City Hall Plaza
Site Improvements

Bid No. 2024-322

Honorable Frank J. Picozzi
Mayor

Bidding Requirements, Bond Forms, Contract Agreement, Conditions of the Contract and Technical Specifications

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Contents:

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INVITATION TO BID

CITY OF WARWICK, RHODE ISLAND

Notice is hereby given that the City of Warwick
Will be accepted bids for the construction of

BID# 2024-322

CITY HALL PLAZA SITE IMPROVEMENTS

The City of Warwick, Rhode Island will accept sealed bids for "CITY HALL PLAZA SITE IMPROVEMENTS" at the City of Warwick Purchasing Department located at Warwick City Hall, Lower Level, 3275 Post Road, Warwick, RI 02886 until no later than **11:00 AM on Thursday, March 21st, 2024**.

Bidding Documents and Contract Specifications will be posted on the City's website at www.warwickri.gov/bids and the RI State Purchasing website at www.purchasing.ri.gov.

A **mandatory Pre-Bid Conference** will be held on **Tuesday, February 20nd, at 10:00 AM** at the Warwick City Hall located at 3275 Post Road, Warwick, Rhode Island. Participants will be asked to sign in and provide an email address as a project contact.

Requests for Information will be due by **Tuesday, March 5th, 2024 by 2:00 PM.** Requests for information or clarification must be made in writing to Dean Pimental, Senior Planner, dean.m.pimentel@warwickri.gov.

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Francis M. Gomez
Purchasing Agent

Frank J. Picozzi
Mayor

City of Warwick
Purchasing Division
3275 Post Road
Warwick, Rhode Island 02886
Tel (401)738-2013
Fax (401) 737-2364

The following notice is to appear on the City of Warwick's website Monday, February 5, 2024. The website address is http://www.warwickri.gov/bids.

CITY OF WARWICK
BIDS REQUESTED FOR

BID# 2024-322

CITY HALL PLAZA SITE IMPROVEMENTS

Specifications are available in the Purchasing Division, Warwick City Hall, Monday through Friday, 8:30 AM until 4:30 PM on or after Monday, February 5, 2024.

Sealed bids will be received by the Purchasing Division, Warwick City Hall Annex, 65 Centerville Road, 1st Floor Suite D, Warwick, Rhode Island 02886 up until 11:00 AM on Thursday, March 21st, 2024. The bids will be opened publicly commencing at 11:00 AM on the same day in the Lower-Level Conference Room at Warwick City Hall.

Awards will be made on the basis of the lowest evaluated or responsive bid price.
Please note that no bids can be accepted via email or fax.

The City of Warwick, in addition to soliciting bids in response to this bid, may consult, consider, and make an award for any and all open bid offers for a comparable unit as sought herein at the following websites:
RI State MPA: https://www.ridop.ri.gov/contract-portal/
NASPO: https://www.naspo.org/
NJPA (National Joint Powers Alliance): https://www.njpacoop.org/cooperative-purchasing
MHEC (Massachusetts Higher Education Consortium): https://www.mhec.net/

Individuals requesting interpreter services for the hearing impaired must notify the Purchasing Division at 401-738-2013 at least 48 hours in advance of the bid opening date.

Original Signature on File
Francis M. Gomez
Purchasing Agent

PLEASE COMPLETE THIS PAGE & SUBMIT WITH YOUR BID

Acknowledgement of Addendum (if applicable)

Addendum Number	Signature of Bidder
_____	_____
_____	_____
_____	_____
_____	_____

COMPANY NAME: _____

COMPANY ADDRESS: _____

COMPANY ADDRESS: _____

BIDDER'S SIGNATURE: _____

BIDDER'S NAME (PRINT): _____

TITLE: _____ TEL. NO.:_____

EMAIL ADDRESS: _____*

*Please include your email address. Future bids will be emailed, unless otherwise noted.

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II. AWARD AND CONTRACT:

The CITY OF WARWICK, acting as duly authorized through its Purchasing Agent/Finance Director/Mayor, accepts the above bid and hereby enters into a contract with the above party to pay the bid price upon completion of the project or receipt of the goods unless another payment schedule is contained in the specifications. All terms of the specifications, both substantive and procedural, are made terms of this contract.

DATE: _____ _____

Bid# 2024-322 Purchasing Agent

PLEASE COMPLETE THIS PAGE & SUBMIT WITH YOUR BID

CERTIFICATION & WARRANT FORM*

This form must be completed and submitted with sealed bid.
Failure to do so will result in automatic rejection.

Any and all bids shall contain a certification and warrant that they comply with all relevant and pertinent statues, laws, ordinances and regulations, in particular, but not limited to Chapter 16-Conflicts of Interest, of the Code of Ordinances of the City of Warwick. Any proven violation of this warranty and representation by a bidder at the time of the bid or during the course of the contract, included, but not limited to negligent acts, either directly or indirectly through agents and/or sub-contractors, shall render the bidder's contract terminated and the bidder shall be required to reimburse the City for any and all costs incurred by the City, including reasonable attorney fees, to prosecute and/or enforce this provision.

_____ _____

Signature Date

_____

Company Name

_____

Address

_____

Address

***This form cannot be altered**

CITY OF WARWICK
NOTICE TO BIDDERS

Bid# 2024-322
CITY HALL PLAZA

If you received this document from our homepage or from a source other than the City of Warwick Purchasing Division, please check with our office prior to submitting your bid to ensure that you have a complete package. The Purchasing Division cannot be responsible to provide addenda if we do not have you on record as a plan holder.

The opening of bids will be in the order established by the posted agenda and the agenda will continue uninterrupted until completion.

Once an item has been reached and any bids on that item has been opened, no other bids on that item will be accepted and any such bid will be deemed late.

The contractor will not discriminate against any employee or applicant for employment because of physical or mental handicap for any position for which the employee or applicant is qualified and that in the event of non-compliance the City may declare the contractor in breach and take any necessary legal recourse including termination or cancellation of the contract.

A bidder filing a bid thereby certifies that no officer, agent, or employee of the City has a pecuniary interest in the bid or has participated in contract negotiations on the part of the City, that the bid is made in good faith without fraud, collusion, or connection of any kind with any other bidder for the same call for bids, and that the bidder is competing solely in his own behalf without connection with, or obligation to, any undisclosed person or firm.

All bids should be submitted with one (1) original and one (1) copy in a sealed envelope, which should read: *YOUR COMPANY NAME* plainly marked on the exterior of the envelope as well as "**Bid# 2024-322 CITY HALL PLAZA SITE IMPROVEMENTS."**

Bids received prior to the time of the opening will be securely kept, unopened. No responsibility will be attached to an officer or person for the premature opening of a bid not properly addressed and identified. No bids will be accepted via facsimile or email.

All proposals submitted become the property of the City and will not be returned. If the company intends to submit **confidential or proprietary information** as part of the proposal, **any limits on the use or distribution of that material should be clearly delineated in writing**. **This information should be submitted in a sealed envelope, clearly labeled confidential** and where it should be submitted in the response. Please be advised of the Freedom of Information Act as it may pertain to your submittal.

Should you have any questions, please contact Dean Pimentel, Senior Planner, 401-921-9684, dean.m.pimentel@warwickri.gov.

All bids should be written in ink or typed. If there is a correction with whiteout, the bidder should initial the change.

Negligence on the part of the bidder in preparing the proposal confers no rights for the withdrawal of the proposal after it is open.

Any deviation from the specifications must be noted in writing and attached as part of the bid proposal. The bidder should indicate the item or part with the deviation and indicate how the bid will deviate from specifications.

The IRS Form W-9 is available on www.warwickri.gov should be completed and submitted with the bid if the bidder falls under IRS requirements to file this form.

The successful bidder must comply with all Rhode Island Laws, applicable to public works projects, and all other applicable local, state and federal laws.

The contractor must carry sufficient liability insurance and agree to indemnify the city against all claims of any nature, which might arise as a result of his operations or conduct of work.

The contractor must keep himself informed of and comply with all laws, ordinances and regulations of the federal, state and municipal governments which may apply and be in force during the life of the contract, in any manner which may affect himself/employees or the conduct of the work or the materials used or employed in the work. Before submitting bids, prospective bidders should examine the terms, covenants and conditions of all codes, permits and laws which may apply. By submitting a bid, the bidder agrees to comply with all pertinent laws/regulations if awarded a contract.

The successful bidder must provide the City of Warwick with an original **Certificate of Insurance** for General Liability and Automobile Liability in a minimum amount of $1 million, naming the **City of Warwick as the additional insured** and so stated on the certificate with the bid name and bid number. It is the vendor's responsibility to provide the City of Warwick with an updated Certificate of Insurance upon expiration of the original certificate.

Failure to provide adequate insurance coverage within the specified duration of time as set forth is a material breach of contract and grounds for termination of the contract.

The successful bidder must furnish a performance and payment bond in the amount of 100 percent of the total bid price.

SERVICE: For a bid to be awarded to a corporation, limited liability company or other legal entity, prior to commencing work under the awarded bid, that corporation, company or legal entity may be required to provide to the Purchasing Agent a **Certificate of Good Standing** from **The Rhode Island Secretary of State** dated no more than thirty (30) days prior to the date upon which the bid approval was made.
Please note that no other State's Certificate of Good Standing will be accepted.

If required, the successful bidder will provide said **Certificate of Insurance, bonds and State of Rhode Island's Certificate of Good Standing** within ten (10) calendar days after notification or the City reserves the right to rescind said award.

Prices to be held firm from date of award through December 31, 2025. Term contracts may be extended for one (1) additional term upon mutual agreement unless otherwise stated.

The City is exempt from the payment of the Rhode Island Sales Tax under the 1956 General Laws of the State of Rhode Island, 44-18-30, Paragraph I, as amended.

The contractor must carry sufficient liability insurance and agree to indemnify the City against all claims of any nature, which might arise as a result of his operations or conduct of work.

The Purchasing Agent reserves the right to reject any and all bids, to waive any minor deviations or informalities in the bids received, and to accept the bid deemed most favorable to the interest of the City.

The City reserves the right to terminate the contract or any part of the contract in the best interests of the City, upon 30-day notice to the contractor. The City will incur no liability for materials or services not yet ordered if it terminates in the best interests of the City. If the City terminates in the interests of the City after an order for materials or services has been placed, the contractor will be entitled to compensation upon submission of invoices and proper proof of claim, in that proportion which its services and products were satisfactorily rendered or provided, as well as expenses necessarily incurred in the performance of work up to time of termination.

No extra charges for delivery, handling or other services will be honored. All claims for damage in transit will be the responsibility of the successful bidder. Deliveries must be made during normal working hours unless otherwise agreed upon.

All costs directly or indirectly related to the preparation of a response to this solicitation, or any presentation or communication to supplement and/or clarify any response to this solicitation which may be required or requested by the City of Warwick will be the sole responsibility of and will be borne by the respondent.

If the respondent is awarded a contract in accordance with this solicitation and fails or refuses to satisfy fully all of the respondents obligations thereunder, the City of Warwick will be entitled to recover from the respondent any losses, damages or costs incurred by the City as a result of such failure or refusal.

The City reserves the right to award in part or full and to increase or decrease quantities in the best interest of the City.

Any quantity reference in the bid specifications are estimates only, and do not represent a commitment on the part of the City of Warwick to any level of billing activity. It is understood and agreed that the agreement will cover the actual quantities ordered during the contract period.

The City reserves the right to rescind award for non-compliance to bid specifications.

The successful bidder must adhere to all City, State and Federal Laws, where applicable.

CITY OF WARWICK

BID AND CONTRACT FORM

Bid# 2024-322
CITY HALL PLAZA

I. BID:

WHEREAS, the CITY OF WARWICK has duly asked for bids for performance of services and/or supply of goods in accordance with the above-indicated specifications.

The person or entity does irrevocably offer to perform the services and/or furnish the goods in accordance with the specifications, which are hereby incorporated by reference in exchange for the bid price.

This offer will remain open and irrevocable until the CITY OF WARWICK has accepted this bid or another bid on the specifications or abandoned the project.

The bidder agrees that acceptance by the CITY OF WARWICK will transform the bid into a contract. This bid and contract will be secured by Bonds, if required by the specifications.

Pricing as Submitted

SECTION 00200

INFORMATION FOR BIDDERS

1.01 RECEIPT AND OPENING OF BIDS

A. The City of Warwick, Rhode Island**,** herein called the Owner, invites sealed bids for “CITY HALL PLAZA SITE IMPROVEMENTS, Bid# 2024-322”, in accordance with the Contract Documents prepared by BETA Group, Inc., Consulting Engineers, 701 George Washington Highway, Lincoln, Rhode Island, 02865.

B. Such Bids, submitted in sealed envelopes plainly marked in the upper left hand corner with the Bidder’s name and address, plainly marked in the lower left hand corner with the date and time of opening;

Addressed to: City of Warwick, Rhode Island
Purchasing Division
3275 Post Road, Warwick, Rhode Island 02886

Endorsed: Bid# 2024-322
CITY HALL PLAZA SITE IMPROVEMENTS

Delivered by: 11:00 AM on Thursday, March 21st, 2024

Said Bids will be publicly opened and read aloud at that time.

C. The Owner may consider informal, any bid not prepared and submitted in accordance with the provisions hereof and may waive any informalities in or reject any and all Bids. Conditional or qualified Bids will not be accepted. Any Bid received after the time and date specified shall not be considered. Should there be reasons why the Contract cannot be awarded within the specified period, the time may be extended by mutual agreement between the Owner and the Bidder.

D. All bids shall comply with the provisions of RIGL §37-2-18 which provides as follows:

§ 37-2-18. Competitive sealed bidding

(a) Contracts exceeding the amount provided by § 37-2-22 shall be awarded by competitive sealed bidding unless it is determined in writing that this method is not practicable or that the best value for the state may be obtained by using an electronic reverse auction as set forth in § 37-2-18.1. Factors to be considered in determining whether competitive sealed bidding is practicable shall include whether:

(1) Specifications can be prepared that permit award on the basis of either the lowest bid price or the lowest evaluated bid price; and

(2) The available sources, the time and place of performance, and other relevant circumstances as are appropriate for the use of competitive sealed bidding.

(b) The invitation for bids shall state whether the award shall be made on the basis of the lowest bid price or the lowest evaluated or responsive bid price. If the latter basis is used, the objective measurable criteria to be utilized shall be set forth in the invitation for bids, if available. All documents submitted in response to the bid proposal are public pursuant to chapter 38-2 upon opening of the bids. The invitation for bids shall state that each bidder must submit a copy of their bid proposal to be available for public inspection upon the opening of the bids. The burden to identify and withhold from the public copy that is released at the bid opening any trade secrets, commercial or financial information, or other information the bidder deems not subject to public disclosure pursuant to chapter 38-2, the Access to Public Records Act, shall rest with the bidder submitting the bid proposal.

(c) Unless the invitations for bid are accessible under the provisions as provided in § 37-2-17.1, public notice of the invitation for bids shall be given a sufficient time prior to the date set forth therein for the opening of bids. Public notice may include publication in a newspaper of general

circulation in the state as determined by the purchasing agent not less than seven (7) days nor more than twenty-eight (28) days before the date set for the opening of the bids. The purchasing agent may make a written determination that the twenty-eight (28) day limitation needs to be waived. The written determination shall state the reason why the twenty-eight (28) day limitation is being waived and shall state the number of days, giving a minimum and maximum, before the date set for the opening of bids when public notice is to be given.

(d) Bids shall be opened and read aloud publicly at the time and place designated in the invitation for bids. Each bid, together with the name of the bidder, shall be recorded and an abstract made available for public inspection.

(e) The chief purchasing officer shall adopt and file regulations governing the bidding of highway and bridge construction projects in the state not later than December 31, 2011.

(f) Immediately subsequent to the opening of the bids, the copies of bid documents submitted pursuant to subsection 37-2-18(b) shall be made available for inspection by the public. Any objection to any bid on the grounds that it is nonresponsive to the invitation for bids must be filed with the purchasing agent within five (5) business days of the opening of the bids. The purchasing agent shall issue a written determination as to whether the subject bid is nonresponsive addressing each assertion in the objection and shall provide a copy of the determination to the objector and all those who submitted bids at least seven (7) business days prior to the award of the contract. If a bid is nonresponsive to the requirements in the invitation to bid, the bid is invalid, and the purchasing agent shall reject the bid. The purchasing agent shall have no discretion to waive any requirements in the invitation to bid which are identified as mandatory. Nothing in this section shall be construed to interfere with or invalidate the results of the due diligence conducted by the division of purchasing to determine whether bids are responsive and responsible.

(g) Subsequent to the awarding of the bid, all documents pertinent to the awarding of the bid that were not made public pursuant to subsection 37-2-18(e) shall be made available and open to public inspection, pursuant to chapter 38-2, the Access to Public Records Act, and retained in the bid file. The copy of the bid proposal provided pursuant to subsection 37-2-18(b) shall be retained until the bid is awarded.

(h) The contract shall be awarded with reasonable promptness by written notice to the responsive and responsible bidder whose bid is either the lowest bid price, lowest evaluated, or responsive bid price.

(i) Correction or withdrawal of bids may be allowed only to the extent permitted by regulations issued by the chief purchasing officer.

(j) As of January 1, 2011, this section shall apply to contracts greater than one million dollars ($1,000,000); on January 1, 2012 for all contracts greater than seven hundred fifty thousand dollars ($750,000); on January 1, 2013 for all contracts greater than five hundred thousand dollars ($500,000); and on January 1, 2014 for all contracts awarded pursuant to this section.

1.02 LOCATION AND WORK TO BE DONE

A. The location, general characteristics, and principal details of the Work are indicated in a set of drawings, entitled “CITY HALL PLAZA SITE IMPROVEMENTS, Bid# 2024-322".

B. Details and Schedules bound in the Appendices, and the Drawings listed above are the Contract Drawings, sometimes referred to herein as the "Drawings".

C. Additional drawings showing details in accordance with which the Work is to be done will be furnished from time to time by the Engineer, if found necessary, and shall then become part of the Drawings.

D. The Contractor shall furnish all labor, services, materials, equipment, plant machinery, apparatus, appliances, tools, supplies and all other things necessary to perform all work required for the completion of each item of the Work and as herein specified.

E. The Work to be done and paid for under any item shall not be limited to the exact extent mentioned or described but shall include all incidental work necessary or customarily done for the completion of that item.

1.03 CONTRACT DOCUMENTS

A. The Contract Documents, INFORMATION FOR BIDDERS, SPECIFICATIONS, and forms for BID, AGREEMENT, and BONDS, may be examined and obtained at the locations designated in the “Notice to Bidders”.

1.04 QUESTIONS REGARDING DRAWINGS AND DOCUMENTS

A. In general, no answer will be given to prospective bidders in reply to an oral question of the intent or meaning of the Drawings or other Contract Documents, or the equality or use of products or methods other than those designated or described on the Drawings or in the Specifications. Any information given to bidders other than by means of the Drawings and other Contract Documents, including Addenda, as described below, is given informally, for information and the convenience of the bidder only and is not guaranteed. The bidder agrees that such information shall not be used as the basis of nor shall the giving of any such information entitle the bidder to assert any claim or demand against the Owner or the Engineer on account thereof.

B. To receive consideration, such questions shall be submitted in writing to Dean Pimentel, Senior Planner, at dean.m.pimentel@warwickri.gov by 2:00pm on Tuesday, March 5th, 2024. If the question involves the equality or use of products or methods, it must be accompanied by drawings, specifications, or other data in sufficient detail to enable the Engineer to determine the equality or suitability of the product or method. In general, the Engineer will neither approve nor disapprove particular products prior to the opening of Bids; such products will be considered when offered by the Contractor for incorporation into the Work.

C. The Engineer will set forth as Addenda, which shall become a part of the Contract Documents, such questions received as above provided as in his sole judgement are appropriate or necessary and his decision regarding each. At least five days prior to the receipt of Bids, he will send a copy of these Addenda to those prospective bidders known to have taken out sets of the Drawings and other Contract Documents.

D. The Contractor agrees to use the products and methods designated or described in the Specifications as amended by the Addenda.

1.05 PRE-BID CONFERENCE

A. A mandatory pre-bid conference advising bidders of bid conditions and guidelines will be held on **Tuesday, February 20nd, at 10:00 AM** at the Warwick City Hall, 3275 Post Road, Warwick, Rhode Island.

1.06 BIDDERS TO INVESTIGATE

A. Bidders are required to submit their Bids upon the following express conditions, which shall apply to and be deemed a part of every Bid received, viz.:

Bidders must satisfy themselves by personal examination of the Work and by such other means as they may wish, as to the actual conditions there existing, the character and requirements of the Work and difficulties attendant upon its execution, and the accuracy of all estimated quantities stated in the Bid.

1.07 INFORMATION NOT GUARANTEED

A. All information given on the Drawings or in the other Contract Drawings relating to subsurface and other conditions, natural phenomena, existing pipes and other structures is from the best sources at present available to the Owner. All such information is furnished only for the information and convenience of bidders and is not guaranteed.

B. It is agreed and understood that the Owner does not warrant or guarantee that the subsurface or other conditions, natural phenomena, existing pipes or other structures encountered during construction will be the same as those indicated on the Drawings or in the other Contract Documents.

C. It is agreed further and understood that no bidder or Contractor shall use or be entitled to use any of the information made available to him or obtained in any examination made by him in any manner as a basis of or ground for any claim or demand against the Owner or the Engineer, arising from or by reason of any variance which may exist between the information made available and the actual subsurface or other conditions, natural phenomena, existing pipes of other structures actually encountered during the construction work, except as may otherwise be expressly provided for in the Contract Documents.

1.08 CONDITIONS OF WORK

A. Each bidder must inform himself fully of the conditions relating to the construction and labor under which the work is now or will be performed; failure to do so will not relieve the successful bidder of his obligation to furnish all materials and all labor necessary to carry out the provisions of the Contract Documents and to complete the contemplated Work for the consideration set forth in his bid. Insofar as possible, the Contractor, in the carrying out of his work, shall employ such methods or means as will not cause any interruption of or interference with: the operation of the existing sewer; traffic; use of existing facilities and

utilities; locations of existing utilities and structures affecting the work or other similar conditions at the site; character of equipment and facilities needed preliminary to and during prosecution of the work; requirements of owners and controlling authorities, having jurisdiction over the various lands, existing structures, facilities, and utilities; and all other conditions affecting the work to be done, and the labor and materials needed; and he shall make his bid in sole reliance thereon; and shall not, at any time after submission of a bid, assert that there was any misunderstanding in regard to the nature or amount of the work to be done.

1.09 BLANK FORM FOR BID

A. Each bid must be submitted on the prescribed form, accompanied by the Bid Security and any other requested information. All blank spaces for bid prices must be filled in, in ink or typewritten, both in words and numerical figures, and be signed by the bidder with his business address and place of residence. Where both written words and numerical figures are given, the written words shall apply in the event of conflict. All bids shall be prepared in conformity with, and based upon and submitted subject to, all requirements of the Specifications and Drawings, together with all addenda thereto.

B. Bidders shall remove and submit the Bid pages (section 00300) only. All pages shall be correctly assembled and submitted in accordance with Section 00100. All erasures or other changes in the Bid must be properly initialed by an authorized representative of the Bidder.

1.10 WITHDRAWAL OF BIDS

A. Except as hereinafter in this subsection otherwise expressly provided, once his Bid is submitted and received by the Owner for consideration and comparison with other bids similarly submitted, the bidder agrees that he may not and will not withdraw it within Ninety (90) consecutive calendar days after the actual date of the opening of Bids.

B. Upon proper written request and identification, Bids may be withdrawn only as follows:

1. At any time prior to the designated time for the opening of Bids.
2. Provided the Bid has not theretofore been accepted by the Owner, at any time subsequent to the expiration of the period during which the bidder has agreed not to withdraw his Bid.

C. Unless a Bid is withdrawn as provided above, the bidder agrees that it shall be deemed open for acceptance until the AGREEMENT has been executed by both parties thereto or until the Owner notifies a bidder in writing that his Bid is rejected or that the Owner does not intend to accept it, or returns his Bid deposit. Notice of acceptance of a Bid shall not constitute rejection of any other Bid.

1.11 INTERESTED PARTIES TO CONTRACT

A. The undersigned declares; that the only person interested this Bid as principals are named herein as such; that no official of the Owner and no person acting for or employed by the Owner is interested directly or indirectly in this Bid, or in any contract which may be made under it, or in any expected profits to arise therefrom; that this Bid is made in good faith, without fraud, collusion or connection with any other person bidding or refraining from

bidding for the same work; that he has examined carefully the said instructions and all other documents bound herewith and the Contract Drawings relating to the Contract covered by this Bid and hereby makes them part of this Bid; that he has informed himself fully in regard to all conditions pertaining to the work and place where it is to be done; and that he has made his own examination and carefully checked his estimates for cost and from them makes this Bid.

1.12 DETERMINATION OF LOWEST RESPONSIBLE BIDDER

A. In determining the lowest responsible bidder, the awarding authority, consistent with section 6-12 of the Charter, shall consider:

1. The ability, capacity and skill of the bidder to perform the contract or provide the service required.
2. Whether the bidder can perform the contract or provide the service promptly, or within the time specified, without delay or interference.
3. The character, integrity, reputation, judgment, experience and efficiency of the bidder.
4. The quality of performance of previous contracts or services.
5. The previous and existing compliance by the bidder with laws and ordinances relating to the contract or service.
6. The sufficiency of the financial resources and ability of the bidder to perform the contract or provide the service.
7. The quality, availability and adaptability of the supplies or contractual services to the particular use required.
8. The ability of the bidder to provide future maintenance and service for the use of the subject of the contracts.
9. A vendor whose principle place of business is located within the City of Warwick, and submits a responsive bid within seven percent of the lowest bid, shall be considered for the award of a contract. The total cost of a purchase shall be considered when evaluating the lowest qualified bidder. Total cost includes: handling/shipping fees and transportation surcharges connected to the initial purchase and any follow-on maintenance or training needs.
    a. The principal place of business of a vendor in the City of Warwick is determined to be an objective measurable criteria and shall be so stated in the invitation to bid.

1.13 BIDS

A. The Owner reserves the right to waive any informalities in, or to reject any or all Bids which in its sole judgement are either incomplete, conditional, obscure, or not responsive or which contain additions not called for, erasures not properly initialed, alternative, or similar irregularities, or the Owner may waive such omissions, conditions, or irregularities as he may feel appropriate.

B. Conditional bids will not be accepted. Bidder(s) will be disqualified if more than one proposal is received from an individual, firm, partnership, corporation or association, under the same or different names and such proposals will not be considered.

C. The Owner reserves the right to reject any or all Bids, should the Owner deem it to be in the public interest to do so.

1.14 COMPARISON OF BIDS

A. Bids will be compared on the basis of the experience and competence of the bidders and on the basis of the totals of the quantities listed in the proposal under the enumerated items at the unit prices or lump sums bid for these items. The Contract will be awarded to the lowest responsive, responsible and eligible bidder as determined by the Owner and/or its authorized representatives or agents. However, the Owner may reject any and all bids if it is in the public interest to do so.

B. The term, "Lowest responsive, responsible and eligible bidder," shall mean the bidder whose bid is the lowest of those bidders possessing the skill, ability and integrity necessary for the faithful performance of the Work; who shall certify that he is able to furnish labor that can work in harmony with all other elements of labor employed or to be employed in the work.

C. Bids should be made on each separate item of work shown in the bid (proposal) with reasonable relation to the probable cost of doing the work included in such items. The Owner reserves the right to reject, wholly, any bid on which an item or items thereof are obviously unbalanced or appear to the Owner to be so unbalanced as to affect or to be liable to affect adversely any interests of the Owner. The attention of the bidder is called to the fact that unbalancing of bids may adversely affect the Contractor if certain portions for the Work are increased or decreased as provided in the Contract Documents.

D. A bidder shall state the proposed price for the work by which the bids will be compared. This price is to cover all the expenses incidental to the completion of the work in full conformity with the Contract, Specifications, and Drawings. In the event that there is a discrepancy between the unit prices and the extended totals, the unit prices shall govern. In the event that there is a discrepancy between the lump-sum or unit prices written in words and numerical figures, the prices written in words shall govern. No bid will be accepted which does not contain a unit price or lump sum as indicated for each of the applicable items enumerated in the proposal form.

1.15 ITEMS AND INDETERMINATE ITEMS

A. The Work to be done under this Contract has been divided into parts or items to enable each bidder to bid on different portions of the work in accordance with his estimate of their cost and so that the actual quantity of work executed under each item may be paid for at the price bid for that particular item, even though such quantity is greater or less than the estimated quantity stated in the BID.

B. The quantities listed in the bid are approximate. The Owner does not expressly or by implication represent that the actual amounts of work will even approximately correspond there with, but does call particular attention to the uncertainty in the quantities of the work involved which can not be predicted in advance. The work under certain items may be materially greater or less than those given in the Bid as may be necessary in the judgment of the Owner complete the work contemplated in the Contract. Attention is particularly called to the fact that the quantity of work to be done under some bid items may be largely dependent on subsurface ground conditions encountered and, therefore, the quantities of work to be done

under the various items may vary substantially from the estimated quantities or may even be omitted.

C. Certain items in the BID cover classes of work of doubtful necessity or work for which it is impractical to estimate approximate quantities. Such items have been marked "Indeterminate". Prices for certain of such items have been stipulated in advance by the Owner as stated in the BID.

D. Only such quantities of the respective items of work actually performed and accepted will be paid for. An increase or decrease in quantity for any item shall not be regarded as grounds for an increase or decrease in the bid prices.

1.16 REDUCTION IN SCOPE OF WORK

A. The Owner reserves the right to decrease the scope of the work to be done under this Contract and to omit any work in order to bring the cost within available funds. To this end, the Owner reserves the right to reduce the quantity of any items or omit all of any as set forth in the BID, either prior to executing the Contract or at any time during the progress of the Work. The Owner further reserves the right, at any time during the progress of the Work, to restore all or part of any items previously omitted or reduced. Exercise by the Owner of the above rights shall not constitute any ground or basis of claim for damages or for anticipated profits on the work omitted.

1.17 CONTRACT BONDS

A. The Bidder whose Bid is accepted agrees to furnish the Contract Bonds in the forms which follow in Section 00600, titled CONTRACT BONDS, each in the sum of the full amount of the Bid and/or Contract Price as determined by the Engineer, and duly executed and acknowledged by the said bidder as Principal and by a surety company qualified to do business under the laws of **Rhode Island** and satisfactory to the Owner, as Surety, for the faithful performance of the contract and payment for labor and materials. The premiums for such Bonds shall be paid by the Contractor.

B. Surety Companies executing the Contract Bonds must also appear on the U.S. Treasury Department's most current list of "Companies Holding Certificates of Authority as Acceptable Sureties on Federal Bonds and as Acceptable Reinsuring Companies" as published in Circular 570 (Amended) by the Audit Staff Bureau of Accounts.

C. As part of the RIDOT Physical Alteration Permit Application (PAPA), the Contractor is required to list RIDOT as an additional oblige on the performance bond related to this project. A copy of all documents including RIDOT as the additional oblige shall be submitted to RIDOT before the PAP can be issued.

1.18 POWER OF ATTORNEY

A. Attorneys-in-fact who sign Contract Bonds must file with each Bond a certified and effectively dated copy of their power of attorney.

1.19 EXECUTION OF AGREEMENT

A. The Bidder whose Bid is accepted will be required and agrees to duly execute the AGREEMENT and furnish the required CONTRACT BONDS within the time limit stated in the BID after notification that the AGREEMENT is ready for signature.

B. The Bidder whose Bid is accepted upon his failure or refusal to duly execute the AGREEMENT and furnish the required CONTRACT BONDS within the time limit stated in the BID, shall forfeit to the Owner as liquidated damages for such failure or refusal, the surety deposited with his BID.

1.20 INSURANCE CERTIFICATES

A. The Contractor will not be permitted to start any construction work until he has submitted certificates covering all insurances called for under that subsection of the AGREEMENT, titled "Insurance." The Contractor shall submit said certificates using the forms supplied by the Engineer under said subsection.

B. In addition, as part of the RIDOT Physical Alteration Permit Application (PAPA), the Contractor is required to list RIDOT as an additional insured on the insurance policy related to this project. A copy of all documents including RIDOT as the additional insured shall be submitted to RIDOT before the PAP can be issued.

1.21 TIME FOR COMPLETION AND LIQUIDATED DAMAGES

A. The bidder must agree to commence work on or before the date specified in the written "NOTICE TO PROCEED" issued by the Owner, and/or Engineer acting on behalf of the Owner, and to fully complete the project within the time specified in Table A of the Agreement, after the date specified in the written "NOTICE TO PROCEED" as stipulated in Table A of the AGREEMENT. The bidder must further agree to pay as liquidated damages to the Owner, the sum as specified in Table A of the Agreement for each consecutive calendar day thereafter as hereafter provided in the AGREEMENT.

B. No work shall be completed during the winter shutdown period from November 15th through the following April 15th, unless directed or approved by the Engineer.

C. The Time of Completion for this project shall be **450 calendar days** (includes winter shut down from November 15th to April 15th) from a Contractor’s receipt of a Notice to Proceed. Completion Date of project should be no later than July 1, 2025.

1.22 LAWS AND REGULATIONS

A. The bidder's attention is directed to the fact that all applicable Federal and State laws, municipal ordinances, and rules and regulations or authorities having jurisdiction over construction of the project, shall apply to the Contract throughout, and shall be deemed to be included in the Contract the same as though herein written out in full.

1.23 WORK ON STATE, MUNICIPAL, AND PRIVATE PROPERTY

A. Particular attention is hereby directed to the fact that portions of the Work included under this Contract will be done within the limits of properties that are State-owned, municipal-owned, or privately owned. The Contractor shall be responsible for coordinating the prosecution of the Work of this Contract with the property owner and for providing work in accordance with any additional requirements as specified herein.

1.24 DATUM OR LEVELS

A. The figures given in the Contract and Specification or upon the Drawings after the word elevation shall mean the distance in feet referenced to the National American Vertical Datum of 1988 (NAVD88).

B. The horizontal datum used in the Contract and Specifications or upon the Drawings references Rhode Island State Plan, North American Horizontal Datum of 1983 (NAD83.)

C. Existing conditions survey of property lines and grades performed by Garofalo & Associates, Inc. in March 2023.

1.25 STATE SALES AND USE TAX

A. Materials and equipment purchased for installation under this Contract are exempt from the **Rhode Island** Sales Tax. The Contractor shall file for exemption on behalf of the Owner with the State of **Rhode Island** Department of Taxation as required by law. The exemption from the Sales Tax shall be taken into account by the Contractor during bidding.

1.26 MANUFACTURER'S EXPERIENCE

A. Wherever it may be written that an equipment manufacturer must have a specified period of experience with his product, equipment which does not meet the specified experience period may be considered by the Owner and/or Engineer if the equipment supplier or manufacturer is willing to provide a sufficient bond or cash deposit as determined by the Owner and/or Engineer for the duration of the specified time period which will guarantee full replacement of that equipment in the event of failure at no additional cost to the Owner.

1.27 PROTECTION OF LIVES AND HEALTH

A. The project is subject to all of the Safety and Health Regulations as promulgated by the United States Department of Labor (Title 29, Part 1926/1910 CFR, 1985 revisions); the Contract Work Hours and Safety Standards Act (40 U.S.C. 327 et seq.) as supplemented by the Department of Labor Regulations (Title 29 CFR Part 5); and OSHA 2207, 1983 revisions; and all subsequent amendments thereto. Contractors are urged to make themselves familiar with the requirements of these regulations.

1.28 NONDISCRIMINATION IN EMPLOYMENT

A. Contracts for work under this bid (proposal) will obligate the Contractors and subcontractors not to discriminate in employment practices.

B. The Contractor will not discriminate against any employee or applicant for employment because of race, color, religion, sex, age, handicap, or national origin. The Contractor shall take affirmative action to ensure that applicants are employed and the employees are treated during employment without regard to their race, color, religion, sex, age, handicap, or national origin. Such actions shall include, but not be limited to, the following: employment, upgrading; demotions, or transfers; recruitment or recruitment advertising, layoffs, or terminations; rates of pay or other forms of compensation; selection for training including apprenticeship; and participation in recreational and education activities. The Contractor agrees to post in conspicuous places available to employees and applicants for employment notice to be provided setting forth the provisions of this non-discrimination clause. The Contractor will in all solicitations or advertisements for employees placed by or on behalf on the Contractor state that all qualified applicants will receive consideration for employment without regard to race, color, religion, sex, age, handicap or national origin. The Contractor will cause the foregoing provisions to be inserted in all sub-contracts for any work covered by this Contract so that such provisions will be binding upon each sub-contractor and upon sub-contracts for standard commercial supplies or raw materials.

C. The Contractor shall keep such records and submit such reports concerning the racial and ethnic origin of applicants for employment and employees as the Owner may require as consistent with Federal and State law. The Contractor agrees to comply with such rules, regulations, or guidelines as the State of **Rhode Island** may implement these requirements. The Contractor further warrants, that he will comply with the President's Executive Order No. 11246 or any preceding similar Executive Order relating thereto.

D. Bidders and Contractors must, if required, submit a compliance report (EPA Form 5720-4) concerning their employment practices and policies in order to maintain their eligibility to receive award of the Contract.

E. Successful bidders and Contractors must, if required, submit a list of all Subcontractors who will perform work on the project, and written signed statements from authorized agents of labor pools with which they will or may deal with for employees on the work, together with any information to the effect that such labor pools' practices or policies are in conformity with said Executive Order that they will affirmatively cooperate in or offer no hindrance to the recruitment, employment, and equal treatment of employees seeking employment and performing work under this Contract; or a certification as to when such agents or labor pools have failed or refused to furnish them, prior to award of the Contract.

F. The successful bidder will be required to comply with Equal Opportunity Requirements for Public Work Projects for all employees on the job. It is the responsibility of Bidders to inform themselves as to the local labor conditions, overtime compensation, health and welfare contributions, labor supply and prospective changes or adjustment of wage rates. Information is available at the Department of Labor.

G. The successful bidder must be prepared to comply with the provisions of the General Laws of Rhode Island and attention is called to Title 37, Chapter 13, Section 1-16, relative to the payment of wages, obligations and charges by Contractors on public works projects. Non-

resident Contractors are subject to Section 44-1-6 of the RI General Laws, as amended, regarding OUT-OF-STATE CONTRACTORS.

1.29 SECTION 3 CLAUSE

A. **Compliance:** Compliance with the provisions of Section 3, the regulations set forth in 24 CFR 75, and all applicable rules and orders of the Department issued thereunder prior to the execution of the Agreement, shall be a condition of the Federal financial assistance provided to the project, binding upon the applicant or recipient for such assistance, its successors, and assigns. Failure to fulfill these requirements shall subject the applicant or recipient, its contractors and subcontractors, its successors, and assigns to those sanctions specified by the grant or loan agreement or Agreement through which Federal assistance is provided, and to such sanctions as are specified by 24 CFR 75. The SUBRECIPIENT certifies and agrees that no contractual or other disability exists which would prevent compliance with these requirements.

The SUBRECIPIENT further agrees to comply with these "Section 3" requirements and to include the following language in all subcontracts executed under this Agreement:

"The work to be performed under this Agreement is on a project assisted under a program providing direct Federal financial assistance from the U.S. Department of Housing and Urban Development (HUD) and is subject to the requirements of Section 3 of the Housing and Urban Development Act of 1968, as amended, 12 U.S.C. 1701. Section 3 requires that to the greatest extent feasible opportunities for training and employment be given lower income residents of the project area [City of Warwick] and Agreements for work in connection with the project be awarded to business concerns that provide economic opportunities for low and very low income persons residing in the metropolitan area [City of Warwick] in which the project is located."

The SUBRECIPIENT further agrees to ensure that opportunities for training and employment arising in connection with a housing rehabilitation (including reduction and abatement of lead based paint hazards), housing construction, or other public construction project are given to low and very low income persons residing within the metropolitan area [City of Warwick] in which the project is located, and to low and very low income participants in other U.S. Department of Housing & Urban Development (HUD) programs; and award Agreements for work undertaken in connection with a housing rehabilitation (including reduction and abatement of lead-based paint hazards), housing construction, or other public construction project are given to business concerns that provide economic opportunities for low and very low income persons residing within the metropolitan area [City of Warwick] in which the Community Development Block Grant (CDBG) funded project is located; where feasible, priority should be given to business concerns which provide economic opportunities to low and very low income residents within the service area or the neighborhood in which the project is located, and to low and very low income participants in other U.S. Department of Housing & Urban Development (HUD) programs.

B. **Notifications:** The SUBRECIPIENT agrees to send to each labor organization or representative of workers with which it has a collective bargaining agreement or other Agreement or understanding, if any, a notice advising said labor organization or worker's representative of its commitments under this Section 3 clause and shall post copies of the

notice in conspicuous places available to employees and applicants for employment or training.

C. **Subagreements:** The SUBRECIPIENT will include this Section 3 clause in every subcontract and will take appropriate action pursuant to the subcontract upon a finding that the subcontractor is in violation of regulations issued by the CITY. The SUBRECIPIENT will not subcontract with any entity where it has notice or knowledge that the latter has been found in violation of regulations under 24 CFR 75 and will not let any subcontract unless the entity has first provided it with a preliminary statement of ability to comply with the requirements of these regulations.

1.30 SEQUENCE OF OPERATIONS

A. The Contractor must submit to the Engineer within fourteen (14) calendar days after execution of the Contractor Documents, a sequence of operations, giving detailed plans and schedules of his operation including any elements for by-pass pumping and/or flow diversion during the Work. Said sequence of operations shall be reviewed and must be approved by the Owner and Engineer prior to the start of the Work. The Owner reserves the right to limit or, if found necessary and/or required, delay construction, or certain activities thereof, in certain areas of the Contract should the Owner deem it to be in the public's best interest to do so.

B. The Contractor shall have no claim for additional compensation or damage on account of any such delays and/or required sequence of operations.

C. The Contractor shall maintain uninterrupted utility services at all times, and plan his work accordingly.

D. The Contractor shall coordinate his activities with any other contract and/or contractor to complete the Work as detailed on the Plans and Specifications.

1.31 BORINGS - SUBSURFACE DATA

A. Subsurface soil and rock information and investigations have been obtained, for use by the Owner, for the Project. The subsurface soil and rock data shown, including the results of borings indicated in the Boring Logs included in the Appendices, are for general information of bidders and the Contractor. The attention of Bidders and Contractors is directed to the fact that, by reason of methods commonly used for obtaining and expressing such boring data, this information and data may be limited and subject to error or misunderstanding. The terms used to describe soils, rock, groundwater, and such other conditions, are subject to local usage, and to the interpretation of the person obtaining and making the records. The borings have been made with reasonable care, substantially at the locations indicated and to the depths shown. Groundwater levels shown in the Specifications under Boring Logs are those reported by the driller to the existing grade at the particular boring location at the time subsurface investigations were made, and do not necessarily represent permanent groundwater levels which may affect his work. Each Bidder is expected to examine the site and the compiled record of investigations and information and then, based upon his own inspections and interpretations, and such other investigations as he may desire, decide for himself the character of material to be encountered and excavated, the suitability of the materials to be used for backfilling and such other purposes, groundwater conditions,

difficulties, or obstacles likely to be encountered, and other conditions, affecting the Work. No warranty, either expressed or implied by the Owner, the Engineer, or their agents, is made to the accuracy of the subsurface information and the data shown on the Drawings; nor for any consequences, delays, expense or losses which may occur or have occurred in the event that such indications shall be found to be incomplete, incorrect or misleading; nor shall such variations or inaccuracies in the indications of subsurface information and data constitute grounds for revisions in Contract price or the time for completion.

1.32 BUILD AMERICA, BUY AMERICA (BABA)

A. Build America, Buy America Act (the Act), enacted as part of the Infrastructure Investment and Jobs Act on November 15, 2021, established a domestic content procurement preference for all Federal financial assistance obligated for infrastructure projects after May 14, 2022. The domestic content procurement preference requires that all iron, steel, manufactured products, and construction materials used in covered infrastructure projects are produced in the United States.

END OF SECTION

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SECTION 00300

BID

To the City of Warwick, Rhode Island, herein called the "Owner", for
City Hall Plaza Site Improvements, Bid No. 2024-322

The Undersigned, as a bidder herein referred to as singular and masculine, declares as follows:

_____
(Name of Bidder)

(1) The only parties interested in this BID as Principals are named herein;

(2) this BID is made without collusion with any other person, firm, or corporation;

(3) no officer, agent, or employee of the Owner is directly or indirectly interested in this BID;

(4) he has carefully examined the site of the proposed Work and fully informed and satisfied himself as to the conditions there existing, the character and requirements of the proposed Work, the difficulties attendant upon its execution and the accuracy of all estimated quantities stated in this BID, and he has carefully read and examined the Drawings, the annexed proposed AGREEMENT and the Specifications and other Contract Documents therein referred to and knows and understands the terms and provisions thereof;

(5) he understands that information relative to subsurface and other conditions, natural phenomena, existing pipes and other structures (surface and/or subsurface) has been furnished only for his information and convenience without any warranty or guarantee, expressed or implied, that the subsurface and/or other conditions, natural phenomena, existing pipes and other structures (surface and/or subsurface) actually encountered will be the same as those shown on the Drawings or in any of the other Contract Documents and he agrees that he shall not use or be entitled to use any such information made available to him through the Contract Documents or otherwise or obtained by him in his own examination of the site, as a basis of or ground for any claim against the Owner or the Engineer arising from or by reason of any variance which may exist between the aforesaid information made available to or acquired by him and the subsurface and/or other conditions, natural phenomena, existing pipes and other structures (surface and/or subsurface) actually encountered during the construction work, and he has made due allowance therefore in this BID;

(6) and he understands that the quantities of work tabulated in this BID or indicated on the Drawings or in the Specifications or other Contract Documents are only approximate and are subject to increase or decrease as deemed necessary by the Engineer; and he agrees that, if this BID is accepted he will contract with the Owner, as provided in the copy of the Contract Documents deposited in the office of the Engineer, this BID form being part of said Contract Documents, and that he will perform all the work and furnish all the materials and equipment, and provide all labor, services, plant, machinery, apparatus, appliances, tools, supplies and all other things required by the Contract Documents in the manner and within the time therein prescribed and according to the requirements of the Engineer as therein set forth, and that he will take in full compensation therefore the total dollar amount tabulated from the actual measured quantities of said work and each unit or lump sum price stated in this BID as hereinafter set forth.

(Note: All entries in the entire BID must be made clearly and in ink; price bid must be written in both words and figures.)

Item No.	Qty./Unit	Item with Unit Price Written in Words (and Figures)		Total in Figures
1	10 EACH	CUTTING, REMOVING, AND DISPOSING ISOLATED TREES AND STUMPS per each,		
		_____	dollars	
		and _____cents	($_____)	($_____)
2	270 SY	REMOVE AND DISPOSE SIDEWALKS AND DRIVEWAYS per square yard,		
		_____	dollars	
		and _____cents	($_____)	($_____)
3	900 LF	REMOVE AND DISPOSE PIPE - ALL SIZES per linear foot,		
		_____	dollars	
		and _____cents	($_____)	($_____)
4	2,800 SY	REMOVAL AND DISPOSAL OF PAVEMENT per square yard,		
		_____	dollars	
		and _____cents	($_____)	($_____)
5	1,300 LF	REMOVAL AND DISPOSAL OF CURBING per linear foot,		
		_____	dollars	
		and _____cents	($_____)	($_____)

Item No.	Qty./Unit	Item with Unit Price Written in Words (and Figures)		Total in Figures
6	3 EACH	REMOVAL AND DISPOSAL OF DRAINAGE AND UTILITY STRUCTURES per each,		
		_____	dollars	
		and _____cents	($_____)	($_____)
7	200 LF	REMOVAL AND DISPOSAL OF FENCES AND RAILINGS per linear foot,		
		_____	dollars	
		and _____cents	($_____)	($_____)
8	11 EACH	REMOVE AND DISPOSE DIRECTIONAL, WARNING, REGULATORY, SERVICE, AND STREET SIGNS per each,		
		_____	dollars	
		and _____cents	($_____)	($_____)
9	1 LS	SITE PREPARATION per lump sum,		
		_____	dollars	
		and _____cents	($_____)	($_____)
10	1000* CY	MANAGEMENT OF EXCESS SOILS per cubic yard,		
		_____	dollars	
		and _____cents	($_____)	($_____)

Item No.	Qty./Unit	Item with Unit Price Written in Words (and Figures)		Total in Figures
11	1 LS	GROUND IMPROVEMENTS per lump sum,		
		_____	dollars	
		and _____cents	($_____)	($_____)
12	160 LF	ABANDON IN PLACE EXISTING UTILITY PIPES per linear foot,		
		_____	dollars	
		and _____cents	($_____)	($_____)
13	4 EACH	ABANDON IN PLACE EXISTING UTILITY STRUCTURES per each,		
		_____	dollars	
		and _____cents	($_____)	($_____)
14	10* CY	ROCK EXCAVATION MECHANICAL per cubic yard,		
		_____	dollars	
		and _____cents	($_____)	($_____)
15	500* CY	UNCLASSIFIED EXCAVATION per cubic yard,		
		_____	dollars	
		and _____cents	($_____)	($_____)
16	500* CY	COMMON BORROW per cubic yard,		
		_____	dollars	
		and _____cents	($_____)	($_____)

Item No.	Qty./Unit	Item with Unit Price Written in Words (and Figures)		Total in Figures
17	250* CY	GRAVEL BORROW per cubic yard,		
		_____	dollars	
		and _____cents	($_____)	($_____)
18	110 SY	CRUSHED STONE per square yard,		
		_____	dollars	
		and _____cents	($_____)	($_____)
19	640 TON	CLASS 12.5 HMA per ton,		
		_____	dollars	
		and _____cents	($_____)	($_____)
20	390 TON	CLASS 9.5 HMA per ton,		
		_____	dollars	
		and _____cents	($_____)	($_____)
21	290 TON	TEMPORARY TRENCH PAVEMENT per ton,		
		_____	dollars	
		and _____cents	($_____)	($_____)
22	40 TON	PERMANENT TRENCH PAVEMENT per ton,		
		_____	dollars	
		and _____cents	($_____)	($_____)

Item No.	Qty./Unit	Item with Unit Price Written in Words (and Figures)		Total in Figures
23	4,500 SY	FULL DEPTH RECLAMATION WITH CALCIUM CHLORIDE per square yard,		
		_____ dollars		
		and _____cents	($_____)	($_____)
24	190 LF	REINFORCED CONCRETE PIPE - 12 INCH per linear foot,		
		_____ dollars		
		and _____cents	($_____)	($_____)
25	150 LF	REINFORCED CONCRETE PIPE - 15 INCH per linear foot,		
		_____ dollars		
		and _____cents	($_____)	($_____)
26	480 LF	REINFORCED CONCRETE PIPE - 18 INCH per linear foot,		
		_____ dollars		
		and _____cents	($_____)	($_____)
27	110 LF	SMOOTH INTERIOR CORRUGATED POLYETHYLENE PIPE - 6 INCH per linear foot,		
		_____ dollars		
		and _____cents	($_____)	($_____)

Item No.	Qty./Unit	Item with Unit Price Written in Words (and Figures)		Total in Figures
28	50 LF	SMOOTH INTERIOR CORRUGATED POLYETHYLENE PIPE - 8 INCH per linear foot,		
		_____	dollars	
		and _____cents	($_____)	($_____)
29	280 LF	SMOOTH INTERIOR CORRUGATED POLYETHYLENE PIPE - 10 INCH per linear foot,		
		_____	dollars	
		and _____cents	($_____)	($_____)
30	20 LF	SMOOTH INTERIOR CORRUGATED POLYETHYLENE PIPE - 12 INCH per linear foot,		
		_____	dollars	
		and _____cents	($_____)	($_____)
31	105 LF	SMOOTH INTERIOR CORRUGATED POLYETHYLENE PIPE - 18 INCH per linear foot,		
		_____	dollars	
		and _____cents	($_____)	($_____)
32	5 LF	SMOOTH INTERIOR CORRUGATED POLYETHYLENE PIPE - 30 INCH per linear foot,		
		_____	dollars	
		and _____cents	($_____)	($_____)

Item No.	Qty./Unit	Item with Unit Price Written in Words (and Figures)		Total in Figures
33	170 LF	DUCTILE IRON DRAIN PIPE - 12 INCH per linear foot,		
		_____	dollars	
		and _____cents	($_____)	($_____)
34	1 LS	WATER SERVICE CONNECTION AND HOT BOX ASSEMBLY per lump sum,		
		_____	dollars	
		and _____cents	($_____)	($_____)
35	1 LS	GAS SERVICE CONNECTION per lump sum,		
		_____	dollars	
		and _____cents	($_____)	($_____)
36	350 LF	SDR-35 PVC IRRIGATION SLEEVE - 3 INCH per linear foot,		
		_____	dollars	
		and _____cents	($_____)	($_____)
37	300 LF	SDR-35 PVC SEWER - 4 INCH per linear foot,		
		_____	dollars	
		and _____cents	($_____)	($_____)

Item No.	Qty./Unit	Item with Unit Price Written in Words (and Figures)		Total in Figures
38	210 LF	SDR-35 PVC SEWER - 6 INCH per linear foot,		
		_____	dollars	
		and _____cents	($_____)	($_____)
39	1 EACH	SANITARY SEWER MANHOLE per each,		
		_____	dollars	
		and _____cents	($_____)	($_____)
40	1 EACH	PRECAST CONCRETE DROP INLET STANDARD 4.5.1 per each,		
		_____	dollars	
		and _____cents	($_____)	($_____)
41	9 EACH	PRECAST CATCH BASIN 4' DIAMETER STANDARD 4.4.0 per each,		
		_____	dollars	
		and _____cents	($_____)	($_____)
42	5 EACH	PRECAST MANHOLE 4' DIAMETER STANDARD 4.2.0 per each,		
		_____	dollars	
		and _____cents	($_____)	($_____)

Item No.	Qty./Unit	Item with Unit Price Written in Words (and Figures)		Total in Figures
43	1 EACH	PRECAST MANHOLE 5' DIAMETER STANDARD 4.2.1 per each,		
		_____	dollars	
		and _____cents	($_____)	($_____)
44	1 EACH	PRECAST DIVERSION MANHOLE 4' DIAMETER per each,		
		_____	dollars	
		and _____cents	($_____)	($_____)
45	3 EACH	PRECAST DIVERSION MANHOLE 5' DIAMETER per each,		
		_____	dollars	
		and _____cents	($_____)	($_____)
46	2 EACH	NDS - CATCH BASIN (OR EQUAL) per each,		
		_____	dollars	
		and _____cents	($_____)	($_____)
47	7 EACH	NDS - DRAIN MANHOLE (OR EQUAL) per each,		
		_____	dollars	
		and _____cents	($_____)	($_____)

Item No.	Qty./Unit	Item with Unit Price Written in Words (and Figures)		Total in Figures
48	1 LS	BMP 1 - INFILTRATION CHAMBER SYSTEM per lump sum,		
		_____	dollars	
		and _____cents	($_____)	($_____)
49	1 LS	BMP 2 - INFILTRATION CHAMBER SYSTEM per lump sum,		
		_____	dollars	
		and _____cents	($_____)	($_____)
50	11 EACH	DRAIN CLEANOUT per each,		
		_____	dollars	
		and _____cents	($_____)	($_____)
51	2 EACH	SEWER CLEANOUT per each,		
		_____	dollars	
		and _____cents	($_____)	($_____)
52	1 EACH	1,000 GALLON GREASE TRAP per each,		
		_____	dollars	
		and _____cents	($_____)	($_____)

Item No.	Qty./Unit	Item with Unit Price Written in Words (and Figures)		Total in Figures
53	2 EACH	PRE AND POST CONSTRUCTION CONDITION SURVEYS per each,		
		_____	dollars	
		and _____cents	($_____)	($_____)
54	1,500 LF	FENCE - TEMPORARY ALL TYPES AND SIZES per linear foot,		
		_____	dollars	
		and _____cents	($_____)	($_____)
55	150 LF	6' HIGH BLACK VINYL CHAIN LINK FENCE AND DOUBLE GATE per linear foot,		
		_____	dollars	
		and _____cents	($_____)	($_____)
56	2 EACH	COLLAPSIBLE BOLLARD per each,		
		_____	dollars	
		and _____cents	($_____)	($_____)
57	170 LF	SCREEN FENCE per linear foot,		
		_____	dollars	
		and _____cents	($_____)	($_____)

Item No.	Qty./Unit	Item with Unit Price Written in Words (and Figures)		Total in Figures
58	2,400 SY	PORTLAND CEMENT CONCRETE SIDEWALKS AND DRIVEWAYS per square yard,		
		_____	dollars	
		and _____cents	($_____)	($_____)
59	75 SY	CONCRETE WHEELCHAIR RAMP per square yard,		
		_____	dollars	
		and _____cents	($_____)	($_____)
60	1,750 SF	PERMEABLE PAVER per square foot,		
		_____	dollars	
		and _____cents	($_____)	($_____)
61	60 SF	UNIT PAVERS per square foot,		
		_____	dollars	
		and _____cents	($_____)	($_____)
62	1,470 LF	GRANITE CURB per linear foot,		
		_____	dollars	
		and _____cents	($_____)	($_____)
63	420 LF	PRECAST CONCRETE CURB per linear foot,		
		_____	dollars	
		and _____cents	($_____)	($_____)

Item No.	Qty./Unit	Item with Unit Price Written in Words (and Figures)		Total in Figures
64	50 LF	REMOVE, HANDLE, HAUL TRIM RESET CURB EDGING, STRAIGHT, CIRCULAR ALL TYPES per linear foot,		
		_____ dollars		
		and _____cents	($_____)	($_____)
65	1 LS	LARGE BRICK VENEER ENTRY WALL per lump sum,		
		_____ dollars		
		and _____cents	($_____)	($_____)
66	1 LS	SMALL BRICK VENEER ENTRY WALL per lump sum,		
		_____ dollars		
		and _____cents	($_____)	($_____)
67	1 LS	10' HIGH LOUVERED SCREEN WALL AND GATE per lump sum,		
		_____ dollars		
		and _____cents	($_____)	($_____)
68	2 EACH	TEST PITS per each,		
		_____ dollars		
		and _____cents	($_____)	($_____)

Item No.	Qty./Unit	Item with Unit Price Written in Words (and Figures)		Total in Figures
69	15 PMO	FIELD OFFICE per month,		
		_____	dollars	
		and _____cents	($_____)	($_____)
70	1** LS	MOBILIZATION per lump sum,		
		_____	dollars	
		and _____cents	($_____)	($_____)
71	1 LS	MAINTENANCE AND PROTECTION OF TRAFFIC per lump sum,		
		_____	dollars	
		and _____cents	($_____)	($_____)
72	1,600 SY	LOAM BORROW 4 INCHES DEEP per square yard,		
		_____	dollars	
		and _____cents	($_____)	($_____)
73	1,600 SY	SEEDING per square yard,		
		_____	dollars	
		and _____cents	($_____)	($_____)
74	100 SY	MULCH BED FURNISH AND SPREAD 4" DEPTH per square yard,		
		_____	dollars	
		and _____cents	($_____)	($_____)

Item No.	Qty./Unit	Item with Unit Price Written in Words (and Figures)		Total in Figures
75	42 EACH	TREES per each,		
		_____	dollars	
		and _____cents	($_____)	($_____)
76	85 EACH	SHRUBS per each,		
		_____	dollars	
		and _____cents	($_____)	($_____)
77	917 EACH	GROUNDCOVER per each,		
		_____	dollars	
		and _____cents	($_____)	($_____)
78	1 LS	ELECTRICAL SITE LIGHTING per lump sum,		
		_____	dollars	
		and _____cents	($_____)	($_____)
79	1 LS	ELECTRICAL SERVICE CONNECTION per lump sum,		
		_____	dollars	
		and _____cents	($_____)	($_____)
80	1 LS	TELECOMMUNICATION SERVICE CONNECTION per lump sum,		
		_____	dollars	
		and _____cents	($_____)	($_____)

Item No.	Qty./Unit	Item with Unit Price Written in Words (and Figures)		Total in Figures
81	10 SF	PARKING SIGNS per square foot,		
		_____	dollars	
		and _____cents	($_____)	($_____)
82	1 EACH	REMOVE AND RESET DIRECTIONAL, WARNING, REGULATORY, SERVICE, AND STREET SIGNS per each,		
		_____	dollars	
		and _____cents	($_____)	($_____)
83	2,600 LF	PAVEMENT MARKINGS per linear foot,		
		_____	dollars	
		and _____cents	($_____)	($_____)
84	1 LS	TEMPORARY PAVEMENT MARKINGS per lump sum,		
		_____	dollars	
		and _____cents	($_____)	($_____)
85	7 EACH	ARROWS, WORDS, OR SYMBOLS PAVEMENT MARKINGS per each,		
		_____	dollars	
		and _____cents	($_____)	($_____)

Item No.	Qty./Unit	Item with Unit Price Written in Words (and Figures)		Total in Figures
86	1 LS	ICE RINK SYSTEM per lump sum,		
		_____	dollars	
		and _____cents	($_____)	($_____)
87	1 LS	CONCESSION AND UTILITY BUILDING per lump sum,		
		_____	dollars	
		and _____cents	($_____)	($_____)
88	1 LS	SHADE STRUCTURE per lump sum,		
		_____	dollars	
		and _____cents	($_____)	($_____)
89	1 ALL	TRAFFIC CONTROL - POLICE DETAIL per allowance,		
		Twenty-Thousand	dollars	
		and Zero cents	($ $20,000)	($ $20,000)
90	1 ALL	TRAFFIC CONTROL - FLAGPERSONS per allowance,		
		Twenty-Thousand	dollars	
		and Zero cents	($ $20,000)	($ $20,000)

Item No.	Qty./Unit	Item with Unit Price Written in Words (and Figures)		Total in Figures
91	1 ALL	TRAFFIC CONTROL - FLAGPERSONS OVERTIME per allowance,		
		Ten-Thousand dollars		
		and Zero cents	($ $10,000)	($ $10,000)
92	1 ALL	TESTING OF MATERIALS AND METHODS per allowance,		
		Ten-Thousand dollars		
		and Zero cents	($ $10,000)	($ $10,000)
93	1 ALL	MISCELLANEOUS UTILITY RELOCATION ALLOWANCE per allowance,		
		Twenty-Thousand dollars		
		and Zero cents	($ $20,000)	($ $20,000)
94	1 ALL	DISPOSAL OF CONTAMINATED SOIL per allowance,		
		Fifty-Thousand dollars		
		and Zero cents	($ $50,000)	($ $50,000)
95	1 ALL	OWNERS ALLOWANCE per allowance,		
		Fifty-Thousand dollars		
		and Zero cents	($ $50,000)	($ $50,000)

* Indeterminate quantity for comparison of bids.
** This lump sum price for this item shall not exceed five percent (5%) of the total amount of the bid, excluding this item.

TOTAL OF BID:

_____

_____Dollars and _____ cents

$_____
Total Bid in Figures

The undersigned agrees that for extra work, if any, performed in accordance with the terms and provisions of the annexed form of AGREEMENT, he will accept compensation as stipulated therein as full payment for such extra work.

If the Bid is accepted by the OWNER, the undersigned agrees to commence work under this Contract on a date to be specified in a written "Notice to Proceed" by the Owner and complete the entire work provided to be done under this Contract within the time stipulated in Table "A" of the AGREEMENT. If this bid is accepted by the Owner, the undersigned, also agrees to comply with the provisions of Section 1.14 “Liquidated Damages” and Table A of the Agreement.

As provided in the INFORMATION FOR BIDDERS, the bidder hereby agrees that he will not withdraw this BID, within 90 consecutive calendar days after the actual date of the opening of Bids, and that, if the Owner shall accept this BID, the bidder will duly execute and acknowledge the AGREEMENT and furnish, duly executed and acknowledged, the required CONTRACT BONDS within fourteen (14) consecutive calendar days after notification that the AGREEMENT and other Contract Documents are ready for signature.

The bidder hereby acknowledges the receipt of, and has included in this BID, the following Addenda:

(To be filled in by Bidder, if Addendums are issues.)

Addendum No. _____, dated _____

Addendum No. _____, dated _____

Addendum No. _____, dated _____

The bidder, by submittal of this BID, agrees with the Owner that the amount of the bid security deposited with this BID fairly and reasonably represents the amount of damages the Owner will suffer due to the failure of the bidder to fulfill his agreements as above provided.

(SEAL) _____L.S.
(Name of Bidder)

By _____
(Signature and title of authorized representative)

_____
(Business address)

_____
(City and State)

Date _____

The bidder is a corporation incorporated in the State (or Commonwealth) of _____ - a partnership - an individual. (Bidder must add and delete as necessary to make this sentence read correctly.)

(Note: If the bidder is a corporation, affix corporate seal and give below the names of its president treasurer, and general manager, if any; if a partnership, give full names and residential addresses of all partners; and if an individual, give residential address, if different from business address.)

The required names and addresses of all persons interested in the foregoing Bid, as Principals, are as follows:

_____

_____

_____

_____

(Add supplementary page if necessary)

CERTIFICATE OF AUTHORIZATION
FOR
BIDDING REPRESENTATIVE

(Note: Bidder must complete for certification of authorized representative signing Bid.)

At a duly authorized meeting of the Board of Directors of the

_____ held on _____, (Name of Corporation) (Date)

at which all the Directors were present or waived notice, it was voted that

_____ _____
(Name of Authorized Representative) (Title)

of this company shall be, and hereby is, authorized to execute bidding documents, contracts and bonds in the name and on behalf of said company, and to affix the corporate seal thereto, and such execution of any contract obligation in this company's name on its behalf of such

_____ under seal of the company shall be valid and binding upon this company. (Title)

A true copy

ATTEST_____

(Clerk)

Place of Business_____

_____

I hereby certify that I am the clerk of the _____
(Name of Corporation)

_____, that _____
(Name of Authorized Representative)

is the duly elected _____ of said company, and that the
(Title)

above vote has not been amended or rescinded and remains in full force and effect as of the date of this contract.

Corporate

_____Seal
(Clerk)

STATEMENT OF BIDDERS' QUALIFICATIONS

The following shall accompany the bid and is required as evidence of the bidder's qualifications to perform the work, as bid upon, in accordance with the contract drawings and specifications. This statement must be notarized. All questions must be answered. Additional data may be submitted on separate attached sheets.

1. Name of Bidder_____

2. Permanent Main Office Address_____

3. Official Mailing Address for This Contract_____

4. When Organized?_____

5. Where Incorporated, If a Corporation _____ Year Incorporated _____

6. Is the Bidder licensed to do business in the State of Rhode Island Yes _____ No _____

7. In accordance with Paragraph 1.13.C (3) of Section 00200, provide a list of completed contracts demonstrating a minimum of ten (10) years related construction experience (Attach supplemental sheets as required):

   a) Contract Name/Location: _____
   Owner: _____
   Engineer: _____
   Contract Amount: _____ Completion Date: _____
   Description of Contract: _____

   b) Contract Name/Location: _____
   Owner: _____
   Engineer: _____
   Contract Amount: _____ Completion Date: _____
   Description of Contract: _____

   c) Contract Name/Location: _____
   Owner: _____
   Engineer: _____
   Contract Amount: _____ Completion Date: _____
   Description of Contract: _____

   d) Contract Name/Location: _____

Owner: _____

Engineer: _____

Contract Amount: _____ Completion Date: _____

Description of Contract: _____

e) Contract Name/Location: _____

Owner: _____

Engineer: _____

Contract Amount: _____ Completion Date: _____

Description of Contract: _____

f) Contract Name/Location: _____

Owner: _____

Engineer: _____

Contract Amount: _____ Completion Date: _____

Description of Contract: _____

g) Contract Name/Location: _____

Owner: _____

Engineer: _____

Contract Amount: _____ Completion Date: _____

Description of Contract: _____

h) Contract Name/Location: _____

Owner: _____

Engineer: _____

Contract Amount: _____ Completion Date: _____

Description of Contract: _____

i) Contract Name/Location: _____

Owner: _____

Engineer: _____

Contract Amount: _____ Completion Date: _____

Description of Contract: _____

j) Contract Name/Location: _____

Owner: _____

Engineer: _____

Contract Amount: _____ Completion Date: _____

Description of Contract: _____

k) Contract Name/Location: _____

Owner: _____

Engineer: _____

Contract Amount: _____ Completion Date: _____

Description of Contract: _____

8. In addition to the above listed projects, and in accordance with Paragraph 1.13.C (4) of Section 00200, list a minimum of five (5) construction projects the bidder has successfully completed (Attach supplemental sheets as required):

a) Contract Name: _____

Location: _____

Owner: _____

Owner Contact Name:_____

Tel. Number: _____ Email: _____

Engineer: _____

Engineer Contact Name: _____

Tel. Number: _____ Email: _____

Description of Contract: _____

_____

b) Contract Name: _____

Location: _____

Owner: _____

Owner Contact Name:_____

Tel. Number: _____ Email: _____

Engineer: _____

Engineer Contact Name: _____

Tel. Number: _____ Email: _____

Description of Contract: _____

_____

c) Contract Name: _____

Location: _____

Owner: _____

Owner Contact Name:_____

Tel. Number: _____ Email: _____

Engineer: _____

Engineer Contact Name: _____

Tel. Number: _____ Email: _____

Description of Contract: _____

_____

d) Contract Name: _____

Location: _____

Owner: _____

Owner Contact Name:_____

Tel. Number: _____ Email: _____

Engineer: _____

Engineer Contact Name: _____

Tel. Number: _____ Email: _____

Description of Contract: _____

_____

e) Contract Name: _____

Location: _____

Owner: _____

Owner Contact Name:_____

Tel. Number: _____ Email: _____

Engineer: _____

Engineer Contact Name: _____

Tel. Number: _____ Email: _____

Description of Contract: _____

_____

8. List contracts currently on hand (Attached supplemental sheets as required):

a) Contract Name/Location: _____

Owner: _____

Engineer: _____

Contract Amount: _____ % Complete: _____ Completion Date: _____

Description of Contract: _____

b) Contract Name/Location: _____

Owner: _____

Engineer: _____

Contract Amount: _____ % Complete: _____ Completion Date: _____

Description of Contract: _____

c) Contract Name/Location: _____

Owner: _____

Engineer: _____

Contract Amount: _____ % Complete: _____ Completion Date: _____

Description of Contract: _____

d) Contract Name/Location: _____

Owner: _____

Engineer: _____

Contract Amount: _____ % Complete: _____Completion Date: _____

Description of Contract: _____

e) Contract Name/Location: _____

Owner: _____

Engineer: _____

Contract Amount: _____ % Complete: _____Completion Date: _____

Description of Contract: _____

9. List any work the firm has failed to complete, state where and why.

_____

10. If you have ever defaulted on any contract, state where and why.

_____

11. List full names and residences of all principals (i.e.: Officers, Directors, Partners, Owners, etc.)

interested in this bid.

Name _____ Title _____

Residence _____

Firm _____

Name _____ Title _____

Residence _____

Firm _____

Name _____ Title _____

Residence _____

Firm _____

Name _____ Title _____

Residence _____

Firm _____

12. State name(s), qualifications, and relevant experience of project staff and onsite resident supervisor(s) for this contract (Attach resumes as required).

_____

_____

_____

_____

_____

13. List major equipment available for this contract and identify ownership or rental.

_____

_____

_____

_____

_____

_____

_____

_____

_____

14. Will you furnish a detailed financial statement and other information, requested by the Owner? Yes _____, No _____.

15. List bank references for verifying financial ability of your company.

Name Address

_____

_____

_____

16. The undersigned hereby authorized and requests any person, firm or corporation, to furnish all information requested by the Owner and/or its designated agents relative to the recitals comprising this Statement of the Bidder's Qualifications.

Dated at _____ this _____ day of _____20_____.

_____
(Name of Bidder)

By: _____

_____
(Title)

State of _____

County of _____

_____ being duly sworn in person, deposes and says

that he is _____ of _____,
(Title) (Name of Bidder)

that he is the firm's duly authorized agent to execute these contract documents, and that the

answers to the foregoing questions and all statements therein contained are correct and true.

Subscribed and sworn to before me this _____ day of _____ 20_____.

(SEAL)

_____
(Notary Public)

_____
(My Commission Expires)

STATEMENT OF PROPOSED SUBCONTRACTORS

The following shall accompany the bid and is required as evidence of the bidder's qualifications to perform the work as bid upon, in accordance with the contract drawings and specifications. The Bidder must state the names and appurtenant information of all major subcontractors he proposed to use to complete the work as bid upon. Additional data may be submitted on separate attached sheets.

If subcontractors are not to be used to complete the Work and/or any portion thereof, as herein bid upon, the Bidder must acknowledge by writing "NONE" _____.

Description of Work_____

Approximate percentage of Total Bid_____

Proposed Subcontractor, Name_____

Address_____

Description of Work_____

Approximate percentage of Total Bid_____

Proposed Subcontractor, Name _____

Address _____

Description of Work _____

Approximate percentage of Total Bid _____

Proposed Subcontractor, Name _____

Address _____

Bidder to insert description of work, percentage of Total BID, and subcontractors' names as may be required.

This is to certify that all names of the above-mentioned subcontractors are submitted with full knowledge and consent of the respective parties.

The Bidder warrants that none of the proposed subcontractors have any conflict of interest as respects this contract.

Date _____

Bidder

_____
(Name of Bidder)

By

_____
(Signature)

_____
(Title)

_____
(Business Address)

_____
(City and State)

STATE OF RHODE ISLAND

UTILIZATION OF MINORITY BUSINESS ENTERPRISES

This project is subject to Chapter 37-14.1 of the Rhode island General Laws, and regulations promulgated thereunder, which require that ten percent (10%) of the dollar value of work performed on the project be performed by minority business enterprises.

The Bidder, as part of the Bid, must submit a MBE PLAN outlining the manner in which he shall make a substantial and concerted effort to meet the ten percent (10%) MBE requirement and submit said plan to the Director of the Rhode Island Department of Administration for approval.

The plan shall include a projection of the number and types of subcontracts to be awarded and a projection of the number and types of MBE's likely to be available to compete for subcontracts from the prime contractor over the period of the project.

PROPOSED MBE PLAN

(All bidders must complete and submit this State Plan with Bid, attach additional sheets as needed)

Proposed MBE Subcontractor	Description of Work	Dollar Value ($)	% of Total Contract
Total MBE Participation		$	

Bidder to insert description of work, percentage of Total BID, and MBE subcontractors' names as may be required.

This is to certify that all names of the above-mentioned MBE subcontractors are submitted with full knowledge and consent of the respective parties.

The Bidder warrants that none of the proposed MBE subcontractors have any conflict of interest as respects this contract.

Date _____ Bidder

_____
(Name of Bidder)

By
_____
(Signature)

_____
(Title)

_____
(Business Address)

_____
(City and State)

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SECTION 00500

CONTRACT AGREEMENT
CITY OF WARWICK, RHODE ISLAND
CITY HALL PLAZA SITE IMPROVEMENTS
CONTRACT NO. 2024-322

THIS AGREEMENT, is executed this _____ day of _____ in the year Two Thousand and **Twenty Four** (herein referred to as the "AGREEMENT") by and between the **CITY OF WARWICK,** Rhode Island, party of the first part, and _____ (Name of Contractor) party of the second part.

WITNESSETH, that the parties to these presents, each in consideration of the undertakings, promises, and agreements on the part of the other herein contained, have undertaken, promised, and agreed and do hereby undertake, promise, and agree, the party of the first part for itself, its successors and assigns, and the party of the second part for himself and his heirs, executors, administrators, successors and assigns, as follows:

1.01 Definitions
1.02 The Contract Documents
1.03 Obligations and Liability of Contractor
1.04 Authority of the Engineer
1.05 Supervision of Work
1.06 Insurance
1.07 Patents
1.08 Compliance with Laws
1.09 Provisions Required by Law Deemed Inserted
1.10 Permits
1.11 Not to Sublet or Assign
1.12 Delay by Owner
1.13 Time for Completion
1.14 Liquidated Damages
1.15 Night, Saturday, Sunday and Holiday Work
1.16 Employ Competent Persons
1.17 Employ Sufficient Labor and Equipment
1.18 Intoxicating Liquors and/or Drugs
1.19 Access to Work
1.20 Examination of Work
1.21 Defective Work, Etc.
1.22 Protection Against Water and Storm
1.23 Right to Materials
1.24 Changes
1.25 Extra Work
1.26 Extension of Time on Account of Extra Work
1.27 Changes Not to Affect Bonds
1.28 Claims for Damages
1.29 Abandonment of Work or Other Default
1.30 Prices for Work
1.31 Moneys May Be Retained
1.32 Formal Acceptance
1.33 Progress Estimates
1.34 Partial Acceptance
1.35 Final Estimate and Payment
1.36 Liens
1.37 Claims
1.38 Application of Moneys Retained
1.39 No Waiver
1.40 Liability of Owner
1.41 Guarantee
1.42 Retain Money for Repairs
1.43 Return of Drawings
1.44 Cleaning Up
1.45 Legal Address of Contractor
1.46 Headings
1.47 Modification or Termination
1.48 Remedies and Arbitration
1.49 Direct Labor cost
1.50 Minority Business
1.51 Termination for Convenience
1.52 Equal Employment Opportunity, Antidiscrimination and Affirmative Action
1.53 Price Adjustment – Liquid Asphalt and Diesel Fuel

1.01 DEFINITIONS

Wherever the words hereinafter defined or pronouns used in their stead occur in the Contract Documents, they shall have the following meaning indicated which shall be applicable to both the singular and plural thereof:

ADDENDA - Written or graphic instruments prior to the opening of Bids which Clarify, correct or change the Bidding Requirements or Contract Documents.

AGREEMENT - the written contract between Owner and Contractor covering the Work to be performed.

"AS DIRECTED," "AS ORDERED," "AS REQUESTED," "AS REQUIRED", "AS PERMITTED," or words of like import are used, it shall be understood that the direction, order, request, requirement, or permission of the Engineer is intended.

"APPROVED," "ACCEPTABLE," "SUITABLE," "SATISFACTORY," and words of like import shall mean approved by, acceptable to, suitable to, or satisfactory to the Engineer.

APPLICATION FOR PAYMENT - Form used by Contractor in requesting progress or final payments, format to be acceptable to the Engineer.

BID - The offer or proposal of the bidder submitted on the prescribed form setting forth the prices for the Work to be performed.

BIDDER - Any person, firm or corporation submitting a bid for the work.

CHANGE ORDER - A document recommended by the Engineer, which is signed by the Contractor and Owner authorizing the addition, deletion or revision in the Work, or adjustment in the Contract Price or Contract Time, issued on or after the effective date of the Agreement.

CONTRACTOR - The person, firm or corporation with whom the Owner has entered into the Agreement. Contract Bonds - Bid, Performance, and Labor and Materials Bonds and other instruments of security furnished by the Contractor and his surety in accordance with the Contract Documents.

CONTRACT DOCUMENTS - The Agreement, Addenda, Bid, Post Bid documentation submitted prior to the Notice Award, The Notice to Proceed, Bonds, General Conditions, Supplementary Conditions, The Specifications, the Drawings, all written Amendments, Change Orders, Field Orders, and Engineers written interpretations and clarifications.

CONTRACT PRICE - The total monies payable to the Contractor under the terms and conditions of the Contract Documents.

CONTRACT TIME - The number of calendar days stated in the Contract Documents for the completion of the Work.

CONSTRUCTION SUPERINTENDENT - That person designated by the Contractor to carry out the provisions of the Contract.

DATUM OR LEVELS - The figures given in the Contract and Specifications or upon the Drawings after the word elevation or abbreviation of it, shall mean the distance in feet above mean sea level, the base of the State in which the Work is located and the United States Geodetic Survey (U.S.G.S.).

DRAWINGS - The part of the Contract Drawings which show the characteristics and Scope of the Work to be performed and which have been prepared or approved by the Engineer.

EARTH - Wherever used as the name of an excavated material or material to be excavated, shall mean all kinds of material other than rock as defined in this section.

ELEVATION - The figures given on the Drawings or in the other Contract Documents after the word "elevation" or abbreviation of it shall mean the distance in feet above the datum adopted by the Engineer.

ENGINEER - The person, firm or corporation duly appointed by the Owner to undertake the duties and powers herein assigned to the Engineer, acting either directly or through duly authorized representatives. (For this Contract, BETA Group, Inc.)

FIELD ORDER - A written order issued by the Engineer which orders minor changes in the Work which do not involve a change in the Contract Price or an extension of the Contract time.

GENERAL REQUIREMENTS - Sections of Division 1 of the Specifications.

"HEREIN," "HEREINAFTER," "HEREUNDER," and words of like import shall be deemed to refer to the Contract Documents.

NOTICE OF AWARD - The written notice of the acceptance of the Bid from the Owner to the successful Bidder.

NOTICE TO PROCEED - Written communication issued by the Owner to the Contractor authorizing him to proceed with the Work and establishing the date of commencement of the Work.

OWNER - The public body or authority, corporation, association, firm or person with whom the Contractor has entered into the Agreement and for whom the Work is to be provided.

PROJECT OR CONTRACT - The undertaking to be performed in the Contract Documents.

PROJECT REPRESENTATIVE - The authorized representative of the owner who is assigned to the project site or any part thereof.

ROCK - wherever used as the name of an excavated material to be excavated, shall mean only boulders and pieces of concrete and masonry exceeding 1 cu. yd. in volume, or igneous, sedimentary, metamorphic, and conglomerate rock which, in the opinion of the Engineer, requires, for its removal, drilling and blasting, wedging, sledging, barring, or breaking up with a power-operated tool. No soft or disintegrated rock which can be removed with a hand pick or power-operated excavator or shovel, no loose, shaken, or previously blasted rock or broken stone in rock fillings, or elsewhere, and no rock exterior to the maximum limits of measurement allowed, which may fall into the excavation, will be measured or allowed as "rock."

SHOP DRAWINGS - All drawings, diagrams, schedules and other data or information prepared for and submitted by the Contractor, to illustrate portions of the Work.

SPECIFICATIONS - The portions of the Contract documents consisting of written technical descriptions of materials, equipment, construction systems, standards and workmanship as applied to the Work and certain administrative details applicable thereto.

SUBCONTRACTOR - An individual, firm or corporation, approved by the Owner and Engineer having a direct contract with the Contractor or with any other Sub-Contractor for the performance of a part of the Work on the Project.

SUBSTANTIAL COMPLETION - Date certified by the Engineer when construction is sufficiently complete, in accordance with the Contract Documents, so the Owner can occupy or utilize the Work or designated portion thereof for which it was intended, as expressed in the Contract documents.

SUPPLEMENTARY CONDITIONS - The part of the Contract Documents which amends or supplements the General Conditions.

SUPPLIER - Any person or organization who supplies materials or equipment for the Work, including that fabricated to a special design, but who does not perform labor at the site.

WRITTEN NOTICE - Any notice to any party of the Agreement relative to any part of this Agreement in writing and considered delivered and the service thereof completed when posted by certified or registered mail to the said party at his last given address or delivered in person to said party or his authorized representative on the Work.

WORK - The entire completed construction or the various separately identifiable parts thereof required to be furnished under the Contract Documents. Work includes and is the result of performing or furnishing labor and furnishing and incorporating materials and equipment into the construction, and performing or furnishing services and furnishing documents, all as required by the Contract Documents.

1.02 THE CONTRACT DOCUMENTS

A. The Contract Documents, as defined above, are sometimes herein referred to as the "Contract".

The Contract Documents are complementary, and what is called for by anyone shall be as binding as if called for by all. In the event of any conflict or inconsistency between the provisions of the AGREEMENT and the provisions of any of the other Contract Documents, the provisions of the AGREEMENT shall prevail.

A. Reference to standard specifications, manuals or codes of any technical society, organization or association, or to the laws or regulations of any governmental authority, whether such reference be specific or by implication, shall mean the edition of the standard specification, manual, code or laws or regulations identified in the reference. In the event a particular edition is not identified, the reference shall mean the latest amended edition in effect at the time of receipt of the Bid. However, no provision of any referenced standard specification, manual or code (whether or not specifically incorporated by reference in the Contract Documents) shall change the duties and

responsibilities of the Owner, the Contractor or the Designer, or any of their consultants, agents or employees from those set forth in the Contract Documents, nor shall it be effective to assign to the Engineer, or any of the Engineer's consultants, agents or employees, any duty or authority to supervise or direct the furnishing or performance of the work or any duty or authority to undertake responsibility contrary to the provisions of the AGREEMENT.

1.03 OBLIGATIONS AND LIABILITY OF CONTRACTOR

A. The Contractor shall do all the work and perform and furnish all the labor, services, materials, equipment, plant, machinery, apparatus, appliances, tools, supplies and all other things (except as otherwise expressly provided herein) necessary and as herein specified for the proper performance and completion of the Work in the manner and within the time hereinafter specified, in strict accordance with the Drawings, Specifications and other Contract Documents, in conformity with the directions and to the satisfaction of the Engineer, and at the prices herein agreed upon therefor.

B. All parts of the Work and all fixtures, equipment, apparatus and other items indicated on the Drawings and not mentioned in the Specifications, or vice versa, and all work and material usual and necessary to make the work complete in all its parts, including all incidental work necessary to make it complete and satisfactory and ready for use and operation, whether or not they are indicated on the Drawings or mentioned in the Specifications, shall be furnished and executed the same as if they were called for both by the Drawings and by the Specifications.

C. The Contractor shall coordinate his operations with those of any other contractors who may be employed on other work of the Owner, shall avoid interference therewith, and shall cooperate in the arrangements for storage of materials and equipment.

D. The Contractor shall conduct his work so as to interfere as little as possible with private business and public travel. Wherever and whenever necessary or required, he shall maintain fences, furnish watchmen, maintain lights, and take such other precaution as may be necessary to protect life and property.

E. The Contractor shall indemnify and save harmless the Owner and the Engineer and their officers, agents, servants and employees, from and against any and all claims, demands, suits, proceedings, liabilities, judgments, awards, losses, damages, costs and expenses, including attorneys' fees, on account of bodily injury, sickness, disease or death sustained by any person or persons or injury or damage to or destruction of any property, directly or indirectly arising out of, relating to or in connection with the Work, whether or not due or claimed to be due in whole or in part to the active, passive or concurrent negligence or fault of the Contractor, his officers, agents, servants or employees, any of his subcontractors, or any of their respective officers, agents, servants or employees and/or any other person or persons, and whether or not such claims, demands, suits or proceedings are just, unjust, groundless, false or fraudulent; and the Contractor shall and does hereby assume and agrees to pay for the defense of all such claims, demands, suits and proceedings, provided, however, that the Contractor shall not be required to indemnify the Engineer, his officers, agents, servants or employees, against any such damages occasioned solely by defects in maps, plans, drawings, designs or specifications prepared, acquired or used by the Engineer and/or solely by the negligence or fault of the Engineer; and provided further, that the Contractor shall not be required to indemnify the Owner, his officers, agents, servants or employees, against any such damages occasioned solely by acts or omissions of the Owner other than supervisory acts or omissions of the Owner in the Work.

F. The Contractor shall have complete responsibility for the Work and the protection thereof, and for preventing injuries to persons and damage to the Work and property and utilities on or about the Work, until final completion and final acceptance thereof. He shall in no way be relieved of his responsibility by and right of the Engineer to give permission or directions relating to any part of the Work, by any such permission or directions given, or by failure of the Engineer to give such permission or directions. The Contractor shall bear all costs, expenses, losses and damages on account of the quantity or character of the Work or the nature of the land (including but not limited to subsurface conditions) in or under or on which the Work is done being different from that indicated or shown in the Contract Documents or from what was estimated or expected, or on account of the weather, elements, or other causes.

G. The Contractor shall conduct his operations so as not to damage existing structures or work installed either by him or by other contractors. In case of any such damage resulting from his operations, he shall repair and make good as new the damaged portions at

his own expense with the consent of the damaged party. In the event that consent is not given, the Contractor shall continue liable for the damage caused.

H. The Contractor shall be as fully responsible to the Owner for the acts and omissions of his subcontractors, their officers, agents, servants and employees as he is for his own acts and omissions and those of his own officers, agents, servants and employees.

I. Should the Contractor sustain any loss, damage or delay through any act or omission of any other contractor or any subcontractor of any such other contractor, the Contractor shall have no claim against the Owner therefor, other than for an extension of time, but shall have recourse solely to such other contractor or subcontractor.

J. If any other contractor or any subcontractor of any such other contractor shall suffer or claim to have suffered loss, damage or delay by reason of the acts or omissions of the contractor or of any of his subcontractors, the Contractor agrees to assume the defense against any such claim and to reimburse such other contractor or subcontractor for such loss or damage.

K. The Contractor agrees to and does hereby indemnify and save harmless the Owner from and against any and all claims by such other contractors or subcontractors alleging such loss, damage or delay from and against any and all claims, demands, suits, proceedings, liabilities, judgments, awards, losses, damages, costs and expenses, including attorneys' fees, arising out of, relating to or resulting from such claims.

L. The Contractor shall promptly pay all federal, state and local taxes which may be assessed against him in connection with the Work or his operations under the AGREEMENT and/or the other Contract Documents, including, but not limited to, taxes attributable to the purchase of material and equipment, to the performance of services, and the employment of persons in the prosecution of the Work.

M. Asbestos, PCBs, Petroleum, Hazardous Waste or Radioactive Material

1. The Owner shall be responsible for any Asbestos, PCBs, Petroleum, Hazardous Waste or Radioactive Material uncovered or revealed at the site which was not shown or indicated in Drawings or Specification or identified in the Contract Documents to be within the scope of the Work and which may present a substantial danger to persons or property exposed thereto in connection with the Work at the site. The Owner shall not be responsible for any such materials brought to the site by the Contractor, Subcontractors, Suppliers or anyone else for whom the Contractor is responsible.

2. To the fullest extent permitted by Laws and Regulations, the Owner shall indemnify and hold harmless the Contractor, Subcontractors, Engineer, Engineer’s Consultants and the officers, directors, employees, agents other consultants and subcontractors of each and any of them from and against all claims, costs, losses and damages arising out of or resulting from such hazardous condition, provided that: (i) any such claim, cost, loss or damage is attributable to bodily injury, sickness, disease or death, or to injury to or destruction of tangible property (other than the Work itself), including the loss of use resulting therefrom, and (ii) nothing in this subparagraph shall obligate the Owner to indemnify any person or entity from and against the consequences of that person’s or entity’s own negligence.

1.04 AUTHORITY OF THE ENGINEER

A. The Engineer shall be the sole judge of the intent and meaning of the Drawings and Specifications and his decisions thereon and his interpretation thereof shall be final, conclusive and binding on all parties.

B. The Engineer shall be the Owner's representative during the life of the Contract and he shall observe the Work in progress on behalf of the Owner. He shall have authority (1) to act on behalf of the Owner to the extent expressly provided in the Contract or otherwise in writing; (2) to determine the amount, quality, acceptability and fitness of all work, materials and equipment required by the Contract; and (3) to decide all questions which arise in relation to the Work, the execution thereof, and the fulfillment of the Contract.

C. The Contractor shall proceed without delay to perform the work as directed, instructed, determined or decided by the Engineer and shall comply promptly with such directions, instructions, determinations or decisions. If the Contractor has any objection thereto he may, within ten (10) days of having received any such direction, instruction, determination or decision, require that any such direction, instruction, determination or decision be put in writing and within ten (10) days after receipt of any such writing he may file a written protest with the Owner stating clearly and in detail his objections, the reasons therefor, and the nature and amount of additional compensation, if any,

to which he claims he will be entitled thereby. A copy of such protest shall be filed with the Engineer at the same time it is filed with the Owner. Unless the Contractor requires that any such direction, instruction, determination or decision be put in writing within ten (10) days of having received such direction, instruction, determination or decision and unless the Contractor files such written protest with the Owner and Engineer within such ten (10) day period, he shall be deemed to have waived all grounds for protest of such direction, instruction, determination, or decision and all claims for additional compensation or damages occasioned thereby, and shall further be deemed to have accepted such direction, instruction, determination, or decision as being fair, reasonable, and finally determinative of his obligations and rights under the Contract.

1.05 SUPERVISION OF WORK

A. The Contractor shall be solely responsible for supervision of the Work, shall give the work the constant attention necessary to ensure the expeditious and orderly progress thereof, and shall cooperate with the Engineer in every possible way.

B. At all times, the Contractor shall have his agent on the Work a competent superintendent capable of reading and thoroughly understanding the Drawings and Specifications, with full authority to execute the directions of the Engineer without delay and to supply promptly such labor, services, materials, equipment, plant, apparatus, appliances, tools, supplies and other items as may be required. Such superintendent shall not be removed from the Work without the prior written consent of the Engineer. If, in the opinion of the Engineer, the superintendent or any successor proves incompetent, the Contractor shall replace him with another person approved by the Engineer; such approval, however, shall in no way relieve or diminish the Contractor's responsibility for supervision of the Work.

C. Whenever the Contractor or his agent or superintendent is not present on any part of the Work where it may be necessary to give directions or instructions with respect to such work, such directions or instructions may be given by the Engineer to and shall be received and obeyed by the designated foreman or any other person in charge of the particular work involved.

1.06 INSURANCE

A. Before starting and until final completion and acceptance of the Work and expiration of the guarantee period provided for in the AGREEMENT the Contractor shall procure and maintain insurance of the types specified in paragraphs (1) to (11), inclusive, below, and to the limits for this insurance specified in Table A at the end of this section. All insurance shall be obtained from companies satisfactory to the Owner and Engineer.

B. Insurance shall be in such forms as will protect the Contractor from all claims and liability for damages for bodily and personal injury, including accidental death, and for property damage, which may arise from operations under the Contract, whether such operations be by himself, his subcontractors, or by anyone directly or indirectly employed or engaged by him.

C. The **City of Warwick** Rhode Island (Owner) and the Engineer shall be named as an "additionally insured".

D. All insurance policies provided by the Contractor shall include a "*Waiver of Subrogation*" endorsement for the Owner, Engineer and/or other third party entity.

E. The following types of insurance shall be provided on all policies:

1. Workmen's Compensation and Employer's Liability Insurance.

2. General Liability coverage, including Bodily Injury Insurance for operations and completed operations and Contractor's Protective Bodily Injury Insurance.

3. General Liability coverage, including Property Damage Insurance for operations and completed operations and Contractor's Protective Property Damage Insurance, each including coverage for injury to or destruction of wires or pipes and similar property and appurtenant apparatus and the collapse of or structural injury to any building or structure except those on which work under the Contract is being done. Blasting and explosion coverage shall be obtained if there is a need for blasting under the Contract, and no blasting shall be performed until such insurance has been secured.

4. Bodily Injury Insurance covering the operation of all motor vehicles owned by the Contractor.

5. Personal Injury Insurance to cover claims for personal injury and including claims brought by employees.

6. Property Damage Insurance covering the operation of all motor vehicles owned by the Contractor.

7. Insurance to cover bodily injuries and property damage resulting from the use of motor vehicles not owned by the Contractor, while such vehicles are being operated in connection with the prosecution of the Work.

8. Contractual Liability Insurance covering the liability assumed by the Contractor under the fifth paragraph of that subsection titled "Obligations and Liability of Contractor" of this AGREEMENT.

9. Owner's/Contractor's Protective Liability and Property Damage Insurance to protect the Owner and the Engineer against claims for Property damage and for bodily injuries, including accidental death, caused by the operations of the Contractor or his subcontractors on the Work. The policy shall indicate the Owner and the Engineer as the named insured. A copy of the policy shall be furnished to the Owner and a Certificate of Insurance shall be furnished to the Engineer.

10. Excess/Umbrella Liability Coverage shall be provided in accordance with the minimum limits stated in Table A.

11. Builders' Risk Insurance with an "All Risk" Installation Floater covering loss by fire and extended coverage in the completed value form in the amount of the total insurable value of all structures, materials, and equipment to be built and installed. The insurance shall be obtained from a company satisfactory to the Owner. The policy shall indicate Owner, the Contractor, all subcontractors, and the Engineer as the named insured with loss payable to the Owner as Trustee. The policy shall provide for a 30-day notice to the Owner of cancellation or restrictive amendment. A copy of the policy shall be furnished to the Owner and a Certificate of Insurance shall be furnished to the Engineer. The insurance shall be obtained before the work is started and shall be maintained until the date of completion of the work as stated in the final estimate, or until the Owner occupies or otherwise take possession of the structure, whichever occurs first.

F. All policies shall be so written that the Owner will be notified in writing of cancellation or restrictive amendment at least 30 days prior to the effective date of such cancellation or amendment.

G. Certificates from the Contractor's insurance carriers stating the coverage provided, the limits of liability, and expiration dates shall be filed in triplicate with the Owner before operations are begun.

H. Certificates from the contractor naming the Owner, **CITY OF WARWICK,** Rhode Island and the Engineer as additionally insured must be received by the Owner prior to initiating the work.

I. Renewal certificates must be furnished by the Contractor prior to the expiration date of any of the initial insurances.

J. No insurance required or furnished hereunder shall in any way relieve the Contractor of or diminish any of his responsibilities, obligations and liabilities under the Contract.

1.07 PATENTS

A. The Contractor's attention is directed to the following "Patent Indemnity Clause" illustrating the format and/or required wording therefore which shall be used by all manufacturers and/or suppliers, as deemed necessary by the Owner and Engineer, as an Indemnification and Hold Harmless Agreement.

B. This Agreement shall be accepted and approved in form by the Owner and Engineer prior to the approval and/or installation of the product.

PATENT INDEMNIFICATION

"In consideration for their purchase and use of the (Name of product and/or equipment) manufactured by (name of Manufacturer) and for other good and valuable consideration, (Name of Manufacturer) agrees to defend and hold harmless (Name of Contractor), BETA Group, Inc., and the (Name of Owner), and their employees and agents, from and against any liability, loss, cost, expense or damage including reasonable attorneys' and accountants' fees incurred by these entities in defending or prosecuting any claim for such liability, loss, cost, expense or damage resulting or arising out of a claim that the use of the above mentioned product and/or equipment delivered hereunder directly infringes any United States Patent, provided that (Name of Manufacturer) is given authority, information, and assistance for the defense of such suit, and (Name of Manufacturer) shall pay all damages and costs assessed against the above named entities for the use of such produce and/or equipment

provided, however, that this indemnification shall not apply to equipment of (Name of Contractor) design, and provided further that if the use of such product and/or equipment is enjoined in any suit, (Name of Manufacturer) shall at its own expense and its option either procure for (name of Contractor) the right to continue the normal use of such produce and/or equipment, replace said product and/or equipment, modify said equipment or refund the purchase price thereof; and provided further that (Name of Manufacturer) indemnity as to use shall not apply to infringement resulting from the use of the produce and/or equipment delivered hereunder in combination with other items where use of the product and/or equipment per se does not constitute infringement."

1.08 COMPLIANCE WITH LAWS

A. The Contractor shall keep himself fully informed of all existing and future federal, state, and local laws, ordinances, rules, and regulations affecting those engaged or employed on the Work, the materials and equipment used in the Work or the conduct of the Work, and of all orders, decrees and other requirements of bodies of tribunals having any jurisdiction or authority over the same. If any discrepancy or inconsistency is discovered in the Drawings, Specifications or other Contract Documents in relation to any such law, ordinance, rule, regulation, order, decree or other requirement, the Contractor shall forthwith report the same to the Engineer in writing. The Contractor shall at all times observe and comply with, and cause all his agents, with all such existing and future laws, ordinances, rules, regulations, orders, decrees and other requirements, and he shall protect, indemnify and save harmless the Owner, its officers, agents, servants and employees, from and against any and all claims, demands, suits, proceedings, liabilities, judgements, penalties, losses, damages, costs and expenses, including attorneys' fees, arising from or based upon any violation or claimed violation of any such law, ordinance, rule, regulation, order, decree or other requirement, whether committed by the Contractor or any of his agents, servants, employees or subcontractors.

1.09 PROVISIONS REQUIRED BY LAW DEEMED INSERTED

A. Each and every provision of law and clause required by law to be inserted in the Contract shall be deemed to be inserted herein, and the Contract shall be read and enforced as though they were included herein. If through mistake or otherwise any such provision is not inserted, or is not correctly inserted, then upon the application of either party, the Contract shall forthwith be physically amended to make such insertion.

1.10 PERMITS

A. The Contractor shall, at his own expense, take out and maintain all necessary permits from the county, municipal, or other public authorities; shall give the notices required by law; and shall post all bonds and pay all fees and charges incident to the due and lawful prosecution of the Work.

1.11 NOT TO SUBLET OR ASSIGN

A. The Contractor shall constantly give his personal attention to the faithful prosecution of the Work, shall keep the same under his personal control, shall not assign the Contract or sublet the Work or any part thereof without the previous written consent of the Owner, and shall not assign any of the moneys payable under the Contract, or his claim thereto, unless by and with the like written consent of the Owner and the Surety on the Contract Bonds. Any assignment or subletting in violation hereof shall be void and unenforceable.

B. The Contractor shall not sublet or assign work to a subcontractor(s), for a total in excess of fifty (50) percent of the Contract Price, without prior written approval of the Owner and Engineer.

C. The Contractor shall be fully responsible to the Owner for the acts and omissions of his subcontractors, suppliers, and of persons either directly or indirectly employed by them as he is for the acts and omissions of persons directly employed by him.

D. The Contractor shall cause appropriate provisions, and applicable State or Federal regulations, to be inserted in all subcontractors relative to the work to bind subcontractors to the Contractor by the terms of the Contract Documents insofar as applicable to the work of subcontractors, and to give the Contractor the same power as regards terminating any subcontract that the Owner may exercise over the Contractor under any provision of the Contract Documents.

E. The Contractor's attention is directed to the fact that nothing contained in this Contract shall create any contractual relation between any subcontractor and the Owner.

1.12 DELAY BY OWNER

A. The Owner may delay the beginning of the Work or any part thereof if the necessary lands or rights-of-way for such work shall not have been obtained. The Contractor shall have no claim for additional compensation or damages on account of such delay, but shall be entitled only to any extension of time as hereinafter provided.

1.13 TIME FOR COMPLETION

A. The rate of progress shall be such that the Work shall be performed and completed in accordance with the Contract before the expiration of the time limit stipulated in Table A at the end of this section, except as otherwise expressly provided herein.

B. It is agreed that the rate of progress herein required has been purposely made low enough to allow for the ordinary and foreseeable delays incident to construction work of this character. No extension of time will be given for ordinary or foreseeable delays, inclement weather, or accidents, and the occurrence of such will not relieve the Contractor from the necessity of maintaining this rate of progress and completing the Work within the stipulated time limit.

C. If delays are caused by acts of God, acts of Government, unavoidable strikes, extra work, or other cause or contingencies clearly beyond the control or responsibility of the Contractor, the Contractor may be entitled to additional time to perform and complete the Work, provided that the Contractor shall, within ten (10) days from the beginning of such delay notify the Owner in writing, with a copy to the Engineer, of the cause and particulars of the delay. Upon receipt of such notification, the Owner shall review and evaluate the cause and extent of the delay. If, under the terms of the AGREEMENT, the delay is properly excusable, the Owner will, in writing, appropriately extend the time for completion of the Work. (This paragraph will be interpreted to include delays in receipt of equipment provided that the Contractor placed his order and submitted shop drawings for such equipment promptly after execution of the Contract, that he has shown due diligence in following the progress of the order, and that the time required for delivery is in accordance with conditions generally prevailing in the industry.) The Contractor agrees that he shall not have or assert any claim for nor shall he be entitled to any additional compensation or damages on account of such delays.

D. The time in which the Work is to be performed and completed is of the essence of this AGREEMENT.

1.14 LIQUIDATED DAMAGES

A. In case the Contractor fails to complete the Work satisfactorily on or before the date of completion fixed herein or as duly extended as hereinbefore provided, the Contractor agrees that the Owner shall deduct from the payments due the Contractor each month the sum set forth in Table A at the end of this section for each calendar day of delay, which sum is agreed upon not as a penalty, but as fixed and liquidated damages for each day of such delay. If the payments due the Contractor are less than the amount of such liquidated damages, said damages shall be deducted from any other moneys due or to become due the Contractor, and, in case such damages shall exceed the amount of all moneys due or to become due the Contractor, the Contractor or his Surety shall pay the balance to the Owner.

1.15 NIGHT, SATURDAY, SUNDAY AND HOLIDAY WORK

A. No work shall be done at night, on Saturday on Sunday or on a holiday except (1) usual protective work, such as pumping and the tending of lights, (2) work done in case of emergency threatening injury to persons or property, or (3) if all of the conditions set forth in the next paragraph below are met.

B. No work other than that included in (1) and (2) above shall be done at night except when (a) in the sole judgment of the Owner, the work will be of advantage to the Owner and can be performed satisfactorily at night, (b) the work will be done by a crew organized for regular and continuous night work, and (c) in the sole judgment of the Owner and Engineer, adequate noise prevention measures are incorporated into the Work by the Contractor to minimize any noise impact within the work area and (d) the Owner has given written permission for such night work. The Contractor is responsible for obtaining all permits and approvals required.

1.16 EMPLOY COMPETENT PERSONS

A. The Contractor shall employ only competent persons on the Work and shall not employ persons or means which may cause strikes, work stoppages or any disturbances by persons employed by the Contractor, any subcontractor, the Owner, the Engineer or any other contractor. Whenever the Engineer notifies the Contractor in writing that in his opinion any person on

the Work is incompetent, unfaithful, disorderly, or otherwise unsatisfactory, or not employed in accordance with the provisions of the Contract, such person shall be discharged from the Work and shall not again be employed on it, except with the written consent of the Engineer.

1.17 EMPLOY SUFFICIENT LABOR AND EQUIPMENT

A. If in the sole judgment of the Engineer the Contractor is not employing sufficient labor, plant, equipment or other means to complete the Work within the time specified, the Engineer may, after giving written notice, require the Contractor to employ such additional labor, plant, equipment and other means as the Engineer deems necessary to enable the Work to progress properly.

1.18 INTOXICATING LIQUORS AND/OR DRUGS

A. The Contractor shall not sell and shall neither permit nor suffer the introduction and/or use of intoxicating liquors and/or drugs upon or about the Work.

1.19 ACCESS TO WORK

A. The Owner, the Engineer, and their officers, agents, servants and employees may at any and all times and for any and all purposes, enter upon the Work and the site thereof and the premises used by the Contractor, and the Contractor shall at all times provide safe and proper facilities therefor.

1.20 EXAMINATION OF WORK

A. The Engineer shall be furnished by the Contractor with every reasonable facility for examining and inspecting the Work and for ascertaining that the Work is being performed in accordance with the requirements and intent of the Contract, even to the extent of requiring the uncovering or taking down portions of furnished work by the Contractor.

B. Should the work thus uncovered or taken down prove satisfactory, the cost of uncovering or taking down and the replacement thereof shall be considered as extra work unless the original work was done in violation of the Contract in point of time or in the absence of the Engineer or his inspector and without his written authorization, which case said cost shall be borne by the Contractor. Should the work uncovered or taken down prove unsatisfactory, said cost shall likewise borne by the Contractor.

C. Examination of inspection of the Work shall not relieve the Contractor of any of his obligations to perform and complete the Work as required by the Contract.

1.21 DEFECTIVE WORK, ETC.

A. Until acceptance and during the applicable guarantee period thereafter, the Contractor shall promptly, without charge, repair, correct or replace work, equipment, materials, apparatus or parts thereof which are defective, damaged or unsuitable or which in any way fail to comply with or be in strict accordance with the provisions and requirements of the Contract or applicable guarantee and shall pay to the Owner all resulting costs, expenses, losses or damages suffered by the Owner.

B. If any material, equipment, apparatus or other items brought upon the site for use or incorporation in the Work, or selected for the same, is rejected by the Engineer as unsuitable or not in conformity with the Specifications or any of the other Contract Documents, the Contractor shall forthwith remove such materials, equipment, apparatus and other items from the site of the Work and shall at his own cost and expense make good and replace the same and any material furnished by the Owner which shall be damaged or rendered defective by the handling or improper installation by the Contractor, his agents, servants, employees or subcontractors.

1.22 PROTECTION AGAINST WATER AND STORM

A. The Contractor shall take all precautions necessary to prevent damage to the Work by storms or by water entering the site of the Work directly or through the ground. In case of damage by storm or water, the Contractor shall at his own cost and expense make such repairs or replacements or rebuild such parts of the Work as the Engineer may require in order that the finished Work may be completed as required by the Contract.

1.23 RIGHT TO MATERIALS

A. Nothing in the Contract shall be construed as vesting in the Contractor any right of property in the materials, equipment, apparatus and other items furnished after they have been installed or incorporated

in or attached or affixed to the Work or the site, but all such materials, equipment, apparatus and other items shall, upon being so installed, incorporated, attached or affixed, become the property of the Owner. Nothing in this subsection shall relieve the Contractor of his duty to protect and maintain all such materials, equipment, apparatus and other items.

1.24 CHANGES

A. The Owner, through the Engineer, may make changes in the Work and in the Drawings and Specifications therefor by making alterations therein, additions thereto or omissions therefrom. All work resulting from such changes shall be performed and furnished under the pursuant to the terms and conditions of the Contract. If such changes result in an increase or decrease in the Work to be done hereunder, or increase or decrease the quantities thereof, adjustment in compensation shall be made therefor at the unit prices stipulated in the Contract for such work, except that if unit prices are not stipulated for such work, compensation for additional or increased work shall be made as provided hereinafter under the subsection titled "Extra Work"; and for eliminated or decreased work the Contractor shall allow the Owner a reasonable credit as determined by the Engineer.

B. Except in an emergency endangering life or property, no change shall be made unless in pursuance of a written order from the Engineer authorizing the change, and no claim for additional compensation shall be valid unless the change is so ordered.

C. The Contractor agrees that he shall neither have nor assert any claim for or be entitled to any additional compensation for damages or for loss of anticipated profits on work that is eliminated.

1.25 EXTRA WORK

A. The Contractor shall perform any extra work (work in connection with the Contract but not provided for herein) when and as ordered in writing by the Engineer, at the unit prices stipulated in the Contract for such work or, if none are so stipulated, whether (a) at the price agreed upon before such work is commenced and named in the written order for such work, or (b) if the Engineer so elects, for the reasonable cost of such work, as determined by the contractor and approved by the Engineer, plus a percentage of such cost, as set forth below. No extra work shall be paid for unless specifically ordered as such in writing by the Engineer.

B. The Contractor shall submit claim for any extra work within fourteen (14) calendar days of performing said extra work.

C. The cost of extra work done under (b) above shall include the reasonable cost to the Contractor of materials used and equipment installed, common and skilled labor, and foremen, and the fair rental of all machinery and equipment used on the extra work for the period of such use.

D. At the request of the Engineer, the Contractor shall furnish itemized statements for the cost of the extra work ordered as above and give the Engineer access to all records, accounts, bills and vouchers and correspondence relating thereto.

E. The Contractor may include in the cost of extra work the amounts of additional premiums, if any, (other than premiums on bonds) paid on the required insurance on account of such extra work, of Social Security or other direct assessments upon the Contractor's payroll by Federal or other properly authorized public agencies, and of other approved assessments when such assessments are not normally included in payments made by the Contractor directly to his employees, but in fact are, and are customarily recognized as, part of the cost of doing work.

F. The fair rental hourly rate for all machinery and equipment shall be based upon the most recent edition of "Rental Rate Blue Book" published by Equipment Watch or a similar publication approved by the Engineer. Hourly rental rates for machinery and equipment shall be developed by dividing the monthly Blue Book rates by 176 hours per month plus Estimated Hourly Operating Costs (FHWA rate). Rate Adjustment tables shall be utilized for equipment model year and region of operation. If said extra work requires the use of machinery or equipment not already on the site of the Work the cost of transportation, not exceeding a distance of 100 miles, of such machinery or equipment to and from the Work shall be added to the fair monthly rental; provided, however, that this shall not apply to machinery or equipment already required to be furnished under the terms of the Contract.

G. The Contractor shall not include in the cost of extra work any cost or rental of small tools, building, or any portion of the time of the Contractor, his superintendent, or his office and engineering staff.

H. To the cost of extra work done by the Contractor's own forces under (b) above (determined as stated above), the Contractor may add **15** percent to cover his overhead, use of capital, the premium on the Bonds as assessed upon the amount of this extra work, and profit.

I. In the case of extra work done under (b) by a subcontractor the subcontractor shall compute, as above, his cost for the extra work, to which he may add **15** percent as in the case of the Contractor. The Contractor shall be allowed an additional 5 percent of the subcontractor's initial cost for the extra work prior to the **15** percent adjustment, to cover the costs of the Contractor's overhead use of capital, the premium on the Bonds as assessed upon the amount of this work, and profit. Said subcontractor's cost must be reasonable and approved by the Engineer.

J. If extra work is done under (b) above, the Contractor and/or subcontractor shall keep daily records of such extra work. The daily record shall include the names of men employed, the nature of the work performed, and hours worked, materials and equipment incorporated, and machinery or equipment used, if any, in the prosecution of such extra work. This daily record, to constitute verification that the work was done, must be signed both by the Contractor's authorized representative and by the Engineer. A separate daily record shall be submitted for each Extra Work Order.

1.26 EXTENSION OF TIME ON ACCOUNT OF EXTRA WORK

A. When extra work is ordered near the completion of the Contract or at any time during the progress of the Work which unavoidably increases the time for the completion of the Work, and extension of time shall be granted as hereinbefore provided.

1.27 CHANGES NOT TO AFFECT BONDS

A. It is distinctly agreed and understood that any changes made in the Work or the Drawings or Specifications therefor (whether such changes increase or decrease the amount thereof or the time required for its performance) or any changes in the manner of time of payments made by the Owner to the Contractor, or any other modifications of the Contract, shall in no way annul, release, diminish or affect the liability of the Surety on the CONTRACT BONDS given by the Contractor, it being the intent hereof that notwithstanding such changes the liability of the Surety on said bonds continue and remain in full force and effect.

1.28 CLAIMS FOR DAMAGES

A. If the Contractor makes claim for any damages alleged to have been sustained by breach of contract or otherwise, he shall, within ten (10) days after occurrence of the alleged breach or within ten (10) days after such damages are alleged to have been sustained, whichever date is the earlier, file with the Engineer a written, itemized statement of the details of the alleged breach and the details and amount of the alleged damages. The Contractor agrees that unless such statement is made and filed as so required, his claim for damages shall be deemed waived, invalid and unenforceable, and that he shall not be entitled to any compensation for any such alleged damages. Within ten (10) days after the timely filing of such statement, the Engineer shall file with the Owner a copy of the statement, together with his recommendations for action by the Owner.

B. The Contractor shall not be entitled to claim any additional compensation for damages by reason of any direction instruction, determination or decision of the Engineer, nor shall any such claims be considered, unless the Contractor shall have complied in all respects with the Article titled "Authority of the Engineer", including, but not limited to the filing of a written protest in the manner and within the time therein provided.

1.29 ABANDONMENT OF WORK OR OTHER DEFAULT

A. If the Work shall be abandoned, or any part thereof shall be sublet without previous written consent of the Owner, or the Contract or any moneys payable hereunder shall be assigned otherwise than as herein specified, or if at any time the Engineer shall be of the opinion, and shall so certify in writing, that the conditions herein specified as to rate of progress are not being complied with, or that the Work or any part thereof is being unnecessarily or unreasonably delayed, or that the Contractor has violated or is in default under any of the provisions of the Contract, or if the Contractor becomes bankrupt or insolvent or goes or is put into liquidation or dissolution, either voluntarily or involuntarily, or petitions for an arrangement or reorganization under the Bankruptcy Act, or makes a general assignment for the benefit of creditors or otherwise acknowledges insolvency, the happening of any of which shall be and constitute a default under the Contract, the Owner may notify the Contractor in

writing, with a copy of such notice mailed to the Surety, to discontinue all Work or any part thereof; thereupon the Contractor shall discontinue such Work or such part thereof as the Owner may designate; and the Owner may, upon giving such notice, by contract or otherwise as it may determine, complete the Work or such part thereof and charge the entire cost and expense of so completing the Work or such part thereof to the Contractor. In addition to the said entire cost and expense of completing the Work, the Owner shall be entitled to reimbursement from the Contractor and the Contractor agrees to pay to the Owner any losses, damages, costs and expenses, including attorney's fees, sustained or incurred by the Owner by reason of any of the foregoing causes. For the purposes of such completion the Owner may for itself or for any Contractors employed by the Owner take possession of and use or cause to be used any and all materials, equipment, plant, machinery, appliances, tools, supplies and such other items of every description that may be found or located at the site of the Work.

B. All costs, expenses, losses, damages, attorney's fees and any and all other charges incurred by the Owner under this subsection shall be charged against the Contractor and deducted and/or paid by the Owner out of any moneys due of payable or to become due or payable under the Contract to the Contractor; in computing the amounts chargeable to the Contractor the Owner shall not be held to a basis of the lowest prices for which the completion of the Work or any part thereof might have been accomplished, but all sums actually paid or obligated therefor to effect its prompt completion shall be charged to and against the account of the Contractor. In case the costs, expenses, losses, damages, attorney's fees and other charges together with all payments theretofore made to or for the account of the Contractor are less than the sum which would have been payable under the Contract if the Work had been properly performed and completed by the Contractor, the Contractor shall be entitled to receive the difference, and, in case such costs, expenses, losses, damages, attorneys' fees and other charges, together with all payments theretofore made to or for the account of the Contractor, shall exceed the said sum, the Contractor shall pay the amount of the excess to the Owner.

1.30 PRICES FOR WORK

A. The Owner shall pay and the Contractor shall receive the prices stipulated in the BID made a part hereof as full compensation for everything performed and furnished and for all risks and obligations undertaken by the Contractor under and as required by the Contract.

1.31 MONEYS MAY BE RETAINED

A. The Owner may at any time retain from any moneys which would otherwise be payable hereunder so much thereof as the Owner may deem necessary to complete the Work hereunder and to reimburse it for all costs, expenses, losses, damage and damages chargeable to the Contractor hereunder, in accordance with the States General Laws.

1.32 FORMAL ACCEPTANCE

A. This Agreement constitutes an entire contract for one whole and complete Work or result. Fixing of the date of completion and acceptance of the Work or a specified part thereof shall only be effective when accomplished by a writing specifically so stating and signed by the Owner.

1.33 PROGRESS ESTIMATES

A. Once a month, except as hereinafter provided, the Engineer shall make an estimate in writing of the total amount and value of the work done to the first of the month by the Contractor. The Owner shall retain a percentage of such estimated value, as set forth in Table A at the end of this section, as part security for fulfillment of the Contract by the Contractor and shall deduct from the balance all previous payments made to the Contractor, all sums chargeable against the Contractor and all sums to be retained under the provisions of the Contract.

B. The Owner shall pay monthly to the Contractor the balance not deducted and/or retained as aforesaid, except that payment may be withheld at any time if, in the sole judgment of the Engineer, the work is not proceeding in accordance with the Contract. If the Owner deems it expedient to do so, it may cause estimates and payments to be made more frequently than one in each month. No progress estimate or payment need be made when, in the sole judgement of the Engineer, the total value of the work done since the last estimate amounts to less than the amount set forth in Table A at the end of this section.

C. Estimates of lump-sum items shall be based on a schedule dividing each such item into its appropriate component parts together with a quantity and a unit price for each part so that the sum of the products of prices and quantities will equal the Contract price for

the item. This schedule must be submitted by the Contractor for and must have the approval of the Engineer before the first estimate becomes due.

D. If the Engineer determines that the progress of the Work will be benefited by the delivery to the site of certain materials and equipment, when available, in advance of actual requirement therefor and if such materials and equipment are delivered and properly stored, protected and insured as determined by the Engineer, the cost to the Contractor or subcontractor as established by invoices or other suitable vouchers satisfactory to the Engineer, less the retained percentages as above provided, may be included in the progress estimates; provided always that there be duly executed and delivered by the Contractor to the Engineer at the same time a Bill of Sale in form satisfactory to the Owner, transferring and assigning to the Owner full ownership and title to such materials or equipment.

1.34 PARTIAL ACCEPTANCE

A. The Owner may, at any time in a written order to the Contractor (1) declare that he intends to use a specified part of the Work which in his opinion is sufficiently complete, in accordance with the Contract Documents, to permit its use; (2) enclose a tentative list of items remaining to be completed or corrected, and (3) fix the date of acceptance of that specified part of the Work.

B. Within 45 days after acceptance under this subsection, the Engineer shall make an estimate in writing of the amount and value of the part of the Work so accepted. The Owner shall pay said amount to the Contractor after deducting therefrom all previous payments, all charges against the Contractor as provided for hereunder, and all amounts to be retained under the provisions of the Contract, said payment to be made at the time of the next monthly progress estimate.

C. Acceptance by the Owner under this subsection shall not relieve the Contractor of any obligations under the Contract Documents except to the extent agreed upon in writing between the Owner and the Contractor.

D. The Owner shall have the right to exclude the Contractor from any part of the Work which has been accepted, but the Owner will allow the Contractor reasonable access thereto to complete or correct items on the tentative list.

1.35 FINAL ESTIMATE AND PAYMENT

A. All quantities shown on progress estimates and all prior payments shall be subject to correction in the final estimate and payment as determined by the Engineer.

B. The acceptance by the Contractor of final payment shall be and shall operate as a release to the Owner of all claims and all liability to the Contractor under or by virtue of this Agreement; and upon satisfactory completion of the work performed under this Agreement, as a condition before final payment under this Agreement or as a termination settlement under this Agreement the Contractor shall execute and deliver to the Owner a release of all claims against the Owner arising under or by virtue of, this Agreement, except claims which are specifically exempted by the Contractor to be set forth herein. Unless otherwise provided in this Agreement, by State law or otherwise expressly agreed to be the parties to this Agreement, any payment, including final payment under, this Agreement or settlement upon termination of this Agreement shall not constitute a waiver of the Owner's claims against the Contractor or his sureties under this Agreement or applicable Performance and Labor and Materials Bonds.

1.36 LIENS

A. If at any time any notices of lien are filed and labor performed or materials or equipment manufactured, furnished, or delivered to or for the Work, the Contractor shall, at its own cost and expense, promptly discharge, remove or otherwise dispose of the same, and until such discharge, removal or disposition, the Owner shall have the right to retain from any moneys payable hereunder an amount which, in its sole judgement, it deems necessary to satisfy such liens and pay the costs and expenses, including attorneys' fees, of defending any actions brought to enforce the same, or incurred in connection therewith or by reason thereof.

1.37 CLAIMS

A. If at any time there be any evidence of any claims for which the Contractor is or may be liable or responsible hereunder, the Contractor shall promptly settle or otherwise dispose of the same, and until such claims are settled or disposed of, the Owner may retain from any moneys which would otherwise be payable hereunder so much thereof as, in its sole judgement, it may deem necessary to settle or otherwise dispose of such claims and to pay the costs and expenses,

including attorney's fees, of defending any actions brought to enforce such claims, or incurred in connection therewith or by reason thereof.

1.38 APPLICATION OF MONEYS RETAINED

A. The Owner may apply any moneys retained hereunder to reimburse itself for any and all costs, expenses, losses, damage and damages, liabilities, suits, judgements and awards incurred, suffered or sustained by the Owner and chargeable to the Contractor hereunder or as determined hereunder.

1.39 NO WAIVER

A. Neither the inspection by the Owner or the Engineer, nor any order, measurement, approval, determination, decision or certificate by the Engineer, nor any order by the Owner for the payment of money, nor any payment for or use, occupancy, possession or acceptance of the whole or any part of the Work by the Owner, nor any extension of time, nor any other act or omission of the Owner or of the Engineer shall constitute or be deemed to be an acceptance of any defective or improper work, materials, or equipment nor operate as a waiver of any requirement or provision of the Contract, nor of any remedy, power or right of or herein reserved to the Owner, nor of any right to damages for breach of contract. Any and all rights and/or remedies provided for in the Contract are intended and shall be construed to be cumulative; and, in addition to each and every other right and remedy provided for herein or by law, the Owner shall be entitled as of right to a writ of injunction against any breach or threatened breach of the Contract by the Contractor, by his subcontractors or by any other person or persons.

1.40 LIABILITY OF OWNER

A. No person, firm or corporation, other than the Contractor who signed this Contract as such, shall have any interest herein or right hereunder. No claim shall be made or be valid either against the Owner or any agent of the Owner and neither the Owner nor any agent of the Owner shall be liable for or be held to pay any money, except as herein provided. The acceptance by the Contractor of the payment as fixed in the final estimate shall operate as and shall be a full and complete release of the Owner and of every agent of the Owner of and from any and all claims, demands, damages and liabilities of, by or to the Contractor for anything done or furnished for or arising out of or relating to or by reason of the Work or for or on account of any act or neglect of the Owner or of an agent of the Owner or of any other person, arising out of, relating to or by reason of the Work, except the claim against the Owner for the unpaid balance, if any there be, of the amounts retained as herein provided.

1.41 GUARANTEE

A. The Contractor guarantees that the Work and services to be performed under the Contract, and all workmanship, materials and equipment performed, furnished, used or installed in the construction of the same, shall be free from defects and flaws, and shall be performed and furnished in strict accordance with the Drawings, Specifications, and other Contract Documents, that the strength of all parts of all manufactured equipment shall be adequate and as specified and that the performance test requirements of the Contract shall be fulfilled. This guarantee shall be for a period of one year from and after the date of completion and acceptance of the Work as stated in the final estimate. If part of the Work is accepted in accordance with that subsection of this AGREEMENT titled "Partial Acceptance", the guarantee for that part of the Work shall be for a period of one year from the date fixed for such acceptance.

B. If at any time within the said period of guarantee any part of the Work requires repairing, correction or replacement, the Owner may notify the Contractor in writing to make the required repairs, correction, or replacements. If the Contractor neglects to commence making such repairs, correction, or replacements to the satisfaction of the Owner within three (3) days from the date of receipt of such notice, or having commenced fails to prosecute such Work with diligence, the Owner may employ other persons to make the same, and all direct and indirect costs of making said repairs, correction or replacements, including compensation for additional professional services, shall be paid by the Contractor.

1.42 RETAIN MONEY FOR REPAIRS

A. The Owner may retain out of the moneys otherwise payable to the Contractor hereunder a percentage of the amount thereof as set forth in Table A at the end of this section, and may expend the same, in the manner hereinafter provided, in making such repairs, corrections and replacements in the Work as the Owner, in its sole judgement, may deem necessary.

B. If at any time within the said period of guarantee any part of the Work requires repairing, correction or replacement, the Owner may notify the Contractor in

writing to make the required repairs, correction or replacements. If the Contractor neglects to commence making such repairs, correction, or replacements to the satisfaction of the Owner within three (3) days from the date of receipt of such notice, or having commenced fails to prosecute such work with diligence, the Owner may employ other persons to make the same. The Owner shall pay the cost and expense of the same out of the amounts retained for that purpose. Upon the expiration of the said period of guarantee, provided that the Work at that time is in good order, the Contractor will be entitled to receive the whole or such part of the sum last aforesaid, if any, as may remain after the cost and expense of making said repairs, correction or replacements, in the manner aforesaid, have been paid therefrom.

1.43 RETURN OF DRAWINGS

A. All Drawings furnished by the Owner or the Engineer to the Contractor may be used only in connection with the prosecution of the Work and shall be returned by the Contractor upon completion of the Work.

1.44 CLEANING UP

A. The Contractor at all times shall keep the site of the Work free from rubbish and debris caused by his operations under the Contract. When the Work has been completed, the Contractor shall remove from the site of the Work all of his plant, machinery, tools, construction equipment, temporary work, and surplus materials so as to leave the Work and the site clean and ready for use.

1.45 LEGAL ADDRESS OF CONTRACTOR

A. The Contractor's business address and his office at or near the site of the Work are both hereby designated as places to which communications shall be delivered. The depositing of any letter, notice, or other communication in a postpaid wrapper directed to the Contractor's business address in a post office box regularly maintained by the Post Office Department or the delivery at either designated address of any letter, notice, or other communication by mail or otherwise shall be deemed sufficient service thereof upon the Contractor, and the date of such service shall be the date of receipt. The first-named address may be charged at any time by an instrument in writing, executed and acknowledged by the Contractor delivered to the Engineer. Service of any notice, letter, or other communication upon the Contractor personally shall likewise be deemed sufficient service.

1.46 HEADINGS

A. The headings or titles of any section, subsection, paragraph, provision, or part of the Contract Documents shall not be deemed to limit or restrict the content, meaning or effect of such section, subsection, paragraph, provision or part.

1.47 MODIFICATION OR TERMINATION

A. Except as otherwise expressly provided herein, the Contract may not be modified or terminated except in writing signed by the parties hereto.

1.48 REMEDIES AND ARBITRATION

A. The Contractor's attention is directed to the fact that this Contract is subject to the Public Works Arbitration Act of R.I. General Laws Section 37-16-1 et., seq Unless otherwise provided in this agreement, all claims, counterclaims, disputes and other matters in question between the Owner and the Contractor arising out of, or relating to, this Agreement or in performance interpretation or breach of it will be decided by arbitration at the election of either party, or in a court of competent jurisdiction within the State in which the Owner is located.

B. Any dispute to be arbitrated shall be done so in accordance with the Construction Industry Arbitration Rules and Regulations of the American Arbitration Association, and judgment upon the award rendered by the Arbitrator(s) may be entered in any court having jurisdiction thereof.

C. However, to the extend allowed by law, if neither party wishes to elect arbitration, and if both parties agree, such claim or controversy may be litigated in a court of competent jurisdiction, as provided in this Agreement. Furthermore, if either party elects to bring such claim or controversy to arbitration, it shall first notify the other party and allow that other party ten (10) calendar days (before filing) within which to have the claim mediated, and shall negotiate in good faith during any such mediation effort.

D. In addition, the method of the appointment of an arbitrator shall vary for the method set forth in Article 13 (Appointment form Panel) of the American Arbitration Association (AAA) Construction Industry Arbitration Rules only so far as that: the AAA Shall submit a second, but no further, set of lists should the parties fail to agree upon any of the persons names, or if acceptable arbitrators are unable to act, or if for any

other reason the appointment cannot be made from the original submitted lists. If for any reason an appointment cannot be made from the second set of lists, the AAA shall have the power to make the appointment from other members of the Panel without the submission of any additional lists.

1.49 DIRECT LABOR COST

A. Direct labor cost percentage for change orders shall be ____ percent. (Direct labor cost percent shall be established following award and prior to execution of the Contract).

1.50 MINORITY BUSINESS

A. The goal for minority business enterprise (MBE/WBE) participation for this contract is a minimum of **ten percent 10%)** MBE, on the basis of the total dollars paid. The Contractor shall take all affirmative steps necessary to achieve this goal, and shall provide reports documenting the portion of contract and subcontract dollars paid to minority businesses, and its efforts to achieve the goals, with each invoice submitted or at such greater intervals as specified by the **City of Warwick**. The Contractor shall require similar reports from its subcontractors.

1.51 TERMINATION FOR CONVENIENCE

A. This Agreement may be terminated by the Owner upon not less than seven days' written notice for the Owner's convenience. In the case of termination for convenience, the Owner shall be responsible for amounts due the Contractor for work performed through the date of termination, provided that the Contractor shall submit a request for payment in accordance with the provisions hereof. The Contractor shall have no other claim for payments due with respect to such termination including any claim for lost profits with respect to the balance of the project.

1.52 EQUAL EMPLOYMENT OPPORTUNITY, ANTIDISCRIMINATION AND AFFIRMATIVE ACTION

A. The Contractor shall not discriminate against or exclude any person from participation herein on grounds of race, religion, color, sex, age, or national origin; and that it shall take affirmative actions to insure that applicants are employed, and that employees are treated during their employment, without regard to race, religion, color, sex, age, handicapped status, or national origin.

1.53 PRICE ADJUSTMENT – LIQUID ASPHALT AND DIESEL FUEL

A. The intent of this provision is to insure adequate and fair compensation for unpredictable and fluctuating costs which, from time to time, occur in the prices of Liquid Asphalt and Diesel Fuel. The price adjustment provisions are made part of the Contract to assure more realistic bidding and encourage competition.

B. The base price is the unit price of the material (FOB Terminal), as determined by the RIDOT, just prior to the project bid date.

C. The period price is the unit price of the material (FOB Terminal), as determined by the RIDOT, for any one month period following the bid date during which the price varies from the base price.

D. Price adjustment will be determined by the difference between the Period Price and the Base Price. Price adjustments will only be made at the end of each month during which; a) work was accomplished on the project; and b) prices increase or decrease by 15% or more. Price adjustments will not be allowed beyond the completion date of the Contract or an approved extension thereof.

E. Liquid Asphalt Cement. The asphalt content will be the optimum amount used in every ton of bituminous concrete mixture, as determined by the RIDOT Standard Specifications. The Price Adjustment will be determined by multiplying the total weight of liquid asphalt, in tons, by the difference between the base price and period price.

F. Diesel Fuel. The fuel for operating the plant, and the fuel for hauling and placing bituminous concrete, will equal the total number of tons of bituminous concrete placed during the month in question times a fuel adjustment factor of 2.5 gallons of fuel per ton of bituminous concrete. Tonnage of bituminous concrete placed during the month in question will equal the sum of the weights indicated on the Daily Automated Recordation printout slips provided at the plant. The Price Adjustment will be determined by multiplying the total volume of fuel, in gallons, by the difference between the base price and the period price.

G. No price adjustment will be made for Liquid Asphalt Cement or Diesel Fuel unless the amount of the adjustment exceeds $500.00 and more than 15% for the month.

IN WITNESS WHEREOF, the parties to this AGREEMENT have hereunto set their hands and seals, and have executed, or caused to be executed by their duly authorized officials, the AGREEMENT in Four (4) copies, each of which shall be deemed an original, as of the day and year first above-written.

WITNESSES

City of Warwick, Rhode Island**,**
(Owner - party of the first part)

(SEAL)

BY: _____
(Signature)

_____
(Title)

ATTEST:

_____
(Signature)

_____

_____
(Contractor - party of the second part)

(SEAL)

BY: _____
(Signature)

_____
(Title)

_____
(Address)

ATTEST:

_____
(Signature)

_____

Approved As To Form:

_____
Legal Counsel for **City of Warwick,** Rhode Island

CERTIFICATE OF ACKNOWLEDGMENT OF CONTRACTOR IF A CORPORATION

For AGREEMENT

State of _____)

County _____)

on this _____ day of _____, 20 _____, before me personally

came _____ to me known, who being me duly

sworn, did depose and say as follows:

That he resides at _____

and is the _____

of _____

the corporation described in and which executed the foregoing instrument; that he knows the corporate seal of said corporation; that the seal affixed to the foregoing instrument is such corporate seal and it was so affixed by order of the Board of Directors of said corporation; and that by the like order he signed thereto his name and official designation.

_____

Notary Public (Seal)

My commission expires _____

CERTIFICATE OF OWNER'S LEGAL COUNSEL

I, the undersigned, _____ the duly authorized and acting legal

representative of the _____, acting herein through its

_____, do hereby certify as follows:

I have examined the foregoing contract and surety bonds and the manner of execution thereof, and I am of the opinion that each of the aforesaid agreements has been duly executed by the proper parties thereto acting through their duly authorized representatives; that said representatives have full power and authority to execute said agreements on behalf of the respective parties named thereon; and that the foregoing agreements constitute valid and legally binding obligations upon the parties executing the same in accordance with the terms, conditions, and provisions thereof.

By: _____
(Signature)

Date: _____

_____
(Name)

_____
(Title)

_____
(Address)

_____
(City, State, Postal code)

TABLE A

Agreement Subsection Reference	Item	Minimum limits
1.06	Workman's Compensation and Employer's Liability Insurance	As required by the law of the State of Massachusetts
1.06	General Liability including Contractor's Protective, Completed Operations and Contractual Liability	Bodily Injury/Property Damage including C.U. Coverage _____ **$1,000,000** (Each Occurrence) **$2,000,000** (Aggregate) _____ Blasting and explosion coverage shall be obtained if there is a need for blasting under the contract.
1.06	Personal Injury Insurance	**$2,000,000** (Aggregate)
1.06	Automobile Liability including coverage for owned, hired or borrowed vehicles	Bodily Injury/Property Damage _____ **$1,000,000** Combined Single Limit (Each Occurrence)
1.06	Owner's/Contractor's Protective (OCP) Liability & Property Damage	Bodily Injury/Property Damage _____ **$3,000,000** (Each Occurrence) **$3,000,000** (Aggregate)
1.06	Excess/Umbrella Liability Coverage	**$5,000,000** (Each Occurrence) **$5,000,000** (Aggregate)
1.06	Builder's Risk Insurance (If Applicable)	Total insurable value of all structures, materials, and equipment to be built and installed.
1.13	a) Time of Completion - Total Contract	Within **450** consecutive calendar days after the date specified in the Notice to Proceed
1.14	Liquidated Damages for each consecutive calendar day of delay in completion time	$1,000

1.33	Percentage of Progress Estimates to be Retained The retainage to be paid the Contractor within Ninety (90) days of the date the work is accepted By the awarding authority unless a dispute exists With respect to the work.	5%

1.33	Amount of Minimum Progress Estimates	$10,000

INSURANCE CERTIFICATE
SHEET 1 OF 2
Issued to
The City of Warwick, Rhode Island

This is to certify that this Company, _____, (Name of Insurance Company) has enforced the following policies covering all work and operations of _____ (Name of Contractor), as the designate Contractor under a Contract with the the City of Warwick, Rhode Island, as the designated Owner, dated _____ City Hall Plaza Site Improvements, Bid No. 2024-322.

POLICY NUMBER EFFECTIVE AND KINDS OF INSURANCE	LIMITS		EXPIRATION DATE
Workmen's Compensation and Employers Liability and Harbor Workers Coverage *			Number: _____ Effective: _____ Expires: _____
Public Liability including Contractor's Protective Personal Injury, Completed Operations, and Contractual Liability**	Bodily Injury	$_____ each occurrence $_____ aggregate	Number: _____ Effective: _____ Expires: _____
***Note: Explosion Collapse and underground coverage is provided	Property Damage including C.U. Coverage***	$_____ each occurrence $_____ aggregate	
	Personal Injury	$_____ aggregate	

* Longshoremen's and Harbor Workers' Coverage may be deleted if not required by contract.

** Contractual Liability covers the liability assumed by the Contractor under the subsection entitled "Obligations and Liability of Contractor" of the AGREEMENT, as required by subsection entitled "Insurance" of the agreement.

*** Blasting coverage is not required.

INSURANCE CERTIFICATE
SHEET 2 OF 2
Issued to
The City of Warwick, Rhode Island

Contract Reference: City of Warwick, Rhode Island,
City Hall Plaza Site Improvements, Bid No. 2024-322.

POLICY NUMBER EFFECTIVE AND KINDS OF INSURANCE	LIMITS		EXPIRATION DATE
Automobile Liability including Coverage for hired or borrowed vehicles	Bodily Injury	$_____ each person $_____ each occurrence	Number: _____ Effective: _____ Expires: _____
	Property Damage	$_____ each occurrence	
Owner's Protective Liability and Property Damage	Bodily Injury	$ _____ each occurrence $ _____ aggregate	Number: _____ Effective: _____
	Property Damage	$ _____ each occurrence $ _____ aggregate	

Note: A copy of the Owner's Protective Policy for the Owner is to be furnished with the completed certificates.

City of Warwick, Rhode Island, to be named as additional insured as applicable.

It is agreed that thirty (30) days notice of cancellation or restrictive amendment of said policies shall be mailed to Owner.

_____
INSURANCE COMPANY

_____
INSURANCE AGENCY

BY: _____
AUTHORIZED AGENT OR OFFICER

DATE: _____

SECTION 00600

CONTRACT BONDS

PERFORMANCE BOND

(NOTE: This Bond is issued simultaneously with the attached Labor and Materials Bond in favor of the Owner.)

KNOW ALL MEN BY THESE PRESENTS:

That we, _____
(an individual, a partnership, a corporation)

duly organized under the Laws of the State of _____,

and having a usual place of business at _____,

_____,

as Principal, and _____ , a corporation duly organized

under the Laws of the State of _____,

and duly authorized to do business in the State Rhode Island of _____,

and having a usual place of business at _____
as Surety, are holden and stand firmly bound and obligated unto **City of Warwick,** Rhode Island, as obligee, in the sum of

_____

lawful money of the United States of America, to and for the true payment whereof we bind ourselves and, each of us, our heirs, executors, administrators, successors, and assigns, jointly and severally, firmly by these presents.

WHEREAS, the Principal, be means of a written AGREEMENT (which together with the Contract Documents in said AGREEMENT referred to are collectively sometimes referred to as the "Contract") dated _____, has entered into a contract with the said obligee **City Hall Plaza Site Improvements, Bid No. 2024-322** in the **City of Warwick,** Rhode Island**,** a copy of which agreement is attached hereto and by references made a part hereof.

NOW THEREFORE, THE CONDITION of this obligation is such that if the Principal shall well and truly keep and fully and faithfully perform all of the terms and conditions of said AGREEMENT and of the "Contract Documents" referred to in said AGREEMENT (which collectively are hereinafter and in said AGREEMENT sometimes referred to as the "Contract") and all modifications thereof on the Principal's part to be performed, this obligation shall be void; otherwise it shall remain in full force and effect.

Whenever the said Principal shall be, and declared by the Owner to be, in default under the said Contract, the Owner having performed the Owner's obligations thereunder Surety, for value received, shall promptly remedy the default, or, at the option of the Owner, shall promptly.

(a) Complete the said AGREEMENT and/or Contract in accordance with its terms and conditions, or

(b) Obtain a bid or bids for submission to and the approval of the Owner for completing the said AGREEMENT and/or Contract and any modifications thereof in accordance with the terms and conditions thereof, and upon determination by the Owner and the Surety of the lowest responsible and acceptable bidder, arrange for a contract between such bidder and the Owner, and make available to the Owner as the work progresses (even though there should be default or a succession of defaults under the contract or contracts of completion arranged under this paragraph) sufficient funds to pay the cost of completion less a sum that shall be equal to the difference between the Contract price as fixed and provided in said AGREEMENT and/or Contract or any modifications thereof to be pair thereunder to the Principal and the amount previously paid by the Owner to and/or for the account of and/or chargeable against the Principal, but not exceeding (including other costs and damages for which the Surety may be liable hereunder) the amount set forth in the first paragraph hereof.

The Surety, for value received, agrees further that no changes in, omissions from, or alterations, modifications or additions to the terms and provisions of said AGREEMENT and/or Contract or the Work to be performed thereunder, and that no extensions of time given or changes made in the manner or time of making payments thereunder, shall in any way effect the Surety's obligations on this bond, and the Surety hereby waives notice of any such changes, omissions, alterations, modifications, additions or extensions.

No right of action shall accrue on this Bond to or for the use of any persons other than the Owner named herein or the heirs, executors, administrators, successors and assigns of the Owner.

IN WITNESS WHEREOF, we have hereunto set our hands and seals to _____

_____ counterparts of this bond, this _____ day of _____,

in the year Two Thousand and _____.

_____ (SEAL)
Principal

_____ (SEAL)
Principal

_____ (SEAL)
Principal

_____ (SEAL)
Surety

_____ (SEAL)
Surety

NOTE:

If the Principal (Contractor) is a partnership, the Bond should be signed by each of the partners.

If the Principal (Contractor) is a corporation, the Bond should be signed in its correct corporate name by its duly authorized officer or officers.

If this Bond is signed on behalf of the Surety by an attorney-in-fact, there should be attached to it a duly certified copy of his power of attorney showing his authority to sign such Bonds.

There should be executed an appropriate number of counterparts of the Bond corresponding to the number of counterparts of the AGREEMENT.

Date of Bond must not be prior to the date of Contract.

Important

Surety Companies executing BONDS must appear on the U.S. Treasury Department's most current list of "Companies Holding Certificates of Authority as Acceptable Sureties on Federal Bonds and as Acceptable Reinsuring Companies" as published in Circular 570 (amended) by the Audit Staff Bureau of Accounts and be authorized to transact business in the state where the PROJECT is located.

The attention of the Surety Companies and Principal executing this Performance Bond is Directed to the fact that said Bond shall remain in full effect throughout the life of any guaranty or warranty periods stipulated in the Contract Documents and/or Agreement.

LABOR AND MATERIALS BOND

(NOTE: This Bond is issued simultaneously with the attached Performance Bonds in favor of the Owner.)

KNOW ALL MEN BY THESE PRESENTS:

That we, _____
(an individual, a partnership, a corporation)

duly organized under the Laws of the State of _____,

having a usual place of business at _____,

_____,

as Principal, and _____a corporation duly organized

under the Laws of the State of _____,

and duly authorized to do business in the State of Rhode Island,

and having a usual place of business at _____,
as Surety, are holden and stand firmly bound and obligated unto the **City of Warwick,** Rhode Island, as obligee, in the sum of

_____
lawful money of the United States of America, to and for the true payment whereof we bind ourselves and, each of us, our heirs, executors, administrators, successors, and assigns, jointly and severally, firmly by these presents.

WHEREAS, the Principal, be means of a written AGREEMENT (which together with the Contract Documents in said AGREEMENT referred to are collectively sometimes referred to as the "Contract") dated _____ , has entered into a contract with the said obligee for **City Hall Plaza Site Improvements, Bid No. 2024-322** in the **City of Warwick,** Rhode Island**,** a copy of which agreement is attached hereto and by references made a part hereof.

NOW, THEREFORE, THE CONDITION of this obligation is such, that if the Principal shall promptly make payments to all claimants as hereinafter defined, for all labor performed or furnished and for all materials and equipment furnished for or used in or in connection with the Work called for by said AGREEMENT and/or Contract and any modifications thereof, including lumber used but not incorporated in said Work, and for the rental or hire of vehicles, tools and other appliances and equipment furnished for or used in connection with said Work, this obligation shall be void; otherwise it shall remain in full force and effect, subject, however, to the following conditions:

(a) A claimant is defined as one having a direct contract with the Principal or with a subcontractor of the Principal for labor, materials and/or equipment used or reasonably required for use in the performance of the said Work, labor and materials being construed to include that part of water, gas, power, light, heat, oil, gasoline, telephone service or rental or equipment directly applicable to the said AGREEMENT and/or Contract and any modifications thereof.

(b) The above named Principal and Surety hereby jointly and severally agree with the Owner that every claimant as herein defined, who has not been paid in full before the expiration of a period of ninety (90) days after the date on which the last of such claimant's work or labor was done or performed, or materials or equipment were furnished by such claimant, may sue on this bond for the use of such claimant, prosecute the suit to final judgment for such sum or sums as may be justly due claimant, and have execution thereon. The Owner shall not be liable for the payment of any costs or expenses of any such suit.

(c) No suit or action shall be commenced hereunder by any claimant.

Unless claimant, other than one having a direct contract with the Principal, shall have given written notice to any two of the following: the Principal, the Owner, or the Surety above named, within ninety (90) days after such claimant did or performed the last of the work or labor, or furnished the last of the materials or equipment for which said claim is made, stating with substantial accuracy the amount claimed and the name of the party to whom the materials or equipment were furnished, or for whom the work or labor was done or performed. Such notice shall be served by mailing the same by registered mail or certified mail, postage prepaid, in an envelope addressed to the Principal, Owner or Surety at any place where an office is regularly maintained for the transaction of business, or served in any manner in which legal process may be served in the state in which the said Work is located, save that such service need not be made by a public officer;

After the expiration of one (1) year following the date on which the Principal ceased work on said AGREEMENT and/or Contract and any modifications thereof, it being understood, however, that if any limitation embodied in this bond is prohibited by any law controlling the construction hereof, such limitation shall be deemed to be amended so as to be equal to the minimum period of limitation permitted by such law.

Other than in a state court of competent jurisdiction in and for the county or other political subdivision of the State in which the said Work, or any part thereof, is situated, or in the United States District Court for the district in which the said Work, or any part thereof, is situated, and not elsewhere.

(d) The amount of this bond shall be reduced by and to the extent of any payment or payments made in good faith hereunder, inclusive of the payment by Surety of mechanics liens which may be filed of record against said AGREEMENT and/Contract or said Work, whether or not claim for the amount of such lien be presented under and against this bond.

The surety, for value received, agrees further that no changes in, omissions from, or alterations, modifications or additions to the terms and provisions of said AGREEMENT and/or Contract or the Work to be performed thereunder, and that no extensions of time given or changes made in the manner or time of making payments thereunder, shall in any way affect the Surety's obligations on this Bond, and the Surety hereby waives notice of any such changes, omissions, alterations, modifications, additions or extensions.

IN WITNESS WHEREOF, we have hereunto set our hands and seals to _____

counterparts of this Bond, this _____ day of _____, in

the year Two Thousand and _____.

_____ (SEAL)
Principal

_____ (SEAL)
Principal

_____ (SEAL)
Principal

_____ (SEAL)
Surety

_____ (SEAL)
Surety

NOTE:
If the Principal (Contractor) is a partnership, the Bond should be signed by each of the partners.

If the Principal (Contractor) is a corporation, the Bond should be signed in its correct corporate name by its duly authorized officer or officers.

If this Bond is signed on behalf of the Surety by an attorney-in-fact, there should be attached to it a duly certified copy of his power of attorney showing his authority to sign such Bonds.

There should be executed an approximate number of counterparts of the Bond corresponding to the number of counterparts of the AGREEMENT.

Date of Bond must not be prior to the date of Contract.

Important

Surety Companies executing BONDS must appear on the Treasury Department's most current list (Circular 570 as amended) and be authorized to transact business in the state where the PROJECT is located.

The attention of the Surety Companies and Principal executing this Labor and Materials Bond is directed to the fact that said Bond shall remain in full effect throughout the life of any guaranty or warranty periods stipulated in the Contract Documents and/or Agreement.

CERTIFICATE OF ACKNOWLEDGMENT OF CONTRACTOR IF A CORPORATION
For CONTRACT BONDS

State of _____

County of _____

On this _____ day of _____, 20 _____, before

me personally came _____ to me known, who being by me duly

sworn, did depose and say as follows:

That he resides at _____

and is the _____

of _____

the corporation described in and which executed the foregoing instrument; that he knows the corporate seal of said corporation; that the seal affixed to the foregoing instrument is such corporate seal and it was so affixed by order of the Board of Directors of said corporation; and that by the like order he signed thereto his name and official designation.

_____
Notary Public (Seal)

My commission expires _____

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SECTION 00700

GENERAL CONDITIONS

1.01 GENERAL PROVISIONS

A. The duties and obligations imposed by these General Conditions will be as effective as if repeated specifically in the Contract Documents in connection with each particular duty, obligation, right and remedy to which they apply.

B. Sections of Division 1, General Requirements govern the execution of the Work of all sections of the specifications.

C. The Specifications are written in imperative and streamlined form. This imperative language is directed to the Contractor, unless stated otherwise.

1.02 DEFINITIONS

A. Wherever the words as listed in subsection 1.01 of the AGREEMENT or pronouns used in their stead occur in the Contract Documents, they shall have the meanings as given in the AGREEMENT.

1.03 MATERIALS AND EQUIPMENT

A. General

1. Unless otherwise provided in the Contract Documents, only new materials and equipment shall be incorporated in the Work.

2. As soon as possible after execution of the AGREEMENT, submit to the Engineer the names and addresses of the manufacturers and suppliers of all materials and equipment proposed to be incorporated into the Work.

3. When shop and working drawings are required as specified below, submit, prior to the submission of such drawings, data in sufficient detail to enable the Engineer to determine whether the manufacturer and/or the supplier have the ability to furnish a product meeting the Specifications.

4. Submit data relating to the materials and equipment proposed to be incorporated into the Work in sufficient detail to enable the Engineer to identify and evaluate the particular product and to determine whether it conforms to the Contract requirements. Such data shall be submitted in a manner similar to that specified for submission of shop and working drawings.

B. Handling

1. Handle, haul, and distribute materials and all surplus materials on the different portions of the Work, required to complete the Work in accordance with the Contract Documents.

2. Provide suitable storage room for materials and equipment during the progress of the Work, and be responsible for the protection, loss of, or damage to materials and equipment furnished under this Contract, until the final completion and acceptance of the Work.

3. Pay all storage and demurrage charges by transportation companies and vendors.

C. Storage of Excavated Material

1. Place excavated materials and equipment to be incorporated in the Work so as not to injure any part of the Work or existing facilities and so that free access can be had at all times to all parts of the Work and to all public utility installations in the vicinity of the Work.

2. Materials shall be kept neatly piled and compactly stored in such locations as will cause a minimum of inconvenience to public travel and adjoining owners, tenants and occupants.

D. Inspection

1. All materials and equipment furnished by the Contractor to be incorporated in the Work shall be subject to the inspection of the Engineer.

2. No material shall be processed or fabricated for the Work or delivered to the work site without prior concurrence of the Engineer.

3. Facilities and labor for the storage, handling, and inspection of all materials and equipment shall be furnished by the Contractor.

4. Defective materials and equipment shall be removed immediately from the site of the Work.

E. Inspection away from Site

1. If work to be done, away from the construction site, is to be inspected on behalf of the Owner during its fabrication, manufacture, or testing, or before shipment, the Contractor shall give notice to the Engineer of the place and time where such fabrication, manufacture, testing, or shipping is to be done. Such notice shall be in writing and delivered to the Engineer in ample time, as determined solely by the Engineer, so that the necessary arrangements for the inspection can be made.

F. Samples

1. Submit samples of materials for tests, as the Engineer deems necessary to demonstrate conformance with the Specifications. Such samples, including concrete test cylinders, shall be furnished, taken, stored, packed, and shipped by the Contractor as directed by the Engineer.

2. Furnish suitable molds for making concrete test cylinders. Except as otherwise expressly specified, the Owner shall make arrangements for, and pay for, the tests.

3. Pack samples so as to reach their destination in good condition, and label to indicate the material represented, the name of the building or work and location for which the material is intended, and the name of the Contractor submitting the sample. To ensure consideration of samples, notify the Engineer by letter that the samples have been shipped and properly describe the samples in the letter. Send letter of notification separate from the samples.

4. Submit data and samples, or place his orders, sufficiently early to permit consideration, inspection and testing before the materials and equipment are needed for incorporation in the Work. The consequences for failure to do so shall be the Contractor's sole responsibility.

5. In order to demonstrate the proficiency of workmen, or to facilitate the choice among several textures, types, finishes, surfaces, etc., provide such samples of workmanship of wall, floor, finish, etc., as may be required.

6. After review of the samples, data, etc. the materials and equipment used for the Work shall in all respects conform therewith.

G. Shop Testing

1. When required, furnish to the Engineer in triplicate, sworn copies of manufacturer's shop or mill tests (or reports from independent testing laboratories) relative to materials, equipment performance ratings, and concrete data.

1.04 CONTRACTOR'S SHOP AND WORKING DRAWINGS

A. Submit shop drawings to the Engineer for review and approval.

B. All submittals will be identified as the Engineer may require and in the number of copies also as required by the Engineer.

C. The data shown on the Shop Drawings will be complete regarding quantities, dimensions, specified performance and design criteria, materials and other

data as particular to the Work that the Contractor proposes to provide.

1.05 OCCUPYING PRIVATE LAND

A. Entering or occupying with men, tools, materials, or equipment, any land outside the rights-of-way or property of the Owner (except after written consent from the proper parties) will not be permitted. A copy of the written consent shall be given to the Engineer.

1.06 INTERFERENCE WITH AND PROTECTION OF STREETS

A. Obtain permits from the governing authorities prior to obstructing any portion of a street, road, or private way. If any street, road or private way is rendered unsafe by the Contractor's operations, he shall make such repairs or provide such temporary ways or guards as ordered by the governing authorities.

B. Maintain streets, roads, private ways, and walks not closed in a passable and safe condition,

C. Provide at least 24 hours in advance, notice to the Owner, Police, Fire and School Departments in writing, with a copy to the Engineer, if the closure of a street or road is necessary. Cooperate with all Departments in the establishment of alternate routes and provide adequate detour signs, plainly marked and well lighted, in order to minimize confusion.

1.07 SAFETY

A. Take all precautions and provide safeguards to prevent personal injury and property damage. Provide protection for all persons including but not limited to employees and employees of other contractors and subcontractors; members of the public; and employees, agents and representatives of the Owner, the Engineer, and regulatory agencies that may be on or about the Work. Provide protection for all public and private property including but not limited to structures, pipes, and utilities, above and below ground.

B. Provide and maintain all safety equipment such as fences, barriers, signs, lights, walkways, guards and fire prevention and fire-fighting equipment.

C. Comply with all applicable Federal, State and local laws, ordinances, rules and regulations and lawful orders of all authorities having jurisdiction for the safety of persons and protection of property.

D. Designate a responsible member of his organization at the site whose duty shall be the prevention of accidents. This responsible person shall have the authority to take immediate action to correct unsafe or hazardous conditions and to enforce safety precautions and programs.

1.08 EXISTING FACILITIES

A. Dimensions of Existing Structures

1. Where the dimensions and locations of existing structures are of importance in the installation or connection of any part of the Work, verify such dimensions and locations in the field before the fabrication of any material or equipment which is dependent on the correctness of such information.

B. Proposed Pipe Location

1. Exterior pipelines will be located substantially as indicated on the Drawings, but the right is reserved to the Owner, acting through the Engineer, to make such modifications in location as may be found desirable to avoid interference with existing structures or for other reasons. Where fittings, etc., are noted on the Drawings, such notation is for the Contractor's convenience and does not relieve him for laying and jointing different or additional items where required.

2. Small interior piping is indicated diagrammatically on the Drawings, and the exact location is to be determined in the field. Piping shall be arranged in a neat, compact, and workmanlike manner, with a minimum of crossing and interlacing, so as not to interfere with equipment or access way, and, in general, without diagonal runs.

C. Interference with Existing Works

1. Conduct operations so as to interfere as little as possible with existing works. Develop a program, in cooperation with the Engineer and interested officials, which shall provide for the construction and putting into service of the new works in the most orderly manner possible. This program shall be adhered to except as deviations therefrom are expressly permitted. All work of connecting with, cutting into, and reconstructing existing pipes or structures shall be planned to interfere with the

operation of the existing facilities for the shortest time when the demands on the facilities best permit such interference, even though it may be necessary to work outside of normal working hours to meet these requirements. Electrical connections should be coordinated with the Owner so as to minimize disruption of normal plant operations. Before starting work which will interfere with the operation of existing facilities, perform preparatory work and see that all tools, materials and equipment are made ready and at hand.

2. Repair utilities damaged by the Contractors operations during the progress of the work and be responsible for correcting all damages to existing utilities and structures at no additional expense to the Owner. Contact the proper utility or authority to correct or make any changes due to utility or other obstructions during the work but the entire responsibility and expense shall be with the Contractor.

3. Make such minor modifications in the work relating to existing structures as may be necessary, without additional compensation.

4. Submit no claim for additional compensation by reason of delay or inconvenience in adapting his operations to the need for continuous flow of sewage.

D. Existing Utilities or Connections

1. The location of existing underground pipes, conduits, and structures, as shown, has been collected from the best available sources. The Owner, together with its agents, does not imply nor guarantee the data and information in connection with underground pipes, conduits, structures and such other parts as to their completeness, nor their locations as indicated. The Contractor shall assume that there are existing water, sewer, gas and other utility connections to each and every building enroute, whether they appear on the drawings or not. An expense and/or delay occasioned by utilities and structures, or damage thereof, including those not shown, shall be the responsibility of the Contractor, at no additional expense to the Owner.

2. Above ground utilities may be present in the areas of the proposed Work. Take all necessary actions and/or precautions, including, but not limited to, utility company notification and necessary relocations (both temporary and permanent), to ensure proper protection of those aboveground utilities and appurtenances to be affected by his operations. All costs associated with the aboveground utilities shall be paid by the Contractor at no additional expense to the Owner.

3. If and when encountered, existing utilities shall be properly supported and protected during the construction work and the Engineer shall be notified accordingly. The operation of existing utilities shall not be interrupted except with written permission of the operator and owner of such utilities. Allow ample time for all measures as may be required for the continuance of existing utility operations. Take extreme precautions to minimize disruption of utilities. Make prompt and full restitution for repairs by others for all disruptions caused by operations required to perform the Work.

4. Comply with all requirements of utility organizations involved.

E. Failure to Repair

1. Any emergency rising from the interruption of electric, telephone, gas, water, or sewer service due to the activities of the Contractor, shall be repaired by the Contractor as quickly as is possible.

2. If and when, in the opinion of the Owner, the Contractor is not initiating repair work as expeditiously as possible upon notification to do so, the Owner, may at his own option, make the necessary repairs using his own forces or those of others. The cost of such repairs shall be subtracted from the payments due to the Contractor.

F. Disturbance of Bounds

1. Replace all bounds disturbed during the construction operation, at no additional cost to the Owner. The bounds shall be relocated by a land surveyor approved by the Engineer and registered in the State that the Work is to be done.

1.09 WORK TO CONFORM

A. During its progress and on its completion, the Work shall confirm to the lines, levels, and grades indicated on the Drawings or given by the Engineer and shall be built in strict accordance with the Contract Documents and the directions given from time to time by the Engineer.

B. All work done without instructions having been given therefore by the Engineer, without proper lines or levels, or performed during the absence of the Engineer, will not be estimated or paid for except when such work is authorized by the Engineer in writing. Work so done may be ordered uncovered or taken down, removed, and replaced at the Contractor's expense.

1.10 PLANNING AND PROGRESS SCHEDULES

A. Before starting the Work and from time to time during its progress, as the Engineer may request, the Contractor shall submit to the Engineer a written description of the methods he plans to use in doing the Work and the various steps he intends to take.

B. Within 14 calendar days after the date of formal execution of the AGREEMENT, the Contractor shall prepare and submit to the Engineer (a) a written schedule fixing the dates on which additional drawings, if any, will be needed by the Contractor and (b) a written schedule fixing the respective dates for the start and completion of various parts of the Work. Each such schedule shall be subject to review from time to time during the progress of the Work.

1.11 PRECAUTIONS DURING ADVERSE WEATHER

A. During adverse weather and against the possibility thereof, take all necessary precautions so that the Work may be properly done and satisfactory in all respects. When required by the manufacturer of the material or equipment to be installed, protection shall be provided by use of tarpaulins, wood and building-paper shelters, or other suitable means.

B. During cold weather, materials shall be preheated, if required, and the materials and adjacent structure into which they are to be incorporated shall be made and kept sufficiently warm so that a proper bond will take place and a proper curing, aging, or drying will result. Protected spaces shall be artificially heated by suitable means that will result in a moist or dry atmosphere according to the particular requirements of the work being protected. Ingredients for concrete and mortar shall be sufficiently heated so that the mixture will be warm throughout when used.

1.12 TEMPORARY HEAT

A. If temporary heat is required for the protection of the Work, provide and install suitable heating apparatus, provide adequate and proper fuel, and shall maintain heat as required.

B. Temporary heating apparatus shall be installed and operated in such manner that finished work will not be damaged.

1.13 ELECTRICAL ENERGY

A. Make all necessary applications and arrangements and pay all fees and charges for electrical energy for power and light necessary for the proper completion of the Work and during its entire progress. Provide and pay for all temporary wiring, switches, connections, and meters.

B. Provide sufficient electric lighting so that all work may be done in a workmanlike manner when there is not sufficient daylight.

1.14 CERTIFICATES OF CONFORMANCE

A. Furnish to the Engineer, in the manner as directed and prior to actual installation, notarized certificates of conformance for all materials to be furnished under this Contract. The notarized certificates of conformance shall state that the material to be furnished meets or exceeds all requirements specified under the Contract Documents. When so directed, the manufacturer’s notarized certificates of conformance, certifying that the materials meet the requirements specified shall accompany each shipment of material. Unless otherwise specifically specified and/or directed by the Engineer, all testing of materials required under this Contract shall be provided by the Contractor at no additional expense to the Owner.

1.15 PATENTS

A. Pay, at no additional expense to the Owner, all applicable royalties and license fees associated with the materials and construction methods to be used under this Contract. Defend all suits or claims for infringements of any patent rights, and save the Owner and Engineer harmless from loss on account thereof, except that the Owner shall be responsible for any such loss when a particular process, design, or product of a particular manufacturer (s) is specifically specified with no option to the Contractor. However, if the Contractor has reason to believe that the design, process or product specified is an infringement of a patent, he shall be responsible for such loss unless he promptly gives such information to the Owner.

B. Refer to Specification Section 00500, 1.07, Patents, regarding the Contractor's responsibilities for any patent rights associated with the materials and construction methods to be used under this Contract.

1.16 " OR EQUAL" CLAUSE

A. Whenever a material or article required is specified or shown on the drawings by using the name of the proprietary product of a particular manufacturer or vendor, any material or article which will perform adequately, in the Engineer's sole judgment and/or opinion, the duties imposed by the general design may be considered equal and satisfactory providing the material or article so proposed is of equal substance. It shall not be purchased or installed without his written approval. In all cases new material shall be used in the project.

B. If more than one brand, name of material, device, or piece of equipment is shown or specified, each should be regarded as the equal of the other. Any other brand make of material, device or equipment, which in the opinion of the OWNER and/or ENGINEER, is the recognized equal of that specified (considering quality, workmanship, and economy of operation), and is suitable for the purpose intended, may be accepted.

C. ENGINEER will be allowed a reasonable time within which to evaluate submittals for Substitute Items. ENGINEER will be the sole judge of acceptability. No “Or Equal” or Substitute Item will be ordered, installed or utilized without ENGINEER’s prior written acceptance which will be evidenced by either a Change Order or an approved Shop Drawing. OWNER may require CONTRACTOR to furnish at CONTRACTOR’s expense a special performance guarantee or other surety with respect to any “or equal” or substitute. ENGINEER will record time required by ENGINEER and ENGINEER’s Consultants in evaluating substitutes proposed or submitted by CONTRACTOR and in making changes to the Contract Documents. Whether or not ENGINEER accepts a Substitute Item so proposed or submitted by CONTRACTOR, CONTRACTOR shall reimburse OWNER for the charges of ENGINEER and ENGINEER's Consultants for evaluating each such proposed Substitute Item.

1.17 ADDITIONAL OR SUBSTITUTE BONDS

A. If at any time the Owner, for justifiable cause, shall be or become dissatisfied with any Surety or Sureties than upon the performance or payment bonds, the Contractor shall, within five (5) calendar days after notice from the Owner so to do, substitute an acceptable bond (or bonds) in such form and sum and signed by such other Surety or Sureties as may be acceptable to the Owner. The Contractor shall pay the premiums on such bonds with no additional expense to the Owner. No further payments shall be deemed due nor will be made until the new Surety or Sureties shall have furnished such as acceptable bond to the Owner.

1.18 SEPARATE CONTRACTS

A. The Owner reserves the right to let other contracts in connection with the construction of the contemplated work of this project or contiguous projects of the Owner. The Contractor, therefore, will afford any such other contractors reasonable opportunity for the introductions and storage of their materials and the execution of their work, will properly connect and coordinate his work with theirs, and will not commit or permit any act which will interfere with the performance of their work.

B. Coordinate operations with those of other contractors. Cooperation will be required in the arrangement for the storage of materials and in the detailed execution of the work.

C. It is essential that all parties interested in the project cooperate to the end that the entire project will be brought to a successful conclusion as rapidly as possible, but the Owner cannot guarantee that no interference or delay will be caused thereby. Interference and delay resulting from such cooperation shall not be basis of claims against the Owner.

1.19 PAYROLLS OF CONTRACTOR AND SUBCONTRACTORS

A. The Contractor and each of his Subcontractors shall prepare his payrolls on forms prescribed and in accordance with instructions to be furnished by the Owner. Within seven (7) days after the regular payment date of the payroll, the Contractor shall deliver to the Owner, with copies to the Engineer, a certified legible copy or copies of each such payroll. Each such payroll shall contain the statement required by the Federal Regulations issued pursuant to the "Anti-Kickback Statute", (48 Stat. 948; 18 U.S.C. 874; 40 U.S.C. 276C).

B. Carrying any person on his payrolls not employed by him will not be permitted. Carrying employees of a subcontractor on his payrolls will not be permitted, but such employees must be carried on the payrolls of the employing subcontractor.

C. Each Contractor or Subcontractor shall preserve his weekly payroll records for a period of three (3) years form the date of completion of the Contract. The payroll records shall set out accurately and completely the name, occupational classification, and hourly wage rate of each employee, hours worked by him during the payroll period and full weekly wages earned by him, and deductions made from such weekly wages and the actual weekly waged paid to him. Such payroll records shall be made available at all times for inspection by the Owner or his authorized representatives, the Engineer or by agents of the United States Department of Labor.

1.20 PAYMENTS BY CONTRACTOR

A. Pay for all traffic control, safety, transportation and utility services not later than the 20th day of the calendar month following that in which services are rendered. Reimbursable costs for services rendered, as specified in the Contract Documents, shall not be incorporated into partial payment estimates until such time that the Contractor submits to the Engineer actual paid invoices from those in which services were rendered.

1.21 " DIG SAFE" LAW

A. Comply with the Rhode Island General Law, Chapter 39-1.2, "Excavation Near Underground Utility Facilities" which became effective on July 1, 1984.

B. Before proceeding with construction operations, the Contractor shall notify the State of Rhode Island Underground Plant Damage Prevention Systems (DIG SAFE at 811), and shall make such supplemental investigations, including exploratory excavations, by hand digging, as he deems necessary to uncover and determine the exact locations of utilities and structures, and shall have no claims for damages due to encountering subsurface structures or utilities in locations other than that shown on the drawings, or which were made known to the Contractor prior to construction operations. The Contractor shall be responsible and liable for all damages to the existing utilities and structures.

C. Before commencing with the construction of any work, identify any water main, gas main, telephone duct, electric duct, and/or other utility present which is or could be in conflict with the proposed work.

D. Relocation of the affected utilities shall be done as directed by the Owner and in accordance with the requirements of the utility company.

E. The attention of the Contractor is directed to the fact that certain utility companies may not fall under the provisions of "DIG SAFE". Individual utility company notifications by the Contractor shall be necessary to ensure proper notification and protection of all existing utilities affected by this Contract.

1.22 FIRE PREVENTION AND PROTECTION

A. State and municipal rules and regulations with respect to fire prevention, fire-resistant construction and fire protection shall be strictly adhered to and all work and facilities necessary therefore shall be provided and maintained by the Contractor in an approved manner.

B. Provide fire protection equipment such as water tanks, hoses, pumps, extinguishers, and other materials, and apparatus, for the protection of the contract work, and adjacent property. Trained personnel experiences in the operation of all fire protection equipment and apparatus shall be available on the site whenever work is in progress, and at such other times as may be necessary for the safety of the public and the work.

1.23 DUST CONTROL

A. Exercise every precaution and means to prevent and control dust arising out of all construction operations from becoming a nuisance to abutting property owners or surrounding neighborhoods. Pavements adjoining pipe trench shall be kept clean of excess materials wherever and whenever directed by the Engineer. Repeated daily dust control treatment shall be provided to satisfactorily prevent the spread of dust until permanent pavement repairs are made and until earth stockpiles have been removed, and all construction operations that might cause dust have been completed. No extra payment will be made for dust control measures, compensation shall be considered to be included in the prices stipulated for the appropriate items as listed in the Bid.

1.24 DISPOSAL OF DEBRIS

A. The materials from the demolition, and those used in the construction of the Work throughout the project, shall be deposited in such a manner so as to

not endanger persons or the Work, and so that free access may be had at any time to all hydrants, gates and existing equipment in the vicinity of the work. The materials shall be kept trimmed-up so as to be of as little inconvenience as possible to the public travel and plant operations. All excavated materials not approved for backfill and fill, all surplus material, and all rock and boulders resulting from the excavations, shall be removed and satisfactorily disposed of off the site by the Contractor, at no additional expense to the Owner.

B. The materials being removed from the pipelines and manholes during the cleaning process shall be deposited in such a manner as to not endanger the public, plant personnel or persons performing the work. Such debris deposits may be of such nature, high in biological organic contents, or chemically aggressive that they will require proper disposal in a safe, health risk free, environment. (Considered to be "Special Wastes" by Rhode Island Department of Environmental Management) Contact the Owner and Engineer and all agencies having jurisdiction thereof, for approval of debris disposal methods and locations of disposal, prior to disposing of any or all debris removed from pipe cleaning methods. All debris shall be removed and satisfactorily disposed of off the work site, at no additional expense to the Owner.

1.25 NIGHT, SATURDAY, SUNDAY AND HOLIDAY WORK

A. No work shall be done at night or on Saturdays, or Sundays or holidays without the prior written approval of the Owner and Engineer.

1.26 LENGTH OF WORK DAY

A. The Owner retains the right to restrict the Contractor to an eight-hour workday. Such restrictions shall not be the basis for damages or claims against the Owner.

B. The Contractor's attentions is also directed to the fact that should it be deemed necessary to perform various items of work during off-peak flow or traffic hours, early morning or late night hours, then he shall notify the Engineer a minimum of 24 hours in advance as to his intentions and reasons for the change in work hours. The Contractor shall be responsible for properly contacting and informing all involved parties of such a change in work hours. The Contractor shall not be entitled to any additional compensation from the Owner for any expenses that may be incurred by change of working hours and/or scheduling.

1.27 HURRICANE PROTECTION

A. Should hurricane warnings be issued, the Contractor shall take every practicable precaution to minimize danger to persons, to the work and to adjacent property. These precautions shall include closing all openings; removing all loose materials, tools and/or equipment from exposed locations; and removing or securing scaffolding and other temporary work.

1.28 REDUCTION IN SCOPE OF WORK

A. The Owner reserves the right to decrease the scope of the work to be done under this Contract and to omit any work should the Owner deem it to be in the public interest to do so. To this end, the Owner reserves the right to reduce the quantity of any items or omit all of any as set forth in the BID, either prior to executing the contract or at any time during the progress of the work. The Owner further reserves the right, at anytime during the progress of the work, to restore all or part of any items previously omitted or reduced. Exercise by the Owner of the above rights shall not constitute any ground or basis of claim for damages or for anticipated profits on the work omitted.

END OF SECTION

SECTION 00800

SUPPLEMENTARY CONDITIONS

1.01 GENERAL

A. These Supplementary Conditions are requirements which amend or supplement the General Conditions specified elsewhere.

B. The duties and obligations imposed by these Supplementary Conditions will be as effective as if repeated specifically in the Contract Documents in connection with each particular duty, obligation, right and remedy to which they apply.

C. Assertion of any claim for any additional compensation or damages on account of and/or the fulfillment of these Supplementary Conditions will not be allowed.

1.02 LIMITS OF NORMAL EXCAVATION

A. In determining the quantities of excavation to which unit prices shall apply, the limits of normal width and depth of excavation shall be as described below, unless other limits are indicated in the Contract Documents.

1. For pipes in trenches, less than or equal to a depth of 10.0-feet, the normal width of the trench shall be measured between vertical planes which are a distance apart equal to the sum of 48 inches plus the nominal inside diameter of the pipe.

2. For pipes in trenches, between a depth greater than 10.0-feet and a depth of 20.0-feet, the normal width of the trench shall be measured between vertical planes which are a distance apart equal to the sum of 60-inches plus the nominal inside diameter of the pipe.

3. If the width so computed is less than 5.0-feet for trenches up to 10.0 feet deep than a width of 5.0 feet shall be the normal width. If the width so computed is less than 6.0-feet for trenches greater than 10.0-feet up to 20.0-feet than a width of 6.0-feet shall be the normal width.

4. The normal depth shall be measured to a distance of 0.5 feet below the bottom of the pipe in earth and 0.5 feet in rock, unless there be a cradle underneath the pipe, in which case the normal depth shall be measured to the underside of the cradle. The trench width for the cradle shall be assumed to be that specified above for pipes in the trench.

B. Quantities for payment shall be in accordance with the above limits or the actual widths, **whichever is less.**

C. For concrete placed directly against undisturbed earth, the normal width and depth of the excavation for such concrete shall be measured to the neat lines of the concrete as indicated on the Drawings or as ordered.

D. For concrete placed against rock surfaces resulting from rock excavation, the normal width and depth of the excavation shall be measured to 4 inches outside the neat lines of the concrete as indicated on the Drawings or as ordered.

E. For other structures, except manholes as noted below, the normal width shall be measured between vertical planes 1.0 feet outside the neat lines of the several parts of the structure, except that the width at any elevation shall be measured as not less than the width at a lower elevation. The normal depth shall be measured to the underside of that part of the structure for which the excavation is made.

F. No additional width or depth of trenches excavated in earth or rock shall be allowed at standard circular manholes. The pay limit for rock removed outside proposed manholes shall commence one foot (1.0) outside the widest dimension of the structure or shall be the maximum connecting trench width, whichever is greater.

G. Wherever bell holes are required for jointing pipe, they shall be provided without additional compensation over and above that resulting from measurements as above described.

1.03 BOLTS, ANCHOR BOLTS AND NUTS

A. Furnish bolts, anchor bolts, nuts, washers, plates and bolt sleeves required by equipment to be installed under this Contract in accordance herewith. Anchor bolts shall have suitable washers and, where so required, their nuts shall be hexagonal.

B. Anchor bolts, nuts, washers, plates, and bolt sleeves shall be galvanized unless otherwise indicated or specified.

C. Expansion bolts shall have malleable iron and lead composition elements of the required number of units and size.

D. Unless otherwise specified, stud, tap, and machine bolts, and nuts shall conform to the requirements of ASTM Standard Specification for Carbon Steel Externally and Internally Threaded Standard Fasteners, Designation A307. Hexagonal nuts of the same quality of metal as the bolts shall be used. All threads shall be clean cut and shall conform to ANSI Standard B1.1-1974 for Unified Inch Screw Threads (UN and UNR Thread Form).

E. Bolts, anchor bolts, nuts and washers, specified to be galvanized, shall be zinc coated, after being threaded, by the hot-dip process in conformity with the ASTM Standard Specification for Zinc (Hot-Galvanized) Coatings on Products Fabricated from Rolled, Pressed and Forged Steel Shapes, Plates, Bars and Strip, Designation A123, or the ASTM Standard Specifications for Zinc Coating (Hot Dip) on Iron and Steel Hardware, Designation A153, as is appropriate.

F. Bolts, anchor bolts, nuts, and washers specified to be stainless steel shall be Type 316 stainless steel unless otherwise indicated or specified.

G. Anchor bolts and expansion bolts shall be set accurately. If anchor bolts are set before the concrete has been placed, they shall be carefully held in suitable templates of acceptable design. Where indicated on the Drawings, specified, or required, anchor bolts shall be provided with square plates at least 4 inches by 4 inches by 3/8 inches or shall have square heads and washers and be set in the concrete forms with suitable pipe sleeves, or both. If anchor or expansion bolts are set after the concrete has been placed, all necessary drilling and grouting or caulking shall be done by the Contractor and care shall be take not to damage the structure or finish by cracking, chipping, spalling, or otherwise during the drilling and caulking.

1.04 CONCRETE INSERTS

A. Concrete inserts for hangers shall be designed to support safely, in the concrete that is used, the maximum load that can be imposed by the hangers used in the inserts. Inserts for hangers shall be of a type which will permit adjustment of the hangers both horizontally (in one plane) and vertically and locking of the hanger head or nut. All inserts shall be galvanized.

1.05 SLEEVES

A. Unless otherwise indicated on the Drawings or specified, openings for the passage of pipes through floors and walls shall be formed of sleeves of standard-weight, galvanized steel pipe. The sleeves shall be of ample diameter to pass the pipe and its insulation, if any, and to permit such expansion as may occur. Sleeves shall be of sufficient length to be flush at the walls and the bottom of slabs and to project 1 inch above the finished floor surface. Threaded nipples shall not be used as sleeves.

B. Sleeves in exterior walls below ground or in walls to have liquids on one or both sides shall have a 2 inch annular fin of 1/8 inch plate welded with a continuous weld completely around the sleeve at about mid-length. Sleeves shall be galvanized after the fins are attached.

C. All sleeves shall be set accurately before the concrete is placed or shall be built in accurately as the masonry is being built.

1.06 CUTTING AND PATCHING

A. The Contractor shall leave all chases or openings for the installation of his own or any other contractor's or subcontractor's work, or shall cut the same in existing work, and shall see that all sleeves or forms are at the Work and properly set in ample time to prevent delays. He shall see that all such chases, openings, and sleeves are located accurately and are of proper size and shape and shall consult

with the Engineer and the contractors and subcontractors concerned in reference to this work.

B. In case of his failure to leave or cut all such openings or have all such sleeves provided and set in proper time, he shall cut them or set them afterwards at his own expense, but in so doing he shall confine the cutting to the smallest extent possible consistent with the work to be done. In no case shall piers or structural members be cut without the written consent of the Engineer.

C. The Contractor shall carefully fit around, close up, repair, patch, and point around the work specified herein to the satisfaction of the Engineer.

D. All of this work shall be done by careful workmen competent to do such work and with the proper small hand tools. Power tools shall not be used except where, in the opinion of the Engineer, the type of tool proposed can be used without damage to any work or structures and without inconvenience or interference with the operation of any facilities. The Engineer's concurrence with the type of tools shall not in any way relieve or diminish the responsibility of the Contractor for such damage, inconvenience, or interference resulting from the use of such tools.

E. The Contractor shall not cut or alter the work of any subcontractors or any other contractor, nor permit any of his subcontractors to cut or alter the work of any other contractor, or subcontractor, except with the written consent of the contractor or subcontractor whose work is to be cut or altered or with the written consent of the Engineer. All cutting and patching or repairing made necessary by the negligence, carelessness, or incompetence of the Contractor or any of his subcontractors shall be done by or at the expense of the Contractor and shall be the full responsibility of the Contractor.

1.07 FOUNDATIONS, INSTALLATION AND GROUTING

A. Furnish materials and construct suitable concrete foundation for all equipment installed under this Contract, even though such foundations may not be indicated on the Drawings. The tops of foundations shall be at such elevations as will permit grouting as specified below.

B. Equipment shall be installed by skilled mechanics and in accordance with the instruction of the manufacturer.

C. In setting pumps, motors, and other items of equipment customarily grouted, make an allowance of at least 1-in. for grout under the equipment bases. Shims used to level and adjust the bases shall be steel. Shims may be left embedded in the grout, in which case they shall be installed neatly and so as to be as inconspicuous as possible in the completed work. Unless otherwise permitted, all grout shall be a suitable nonshrink grout.

D. Grout shall be mixed and placed in accordance with the recommendations of the manufacturer. Where practicable, the grout shall be placed through the grout holes in the base and worked outward and under the edges of the base and across the rough top of the concrete foundation to a peripheral form so constructed as to provide a suitable chamber around the top edge of the finished foundation.

E. Where such procedure is impracticable, the method of placing grout shall be as permitted by the Engineer. After the grout has hardened sufficiently, all forms, hoppers, and excess grout shall be removed, and all exposed grout surfaces shall be patched in an approved manner, if necessary, given a burlap-rubbed finish, and painted with at least two coats of an acceptable paint.

1.08 SERVICES OF MANUFACTURER'S REPRESENTATIVE

A. Arrange for the services of qualified factory service representatives from the companies manufacturing or supplying equipment and/or materials to be used or installed in the work as specified, to perform the following duties.

B. After installation of the listed equipment has been completed and the equipment is presumably ready for operation, but before others operate it, the representative shall inspect, operate, test, and adjust the equipment. The inspection shall include but shall not be limited to, the following points as applicable:

1. Soundness (without cracked or otherwise damaged parts).

2. Completeness in all details, as specified.

3. Correctness of setting, alignment, and relative arrangement of various parts.

4. Adequacy and correctness of packing, sealing and lubricants.

C. The operation, testing, and adjustment shall be as required to prove that the equipment is left in proper condition for satisfactory operation under the conditions specified.

D. On completion of his work, the manufacturer's or supplier's representative shall submit in triplicate to the Engineer a complete signed report of the result of his inspection, operation, adjustments, and tests. The report shall include detailed descriptions of the points inspected, tests and adjustments made, quantitative results obtained if such are specified, and suggestions for precautions to be taken to ensure proper maintenance. The report also shall include a certificate that specifically states "the equipment conforms to the requirements of the Contract and is ready for permanent operation and that nothing in the installation will render the manufacturer's warranty null and void".

E. After the Engineer has reviewed the reports from the manufacturer's representatives, the Contractor shall make all arrangements to have the manufacturer's representatives present when the field acceptance tests are made by the Engineer without additional cost to the Owner.

1.09 OPERATING INSTRUCTIONS AND PARTS LISTS

A. Where reference is made in the Technical Specifications to operating instructions and spare parts lists, furnish, for each piece of equipment, six complete sets giving the information listed below:

1. Clear and concise instructions for the operation, adjustment, and lubrication and other maintenance of the equipment. These instructions shall include a complete lubrication chart.

2. List of all parts for the equipment, with catalog numbers and other data necessary for ordering replacement parts.

B. Such instructions and parts lists shall be annotated to indicate only the specific equipment furnished. References to other sizes and types or models of similar equipment shall be deleted or neatly lined out.

C. Such operating instructions and parts lists shall be delivered to the Engineer at the same time that the equipment to which they pertain is delivered to the site.

1.10 LUBRICANTS

A. During testing and prior to acceptance, Furnish all lubricants necessary for the proper lubrication of all equipment furnished under this Contract.

1.11 SPECIAL TOOLS

A. For each type of equipment furnished provide a complete set of all special tools (including grease guns or other lubricating devices) which may be necessary for the adjustment, operation, maintenance, and disassembly of such equipment. Tools shall be high-grade, smooth, forged, alloy, tool steel. Grease guns shall be lever type.

B. Special tools are considered to be those tools which because of their limited use are not normally available, but which are necessary for the particular equipment.

C. Special tools shall be delivered at the same time as the equipment to which they pertain. Properly store and safeguard such special tools until completion of the work, at which time they shall be formally transmitted and delivered to the Owner.

1.12 EQUIPMENT DRIVE GUARDS

A. All equipment driven by open shafts, belts, chains, or gears shall be provided with acceptable all-metal guards enclosing the drive mechanism. Guards shall be constructed of galvanized sheet steel or galvanized woven wire or expanded metal set in a frame of galvanized steel members. Guards shall be secured in position by steel braces or straps that will permit easy removal for servicing the equipment. The guards shall conform in all respects to all applicable safety codes and regulations.

1.13 PROTECTION AGAINST ELECTROLYSIS

A. Where dissimilar metals are used in conjunction with each other, suitable insulation shall be provided between adjoining surfaces so as to eliminate direct contact and any resultant electrolysis. The insulation shall be bituminous impregnated felt, heavy bituminous coatings, nonmetallic separators or washers, or by other acceptable materials.

1.14 COVERING EXCAVATED TRENCH

A. In addition to the requirements in Section 00700 titled Interference with and Protection of Streets. Cover all open excavations when construction operations are suspended at the end of the day, or in excavated trenches where work is not actually in progress. Cover shall be capable of withstanding AASHTO H20-S16 loading. This cover shall consist of steel plates or some other satisfactory cover of adequate size and strength suitably held in place to keep all traffic out of excavations, all as verified in

writing by the Contractor. The cover shall be laid over the excavation until it is backfilled.

1.15 MAINTAINING TRENCH EXCAVATIONS

A. The length of trench opened at any time, from point where ground is being broken to completed backfill, and also the amount of space in streets or public and private lands occupied by equipment, trench, and supplies, shall not exceed the length of space considered reasonably necessary and expedient by the Engineer. In determining the length of open trench or spaces for equipment, materials, supplies and other necessities, the Engineer will consider: the nature of the lands or streets where work is being done; types and methods of construction and equipment being used; inconvenience to the public or to private parties; possible dangers; and other proper matters. All work must be constructed with a minimum inconvenience and danger to the public and all other parties concerned.

B. Whenever any trench obstructs pedestrian and vehicular traffic in or to any public street, private driveway or property entrance, or on private property, take such means as may be necessary to maintain pedestrian and vehicular traffic and access. Until such time as the work may have attained sufficient strength to support backfill, or if for any other reason it is not expedient to backfill the trench immediately, construct and maintain suitable plank crossing and bridges to carry essential traffic in or to the street, driveway or property in question, as specified or directed.

C. Suitable signs, lights, and such items required by Police Authorities to direct traffic, shall be furnished and maintained by the Contractor at his own expense.

D. Keep streets and premises free from unnecessary obstructions, debris and all other materials. The Engineer may, at any time, order all equipment, materials, surplus from excavations, debris and all other materials lying outside that length of working space, promptly removed. Should the Contractor fail to remove such material within 24 hours after notice to remove the same, the Owner may cause any part or all of such materials to be removed by such persons as he may employ, at the Contractor's expense; and may deduct the costs thereof from payments which may be or may become, due to the Contractor under the Contract. In special cases, where public safety urgently demands it, the Owner may cause such materials to be removed at the Contractor's expense without prior notice.

1.16 DISRUPTION OF STORM DRAINS

A. Portions of the Work may be located in areas that are serviced by storm drains. Take extreme precaution to minimize disruption of the drains, and repair and/or make restitution for repairs by others for all disruptions caused by the construction operations.

1.17 PRECAUTION AGAINST HYDRAULIC UPLIFT DURING CONSTRUCTION

A. Protect all structures against hydraulic uplift until such structures have beneficially completed.

1.18 BLASTING AND PRE-CONSTRUCTION BLASTING SURVEY

A. Blasting will not be permitted.

1.19 NAMEPLATES

A. With the exceptions mentioned below, each piece of equipment shall be provided with a substantial nameplate of noncorrodible metal, securely fastened in place and clearly and permanently inscribed with the manufacturer's name, model or type designation, serial number, principal rated capacities, electrical or other power characteristics, and similar information as appropriate. Coordinate nameplate text requirements with Engineer prior to fabrication. Nameplates shall be securely mounted in a readily visible location approved by the Engineer. Equipment Specification sections may contain additional information regarding nameplates.

B. This requirement shall not apply to standard manually operated hydrants or to gate, globe, check, and plug valves.

C. Each process valve shall be provided with a substantial tag of noncorrodible metal securely fastened in place and inscribed with an identification number in conformance with the Valve Identification Schedule indicated on the drawings or furnished later by the Engineer.

1.20 LAND, EASEMENTS, AND RIGHTS-OF-WAY

A. As indicated, a portion of the work may be located within easements and/or rights-of-way, obtained or which will be obtained by the Owner, through private property. On all other lands, the Contractor has no rights unless he obtains them from the proper parties as specified in Section 00700, Occupying Private Land.

B. Prior to issuance of the Notice to Proceed, the Owner shall obtain all land, easements and rights-of-way necessary for carrying out and for the completion of the work to be performed pursuant to the Contract Documents, unless otherwise mutually agreed.

C. The Owner shall provide to the Contractor information which delineates and describes the lands owned and rights-of-way acquired.

D. The Contractor shall provide at his own expense and without liability to the Owner any additional land and access thereto that the Contractor may desire for temporary construction facilities or for storage of equipment and materials.

E. If however, lands, easements or rights-of-way cannot be obtained before work on the project begins, the Contractor shall begin his work upon such land, easements or rights-of-way as have been previously acquired by the Owner, and no claims for damages whatsoever will be allowed by reason of its inability to procure the lands, easements, or rights-of-way for the said work, the Contractor shall not be entitled to make or assert a claim for damages by reason of the said delay, or to withdraw from the Contract except by consent of the Owner. Time for completion of work will be extended to such time as the Owner determines will compensate for the time lost by such delay, such determination to set forth in writing.

1.21 CLEANING FINISHED WORK

A. After the work is completed, the pipes, manholes and structures shall be carefully cleaned free of debris and dirt, broken masonry, and mortar, and left in first class condition, ready to use. All temporary or excess materials shall be disposed of off-site and the work left broom clean, to the satisfaction of the Engineer.

END OF SECTION

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END OF T.O.C.

DIVISION 1

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SECTION 01010

SUMMARY OF WORK

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Work covered by the Contract, listing of Owner, Project location, Engineer. Sequence requirements, the Contractor's use of the premises and Owner's occupancy requirements.

1.02 WORK COVERED BY CONTRACT DOCUMENTS

A. The entire scope of work is delineated in the Drawings & Specifications attached hereto and includes in part; Set up and maintain site security & pedestrian detours. Dust control. Set up and maintain entry gate tracking pad(s) and maintenance of city streets, parking lots & sidewalks in proximity of the site access point(s). Coordinate with the City Police Department for the maintenance & protection of traffic and citizens in the vicinity of the site.

Major improvements include:

- Site preparation and demolition of existing parking lot.
- New (approx.) 60'x 120' outdoor skating rink including: rink floor system, refrigeration system, and dasher board system.
- New Rink building with restrooms, skate rentals, lockers, mechanical room, utility, and resurfacer (Zamboni) storage.
- New (approx.) 75' x 120' open air pre-engineered metal shade structure with standing seam roof, underside soffit, lighting, AV, and gutters.
- New site area improvements including utility work, drainage, concrete flatwork, fences and screens, asphalt parking lot, unit pavers, signage, lighting, site amenities, and landscaping.
- All related civil/site, architectural, landscape, structural, heating and ventilation, plumbing, and electrical.

1.03 OWNER

A. City of Warwick
3275 Post Road
Warwick, Rhode Island 02886
Telephone: 401-921-9684
Contact: Dean Pimentel, Senior Planner

1.04 PROJECT LOCATION

A. Warwick City Hall
3257 Post Road
Warwick, Rhode Island 02886

1.05 ENGINEER

A. BETA Group, Inc.
701 George Washington Highway
Lincoln, Rhode Island 02865
Telephone: 401-333-2382
Fax: 401-333-9225
Contact: Randy Collins, RLA, ASLA

1.06 WORK SEQUENCE

A. The responsibility of phasing the Work falls entirely on the Contractor. A recommended phasing plan has been provided in the Plans to meet the Owner's access requirements.

B. The work will need to be phased within the parking area to maintain access to City Hall as well as abutting properties and recreation areas as depicted on the Phasing Plan.

C. In order that Work may be conducted with minimum inconvenience to the public and, work under this Contract may be coordinated with other work which may be under construction or contemplated, and that work under the Contract may conform to conditions which it has been undertaken or conditions attached to a right-of-way or particular location for this work, the Engineer may determine the point or points and time or times when portions of work will commence or be carried on and may issue orders pertaining to the work sequence, relative to the rate of progress on several portions of the work.

1.07 CONTRACTOR USE OF PREMISES

A. The Contractor's use of premises shall be within the limits shown on the Drawings and as defined in Section 00500 – Contract Agreement, for the performance of the Work.

B. The Contractor shall maintain access and utilities to the existing city hall, baseball fields and existing parking which falls outside of the limit of work, as shown on the Drawings.

C. The Contractor shall assume full responsibility for security of all materials and equipment on the site, including those of his subcontractor's.

D. If directed by the Owner, the Contractor shall move any stored items that interfere with operations of the Owner.

E. Obtain and pay for use of additional storage or work areas if needed to perform the Work.

1.08 OWNER OCCUPANCY REQUIREMENTS

A. The Contractor shall maintain access and utilities to the existing city hall, baseball fields and existing parking which falls outside of the limit of work, as shown on the Drawings.

B. The existing collection systems must remain in full service at all times, throughout the duration of the project. Contractor shall conduct his operations in accordance with Section 02149.

C. Contract Milestones

1. Phase 1 construction shall be completed no later than November 15, 2024.
2. Completion date of project to be no later than July 1, 2025.

PART 2 PRODUCTS

NOT USED

PART 3 EXECUTION

NOT USED

END OF SECTION

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SECTION 01020

ALLOWANCES

PART 1 GENERAL

1.01 SUMMARY

A. Section Includes

1. Contingencies and their respective value which have been established in the BID as an estimated lump sum to facilitate comparison of bids only.

B. Related Sections

1. Section 00300 - Bid Forms
2. Section 01025 - Measurement and Payment

1.02 ALLOWANCES

A. Bid Item No. 89 – Traffic Control - Police Detail

1. Coordinate and schedule uniformed traffic Police detail prior to commencement of work on public ways.

B. Bid Item No. 90 – Traffic Control – Flagpersons

1. Coordinate and schedule flagger persons prior to commencement of work on public ways.

C. Bid Item No. 91 – Traffic Control – Flagpersons Overtime

1. Coordinate and schedule flagger persons prior to commencement of work on public ways.

D. Bid Item No. 92 – Materials Testing

1. Provide services of an independent testing laboratory in accordance with Section 01410.

E. Bid Item No. 93 – Miscellaneous Utility Allowance

1. Provide the support, relocation, replacement or repair as shown on the Contract Documents and/or as directed by the Engineer.
2. Coordinate all work in advance with the respective utility company or department, and provide access to the site at the appropriate time the respective utility company and/or their contractors to prevent any delay in the work specified to be done under these Contract Documents.
3. In the event the respective utility company or department does not customarily perform relocation work on utilities under their jurisdiction, the Contractor shall perform all necessary work with his own forces experienced in the relocation work required.

F. Bid Item No. 94 – Disposal of Contaminated Soils

1. Legal disposal of soil in accordance with Section 02080.

G. Bid Item No. 95 – Owners Allowance

1. To be used at the Owner’s discretion.

H. Non-Allowance Utility Modifications/Relocations

1. In the event that a utility company, department or entity responsible for a utility called for to be modified or relocated does not customarily perform said work on utilities under their jurisdiction, the Contractor shall perform all necessary modification or relocation work with his own forces and/or subcontractors suitably experienced in the work required, and shall be compensated for same through other items in the contract, as specified. There shall be no allowances set aside for such work.
2. The performance of modification/relocation utility work by the Contractor, and not a utility company, department or entity responsible for said utility, shall not relieve the Contractor of the responsibility to adhere at all times to the applicable requirements of the utility company, department or entity with jurisdiction over the utility in question.

1.03 PAYMENT PROCEDURES

A. Under these items, the Contractor shall be reimbursed for charges for the allowances required and authorized by the Owner and Engineer, as detailed in Section 01025 - Measurement and Payment.

B. The price for allowances is established in Section 00300 as an estimated figure to facilitate comparison of bids only. The actual amount to be paid under this item shall be based on the actual invoices from the service provider(s) for services rendered by same, and shall constitute full compensation for all services rendered by said provider.

C. The lump-sum price for this item shall NOT include any costs associated with services rendered for routine utility markings, repair damages incurred as a result of the Contractor's operations, relocations of utilities done at the Contractor's request and/or convenience, or any other unauthorized services rendered by utility companies. The purpose of this item is strictly for the Contractor's reimbursement for those services authorized by the Owner or Engineer prior to the work being performed.

D. The Contractor will be paid based on the actual PAID invoiced amount from the authority in question as approved by the Engineer. If the total cost for such charges is greater or less than the allowance amount stated under this item of the BID, a debit or credit of the difference in cost shall be to the Owner.

E. The Contractor shall not be entitled to apply any mark-up (e.g. for handling, profit, or processing) to invoices submitted by service providers for payment under an allowance.

PART 2 PRODUCTS

2.01 MATERIALS

A. Materials as required and ordered by the Engineer shall conform to the Contract Documents and/or the standards and requirements of the service provider in question.

PART 3 EXECUTION

3.01 INSTALLATION

A. Installation, relocation, or repair of utilities, shall be performed in accordance with the Contract Documents.

END OF SECTION

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SECTION 01025

MEASUREMENT AND PAYMENT

PART 1 GENERAL

1.01 SUMMARY

A. SECTION INCLUDES

1. Measurement and payment criteria applicable to the Work performed under a unit price and lump sum payment method of Items listed in the BID.

B. RELATED SECTIONS

1. Section 00300 – Bid
2. Section 00500 – Agreement
3. Section 01020 – Allowances
4. Section 01026 – Schedule of Values

1.02 UNIT QUANTITIES SPECIFIED

A. Quantities and measurements indicated in SECTION 00300 are for bidding and contract purposes only. Quantities and measurements supplied or placed in the Work and verified by the Engineer shall determine payment.

B. If the actual Work requires more or fewer quantities than those quantities indicated, provide the required quantities at the unit price contracted.

1.03 MEASUREMENTS OF QUANTITIES

A. Measurement by Volume: Measured by cubic dimension using mean length, width and height or thickness.

B. Measurement by Area: Measured by square dimension using mean length and width or radius.

C. Linear Measurement: Measured by linear dimension, along the horizontal projection of the centerline or mean chord.

D. At appropriate points in this text, specifications are given with respect to measuring or estimating certain quantities and the sums due for the same. Except as otherwise provided, the Engineer shall determine the appropriate method for measuring and computing each quantity, and for estimating the sums due for the various kinds of work and material, using such methods, tools and degrees of precision as are suitable for the particular measurement, Item or computation. When so requested by the Engineer, assistance in measuring or determining quantities, shall be provided by furnishing the help of unskilled laborers on the site, by furnishing copies of invoices, or by other means.

E. For estimating quantities in which the computations of areas by analytic and geometric methods would be laborious, as determined by the Engineer, it is stipulated and agreed that

the planimeter shall be considered an instrument of precision adapted to the measurement of such areas and may be used for this purpose.

1.04 UNIT PRICES

A. Payment will be computed on the basis of the unit price bid in SECTION 00300 for each Item and the quantity of units completed. Unit prices are to include cost of all necessary materials, labor, equipment, overhead, profit and other applicable costs. (See Par. 1.06, this Section.)

1.05 LUMP SUM PRICES

A. Payment will be computed on the basis of the percentage of work completed on each Item in the contract BID as determined by the Engineer. Lump sum prices are to include the cost of all necessary materials, labor, equipment, overhead, profit and other applicable costs. (See Par. 1.06, this Section.)

B. The Contractor's breakdown (submit under SECTION 01026) of the lump sum bid will be used only as a guide to determine the percentage of completion.

1.06 PRICES INCLUDE

A. The prices stated in the Proposal include full compensation not only for furnishing all the labor, equipment and materials needed for, and for performing the work and constructing the structures (including any incidental items necessary to complete to work) required by the Contract, but also for assuming all risks of any kind for expenses arising by reason of the nature of the soil, groundwater, or the action of the elements; for all excavation and backfilling; for the removal of and delay or damage occasioned by trees, stumps, tracks, pipes, ducts, timber, masonry or other obstacles; for removing, protecting, repairing, or restoring, without cost to the Owner, all pipes, ducts, drains, sewers, culverts, conduits, curbs, gutters, walks, fences, tracks, or other obstacles, road pavements and other ground surfacing whether shown on plans or not for draining, damming, pumping or otherwise handling and removing, without damage to the work or to other parties, and without needless nuisance, all water or sewage from whatever source which might affect the work or its progress, or be encountered in excavations made for the work; for furnishing, inserting and removing all sheeting, shoring staging, cofferdams, etc.; for all signs (up to 100 square feet), fencing, lighting, watching, guarding, temporary surfacing, bridging, snow removal, etc., necessary to maintain and protect travel on streets, walks and private ways; for making all provisions necessary to maintain and protect buildings, fences, poles, trees, structures, pipes, ducts and other public or private property affected or endangered by the work; for the repair or replacement of such things if injured by neglect of such provisions; for removing all surplus or rejected materials as may be directed; for replacing, repairing and maintaining the surfaces of streets, highways, public and private lands if and where disturbed by work performed under the Contract or by negligence in the performance of work under the Contract; for furnishing the requisite filling materials in case of any deficiency or lack of suitable materials; for obtaining all permits and licenses and complying with the requirements thereof, including the cost of furnishing any security needed in connection therewith; for any and all expenses on account of the use of any patented device or process; for protection against inclement or cold weather; for all expenses incurred by or on account of the suspension; interruption or discontinuance of work; for the cost of the surety bonds and adequate insurance; for all taxes, fees, union dues, etc., for which the Contractor may be or become liable, arising out of his operations incidental to the Contract; equipment on the site and away therefrom; for providing a field office and its appurtenances and for all general and incidental

expenses; for tools, implements and equipment required to build and put into good working order all work contemplated by the Contract; for maintaining and guaranteeing the same as provided; and for fulfilling all obligations assumed by the Contractor under the Contract and its related documents.

B. The Owner shall pay and the Contractor shall receive the prices stipulated in the BID made a part hereof as full compensation for everything performed and for all risks and obligations undertaken by the Contractor under and as required by the Contract.

1.07 PAYMENT

A. In general, payment will be made for all Contract work satisfactorily completed and accepted through the end of the previous month. The payment will include any additional work which has been completed and approved and change order work agreed upon by the Owner and Contractor which has been completed and approved (See SECTION 00500).

B. Each application for payment, up to the date of substantial completion as determined by the Engineer, will indicate the total value of a minimum five percent (5%) retainage to be held by the Owner, based on the total value of all work completed under the contract and approved for payment to-date. The rate of retainage subsequent to the established date of substantial completion may, at the Owner's approval, be reduced from five percent (5%) to two percent (2%), and a portion of the monies held as retainage at the five percent (5%) rate may be requested by and released to the Contractor as part of his application for payment in an amount which results in a balance of two percent (2%) retainage being held by the Owner.

B. Retainage in the amount of two percent (2%) of the value of all work completed under the contract shall be retained by the Owner for a warranty period of not less than one (1) year from the date of project completion as determined by the Engineer (not to be construed as substantial completion), at or after which time the Contractor may request the release of final retainage in full, provided that all work has been satisfactorily completed and adequately performed during the warranty period. The Owner shall be the sole judge of whether work has been satisfactorily completed and has adequately performed.

D. Monthly applications for payment shall also indicate the reduction or increase to the total Contract price when an approved change order results in a net reduction or net increase in the cost and quantity of work to be performed under the Contract.

E. Special billings and charges against the Contract as credit or payment to the Owner, that are not for change order work, may be subtracted from monies due on any monthly application for payment, but shall not serve to reduce the total Contract price.

F. Final payment for Work governed by unit prices will be made on the basis of the actual measurements and quantities accepted by the Engineer multiplied by the unit price for work which is incorporated in or made necessary by the Work.

1.08 BID ITEM METHOD OF MEASUREMENT AND BASIS OF PAYMENT

BID ITEM NO. 1 CUTTING, REMOVING, AND DISPOSING ISOLATED TREES AND STUMPS

A. METHOD OF MEASUREMENT

1. The quantity of this item to be paid for shall be measured per each, based on the actual number of trees removed and disposed, complete-in-place, as indicated on the Drawings or as otherwise directed by the Engineer.

B. BASIS OF PAYMENT

1. The unit price for these items shall include full compensation for all labor, equipment, materials and incidentals needed to complete the following:

a. Cutting, removing from the ground, and legally disposing stumps (all diameters), brush, shrubs, hedges, roots and other vegetation within the project limits;
b. Legally disposing of trees, stumps and debris;
c. Furnishing and installing backfill material including compacting the material as specified;
d. Any and all other work, whether direct or incidental, associated with the removal and disposal of trees not specifically identified herein.

BID ITEM NO. 2 REMOVE AND DISPOSE SIDEWALKS AND DRIVEWAYS

A. METHOD OF MEASUREMENT

1. The quantity of remove and dispose sidewalks and driveways to be paid for under this item shall be measured by the number of square yards of sidewalks and driveways, based on the actual square yards of sidewalk and driveway removal in accordance with the Plans and/or as directed by the Engineer.

B. BASIS OF PAYMENT

1. The unit price for this item shall include full compensation for all labor, equipment, materials and incidentals needed to complete the following:

a. Sawcutting and excavation required for removing and legally disposing of sidewalks and driveways;
b. Furnishing and installing backfill gravel borrow material including compaction as specified and any fine grading required;
c. Cutting all edges in front of edgestone;
d. No separate payment will be made for saw cutting.
e. Other work, whether direct or incidental, associated with the removal and disposal of sidewalks, not specifically identified herein.

BID ITEM NO. 3 REMOVE AND DISPOSE PIPE - ALL SIZES

A. METHOD OF MEASUREMENT

1. The quantity of remove and dispose pipe to be paid for under this item shall be measured by the linear foot taken along the centerline of the removed and disposed drain and/or sewer pipe.

B. BASIS OF PAYMENT

1. The unit price for this item shall include full compensation for all labor, equipment, materials and incidentals needed to complete the following:

   a. Excavation, removal, and legally disposing of the existing drain and sewer pipe; including any sawcutting of the existing pavements and removal and disposal of all existing pavements, including any existing bituminous concrete, concrete base or reinforced concrete base (if encountered), masonry or concrete walls;
   b. The work shall include any temporary excavation support, dewatering, furnishing and installing gravel backfill material including compacting the material as specified;
   c. Removing and legally disposing of any accumulated debris within the pipe;
   d. Any and all other work, whether direct or incidental, associated with the removal and disposal of the existing drain pipe not specifically identified herein.

BID ITEM NO. 4 REMOVAL AND DISPOSAL OF PAVEMENT

A. METHOD OF MEASUREMENT

1. The quantity for removal and disposal pavement to be paid for under this item shall be measured by the square yard, based on the actual square yards of pavement removal, complete-in-place, as directed by the Engineer.

B. BASIS OF PAYMENT

1. The unit price for this item shall include full compensation for all labor, equipment, materials and incidentals needed to complete the following:

   a. Removal of all types of existing pavement, including berm, in its entirety to the limits as indicated on the plan, or as directed by the engineer;
   b. Any excess material removal required to keep the existing roadway grade and allow for the installation of new base and surface bituminous concrete shall be paid for under this item;
   c. Legally disposing of pavement material at an off-site location;
   d. Item shall include removal and disposal of all types of pavement;
   e. Calcium chloride and water for roadway dust control;
   f. No separate payment will be made for saw cutting;
   g. Other work, whether direct or incidental, associated with existing pavement removal and disposal, not specifically identified herein.

BID ITEM NO. 5 REMOVAL AND DISPOSAL OF CURBING

A. METHOD OF MEASUREMENT

1. The quantity for removal and disposal of curbing to be paid for under this item shall be measured by the linear foot as measured along the centerline of all curb removed, indicated on the Drawings or as otherwise directed by the Engineer.

B. BASIS OF PAVEMENT

1. The unit price for this item shall include full compensation for all labor, equipment, materials and incidentals needed to complete the following:

    a. Sawcutting, excavation, backfilling, and any temporary patching required for removing and legally disposing of the curb, in its entirety to the limits as indicated on the plan, or as directed by the engineer;
    b. Any and all other work, whether direct or incidental, associated with the removal and disposal of concrete curbing not specifically identified herein.

BID ITEM NO. 6 REMOVE AND DISPOSE DRAINAGE AND UTILITY STRUCTURES

A. METHOD OF MEASUREMENT

1. The quantity of remove and dispose drainage and utility structures to be paid for under this item shall be measured per each, based on the actual number of existing drain structures removed and disposed, as indicated on the Drawings or as otherwise directed by the Engineer.

B. BASIS OF PAYMENT

1. The unit price for this item shall include full compensation for all labor, equipment, materials and incidentals needed to complete the following:

    a. Excavation, removal and legally disposing of the existing structures; including any sawcutting of the existing pavements and removal and disposal of all existing pavements, including any existing bituminous concrete and concrete base or reinforced concrete base, and masonry or concrete walls;
    b. The work shall include any temporary excavation support, dewatering, furnishing and installing backfill material including compacting the material as specified;
    c. Removing and legally disposing of any accumulated debris within the structure;
    d. Removing and legally disposing of existing castings;
    e. Protection and support of existing utilities, maintaining flows of all utilities, and repairing and/or replacing damaged or impacted existing utilities not specifically included for payment under other items;
    f. Any and all other work, whether direct or incidental, associated with removing and disposing drain structures not specifically identified herein.

BID ITEM NO. 7 REMOVAL AND DISPOSAL OF FENCES AND RAILLINGS

A. METHOD OF MEASUREMENT

1. The quantity of removal and disposal of fences and railings to be paid for under this item shall be measured per linear feet of fence and railing removed and disposed, including all gates and appurtenances, as indicated on the Drawings or as otherwise directed by the Engineer.

B. BASIS OF PAYMENT

1. Payment for work to be done under this item will be by the unit price bid per each, which will be full compensation for the satisfactory removal and disposal of existing fences and railings

of all types and sizes, including all posts, gates, and concrete bases, and for furnishing all labor, tools, equipment and any other incidentals to complete the work. The contract unit price shall also include excavation and disposal of existing foundations and the supplying and placing of compacted gravel backfill where foundations and posts are removed and restoration of surface for which no additional payment will be made.

2. Any and all other work, whether direct or incidental, associated with removing and disposing signs not specifically identified herein.

BID ITEM NO. 8 REMOVE AND DISPOSE DIRECTIONAL, WARNING, REGULATORY , SERVICE AND STREET SIGNS

A. METHOD OF MEASUREMENT

1. The quantity of remove and dispose signs to be paid for under this item shall be measured per each, based on the number of signs removed and disposed, as indicated on the Drawings or as otherwise directed by the Engineer.

B. BASIS OF PAYMENT

1. Payment for work to be done under this item will be by the unit price bid per each, which will be full compensation for the satisfactory removal and disposal of existing signs, posts, and concrete base, and for furnishing all labor, tools, equipment and any other incidentals to complete the work. The contract unit price shall also include excavation and disposal of existing foundations and the supplying and placing of compacted gravel backfill where foundations and posts are removed and restoration of surface for which no additional payment will be made.
2. Any and all other work, whether direct or incidental, associated with removing and disposing signs not specifically identified herein.

BID ITEM NO. 9 SITE PREPARATION

A. METHOD OF MEASUREMENT

1. This item shall be paid for at the contract unit price bid per lump sum.

B. BASIS OF PAYMENT

1. The unit price for this item shall include full compensation for all labor, equipment, materials and incidentals needed to complete the following:
   a. Furnishing, placing, relocating, maintaining, removing and disposing of erosion control measures, including but not limited to catch basin inserts, compost filter socks, sediment control traps, construction entrances, and dewatering basins throughout the duration of the Work, as indicated on the Drawings or as otherwise directed by the Engineer;
   b. Furnishing, placing, relocating, maintaining, removing and disposing of any temporary gravel or crushed stone access roads or ways created within the project limits;
   c. Furnishing, placing, relocating, maintaining, removing and disposing of any temporary stockpile and concrete washout areas;
   d. Removing and stacking of the existing wheel stops.
   e. Any clearing and grubbing that may be required to complete the work.
   f. All labor, materials and equipment needed to protect trees and shrubs during construction as indicated on the Drawings or as otherwise directed by the Engineer. The unit price

shall also include costs to remove and dispose of tree and shrub protection once construction is complete;

g. Any and all other work, whether direct or incidental, associated with site preparation not specifically identified herein.

BID ITEM NO. 10 MANAGEMENT OF EXCESS SOIL

A. METHOD OF MEASUREMENT

1. The quantity of soil to be paid for under this item shall be measured per cubic yard, and shall be the actual amount of excess soil segregated and stockpiled, in accordance with the specifications and details, at the direction of the Engineer.

B. BASIS OF PAYMENT

1. The unit price for this item shall include full compensation for all labor, equipment, materials and incidentals needed to complete the following:

a. Furnishing, placing, relocating, maintaining, removing and disposing of the temporary stockpile area, including all required erosion control measures and polyethylene sheeting;
b. Stockpiled excess soil shall be sampled by the Contractor at a minimum frequency of one sample per 500 cubic yards and analyzed by a laboratory certified by the State of Rhode Island in conformance with Section 02080.
c. Any and all other work, whether direct or incidental, associated with management of excess soil not specifically identified herein and as specified in Section 02080.

BID ITEM NO. 11 GROUND IMPROVEMENTS

A. METHOD OF MEASUREMENT

1. This item shall be paid for at the contract unit price bid per lump sum.

B. BASIS OF PAYMENT

1. The unit price for this item shall include full compensation for all labor, equipment, materials and incidentals needed to complete the following:

a. The Lump Sum price for ground improvements will constitute full payment for designing and installing the approved ground improvements by a specialty contractor, as well as related performance testing and quality control during construction, as specified in Section 02999 of the specifications, in accordance with the Plans and/or directed by the Engineer.
b. Any and all other work, whether direct or incidental, associated with the proposed ground improvements not specifically identified herein and as specified in Section 02999.

BID ITEM NO. 12 ABANDON-IN-PLACE EXISTING UTILITY PIPES

A. METHOD OF MEASUREMENT

1. The quantity of abandon-in-place utility pipes to be paid for under this item shall be measured by the linear foot taken along the centerline of the abandoned pipe.

B. BASIS OF PAYMENT

1. The unit price for this item shall include full compensation for all labor, equipment, materials and incidentals needed to complete the following:

    a. Excavation, excavation support, backfill material and compaction;
    b. Cutting and plugging pipe ends;
    c. Plugging existing pipe or pipe opening at drain structure;
    d. Filling the existing pipeline with controlled density fill, complete-in-place, as indicated on the Drawings or as needed and specified by the Engineer;
    e. Any and all other work, whether direct or incidental, associated with the abandonment-in-place of the existing culvert not specifically identified herein.

BID ITEM NO. 13 ABANDON-IN-PLACE EXISTING UTILITY STRUCTURES

A. METHOD OF MEASUREMENT

1. The quantity of abandon utility structures to be paid for under this item shall be measured per each, based on the actual number of existing structures abandoned, as indicated on the Drawings or as otherwise directed by the Engineer.

B. BASIS OF PAYMENT

1. The unit price for this item shall include full compensation for all labor, equipment, materials and incidentals needed to complete the following:

    a. Filling structure with appropriate material;
    b. Covering and plugging all inlets/outlets;
    c. Demolishing, removing and disposing structure below existing grade including frame and cover and/or grate;
    d. Backfilling with gravel borrow, compacting, finishing surface with material (asphalt, concrete, loam and seed, as appropriate) that matches the surrounding surface material;
    e. Resetting curb;
    f. Restoration of any disturbed landscaping areas to existing conditions;
    g. All other requirements for abandoning existing utility structures as specified in Section 02750.
    h. Any and all other work, whether direct or incidental, associated with removing and disposing drain structures not specifically identified herein.

BID ITEM NO. 14 ROCK EXCAVATION MECHANICAL

A. METHOD OF MEASUREMENT

1. The quantity of rock excavation mechanical to be paid for under this item shall be measured per cubic yard, based on the total number of cubic yards of rock removed, measured in place before excavation, within the payment limits indicated on the Drawings and as defined in the Specifications, unless rock excavation beyond such limits has been authorized in writing by the Engineer, in which case, measurements shall be made to the authorized limits.

B. BASIS OF PAYMENT

1. The unit price for this item shall include full compensation for all labor, equipment, materials and incidentals needed to complete the following:

    a. Removal and proper disposal of boulders in excess of 1 C.Y. in volume (measurement and volume determination to be made by Engineer);
    b. Breaking or fracturing of solid contiguous rock by mechanical means (rock hammer, jackhammer); blasting of rock shall not be allowed under any circumstances;
    c. Excavation of all broken rock to the authorized limits as determined by the Engineer;
    d. Replacement of excavated rock with sand, gravel or crushed stone as specified and detailed on the Drawings, at the direction of the Engineer;
    e. Proper disposal of excavated rock at an off-site location;
    f. Any and all other work, whether direct or incidental, associated with the excavation and disposal of rock not specifically identified herein.

2. Where rock is encountered, it shall be uncovered but not excavated until measurements have been made by the Engineer, unless in the opinion of the Engineer, satisfactory measurements can be made in some other manner.

3. Excavated rock which has not yet been disposed of shall not be included for payment.

4. For bid items which include incidental earth excavation, the bidder shall include in his unit prices the cost of performing the entire excavation as earth. The unit price for this item is intended to represent the difference between the cost of rock excavation & disposal and the cost of earth excavation which would have taken place as part of the other bid items. The unit price for this item shall be paid in addition to the incidental earth excavation costs included in the other items; no adjustment to the unit prices for other items which include earth excavation shall be made in the event that rock is encountered and excavated in lieu of earth.

BID ITEM NO. 15 UNCLASSIFIED EXCAVATION

A. METHOD OF MEASUREMENT

1. The quantity of unclassified excavation to be paid for under this item shall be measured per cubic yard, based on the total number of cubic yards of materials excavated and either re-used in the Work or disposed of at an off-site location which are not incidental to the performance of other work items.

B. BASIS OF PAYMENT

1. The unit price for this item shall include full compensation for all labor, equipment, materials and incidentals needed to complete the following:

    a. Excavation of all materials (except rock), including but not limited to silt, sand, gravel or other soils, existing or temporary pavements, berms, curbs, and any other materials;
    b. Stockpiling and re-handling excavated materials for reuse on other portions of this project, or removing and legally disposing of excavated materials at an off-site location (the Contractor shall locate and secure an acceptable disposal site for all excess materials);
    c. Any and all other work, whether direct or incidental, associated with excavation of unclassified materials not specifically identified herein.

2. Excess soil shall be tested to determine whether the materials may/shall be re-used or disposed of off-site; there shall be no difference in the unit price for materials which are re-used on-site and materials which are disposed of off-site.

BID ITEM NO. 16 COMMON BORROW
BID ITEM NO. 17 GRAVEL BORROW

A. METHOD OF MEASUREMENT

1. The quantity of common borrow or gravel borrow to be paid for under these items shall be measured per cubic yard, based on the total number of cubic yards of common borrow or gravel borrow installed, complete-in-place, as directed by the Engineer.

B. BASIS OF PAYMENT

1. The unit price for this item shall include full compensation for all labor, equipment, materials and incidentals needed to complete the following:

   a. Furnishing, placing and compacting common borrow or gravel borrow to the relative density required for the specific location or application for which it is being used.
   b. Any and all other work, whether direct or incidental, associated with furnishing and placing gravel borrow not specifically identified herein.

2. Common borrow or gravel borrow outside the limits of normal excavation shall be furnished, placed, and compacted at the Contractor's expense, and no payment under this item will be made for such common borrow or gravel.

3. Common borrow or gravel borrow used to backfill rock excavations will not be measured for payment under this Item, but shall be included in the unit price for "Rock Excavation Mechanical."

BID ITEM NO. 18 CRUSHED STONE

A. METHOD OF MEASUREMENT

1. The quantity of crushed to be paid for under this item shall be measured per square foot, based on the total number of square feet of crushed stone installed to the depth indicated on the plans, complete-in-place, as directed by the Engineer.

B. BASIS OF PAYMENT

1. The unit price for this item shall include full compensation for all labor, equipment, materials and incidentals needed to complete the following:

   a. Furnishing, placing and compacting crushed stone to the relative density required for the specific location or application for which it is being used.
   b. Any and all other work, whether direct or incidental, associated with furnishing and placing gravel borrow not specifically identified herein.

BID ITEM NO. 19 CLASS 12.5 HMA BASE COURSE

A. METHOD OF MEASUREMENT

1. The quantity of HMA base course to be paid for under this item shall be measured by the ton, based on the tons of HMA base course installed, complete-in-place, as directed by the Engineer.

B. BASIS OF PAYMENT

1. The unit price for this item shall include full compensation for all labor, equipment, materials and incidentals needed to complete the following:

a. Furnishing, placing and compacting HMA base course to the relative density required for the specific location or application for which it is being used;
b. Thoroughly sweeping of all surfaces to be paved; and constructing the pavement complete, as specified and as indicated and not specifically included for payment under other items;
c. Asphalt emulsion tack coat shall be paid for under this item;
d. Trimming and fine grading will be paid for under this item;
e. Any full-depth sawcutting of bituminous pavement required to complete the work shall be paid for under this item, no separate payment shall be made;
f. Furnish, prepare, and apply joint sealer;
g. Other work, whether direct or incidental, associated with furnishing and placing HMA base course not specifically identified herein.

BID ITEM NO. 20 CLASS 9.5 HMA SURFACE COURSE

A. METHOD OF MEASUREMENT

1. The quantity of HMA surface course to be paid for under this item shall be measured by the ton, based on the tons of HMA surface course installed, complete-in-place, as directed by the Engineer.

B. BASIS OF PAYMENT

1. The unit price for this item shall include full compensation for all labor, equipment, materials and incidentals needed to complete the following:

a. Furnishing, placing and compacting HMA surface course to the relative density required for the specific location or application for which it is being used;
b. Thoroughly sweeping of all surfaces to be paved; and constructing the pavement complete, as specified and as indicated and not specifically included for payment under other items;
c. Trimming and fine grading, including but not limited to gravel, dirt, and/or crushed stone;
d. Asphalt emulsion tack coat shall be paid for under this item;
e. Any full-depth sawcutting of bituminous pavement required to complete the work shall be paid for under this item, no separate payment shall be made;
f. Furnish, prepare, and apply joint sealer;
g. Raising and lowering of castings and gate boxes;
h. Adjustment of structures and/or gate boxes to grade shall be paid for under this item, no payment will be made under a separate item for this work;
i. The Contractor shall be responsible to ensure that at the end of final paving operations, flow to drainage structures has been re-established and that no isolated depressions remain. There shall be no separate payment for this provision; it shall be considered incidental to paving operations;

j. Other work, whether direct or incidental, associated with furnishing and placing HMA surface course not specifically identified herein.

BID ITEM NO. 21 TEMPORARY TRENCH PAVEMENT

A. METHOD OF MEASUREMENT

1. The quantity of Temporary Trench Pavement to be paid for under this item shall be equal to the actual amount of bituminous concrete, furnished and installed to the depths indicated, and measured by the ton to the trench payment limits as indicated on the Drawings.

2. Temporary Pavement for driveways is to be paid for under this item as directed by Engineer.

3. Temporary pavement required and installed beyond the specified payment limits shall not be measured for payment.

B. BASIS OF PAYMENT

1. The quantity of temporary pavement to be paid for under this item shall be equal to the actual amount of bituminous concrete, furnished and installed to the depths indicated, and measured by the ton to the payment limits as indicated on the Drawings.
2. The unit price shall include the 15 inches of Gravel Borrow as shown in the Drawing Detail;
3. The unit price shall constitute full compensation for furnishing and installing the temporary pavement, complete as specified and/or detailed on the Drawings.
4. There will be no separate payment for the work of removing the temporary bituminous concrete.

BID ITEM NO. 22 PERMANENT TRENCH PAVEMENT

A. METHOD OF MEASUREMENT

1. The quantity of Permanent Trench Pavement to be paid for under this item shall be equal to the actual amount of bituminous concrete, furnished and installed to the depths indicated, and measured by the ton to the trench payment limits as indicated on the Drawings.

B. BASIS OF PAYMENT

1. The quantity of permanent pavement to be paid for under this item shall be equal to the actual amount of pavement, furnished and installed to the depths indicated, measured by the square yard of trench pavement actually installed, as indicated on the Drawings or as directed by the Engineer.

2. The unit price for permanent trench pavement shall constitute full compensation for furnishing and installing the bituminous base course and bituminous surface course.

3. The unit price shall include sawcutting, removal and disposal of any temporary and existing pavement, excavation to the required depth, grading and compaction of the gravel base course; special compaction requirements; matching existing pavement; casting and valve box adjustments; applying required prime coats and tack coats; hand work necessary for driveways; and constructing the pavement complete, as specified and as indicated on the Drawings and not specifically included for payment under other items.

BID ITEM NO. 23 FULL DEPTH RECLAMATION WITH CALIUM CHLORIDE

A. METHOD OF MEASUREMENT

1. The quantity of full depth reclamation to be paid for under this item shall be measured per square yard, based on the actual number of square yards of reclaimed base course installed, complete-in-place, as directed by the Engineer.

B. BASIS OF PAYMENT

1. The unit price for this item shall include full compensation for all labor, equipment, materials and incidentals needed to complete the following:

    a. Crushing, pulverizing, blending, spreading, grading, compacting, mixing of any additional aggregate material required to meet the gradation requirements specified under this item, gradation and compaction testing, moving the processed material to allow for modification to the remaining sub-base and/or sub-grade, moving of reclaimed material from one location to another within the project, grading and compacting the sub-base and/or subgrade and that resulting from the removal of unsuitable material, calcium chloride and water for roadway dust control and any incurred costs resulting if the Contractor's decides to process off site;
    b. Referencing of structures and gate boxes, removing castings and gate boxes and lowering and plating of structures and gate boxes. The raising of gate boxes and castings to base course grade and surface course grade shall also be included for payment under this Item. It shall also include full compensation for all labor, tools, equipment, materials, and all incidental work necessary to complete the work as specified;
    c. Removal and disposal of unsuitable material shall be paid for under Unclassified Excavation;
    d. No separate payment will be made for saw cutting;
    e. No separate payment will be made for the removal of surplus reclaimed material or any sub-base/sub-grade material necessary for meeting existing grade or grade changes;
    f. Other work, whether direct or incidental, associated with furnishing and placing reclaimed base course not specifically identified herein.

BID ITEM NO. 24 REINFORCED CONCRETE PIPE – 12 INCH
BID ITEM NO. 25 REINFORCED CONCRETE PIPE – 15 INCH
BID ITEM NO. 26 REINFORCED CONCRETE PIPE – 18 INCH
BID ITEM NO. 27 SMOOTH INTERIOR CORRUGATED POLYETHLENE PIPE – 6 INCH
BID ITEM NO. 28 SMOOTH INTERIOR CORRUGATED POLYETHLENE PIPE – 8 INCH
BID ITEM NO. 29 SMOOTH INTERIOR CORRUGATED POLYETHLENE PIPE – 10 INCH
BID ITEM NO. 30 SMOOTH INTERIOR CORRUGATED POLYETHLENE PIPE – 12 INCH
BID ITEM NO. 31 SMOOTH INTERIOR CORRUGATED POLYETHLENE PIPE – 18 INCH
BID ITEM NO. 32 SMOOTH INTERIOR CORRUGATED POLYETHLENE PIPE – 30 INCH
BID ITEM NO. 33 DUCTILE IRON PIPE – 12 INCH

A. METHOD OF MEASUREMENT

1. The quantities of drain pipe to be paid for under these items shall be measured by the linear foot along the horizontal projection of the centerline of the completed drain, excluding the length of manholes and catch basins, measured to the limits of the manhole inside diameter or the catch basin inside face of wall.

B. BASIS OF PAYMENT

1. The unit prices for these items shall include full compensation for all labor, equipment, materials and incidentals needed to complete the following:

    a. Furnishing and installing the gravity drains, complete-in-place, including all excavation, excavation support, disposal of material, furnishing and installing gravel borrow backfill, crushed stone for pipe bedding/backfill material, compacting materials as specified, and all incidental work not specifically included for payment under other items;
    b. Excavation shall also include any sawcutting of the existing pavements and removal and disposal of all existing pavements, including any existing bituminous concrete, masonry or concrete walls or reinforced concrete base (if encountered);
    c. Protection and support of existing utilities, maintaining flows of all utilities, and repairing and/or replacing damaged or impacted existing utilities not specifically included for payment under other items;
    d. Implementing safety precautions, including designing and implementing excavation support;
    e. Designing, furnishing, installing, operating, maintaining and removing temporary dewatering systems required to lower and control water levels and hydrostatic pressures during construction, as well as the appropriate disposal of pumped water;
    f. Furnishing and installing tees, cleanouts and other adapters or couplings required to install the system complete-in-place, as specified and indicated on the Drawings;
    g. Connecting new gravity drains to the new/existing gravity drain structures or system, including all excavation, modifications to existing structures (including but not limited to form work, coring, cutting, concrete work, masonry and bricks), modifying and/or removing existing pipe (all materials and sizes), and furnishing and installing adapters and couplings;
    h. Any and all other work, whether direct or incidental, associated with the furnishing and installation of the gravity drains not specifically identified herein.

BID ITEM NO. 34 WATER SERVICE CONNECTION AND HOT BOX ASSEMBLY

A. METHOD OF MEASUREMENT

1. This item shall be paid for at the contract unit price bid per lump sum.

B. BASIS OF PAYMENT

1. The unit price for this item shall include full compensation for all labor, equipment, materials and incidentals need complete the following:

    a. Furnishing and installing the water service connection and hot box assembly, as depicted on the Drawings or as directed or required by the Engineer and/or utility provider, including but not limited to joint-restraint fittings and thrust blocks, bends, tees, gate valves, reducers, couplings and adapters, backflow preventer, concrete pad, utility supports, above grade heated enclosure, and all other work as shown on the Drawings or described in the Specifications;
    b. Pressure testing, disinfection and sampling performed by separate independent and qualified companies and laboratories;
    c. Sawcutting existing pavement in area of water service connection;
    d. Removing and disposing of excavated bituminous concrete;
    e. Excavation, trench support and dewatering;

f. Removal and disposal of excess material;
g. Coordination with Kent County Water Authority (KCWA) for all water utility work associated with the project.
h. Excavation and disposal of material, furnishing and installing crushed stone and gravel borrow pipe bedding/backfill material, and backfilling and compacting as specified, including all incidental work not specifically included for payment under other items;
i. Any and all other work, whether direct or incidental, associated with the water service connection and hot box assembly not specifically identified herein.

BID ITEM NO. 35 GAS SERVICE CONNECTION

A. METHOD OF MEASUREMENT

1. This item shall be paid for at the contract unit price bid per lump sum.

B. BASIS OF PAYMENT

1. The unit price for this item shall include full compensation for all labor, equipment, materials and incidentals need complete the following:

a. Installation (by others) of natural gas underground service as depicted on the Drawings, as required by field conditions, or as directed or required by the Engineer and/or utility provider;
b. Coordination with the utility provider for the installation of the gas service, connection to existing stub, and meter pad;
c. Gas meter pad and utility bollards;

1. The utility provider (RI Energy) shall use their own forces and or contractors to perform all gas service work. The work to be performed by the utility provider and/or its contractors shall not include surface restoration of any kind; temporary and permanent restoration of areas where gas relocations are performed, this shall be performed by the Contractor and included as part of the lump sum price.

2. Invoices for said work shall be provided by RI Energy to the Contractor, who will include same with his payment requisitions.

BID ITEM NO. 36 SDR-35 PVC IRRIGATION SLEEVE – 3 INCH

A. METHOD OF MEASUREMENT

1. The quantity of PVC sleeve to be paid for under this item shall be the actual amount of PVC sleeve furnished and installed, measured by the linear foot along the horizontal projection of the centerline of the sleeve, complete as indicated on the Drawings or as otherwise directed by the Engineer.

B. BASIS OF PAYMENT

1. The unit price for this item shall include full compensation for all labor, equipment, materials and incidentals needed to complete the following:
a. Furnishing and installing the irrigation sleeve, complete-in-place, including all excavation and disposal of materials, furnishing and installing crushed stone, backfill material, and compacting as specified;

b. Furnishing and installing all necessary adapters, couplings and fittings;
c. Sawcutting of the existing pavements and removal and disposal of all existing pavements, including any existing bituminous, concrete or reinforced concrete base (if encountered);
d. Any and all other work, whether direct or incidental, associated with the furnishing and installation of the irrigation sleeve not specifically identified herein.

BID ITEM NO. 37 SDR-35 PVC SEWER – 4 INCH
BID ITEM NO. 38 SDR-35 PVC SEWER – 6 INCH

A. METHOD OF MEASUREMENT

1. The quantity of gravity sewer to be paid for under this item shall be measured by the linear foot along the horizontal projection of the centerline of the completed sewer excluding the length of manholes measured to the limits of the manhole inside diameter.

B. BASIS OF PAYMENT

1. The unit price for this item shall include full compensation for all labor, equipment, materials and incidentals needed to complete the following:

a. Furnishing and installing the gravity sewer, complete-in-place, including all excavation and disposal of materials, furnishing and installing geotextile filter fabric, furnishing and installing crushed stone and gravel borrow pipe bedding, backfill material, and compacting as specified;
b. The work shall include all necessary adapters and fittings for re-connection of existing or new lateral services to the new sanitary line including fittings and couplings. Connecting new gravity sewers to new or existing gravity sewer structures or system, modifications to existing structures (including but not limited to form work, coring, cutting, concrete work, masonry and bricks), and furnishing and installing adapters and couplings;
c. Sawcutting of the existing pavements and removal and disposal of all existing pavements, including any existing bituminous, concrete or reinforced concrete base (if encountered);
d. Protection and support of existing utilities, maintaining flows of all utilities, providing sanitary by-pass pumping, and repairing and/or replacing damaged or impacted existing utilities not specifically included for payment under other items (Contractor to test existing sanitary sewer flow prior to providing sanitary sewer by-pass);
e. Implementing safety precautions, including designing and implementing excavation support;
f. Designing, furnishing, installing, operating, maintaining and removing temporary dewatering systems required to lower and control water levels and hydrostatic pressures during construction, as well as the appropriate disposal of pumped water;
g. Any and all other work, whether direct or incidental, associated with the furnishing and installation of the gravity sewers not specifically identified herein.

BID ITEM NO. 39 SANITARY SEWER MANHOLE

A. METHOD OF MEASUREMENT

1. The quantity of sewer manholes to be paid for under this item shall be measured per each, based on the actual number of sewer manholes furnished and installed, complete-in-place, as indicated on the Drawings or as otherwise directed by the Engineer.

B. BASIS OF PAYMENT

1. The unit price for this item shall include full compensation for all labor, equipment, materials and incidentals needed to complete the following:

    a. Furnishing and installing, complete-in-place, precast concrete sewer manholes, including sawcutting, temporary excavation support, dewatering, excavation & disposal of material, furnishing and installing bedding material, construction of inverts, base sections, risers, cones or flat slab tops (as required), watertight frames and covers, backfill with gravel borrow and all other work and materials required to complete the work as indicated on the Drawings and as specified.
    b. Any and all other work, whether direct or incidental, associated with the construction of the sewer manholes not specifically identified herein.

BID ITEM NO. 40 PRECAST CONCRETE DROP INLET STANDARD 4.5.1
BID ITEM NO. 41 PRECAST CATCH BASIN 4’ DIAMETER STANDARD 4.4.0
BID ITEM NO. 46 NDS – CATCH BASIN (OR EQUAL)

A. METHOD OF MEASUREMENT

1. The quantity of drop inlets and catch basins to be paid for under this item shall be measured per each, based on the actual number of drop inlets or catch basins installed, complete-in-place, as indicated on the Drawings or as otherwise directed by the Engineer.

B. BASIS OF PAYMENT

1. The unit price for this item shall include full compensation for all labor, equipment, materials and incidentals needed to complete the following:

    a. Furnishing and installing, complete-in-place, drop inlets and catch basins, including sawcutting, temporary excavation support, dewatering, excavation and disposal of material, furnishing and installing crushed stone bedding material, construction of inverts, base sections, risers, cones or flat slab tops (as required), frames and grates, frames and covers (as required), backfill with gravel borrow, and all other work and materials required to complete the work as indicated on the Drawings and as specified;
    b. Where applicable, the unit price for this item shall also include full compensation for furnishing all labor, equipment, materials and incidentals necessary for installing new curb inlets or aprons as indicated on the Drawings or as directed by the Engineer, including excavation, backfill, compaction, bedding material, concrete formwork and placement of concrete, matching line and grade of existing curb, and all other work incidental to installation of the new curb inlets and not specifically included for payment under other items;
    c. Any and all other work, whether direct or incidental, associated with the construction of the drop inlets and catch basins not specifically identified herein.

BID ITEM NO. 42 PRECAST MANHOLE 4’ DIAMETER STANDARD 4.2.0
BID ITEM NO. 43 PRECAST MANHOLE 5’ DIAMETER STANDARD 4.2.1
BID ITEM NO. 44 PRECAST DIVERSION MANHOLE 4’ DIAMETER
BID ITEM NO. 45 PRECAST DIVERSION MANHOLE 5’ DIAMETER
BID ITEM NO. 47 NDS – MANHOLE (OR EQUAL)

A. METHOD OF MEASUREMENT

1. The quantity of drain manholes and diversion manholes to be paid for under this item shall be measured per each, based on the actual number of drain manholes furnished and installed, all depths, complete-in-place, as indicated on the Drawings or as otherwise directed by the Engineer.

B. BASIS OF PAYMENT

1. The unit price for this item shall include full compensation for all labor, equipment, materials and incidentals needed to complete the following:

   a. Furnishing and installing, complete-in-place, precast concrete drain manholes and diversion manholes, including sawcutting, temporary excavation support, dewatering, excavation and disposal of material, furnishing and installing crushed stone bedding material, construction of inverts and weir wall, base sections, risers, cones or flat slab tops (as required), frames and covers, backfill with gravel borrow, and all other work and materials required to complete the work as indicated on the Drawings and as specified;
   b. Any and all other work, whether direct or incidental, associated with the construction of the drain manholes and diversion manholes not specifically identified herein.

BID ITEM NO. 48 BMP 1 – INFLITRATION CHAMBER SYSTEM
BID ITEM NO. 49 BMP 2 – INFLITRATION CHAMBER SYSTEM

A. METHOD OF MEASUREMENT

1. These items shall be paid for at the contract unit price bid per lump sum.

B. BASIS OF PAYMENT

1. The unit price for these items shall include full and complete compensation for all the labor, equipment, materials, and incidentals associated with the installation of the infiltration chamber system including but not limited to:
   a. Furnishing and installing, complete in-place, infiltration chambers system, including sawcutting, temporary excavation support, dewatering, excavation and disposal of material, and backfill.
   b. Furnishing and installing of recharger chamber units, geotextile (woven and non-woven geotextile), washed crushed stone, ASTM C-33 concrete sand, construction of inspection ports, all interior drainage piping and manifolds and all other work and materials required to complete the work as indicated on the Drawings and as specified;
   c. Any and all other work, whether direct or incidental, associated with the construction of the Infiltration Chamber System not specifically identified herein.

BID ITEM NO. 50 DRAIN CLEANOUT

A. METHOD OF MEASUREMENT

1. The quantity of drain cleanouts to be paid for under this item shall be measured per each, based on the actual number of drain cleanouts installed, complete-in-place, as indicated on the Drawings or as otherwise directed by the Engineer.

B. BASIS OF PAYMENT

1. The unit price for this item shall include full compensation for all labor, equipment, materials and incidentals needed to complete the following:

    a. Furnishing and installing, complete-in-place, drain cleanout, including sawcutting, temporary excavation support, dewatering, excavation and disposal of material, furnishing and installing crushed stone bedding material, concrete block support, construction of inverts, riser pipe, end caps fittings, cast iron frames and lids, class "XX" concrete (as required) and all other work and materials required to complete the work as indicated on the Drawings and as specified;
    b. Any and all other work, whether direct or incidental, associated with the construction of the concrete block catch basins not specifically identified herein.

BID ITEM NO. 51 SEWER CLEANOUT

A. METHOD OF MEASUREMENT

1. The quantity of sewer cleanouts to be paid for under this item shall be measured per each, based on the actual number of sewer cleanouts installed, complete-in-place, as indicated on the Drawings or as otherwise directed by the Engineer.

B. BASIS OF PAYMENT

1. The unit price for this item shall include full compensation for all labor, equipment, materials and incidentals needed to complete the following:

    a. Furnishing and installing, complete-in-place, sewer cleanout, including sawcutting, temporary excavation support, dewatering, excavation and disposal of material, furnishing and installing crushed stone bedding material, construction of inverts, riser pipe, cast iron frames and covers, concrete collar and all other work and materials required to complete the work as indicated on the Drawings and as specified;
    b. The work shall include all necessary adapters and fittings for connection of riser pipe to the new sanitary line including fittings and couplings;
    c. Any and all other work, whether direct or incidental, associated with the construction of the concrete block catch basins not specifically identified herein.

BID ITEM NO. 52 1,000 GALLON GREASE TRAP

A. METHOD OF MEASUREMENT

1. The quantity to be paid for under this item shall be measured per each, based on the actual number of grease traps installed, complete-in-place, as indicated on the Drawings or as otherwise directed by the Engineer.

B. BASIS OF PAYMENT

1. The unit price for this item shall include full compensation for all labor, equipment, materials and incidentals needed to complete the following:

    a. Furnishing and installing, complete-in-place, grease trap, including sawcutting, temporary excavation support, dewatering, excavation and disposal of material, furnishing and installing crushed stone bedding material, watertight frames and covers,

backfill with gravel borrow and all other work and materials required to complete the work as indicated on the Drawings and as specified.

b. Protection and support of existing utilities, maintaining flows of all utilities, and repairing and/or replacing damaged or impacted existing utilities not specifically included for payment under other items;
c. Implementing safety precautions, including designing and implementing excavation support;
d. Designing, furnishing, installing, operating, maintaining and removing temporary dewatering systems required to lower and control water levels and hydrostatic pressures during construction, as well as the appropriate disposal of pumped water;
e. Furnishing and installing tees, cleanouts and other adapters or couplings required to install the system complete-in-place, as specified and indicated on the Drawings;
f. Connecting new gravity sanitary pipes to the grease trap, including all excavation and furnishing and installing adapters and couplings;
g. Any and all other work, whether direct or incidental, associated with the construction of the concrete block catch basins not specifically identified herein.

BID ITEM NO. 53 PRE- AND POST-CONSTRUCTION CONDITION SURVEYS

A. METHOD OF MEASUREMENT

1. Pre- and post-construction condition surveys will be measured for payment by the number of locations that surveys are performed.

B. BASIS OF PAYMENT

1. Pre- and post-construction condition surveys will be paid for at the contract unit price per each. Said price will constitute full payment for performance of both pre- and post-construction surveys and submission of reports for a given location as specified in Section 01399 of the specifications, in accordance with the Plans and/or directed by the Engineer.

BID ITEM NO. 54 FENCE – TEMPORARY ALL TYPES AND SIZES

A. METHOD OF MEASUREMENT

1. The length of temporary fence to be paid for under this Item shall be measured by the linear foot of actual fence furnished and installed only in the current limits of work under active construction by the Contractor, complete-in-place, in accordance with the Plans, and/or as directed by the Engineer. Limits of work shall be approved and/or directed by the Engineer.

B. BASIS OF PAYMENT

1. The unit price for this item shall include full compensation for all labor, equipment, materials and incidentals needed to complete the following:

a. Furnishing and installing temporary fence and gates including posts and post foundations, framework, fabric, hardware and appurtenances;
b. Maintaining the temporary fence;
c. Removing and resetting the temporary fence from one portion of the project to another;
d. Replacement and/or restoration of fence damaged due to construction activities, accidents, vandalism, and/or damaged in any other manner;
e. Final removal of temporary fence;

f. Any and all other work, whether direct or incidental, associated with the installation of the temporary fence not specifically identified herein.

BID ITEM NO. 55 6’ HIGH BLACK VINLY CHAIN LINK FENCE AND DOUBLE GATE

A. METHOD OF MEASUREMENT

1. The length of fence to be paid for under this Item shall be measured by the linear foot of actual fence furnished and installed, complete-in-place, in accordance with the Plans and/or as directed by the Engineer.

B. BASIS OF PAYMENT

1. The unit price for this item shall include full compensation for all labor, equipment, materials and incidentals needed to complete the following:

a. Furnishing and installing chain link fence including posts and post foundations, framework, fabric, hardware and appurtenances;
b. Furnishing and installing single or double gates;
c. Excavation material for, backfill for, concrete for, and installation of post bases;
d. Removal and legal disposal of excess material;
e. Furnishing and installing privacy slats (if required);
f. Any and all other work, whether direct or incidental, associated with the installation of the chain link fence not specifically identified herein.

BID ITEM NO. 56 COLLAPSIBLE BOLLARD

A. METHOD OF MEASUREMENT

1. The quantity of collapsible bollard to be paid for under this item shall be measured per each, based on the actual number of collapsible bollards installed, as indicated on the Drawings or as otherwise directed by the Engineer.

B. BASIS OF PAYMENT

1. The unit price for this item shall include full compensation for all labor, equipment, materials and incidentals needed to complete the following:

a. Excavation, removal and legally disposing of the unsuitable material, including existing soil, or any existing bituminous concrete and concrete base or and reinforced concrete base;
b. Furnishing and installing new gravel base, bollards, concrete pad, top plate, and appurtenances;
c. Any and all other work, whether direct or incidental, associated with bollard and rope – all types not specifically identified herein.

BID ITEM NO. 57 SCREEN FENCE

A. METHOD OF MEASUREMENT

1. The length of screen fence to be paid for under this Item shall be measured by the linear foot of actual fence furnished and installed, complete-in-place, in accordance with the Plans and/or as directed by the Engineer.

B. BASIS OF PAYMENT

1. The unit price for this item shall include full compensation for all labor, equipment, materials and incidentals needed to complete the following:

    a. Furnishing and installing screen fence and gates including posts and post foundations, framework, fabric, hardware and appurtenances;
    b. Excavation for, backfill for, concrete for, and installation of post bases;
    c. Removal and legal disposal of excess material;
    d. Furnishing and installing single or double gates (as required);
    e. Any and all other work, whether direct or incidental, associated with the installation of the picket fence not specifically identified herein.

BID ITEM NO. 58 PORTLAND CEMENT CONCRETE SIDEWALKS AND DRIVEWAYS

A. METHOD OF MEASUREMENT

1. The quantity for Portland cement concrete sidewalks and driveways shall be measured per square yard, based on the actual square yards of cement concrete installed in accordance with the Contract Documents or as direct by the Engineer.

B. BASIS OF PAYMENT

1. The unit price for this item shall include full compensation for all labor, equipment, materials and incidentals needed to complete the following:

    a. Excavation, trimming and fine grading, and formwork shall be paid for under this item;
    b. Furnishing and installing backfill gravel borrow material including compaction as specified and any fine grading required;
    c. Resetting or replacement of all signposts and resetting of existing curb boxes and castings in sidewalks and driveways;
    d. Installation of ADA detectable warning devices at required locations;
    e. Furnish and install stamped concrete band on Post Road, match existing in kind;
    f. Any and all other work, whether direct or incidental, associated with the removal and replacement of concrete wheelchair ramps not specifically identified herein.

2. Adjustment of structures and/or gate boxes to grade shall be paid for under this item, no payment will be made under a separate item for this work;

BID ITEM NO. 59 CONCRETE WHEELCHAIR RAMP

A. METHOD OF MEASUREMENT

1. The quantity of concrete wheelchair ramps to be paid for under this item shall be measured by the number of square yards of wheelchair ramp furnished and installed in accordance with the Plans and/or as directed by the Engineer.

B. BASIS OF PAYMENT

1. The unit price for this item shall include full compensation for all labor, equipment, materials and incidentals needed to complete the following:

a. Excavation, trimming and fine grading, and formwork shall be paid for under this item;
b. Furnishing and installing backfill gravel borrow material including compaction as specified and any fine grading required;
c. Furnishing and installing ADA-compliant wheelchair ramps. Any concrete sidewalks required to meet existing sidewalks will also be paid for under this item;
d. Installation of ADA detectable warning devices at required locations;
e. Resetting or replacement of all signposts and resetting of existing curb boxes and castings in sidewalks and driveways;
f. Granite wheelchair ramp transition curbs and concrete curb lock shall be paid for under this item;
g. Any removal and resetting of granite curb required to meet existing curb will also be paid for under this item;
h. Any and all other work, whether direct or incidental, associated with the removal and replacement of concrete wheelchair ramps not specifically identified herein.

BID ITEM NO. 60 PERMEABLE PAVERS

A. METHOD OF MEASUREMENT

1. The quantity of permeable pavers to be paid for under this item shall be measured by the number of square foot of permeable pavers installed, along with subgrade materials, complete-in-place, in accordance with the Plans and/or as directed by the Engineer.

B. BASIS OF PAYMENT

1. The unit price for this item shall include full compensation for all labor, equipment, materials and incidentals needed to complete the following:

a. Trimming and fine grading the sub base;
b. Implementing safety precautions, including designing and implementing excavation support;
c. Furnishing and installing non-woven impermeable filter fabric, ASTM C-33 concrete sand, and crushed stone reservoir courses to the depths and grades shown on the plans;
d. Furnishing and placing pea stone filter blanket material to the depths and grades shown on the plans;
e. Furnishing and placing filter course material to the depths and grades shown on the plans;
f. Furnishing and placing choker course crushed stone to the depths and grades shown on the plans;
g. Furnishing and placing open graded, crushed angular chipstone to the depths and grades shown on the plans;
h. Furnishing and installing interlocking pervious pavers;
i. Sawcutting, removal and disposal of any temporary pavement, grading of the subgrade, special compaction requirements, matching existing pavement, and casting and valve box adjustments;
j. Furnishing and installing the permeable pavers, complete-in-place, including all excavation, disposal of material, gravel borrow backfill, compacting materials as specified, and all incidental work not specifically included for payment under other items;
k. Any and all other work, whether direct or incidental, associated with the furnishing and installing of permeable pavers not specifically identified herein.

BID ITEM NO. 61 UNIT PAVERS

A. METHOD OF MEASUREMENT

1. The quantity of unit pavers to be paid for under this item shall be measured per square foot, including subgrade materials, based on the actual area of new pavers installed, as indicated on the Drawings or as otherwise directed by the Engineer.

B. BASIS OF PAYMENT

1. The unit price for this item shall include full compensation for all labor, equipment, materials and incidentals needed to complete the following:

   a. Excavation, removal and legally disposing of the unsuitable material, including existing soil, any sawcutting of the existing pavements and removal and disposal, pavements, including any existing bituminous concrete and concrete base or and reinforced concrete base;
   b. Furnishing and installing gravel base, stone dust setting bed, and unit pavers;
   c. Compacting subbase, new gravel base and setting bed;
   d. Trimming and fine grading the gravel base and setting bed;
   e. Any and all other work, whether direct or incidental, associated with installing new brick pavers not specifically identified herein.

BID ITEM NO. 62 GRANITE CURB
BID ITEM NO. 63 PRECAST CONCRETE CURB

A. METHOD OF MEASUREMENT

1. The quantity of granite or precast concrete curb to be paid for under this item shall be actual amount of curb, furnished and installed, measured by the linear foot of the curb, complete as indicated on the Drawings or as otherwise directed by the Engineer.

B. BASIS OF PAYMENT

1. The unit price for this item shall include full compensation for all labor, equipment, materials and incidentals needed to complete the following:

   a. Furnishing and installing curb as detailed on the Drawings and as directed by the Engineer;
   b. The unit price for this item shall constitute full compensation for procuring granite curb, saw cutting, excavation, bedding, concrete, curb lock, removal and replacement of gravel backfill and mechanical compaction. Restoration of roadways, driveways, bushes, trees and plantings, fences and walls disturbed by the Contractor’s operations, to a condition at least equal to a condition which existed prior to construction, as directed by the Engineer, at no additional cost to the Owner.
   c. Transition curbs for driveways, sidewalks, and walkways shall be paid for under this item, no separate payment will be made.
   d. Transition curb for wheelchair ramps shall be paid for under **Bid Item No. 59**.
   e. All other work, whether direct or incidental, associated with furnishing and installing new curbing not specifically identified herein.

BID ITEM NO. 64 REMOVE, HANDLE, HAUL TRIM RESET CURB EDGING, STRAIGHT, CIRCULAR ALL TYPES

A. METHOD OF MEASUREMENT

1. The quantity of curbing to be paid for under this item shall be equal to the actual length of curbing removed and reset, measured by the linear foot along the centerline of the curb complete as indicated on the Drawings, or as directed by the Engineer.

B. BASIS OF PAYMENT

1. The unit price for this item shall constitute full compensation for furnishing all labor, materials, tools and equipment necessary for saw cutting pavements, removing, salvaging, trimming and resetting existing curbing as directed by the Engineer.
2. The unit price for this item shall constitute full compensation for excavation, bedding, concrete, formwork, removal and replacement of gravel, backfill, compaction, restoration of areas disturbed by the Contractor's operations, to a condition at least equal to a condition which existed prior to construction, as directed by the Engineer, at no additional cost to the Owner, and all other work incidental to removing and resetting existing curbing and not specifically included for payment under other items.
3. Curbing damaged during removal or other construction operations shall be replaced in kind at no expense to the Owner.
4. All other work, whether direct or incidental, associated with furnishing and installing new curbing not specifically identified herein.

BID ITEM NO. 65 LARGE BRICK VENEER ENTRY WALL
BID ITEM NO. 66 SMALL BRICK VENEER ENTRY WALL

A. METHOD OF MEASUREMENT

1. These items shall be paid for at the contract unit price bid per lump sum.

B. BASIS OF PAYMENT

1. The unit price for this item shall include full compensation for all labor, equipment, materials and incidentals needed to complete the following:

    a. Furnishing and installing brick veneer entry walls, complete-in-place, including excavation and disposal of material, furnishing and installing gravel borrow bedding, concrete foundations including all formwork and rebar, flashing, granite cap stone, name plate lettering, backfill with gravel borrow and all other work and materials required to complete the work as indicated on the Drawings and as specified.
    b. Any and all other work, whether direct or incidental, associated with the construction of the concrete block catch basins not specifically identified herein.

BID ITEM NO. 67 10’ HIGH LOUVERED SCREEN WALL AND GATE

A. METHOD OF MEASUREMENT

1. This item shall be paid for at the contract unit price bid per lump sum.

B. BASIS OF PAYMENT

1. The price for this item shall include full compensation for all labor, equipment, materials and incidentals needed to complete the following:

    a. Furnishing and installing louvered wall and gates including posts and post foundations, framework, fabric, hardware and appurtenances;
    b. Excavation for, backfill for, concrete for, and installation of post bases;
    c. Removal and legal disposal of excess material;
    d. Furnishing and installing single or double gates (as required);
    e. Any and all other work, whether direct or incidental, associated with the installation of the picket fence not specifically identified herein.

BID ITEM NO. 68 TEST PITS

A. METHOD OF MEASUREMENT

1. The quantity of test pits to be paid for under this item shall be measured per each, based on the actual number of test pits performed, as indicated on the Drawings or as otherwise directed by the Engineer.

B. BASIS OF PAYMENT

1. The unit price for this item shall include full compensation for all labor, equipment, materials and incidentals needed to complete the following:
    a. Excavation including any sawcutting of the existing pavements and removal and disposal of all existing pavements, including any existing bituminous concrete, concrete base or reinforced concrete base (if encountered);
    b. The work shall include any temporary excavation support, dewatering, furnishing and installing backfill material including compacting the material as specified,
    c. Installation of a minimum 3-inch temporary bituminous pavement patch over test pit area;
    d. Collection and recording of data and existing conditions discovered as a result of the test pit;
    e. Data to be collected shall be approved by the Engineer prior to the start of the work. The Contractor or its subcontractor shall submit all findings in a form acceptable by the Engineer;
    f. Test Pits which data has not yet been submitted shall not be included for payment;
    g. Any and all other work, whether direct or incidental, associated with excavation and backfill for test pits not specifically identified herein.

BID ITEM NO. 69 FIELD OFFICE

A. METHOD OF MEASUREMENT

1. This item shall be paid for at the contract unit price bid per month.

B. BASIS OF PAYMENT

1. The unit price for this item shall include full compensation for all labor, equipment, materials and incidentals needed to complete the following:

a. Furnishing and maintaining a field office and all associated temporary utility connections, sanitary facilities, equipment, furniture, and other items required by the Engineer for full-time occupation and use throughout the progress of the Work;
b. Payment of all connection and usage fees for the temporary utilities to the field office for the duration of the Project;
c. Disconnection and removal of the field office upon completion of the Project, or when directed by the Engineer.

BID ITEM NO. 70 MOBILIZATION

A. METHOD OF MEASUREMENT

2. This item shall be paid for at the contract unit price bid per lump sum.

3. The lump sum price for this item shall not exceed five percent (5%) of the total amount of the bid, excluding this item.

4. A maximum of fifty percent (50%) of the Mobilization lump sum shall be payable in the initial payment requisition. The balance of the lump sum shall be payable upon completion of the project, after all temporary items and measures have been removed and suitably disposed of and final restoration has been completed.

B. BASIS OF PAYMENT

1. The lump sum price for this item shall include full compensation for all labor, equipment, materials and incidentals needed to complete the following:

a. Initiating and administering the contract, including but not limited to furnishing performance and payment bonds and all other securities and insurances required, project meetings, securing of all necessary permits, etc., for providing all other materials, supplies, tools, equipment, labor, financing, supervision, temporary structures, and any and all other administrative expenses incurred in carrying out the work and furnishing the materials, keeping records and preparing required reports, and assuming risks, which have not been included in the prices in other items of the Proposal;
b. Costs, exclusive of the cost of materials, for mobilizing all machinery, plant, tools, and other equipment necessary to carry on and complete the work;
c. Establishing and maintaining survey controls for the construction layout of the overall project by a qualified professional, using appropriate means and methods to insure the accuracy of the layout, as specified and/or as directed by the Engineer;
d. Re-establishing all benchmarks, concrete bounds, iron pins, and all permanent property boundary markers;
e. Coordinating and scheduling the use of uniformed traffic persons and/or flaggers including tracking or verifying hours worked by traffic persons;
f. Furnishing and installing temporary stabilizing erosion control measures in areas after construction activity has ceased.
g. Furnishing and spreading calcium chloride and/or water in order to control (minimize) dust at the Work areas;
h. Costs for demobilizing all machinery, plant, tools, and other equipment used to perform the work upon completion of the project;
i. Costs for performing final cleanup of the project area, exclusive of specific restoration to be paid for under other items.

BID ITEM NO. 71 MAINTENANCE AND PROTECTION OF TRAFFIC

A. METHOD OF MEASUREMENT

1. Maintenance and Protection of Traffic shall be paid for on a lump sum basis.

2. A maximum of fifty percent (50%) of the traffic control lump sum shall be payable in the initial payment requisition. The balance of the lump sum shall be payable upon completion of the project, after all temporary items and measures have been removed and suitably disposed of and final restoration has been completed.

B. BASIS OF PAYMENT

1. The lump sum for this item shall include full compensation for all labor, equipment, materials and incidentals needed to complete the following:

   a. Fabricating, furnishing, erecting, maintaining, removing and relocating the traffic management devices for the overall project, complete-in-place, as specified and indicated in the Contract Drawings;
   b. Providing additional traffic management devices to provide a clear and visible traffic control through the project area (if required);
   c. The Contractor shall be required to reposition the traffic control devices as many times as necessary to ensure the safe passage of vehicular traffic and pedestrians. Supplemental signs and traffic control devices directing traffic around and/or through the work zones shall be supplied as operations require or as directed by the Engineer. Payment for these traffic control measures shall be included as part of this item and no additional payment will be made;
   d. Any and all other work, whether direct or incidental, associated with the traffic control not specifically identified herein.

BID ITEM NO. 72 LOAM BORROW 4 INCHES DEEP

A. METHOD OF MEASUREMENT

1. The quantity of loam borrow shall be measured by the number of square yards of loam borrow installed with a minimum depth of 4 inches, complete-in-place, in accordance with the Plans and/or as directed by the Engineer.

B. BASIS OF PAYMENT

1. The unit price for this item shall include full compensation for all labor, equipment, materials and incidentals needed to complete the following:

   a. Trimming and fine grading the sub base;
   b. Placing loam borrow;
   c. Resetting or replacement of all signposts and resetting of curb boxes and castings in loamed and seeded areas;
   d. Any and all other work, whether direct or incidental, associated with the furnishing and installing loam borrow not specifically identified herein.

BID ITEM NO. 73 SEEDING

A. METHOD OF MEASUREMENT

1. The quantity of seeding shall be measured by the number of square yards, surface measurement, of the area in which seed has been installed, complete-in-place, in accordance with the Plans and/or as directed by the Engineer.

B. BASIS OF PAYMENT

1. The unit price for this item shall include full compensation for all labor, equipment, materials and incidentals needed to complete the following:

   a. Furnishing and placing seed, lime and fertilizer;
   b. Protecting and maintaining the loamed and seeded area until such time as an acceptable level of grass growth has been established;
   c. Resetting or replacement of all signposts and resetting of curb boxes and castings in loamed and seeded areas;
   d. Any and all other work, whether direct or incidental, associated with the restoration of vegetated areas not specifically identified herein.

BID ITEM NO. 74 MULCH BED – FURNISH AND SPREAD 4” DEPTH

A. METHOD OF MEASUREMENT

1. The quantity of mulch shall be measured by the number of square yards installed with a minimum depth of 4 inches, complete-in-place, in accordance with the Plans and/or as directed by the Engineer.

B. BASIS OF PAYMENT

1. The unit price for this item shall include full compensation for all labor, equipment, materials and incidentals needed to complete the following:

   a. Trimming and fine grading the sub base;
   b. Placing and spreading mulch;
   c. Any and all other work, whether direct or incidental, associated with the furnishing and installing loam borrow not specifically identified herein.

BID ITEM NO. 75 TREES
BID ITEM NO. 76 SHRUBS
BID ITEM NO. 77 GROUNDCOVER

A. METHOD OF MEASUREMENT

1. The quantity of trees, shrubs, and groundcover to be paid for under these items shall be measured per each, based on the actual number trees, shrubs, and groundcover installed, including any incidentals, as shown on the Drawings and as specified herein, complete and accepted in place, to the full satisfaction of the Engineer.

B. BASIS OF PAYMENT

1. The unit price for this item shall include full compensation for all labor, equipment, materials and incidentals needed to complete the following:

    a. Furnishing all labor, materials, equipment, and incidentals required for installing all trees, shrubs, and groundcover, all sizes, inclusive of tagging, placing, field layout and coordination, hand and machine excavation required for plant installation, backfilling and compacting, soil amendments, herbicides, fertilizers, staking, watering, placing pine bark mulch, establishment and maintenance measures, as shown on the plans and as specified herein, and any and all incidentals and miscellaneous work not specifically included for payment but necessary to complete the Work.

BID ITEM NO. 78 ELECTRICAL SITE LIGHTING

A. METHOD OF MEASUREMENT

1. This item shall be paid for at the contract unit price bid per lump sum.

B. BASIS OF PAYMENT

1. The unit price for this item shall include full compensation for all labor, equipment, materials and incidentals needed to complete the following:
    a. Furnishing and installation the electrical site lighting, inclusive of all work shown on the Drawings and detailed in the Specifications, including but not limited to excavation, backfill, conduit, wiring, concrete, reinforcement and installation of pole bases as detailed on the Drawings;
    b. Precast light pole base, rebar, tie rods, ground clamps, anchor bolts, lamp posts, luminaire fixtures, and all other work as detailed on the Drawings;
    c. Contractor to coordinate all work with RI Energy;
2. Any and all other work, whether direct or incidental, associated with the electrical site lighting not specifically identified herein.

BID ITEM NO. 79 ELECTRICAL SERVICE CONENCTION

A. METHOD OF MEASUREMENT

1. This item shall be paid for at the contract unit price bid per lump sum.

B. BASIS OF PAYMENT

1. The unit price for this item shall include full compensation for all labor, equipment, materials and incidentals needed to complete the following:
    a. Furnish and installing of electrical service, inclusive of all work shown on the Drawings and detailed in the Specifications, including but not limited to sawcutting, excavation and disposal of material, backfill, conduit and concrete encasement, handholes, utility bollards, primary and secondary services, transformer with pad and containment curb, utility pole and overhead wiring, connection to the building, hot box, and existing service, and all appurtenances required in accordance with the specifications.
    b. Removal and disposal of existing duct bank in coordination with RI Energy.
    c. Contractor to coordinate all work with RI Energy;
2. Any and all other work, whether direct or incidental, associated with the electrical service connection not specifically identified herein.

BID ITEM NO. 80 TELECOMMUNICATION SERVICE CONENCTION

A. METHOD OF MEASUREMENT

1. This item shall be paid for at the contract unit price bid per lump sum.

B. BASIS OF PAYMENT

1. The unit price for this item shall include full compensation for all labor, equipment, materials and incidentals needed to complete the following:
   a. Furnish and installing of telecommunication conduit as detailed on the Drawings or directed by the Engineer and/or utility provider, included but not limited to sawcutting, excavation and disposal of material, backfill, conduit, handhole, connection to concession/utility building and existing handhole and all appurtenances required in accordance with the specification.

2. Any and all other work, whether direct or incidental, associated with telecommunication service connection not specifically identified herein.

BID ITEM NO. 81 PARKING SIGNS

A. METHOD OF MEASUREMENT

1. Parking Signs will be measured per square foot of signage actually installed, complete in place, including the foundation, excavation, backfilling and compaction for foundations and the structural supports.

B. BASIS OF PAYMENT

1. The unit price shall include full compensation for furnishing and erecting the supports, including construction of the concrete bases, steel reinforcement and anchor bolts, furnishing and installing post assembly, furnishing and installing the signage, and all excavation, gravel backfill, and all incidental costs required to complete the work.

BID ITEM NO. 82 REMOVE AND RESET DIRECTIONAL, WARNING, REGULATORY, SERVICE AND STREET SIGNS

A. METHOD OF MEASUREMENT

1. Removing and resetting signs will be measured per each sign actually removed and reset, complete in place, including the foundation, excavation, backfilling and compaction for foundations and the structural supports.

B. BASIS OF PAYMENT

1. Payment for work to be done under this item will be by the unit price bid per each, which will be full compensation for the satisfactory removal, stockpiling and resetting of existing posts, installation of new post and concrete base, and for all excavation and backfill, and for furnishing all labor, tools, equipment and any other incidentals to complete the work. The contract unit price shall also include excavation and disposal of existing foundations and the supplying and placing of compacted gravel backfill where foundations and posts are removed and restoration of surface for which no additional payment will be made. If posts are

damaged during excavation and determined by the Engineer to be unfit for reuse, the Contractor shall replace the sign at no additional cost to the Owner.

BID ITEM NO. 83 PAVEMENT MARKINGS

A. METHOD OF MEASUREMENT

1. Pavement Markings are to be paid for on the actual length of lines measured by the linear foot applied under the various items of the Contract. The lengths of solid lines will be obtained by use of a measuring wheel.

B. BASIS OF PAYMENT

1. The unit price constitutes full compensation for all labor, tools, materials and equipment, including protection of newly applied markings from traffic, layout, cleaning and sweeping, furnishing and applying the pavement markings, and all incidentals required to finish the work, complete and accepted.

2. No payment will be made for the repair or replacement of defective pavement markings.

BID ITEM NO. 84 TEMPORARY PAVEMENT MARKINGS

A. METHOD OF MEASUREMENT

1. This item shall be paid for at the contract unit price bid per lump sum.

B. BASIS OF PAYMENT

1. The price constitutes full compensation for all labor, tools, materials, and equipment, including protection of newly applied markings, cleaning and sweeping pavement, applying pavement markings and removal of pavement markings when no longer in use, and all incidentals required to finish the work, complete and accepted. Fifty percent of the Contract bid price will be paid at the time of installation and 50 percent upon removal of the markings.

2. No payment will be made for the repair or replacement of defective pavement markings.

BID ITEM NO. 85 ARROWS, WORDS, OR SYMBOLS PAVEMENT MARKINGS

A. METHOD OF MEASUREMENT

1. Arrows, Words, or Symbol Pavement Markings shall be measured per each pavement marking applied, complete-in-place, in accordance with the Drawings and/or as directed by the Engineer.

B. BASIS OF PAYMENT

1. The unit price constitutes full compensation for all labor, tools, materials and equipment, including protection of newly applied markings from traffic, layout, cleaning and sweeping, furnishing and applying the pavement markings, and all incidentals required to finish the work, complete and accepted.

2. No payment will be made for the repair or replacement of defective pavement markings.

BID ITEM NO. 86 ICE RINK SYSTEM

A. METHOD OF MEASUREMENT

1. This item shall be paid for at the contract unit price bid per lump sum.

B. BASIS OF PAYMENT

1. The unit price for this item shall include full compensation for all labor, equipment, materials and incidentals needed complete the following:

    a. Furnishing and installing of the ice rink system, inclusive of all work shown on the Drawings and detailed in the Specifications, or as directed or required by the Engineer including but not limited to the chiller, compressors, pumps, condenser system, piping valves, controls, motor control center and all related electrical components and connections necessary for a completely automatic refrigeration system with alarms, operating at the conditions described in Section 13812 of the Specifications;
    b. Furnishing and installing the ice rink floor system as depicted in the Drawings or as directed or required by the Engineer including but not limited to all excavation, excavation support, disposal of material, furnishing installing the of sand, insulation, jacketing vapor barriers, rebar reinforcement, pipe and fittings, compressions seals, expansion joint materials, concrete, temperature sensors and monitors and headers vents as described in Section 13813 of Specifications
    c. Furnishing and installing the ice rink dasher board system as depicted in the Drawings or as directed or required by the Engineer including but not limited to frame, polyethylene and fiberglass material, fasteners, access gates, equipment gates, floor anchors and inserts and all accessories, as described in Section 13816 of Specifications
    d. Any and all other work, whether direct or incidental, associated with the ice rink system not specifically identified herein.

BID ITEM NO. 87 CONCESSION AND UTILTY BUILDING

A. METHOD OF MEASUREMENT

1. This item shall be paid for at the contract unit price bid per lump sum.

B. BASIS OF PAYMENT

1. The unit price for this item shall include full compensation for all labor, equipment, materials and incidentals needed complete the following:

    a. Furnishing and installing the concession and utility building, inclusive of all work shown on the Drawings and detailed in the Specifications, including but not limited to concrete, masonry, rough carpentry, finish carpentry and millwork, insulation, roofing, caulking, doors, frames, hardware, window, glazing, plaster, gypsum board, ceiling and automatic temperature control, flooring, painting, specialties, fire protection, plumbing, HVAC and electrical, as depicted in the Drawings or as directed or required by the Engineer, in accordance with the specifications;
    b. Connection from roof leaders to drainage system, including all pipe, fittings, and other appurtenances.

c. Removal and legal disposal of all remnant structures, foundations, and debris encountered beneath the proposed building footprint in accordance with the Geotechnical Report and Section 02999.
d. All applications, permits and fees required by the City's building department;
e. Any and all other work, whether direct or incidental, associated with the concession and utility building not specifically identified herein.

BID ITEM NO. 88 SHADE STRUCTURE

A. METHOD OF MEASUREMENT

1. This item shall be paid for at the contract unit price bid per lump sum.

B. BASIS OF PAYMENT

1. The unit price for this item shall include full compensation for all labor, equipment, materials and incidentals needed complete the following:

a. Furnishing and installing of the shade structure, inclusive of all work shown on the Drawings and detailed in the Specifications, including but not limited to concrete, metal building frame, gutters, painting, foundations, and audio-visual equipment and electrical as depicted in the Drawings or as directed or required by the Engineer, in accordance with the specifications;
b. Connection from roof leaders to drainage system, including all pipe, fittings, and other appurtenances.
c. Removal and legal disposal of all remnant structures, foundations, and debris encountered beneath the proposed building footprint in accordance with the Geotechnical Report and Section 02999.
d. All applications, permits and fees required by the City's building department;
e. Any and all other work, whether direct or incidental, associated with the shade structure not specifically identified herein.

BID ITEM NO. 89 TRAFFIC CONTROL – POLICE DETAIL

A. METHOD OF MEASUREMENT

1. Traffic Control – Police Detail shall be paid for on an allowance basis.

B. BASIS OF PAYMENT

1. The allowance for this item shall include full compensation for all Police details required to complete the work. Signed Police detail slips must be submitted to the Engineer in order to receive compensation for said work.

BID ITEM NO. 90 TRAFFIC CONTROL – FLAGPERSONS
BID ITEM NO. 91 TRAFFIC CONTROL – FLAGPERSONS OVERTIME

A. METHOD OF MEASUREMENT

1. Flagpersons and flagpersons overtime shall be paid for on an allowance basis.

B. BASIS OF PAYMENT

1. The allowance for this item shall include full compensation for all flagpersons required to complete the work. Signed detail slips must be submitted to the Engineer in order to receive compensation for said work.

BID ITEM NO. 92 TESTING OF MATERIALS AND METHODS

A. METHOD OF MEASUREMENT

1. Under this item, the Contractor shall be reimbursed for certain charges, authorized by the Engineer associated with testing of in-situ soils, materials including but not limited to gravel borrow, concrete, and bituminous concrete.

2. The allowance price for this item established in the BID is an estimated figure to facilitate comparison of bids only. The actual amount to be paid under this item shall constitute full compensation for costs associated with the testing of in-situ soils, materials including but not limited to gravel borrow, concrete, and bituminous concrete, as approved by the Owner/Engineer.

3. The purpose of this item is strictly for the Contractor's reimbursement for those services authorized by the Engineer.

4. The allowance price for this item shall NOT include any costs associated with services rendered for testing done at Contractor's request and/or convenience

B. BASIS OF PAYMENT

1. The Contractor will be paid based on the actual PAID invoiced amount from the testing company in question, plus five percent (5%), as approved by the Engineer. If the total cost for such charges is greater or less than the allowance amount stated under this item of the BID, a debit or credit of the difference in cost shall be to the Owner.

2. The allowance for this item shall include full compensation to complete the following:

   a. Cost for testing of in-situ soils, materials including but not limited to gravel borrow, crushed stone, concrete, and bituminous concrete;
   b. Any and all other work, whether direct or incidental, associated with the testing of soil, concrete, and asphalt not specifically identified herein.

3. Invoices for work to provide testing shall be provided to the Contractor, who will include copy of the PAID invoice with his payment requisition.

BID ITEM NO. 93 MISCELLANEOUS UTILITY RELOCATION ALLOWANCE

A. METHOD OF MEASUREMENT

1. Relocation of existing electric, communication, and sewer force mains shall be paid for as an allowance. Support of existing utility poles shall be included in this item.

B. BASIS OF PAYMENT

1. Under these Items, the Contractor shall be reimbursed for certain charges, authorized by the Engineer for required utility relocations due to unavoidable conflicts with the new drain, as authorized by the Engineer.

2. The allowance price for this Item established in the BID is an estimated figure to facilitate comparison of bids only. The actual amount to be paid under this item shall constitute full compensation for wages paid, premiums on Workman's Compensation Insurance, payment on account for Social Security and other direct assessments on payroll, as may be required, and all other costs incidental to the services rendered.

3. The allowance price for these Items shall NOT include any costs associated with services rendered for routine utility markings, repair damages incurred as a result of the Contractor's operations, relocations or dismantling and reassembling of utilities done at the Contractor's request and/or convenience or other utility relocation specifically covered under any other bid item, or any other unauthorized services rendered by utility companies. The purpose of this item is strictly for the Contractor's reimbursement for those unforeseen services authorized by the Engineer prior to the work being performed.

4. The Contractor will be paid based on the actual PAID invoiced amount from the Utility Company in question, plus direct labor and materials costs incurred by the Contractor, as approved by the Engineer. If the total cost for such charges is greater or less than the allowance amount stated under this item of the BID, a debit or credit of the difference in cost shall be to the Owner.

BID ITEM NO. 94 DISPOSAL OF CONTAMINATED SOIL

A. METHOD OF MEASUREMENT

1. The quantity of contaminated material transported and disposed to be paid for under this Item shall be the number of tons, measured by the scale weights at the disposal facility and documented by the Contractor.

B. BASIS OF PAYMENT

1. The unit price shall constitute full payment for transporting and disposing of designated contaminated soil at an appropriately licensed facility. Contaminated soil shall be defined as soil containing concentrations of contaminants above RIDEM's Method 1 Residential Direct Exposure Criteria (RDEC) based on the Engineer's laboratory analytical results.

2. Compensation for providing and obtaining approval for the submittals required in Specification Section 02080 Article 1.06, including soil disposal applications, shall be included in the unit price.

3. The unit price for this Item shall be paid in addition to any payment made for testing of excess soil. No separate payment will be made for transporting and legally disposing soil that is compliant with the State's Method 1 Residential direct Exposure Criteria.

4. The unit price for this item shall include all work covered under Specification Section 02080 including, but not limited to mobilization/demobilization, preparation, handling, transportation, disposal at a licensed facility (including any fees), decontamination and site cleanup.

5. Environmental testing performed by the Contractor or his representative shall be paid for under **Bid Item No. 10**.

BID ITEM NO. 95 OWNERS ALLOWANCE

A. METHOD OF MEASUREMENT

1. This item shall be paid for on an allowance basis.

B. BASIS OF PAYMENT

1. The allowance for this item is for the sole use of the Owner at the Owner's discretion for changes to the project.

2. The Owner shall direct Contractor in writing when this line item is to be used along with all the pertinent specifying information for purchase by contractor.

3. Contractor shall submit purchase receipts documenting the cost of owner requested materials with pay application for reimbursement.

PART 2 – PRODUCTS - NOT USED

PART 3 – EXECUTION - NOT USED

END OF SECTION

SECTION 01026

SCHEDULE OF VALUES

PART 1 GENERAL

1.01 SUMMARY

A. Section Includes

1. Requirements for breakdown of lump sum bid.

B. Related Sections

1. Section 01300 - Submittals

1.02 BREAKDOWN OF LUMP SUM BID

A. Within 20 business days of the date of the executed Contract, a list detailing the breakdown of the lump sums bid by the appropriate Divisions of these Specifications or as otherwise directed by the Engineer, shall be submitted for review and concurrence by the Engineer. This list will be used by the Engineer as a guide in preparing estimates for payment. The list shall be an accurate representation of costs required to complete the Work in accordance with the Contract Documents.

B. A schedule of the monthly value of work done based on the Progress Schedule submitted under Section 01300 - Submittals shall be submitted within 20 business days of the date of the executed Contract. The schedule shall show the total sum of work done for each month of the projected construction period and shall be updated monthly to reflect the actual amount requisitioned for payment.

PART 2 PRODUCTS

NOT USED

PART 3 EXECUTION

NOT USED

END OF SECTION

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SECTION 01035

MODIFICATION PROCEDURES

PART 1 GENERAL

1.01 SUMMARY

A. Section Includes

1. Procedures for making modifications to the Contract by change orders or other means.

B. Related Sections

1. Document 00500 - Agreement

1.02 CHANGE ORDERS

A. In general Change Orders will be issued for modification of Contract documents which will incorporate changes in the Contract requirements, including additions or deletions in the Work; for unforeseen field conditions which will necessitate changes in the Work; changes in code provisions or other requirements of federal, state or local authority requiring changes in the Work; changes in the availability of products or for incorporating new products into the work and for changes directed by the Engineer for the benefit of the Owner.

B. Authority to execute Change Orders shall be that of the Engineer and not of the Contractor. Changes Orders will, in general, originate by a “Change Order Proposal Request” or by issuance of a “Construction Change Authorization”.

C. Unless authorized by the Engineer, no work shall be performed that is involved in the change until a formal Change Order is issued.

D. To initiate a Change Order, the Engineer will forward a Change Order proposal request describing the proposed changes and if required, include additional or revised drawings and specifications soliciting a formal quotation of cost and time to complete the proposed Change Order work. Upon reaching mutual agreement on the cost and time, the Engineer will sign his approval of the Change Order and submit it to the Contractor for his full signature of acceptance.

1.03 FIELD ORDERS

A. The Engineer may, to avoid costly removal of, or alterations to, present on-going work, issue a Work Directive Change authorizing the Contractor to proceed, subject to later negotiation of the price of the change.

1.04 PRICE AGREEMENTS

A. Prices agreed upon to cover the Change Orders may be either by mutual acceptance of a lump sum or by unit prices as stated in the Contract bid proposal or actual direct cost plus a percentage for overhead, profit and other expenses consistent with Section 00500 – Contract Agreement.

B. Work done by a subcontractor entitles the General Contractor a percentage of the sum of the actual direct cost, not including the subcontractor's overhead and profit, consistent with Section 00500 – Contract Agreement.

C. Method for computing the cost of the change shall be based on the net additional increase. No overhead and profit shall be deducted from prices for changes deleting work.

D. The Change Order form document shall indicate the net adjustment (+/-) to the total Contract price as a result thereof including extension or reduction of time when applicable.

PART 2 PRODUCTS

NOT USED

PART 3 EXECUTION

NOT USED

END OF SECTION

SECTION 01040

COORDINATION

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Requirements for coordinating the various parts of Work under this Contract.

1.02 REQUIREMENTS

A. Coordinate scheduling, submittals, and Work of the various Sections of specifications to assure efficient and orderly sequence of installation of interdependent construction elements.

B. Verify that utility requirement characteristics of operating equipment are compatible with building utilities. Coordinate work of various Sections having interdependent responsibilities for installing, connecting to, and placing in service, such equipment.

C. Coordinate space requirements and installation of mechanical, instrumentation and electrical work, which are indicated diagrammatically on Drawings. Follow routing shown for pipes, ducts, and conduit, as closely as practicable; place runs parallel with line of building. Utilize spaces efficiently to maximize accessibility for other installations, for maintenance, and for repairs.

D. In finished areas except as otherwise indicated, conceal pipes, ducts, and wiring within the construction. Coordinate locations of fixtures and outlets with finish elements.

E. Coordinate completion and clean up of Work of separate Sections in preparation for Substantial Completion.

F. After Owner occupancy of premises, coordinate access to site for correction of defective Work and Work not in accordance with Contract Documents, to minimize disruption of Owner's activities.

G. Coordinate work with all utility companies necessary for completion of work under this contract.

1. Kent Water Authority (BCWA)
   John Duchesneau III
   401-821-9300

2. Rhode Island Energy – Gas
   May Zhen
   781-907-3463

3. Rhode Island Energy – Electric
   Patrick Ventre
   732-672-3359

4. Warwick Sewer Department
   Mathew Solitro
   401-253-8877

5. Verizon
   Peter DeCosta
   508-944-6701

PART 2 PRODUCTS

NOT USED

PART 3 EXECUTION

NOT USED

END OF SECTION

SECTION 01045

CUTTING, CORING AND PATCHING

PART 1 GENERAL

1.01 SUMMARY

A. Section Includes

1. Requirements and limitations for cutting, coring and patching of Work.

B. Related Sections

1. Section 01300-Submittals

1.02 SUBMITTALS

A. In accordance with Section 01300 submit written request in advance of cutting or alteration which affects the following:

1. Structural integrity of any element of Project.
2. Integrity of weather-exposed or moisture-resistant element.
3. Efficiency, maintenance, or safety of any operational element.
4. Visual qualities of sight exposed elements.
5. Work of Owner or separate contractor.

B. Include in request:

1. Identification of Project.
2. Location and description of affected work.
3. Necessity for cutting or alteration.
4. Description of proposed work, and products to be used.
5. Alternatives to cutting and patching.
6. Effect on work of Owner or separate contractor.
7. Written permission of affected separate contractor.
8. Date and time work will be executed.

C. Should conditions of the Work, or schedule, indicate a required change of materials or methods for cutting and patching, notify the Engineer and secure his written permission and the required Change Order prior to proceeding.

PART 2 PRODUCTS

2.01 MATERIALS

A. For replacement of items removed, use materials complying with pertinent sections of these specifications.

B. Concrete and grout for rough patching shall be as specified in Division 3 of these specifications.

C. Sealing cored holes in sewer manholes to be with a resilient seal similar to Kor-N-Seal made by National Pollution Control Systems, Inc., Nashua, NH or similar product, as indicated on the Drawings.

D. Materials for finish patching shall be equal to those of adjacent construction.

PART 3 EXECUTION

3.01 GENERAL:

A. All cutting and coring shall be performed in such a manner as to limit the extent of patching.

B. All holes cut through concrete and masonry walls, slabs or arches shall be core drilled unless otherwise approved in writing to the Engineer. No structural members shall be cut without approval of the Engineer and all such cutting shall be done in a manner directed by the Engineer. No holes may be drilled in beams or other structural members without obtaining prior approval. All work shall be performed by craftsmen skilled in this type of work.

C. If holes are cored through floor slabs they shall be drilled from below the slab.

D. Rough patching shall be such as to bring the cut or cored area flush with existing construction unless otherwise shown. Finish patching shall match the color, texture and finish of existing surfaces as approved.

3.02 EXAMINATION

A. Site Verification of Conditions

1. Inspect existing conditions, including elements subject to movement or damage during cutting, excavating, patching, and backfilling.
2. After uncovering the work, inspect conditions affecting installation of new work.
3. If uncovered conditions are not as anticipated, immediately notify the Engineer.
4. Do not proceed until unsatisfactory conditions are corrected.

3.03 PREPARATION

A. Protection

1. Provide required protection including, but not necessarily limited to, shoring, bracing, and support to maintain structural integrity of the Work.
2. Perform cutting and demolition by methods which will prevent damage to portions of the Work.

B. Surface Preparation

1. Provide proper surfaces to receive installation of repair and new work.

3.04 CORING:

A. Coring shall be performed with an approved non-impact rotary tool with diamond core drills. Size of holes shall be suitable for pipe, conduit, sleeves, equipment or mechanical seals to be installed.

B. All equipment shall conform to OSHA standards and specifications pertaining to plugs, noise and fume pollution, wiring and maintenance.

C. Provide protection for existing equipment, utilities and critical areas against water or other damage caused by drilling operation.

D. Slurry or tailings resulting from coring operations shall be vacuumed or otherwise removed from the area following drilling.

3.05 CUTTING:

A. Cutting shall be performed with a concrete wall saw and diamond saw blades of proper size.

B. Provide for control of slurry generated by sawing operation on both sides of wall.

C. The cutting of a reinforced concrete wall shall be done so as not to damage the bond between the concrete and the reinforcing steel left in structure. The cut shall be made so that steel neither protrudes nor is recessed from face of the cut.

D. Adequate bracing of area to be cut shall be installed prior to start of cutting. Check area during sawing operations for partial cracking and provide additional bracing as required to prevent a release or toppling of cut area during sawing operations.

E. Provide equipment of adequate size to remove cut panel.

3.06 FIELD QUALITY CONTROL

A. In addition to other requirements specified, upon the Engineer's request uncover work to provide for inspection by the Engineer of covered work, and remove samples of installed materials for testing.

B. Do not cut or alter work performed under separate contracts without the Engineer's written permission.

3.07 ADJUSTING

A. Perform fitting and adjusting of products to provide finished installation complying with the specified tolerances and finishes.

END OF SECTION

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SECTION 01050

FIELD ENGINEERING

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Survey work and other field engineering responsibilities of the Contractor.

1.02 REQUIREMENTS

A. The Contractor shall be responsible for layout of the work and the establishing of lines and grades.

B. Establish elevations, lines, levels, reference marks, batter boards, etc., required during the progress of the Work. Verify such marks by instrument to confirm accuracy.

C. Locate and protect survey control and reference points.

D. Make, check, and be responsible for all measurements and dimensions necessary for the proper construction of the Work.

E. The Engineer will be permitted to check the lines, elevations, reference marks, batter boards, etc., set by the Contractor. The Contractor shall correct any errors found in lines, elevations, reference marks, batter boards, etc.. Such a check shall not be construed as approval of the Contractor's work and shall not relieve or diminish the responsibility of the Contractor for the accurate construction and completion of the Work.

F. Control datum for survey as shown on Drawings.

1.03 QUALITY ASSURANCE

A. Qualifications

1. Employ a Civil Engineer or Land Surveyor registered within the State of Rhode Island, acceptable to the Engineer.

B. Certifications

1. Submit certificate signed by the Contractor’s Engineer or Land Surveyor stating elevations and locations of the Work are in conformance with the Contract Documents.

PART 2 PRODUCTS

NOT USED

PART 3 EXECUTION

NOT USED

END OF SECTION

SECTION 01060

REGULATORY REQUIREMENTS
(RHODE ISLAND)

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Building codes, Mechanical codes, and Electrical codes, Regulations, Permits and Fees applicable to the project.

1.02 PERMITS BY CONTRACTOR

A. The Contractor shall secure all necessary permits from the state, city or town authorities having jurisdiction, for digging of trenches in the streets or highways and all other building and construction operations requiring permits.

B. As a minimum the following permits are required:

1. Application For Physical Alteration - City of Warwick, Dept. of Public Works
2. Building Permit – City of Warwick
3. RIPDES Permit and Water Quality Certification through RIDEM Division of Water Resources, for discharge from dewatering operations.

1.03 PERMITS BY OWNER

A. The Owner has obtained or will obtain and pay all fees for the permits listed here:

1. Order of Approval – RIDEM Division of Water Resources
2. Insignificant Alterations Permit – RIDEM Division of Freshwater Wetlands
3. Physical Alteration Permit – RIDOT

1.04 CODES

A. The Contractor shall conform to the requirements of and pay all fees imposed by local and State Building Authorities having jurisdiction over the Work. The Contractor is responsible to conform to all building, mechanical, electrical and plumbing code requirements.

B. The Contractor shall conform to the latest requirements of the following codes:

1. Federal, State and Municipal Laws
2. Rhode Island State Building Codes, National Building Code Regulation SBC-1
3. Rhode Island State Building Codes, Plumbing Code Regulation SBC-3
4. Rhode Island State Building Codes, Mechanical Code Regulation SBC-4
5. Rhode Island State Building Codes, Electrical Code Regulation SBC-5
6. Any prevailing rules and regulations pertaining to adequate protection and/or guarding of any moving parts or otherwise hazardous locations.

1.04 FEES

A. The cost of all permits secured by the Contractor shall be borne by him and shall be considered as having been included in the price or prices stated in the Bid. Copies of all

required permits shall be filed with the Engineer prior to starting work for which a permit is required.

PART 2 PRODUCTS

NOT USED

PART 3 EXECUTION

NOT USED

END OF SECTION

SECTION 01067

STATE OF RHODE ISLAND AND FEDERAL REQUIREMENTS

PART 1 GENERAL

1.01 SECTION INCLUDES

A. RHODE ISLAND SALES AND USE TAX
B. HISTORICAL ARTICLES
C. EXCERPTS FROM RHODE ISLAND LAWS
D. REQUIREMENTS FOR MINORITY BUSINESS ENTERPRISE, EQUAL OPPORTUNITY AND NONDISCRIMINATION

1.02 RHODE ISLAND SALES AND USE TAX

A. Materials and equipment purchased for installation under this Contract are exempt from the Rhode Island Sales Tax. The Contractor shall file for exemption on behalf of the Owner, with the State of Rhode Island Department of Taxation as required by law. The exemption from the Sales Tax shall be taken into account by the Contractor during bidding.

1.03 HISTORICAL ARTICLES

A. During the life of this Contract, the Contractor is herewith required to immediately notify the following organizations in the event that any articles such as "charcoal," "bone," "shell," "cultural objects - fire cracked stones or stone flaking material" or any other such related items of historical significance are discovered.

1. Owner
2. Local Historical Society
3. Rhode Island Historical Commissioner
4. Engineer

1.04 EXCERPTS FROM RHODE ISLAND LAWS

A. The Contractor and each of his subcontractors shall especially note his obligations to comply with the following statues or excerpts therefrom and any current revisions thereof contained in the General Laws of Rhode Island.

B. These laws reflect changes made through the end of the 1992 legislative session. While every attempt at accuracy has been made, these are not certified true copies of these laws. The responsibility for compliance with all applicable provisions of Rhode Island laws relating to bidding, award, and performance of public works contracts is the Contractor's. Certified true and complete copies of any Rhode Island laws and regulations may be obtained from the Office of the Rhode Island Secretary of State.

R.I.G.L.
Title, Chapter, Section EXCERPT

5-6-2 WORK FOR WHICH LICENSE REQUIRED

"No person, firm, or corporation shall enter into, engage in, or work at the business of installing wire, conduits, apparatus, fixtures and other appliances for carrying or using electricity for light,

heat or other purpose, unless such person, firm or corporation shall have received a license and a certificate therefore, issued by the State Board of Examiners of Electricians."

28-26-6 LICENSE REQUIRED FOR OPERATION OF HOISTING MACHINERY - PUBLIC CONTRACTS

"No persons shall operate or be in direct charge of a hoisting or excavation gasoline, steam, diesel, electric or compressed air hoist, shovel, crane, excavator, of five horsepower or more without obtaining a license to do so as provided in this chapter. No user or agent of use of any such described steam, gasoline, diesel, electric or compressed air hoisting machinery shall permit it to be operated unless it is operated by a duly licensed person as hereinafter provided by this chapter.

Every contract in the construction of public works by the State, or by any City of Town, or by persons contracting therewith for such construction, shall contain a clause embodying the provisions of this section."

Chapter 116

From Chapter 116 of the General Laws of Rhode Island, 1938, relative to the conditions precedent, etc., to carrying on business within this State by foreign corporations:

"The certificate and power of attorney mentioned in the General Corporation Law, properly filled out, subscribed and sworn to, and accompanied by a certified copy of the Charter, articles of association or other similar organization papers, together with all amendments thereto, must be filed in the office of the Secretary of State by all foreign corporations intending to carry on business within this State, or for a foreign corporation to enforce in the courts of this State any contract made within the State."

Detailed information regarding Chapter 116 of the General Laws of Rhode Island, 1938, relative to the conditions precedent, etc., to carrying on business within this State for foreign corporations may be obtained from the Secretary of State, State House, Smith Street, Providence, Rhode Island.

Title 37 (chapters as provided at the end of this Specification Section.)

1.05 REQUIREMENTS FOR MINORITY BUSINESS ENTERPRISE, EQUAL OPPORTUNITY AND NONDISCRIMINATION

A. Contracts for work under the bid (proposal) will obligate the contractors and subcontractors not to discriminate in employment practices.

B. The Contractor will not discriminate against any employee or applicant for employment because of race, color, religion, sex, age, handicap, or national origin. The Contractor shall take affirmative action to ensure that applicants are employed and the employees are treated during employment without regard to their race, color, religion, sex, age, handicap, or national origin. Such actions shall include, but not be limited to, the following: employment, upgrading, demotions, or transfers; recruitment or recruitment advertising, selection for training including apprenticeship; and participation in recreational and educational activities. The Contractor agrees to post in conspicuous places available to employees and applicants for employment, notice to be provided, setting forth the provisions of this non-discrimination clause. The Contractor will cause the foregoing provisions to be inserted in all subcontracts

for any work covered by this Contract so that such provisions will be binding upon each subcontractor and upon subcontractors for standard commercial supplies or raw materials.

C. The Contractor shall keep such records and submit such reports concerning the racial and ethnic origin of applicants for employment and employees as the Owner may require as consistent with Federal and State law.

D. The Contractor agrees to comply with such rules, regulations, or guidelines as the State of Rhode Island may issue to implement these requirements. The Contractor further warrants, that it will comply with, Title VI of the Civil rights Act of 1964, 42 U.S.C. 200d to d4.

E. Contractors shall comply with the provisions of the General Laws of Rhode Island and attention is called to Title 37, Chapter 13, Section 1-16, relative to the payment of wages, obligations and charges by Contractors on public works projects. Non-resident Contractors are subject to Section 44-1-6 of the RI General Laws, as amended, regarding OUT-OF-STATE CONTRACTORS.

F. The Contractor will be required to comply with Equal Opportunity Requirements and to abide by the prevailing wage rates for Public Works Projects for all employees on the job. It is the responsibility of contractors to inform themselves as to the local labor conditions, overtime compensation, health and welfare contributions, labor supply and prospective changes or adjustment of wage rates. Information is available at the Department of Labor.

G. The attention of the Contractor is directed to the fact that this Contract is subject to both Federal and State requirements regarding Minority Business Enterprises (MBE) and Woman's Business Enterprises (WBE) participation. The Contractor hereby agrees to ensure compliance with all Federal and State MBE/WBE requirements to provide maximum opportunity for such participation.

H. The Contractor further agrees to ensure that minority business enterprises as defined in RIGL Section 37-14.1-3, shall have the maximum opportunity to participate in the performance of subcontracts performed under this Contract. The Contractor will take reasonable steps in accordance with regulations promulgated under Chapter 37-14.1 of the RIGL to ensure that minority business enterprises have the maximum opportunity to compete for and perform subcontracts under this Contract. DEPARTMENT OF ADMINISTRATION RI STATE EQUAL OPPORTUNITY OFFICE GENERAL CONTRACT COMPLIANCE CERTIFICATE AND AGREEMENT, Pages 1 through 6, are provided at the end of this Specification.

1.06 ATTACHMENTS

A. Attachments referenced by this Specification follow this Section.

PART 2 PRODUCTS

NOT USED

PART 3 EXECUTION

NOT USED

END OF SECTION

SECTION 01069

HEALTH & SAFETY REQUIREMENTS

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Requirements for providing a Health and Safety Plan (HASP) and maintenance of health and safety while performing the Work.

1.02 REQUIREMENTS

A. Monitor working conditions at all times during construction and provide appropriate protective clothing, equipment and facilities for personnel, and establish workplace procedures to ensure personnel safety.

B. Implement a Health and Safety protection program. The procedures for such implementation shall be submitted to the Engineer and Owner for approval. The procedures shall include provisions for stations allowing workers to wash and to put on and remove protective clothing, and stations for vehicles to be cleaned, if necessary, before leaving the site, air monitoring, and evaluation of areas where unsafe levels of gas has accumulated.

C. Comply with all Federal, State, and local safety requirements related to the hazards anticipated to be encountered during the course of this project.

D. In addition to the above requirements, comply with the following:

1. All construction equipment on the site shall be equipped with vertical exhaust pipes or a spark proof exhaust.
2. Smoking shall not be permitted in any area where gases can accumulate, or in areas where contaminated soil is present.
3. Welding or open flames shall not be permitted in enclosed areas.
4. Toxic gas indicators, an organic vapor analyzer, a combustible gas indicator, an oxygen indicator, and fire extinguishers shall be available at all times during operations. Periodic monitoring with portable monitoring devices shall be employed as dictated by the Health and Safety Plan.
5. During operations, whenever unsafe levels of toxic gases are detected, all work will cease in that area until acceptable levels are reached.

E. There will be no separate payment for the HASP, it will be considered incidental to the completion of the project.

1.03 SHOP DRAWINGS

A. Submit site specific Health and Safety Plan (HASP) that complies with all applicable OSHA requirements to the Engineer for review and acceptance within fifteen (15) working days of the Contractor’s Notice to Proceed. Certified Industrial Hygienist

must certify the Contractor's plan prior to submittal to and review by the Engineer. The Contractor is not to proceed with any subsurface or site work without review and acceptance of the submitted Health and Safety Plan by the Engineer.

1.04 QUALITY ASSURANCE

A. Engage an independent, qualified Health and Safety expert having experience in similar construction conditions, to monitor site conditions and recommend all necessary Health and Safety protection. This person shall be a Certified Industrial Hygienist (CIH). The Contractor shall follow such recommendations and shall provide such protection to his personnel, and personnel of the Owner and Engineer, as may be affected.

1.05 REGULATORY REQUIREMENTS

A. Establish work place procedures, enforce the use of these procedures, and the associated equipment and facilities in accordance with the following guidelines:

1. Safety and Health Regulations Promulgated by the U.S. Department of Labor OSHA, 29 CFR 1910 - Occupational Safety and Health Standards, and 29 CFR 1920 - Safety and Health Regulations for Construction.
2. Occupational Safety and Health Standards, 29 CFR 1926 - Safety and Health Regulations for Construction.
3. U.S. Environmental Protection Agency Medical Monitoring Program Guidelines.

PART 2 PRODUCTS

NOT USED

PART 3 EXECUTION

3.01 PROTECTION

A. If, at any time, the Owner or the Engineer is apprised of a safety hazard which demands immediate attention because of its high potential for harm to the public travel, persons on or about the Work, or public or private property, the Owner or the Engineer shall have the right to order such safeguards to be erected and such precautions to be taken as necessary and the Contractor shall comply with such orders. If, under such circumstances, the Contractor does not or cannot immediately put the Work into proper and approved condition, or if the Contractor or his representative is not upon the site so that he can be notified immediately of the insufficiency of safety precautions, then the Owner may put the Work into such a condition that is, in his opinion, in all respects safe, and the Contractor shall pay all expenses of such labor and materials as may have been used for this purpose by him or by the Owner. The fact that the Owner or the Engineer does not observe a safety hazard or does not order the Contractor to take remedial measures shall in no way relieve the Contractor of the entire responsibility for any costs, loss or damage by any

party sustained on account of the insufficiency of the safety precautions taken by him or by the Owner acting under authority of this Section.

B. If the Contractor is alerted to the fact that conditions of high hazard are present or can be present at the site during the performance of the Work, it is the responsibility of the Contractor to take appropriate safety precautions to meet whatever conditions of hazard may be present during the performance of the Work, whether reasonably foreseeable or not. The safety conditions enumerated in the Specifications are the minimum permissible and neither the Owner not the Engineer makes any representation that the safety standards provided herein will be adequate to meet all eventualities. The Contractor is therefore alerted to the fact that it shall be his responsibility to anticipate and provide such additional safety precautions, facilities, personnel and equipment as shall be necessary to protect life and property from whatsoever conditions of hazard are present or may be present.

C. The Contractor shall supply and erect highly visible safety fencing a minimum of three feet in height around all construction areas that pose a threat to safety and post proper signage as required by Local, State and Federal requirements. The Contractor shall erect safety fencing as documented in the Contact Drawings or as directed by the Engineer and shall maintain such fencing and signage until such a time that the potential safety hazard has been rectified. Upon final completion of construction all safety fencing shall be removed off-site by the Contractor. Safety fencing requirements of OSHA shall be enforced by the Contractor.

END OF SECTION

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SECTION 01090

REFERENCE STANDARDS

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Reference material, abbreviations, and terms used in the Construction Documents and establishes edition dates and complete titles for standards referenced elsewhere in the Specifications.

1.02 QUALITY ASSURANCE

A. For products or workmanship specified by association, trade or Federal Standards, comply with requirements of the standard, except when more rigid requirements are specified or are required by applicable codes.

B. Obtain copies of standards when required by Contract Documents.

C. Maintain copy at jobsite during submittals, planning, and progress of the specific work, until Substantial Completion.

D. Should specified reference standards conflict with Contract Documents, request clarification from Architect/Engineer before proceeding.

E. The contractual relationship of the parties to the Contract shall not be altered from the Contract Documents by mention or inference otherwise in any reference document.

1.03 SCHEDULE OF REFERENCES

AA	Aluminum Association 1400 Crystal Dr. Suite 430 Arlington, VA 22202
AASHTO	American Association of State Highway and Transportation Officials 444 North Capitol Street, N.W. Washington, DC 20001
ACI	American Concrete Institute 38800 Country Club Dr. Farmington Hills, MI 48331-3439
AFBMA	Anti-Friction Bearing Manufacturers Association 2025 M. Street, NW Washington, DC 20036-3309
AGC	Associated General Contractors of America 2300 Wilson Blvd. Arlington, VA 22201

AGM	American Gear Manufacturers Association 1001 N. Fairfax Street Alexandria, VA 22314-1587
AI	Asphalt Institute 2696 Research Park Drive Lexington, KY 40511-8480
AISC	American Institute of Steel Construction One East Wacker Drive Chicago, IL 60601-1802
AISI	American Iron and Steel Institute 25 Massachusetts Drive Washington, DC 20001
AMCA	Air Movement and Control Association 30 West University Drive Arlington Heights, IL 60004
ANS	American National Standard
ANSI	American National Standards Institute 1899 L Street, NW, 11th Floor Washington, DC 20036
API	American Petroleum Institute 1220 L Street, NW Washington, DC 20005
ARI	Air-Conditioning and Refrigeration Institute 2111 Wilson Boulevard Arlington, VA 22201
ASCE	American Society of Civil Engineers 1801 Alexander Bell Drive Reston, VA 20191
ASHRAE	American Society of Heating, Refrigerating and Air Conditioning Engineers 1791 Tullie Circle, N.E. Atlanta, GA 30329
ASME	American Society of Mechanical Engineers Two Park Avenue New York, NY 10016-5990
ASPA	American Sod Producers Association 1855 A Hicks Road Rolling Meadows. IL 60008

ASTM	American Society for Testing and Materials 100 Bar Harbor Drive PO Box C700 West Conshohocken, PA 19428-2959
AWG	American or Brown and Sharpe Wire Gage
AWPA	American Wood-Preservers' Association 100 Chase Park South Birmingham, AL 35244-1851
AWS	American Welding Society
AWWA	American Water Works Association 6666 West Quincy Avenue Denver, CO 80235
BIA	Brick Institute of America 1850 Centennial Park Drive Reston, VA 20191
CS	Commercial Standard
EJCDC	Engineers' Joint Contract Document Committee American Consulting Engineers Council 1015 15th Street, N.W. Washington, DC 20005
FM	Factory Mutual System 1151 Boston-Providence Turnpike PO Box 688 Norwood, Massachusetts 02062
Fed Spec.	Federal Specification General Services Administration Specification and Consumer Information Distribution Section (WFSIS) Washington Navy Yard, Bldg. 197 Washington, DC 20407
HMA	Hot Mix Asphalt
IBR	Institute of Boiler and Radiator Manufacturers
ICBO	International Conference of Building Officials 900 Montclair Road Birmingham, AL 35213-2298
IPS	Iron Pipe Size
JIC	Joint Industry Conference Standards

MIL	Military Specification Naval Publications and Forms Center 5801 Tabor Avenue Philadelphia, PA 19120
NASSCO	National Association of Sewer Service Companies 2470 Longstone Lane Marriottsville, MD 21104
NBS	National Bureau of Standards
NCMA	National Concrete Masonry Association 13750 Sunrise Valley Drive Herndon, VA 20171
NCPWB	National Certified Pipe Welding Bureau
NEMA	National Electrical Manufacturers' Association 1300 North 17th Street Arlington, VA 22209
NFPA	National Fire Protection Association Battery March Park Quincy, MA 02269
NPT	National Pipe Thread
OS&Y	Outside screw and yoke
PCA	Portland Cement Association 5420 Old Orchard Road Skokie, IL 60077
SMACNA	Sheet Metal and Air Conditioning Contractors' National Assoc. 4201 Lafayette Center Drive Chantilly, VA 20151-1219
Stl. WG	U.S. Steel Wire Washburn and Moen, American Steel and Wire or Roebling Gage
UL	Underwriters' Laboratories, Inc. 333 Pfingston Road Northbrook, IL 60062
USS Gage	United States Standard Gage
125-lb. ANS 250-lb. ANS	American National Standard for Cast-Iron Pipe Flanges and Flange Fittings, Designation B16.1-1975, for the appropriate class

1.04 EDITION DATES

A. Reference to publications and reference material shall be understood to mean the latest edition, unless stated otherwise.

PART 2 PRODUCTS NOT USED

PART 3 EXECUTION NOT USED

END OF SECTION

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SECTION 01100

MISCELLANEOUS AND SPECIAL PROJECT REQUIREMENTS

PART 1 - GENERAL

1.01 DESCRIPTION:

A. This section includes coordination with others and restrictions on Contractor's operations.

B. Related Work Described Elsewhere:

1. Summary of Work, Section 01010
2. Traffic Regulation, Section 01570

1.02 CONSTRUCTION WORK HOUR RESTRICTIONS BY ENGINEER AND OWNER

A. Except as otherwise specifically allowed elsewhere in the Contract Documents, normal construction activity shall take place only between the hours of 7:00 AM and 5:00 PM excluding, Saturdays, Sundays, and legal holidays. The Contractor shall plan the Work so as to avoid working beyond these hours. However, if despite the Contractor's diligent efforts, the Contractor believes that overtime work is necessary in order for the Contractor to complete the Work, the Contractor may apply to the Engineer and to the Owner for approval to perform overtime work, which approval may be withheld in their sole discretion. No additional compensation or time extension shall be due to the Contractor whether approval is granted or denied.

B. If the Contractor believes that overtime work is necessary, the Contractor shall obtain prior approval from the Engineer and the Owner. The Contractor shall file a request for such approval in writing and shall include the specific reasons therefore and the time that the overtime work is expected to be concluded. Overtime work will normally be limited to evening hours (5:00 PM to 8:00 PM) Monday through Friday and daytime hours (7:00 AM to 5:00PM) on Saturdays except in special circumstances approved by the Engineer and the Owner.

1.03 CONSTRUCTION WORK HOUR RESTRICTIONS BY CITY OF WARWICK

A. The Contractor's construction operations shall comply with all Laws, Permits and the City of Warwick Code of Ordinances including the Noise Ordinance in Chapter 12 Article III. Should the Contractor sustain any delay or damages in the prosecution of the Work due to the Contractor's failure to conform to the requirements of the Permit, Laws or Ordinances as determined by the City of Warwick or other regulatory agency, the Contractor shall not be entitled to an extension of Contract Time or Contract Price.

1.04 SEASONAL RESTRICTIONS

A. The Engineer will determine when conditions are unfavorable for work and may order the work or any portion of the work suspended whenever, in his opinion, the conditions are not such as will insure first class work.

B. Pouring of concrete shall be prosecuted from April 15th through November 1st.

C. Paving of asphalt roads and sidewalks shall be prosecuted from April 15th through November 15th.

D. Water work including temporary potable water bypass shall be prosecuted from April 15th through November 15th.

1.06 PROHIBITION OF BLASTING

A. The Contractor shall be prohibited from performing blasting at the site.

PART 2 PRODUCTS (NOT USED)

PART 3 EXECUTION (NOT USED)

END OF SECTION

SECTION 01170

ENVIRONMENTAL PROTECTION

PART 1 GENERAL

1.01 SUMMARY

A. Section Includes

1. Requirements for environmental protection during and as the result of construction operations under this Contract except for those measures set forth in other provisions of these Specifications.
2. Environmental protection requires consideration of air, water and land, noise, solid waste management, vector and fire control.

B. Related Sections

1. Section 01300 - Submittals

1.02 QUALITY ASSURANCE

A. Requirements of regulatory agencies:

1. In order to prevent environmental pollution and to provide for environmental protection arising from construction activities related to the performance of this Contract, the Contractor and his subcontractors shall comply with all applicable Federal, State, and local laws and regulations concerning environmental protection, as well as the specific requirements stated in the Section and elsewhere in the Specifications.

1.03 SUBMITTALS

A. Under the requirements of Section 01300 - Submit the following.

B. Implementation Plan

1. Prior to commencement of the work, the Contractor shall:
   a. Submit in writing his plans for implementing this Section for environmental protection.
   b. Meet with the Engineer to develop mutual understandings relative to compliance with the provisions of this Section and administration of the environmental protection program.

C. Temporary Excavation and Embankments

1. If the Contractor proposes to construct temporary roads or embankments and excavations for work areas, he shall submit the following for approval prior to scheduled start of such temporary work:
   a. A layout of all temporary roads, excavations and embankments to be constructed within the work area.
   b. Plans and cross-sections of proposed embankments and their foundations, including a description of proposed materials.
   c. A landscaping plan showing the proposed restoration of the area. Removal of any necessary trees and shrubs outside the limits of existing cleared areas shall be indicated. The plan shall provide for the obliteration of construction scars

and shall provide for a reasonably natural appearing final condition of the area. Modification of the Contractor's plans shall be made only with the written approval of the Engineer. No unauthorized road construction, excavation or embankment construction, including disposal areas will be permitted.

D. Erosion Sedimentation Plan

1. The Contractor shall submit to the Engineer, a detailed erosion and sedimentation plan for approval at least 10 days prior to initiation of work. The plan shall include location and construction details of the Contractor's proposed dikes, basins, etc. The Contractor shall provide and submit his control measures for stockpile material.

PART 2 PRODUCTS

2.01 GENERAL

A. All materials shall be as specified elsewhere in this Specification.

PART 3 EXECUTION

3.01 PROTECTION OF LAND RESOURCES

A. It is intended that the land resources within the project boundaries and outside the limits of permanent work performed under this Contract be preserved in their present condition, or be restored to a condition after completion of construction, that will appear to be natural and not detract from the appearance of the project. The Contractor shall confine his construction activities to areas defined on the Drawings or in the Specifications except with written approval of the property owners and the Engineer.

B. Limits of working areas include areas for storage of construction material, and shall be cleared in a manner which will enable satisfactory restoration and which will not affect the environment during or after the construction period. The Contractor shall not enter beyond the working limits of the working area except with written approval of the Engineer and Owner.

C. The location of areas for storage of the Contractor's materials required temporarily in the performance of the work, shall be within the limits of the working area and shall require written approval of the Engineer prior to use. The preservation of the landscape shall be an imperative consideration in the selection of all such sites. Where temporary structures are constructed on sidehills, the Engineer may require cribbing to be used to obtain level foundation. Benching or leveling of earth may not be allowed, depending on the location of the proposed facility.

D. The Contractor shall obliterate all signs of temporary construction facilities such as haul roads, work areas, structures, foundations of temporary structures, stockpiles of excess or waste materials, or any other vestiges of construction. It is anticipated that excavation, filling and plowing of roadways will be required to restore the area to near natural conditions which permit the growth of vegetation thereon. The disturbed areas shall be graded and filled as required, and topsoil shall be spread to a depth of approximately 6 inches over the entire area and the entire area shall be seeded.

3.02 PROTECTION OF WATER RESOURCES

A. The Contractor shall not pollute streams, lakes or reservoirs with fuels, oils, bitumen's, calcium chloride, acids or harmful materials. It is the responsibility of the Contractor to investigate and comply with all applicable Federal, State, County, and Municipal laws concerning pollution of rivers, streams and impounded water. All work under this Contract shall be performed in such a manner that objectionable conditions will not be created in streams through, or bodies of water adjacent to, the project area.

B. Surface drainage from cuts and fills within the construction limits, whether or not completed, and from borrow and waste disposal areas, shall, if turbidity producing materials are present, be held in suitable sedimentation basins or shall be graded to control erosion within acceptable limits. Temporary erosion and sediment control measures such as berms, dikes, drains, or sedimentation basins, if required to meet the above standards, shall be provided and maintained until permanent drainage and erosion control facilities are completed and operative. The area of bare soil exposed at any one time by construction operations should be held to a minimum.

C. Apply temporary mulch on denuded ground immediately after rough grading is completed. This shall apply to all areas not subject to appreciable traffic during construction, even those that are to receive some form of construction later if ground is to be exposed 30 days or more.

D. Stream and drainage ditch crossings by fording with equipment shall be limited to control turbidity, and in areas of frequent crossings, temporary culverts or bridge structures shall be installed. Any temporary culverts or bridge structures shall be removed upon completion of the project. Fills and waste areas shall be constructed by selective placement to eliminate silts or clays on the surface that will erode and contaminate adjacent streams.

E. At all times of the year, special measures shall be taken to prevent chemicals, fuels, oils, greases, bituminous materials, waste washings, herbicides and insecticides, and cement and surface drainage from entering public waters.

F. Disposal of any materials, wastes, effluents, trash, garbage, oil, grease, chemicals, etc., in areas adjacent to streams or other waterways shall be disposed of by the Contractor in accordance with the **applicable governing regulations**. If any waste material is dumped in unauthorized area, the Contractor shall remove the material and restore the area to the condition of the adjacent undisturbed area. If necessary, contaminated ground shall be excavated, disposed of as specified hereinbefore, and replaced with suitable fill material, compacted and finished with topsoil, all at the expense of the Contractor.

3.03 MAINTENANCE

A. The Contractor shall dispose of all discarded debris and aggregate samples in a manner approved by the Engineer. Toilet facilities shall be kept clean and sanitary at all times. Services shall be performed at such a time and in such a manner to least interfere with the operations. Services shall be accomplished to the satisfaction of the Engineer.

B. The Contractor shall frequently remove materials no longer required on the site so that, at all times, the site, access routes to the site and any other areas disturbed by his operations shall present a neat, orderly, workmanlike appearance.

C. Before semi-final payment, the Contractor shall remove all surplus material, plant of any description, and debris of every nature resulting from his operations, and put the site in a neat, orderly condition; and restore all areas which have been used for storage of materials and equipment, and all areas which have been disturbed by his operations, to their original condition or to a condition satisfactory to and approved by the Engineer.

3.04 DUST CONTROL

A. The Contractor shall maintain all excavations, embankments, stockpiles, haul roads, permanent access roads, waste areas, borrow areas and all other work areas within or without the project boundaries free from dust which would cause a hazard or nuisance to others or contaminate surface water.

3.05 NOISE CONTROL

A. The Contractor shall use every effort and means possible to minimize or eliminate noise caused by his operation which the Engineer may consider objectionable.

B. All equipment utilized by the Contractor at the Landfill shall be equipped with adequate muffler systems to minimize on-site noise generation.

3.06 ODOR CONTROL

A. Any odors originating from the Contractor's operations which expose solid waste shall be minimized by immediately covering with adequate layers of approved cover material.

B. Under no circumstances shall exposed solid waste remain uncovered overnight.

3.07 LITTER CONTROL

A. Any litter generated by the Contractor's operation, whether from disturbance of existing buried solid waste or generated in the course of performing the work under Contract, shall be collected and properly disposed of on a daily basis.

3.08 VECTOR CONTROL

A. Sanitary measures and conditions shall be maintained at the Landfill, by the Contractor, at all times in order to avoid harboring, feeding, and breeding of vectors.

3.09 FIRE PREVENTION AND CONTROL

A. Open burning of any type within the project limits or on adjacent property is prohibited.

B. The Contractor shall take necessary precautions and implement procedures to prevent and control fires, whether within the project limits or within a piece of equipment used in performing the work under Contract.

3.10 PROHIBITED CONSTRUCTION PROCEDURES

A. The Contractor is advised that the disposal of excess excavated material in wetlands, stream corridors, and floodplains is strictly prohibited. Any violation of this restriction by the Contractor or any person employed by him, will be brought to the immediate attention of the responsible regulatory agencies.

B. The Contractor shall comply with the following requirements regarding prohibited construction procedures as follows:

1. Dumping of spoil material into any stream corridor, any wetland, any surface waters, or at unspecified locations.
2. Indiscriminate, arbitrary or capricious operation of equipment in any stream corridors, any wetlands or surface waters.
3. Pumping of silt-laden water from trenches or other excavations into any surface waters, any stream corridors or any wetlands.
4. Damaging vegetation adjacent to, or outside of, the area of the work.
5. Disposal of trees, brush and other debris in any stream corridors, any wetlands, any surface waters, or at unspecified locations.
6. Permanent or unspecified alteration of the flow line of any stream.
7. Open burning of project debris.
8. Location of storage stockpile areas in environmentally sensitive areas.
9. Disposal of excess or unsuitable excavation material in wetlands or floodplains even with permission of the property owner.

END OF SECTION

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SECTION 01200

PROJECT MEETINGS

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Administrative and procedural requirements for project meetings.

1.02 PRECONSTRUCTION CONFERENCE

A. The Engineer will schedule and administer a pre-construction conference.

B. The pre-construction conference will be scheduled and administered within fourteen (14) calendar days after the dated "Notice to Proceed". The Contractor shall be prepared to address such topics as projected construction schedules, major personnel, critical work areas, construction facilities and shop drawing submittals.

C. The Warwick Sewer Authority (WSA) shall be invited to the pre-construction meeting to address protocol for construction and inspection. The Contractor shall contact Joseph Collicchio at (joseph.d.colicchio@warwickri.gov) from the WSA for attendance.

D. The Kent County Water Authority (KCWA) shall be invited to the pre-construction meeting to address protocol for construction and inspection. The Contractor shall contact the KCWA for attendance.

E. Rhode Island energy shall be invited to the pre-construction meeting to address protocol for construction and inspection. The Contractor shall contact RI Energy for attendance.

1.03 PROGRESS MEETINGS

A. The Engineer will schedule and administer progress meetings and specially called meetings throughout the duration of the Work at minimum monthly intervals.

B. The time and location of such meetings shall be designated by the Engineer and shall be convenient for all parties involved.

C. The Engineer will, prepare agenda with copies for participants, preside at meetings, record minutes, and distribute copies to participants, and those affected by decisions made.

PART 2 PRODUCTS

NOT USED

PART 3 EXECUTION

NOT USED

END OF SECTION

SECTION 01300

SUBMITTALS

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Requirements for submission of schedules and shop drawings.

1.02 PROGRESS SCHEDULE

A. Refer to Section 01310 Construction Progress Schedule for Critical Path Method (CPM) construction scheduling requirements.

B. Special attention is directed to the requirement that the Contractor shall start the Work, as specified under this Contract, no later than thirty (30) calendar days after the execution of the Contract Documents, unless otherwise directed by the Owner. The Contractor shall comply with all pre-construction requirements as specified. The Owner reserves the right to delay the commencement of the Work or any part thereof if the specified requirements as determined by the Engineer have not been satisfied. The Owner further reserves the right to limit or, delay construction, or certain activities thereof, in certain areas of the Contract should the Owner deem it to be in the public's best interest and/or safety to do so.

C. The Contractor shall contact the appropriate town or city authorities concerning any public or semi-public events that may occur during the construction period that may affect construction. The Contractor alone shall be responsible for arranging his construction sequence to conform to any restrictions these events may impose. No claims for extras will be allowed because of any delay, extra materials handling, extra excavation, etc. caused by the imposed restrictions. However, additional time may be granted for completion of the work to compensate for delays caused by said restrictions.

1.03 SHOP DRAWINGS

A. Submit digital copies (PDF) of all shop and working drawings of concrete reinforcement, structural details, piping layout, wiring, materials fabricated especially for the Contract, and materials and equipment for which such drawings are specifically requested.

B. A maximum of two (2) submittals of each shop drawing will be reviewed by the Engineer. If more submittals are required due to the Contractor’s neglect or failure to fulfill the requirements of the Contract plans and specifications, or to make corrections or modifications required by the Engineer in the review of the first two submittals, the Engineer will review the submittal and the Contractor will be responsible for the cost of the review, as determined by the Owner based on the Engineer’s documentation of time and rates for additional services established in the Engineering Agreement between the Owner and the Engineer.

C. Such drawings shall show the principal dimensions, weight, structural and operating features, space required, clearances, type and/or brand of finish or shop coat, grease fittings, etc., depending on the subject of the drawing. When the dimensions are of particular importance, or when specified, the drawings shall be certified by the manufacturer or fabricator as correct for the Contract.

D. When so specified or if considered by the Engineer to be acceptable, manufacturer's specifications, catalog data, descriptive matter, illustrations, etc., may be submitted in place of shop and working drawings.

E. The Contractor shall be responsible for the prompt and timely submittal of all shop and working drawings to eliminate delay to the Work due to the absence of such drawings. All shop and working drawings must be submitted to the Engineer within thirty (30) calendar days prior to incorporation into the Work, unless otherwise permitted by the Engineer. **Prior to the submittal of any shop drawings, the Contractor shall submit a schedule of proposed shop drawing transmittals.** The schedule shall identify the subject matter of each transmittal, the corresponding specification section number and the proposed date of submission. Prior to and during the progress of the Work the schedule shall be revised and resubmitted as requested by the Engineer.

F. No material or equipment shall be purchased or fabricated for the Contract until the required shop and working drawings have been submitted as hereinabove provided and reviewed for conformance to the Contract requirements. All such materials and equipment and the work involved in their installation or incorporation into the Work shall then be as shown in and represented by said drawings.

G. Until the necessary review has been made, the Contractor shall not proceed with any portion of the Work (such as the construction of foundations) for which review is required.

H. All shop and working drawings shall be submitted to the Engineer by and/or through the Contractor, who shall be responsible for obtaining shop and working drawings from his subcontractors and returning reviewed drawings to them. All shop and working drawings shall be prepared on standard size, 24 inch by 36 inch sheets, except those which are made by changing existing standard shop and working drawings. All drawings shall be clearly marked with the names of the Owner, Contractor, and building, equipment, or structure to which the drawing applies, and shall be suitable numbered. Submitted shop drawings shall be accompanied by a letter of transmittal, completed by the Contractor as **[approved] [provided]** by the Engineer.

I. Only drawings which have been checked and corrected by the fabricator should be submitted to the Contractor by his subcontractors and vendors. Prior to submitting drawings to the Engineer, the Contractor shall check thoroughly all such drawings to satisfy himself that the subject matter thereof conforms to the Drawings and Specifications in all respects. All drawings which are correct shall be marked with the date, checker's name, and indication of the Contractor's approval, and then shall be submitted to the Engineer; other drawings shall be returned for correction.

J. If a shop drawing shows any deviation from the Contract requirements, the Contractor shall make specific mention of the deviations in his letter of transmittal.

K. The review of shop and working drawings by the Engineer will be general only, and nothing contained in this Section shall relieve, diminish, or alter in any respect the responsibilities of the Contractor under the Contract Documents and in particular, the specific responsibility of the Contractor for details of design and dimensions necessary for proper fitting and construction of the work as required by the Contract and for achieving the result and performance as specified. The Contractor shall be responsible for errors and omissions in shop drawings.

L. Should the Contractor submit equipment that requires modifications to the structures, piping, electrical conduit, wires, appurtenances, or layouts etc., either existing or as detailed on the Drawings, he shall also submit details of the proposed modifications. If such equipment and modifications are accepted, the Contractor, at no additional cost to the Owner, shall do the work necessary to make such modifications.

M. The Contractor shall furnish additional copies of shop drawings or catalog cuts when so requested.

PART 2 PRODUCTS

NOT USED

PART 3 EXECUTION

NOT USED

END OF SECTION

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SECTION 01310

CONSTRUCTION PROGRESS SCHEDULE

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Requirements for computer generated Critical Path Method (CPM) construction scheduling and Narrative progress report.

B. No portion of this specification shall take precedent over SECTION 00500-Contract Agreement.

1.02 SUBMITTALS

A. Submit in accordance with SECTION 01300-Submittals

1. Quality Assurance/Control Submittal
   a. Name and version of CPM software proposed for use.
   b. List of construction projects completed on which progress of work was controlled with CPM software.
2. Schedule
   a. Within **14 days** following the receipt of the Notice to Proceed, the Contractor shall submit **two** color copies of a computer generated schedule and a list of activities to the Engineer. Following review by the Engineer and Owner the Contractor shall meet with the Engineer and Owner to discuss the review. The Contractor shall incorporate the Engineer's comments into the schedule and submit eight color copies of the revised schedule within 14 days following receipt of the Engineer's comments.

PART 2 PRODUCTS

2.01 SOFTWARE

A. Computer based scheduling software used by the Contractor shall be the product of a recognized commercial computer software producer and shall be capable of meeting the requirements specified herein.

PART 3 EXECUTION

3.01 PREPARATION

A. General

1. The Contractor shall prepare his proposed CPM schedule based on a breakdown of work tasks that he has developed.
2. The construction schedule and updates shall be prepared by the Contractor or the Contractor's qualified consultant.

B. Schedule

1. Each schedule shall be prefaced with the following summary data:
   a. Contract name and number
   b. Contractor's Name
   c. Contract duration
   d. The effective or starting date of the schedule
   e. Revision date of the latest schedule.
2. The CPM schedule shall be sequenced by early start date and shall include the following minimum items:
   a. Activity Name
   b. Estimated duration
   c. Activity description
   d. Early start date (calendar date)
   e. Early finish date (calendar date)
   f. Latest allowable start date (calendar date)
   g. Latest allowable finish date (calendar date)
   h. Status (whether critical)
   i. Estimated cost of the activity
   j. Float (total and free)
   k. Major milestones
3. Separate milestones shall be included for Notice-to-Proceed and Project Completion Date.
4. Activities shall include major components of the work including submittals that might impact the critical path, subcontractor work, major and critical equipment design, fabrication, testing, delivery and installation times, system/subsystem/component testing, process and facility startup, training, demobilization, project cleanup and closeout. Critical portions of process instrumentation and control system work, shall be defined in detail in a sub schedule.
5. The sum of the costs assigned to the activities shall be equal to the Contract price. Activity costs shall not be assigned to submittals or submittal reviews. Comply with SECTION 01026-Schedule of Values. Provide a table showing the anticipated monthly percentage of completion, based on the total contract price.
6. Critical activities, predecessors, free float and total float shall be clearly displayed on the schedule in graphical form. Schedules that contain activities showing negative float or that extend beyond the contract completion date will not be approved.
7. Each schedule submittal shall also include a list of activities in the order in which the activities will be performed, along with activity durations, activity predecessors, type of predecessor (finish-start, finish-finish, start-start, lead/lag), and any dependency or required date.
8. The schedule shall be based on a standard 5-day work week with allowance for holidays and adverse weather.
9. Engineer’s approval of the CPM schedule is advisory only and shall not relieve the Contractor of responsibility for accomplishing the work prior to the contract completion date. Omissions and errors in the approved CPM schedule shall not excuse performance less than that required by the Contract. Approval by the Engineer in no way makes the Engineer an insurer of the CPM schedule's success or liable for time or cost overruns flowing from its shortcomings. The Owner hereby disclaims any obligation or liability by reason of approval by its agent, the Engineer, of the CPM schedule.

C. Narrative Progress Report

1. Include as a minimum:
   a. Summary of work completed during the previous period (since submission of last narrative progress report).
   b. Explanation for variations between actual work completed in previous period and planned work as reported in last period.
   c. Summary of work planned during the next period.
   d. Current and anticipated delaying factors and their estimated impacts on other activities and milestones, both critical and non-critical.
   e. Corrective actions taken or proposed.
2. A Narrative Progress Report shall be submitted monthly to the Engineer, at least 5 working days prior to the progress meeting.
3. At the discretion of the Engineer, the Contractor may be required to submit a revised CPM schedule showing completion to date and any changes to the previous schedule.

3.02 MONITORING SCHEDULE

A. The CPM approved construction schedule shall be used by the Contractor throughout the duration of the project for planning, organizing, and directing the Work, and for reporting progress of the Work

B. The Contractor is solely responsible for monitoring schedule compliance. When a delay to the critical path occurs, the Contractor shall immediately notify the Engineer in writing. Within one week of the notification, the Contractor shall submit for the Engineer's approval, a description of proposed actions to return the project to schedule.

3.03 MODIFYING SCHEDULE

A. If the Contractor desires to make changes in his method of operating which affect the approved CPM schedule, he shall notify the Engineer in writing stating what changes are proposed and the reason for the change. If the Engineer approves these changes, the Contractor shall revise and submit for approval, without additional cost to the Owner, all of the affected portions of the CPM schedule.

B. It may be necessary for the contract schedule or completion time to be adjusted by the Owner to reflect the effects of job conditions, weather, technical difficulties, strikes, unavoidable delays on the part of the Owner or its representatives and other unforeseeable conditions which may indicate schedule adjustments or completion time extensions. Under such conditions, the Engineer will direct the Contractor to reschedule the work or contract completion time to reflect the changed conditions and the Contractor shall revise his schedule accordingly.

C. Float time is a project resource available to both the Contractor and the Owner to meet contract milestones and completion dates. Use of float suppression techniques such as preferential sequencing or logic, special lead/lag logic restraints, and extended activity times are prohibited, and use of float time disclosed or implied by use of alternate float suppression techniques shall be shared to proportionate benefit of OWNER and CONTRACTOR.

D. If the Contractor provides an accepted schedule with an early completion date, the Owner reserves the right to reduce the Time of Completion to match the early completion date by issuing a deductive Change Order at no change in Contract Price.

END OF SECTION

SECTION 01399

PRE- AND POST-CONSTRUCTION CONDITION SURVEYS

PART 1 GENERAL

1.01 SECTION INCLUDES

A. The work shall include performance of a pre-construction and a post-construction condition survey of the adjacent structures in the vicinity of the ground improvements work. These structures include:

1. #3275 Post Road – Warwick City Hall Building
2. #1350 Greenwich Avenue - Commercial Building

B. The intent of the pre- and post-construction condition surveys is to document conditions at these structures prior to and after construction. The pre-construction survey will form a baseline for later comparison to the post-construction survey to evaluate impacts (if any) from construction activities. The two surveys could also be useful to evaluate construction related damage claims that could later arise from the adjacent property owners.

1.02 QUALIFICATIONS

A. The pre- and post-construction condition surveys shall be performed by a Professional Engineer registered in Rhode Island. The Contractor's Professional Engineer shall be familiar with residential and commercial construction, shall have been in business for at least five consecutive years, and shall be a certified home inspector registered in Rhode Island.

1.03 SUBMITTALS

A. At least 30 days prior to the start of the Work, the Contractor shall submit the resume of the Registered Professional Engineer who will be performing the surveys.

B. At least 30 days prior to the start of the Work, the Contractor shall submit a listing of buildings to be surveyed and the methods to be used for building surveys, including contingencies for a) interior access to structures; b) exterior access to structures from the building property; and c) no access to property (survey from public property). The submittal shall include proposed agreement forms between the Contractor and building owners allowing access for surveys.

C. At least 14 days prior to the start of the Work, the Contractor shall submit a pre-construction condition survey conforming to the requirements specified herein.

D. No more than 30 days after substantial completion, the Contractor shall submit a post-construction condition survey conforming to the requirements specified herein

PART 2 PRODUCTS

SECTION NOT USED

PART 3 EXECUTION

3.01 METHOD OF CONSTRUCTION

A. The Contractor shall coordinate the pre- and post-construction survey schedule with the Engineer. The Contractor shall arrange for access to the buildings for surveys. Building access agreement forms shall be sent to the Owner via Certified Mail.

B. The Contractor's Professional Engineer and the City or its designated agent must be present during residential structure survey. Building surveys shall be performed in accordance with the Contractor's reviewed and approved submittal. Written property owner access agreement forms must be obtained by the Contractor prior to entering each property.

C. The Contractor's Professional Engineer shall submit a Report documenting the findings of the pre- and post-construction surveys including appropriate sketches and photographs.

END OF SECTION

SECTION 01400

QUALITY CONTROL

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Requirements for Contractor’s quality control of products, suppliers, manufacturers, services, site conditions, and workmanship, to produce Work of specified quality.

1.02 QUALITY ASSURANCE/CONTROL OF INSTALLATION

A. Comply fully with manufacturers' instructions, including each step-in sequence.

B. Should manufacturers' instructions conflict with Contract Documents, request clarification from Engineer before proceeding.

C. Comply with specified standards as a minimum quality for the Work except when more stringent tolerances, codes, or specified requirements indicate higher standards or more precise workmanship.

D. Perform work by persons qualified to produce workmanship of specified quality.

E. Secure Products in place with positive anchorage devices designed and sized to withstand stresses, vibration, physical distortion or disfigurement.

1.03 FIELD SAMPLES

A. Install field samples at the site as required by individual specifications sections for review.

B. Acceptable samples represent a quality level for the Work.

C. Where field sample is specified to be removed, clear area only after field sample has been accepted by the Engineer.

1.04 CERTIFIED WELDERS

A. Structural welds shall be made only by operators who have been qualified by tests, as prescribed in the "Standard Qualification Procedure" of the American Welders Society, to perform the type of work required.

B. Pipe welds shall be made only by operators who have been qualified by the National Certified Pipe Welding Bureau and each operator's qualification record shall be submitted to the Engineer before any work is performed.

C. Shop welding shall be in accordance with the "Code for Welding in Building Construction".

PART 2 PRODUCTS

NOT USED

PART 3 EXECUTION

NOT USED

END OF SECTION

SECTION 01410

TESTING LABORATORY SERVICES

PART 1 GENERAL

1.01 SUMMARY

A. Section Includes

1. Qualification, duties and responsibilities of testing laboratories.
2. Coordination and scheduling responsibilities of the Contractor.

B. Related Sections

1. Section 01600 - Materials and Equipment

1.02 PAYMENT PROCEDURES

A. Initial Testing

1. The Owner will pay for initial testing services required by the Engineer, unless noted otherwise.

B. Retesting

1. When initial tests indicate noncompliance with the Contract Documents, subsequent retesting occasioned by the noncompliance shall be performed by the same testing agency, and costs thereof will be deducted by the Owner from the Contract Total.

C. Contractors Convenience Testing

1. Inspecting and testing performed exclusively for the Contractor's quality control purposes and for conformance with the specifications shall be the sole responsibility of the Contractor.

1.03 REFERENCES

A. American Society for Testing and Materials (ASTM)

1. E329, Standard Specification for Agencies Engaged in Construction Inspection, Testing, or Special Inspection

1.04 REQUIREMENTS

A. Work included:

1. Cooperate with the Owner's selected testing agency and all others responsible or testing and inspecting the Work.
2. Provide other testing and inspecting as specified to be furnished by the Contractor in this Section and/or elsewhere in the Contract Documents.
3. Where no testing requirements are described, but the Owner directs testing, the Contractor shall provide testing under the requirements of this Specification.

B. Work not included:

1. Selection of testing laboratory: The Owner will select a qualified independent testing laboratory.

1.05 QUALITY ASSURANCE

A. Qualifications

1. The testing laboratory will be qualified to the Owner's approval in accordance with ASTM E329.

B. Regulatory requirements

1. Testing, when required, will be in accordance with all pertinent codes and regulations and with selected standards of the American Society for Testing and Materials.
2. Regulatory Requirements Inspections and tests required by codes or ordinances, or by a plan approved authority, and which are made by a legally constituted authority, shall be the responsibility of and shall be paid for by the Contractor, unless otherwise provided in the Contract Documents.

1.06 DELIVERY, STORAGE, AND HANDLING

A. Comply with pertinent provisions of Section 01600 - Materials and Equipment.

B. Promptly process and distribute, to the Engineer, required copies of test reports and instructions to assure necessary retesting and replacement of materials with the least possible delay in progress of the Work.

1.07 SCHEDULING

A. Establishing schedule

1. By advance discussion with the testing laboratory selected by the Owner, determine the time required for the laboratory to perform its tests and to issue each of its findings.
2. Provide all required time within the construction schedule.
3. Coordinate testing activity with the appropriate testing laboratory.

B. Revising schedule

1. When changes of construction schedule are necessary during construction, coordinate all such changes with the testing laboratory as required.

C. Adherence to schedule

1. When the testing laboratory is ready to test according to the established schedule, but is prevented from testing or taking specimens due to incompleteness of the Work, all extra charges for testing attributable to the delay may be back-charged to the Contractor and shall not be borne by the Owner.

PART 2 PRODUCTS

NOT USED

PART 3 EXECUTION

3.01 FIELD QUALITY CONTROL

A. Site Tests

1. Representatives of the testing laboratory shall have access to the Work at all times and at all locations where the Work is in progress. Provide facilities for such access to enable the laboratory to perform its functions properly.
2. All specimens and samples for testing, unless otherwise provided in the Contract Documents, shall be taken by the testing personnel. All sampling equipment and personnel will be provided by the testing laboratory. All deliveries of specimens and samples to the testing laboratory will be performed by the testing laboratory.
3. Sieve and Proctor analysis are required for all in-situ aggregate to be used in the Work. Sieve and Proctor analysis to be stamped and signed by a Professional Engineer registered in the State of Rhode Island.
4. Sieve analysis are required for all aggregate and soils delivered to the job site to be used in the Work. Sieve analysis to be stamped and signed by a Professional Engineer registered in the State of Rhode Island.
5. Soil compaction testing for paved areas shall be performed for every 3,000 square feet of bituminous concrete placed, but no less than two tests per site. Contractor responsible for all Proctor's.
6. Soil compaction testing to be performed for every 50 linear feet of excavated trench repair. Contractor responsible for all Proctor's.
7. Asphalt compaction testing each day permanent bituminous concrete is placed. Testing shall be provided for every 3,000 square feet of bituminous asphalt, with a minimum of two tests. Contractor responsible for obtaining Marshall values.
8. Sample all imported soils and aggregates at a minimum frequency of one (1) per one thousand cubic yards each to verify materials free of contamination. The material shall be tested for the following: volatile organic compounds (VOC's) (EPA method 8260), Poly-Nuclear Aromatic Hydocarbons (PAH's) (EPA method 8270), total Petroleum Hydrocarbons ((TPH), and RCRA 8 Metals.

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SECTION 01510

TEMPORARY UTILITIES

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Requirements for temporary utilities required during construction.

1.02 GENERAL REQUIREMENTS

A. The Contractor is responsible for payment of all costs associated with the installation and operation of all temporary utilities necessary for the completion of the work. The General Contractor shall arrange with the Engineer and Owner methods of determining monthly utility costs for Temporary Utilities prior to connection of any temporary systems. The Contractor shall pay the Owner on a monthly basis for all temporary utility costs. The Temporary Utilities to be paid by the Contractor include but are not limited to the following: Electricity, Water, Sanitary, Heating, Ventilation, Plumbing and other services required to complete the work.

1.03 TEMPORARY WATER

A. Temporary pipe lines and connections from the permanent service lines, necessary for the use of the General Contractor and his Subcontractors shall be installed, protected, and maintained at the expense of the General Contractor.

B. Provide an adequate supply of drinking water from an approved source of acceptable quality, satisfactorily cooled, for his employees and those of his Subcontractors.

1.04 TEMPORARY ELECTRICITY

A. Provide electrical energy required for temporary lighting and power.

B. Assume all costs necessary to provide a temporary, separately metered electric service for all construction. Temporary electric service shall be connected to Owner’s existing service.

C. The General Contractor shall pay for the cost of electrical energy consumed by himself and by all of his Subcontractors. The Contractor shall record meter readings weekly and provide a copy of the meter readings to the Engineer and Owner. The entire electric bill shall be proportioned according to the KWH used. The Owner will provide the Contractor and Engineer with copies of the monthly electric bills as well as with the calculations for determining the amount owed by the Contractor. The Contractor shall reimburse the Owner within 15 days of receiving the monthly bill and backup from the Owner, by means of a separately issued check, made payable to the Owner.

D. Temporary wiring of a special nature shall be paid for by the Contractor including but not limited to special circuits required by electric welders, elevators, lifts, pumps or other special equipment requiring high-amperage and/or special voltage service and exterior lighting circuits for protection against vandalism, public warning lights and lights for advertising, etc.

E. The General Contractor and all Subcontractors, individually, shall furnish all extension cords, sockets, motors, and accessories required for their work. They shall also pay for all temporary wiring of construction offices and buildings used by them.

F. Temporary wiring installed by the Electrical Subcontractor shall be removed after it has served its purpose.

G. Electrical work to be done in accordance with applicable codes.

1.05 TEMPORARY SANITARY FACILITIES

A. Provide adequate sanitary facilities for the use of those employed on the Work. Sanitary facilities shall be made available when the first employees arrive on the site of the Work, be properly secluded from public observation, and be maintained during the progress of the Work in suitable numbers.

B. Maintain sanitary facilities in an orderly and sanitary condition at all times and enforce their use. Rigorously prohibit the committing of nuisances on the site of the Work, on the lands of the Owner, or any adjacent property.

1.06 TEMPORARY HEATING

A. Within 30 calendar days after the execution of this Contract, submit in writing to the Engineer for approval, three copies of method and time schedule for heating during construction which shall concur with his progress schedule submitted under Specification Section 01300.

B. The installation and operation of heating devices shall comply with all safety regulations including provisions for adequate ventilation and fire protection. Heating devices which may cause damage to finish surfaces shall not be used.

C. After the permanent heating system has been installed, tested, and made ready for operation, the Contractor may, at his own risk and expense, use it for providing heat for protection of the Work. He shall provide and pay for all fuel and care necessary, and, when the Work is ready for acceptance, he shall, at his own expense, put the system into first-class condition, even to the extent of replacing worn or damaged parts as directed.

PART 2 PRODUCTS

NOT USED

PART 3 EXECUTION

NOT USED

END OF SECTION

SECTION 01525

TEMPORARY ENCLOSURES

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Requirements for protecting portions of the Work which are affected by inclement weather conditions.

B. Provide “Weather Protection” and heat to permit construction work to be carried on during the months of November through March. These Specifications are not to be construed as requiring enclosures or heat for operations that are not economically feasible to protect in the judgment of the Engineer. Included in the preceding category, without limitation, are such items as site work, excavation, pile driving, steel erection, erection of certain "exterior" wall panels, roofing, and similar operation.

1.02 SUBMITTALS

A. Within 30 calendar days after execution of this contract, submit in accordance with Specification Section 01300, proposed methods for "Weather Protection".

1.03 WEATHER PROTECTION

A. Weather Protection shall be provided for protection of that work adversely affected by moisture, wind and cold, by covering, enclosing and/or heating. This protection shall provide adequate working areas during dates consistent with the approved Progress Schedule to permit the continuous progress of all work necessary to maintain an orderly and efficient sequence of construction operations.

B. Furnish and install all enclosures and be responsible for all costs, including heating required to maintain a minimum temperature of 40 degrees F., at the working surface. This provision does not supersede any specific requirements for methods of construction, curing of materials or the applicable general conditions set forth in the Contract Documents with added regard to performance obligations of the Contractor.

C. Installation of weather protection and heating devices shall comply with all safety regulations including provisions for adequate ventilation and fire protection devices. Heating devices which may cause damage to finish surfaces shall not be used.

PART 2 PRODUCTS NOT USED

PART 3 EXECUTION NOT USED

END OF SECTION

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SECTION 01560

TEMPORARY CONTROLS

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Requirements for cleaning, maintenance of the site, barriers and fences required during construction.

1.02 CLEANING DURING CONSTRUCTION

A. Unless otherwise specified under the various trade Sections of the Specifications, the General Contractor shall perform clean-up operations during construction as herein specified.

1. Control accumulation of waste materials and rubbish; periodically dispose of off-site. Bear all costs, including fees resulting from disposal.
2. Clean interior areas prior to start finish work and maintain areas free of dust and other contaminants during finishing operations.
3. Maintain project in accordance with all local, State and Federal Regulatory Requirements.
4. Store volatile wastes in covered metal containers, and remove from premises.
5. Prevent accumulation of wastes that create hazardous conditions.
6. Provide adequate ventilation during use of volatile or noxious substances

B. Conduct cleaning and disposal operations to comply with local ordinances and anti-pollution laws.

1. Do not burn or bury rubbish and waste materials on site.
2. Do not dispose or volatile wastes such as mineral spirits, oil, or paint thinner in storm or sanitary drains.
3. Do not dispose of wastes into streams or waterways.
4. Use only those materials which will not create hazards to health or property and which will not damage surfaces.
5. Use only those cleaning materials and methods recommended by manufacturer of surface material to be cleaned.
6. Execute cleaning to ensure that the buildings, the sites, and adjacent properties are maintained free from accumulations of waste materials and rubbish and wind blown debris, resulting from construction operations.
7. Provide on-site containers for collection of waste materials, debris, and rubbish.
8. Remove waste materials, debris, and rubbish from the site periodically and dispose of at legal disposal areas off the construction site.
9. Handle material in a controlled manner with as little handling as possible. Do not drop or throw materials from heights.
10. Schedule cleaning operations so that dust and other contaminants resulting from cleaning process will not damage surrounding surfaces.
11. During its progress, the work and the adjacent areas affected thereby shall be kept cleaned up and all rubbish, surplus materials, and unneeded construction equipment shall be removed and all damage repaired so that the public and property owners will be inconvenienced as little as possible.
12. Where material or debris has washed or flowed into or been placed in existing watercourses, ditches, gutters, drains, pipes, structures, work done under this contract, or

elsewhere during the course of the Contractor's operations, such material or debris shall be entirely removed and satisfactorily disposed of during the progress of the work, and the ditches, channels, drains, pipes, structures, and work, etc. shall, upon completion of the work, be left in a clean and neat condition.

1.03 DUST CONTROL

A. Provide adequate means for the purpose of preventing dust caused by construction operations throughout the period of the construction contract.

B. This provision does not supersede any specific requirements for methods of construction or applicable general conditions or performance obligations of the General Contractor.

1.04 EROSION AND SEDIMENT CONTROL

A. Plan and execute construction by methods to control surface drainage from cuts and fills, from borrow and waste disposal areas. Prevent erosion and sedimentation.

B. Minimize amount of bare soil exposed at one time.

C. Provide temporary measures such as berms, dikes, and drains, to prevent water flow.

D. Construct fill and waste areas by selective placement to avoid erosive surface silts for clays.

E. Periodically inspect earthwork to detect evidence of erosion and sedimentation; promptly apply corrective measures.

F. Construct sediment control devices for discharge from dewatering trenches.

G. Construct all sedimentation control devices shown on the plans.

H. Refer to applicable permits for additional requirements.

1.05 NOISE CONTROL

A. Develop and maintain a noise-abatement program and enforce strict discipline over all personnel to keep noise to a minimum.

B. Execute construction work by methods and by use of equipment which will reduce excess noise.

1. Equip air compressors with Silencers, and power equipment with mufflers.
2. Manage vehicular traffic and scheduling to reduce noise.

1.06 POLLUTION CONTROL

A. Special care shall be taken to prevent contamination or muddying up or interfering in any way with the stream flows, if any along the line of work. No waste matter of any kind will be allowed to discharge into the stream flows or impounded water of any pools or other bodies of water.

1.07 SURFACE WATER CONTROL

A. Take all precautions to prevent damage to the work or equipment by high waters or by storms. The Engineer with the approval of the Owner may prohibit the carrying out of any work at any time when in his judgment, high water or storm conditions are unfavorable or not suitable, or at any time, regardless of the weather, when proper precautions are not being taken to safeguard previously constructed work or work in progress.

B. In case of damage caused by the failure of the Contractor to take adequate precautions, the Contractor shall repair or replace equipment damaged and shall make such repairs or rebuild such parts of the damaged work, as the Engineer may require, at no additional expense to the Owner.

1.08 BARRIERS AND ENCLOSURES

A. Fences and Barricades

1. Provide and maintain temporary fences, barriers, lights, guardrails, and barricades as indicated in the Contract Documents, or as necessary to secure the Work and adjacent property, and protect persons and property.
2. Temporary fence shall be used to close off the construction area from adjacent private properties whose use conflict with the construction activities. The Contractor shall be responsible for providing the Engineer with an acceptable method for the installation of the temporary fence that will provide for the pedestrian and worker safety and security for which it is intended.
3. Obtain necessary approvals and permits and provide temporary expedients as necessary to accommodate tasks requiring items mentioned herein.

B. Protection of Trees

1. The Contractor shall take care not to harm trees along the sides of roads or with in the existing facility in which the construction work is to be done or trees on adjacent lands except as indicated on the drawings or with the written permission of the Owner and any other owner of the trees involved. Care shall be taken not to cut tree roots so as to harm the growth of trees to remain.
2. If, in the opinion of the Engineer, any trees damaged during construction can be repaired, the Contractor shall satisfactorily repair same at no further cost to the Owner.
3. If, in the opinion of the Engineer, any tree damaged during construction cannot be repaired and should be removed, the Contractor shall satisfactorily remove and replace, in kind, same at no further cost to the Owner.

PART 2 PRODUCTS

NOT USED

PART 3 EXECUTION

NOT USED

END OF SECTION

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SECTION 01570

TRAFFIC REGULATIONS

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Requirements for traffic control for the duration of the Contract.

1.02 REFERENCES

A. This specification includes, requirements of additional specifications as listed. The Contractor shall perform the Work in accordance with requirements of the referenced specification in addition to the requirements of this Specification Section 01570.

B. The Contractor shall obtain and familiarize himself with all requirements of these specifications.

1. Rhode Island Department of Transportation Standard Specification for Road and Bridge Construction, including all addenda issued by the State of Rhode Island Department of Public Works. (Referred to as the Standard Specification).
2. Manual of Uniform Traffic Control Devises (MUTCD) Latest Edition, including all addenda.

1.03 PERFORMANCE REQUIREMENTS

A. Contractor shall have the sole responsibility for the maintenance and protection of traffic.

B. An authorized representative of the Contractor shall be available on a 24-hour basis for the duration of the Contract for the purpose of correcting construction related impediments or hazards.

1.04 SUBMITTALS

A. Shop Drawings

1. In accordance with SECTION 01300 – SUBMITTALS, submit a traffic plan delineating requirements of this section, the Contract Drawings, and the City of Warwick and RIDOT requirements.
2. Traffic control plans shall detail all typical work zones and detours.

1.05 SITE CONDITIONS

A. Replace at no cost to the City of Warwick or RIDOT, pavement markings, legends and lane arrows removed or damaged by the construction operation.

B. Restore temporary detours to original condition.

C. Replace traffic signal loops damaged during construction with in 72 hours.

1.06 SCHEDULING

A. There shall be no time limitations on construction operations except those hours and locations where noise regulations may apply and except as required for the maintenance of traffic as required by the City of Warwick or RIDOT.

B. Keep closing of travel lanes to a minimum.

C. Notify city departments 48 hours prior to construction operations on travel ways.

1. Police Department (401) 468-4200
2. Fire Department (401) 468-4000
3. Department of Public Works (401) 738-2003

PART 2 PRODUCTS

2.01 TRAFFIC CONTROL DEVISES

A. In accordance with the Standard Specification and MUTCD.

PART 3 EXECUTION

3.01 INSTALLATION OF TRAFFIC CONTROL DEVISES

A. In accordance with the Standard Specification and MUTCD.

3.02 PROTECTION OF TRAFFIC

A. Barricade trenches and roadway excavations at the end of each work period with temporary precast concrete barriers, properly lighted and marked to guide traffic to designated travel lane. Or other means acceptable to the Engineer and approved on the Traffic Plan.

B. Maintain and protect traffic movements for the entire length of the project.

C. Keep one lane of traffic open at all times except for brief stoppages dictated by the construction operation involving safety of vehicles in the travel lanes.

D. Maintain access to business and private ways during construction operations.

E. Furnish sufficient number of signs, temporary precast concrete barriers, warning lights, drums and traffic cones to warn traffic of construction and guide traffic through the construction area.

3.03 TRAFFIC PERSONS

A. Contractor shall procure the service of uniformed traffic persons as required to perform construction while safely managing the movement of non-construction traffic through active project areas. Contractor shall be responsible for determining the need

for uniformed traffic persons over the course of the project and shall schedule traffic persons in a timely fashion in advance of when said traffic persons will be needed.

B. Traffic persons shall be City of Warwick Police Officers, unless otherwise authorized or required (e.g. if an adequate number City of Warwick police officers are unavailable to serve as uniformed traffic persons).

C. Traffic persons used by the Contractor shall be compensated directly by the City of Warwick, based on the number of hours actually worked (both straight time and overtime) and the corresponding hourly rates for each time classification. Contractor shall be responsible for tracking or verifying hours worked by traffic persons on the project.

D. The intent is to insure public safety by police direction of traffic. Police are not to serve as watchmen to protect the Contractor's equipment and materials, or to warn pedestrians of such hazards as open trenches.

E. Nothing contained herein shall be construed as relieving the Contractor of any of his responsibilities for protection of persons and property under the terms of the Contract.

END OF SECTION

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SECTION 01580

PROJECT SIGNS

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PART 1 GENERAL

1.01 SUMMARY

A. Section Includes

1. Requirements for fabricating and erecting Project signs

1.02 SEQUENCING

A. Signage to be in place prior to start of construction.

1.03 SUBMITTALS

A. Shop drawing shall be submitted for the Project Sign for approval by Owner before the manufacturing shall begin. The owner is allowed one set of changes and a second review for sign-off.

1. Design vendor will provide “Final Draft” text, typestyles, graphic elements, and layout for the park entrance sign.

B. Shop Drawings: Show fabrication and installation details for signs.

1. Show sign mounting heights, locations of supplementary supports to be provided by others, and accessories.
2. Include fabrication and installation details and attachments to other work.
3. Owner is allowed changes to the sign fabrication drawings during the submittal process. This includes a second proof of the entire drawing package at no additional charge.

PART 2 PRODUCTS

2.01 PROJECT SIGN

A. Contractor shall furnish, install and maintain one (1) 4' x 8' single sided project sign. This sign shall be installed within seven (7) calendar days of the date of commencement in a location to be selected by the Owner or Owner’s Representative.

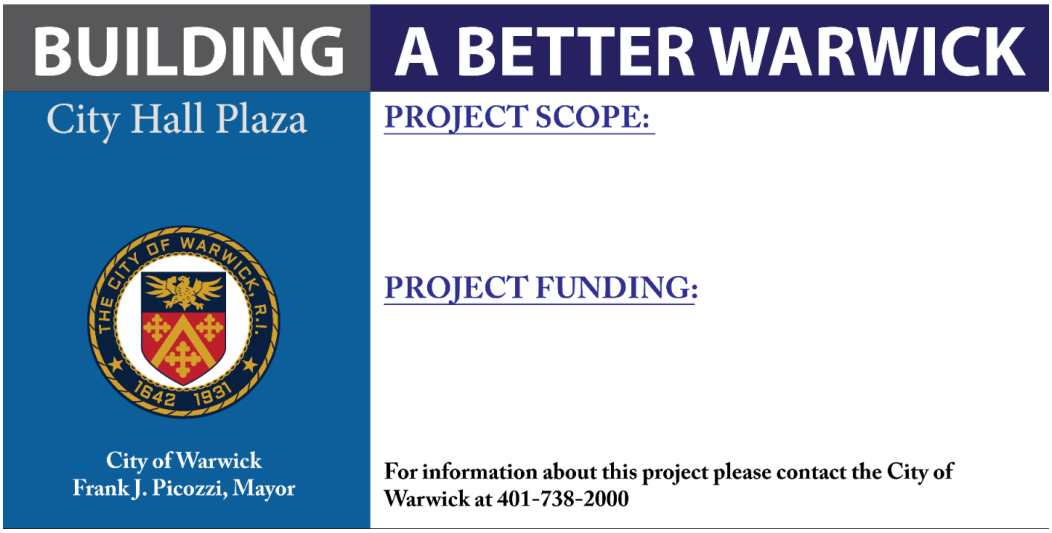
B. Project sign shall be constructed out of a single sheet of 4' x 8' x 1/2" MDF, all sides painted white, with a single sheet of vinyl graphics applied to the board.

C. Secure sign to three 4” x 4” x 12' pressure-treated wood posts with tamper resistant fasteners. Locate as directed by Owner or Owner's representative and install no later than 7 days following notice to proceed.

D. Metal Fasteners and Screws - All metal fasteners shall be heavy-duty stainless steel. All fasteners shall be tamper-resistant type fasteners. Provide shop drawings and / or samples of method of attachment of Project Sign.

E. Sign Graphic

1. Sign graphic will be as follows and as amended with scope and funding info/ graphics per the Engineer.



PART 3 EXECUTION

3.01 INSTALLATION

A. Fabricate, construct and install sign as indicated, using mounting methods and of types described and complying with applicable manufacturer's written instructions.

1. Install signs level, plumb, and at heights indicated, keep sign surfaces free of distortion and other defects in appearance.

END OF SECTION

SECTION 01590

FIELD OFFICES

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Requirements for Contractor’s and Engineer’s field offices.

1.02 CONTRACTOR’S FIELD OFFICE

A. Maintain a temporary field office near the work for their own use during the period of construction at which readily accessible copies of all contract documents shall be kept. Locate field office where it will not interfere with the progress of the Work. In charge of this office there shall be a responsible contractor superintendent.

1.03 ENGINEER’S FIELD OFFICE

A. Prior to starting work at the site, provide and equip a suitable office for the exclusive use of the Engineer, and maintain this office until the completion of the Work under this Contract. This office shall be a separate building located, as directed, where it will not interfere with the progress of the work. An approved, suitably constructed and equipped trailer of adequate size and design for the purpose may be furnished as the Engineer's office. The office, furniture, equipment, and services necessary shall be satisfactory to the Engineer.

B. The office shall be of suitable height and of ample size to accommodate the furniture and equipment listed below, without crowding (at least 400 sq. ft. of floor area). It shall be weather tight; the walls and roof shall be insulated with at least 1/2-in. insulating board suitably ventilated; and the floor shall be tight and of double-thick construction. The office shall have at least three screened windows which can be both opened and locked shut and the door shall have a cylinder lock with two keys. There also shall be a screen door.

C. Provide acceptable toilet facilities within the office for the exclusive use of the Engineer. The Contractor shall make all water and sewer connections and pay all charges for such connections.

D. Furnish the following furniture, equipment, supplies, and services:

1. One plan table or sloping plan shelves, each about 3 ft. by 5 ft., with a reasonably smooth top, and two suitable swivel stools.
2. Four additional chairs.
3. Shelves as directed.
4. Electric lights and outlets as directed. The Contractor shall pay all charges for the energy used.
5. Broom and dustpan.

6. Two desks for general office use, each about 3 ft. by 5 ft., one with a desk chair of the armchair swivel type and one with a secretary's chair.
7. Plan rack, as directed.
8. Two fireproof four-drawer, legal size, metal filling cabinets, each with lock.
9. Carbon dioxide type fire extinguisher of at least 4-lb. capacity.
10. Insulated chest for storage and moist curing of concrete cylinders; size and construction as directed.
11. A copy machine with supplies and service.
12. Facsimile machine with supplies, and dedicated telephone line. The Contractor shall pay all charges.
13. Calculating machine, electric or electronic with tape output.
14. Supply of drinking water in a suitable cooler or other approved container.
15. An outdoor thermometer - to be mounted on the outside of engineer's trailer.
16. Janitor service.
17. Paper cups, paper towels, liquid soap, and toilet paper; each with suitable dispenser or holder.
18. Thermostatically controlled heating unit or system of adequate capacity to maintain a minimum temperature of not less than 68 degrees. F. under all cold weather conditions.
19. Thermostatically controlled, refrigerant type, air conditioners of adequate capacity to maintain a maximum temperature of not more than 72 degrees F. under all hot weather conditions.
20. Metal clothing lockers, each 12-in. wide by 8-in. deep by 72-in. high, minimum dimensions.
21. 19-inch color television and DVD playback equipment for use in viewing DVD’s of the project provided under Section 01381 Audio Video Recording.
22. Internet service

1.04 REMOVAL OF OFFICES

A. Remove the Engineer's field office and all other temporary facilities from the site, after the date of completion of the Work as stated in the final estimate, unless otherwise directed by the Engineer. The field office and temporary facilities shall become the Contractor's property and the premises shall be left in a condition acceptable to the Engineer.

PART 2 PRODUCTS NOT USED

NOT USED

PART 3 EXECUTION NOT USED

NOT USED

END OF SECTION

SECTION 01600

MATERIALS AND EQUIPMENT

PART 1 GENERAL

1.01 SUMMARY

A. Section Includes

1. Requirements for delivery, storage, handling and installation of systems, materials, manufactured units, equipment, components, and accessories used in the work.

B. Related Sections

1. Section 01300 - Submittals

1.02 DELIVERY

A. Refer to Specifications' Sections for requirements pertaining to delivery and handling of materials and equipment.

B. Transport products by methods to avoid product damage; deliver in undamaged condition in manufacturers' unopened containers or packaging, dry.

C. Provide equipment and personnel to handle products by methods to prevent soiling or damage.

D. Promptly inspect shipments to assure that products comply with requirements, that quantities are correct, and products are undamaged.

1.03 STORAGE AND PROTECTION

A. Refer to Specifications' Sections for requirements pertaining to storage and protection of materials and equipment.

B. Store products in accordance with manufacturers' instruction, with seals and labels intact and legible. Store sensitive products in weather tight enclosures; maintain within temperature and humidity ranges required by manufacturers' instructions.

C. For exterior storage of fabricated products, place on sloped supports above ground. Cover products subject to deterioration with impervious sheet covering; provide ventilation to avoid condensation.

D. Store loose granular materials on solid surfaces in a well-drained area; prevent mixing with foreign matter.

E. Arrange storage to provide access for inspection. Periodically inspect to assure that products are undamaged, and are maintained under required conditions.

1.04 INSTALLATION STANDARDS

A. Comply with Specifications and referenced standards as minimum requirements.

B. Components required to be supplied in quantity within a Specification Section shall be the same, and shall be interchangeable.

C. Do not use materials and equipment removed from existing structures, except as specifically required, or allowed, by the Contract Documents.

D. Perform work by persons qualified to produce workmanship of specified quality.

E. Secure products in place with positive anchorage devices designed and sized to withstand stresses, vibration, and racking.

F. When work is specified to comply with manufacturers' instructions, submit copies as specified in Section 01300 - Submittals, distribute copies to persons involved, and maintain one set in field office.

G. Perform work in accordance with details of instructions and specified requirements.

PART 2 PRODUCTS

NOT USED

PART 3 EXECUTION

NOT USED

END OF SECTION

SECTION 01700

CONTRACT CLOSE-OUT

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Requirements for specific administrative procedures, record keeping, close-out submittals, and forms used at substantial and final completion of the Work.

B. Contractor shall satisfy all administrative requirements within the Contract Documents and the Requirements listed in this section prior to Contract Close-out.

1.02 FINAL CLEANING

A. On or before the completion of the work, the Contractor shall, unless otherwise especially directed or permitted in writing, tear down and remove all temporary buildings and structures built by him; shall remove all temporary works, tools, and machinery or other construction equipment furnished by him; shall remove all rubbish from any grounds which he has occupied; and shall leave the roads and all parts of the premises and adjacent property affected by his operations in a neat and satisfactory condition.

B. The Contractor shall restore or replace, when and as directed, any public or private property damage by his work, equipment, or employees, to a condition at least equal to that existing immediately prior to the beginning of operations. To this end, the Contractor shall do as required, all necessary highway or driveway, walk and landscaping work. Suitable materials, equipment, and methods shall be used for such restoration. The restoration of existing property or structures shall be done as promptly as practicable as work progresses and shall not be left until the end of the contract period.

C. Unless otherwise specified under the various Sections of the Specifications, the Contract or shall perform final cleaning operations as herein specified prior to final inspection.

D. At completion of work, remove waste materials, rubbish tools, equipment, machinery and surplus materials, and clean all sight-exposed surfaces; leave project clean and ready for occupancy.

E. Cleaning shall include all surfaces, interior and exterior in which the Contractor and all Subcontractors have had access whether existing or new.

F. Refer to Sections of the Specifications for cleaning of specific products or work.

G. Use only those materials which will not create hazards to health or property and which will not damage surfaces.

H. Use only those cleaning materials and methods that are recommended by the manufacturer of surfaces material to be cleaned.

I. Employ experienced workmen, or professional cleaners, for final cleaning operations.

1.03 PROJECT RECORD DOCUMENTS

A. Project Record Documents also referred here as Record Drawings shall consist of all the contract drawings.

B. The Contractor and all Subcontractors shall be required to maintain one set of Record Drawings, as the work relates to their Sections of the Specifications, at the site.

C. Record Drawings shall be stored and maintained in the General Contractor's field office apart from other documents used for construction. The Record Drawings shall be maintained in a clean, dry, and legible condition and shall not be used for construction purposes.

D. Record Drawings shall be available at all time for inspection by the Engineer. All deficiencies noted shall be promptly corrected.

E. The following information shall be indicated on the Record Drawings for building construction:

1. Record all changes, including change orders, in the location, size, number, and type both horizontally and vertically of all elements of the projects which deviate from those indicated on all the contract drawings.
2. The tolerance for the actual location of utilities and appurtenances within the building to be marked on the Record Drawings shall be plus or minus two (2) inches.
3. The location of all underground utilities and appurtenances referenced to permanent surface improvements, both horizontally and vertically at ten (10) ft. intervals and at all changes of direction.
4. The location of all internal utilities and appurtenances, concealed by finish materials, including but not limited to valves, coils, dampers, vents, clean outs, strainers, pipes, junction boxes, turning vanes, variable and constant volume boxes, ducts, traps and maintenance devices. The location of these internal utilities, appurtenances and devices shall be shown by offsets to the column grid lines on the drawings.
5. Each of the utilities and appurtenances shall be referenced by showing a tag number, area served and function on the Record Drawings.
6. Prior to the installation of all finish materials, a review of the Record Drawings shall be made to confirm that all changes have been recorded. All costs to investigate such conditions shall be borne by the applicable party as demonstrated by the Engineer.

F. The following information shall be indicated on the Record Drawings for sewer construction:

1. Location of manholes with 3 swing ties.
2. Linear distance of sewer from manhole to manhole, including size and type of pipe.
3. Manhole rim elevation and invert elevations of all pipes within manholes, including drops.
4. Recalculated pipe slopes based on record elevations.
5. Location in feet from downstream manhole of wyes and chimneys and vertical height of chimneys.
6. Length of service connections.
7. Location of service connection terminus (at property line) with 3 swing ties and depth from existing surface grade.
8. Pumping station information as detailed in 1.03, E.

G. The following information shall be indicated on the Record Drawings for water main construction:

1. Linear distance along watermain from appurtenance (i.e. vault to tee, tee to bends, bends to valves, blow offs and service corporations, including size and type of pipe.
2. Depths of pipe and fittings.
3. Location of vaults, valves, hydrants, bends, blow offs and service curb boxes with 3 swing ties.
4. Rim elevation on vaults (meter, air release etc.).

H. The following information shall be indicated on the Record Drawings for storm drain construction:

1. Rim elevations on inlets, catch basins, manholes and other structures.
2. Invert elevations of all pipes within inlets, catch basins, manholes, end sections, headwalls, culverts and other structures.
3. Linear distance along drain from structure to structure, and branch connections, including size and type of pipe.
4. Recalculated pipe slopes based on record elevations.
5. Location of manholes, inlets, catch basins, outlets, headwalls, other structures and service line connections with 3 swing ties.

I. At the end of each month and before payment for materials installed, the Contractor, and his Subcontractors, shall review Record Drawings for purpose of payment. If the changes in location of all installed elements are not shown on the Record Drawings and verified in the field, then the material shall not be considered as installed and payment will be withheld.

J. Prior to the installation of all finish materials, a review of the Record Drawings shall be made to confirm that all changes have been recorded. All costs to investigate such conditions shall be borne by the applicable party as demonstrated by the Engineer.

K. At the completion of the contract, each Subcontractor shall submit to the Contractor a complete set of his respective Record Drawings indicating all changes. After checking the above drawings, the Contractor shall certify in writing on the title sheet of the drawings that they are complete and correct and shall submit the Record Drawings to the Engineer.

1.04 EQUIPMENT AND SYSTEM CHECKOUT, CERTIFICATIONS AND TESTING

A. Comply with requirements of Section 01680 Equipment and System Checkout, Certifications and Testing.

1.05 SPARE PARTS

A. Comply with requirements of Section 01740 Spare Parts.

1.06 WARRANTIES

A. Comply with requirements of Section 01740 Warranties.

1.07 FINAL INSPECTION

A. The Contractor shall submit written certification that:

1. Project has been inspected for compliance with Contract Documents.
2. Equipment and systems have been tested in the presence of the manufacturer's representative and are operational and satisfactory.

3. Project is completed, and ready for final inspection.

PART 2 PRODUCTS

NOT USED

PART 3 EXECUTION

NOT USED

END OF SECTION

SECTION 01730

OPERATION AND MAINTENANCE MANUALS

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Requirements for compiling and submitting operation and maintenance manuals.

1.02 OPERATION AND MAINTENANCE MANUALS

A. General

1. Include all elements and components of the system including instrumentation. Provide a description of how the equipment or complete system works. Additionally, where a number of components are furnished to provide a complete system, describe the operation of components as they relate to the complete system.
2. Include all necessary instruction for the maintenance and operation of the equipment or system in accordance with the manufacturer’s recommendations, and as herein specified.
3. Customize the manual so that only data pertaining to the specific equipment or system to be furnished is included. If a standard type manual is utilized, it shall be neatly annotated to highlight the data pertaining to, and deleting the data not pertaining to, the specific equipment or equipment being furnished.
4. Bind each manual for each type of equipment or system separately as specified below.

B. Content of Manuals

1. Table of Contents and index. Provide title of Contract and schedule of products and systems, indexed to content of the volume.
2. Brief description of each system and components. Identify function, normal operating characteristics and limiting conditions. Include performance curves, with engineering data and tests. Include equipment Nameplate Data (Serial No., Model No., rating, voltage, etc.).
3. One copy of each approved shop drawing and each Contractor's coordination and layout drawing
4. Copy of any applicable warranties, guarantees and bonds
5. Operating Procedures:
    a. Manufacturer's printed operating instructions.
6. Maintenance Procedures:
    a. Manufacturer's printed maintenance instructions, parts list, illustrations, and diagrams.
7. Additional Requirements: As specified in individual product specification sections.

C. Format

1. Binder

a. Binders: Commercial quality, 8-1/2 x 11 inch three-ring binders with hardback, cleanable, plastic covers; two inch maximum ring size. When multiple binders are used, correlate data into related, consistent groupings. Provide a table of contents in each binder.
b. All binders to be of similar design and color, but sized to suit the individual manuals with a minimum allowable edge of width of 1 inch.
c. Identify each manual with a permanent label affixed to the outside binding of the binder and include the following information:
   1) Name of Contract, Contract Number
   2) Location of equipment or system (i.e. Primary Settling Tanks)
   3) Common name of equipment or system (i.e. Chain and Flight Sludge Collectors)
d. Provide tabbed fly leaf for each separate product and system, with typed description of product and major component parts of equipment.

2. Material for Content

a. Loose leaf on 60 pound, punched paper
b. Holes reinforced with plastic cloth or metal
c. Page size, 8 1/2 by 11 inches
d. Diagrams, illustrations, and attached foldouts as required, of original quality, reproduced by dry copy method
e. Drawings: Provide with reinforced punched, binder tab. Bind in with text; fold larger drawings to size of text pages

1.03 SUBMITTALS

A. Sample of typical binder, cover and tabbed fly leaf.

B. Provide six (6) copies of O&M manuals for approval no later than the time that the equipment is delivered to the site. If the manual is satisfactory, the Engineer will retain all six (6) copies. If the manual is not satisfactory, the Engineer will retain one (1) copy and return five (5) copies to the Contractor. When manuals are resubmitted, six (6) copies will again be required. When the manual is satisfactory, except for some missing information, the Engineer may, at his option, retain all six (6) copies of the manual and request six (6) copies of the additional information to be provided.

C. All manuals pertaining to equipment or a system within each specific components of construction must be completely approved prior to the Field Acceptance Tests of that component.

PART 2 PRODUCTS

NOT USED

PART 3 EXECUTION

NOT USED

END OF SECTION

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SECTION 01740

WARRANTIES

PART 1 GENERAL

1.01 SECTION INCLUDES

A. General administrative and procedural requirements for warranties required by the Contract Documents, including manufacturers standard warranties on products and special warranties.

1.02 SUBMITTAL

A. Submit written warranties to the Owner prior to the date fixed by the Engineer for Substantial Completion. If the Certificate of Substantial Completion designates a commencement date for warranties other than a date of Substantial Completion for the Work, or a designed portion of the Work, submit written warranties upon request of the Owner.

B. When a designated portion of the Work is completed and occupied or used by the Owner, by separate agreement with the Contractor during the construction period, submit properly executed warranties to the Owner prior to acceptance of this portion of the Work.

C. Refer to individual Sections of Division 2 through 26 for specific content requirements, and particular requirements for submittal of special warranties.

1.03 WARRANTY REQUIREMENT

A. Related Damages and Losses: When correcting warranted Work that has failed, remove and replace other Work that has been damaged as a result of such failure or that must be removed and replaced to provide access for correction of warranted Work.

B. Reinstatement of Warranty: When Work covered by a warranty has failed and been corrected by replacement or rebuilding, reinstate the warranty by written endorsement. The reinstated warranty shall be equal to the original warranty with an equitable adjustment for depreciation.

C. Replacement Cost: Upon determination that Work covered by a warranty has failed, replace or rebuild the Work to an acceptable condition complying with requirements of Contract Documents. The Contractor is responsible for the cost of replacing or rebuilding defective Work regardless of whether the Owner has benefited from use of the Work through a portion of its anticipated useful service life.

D. Owner's Recourse: Written warranties made to the Owner are in addition to implied warranties, and shall not limit the duties, obligations, rights and remedies otherwise available under the law, nor shall warranty periods be interpreted as limitations on time in which the Owner can enforce such other duties, obligations, rights, or remedies.

E. Rejection of Warranties: The Owner reserves the right to reject warranties and to limit selections to products with warranties not in conflict with requirements of the contract Documents.

F. Disclaimers and Limitations: Manufacturer's disclaimers and limitations on product warranties do not relieve the Contractor of the warranty on the Work that incorporates the products, nor does it relieve suppliers, manufacturers, and subcontractors required to countersign special warranties with the Contractor.

1.04 DEFINITIONS

A. Standard Product Warranties are preprinted written warranties published by individual manufacturers for particular products and are specifically endorsed by the manufacturer to the Owner.

B. Special Warranties are written warranties required by or incorporated in the Contract Documents, either to extend time limits provided by standard warranties or to provide greater rights for the Owner.

PART 2 PRODUCTS

NOT USED

PART 3 EXECUTION

NOT USED

END OF SECTION

SECTION 01750

SPARE PARTS

PART 1 GENERAL

1.01 DESCRIPTION

A. Spare parts which are identical and interchangeable with original parts shall be provided with equipment as specified in each Section of the Specifications. Spare parts shall be individually packaged in boxes bearing the equipment reference, tag number, and part identification (Example: Primary Scum Pump No. 1).

B. Subsequent to the approval of the appropriate operation and maintenance manuals but prior to the delivery of the spare parts, the Contractor shall prepare and submit an itemized tabulation of all spare parts to be provided. The tabulation shall include the name of the equipment for which the spare part is intended, type of spare part, manufacturer of spare part, manufacturer model or manufacturer identification number of spare part, quantity of spare part, and page in the appropriate operation and maintenance manual detailing the parts list.

C. Spare parts shall be stored by the Contractor in a location approved by the Engineer. Unless otherwise directed by the Engineer, the Contractor shall deliver the spare parts to the Owner at the time of "Substantial Completion." Spare parts shall be stored in accordance with the manufacturer's written recommendations, and shall be protected against theft, vandalism, weather, and all other adverse conditions. Spare parts delivered to the Owner shall be in new, undamaged condition. Upon delivery to the Owner, spare parts shall be logged in against the above noted tabulation and inspected by the Contractor in the presence of the Engineer. Any missing or damaged spare parts shall be replaced by the Contractor at no expense to the Owner.

1.02 SPECIAL TOOLS

A. Provide special tools required for operation, service, or maintenance of the products as specified or as needed, as determined by the manufacturer’s representative.

B. Pack items to protect them during storage. Tag items and containers to clearly identify them.

1.03 CONTRACT SPECIFIC REQUIREMENTS

A. Specific requirements for spare parts for this contract are included in the technical specifications.

PART 2 PRODUCTS

NOT USED

PART 3 EXECUTION

NOT USED

END OF SECTION

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SECTION 01800

MAINTENANCE

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Procedures for maintaining work completed under this Contract.

1.02 MAINTENANCE PERIOD

A. The general maintenance period for all construction or materials under this Contract shall be one (1) year subsequent to the date of the acceptance of the work by the Owner, or as provided by other sections of this Specification.

B. If the Owner puts any structure or equipment to use prior to acceptance of all work under the Contract, the maintenance period for such structures or equipment shall be calculated from the time use begins.

C. Contractor agrees to replace the material which does not conform to the Contract requirements, and to repair any damage of material or work without cost to the Owner, to satisfaction of Engineer, in conformance with Contract Documents provided orders for replacement and/or repairs are received in writing by the Contractor within the one year period.

D. This Section shall in no way limit the duration of the Contractor's responsibility for the correction of any defect due to workmanship or materials provided by the Contractor which are not in compliance with the Contract Documents.

1.03 ABUSE OF WORK

A. Contractor is not obligated to perform work of replacement or repair that he may prove is required because of abuse by parties other than the Contractor, after the date the Owner puts to continuous use the work requiring replacements or repair, or after date the Owner has approved the Certificate of Completion.

1.04 EMERGENCY REPAIRS

A. If the Owner deems necessary, the Owner shall order replacement or repairs be undertaken within 24 hours.

B. If the Contractor delays or fails to make the ordered replacement or repairs within the time specified, the Owner shall have the right to make such replacements or repairs and the expense shall be deducted from moneys due the Contractor, or moneys of the Contractor retained by the Owner.

PART 2 PRODUCTS

NOT USED

PART 3 EXECUTION

NOT USED

END OF SECTION

DIVISION 2

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SECTION 02050

DEMOLITION

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Requirements for demolition of existing site elements and removal of materials for reuse or salvage.

1.02 SUBMITTALS

A. Shop Drawings

1. In accordance with Specification SECTION 01300 1.03 Shop Drawings.
2. Schedule of demolition included in and consistent with requirements of Specification SECTION 01300 1.02 Progress Schedules and SECTION 01310 Construction Progress Schedule.

B. Quality Assurance/Control Submittals

1. Methods of demolition and equipment proposed for use in demolition
2. Copies of Permits required for demolition.

PART 2 PRODUCTS

NOT USED

PART 3 EXECUTION

3.01 PREPARATION

A. Equipment Salvage and Reuse

1. Do not remove equipment or materials without approval of Engineer.
2. Properly store and maintain equipment and materials to be reused in the Work.

3.02 SEQUENCE

A. Sequence for demolition and site preparation shall be coordinated during the Pre-Construction Meeting.

3.03 SAFETY

A. Protect persons and property throughout progress of work.

B. Have acceptable fire extinguishers available at all times where demolition by burning torches is being conducted.

C. Burning of demolition debris not permitted on or near site.

D. Explosives not to be used or brought to site without prior written permission by Engineer.

E. Provide and maintain temporary passageways for safe access within area of demolition operation.

F. Take precautions to minimize spread of dust and flying particles. Keep work area wet down to prevent dust from rising.

G. Provide maximum practical protection from inclement weather to materials, equipment, and personnel in partially dismantled structures.

3.04 DEMOLITION

A. Confine demolition work, new construction and operations to areas that will not interfere with continued use and operation of entire plant.

B. All existing instrumentation not scheduled for demolition or alterations to remain where located and in operation, including instruments which relate to new monitoring or control loops unless otherwise indicated or specified.

C. On exposed surfaces, where there will be in the finish work a joint between old and new concrete, the existing concrete at the face shall be removed to a straight rather than a rough line.

3.05 REPAIR/RESTORATION

A. Repair or remove and replace items not scheduled for demolition damaged by Contractors operations to original condition as directed by Engineer.

B. The Contractor shall exercise extreme caution when removing sections of concrete from slabs or walls that are to be utilized as part of the new construction. Demolition shall be to the exact limits indicated on the Drawings. Over-excavated concrete shall be replaced at the Contractor's expense and to the satisfaction of the Engineer. Any damage to the remaining structure caused by the Contractor's operations shall be satisfactorily repaired at the Contractor's expense.

3.06 DISPOSAL

A. All mechanical equipment, including interior piping, valves and other appurtenances indicated on the drawings or specified and directed by Engineer to be demolished or removed will be removed from the property of the Owner immediately after disassembly and will become the property of the Contractor. The Owner reserves the right to remove any equipment or piping prior to signing of the agreement.

B. Debris from structures, including concrete, masonry, steel or other rubble shall become the property of the Contractor, unless otherwise directed by the Engineer, and shall be promptly removed from site at the Contractor's expense.

3.07 CLEANING

A. Leave affected areas of demolition in a clean, safe and orderly condition, ready to accept new work if proposed.

END OF SECTION

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SECTION 02080

MANAGEMENT OF EXCESS SOIL

PART 1 GENERAL

1.01 SUMMARY

A. Section Includes

1. Requirements for identifying, handling, stockpiling, and disposing of excess soil.

B. Related Sections

1. Section 01025 – Measurement and Payment
2. Section 01069 - Health &Safety Requirements
3. Section 01300 – Submittals
4. Section 02140 – Dewatering

1.02 WORK INCLUDED AND DEFINITIONS

A. In general, Work under this Section shall include all labor, materials, equipment, supervision and supplies necessary for the loading, handling, transportation, and off-site disposal of excess soil.

1. "Contaminated" soil is defined as non-hazardous and further defined as those containing concentrations of contaminants above Rhode Island's Method 1 Residential Direct Exposure Criteria (RDEC) identified in Table 1 of RIDEM's Regulations based on the Engineer's laboratory analytical results.

2. "Excess" soil is defined as the material that will be excavated and will not be reused as backfill.

3. Upon determination that the Excess Soil is characterized as contaminated, the Contractor is responsible for coordinating all off-site disposal of these materials at an appropriately licensed disposal facility. The Contractor is also responsible for the disposal of Excess Soil where contaminants are at concentrations less than Rhode Island's Method 1 Residential Direct Exposure Criteria identified in Table 1 of RIDEM's Regulations at no additional cost to the Owner.

1.03 SAMPLING

A. To determine if excess soil meet the definition of "contaminated", stockpiled material shall be sampled by the Contractor at a minimum frequency of one sample per 500 cubic yards. Samples shall be analyzed for the following parameters by a laboratory certified by the State Rhode Island:

- Volatile Organic Compounds (EPA Method 8260);
- Semi-Volatile Organic Compounds (EPA Method 8270);
- Total Petroleum Hydrocarbons (EPA Method 8100 Modified)
- 13 Priority Pollutant Metals (EPA Method 6010 C-D);

- TCLP for any metal at a concentration greater than 20 times its TCLP threshold;
- Polychlorinated Biphenyls (EPA Method 8082);
- pH;
- Reactivity;
- Flashpoint (EPA Method 1010A); and
- Conductivity (EPA Method SM21-22-2510).

B. The Contractor will be responsible for additional sampling and analyses as may be required by the receiving disposal facility(ies) selected by the Contractor for off-site disposal of Contaminated soil. Contractor shall schedule his/her activities to allow for sampling to be performed, analytical results to be compiled and management decisions to be made. No claim shall be made for reasonable delays associated with such supplemental sampling, analytical services and decision making.

1.04 QUALIFIED ENVIRONMENTAL PROFESSIONAL (QEP) SERVICES

A. All Qualified Environmental Professional (QEP) services for the work shall be provided by the Engineer. The QEP will be responsible for preparing all RIDEM related filings including but not limited to Remedial Action Progress Reports, and a Remedial Action Closure Report.

1.05 APPLICABLE LAWS AND REGULATIONS

A. Work under this Section shall be performed in strict compliance with all applicable Federal, State and local laws, rules, and regulations, including Rhode Island's Remediation Regulations, related to the handling and off-site management of contaminated soil.

B. Pertinent Federal and State Authorities having jurisdiction over this project include:

1. Occupational Safety and Health Administration (OSHA)

2. Rhode Island Department of Environmental Management (RIDEM)

C. The following OSHA regulations will apply:

1. Occupational Safety and Health Standards, Hazardous Waste Operations and Emergency Response - 29 CFR 1910.120.

2. Safety and Health Regulations for Construction - 29 CFR 1926.

1.06 SUBMITTALS

A. Submittals shall be made in compliance with the requirements of Section 01300 except as provided for herein.

B. No Work will be permitted to proceed until the required submittals have been received and approved by the Engineer. In the event the Engineer requests additional information, it shall be the Contractor's responsibility to provide such additional information in a complete and timely manner, so that construction can proceed by the date stipulated in the Notice to Proceed.

C. Prior to the commencement of work, the Contractor shall submit the following to the Engineer for approval:

1. Submittal of all required certifications demonstrating that personnel are properly trained and qualified to perform the Work in accordance with applicable OSHA regulations and all laws governing the Work.

2. Names and qualifications of all proposed subcontractors, if any, identifying the tasks to be performed by each proposed Subcontractor.

3. A Proposed Soil Management Plan, including a description of the proposed equipment and decontamination procedures, identification of any staging areas for the loading of the Contaminated soil, proposed disposal facility(ies), and project schedule.

4. The Contractor's Site-Specific Health & Safety Plan pursuant to OSHA 1910.120 requirements.

D. Approval of submittals by the Engineer shall not impose any liability upon the Engineer, nor shall any such approval relieve the Contractor of his/her responsibilities to meet all of the requirements and comply with all applicable laws, regulations and other applicable requirements under this Contract.

1.07 EXISTING ENVIRONMENTAL CONDITIONS

A. The Contractor shall satisfy himself/herself as to the conditions existing at the Site, the type of equipment required to perform this Work, and the quality and quantity of the materials to be removed.

B. Failure of the Contractor to become fully acquainted with the available information will not relieve him/her of the responsibility to completely and properly perform the work in full compliance with the Contract Documents. The Engineer assumes no responsibility for any conclusion or interpretation made by the Contractor on the basis of information made available by the Owner or Engineer.

PART 2 PRODUCTS [NOT USED]

PART 3 EXECUTION

3.01 GENERAL

A. The Contractor will provide adequate barriers and demarcation of excavations and exclusion zones to warn site visitors and the public of potential hazards.

B. The Contractor will take appropriate means to prevent a release or the spread of contaminated soil as a result of the Contractor's operations.

C. The Contractor will be responsible for collection and analysis of all samples.

3.02 SITE HEALTH & SAFETY

A. The Contractor is solely responsible for controlling Site health and safety, including the provision of a Site Health and Safety Officer. In the performance of its Work, the Contractor shall provide for the safety of all Contractor personnel, other Contractor's personnel, regulatory agency personnel, and the public for the duration of the Contract.

B. The Contractor is solely responsible for his/her construction means and methods.

C. The Engineer will be responsible for the health and safety of its personnel only.

D. The Contractor shall provide a Health and Safety Plan (HASP) which addresses identified contaminants of concern for the Work under this Contract. Such plan shall conform to the requirements of OSHA 1910.120 and all other applicable federal, state, and local laws, regulations, ordinances, and procedures. The HASP shall be developed and implemented by the Contractor's Safety Officer experienced with the health and safety requirements of OSHA 1910.120. The HASP shall be revised, as needed, whenever new information about site hazards is obtained.

E. All personnel performing Work in contaminated areas shall be fully trained in accordance with the OSHA 1910.120 and the HASP and shall be thoroughly briefed on anticipated hazards, safety equipment to be employed, safety practices to be followed, and emergency procedures and communications. The Contractor shall have a medical monitoring surveillance program in place for all personnel in accordance with all applicable laws and regulations.

3.03 MISCELLANEOUS PROVISIONS

A. Contractor must have a valid EPA identification number and any other permits or licenses required by federal, state, and local laws, regulations, ordinances, and procedures for the transportation of hazardous wastes.

B. The Contractor shall be responsible for securing all necessary and applicable permits, certificates, licenses, and approvals required for the performance of this Work and shall be responsible for the payment of all associated fees.

C. The Contractor shall comply with all required reporting and record keeping requirements in accordance with the provisions of this Contract and all applicable federal, state, and local laws, regulations, ordinances, and procedures.

D. The Contractor shall be responsible for all notifications required by federal, state, and local laws, regulations, ordinances, and procedures. All notifications shall be coordinated with the Engineer.

E. The Owner will be responsible for signing all waste manifests and bills of lading. In order for Contractor's operations to proceed without interruption, complete and accurate information shall be provided by the Contractor during the Submittals process. Contractor shall be responsible for preparing applications to disposal facilities.

3.04 DUST MONITORING & CONTROL MEASURES

A. The Contractor is responsible for monitoring the Work for evidence of airborne particulates (dusts) emanating from the Work area. It shall be the Contractor's responsibility to continuously monitor the work area for dust levels.

B. The Contractor shall take appropriate measures to substantially eliminate the generation of dusts within the Work Area, including use of water provided by the Contractor and covering all stockpiled wastes and/or soil, except in the immediate vicinity of the excavation, where water may be required to control dust emissions.

C. The Engineer will also be monitoring the site for elevated levels of dusts. In the event that visible emissions are observed, the Engineer may direct the contractor to take appropriate measures to mitigate the condition. Failure of the Contractor to implement measures that reduce dust levels may be cause for suspension of the Work, until otherwise directed by the Engineer.

3.05 EXCAVATON OF SOIL

A. Excavation activities performed by the Contractor or Subcontractors within the Project Limits shall be performed in a manner which considers the health and safety of all Contractor and Subcontractor personnel, support personnel, the Engineer and his representatives, and the surrounding environment.

B. The Contractor shall minimize the spread and loss of Contaminated Soil during excavation activities.

C. No excavation shall be performed beyond the depth or horizontal extents established by the Contract Drawings without the authorization of the Engineer.

D. In the event that visual or olfactory evidence of soil contamination other than that typically associated with urban fill is encountered, the Contractor shall immediately stop work and notify the Engineer. The Engineer will assess soil conditions and provide direction to the Contractor. If necessary, the Engineer will notify the Rhode Island Department of Environmental Management or other regulatory authorities with jurisdiction over the project.

3.06 TEMPORARY SOIL AND SEDIMENT STOCKPILING

A. Excess soil shall be stockpiled on the project site in a location agreed to by the Contractor and the Engineer. The following provisions shall apply to the stockpiling:

1. As directed by the Engineer, excess soil shall be stockpiled out of the immediate work area in the designated area on 6-mil polyethylene sheeting. All stockpiled excess soil shall be covered with 6-mil polyethylene sheeting at the end of every working day. Sheeting shall be properly secured such that it remains fully intact during inclement weather conditions.

2. No individual stockpile may exceed 500 cubic yards.

3. In no case shall excess soil remain stockpiled for more than 45 days from its excavation.

4. Sampling and characterization of excess soil shall be performed in accordance with the provisions of this specification.

3.07 OFF-SITE DISPOSAL OF EXCESS SOIL

A. Upon determination by the Engineer (based on laboratory sample results) that the excess soil qualifies as Contaminated soil, off-site disposal will meet Section 3.08 of this specification.

B. Upon determination by the Engineer (based on laboratory sample results) that the excess soil in non-jurisdictional with contaminant concentrations less than RIDEM's Residential Direct Exposure Criteria, the soil shall be hauled away and disposed by the Contractor, at his expense, at appropriate locations.

3.08 OFF-SITE MANAGEMENT OF CONTAMINATED SOIL

A. The Contractor shall be responsible for the off-site transportation and disposal of Contaminated Soil at an appropriately licensed disposal facility selected by the contractor.

B. The Contractor will be responsible for additional sampling and analyses as may be required by the receiving disposal facility(ies) for off-site disposal of Contaminated Soil.

C. The Contractor shall contain all Contaminated Soil in DOT-approved containers and/or transport in DOT-approved vehicles. Containers or transport vehicles shall be provided with appropriately sized polyethylene bladder bags and/or polyethylene liners that can be secured by duct tape or other appropriate means, to the satisfaction of the Engineer, prior to leaving the site. In addition, loose soil, dusts and other deleterious materials shall be removed from containers and transport vehicles at the decontamination area, after loading and prior to leaving the site.

D. Vehicles used for transportation of Contaminated Soil shall be properly labeled and placarded, as required for off-site transportation for conformance with federal, state, and local laws, regulations, ordinances, and procedures.

E. The Contractor shall be responsible for coordination of all transporter and receiving facility activities. Transporter vehicles used for the transportation of Contaminated soil shall be covered, substance compatible, licensed, insured, and permitted pursuant to federal, state, and local laws, regulations, ordinances, and procedures.

F. Vehicles departing the site shall be properly logged to show the vehicle identification, driver's name, time of departure, destination, and approximate volume and content of material carried.

G. No Contaminated soil shall leave the site until the designated receiving facility has agreed in writing to accept the type and quantity of waste/soil to be shipped.

H. The Contractor shall complete required facility applications and other pertinent forms for proper transportation and disposal. The Engineer shall review and the Town will sign the applications. Signatures from the receiving location of materials transported off-site are required. The Contractor shall be held accountable for ensuring that requirements of the transporter and receiving disposal facility(ies) and federal, state, and local laws, regulations, ordinances, and procedures are complied with and properly documented.

I. Documentation shall be maintained indicating that applicable laws have been satisfied and that Contaminated soil has been successfully transported and received at the disposal facility(ies).

J. Actual quantities will be measured by the documented scale weights at the disposal facility. The Contractor will not be reimbursed for work performed without the prior approval by the Engineer.

3.09 SITE CLEANUP

A. During the course of the Work, the Contractor shall keep the Site and his operations clean and neat at all times. The Contractor shall dispose of all residue resulting from the site operations; and at the conclusion for the day's Work, he shall remove and haul away surplus materials,

lumber, equipment, temporary structures, and any other refuse remaining from the site operations and shall leave the site in a neat and orderly condition.

3.10 DOCUMENTATION

A. Within 21 days after substantial completion of the Work, the Contractor shall submit to the Engineer one (1) original copy of all manifests, certified weigh slips (tons), bills-of-lading, and records of final waste disposition from the accepting disposal facility(ies), and all other pertinent documentation, including a summary of dates and quantities relating to the off-site management of Contaminated soil.

END OF SECTION

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SECTION 02100

SITE PREPARATION

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Requirements for removal of vegetation and topsoil at the site.

1.02 DEFINITIONS

A. Clearing: Removal of trash, vegetation, or organic matter alive or dead.

B. Grubbing: Removal of vegetation including stumps, buried logs and roots.

C. Scalping: Removal of grass turf to a depth of three (3) inches.

D. Stripping: Removal of topsoil after scalping operation is complete.

1.03 QUALITY ASSURANCE

A. Obtain Engineer's approval of staked work limits prior to starting the clearing, grubbing, and stripping.

1.04 PROJECT/SITE CONDITIONS

A. Environmental Requirements

1. Install erosion and sediment controls prior to starting the Work.

B. Existing Conditions

1. Temporarily remove property improvements, to the minimum extent necessary, to complete the work and restore improvements to condition which existed prior to construction.

PART 2 PRODUCTS

2.01 EXISTING PRODUCTS

A. Chips from cleared trees and brush.

PART 3 EXECUTION

3.01 PROTECTION

A. Do not cut or injure any trees or other vegetation outside the limits of disturbance and/or permanent easement, as indicated on the drawings.

B. Trees, shrubbery, or planting, along the traveled highways or roads, shall not be removed except with the written approval of the Engineer.

C. Preserve certain vegetation such as trees, shrubs, hedges and plants within the construction area, as indicated on the drawings to be protected.

D. Work In Improved Property

1. Protect trees, cultivated hedges, lawns, shrubs, and plants that might be damaged by the Contractor's operations.

2. Temporarily replant and care for trees less than 4 inches in diameter that would be damaged by the construction operation. After the construction operations have been substantially completed, replant in their original positions and care for until growth is reestablished. If trees, cultivated hedges, lawns, shrubs, and plants are injured to such a degree as to affect their growth or diminish their beauty or usefulness, they shall be replaced at the Contractor's expense by items of kind and quality existing at the start of the work.

3. Do such handwork as may be required to prevent damage to buildings and improvements.

4. Protect fences, stairs, curbs, walls, etc. and if needed to be removed to facilitate construction or if damaged, upon completion of the work, properly restore or repair to at least as good condition as existed prior to start of the work.

3.02 CLEARING

A. Cut or remove all trees, saplings, brush, and vines, windfalls, logs, and trees lying on the ground, dead trees and stubs more than 1 foot high above the ground surface.

B. Except where clearing is done by uprooting with machinery or where stumps are left longer to facilitate subsequent grubbing operations, trees, stumps, and the stubs to be cleared shall be cut as close to the ground surface as practicable, but no more than 6-inches above the ground surface in the case of small trees, and 12-inches in the case of larger trees. Saplings, brush, and vines shall be cut off close to the ground.

C. Selective Trimming

1. Cut back limbs and branches of trees to be preserved only to the extent necessary for construction.

2. Trim neatly, and cleanly so that the remaining tree will not be damaged and healing will be facilitated. Where limbs and branches over 1 inch in diameter have been cut, the newly cut area of the tree shall be given a thorough application of approved tree-healing paint.

3.03 GRUBBING

A. Remove completely all stumps.

B. Remove to a depth of 12-inches all roots larger than 3-inches in diameter.

C. Remove to a depth of 6-inches all roots larger than 1/2-inches in diameter.

D. Measure depths from the existing ground surface or the proposed finished grade, whichever is the lower.

3.04 STRIPPING

A. Strip topsoil, loam and unsuitable earth from the ground surface in areas cleared and grubbed.

B. Utilize topsoil and loam, where possible, for finished surfacing.

C. All loam shall remain on site.

D. Dispose of unsuitable materials off site at authorized disposal location.

3.05 DISPOSAL OF CLEARED AND GRUBBED MATERIALS

A. Dispose of cleared and grubbed materials off site at authorized disposal location.

B. Such disposal shall be carried on as promptly as possible after removal of material in the clearing and grubbing operations and shall not be left until the final period of cleaning up.

C. Elm bark whether stripped from the wood or intact with the wood shall be either buried at least 1 ft. below grade in approved dumping areas or burned in a suitable incinerator off-site with satisfactory anti pollution and fire prevention controls to prevent the spread of Dutch Elm Disease.

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SECTION 02115

TREE PROTECTION

PART 1 GENERAL

1.01 SUMMARY

A. Section Includes

1. Requirements for furnishing and placing standardized drip line snow fencing or wooden boards on tree trunks for tree protection, at locations shown as indicated on the Plans or as directed by the Owner or Owner's Representative, all in accordance with these Specifications.

1.02 REFERENCES

A. State of Rhode Island Department of Transportation (RIDOT) Standard Specifications, 2004 Edition with latest addenda.

1.03 SUBMITTALS

A. Shop Drawings

1. Provide Material Specifications and Manufacturer's Data Sheets.

1.04 QUALITY ASSURANCE

A. Field Samples

1. The attention of the Contractor is directed to the fact that all materials furnished by the Contractor to be incorporated into the Work shall be subject to the inspection of the Owner or Owner's Representative. The Owner or Owner's Representative shall be the sole judge as to the acceptability of proposed materials and said judgement shall be final, conclusive, and binding.

PART 2 PRODUCTS

2.01 MATERIALS

A. DRIP-LINE TREE PROTECTION

1. Shall be in accordance with the State of Rhode Island Department of Transportation (RIDOT) Standard Specifications, latest edition.
2. Shall be standardized snow fencing or construction fencing and standard steel posts a minimum of 8 feet in length.
3. Owner's Representative may elect to sample material supplied at the source.

TREE TRUNK PROTECTION

1. Shall be in accordance with the State of Rhode Island Department of Transportation (RIDOT) Standard Specifications, latest edition.

PART 3 EXECUTION

3.01 INSTALLATION

A. Drip-Line Tree Protection

1. The Tree Protection shall be placed around the tree in a circumferential manner as indicated on the Plans. It shall be securely erected and be vertically plumb. The Tree Protection shall not be secured to the tree in any manner. At no time shall restraining lines be secured to the tree or to surrounding vegetative growth. The Tree Protection shall be removed when all mechanical work within the project areas has been completed and approved. Removal of the fence shall be approved by the Owner or Owner's Representative.

B. Tree Trunk Protection

1. The Tree Protection shall be placed around the tree in a circumferential manner as indicated on the Plans or as directed by the Engineer. Do not space wood framing members greater than 4 inches apart. The Tree Protection shall cover the root flare and up to 12' in height, or to the scaffold branches, or as determined for the situation. Do not allow the binding material to contact any portion of the tree. Do not allow nails or any other fasteners to enter the tree. The Tree Protection shall be removed when all mechanical work within the project areas has been completed and approved. Removal of the fence shall be approved by the Owner or Owner's Representative

END OF SECTION

SECTION 02140

DEWATERING

PART 1 GENERAL

1.01 SUMMARY

A. Dewatering specified in this section is applicable to utilities and all other structures.

B. Section Includes

1. Requirements for designing, furnishing, installing, maintaining, operating and removal of temporary dewatering systems required to lower and control water levels and hydrostatic pressures during construction.

2. Requirements for disposing of pumped water.

1.02 DEFINITIONS

A. Dewatering: Lowering the zone of saturation and intercepting groundwater seepage which would otherwise emerge from the slopes or bottom of the excavations. The purposes of dewatering are to increase the stability of excavated slopes; prevent loss of material from beneath the slopes or bottom of the excavation; improve the excavating and hauling characteristics of on site soil; prevent rupture or heaving of the bottom of an excavation; and dispose of pumped water. In addition, dewatering is required to place and compact structural fill.

1.03 DESIGN REQUIREMENTS

A. The Contractor is responsible for the adequacy of the dewatering system.

B. Design dewatering systems to:

1. Effectively reduce the hydrostatic pressure and lower the groundwater levels to a minimum of 2 feet below excavation in soil;

2. Develop a substantially dry and stable subgrade for the protection of subsequent operations;

3. Result in no damage to adjacent buildings, structures, utilities and other work, included in this contract.

4. Depressurize stratified layers of sand that may be confined by silt layers so that a stable excavation bottom is maintained.

C. Methods may include sump pumping, single or multiple stage well point or jet eductor well point systems, deep wells, or combinations thereof.

D. Locate dewatering facilities where they will not interfere with existing utilities, facilities and/or construction work to be done under this Contract.

E. Contractor is responsible to obtain all necessary permits from state and local authorities regarding the operation and discharge of the dewatering system, and to conduct all necessary sampling and testing that may be required by those authorities.

1.04 SUBMITTALS

A. Shop Drawings

1. In accordance with Section 01300 submit the following prior to dewatering system installation:

a. Proposed system components.
b. Operational plan to include locations and depth of components.
c. Method of disposal of pumped water, including method of insuring proper sediment removal should upset in dewatering system occur.

2. Provide test pit data.

a. Depth
b. Soil material encountered
c. Depth to groundwater
d. Depth to sewer

B. Quality Assurance/Control Submittals

1. In accordance with Section 01300 submit the following:

a. Dewatering systems to be designed under the direct supervision of a professional Civil Engineer registered in the state which the work is to be done.
b. Complete Certificate of Design at the end of this section.
c. Provide documentation demonstrating ability and experience of installing contractor for the type of conditions under this contract.
d. Names, addresses and telephone numbers of supervisory personnel actively involved in at least five successful projects requiring dewatering.

1.05 PROJECT/SITE CONDITIONS

A. Environmental Requirements

1. Dispose of all pumped water in accordance with RIDEM requirments.

B. Existing Conditions

1. Groundwater Measurements have been made previously and are noted in the boring logs.

2. Groundwater surface is subject to fluctuations during periods of heavy precipitation.

PART 2 PRODUCTS

NOT USED

PART 3 EXECUTION

3.01 SITE PREPARATION

A. Surface Drainage

1. Construct dikes, ditches, pipe lines, sumps or other means to intercept and divert precipitation and surface water away from excavations.

B. Drainage of Excavated Areas

1. Construct dikes, ditches, pipe lines, sumps or other means to collect surface and seepage water which may enter the excavation.
2. Discharge water through settling basins or method approved by Engineer when water is to be deposited into an existing watercourse.

3.02 INSTALLATION

A. Advise Engineer of changes made to Operation Plan as submitted under article 1.05 of this section, made to accommodate field conditions.

3.03 MONITORING

A. Observe and record daily the elevation of the groundwater during the length of the dewatering operation and provide data to Engineer on daily basis.

3.04 OPERATION

A. Operate dewatering systems to lower the groundwater level in excavations allowing all subsequent work to be done on a stable dry subgrade.

B. Modify dewatering procedures which cause, or threaten to cause, damage to new or existing facilities, to prevent further damage. Modifications made at no additional expense to the Owner.

C. Maintain the water level a minimum of two (2) feet below subgrade or at lower elevation to eliminate hydrostatic pressure on structures.

D. Prevent disturbance of foundation soils and loss of ground as water is removed.

E. Notify the Engineer of disturbance to the foundation soils caused by an interruption or inadequacy of the dewatering system.

F. Maintain on site, auxiliary equipment to operate the dewatering system continuously while excavations are opened below elevation of final grade.

3.05 DISPOSAL OF WATER

A. Discharge water in a manner that will not cause erosion, flooding, damage to existing facilities, completed Work or adjacent property, improved or otherwise.

3.06 REMOVAL

A. Remove all material and equipment from the site upon completion of dewatering operations.

B. Seal all dewatering wells upon completion of the dewatering by pressure injecting a grout capable of sealing the wells and preventing leakage.

END OF SECTION

CERTIFICATE OF DESIGN

Re: Contract Between

OWNER: _____
(Name)
and
CONTRACTOR: _____
(Name)
on
CONTRACT: _____
(Title)

_____ Dated:_____
(Number)

Contractor hereby certifies that_____
(Designer)

1. Is licensed or registered to perform professional engineering work in the state of

_____
(Location of Project)

2. Is qualified to design the_____
(Item)
specified in Section_____ of the subject contract;

3. Has designed_____before;

4. Has prepared the design in full compliance with the applications and requirements of Section_____ of subject contract including all applicable laws, regulations, rules and codes; and

5. The work has been signed and sealed pursuant to the applicable state law.

FOR: _____
(Contractor)

BY: _____
(Signature)

_____ Dated:_____
(Name and Title)

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SECTION 02149

MAINTAINING EXISTING FLOW

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Requirements to maintain existing flow and implement and complete all flow diversions and/or bypass pumping required to complete the Work indicated on the Drawings.

1.02 PERFORMANCE REQUIREMENTS

A. It is essential to the operation of the existing sewerage system that there be no interruption of the wastewater flow throughout the duration of this project. An interruption shall be considered, but may not be limited to, any condition that in the sole opinion of the Engineer adversely affects or alters operation of the existing sewage system and/or any other portion or component of the existing sewage treatment and collection system including the associated flows; allows the level of sewage flow to increase, rise, collect, surcharge and/or overflow existing facilities in any manner; or results in any operational or permit violations being issued to the Owner.

B. The Contractor shall provide, maintain, and operate temporary facilities such as dams, bulkheads, pumping equipment (both primary and backup units as required) conduits, electrical power, and all other labor and equipment to intercept and maintain the existing sewage flow before it reaches the point where it would interfere with his work, carry it past his work, and return it to the existing facilities beyond his work.

C. The Contractor is responsible for measuring flows prior to beginning work in the area and sizing bypass equipment accordingly. The Contractor's attention is directed to the fact that the existing wastewater flow may be affected by high groundwater and rainfall. Increases in normal flow should be expected during periods of wet weather. The Contractor shall therefore take all precautions necessary including monitoring weather forecasts to fully accommodate, control and sufficiently handle the increases in flow during periods of wet weather and/or storms as well as periods of normal flow.

D. The Engineer may prohibit the carrying out of any work at any time when in his sole judgment, increased flow conditions are unfavorable or not suitable, or at any time, regardless of the existing flows, when proper precautions are not being taken to safeguard the existing sewerage system, previously constructed work, work in progress and/or the general public.

E. In case of damage caused by the failure of the Contractor to take adequate precautions, the Contractor shall repair or replace equipment damaged and shall make such repairs or rebuild such parts of the damaged work, as the Owner may require, at no additional expense to the Owner.

1.03 SUBMITTALS

A. In accordance with SECTION 01300 submit the following:

1. Detailed plans and descriptions outlining all provisions and precautions to be taken regarding the control and handling of existing sewage flows.
2. Include such items as schedules, locations, elevations, capacities of equipment, materials, traffic maintenance plans, and all other incidental items necessary and/or required by the Owner to ensure proper protection of the facilities and compliance with the requirements herein specified.
3. Qualifications as described herein.
4. Detailed proposal for noise prevention measures for review.
5. Shop drawings for all pumping, piping, and appurtenances for type and size of equipment required to perform the flow diversion and/or bypass pumping work as required herein.

B. The Engineer reserves the right to limit and/or otherwise restrict the Contractor's overall proposal and/or operations without claim from the Contractor should the Engineer deem it to be in the Owner's or publics best interest to do so.

1.04 QUALITY ASSURANCE

A. Qualifications

1. The design, installation and operation of the temporary pumping system shall be the Contractor's responsibility. The Contractor shall employ the services of a vendor who can demonstrate to the Engineer that he specializes in the design and operation of temporary bypass pumping systems. The vendor shall provide at least five (5) references of projects of similar size and complexity in wastewater applications performed by his firm within the past three years within New England. The bypass system shall meet the requirements of codes and regulatory agencies having jurisdiction.
2. The vendor shall demonstrate the bypass pumping equipment is automated and is capable of functioning without the assistance of an operator.
3. The vendor shall demonstrate the pumping equipment can operate for an extended period of time running dry. After this period of time, the pump shall have the capability of pulling a 25" Hg vacuum without adjustment or repair.
4. The vendor shall demonstrate sufficient service resources and repair parts in stock to fulfill service or repair of rental equipment within one hour of a service call, twenty-four hours per day, seven days per week.
5. Temporary components of the bypass system including pumps, pipe, hose, valves, and fittings shall be provided by one bypass vendor. Hydraulic calculations and drawings required by the submittals shall be provided by the bypass vendor and stamped and certified by a Professional Engineer licensed in the State of the installation.

B. Pre-Installation Meeting

1. Contractor to schedule and attend a pre-installation meeting with the vendor, Owner and Engineer prior to installation of by-pass system.

PART 2 PRODUCTS

2.01 EQUIPMENT

A. At a minimum, all equipment shall be supplied in duplicate for emergency situations. Provide adequate on-line backup facilities so that no interruption in service is encountered. Equipment and installation are subject to the approval of the Owner and the Engineer.

B. Pumping System(s)

1. All pumping units (primary and secondary) and appurtenances shall be sized properly to handle the flows encountered including increased flows due to wet weather.
2. Pumps shall be centrifugal, end suction, fully automatic self-priming pumps that do not require the use of foot-valves, vacuum pumps, diaphragm pumps, or isolation valves in the priming system. The pumps may be electric or diesel powered. Pumps must be constructed to allow dry running for long periods of time to accommodate the cyclical nature of effluent flows and shall immediately develop 25" Hg vacuum without adjustment or repair or employ level control devices to regulate on/off or variable speed of the pump. Pumps shall be CD low noise units as manufactured by Godwin Pump of America, Inc, or approved equal. All pumping units and appurtenances shall be sized in accordance with the design parameters provided. Pumps shall not be connected by a common suction manifold.
3. Seals shall be high pressure, mechanical self-adjusting type with silicon carbide faces capable of withstanding suction pressures to 100 psi running. The mechanical seal shall be cooled and lubricated in an oil bath reservoir, requiring no maintenance or adjustment. Pump shall be capable of running dry, with no damage, for extended periods of time. All metal parts shall be of stainless steel. Elastomers shall be Viton.
4. The Contractor shall provide the necessary start/stop controls for each pump.
5. The Contractor shall be responsible to meet noise requirements in specified elsewhere in this section. All diesel driven primary and standby pumps shall be sound attenuated. The use of Critical Silenced Canopy pumps or acoustical Whisper Pac enclosures for sound attenuation are required.

C. Piping System(s)

1. All piping systems (primary and secondary) and appurtenance shall be sized properly to handle the flows encountered including increased flows due to wet weather.

D. Power Generating Facilities

1. Include power generating facilities capable of providing all power necessary to operate any primary and secondary pumping systems.
2. Maintain facility to be ready for use if required.

E. Noise Prevention

1. Noise prevention measures for all equipment shall be used to insure minimum noise impact on surrounding areas.
2. Measures may include but shall not be limited to enclosures, insulation, electric pumping units, and hospital grade silencers or mufflers.
3. Noise levels shall be maintained such that increase shall not exceed 10 dBA over background at the nearest property line.
4. Should at any time prior to or during the performance of above mentioned work, the Engineer determines the noise prevention measures being used are not adequate, the

Contractor shall at no additional cost to the Owner suspend all work until acceptable measures are incorporated.

PART 3 EXECUTION

3.01 ADVANCE NOTICE

A. Contractor shall provide Town sufficient information to provide press releases. Information shall include schedule for various areas and outline of the program, with specific attention to what can be expected to take place.

B. Contractor shall provide door to door notification within 24 hours before work begins. Notification shall include time and duration of service interruption, if any.

3.02 PUBLIC SAFETY AND CONVENIENCE

A. General

1. The Contractor shall at all times keep the streets, highways, roads, driveways, parking lots, private walks, and public sidewalks open for pedestrian and vehicular traffic unless otherwise authorized by the Owner/Engineer.

B. Public Travel Ways

1. Any authorized temporary closure of any streets, highways or roads shall be coordinated with the local Fire, Police and/or Department of Public Works as required by the municipality.

C. Municipal, Commercial and Private Property

1. Any authorized, temporary closure of any municipal, commercial or private driveway or access route will require the Contractor provide 48 hour notice to abutters of the temporary restriction of access to their property. The Contractor will make every attempt to schedule his work with as little inconvenience to the property owner as possible

3.03 INSTALLATION

A. Keep the Engineer advised at all times of any changes made to the overall operation(s) to accommodate field conditions.

B. Flow diversions and/or bypass pumping shall be maintained at all times as long as it is necessary to maintain the flow through the limits of the project during construction.

C. Maintain auxiliary and/or emergency equipment at the site to continue flow division and/or by-pass pumping operations in the event of a breakdown and/or loss of normal power.

D. The Contractor shall be responsible for the proper functioning and operation of the backup pumping units. Back-up pump(s) shall be on-line, isolated from the primary system by a valve.

E. No work shall begin until all provisions and requirements of this Section have been reviewed and approved by the Engineer.

F. The Engineer reserves the right to limit and/or otherwise restrict the Contractor's overall activities and/or operations at any time without claim should the Engineer deem it to be in the Owner's or public's best interest to do so.

END OF SECTION

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SECTION 02160

EXCAVATION SUPPORT

PART 1 GENERAL

1.01 DESCRIPTION

A. The Contractor shall properly design and furnish all labor and materials necessary and shall construct complete, all sheeting, bracing supports, and appurtenances required to perform the Work including sheet piling for construction of structures and buildings, trench support and cofferdams, permanent and temporary alike, as indicated on the Drawings and specified or as otherwise directed by the Engineer or required by agencies having jurisdiction over the Work.

B. Wood timber or steel sheeting shall be used except where otherwise indicated, specified or directed by the Engineer and agencies having jurisdiction over the work.

1.02 DESIGN RESPONSIBILITY

A. The Contractor shall be fully responsible for providing complete and adequately designed sheeting as required and/or directed by the Engineer in accordance with the provisions set forth herein. The sheeting shall be designed to resist hydrostatic pressures in accordance with the Contractor’s dewatering design.

B. The Contractor shall engage, at his own expense, the services of a fully competent and qualified Professional Engineer, hereinafter referred to as the "Contractor's Engineer", registered in the State in which the Work is being constructed, for the design of all sheeting requirements to accomplish the Work specified, and for supervising the proper on-site installation associated therewith. The Contractor's Engineer shall be acceptable to the Engineer and demonstrate a minimum of ten (10) years documented experience in the field of sheeting design and implementation. Prior to the actual employment of the Contractor's Engineer, the Contractor shall submit to the Engineer, to the full extent deemed necessary, a detailed resume stating the Contractor's Engineer's professional qualifications, related experience and references, and if requested, examples of work similar to that required for the Work specified, for a general review by the Engineer and a means of documenting the requisite experience hereinbefore specified. Only after a satisfactory review of the Contractor's Engineer's overall qualifications by the Engineer in fulfillment of the requisite experience hereinbefore specified shall the Contractor finalize such employment and begin the design aspects of the Work.

C. The Contractor's attention is directed to the fact the acceptance of the Contractor's Engineer and/or his/her qualifications by the Owner and/or Engineer shall not be an overall approval of the Contractor's Engineer nor the sheeting designs and methods of installation employed during the Work. It being understood that all sheeting requirements necessary to accomplish the Work specified and/or indicated on the Drawings shall be designed by and installed under the direct supervision of the Contractor's Engineer who shall ultimately and fully bear the responsibility for that Work.

1.03 QUALITY ASSURANCE

A. The Contractor's Engineer shall provide and maintain throughout the sheeting installation and/or Work sufficient supervision and technical guidance to the Contractor for proper sheeting materials, equipment, operations and methods to the extent necessary to assure strict compliance with the Contractor's Engineer's design, all safety procedures and standard requirements for such Work, and the successful completion of the Work. Failure to provide and/or maintain such supervision and/or technical guidance during the Work shall in no way relieve the Contractor's Engineer and/or the Contractor from their overall responsibilities and obligations under the Contract, nor shall it be a basis for any claim by either against the Owner and/or Engineer.

B. The Contractor and Contractor's Engineer shall fully indemnify and save harmless the Owner and Engineer and their agents, employees and representatives, from and against any and all claims as stipulated under the Agreement, whether directly or indirectly arising out of, relating to or in connection with the Work.

C. Quality assurances and proper safety procedures must be maintained at all times and be in strict accordance with the Contractor's Engineer's requirements and consistent with all federal, state and local regulatory agencies having jurisdiction over the Work. Should any conflict in requirements, regulations, restrictions or codes exist between that which is specified by the Contractor's Engineer and any federal, state or local agency, the more stringent application shall prevail.

1.04 PRODUCTS AND DESIGN CRITERIA

A. The overall sheeting design, quality of materials and methods of installation for all sheeting applications necessary to accomplish the Work specified shall be consistent with the established standards of the construction industry and must, as a minimum, comply with the requirements for earth support systems for excavations as defined by current US Department of Labor, Occupational Safety and Health Act (OSHA) regulation applicable thereto, and any other federal, state and local agencies having jurisdiction and/or requirements pertaining thereto including Building Code requirements for the State in which the work is being performed. The design and implementation thereof shall be in accordance with sound engineering practice and modern accepted principles of soil mechanics, and shall include the effects of hydrostatic forces and all surcharge loads which may be reasonable anticipated. The methods employed shall be to the extent necessary to permit the proper and satisfactory installation and construction of the Work specified; to withstand all loads and forces encountered; to provide soil restraint and control of water as required; to insure the safety of the workers and all other personnel on or near the site; to prevent injurious caving or erosion, or loss of ground; to maintain at all times proper and safe pedestrian, vehicular traffic on public and private streets, property and rights-of-way; and to stabilize unforeseen areas of work encountered during the execution of the Work as deemed necessary by the Owner and/or Engineer.

B. The Contractor and Contractor's Engineer's attention is directed to the fact that should any additional investigations, subsurface explorations and/or other appurtenant information be required to fulfill the needs of this design, as determined by the Contractor's Engineer above and beyond that which is already provided under these Contract Documents, the Contractor shall obtain all such information and data required at his own expense.

1.05 SHOP DRAWINGS AND/OR DESCRIPTIVE LITERATURE

A. Prior to the installation of any sheeting, the Contractor shall submit to the Engineer for documentation ONLY, complete sheeting layout and detail drawings and sheeting descriptions bearing the Contractor's Engineer's State of Rhode Island Professional Seal and signature. Said submission shall be for informational purposes only as a means of documenting the work to be performed and will not be considered an approval or disapproval of the design and/or the implementation thereof. This submission will not relieve the Contractor of the sole responsibility for the adequacy of the system nor shall it be construed as an approval or guarantee that the Contractor's proposed equipment, materials and methods for the sheeting, bracing or appurtenances will be adequate for the work required at the locations of and for the Work required by this Contract.

B. Included as part of this submission, the Contractor's Engineer must provide a complete listing of all references, codes and specifications used by the Contractor's Engineer and required by any federal, state or local agency having jurisdiction, and to which the sheeting design conforms.

C. Specific design calculations are not to be submitted to the Engineer. In the event design calculations are submitted to the Engineer, they shall be returned to the Contractor without review nor checking by the Engineer.

1.06 CERTIFICATE OF DESIGN

A. The Contractor's special attention is directed to the required "Certificate of Design", the form of which is provided at the end of this Section. The Contractor and Contractor's Engineer shall complete this "Certificate" in its entirety for each location of work to be done, and any revisions associated there with, and submit it simultaneously with, as an integral part thereof, the sheeting submission. Any submission made without the completed "Certificate", appropriately signed and sealed, shall be returned to the Contractor. The Owner and/or Engineer hereby reserves the right to delay sheeting work and/or any work associated with, or dependent upon, the proper implementation of sheeting, without cause for claim against the Owner or Engineer, until a complete and appropriate submission is rendered. This Certification shall indicate that the sheeting, bracing and all appurtenances related thereto are designed to withstand the required loads, forces to be encountered, and to provide soil and water control, and are in compliance with these specifications and all federal, state or local agencies having jurisdiction over the Work to be performed.

PART 2 PRODUCTS

2.01 MATERIALS

A. Timber sheeting and bracing:

1. Timber sheeting and bracing may be of any species of wood which will satisfactorily withstand all driving and construction stresses and the loads to which the members will be subjected. Sheeting shall not be less than 3 inches nominal thickness and shall be provided with continuous interlocks. All timber sheeting and bracing shall be free from worm-holes, windshakes, loose knots, decayed or unsound portions or other defects which might impair its strength or tightness.

B. Steel sheeting:

1. The shapes, sizes, and lengths of steel sheeting to be utilized are optional with the Contractor, providing they are satisfactory to withstand all driving and construction stresses and provided with continuous interlocks.

C. Bracing, Hardware and Fastenings:

1. Bracing and other supports whether of steel or of timber, shall be of the strength and dimensions necessary to satisfactorily withstand the loads to which they will be subjected. All bracing and other supports shall be free from any defects which might impair this strength. The Contractor shall provide all necessary hardware and fastenings necessary in connections with satisfactory installation of all sheeting and bracing.

PART 3 EXECUTION

3.01 INSTALLATION

A. The Contractor shall be fully responsible for ensuring adequate safety measures are provided at all times and shall comply with all safety requirements of federal, state and local agencies having jurisdiction over the Work. Installation of the sheeting including all bracing, supports and appurtenances, shall be adequate to permit the performance of the Work and be in accordance with the requirements of the Contractor's Engineer and the sheeting design associated therewith.

B. Any movements of sheeting and/or appurtenances which prevent the proper completion of the work shall be corrected at the expense of the Contractor.

C. Sheeting shall be installed in a manner which will prevent the disturbance of the surrounding surface, subsurface conditions and/or structures. Any such disturbances shall be corrected at the Contractor's expense and to the satisfaction of the Engineer.

3.02 REMOVAL

A. All sheeting shall be removed except as shown on the Contract Drawings or directed by the Engineer.

B. All sheeting approved for removal by the Engineer shall become the property of the Contractor.

C. All restoration and clean up shall be as indicated and as specified.

CERTIFICATE OF DESIGN

_____(Owner)

Contract Reference: _____

_____, dated _____.

In accordance with the provisions of the above referenced Contract, as the designated Contractor,

_____

_____
(Contractor's Name and Address)

hereby certifies that _____

_____
(Contractor's Engineer's Name and Address)

(1) Is properly licensed and currently registered as a Professional Engineer in the State (or Commonwealth) of _____;

(2) Is fully qualified to design and supervise the _____

_____
(Item of work and location)

In accordance with the provision specified under the appropriate Section and/or Subsections of the Contract Documents:

(3) Has successfully designed and supervised _____

_____
(Item of work)

before and demonstrates a minimum of ten (10) documented years of proven experience in such field;

(4) Has personally examined the type(s) and locations(s) of the Work required under this Contract, and the overall conditions associated therewith, to the extent necessary to fully satisfy his or her professional responsibilities for designing and supervising the above referenced work;

(5) Has prepared the attached design in full compliance with the applications and requirements of the Contract Documents, sound engineering practice, modern accepted principles of construction, and all applicable federal, state and local laws, regulations, rules and codes having jurisdiction over the Work;

(6) Will provide sufficient supervision and technical guidance to the Contractor throughout the Work to ensure compliance with the design and all quality assurances necessary to successfully complete the Work;

(7) Hereby indemnifies and holds harmless the_____

_____and BETA Group, Inc.,
(name of owner)

and their agents, employees and representatives, from and against any and all claims, whether directly or indirectly, arising out of, relating to or in connection with the Work; and

(8) This "Certificate of Design" together with all applicable designs, drawings, details, specifications on other related documents necessary to complete the Work as specified, have been signed and sealed pursuant to applicable state law.

In recognition and observance of the above referenced statements, the undersigned parties hereby acknowledge and accept the responsibilities and obligations associated therewith.

CONTRACTOR:	CONTRACTOR'S ENGINEER:
_____	_____
(Contractor's Name)	(Engineer's Name)
_____	_____
By: _____	By: _____
_____	_____
(Name and Title)	(Name and Title)
Date: _____	Date: _____
(SEAL)	(P.E. STAMP)

(Note: Contractor to fully reference all attachments below)

_____

_____

_____

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SECTION 02200

EARTH EXCAVATION, BACKFILL, FILL AND GRADING

PART 1 GENERAL

1.01 SUMMARY

A. Section Includes

1. Requirements for; excavating in earth for trenches and structures; backfilling excavations; furnishing necessary material; compaction; constructing embankments and fills; miscellaneous earth excavations and miscellaneous grading.

B. Related Sections

1. Section 01025 - Measurement and Payment
2. Section 01410 - Testing Laboratory Services
3. Section 02140 – Dewatering
4. Section 02149 – Maintaining Existing Flow
5. Section 02160 – Excavation Support
6. Section 02215 - Aggregate Materials
7. Section 03300 - Cast-In-Place Concrete

1.02 REFERENCES

A. American Society for Testing and Materials (ASTM).

1. D1557, Standard Test Methods for Laboratory Compaction Characteristics of Soil Using Modified Effort (56,000 ft-lbf/ft^3 (2,700 kN-m/m^3)).

1.03 MEASUREMENT AND PAYMENT PROCEDURES

A. Sheeting

1. As specified in SECTION 01025, Contractor paid only for certain sheeting left in place.

B. Test Pits

1. Where determination of the exact location of pipe or other underground structure is necessary for doing the work properly, the Contractor may be required to excavate test pits to determine such locations. When such test pits may be properly considered as incidental to other excavation, the Contractor shall receive no additional compensation, the work being understood to be included as part of the excavation. When the Engineer orders test pits beyond the limits of excavation he considers a part of the work, such test pits shall be paid for as specified in SECTION 01025.

1.04 QUALITY ASSURANCE

A. Field Samples

1. Provide samples of materials as requested by the Engineer, to the Quality Control Engineer hired by the Owner, prior to delivery of materials on site, in order to facilitate field testing of compaction operations and material properties.

1.05 PROJECT/SITE CONDITIONS

A. Existing Conditions

1. There are pipes, drains, and other utilities in locations not indicated on drawings, no attempt has been made to show all services, and completeness or accuracy of information given is not guaranteed.

1.06 MAINTENANCE

A. Maintain all work in accordance with SECTION 01800.

PART 2 PRODUCTS

2.01 MATERIALS

A. Suitable Aggregate

1. The nature of materials will govern both acceptability for backfill and methods best suited for placement and compaction.
2. All material whether from excavations or from borrow pits, after being placed and properly compact, will make a dense stable fill and containing no vegetation, masses of roots, individual roots more than 18 inches long, or more than 1/2 inch in diameter, stones over 6 inches in diameter, or porous matter.
3. Organic matter to be well distributed and not to exceed minor quantities.

B. Trench and Excavation Backfill

1. In general, and unless other material is indicated on drawings or specified, material used for backfilling trenches and excavations shall be suitable material which was removed in the course of making the construction excavations. If sufficient suitable material is not available from the excavations, the backfill material shall be crushed stone, gravel borrow or select borrow as directed by the Engineer, in according to respective Specification Sections.

C. Structure Backfill

1. Unless otherwise indicated or specified, all fill and backfill under structures and pavement adjacent to structures shall be compacted gravel borrow containing not more than 10 percent material passing a 200 sieve. When coarse aggregate and fine aggregate are indicated or specified for use under structures, they shall conform to the requirements for coarse and fine aggregate specified in SECTION 03300.

D. Filling and Embankment Backfill

1. Suitable selected materials available from the excavations and not required for backfill around pipes or against structures may be used for filling and building embankments, except as otherwise specified. Material needed in addition to that available from construction operations shall be obtained from suitable gravel banks or other suitable deposits. The Contractor shall furnish, at his own expense, all borrow material needed on the work.

E. Additional materials

1. Concrete: In accordance with SECTION 03300.
2. Crushed stone: In accordance with SECTION 02215.
3. Gravel borrow: In accordance with SECTION 02215.
4. Select borrow: In accordance with SECTION 02215.

2.02 EQUIPMENT

A. Well Points

1. Designed to drain soil and prevent saturated soil from flowing into excavation.

B. Pumping Units

1. Designed for use with the wellpoints, capable of maintaining a high vacuum and, handling large volumes of air and water at the same time.

C. Underdrain Pipe

1. HDPE pipe enclosed in crushed stone encased in filter fabric.
2. Sewer pipe of quality known as "seconds".

2.03 SOURCE QUALITY CONTROL

A. Provide Engineer with access to location of off site sources of materials.

A. All imported material to be used as backfill and loam on the project shall be tested by Contractor to demonstrate compliance with RIDEM's Residential Direct Exposure Criteria and GB Leachability Criteria prior to the material being imported for use. No soil shall be brought on-site without the Town's Environmental Professional's approval. A minimum frequency of one (1) sample per every one thousand (1,000) cubic yards of each type of required clean soil shall be collected by the Contractor's Environmental Professional and analyzed for the following:

- TPH via EPA Method 8100;
- VOCs via EPA Method 8260;
- PAHs via EPA Method 8270: and
- RCRA 8 Metals via EPA Method 6010/7471.

All original laboratory analytical data and/or a certification from the facility that provides the clean fill and/or loam attesting to the materials origin and suitability shall be provided to the Town prior to bringing the material on-site.

PART 3 EXECUTION

3.01 EXAMINATION

A. Verify all existing utilities and facilities prior to excavation.

3.02 PROTECTION

A. Utilities

1. Support and protect from damage existing pipes, poles, wires, fences, curbing, property line markers, and other structures, which the Engineer decides must be preserved in place without being temporarily or permanently relocated.
2. Restore items damaged during construction without compensation, to a condition at least equal prior to construction.

B. Trees

1. Enclose the trunks of trees adjacent to work with substantial wooden boxes of height necessary to protect trees from injury from piled material, equipment, operations or otherwise.
2. Employ excavating machinery and cranes of suitable type and size and operate with care to prevent injury to trees not to be cut and particularly to overhanging branches and limbs.
3. When trimming is required, make all cuts smooth and neat without splitting or crushing.
4. Cover cut areas with an application of grafting wax or tree healing paint.
5. Branches, limbs, and roots shall not be cut except by permission of the Engineer.

C. Plantings

1. Protect by suitable means or temporarily replant and maintain cultivated hedges, shrubs, and plants which may be injured by the Contractor's operations
2. Replant in their original positions and care for until growth is re-established, once the construction operations have been substantially completed.
3. If cultivated hedges, shrubs, and plants are injured to such a degree as to affect their growth or diminish their beauty or usefulness, they shall be replaced by items of kind and quality at least equal to which existed prior to the start of the Work.

D. Paved surfaces

1. Do not use or operate tractors, bulldozers, or other power-operated equipment with treads or wheels shaped as to cut or injure paved surfaces.
2. All surfaces which have been injured by the Contractor's operations shall be restored to a condition at least equal to which existed prior to start of the Work.
3. Suitable materials and methods shall be used for such restoration.

3.03 PREPARATION

A. Pavement Removal

1. Remove only existing pavement as necessary for the prosecution of the work.
2. Engineer may require that pavement be cut with pneumatic tools or saws without extra compensation to Contractor, where in the opinion of the Engineer it is necessary to prevent damage to the remaining road surface.
3. Dispose large of pieces of broken pavement before proceeding with excavation.

B. Top Soil Removal

1. From areas which excavations are to be made, loam and topsoil shall be carefully removed and separately stored to be used again as directed; or, if the Contractor prefers not to separate surface materials, he shall furnish, as directed, loam and topsoil at least equal in quantity and quality to that excavated.

C. Subgrade

1. Remove loam and topsoil, loose vegetable matter, stumps, large roots, etc., from areas where embankments will be built or material will be placed for grading.

2. Shape as indicated on the drawings and prepare by forking, furrowing, or plowing to bond first layer of the new material placed.

3.04 RELOCATION AND REPLACEMENT OF EXISTING STRUCTURES

A. The structures to which the provisions of this article apply include pipes, wires, and other structures which meet all of the following:

1. Are not indicated on the drawings or otherwise provided for.
2. Encroach upon or are encountered near and substantially parallel to the edge of the excavation.
3. In the opinion of the Engineer will impede progress to such an extent that satisfactory construction cannot proceed until they have been changed in location, removed (to be later restored), or replaced.

B. In removing existing pipes or other structures, the Contractor should use care to avoid damage to materials, and the Engineer shall include for payment only those new materials which, in his judgment, are necessary to replace those unavoidably damaged.

C. Whenever the Contractor encounters certain existing structures as described above and is so ordered in writing, he shall do the whole or such portions of the work as he may be directed to change the location of, remove and later restore, or replace such structures, or to assist the Owner thereof in so doing. For all such work, the Contractor shall be paid under such items of work as may be applicable, otherwise as Extra Work.

D. When fences interfere with the Contractor's operations, he shall remove and (unless otherwise specified) later restore them to a condition which existed prior to the start of the Work, all without additional compensation. The restoration of fences shall be done as promptly as possible and not left until the end of the construction period.

3.05 SHEETING AND BRACING

A. Provide in accordance with specification Section 02160.

3.06 DEWATERING

A. Provide in accordance with specification Section 02140.

3.07 EXCAVATION

A. Execute operation of dewatering, sheeting and bracing without undermining or disturbing foundations of existing structures or of work previously completed under this contract.

B. Excavate to widths that provide suitable room for:

1. Building structures or laying and jointing piping.
2. Placing all sheeting, bracing, and supports.
3. Cofferdamming, pumping and draining.

C. Render bottom of excavations firm, dry and acceptable in all respects.

D. Do not plow, scrap or dig by machinery, earth at finished subgrade which results in disturbance of material below subgrade, unless indicated or specified, and remove with pick and shovel, last of material to be excavated, just before placing pipe, masonry or other structure.

E. Make all excavations in open, except as otherwise specified or permitted.

F. Excavation Near Existing Facilities

1. As the excavation approaches pipes, conduits, or other underground structures, digging by machinery shall be discontinued and the excavation shall be done by means of hand tools. Such manual excavation when incidental to normal excavation shall be included in the work to be done under items involving normal excavation.

G. Unauthorized Excavation

1. If the bottom of any excavation is taken out beyond the limits indicated or prescribed, the resulting void shall be backfilled at the Contractor's expense with thoroughly compacted gravel borrow, if the excavation was for a pipeline, or with Class B concrete, if the excavation was for a masonry structure.

H. Unsuitable Material

1. If material unsuitable for foundation (in the opinion of the Engineer) is found at or below the grade to which excavation would normally be carried in accordance with the Drawings and/or Specifications, the Contractor shall remove such material to the required width and depth and replace it with thoroughly compacted, crushed stone, gravel borrow, fine aggregate or concrete as directed.

3.08 TRENCHING

A. Trench Excavation

1. Where pipe is to be laid in specified bedding material or concrete cradle, the trench may be excavated by machinery to, or to just below, the designated subgrade, provided that the material remaining at the bottom of the trench is no more than slightly disturbed.
2. Where pipe is to be laid directly on the trench bottom, the lower part of trenches in earth shall not be excavated to subgrade by machinery, but, just before the pipe is to be placed, the last of the material to be excavated shall be removed by means of hand tools to form a flat or shaped bottom, true to grade, so that the pipe will have a uniform and continuous bearing and support on firm and undisturbed material between joints except for limited areas where the use of pipe slings may have disturbed the bottom.

B. Depth of Trench

1. Excavate trench to depths permitting the pipe to be laid at the elevations, slopes, or depths of cover indicated on the drawings, and at uniform slopes between indicated elevations.

C. Width of Trench

1. Excavate trench as narrow as practicable and do not widen by scraping or loosening materials from the sides. Every effort shall be made to keep the sides of the trenches firm and undisturbed until backfilling has been completed and consolidated.
2. Excavate trenches with approximately vertical sides between the elevation of the center of the pipe and an elevation 1 ft. above the top of the pipe.

D. Trench Excavation in Fill

1. If pipe is to be laid in embankments or other recently filled material, the material shall first be placed to the top of the fill or to a height of at least 1 ft. above the top of the pipe, whichever is the lesser. Particular care shall be taken to ensure maximum consolidation of material under the pipe location. The pipe trench shall then be excavated as though in undisturbed material.
2. Length of trench open at any one time will be controlled by conditions, subject to any limits that may be prescribed by the Engineer.

3.09 BACKFILLING

A. General

1. Frozen material shall not be placed in the backfill nor shall backfill be placed upon frozen material. Previously frozen material shall be removed or shall be otherwise treated as required, before new backfill is placed.

B. Fill and Backfill Under Structures

1. The fill and backfill materials shall be placed in layers not exceeding 6 inches in thickness. Unless otherwise indicated or specified, each layer shall be compacted to 95 percent in accordance with ASTM D1557.

C. Backfilling Around Structures

1. Do not place backfill against or on structures until they have attained sufficient strength to support the loads (including construction loads) to which they will be subjected, without distortion, cracking, or other damage. As soon as practicable after the structures are structurally adequate and other necessary work has been done, special leakage tests, if required, shall be made. Promptly after the completion of such tests, the backfilling shall be started and then shall proceed until its completion. The best of the excavated materials shall be used in backfilling within 2 ft. of the structure. Unequal soil pressures shall be avoided by depositing the material evenly around the structure.
2. The material shall be placed and compacted to 90 percent in accordance with ASTM D1557 unless otherwise indicated or specified.

D. Backfilling Pipe Trenches

1. As soon as practicable after the pipes have been laid and the joints have acquired a suitable degree of hardness, if applicable, or the structures have been built and are structurally adequate to support the loads, including construction loads to which they will be subjected, the backfilling shall be started and thereafter it shall proceed until its completion.
2. With the exception mentioned below in this paragraph, trenches shall not be backfilled at pipe joints until after that section of the pipeline has successfully passed any specified tests required. Should the Contractor wish to minimize the maintenance of lights and barricades and the obstruction of traffic, he may, at his own risk backfill the entire trench, omitting or including backfill at joints as soon as practicable after the joints have acquired a suitable degree of hardness, if applicable, and the related structures have acquired a suitable degree of strength. He shall, however, be responsible for removing and later replacing such backfill, at his own expense, should he be ordered to do so in order to locate and repair or replace leaking or defective joints or pipe.
3. No stone or rock fragment larger than 12 inches in greatest dimension shall be placed in the backfill nor shall large masses of backfill material be dropped into the trench in such

a manner as to endanger the pipeline. If necessary, a timber grillage shall be used to break the fall of material dropped from a height of more than 5 ft. Pieces of bituminous pavement shall be excluded from the backfill unless their use is expressly permitted, in which case they shall be broken up as directed.

4. Zone Around Pipe
   a. Backfilled with the materials and to the limits indicated on the drawings.
   b. Material shall be compacted to 90 percent by tamping.

5. Remainder of Trench
   a. Compact by water-jetting, or tamping, in accordance with the nature of the material to 95 percent in accordance with ASTM D1557. Water-jetting may be used wherever the material does not contain so much clay or loam as to delay or prevent satisfactory drainage. However, tamping shall be used if water-jetting does not compact the material to the density required.

6. Excavated material which is acceptable to the Engineer for surfacing or pavement subbase shall be placed at the top of the backfill to such depths as may be specified elsewhere or as directed. The surface shall be brought to the required grade and stones raked out and removed.

E. Placing and Compacting Embankment Material

1. After the subgrade has been prepared as hereinbefore specified, the material shall be placed thereon and built up in successive layers until it has reached the required elevation.
2. Layers shall not exceed 12 inches in thickness before compaction. In embankments at structures, the layers shall have a slight downward slope away from the structure; in other embankments the layers shall have a slight downward slope away from the center. In general, the finer and less pervious materials shall be placed against the structures or in the center, and the coarser and more pervious materials, upon the outer parts of embankments.
3. Each layer of material shall be compacted by the use of approved rollers or other approved means so as to secure a dense, stable, and thoroughly compacted mass. At such points as cannot be reached by mobile mechanical equipment, the materials shall be thoroughly compacted by the use of suitable power-driven tampers.
4. Previously placed or new materials shall be moistened by sprinkling, if required, to ensure proper bond and compaction. No compacting shall be done when the material is too wet, from either rain or too great an application of water, to compact it properly; at such times the work shall be suspended until the previously placed and new materials have dried out sufficiently to permit proper compaction, or such other precautions shall be taken as may be necessary to obtain proper compaction.
5. The portion of embankments constructed below proposed structures shall be compacted to 95 percent in accordance with ASTM D1557. The top 2 ft. of an embankment below a pavement base shall be compacted to 95 percent. All other embankments shall be compacted to 90 percent in accordance with ASTM D1557.

3.10 METHODS OF COMPACTION

A. Water-Jetting

1. Saturate backfill material throughout its full depth and at frequent intervals across and along the trench until all slumping ceases.
2. Furnish one or more jet pipes, each of sufficient length to reach the specified depth and of sufficient diameter (not less than 1-1/4 in.) to supply an adequate flow of water to compact the material.
3. Equip jet pipe with a quick-acting valve, supply water through a fire hose from a hydrant or a pump having adequate pressure and capacity to achieve the required results.

B. Tamping and Rolling

1. Deposit backfill material and spread in uniform, parallel layers not exceeding 8 in. thick before compaction. Before the next layer is placed, each layer shall be tamped to obtain a thoroughly compacted mass. Care shall be taken that the material close to the bank, as well as in all other portions of the trench, is thoroughly compacted. When the trench width and the depth to which backfill has been placed are sufficient to make it feasible, and it can be done effectively and without damage to the pipe, backfill may, on approval, be compacted by the use of suitable rollers, tractors, or similar power equipment instead of by tamping. For compaction by tamping (or rolling), the rate at which backfilling material is deposited in the trench shall not exceed that permitted by the facilities for its spreading, leveling, and compacting.
2. If necessary to ensure proper compaction by tamping (or rolling), the backfill material shall first be wet by sprinkling. However, no compaction by tamping (or rolling) shall be done when the material is too wet either from rain or too great an application of water to be compacted properly; at such times the work shall be suspended until the previously placed and new materials have dried out sufficiently to permit proper compacting, or such other precautions shall be taken as may be necessary to obtain proper compaction.

C. Miscellaneous Requirements.

1. Whatever method of compacting backfill is used, care shall be taken that stones and lumps shall not become nested and that all voids between stones shall be completely filled with fine material. Only suitable quantities of stones and rock fragments shall be used in the backfill; the Contractor shall, as part of the work done under the items involving earth excavation and rock excavation as appropriate, furnish and place all other necessary backfill material.
2. All voids left by the removal of sheeting shall be completely backfilled with suitable materials, and thoroughly compacted.

3.11 DISPOSAL OF SURPLUS EXCAVATED MATERIALS

A. No excavated materials shall be removed from the site of the work or disposed of by the Contractor except as directed or permitted by the Engineer.

B. Surplus excavated materials suitable for backfill shall be used to backfill normal excavations in rock or to replace other materials unacceptable for use as backfill; shall be neatly deposited and graded so as to make or widen fills, flatten side slopes, or fill depressions; or shall be neatly deposited for other purposes within a haul of 1 mile from the point of excavation; all as directed or permitted and without additional compensation. Prior to re-use of in-situ material, the material shall be tested to determine if the material meets the requirements of applicable Specification Section for crushed stone, gravel borrow, or common borrow.

C. Surplus excavated materials not needed as specified above shall be handled in accordance with Section 02080.

3.12 MANAGEMENT OF SUSPECT SOILS

A. Any excavated materials that are deemed suspect by the Contractor or at the discretion of the Engineer, shall be stockpiled separately on site and tested, handled, and disposed of in accordance with 02080.

3.13 DUST CONTROL

A. During the progress of the Work, maintain the area of activities, by sweeping and sprinkling of streets to minimize the creation and dispersion of dust. If the Engineer decides that it is necessary to use calcium chloride for more effective dust control, the Contractor shall furnish and spread the material, as directed.

3.14 BRIDGING TRENCHES

A. Provide suitable and safe bridges and other crossings where required for the accommodation of travel, and to provide access to private property during construction. Remove once bridges and crossings are no longer needed.

3.15 FIELD QUALITY CONTROL

A. Site Tests

1. In accordance with SECTION 01410

3.16 CARE AND RESTORATION OF PROPERTY

A. Restoration of existing property or structures done as promptly as practicable and not left until the end of the construction period.

END OF SECTION

SECTION 02210

ROCK EXCAVATION

PART 1 GENERAL

1.01 SUMMARY

A. Section Includes

1. Requirements for removal and disposal of rock.

B. Related Sections

1. Section 00500-Agreement
2. Section 00800- Supplementary Conditions
3. Section 02200-Earth Excavation, Backfill, Fill and Grading

1.02 DEFINITIONS

A. Rock-as defined in SECTION 00500.

1.03 REQUIREMENTS

A. Excavate rock if encountered, to the lines and grades indicated on the drawings or as directed, dispose of the excavated material, and furnish acceptable material for backfill in place of the excavated rock.

B. Excavate rock in pipe trenches to a limit which provides 6-inches clearance minimum from the pipe after it has been laid. Before the pipe is laid, the trench shall be backfilled to the correct subgrade with thoroughly compacted, suitable material or, when so specified or indicated on the drawings, with the same material as that required for bedding the pipe, furnished and placed at the expense of the Contractor.

C. The use of explosives will not be allowed.

PART 2 PRODUCTS

NOT USED

PART 3 EXECUTION

3.01 EXCESS ROCK EXCAVATION

A. If rock is excavated beyond the limits of payment indicated on the drawings, specified, or authorized in writing by the Engineer, the excess excavation, whether resulting from overbreakage or other causes, shall be backfilled, by and at the expense of the Contractor, as specified below in this section.

B. In pipe trenches, excess excavation below the elevation of the top of the bedding, cradle, or envelope shall be filled with material of the same type, placed and compacted in the same manner, as specified for the bedding, cradle, or envelope. Excess excavation above said elevation shall be filled with earth as specified in the article titled "Backfilling Pipe Trenches" in SECTION 02200.

C. In excavations for structures, excess excavation in the rock beneath foundations shall be filled with 3000 psi concrete. Other excess excavation shall be filled with earth as specified in the article titled "Backfilling Around Structures" in SECTION 02200.

3.02 SHATTERED ROCK

A. If the rock below normal depth is shattered due to rock removal operations of the Contractor, and the Engineer considers such shattered rock to be unfit for foundations, the shattered rock shall be removed and the excavation shall be backfilled with concrete as required, except that in pipe trenches screened gravel shall be used for backfill. All such removal and backfilling shall be done by and at the expense of the Contractor.

3.03 PREPARATION OF ROCK SURFACES

A. Whenever so directed during the progress of the work, remove all dirt and loose rock from designated areas and shall clean the surface of the rock thoroughly, using steam to melt snow and ice, if necessary. Water in depressions shall then be removed as required so that the whole surface of the designated area can be inspected to determine whether seams or other defects exist.

B. The surfaces of rock foundations shall be left sufficiently rough to bond well with the masonry and embankments to be built thereon, and if required, shall be cut to rough benches or steps.

C. Before any masonry or embankment is built on or against the rock, the rock shall be scrupulously freed from all vegetation, dirt, sand, clay, boulders, scale, excessively cracked rock, loose fragments, ice, snow, and other objectionable substances. Picking, barring, wedging, streams of water under sufficient pressure, stiff brushes, hammers, steam jets, and other effective means shall be used to accomplish this cleaning. Remove free water left on the surface of the rock.

3.04 REMOVAL OF BOULDERS

A. Remove piles of boulders and loose rock encountered within the limits of earth embankments and dispose in a suitable place.

3.05 DISPOSAL OF EXCAVATED ROCK

A. All excavated rock shall be handled, transported and disposed of by the Contractor, at his expense, at appropriate locations, and in accordance with arrangements made by him without additional cost to the Owner.

B. Excavated rock may be used in backfilling trenches subject to the following limitations:

1. Pieces of rock larger than permitted under the article titled "Backfilling Pipe Trenches" in SECTION 02200 shall not be used for this purpose.
2. The quantity of rock used as backfill in any location shall not be so great as to result in the formation of voids.
3. Rock backfill shall not be placed within 36 in. of the surface of the finish grade.

C. Surplus excavated rock shall be disposed of as specified for surplus excavated material as specified in SECTION 02200.

3.06 BACKFILLING ROCK EXCAVATIONS

A. Where rock has been excavated and the excavation is to be backfilled, the backfilling above normal depth shall be done as specified in SECTION 02200. If material suitable for backfilling is not available in sufficient quantity from other excavations, the Contractor shall, at his own expense, furnish suitable material from outside sources.

END OF SECTION

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SECTION 02215

AGGREGATE MATERIALS

PART 1 GENERAL

1.01 SUMMARY

A. Section Includes

1. Requirements for furnishing and placing materials, which include Crushed Stone, Gravel Borrow and Select Borrow.
2. Location of specified materials as detailed on the Drawings or as directed by the Engineer for excavation below normal depth, utility support, replacement of unsuitable material or elsewhere, as ordered.

B. Related Sections

1. Section 02200 - Earth Excavation, Backfill, Fill and Grading.
2. Section 02500 - Paving

1.02 REFERENCES

A. American Association of State Highway and Transportation Officials (AASHTO).

1. T11, Amount of Material Finer than 0.075 mm Sieve in Aggregate
2. T27, Sieve Analysis of Fine and Coarse Aggregates.

B. American Society for Testing and Materials (ASTM).

1. D1557, Standard Test Methods for Laboratory Compaction Characteristics of Soil Using Modified Effort (56,000 ft-lbf/ft^3 (2,700 kN-m/m^3)).

1.03 DEFINITIONS

A. The term Screened Gravel as used in the Contract Documents shall mean Crushed Stone.

1.04 SUBMITTALS

A. Shop Drawings

1. Provide sieve analysis when gradation requirements are given in the Specification.

B. Samples

1. Furnish representative sample including location of source with Shop Drawing transmittal sheet.

1.05 QUALITY ASSURANCE

A. Field Samples

1. The attention of the Contractor is directed to the fact that under Specification SECTION 00700, 1.03 Materials and Equipment, all materials furnished by the Contractor to be incorporated into the Work shall be subject to the inspection of the Engineer. The

Engineer shall be the sole judge as to the acceptability of proposed materials and said judgement shall be final, conclusive, and binding.

1.06 DELIVERY, STORAGE, AND HANDLING

A. Storage and Protection

1. In accordance with Specification SECTION 00700, 1.03 Materials and Equipment.

PART 2 PRODUCTS

2.01 MATERIALS

A. Crushed Stone

1. Crushed Stone shall conform to the State of Rhode Island Department of Transportation (RIDOT) Standard Specifications, 2004 Edition with latest addenda.
2. For bedding and pipe zone material for pipe larger than 3 inches diameter. Well graded in size from 3/8 inches to 3/4 inches or such other sizes as may be approved.
3. For bedding and pipe zone material for plastic pipe 3 inches diameter and less, maximum particle size shall be 3/8 inches.
4. Clean, hard, and durable particles or fragments, free from dirt, vegetation, or other objectionable matter, and free from an excess of soft, thin elongated, laminated or disintegrated pieces.
5. Screened Stone of similar size and grading to this specification may be used instead of Crushed Stone.
6. Crushed Stone beneath footing foundations shall be clean, washed crushed stone meeting the requirements of ASTM D-448, No. 57 stone.

B. Gravel Borrow

1. Gravel Borrow shall conform to the State of Rhode Island Department of Transportation (RIDOT) Standard Specifications, 2004 Edition with latest addenda.
2. Granular material well graded from fine to coarse with a maximum size of 3 inches, obtained from approved natural deposits and unprocessed except for the removal of unacceptable material and stones larger than the maximum size permitted.
3. Gravel shall not contain vegetation, masses of roots, or individual roots more than 18 inches long or more than 1/2 inches in diameter.
4. Gravel shall be substantially free from loam and other organic matter, clay and other fine or harmful substances.
5. Gradation requirements for gravel shall be determined by AASHTO-T11 and T27 and conform to M01.09, Column Ia of the RIDOT Standard Specifications.

C. Select Borrow

1. Use inorganic natural soils and/or rock, having not more than 8 percent by weight passing the No. 200 sieve and having a maximum stone size no greater than 6-inches.
2. Use only material well-graded throughout entire size range, free of roots, leaves and other organic material, ice or frost and aggregations of frozen soil particles.
3. Moisture content to be within plus minus 3 percent optimum at the borrow source.
4. Material must meet compaction requirements indicated or as specified.

D. Gravel Base Course

1. In accordance with SECTION 02500.

E. Structural Fill

1. Foundation backfill and material below entrance slabs, and fill to raise grade in building and ice rink areas should be clean, non-frost susceptible sand and gravel meeting the gradation requirements for Structural Fill as given below:

Structural Fill	
Sieve Size	**Percent Finer by Weight**
4-inch	100
3-inch	90 to 100
¼-inch	25 to 90
#40	0 to 30
#200	0 to 6

F. Filter Stone

1. Shall be in accordance with the RIDOT Standard Specifications, Section M.01.09 Table 1, Column V.

2.02 SOURCE QUALITY CONTROL

A. Test, Inspection

1. Engineer may elect to sample material supplied at the source.
2. Assist the Engineer and/or personnel from the designated testing laboratory in obtaining samples.

PART 3 EXECUTION

3.01 INSTALLATION

A. Crushed Stone

1. Spread in layers of uniform thickness not greater than 6 inches.
2. Compact thoroughly by means of a suitable vibrator or mechanical tamper.

B. Gravel Borrow

1. Spread in layers of uniform thickness not exceeding 12 inches before compaction and moistened or allowed to dry as directed.
2. Compact thoroughly by means of suitable power-driven tampers or other power-driven equipment.
3. Compaction shall conform to 95% of minimum dry density per ASTM D1557.
4. The percolation rate for the compacted bank-run gravel shall not exceed 5 minutes per inch.

C. Select Borrow

1. Spread in layers of uniform thickness not exceeding 12 in. (loose lift) before compaction and moistened or allowed to dry.

2. Compact thoroughly by means of suitable power-driven tampers or other power-driven equipment unless otherwise directed by the Engineer.

3.02 FIELD QUALITY CONTROL

A. Material and compaction testing

1. In accordance with SECTION 01410.

END OF SECTION

SECTION 02224

CONTROLLED DENSITY FILL

PART 1 GENERAL

1.01 SUMMARY

A. Section Includes

1. Requirements for flowable concrete fill to be used in place of compacted soil for general backfill of trenches.

B. Related Sections

1. Section 02200 - Earth Excavation, Backfill, Fill and Grading
2. Section 03300 - Cast-In-Place Concrete

1.02 REFERENCES

A. American Society for Testing and Materials (ASTM)

1. C33, Standard Specification for Concrete Aggregates.
2. C150, Standard Specification for Portland Cement.
3. C260, Standard Specification for Air-Entraining Admixtures for Concrete.
4. C494, Standard Specification for Chemical Admixtures for Concrete
5. C618, Standard Specification for Coal Fly Ash and Raw or Calcined Natural Pozzolan for Use as a Mineral Admixture in Portland Cement Concrete.
6. C989, Standard Specification for Ground Granulated Blast-Furnace Slag for Use in Concrete and Mortars

B. American Concrete Institute (ACI)

1. ACI Committee 229, Standard Specification for Controlled Low Strength Materials (CLSM).

1.03 DEFINITIONS

A. Controlled Density Fill (CDF), also known as “Flowable Fill” and “Ready-mix Fill.” Self-compacting, self-leveling, cementitious material used for backfills, fills and structural fills.

B. Very Flowable - Exhibits characteristics needed for small or confined areas and required to flow over long distances.

C. Flowable - Where the above flowability characteristics are not required.

D. Excavatable - May be removed in the future if required.

E. Non-excavatable - Not expected to be removed in the future.

1.04 DESIGN REQUIREMENTS

A. Provide a mixture of Portland cement, aggregates, water and mineral admixtures with a low cement content and high slump to reduce strength development for possible removal and minimize settlement after placement.

B. The proposed mix should maximize the flow characteristics of the material while producing the necessary strength.

C. The design mixes shall have the following strengths at 28 days:

1. Excavatable fill,
    a. Class I (flowable) and II (very flowable), 30 to 100 psi., 150 psi maximum at one (1) year
2. Non-excavatable fill,
    a. Class III (flowable) and IV (very flowable), 100 to 1200* psi.

    * Specific compressive strength(s) for structural applications are noted on the Contract Drawings

D. Air Content to be minimum 15%

E. Slump, using the modified method consisting of a six (6) inch long by three (3) inch inside diameter straight tube of non porous material.

1. Class I and III: 6” to 8” diameter
2. Class II and IV: 9” to 14” diameter

1.05 PERFORMANCE REQUIREMENTS

A. Provide fill of homogeneous structure which when cured, will have the required strength, water tightness, and durability. To this end, it is essential that careful attention be given to the selection of materials, mixtures, placing and curing of the fill.

1.06 SUBMITTALS

A. In accordance with Section 01300, submit the following,

1. Mix design data not limited to, but including maximum and minimum strengths, air content, setting times, flowability and yield.
2. Certification by the supplier stating compatibility with the project requirements and the Contractor's installation methods.

1.07 QUALITY ASSURANCE

A. Furnish the supplier with information as to the intended use of the CDF.

PART 2 PRODUCTS

2.01 MATERIALS

A. Portland Cement: ASTM C150, Type II American-made. (AASHTO M 85)

B. Water: Clean, potable and complying with ASTM C94. (AASHTO M 157)

C. Aggregates: ASTM C33 or a non-reactive aggregate source free of contaminants which exhibits high flow properties for controlled density fill. (AASHTO M 6, M 80)

D. Air entraining admixture conforming to ASTM C260, or as approved by the Engineer.

E. Chemical Admixtures: In accordance with ASTM C494. (AASHTO M 195)

F. Fly Ash: Meet requirements of ASTM C618 Class C or Class F. (AASHTO M 295)

G. Granulated Blast Furnace Slag: In accordance with ASTM C989. (AASHTO M 302)

PART 3 EXECUTION

3.01 GENERAL

A. The Contractor shall follow the guideline set forth in ACI 229, except non standard materials shall not be used.

3.02 PREPARATION

A. Pipes and all other members to be encased in CDF shall be temporarily secured in place to prevent displacement during fill placement.

B. To reduce hydrostatic pressure and limit displacement potential, Contractor may use a high air generator in the fill mixture to lower unit weights.

C. Pre-job test all pump applications prior to day of placement with actual equipment.

D. Secure site during the placement for the CDF. Cautions include but are not limited to barricades, fences, lights and steel plates.

E. Work shall be sequenced so as to keep traffic flowing within the project area.

3.03 INSTALLATION

A. CDF shall be batched at concrete plants and hauled to job sites in ready-mix trucks with continuous agitating drums.

B. During waiting period prior to discharge, truck drums shall agitate mixture.

C. CDF shall be installed in accordance with supplier's recommendations.

3.04 FIELD QUALITY CONTROL

A. All CDF to be used in the work shall be subject to testing to determine whether it conforms to the requirements of the specifications. The methods of testing shall be in accordance with the National Ready Mixed Concrete Association, Guide Specification for Controlled Low Strength Materials (CLSM) Article 8.0 Quality Control. The place, time, frequency, and method of sampling will be determined by the Engineer in accordance with the particular conditions of this project.

3.05 PROTECTION

A. Open trenches shall not be left uncovered overnight.

END OF SECTION

SECTION 02370

STORMWATER POLLUTION PREVENTION

PART 1 GENERAL

1.01 SCOPE.

A. The work specified in this section includes the installation, maintenance, and removal of perimeter erosion controls, check dams, temporary dewatering basins, storm drain protection, stilling basins for water pollution control, turbidity curtains/floating silt curtains, and construction accesses. Soil erosion and sediment controls shown on the Plans shall be installed by the Contractor. Some soil erosion and sediment controls specified herein may or may not be shown or detailed on the Drawings, but may be utilized by the Contractor. Soil erosion and sediment controls not detailed on the Plans shall be in accordance with this specification and the latest edition of the Rhode Island Department of Environmental Management (RIDEM) Soil Erosion and Sediment Control Handbook, and all addendums. The methods described in this section are approved means for soil erosion and sediment control, the actual means and methods shall be determined by the Contractor. The Contractor shall be responsible for preparing and establishing a stormwater pollution prevention plan at each work site for approval by the Engineer.

B. Related Work Described Elsewhere:

1. Earth Excavation, Backfill, Fill, and Grading, Section 02200.
2. Aggregate Materials, Section 02215.

1.02 GENERAL REQUIREMENTS.

A. Perimeter Erosion Controls: Work shall consist of the provision of perimeter erosion controls in reasonably close conformity with the dimensions and details indicated on the Drawings, all in accordance with these Specifications. Perimeter erosion controls consist of the following two types:

1. Compost Filter Socks: Filter socks shall be constructed as indicated on the Drawings.

2. Silt Fence. Silt fencing shall consist of oak fence posts to which are attached industrial support netting and sediment control filter fabric, and are constructed as indicated on the Drawings.

B. Check Dams: Work shall consist of the provision of check dams and dikes in reasonably close conformity with the RIDEM Soil Erosion and Sediment Control Handbook. Check dams consist of the following three types:

1. Baled Hay Ditch and Swale Erosion Checks. Baled hay ditch and swale erosion checks shall consist of baled hay or straw, each bale of which is embedded and attached to the ground with wood stakes.

2. Sand Bag Erosion Dikes. This work shall consist of the placement of sand bags across either riprap or earth ditches, thereby forming a dike, to create temporary stilling basins for pollution control.

3. Stone Check Dams. This work shall consist of the placement of stone in ditches or drainage swales to reduce flow velocities, to prevent soil erosion.

C. Temporary Dewatering Basins: Work shall consist of the provision of temporary dewatering basins for the purpose of controlling water pollution caused by sediment-laden discharge from excavation sites. The basins shall be constructed in reasonably close conformity to means and methods of the RIDEM Soil Erosion and Sediment Control Handbook. Temporary dewatering basins consist of the following two types:

1. Dewatering Basin. The basin consists of a rectangular concrete barrier enclosure, the bottom and sides of which are lined with filter fabric. The bottom fabric is stabilized with filter stone. The basin is divided into the required number of 12-foot sections by stone berms approximately 18-inches high.

2. Filter Fabric Retention Basin. The basin consists of a rectangular enclosure formed by a 2-foot high chain link fence. Both the fence and the bottom of the enclosure are lined with filter fabric which is stabilized by a layer of rock riprap.

D. Storm Drain Protection: Work shall consist of the provision of temporary storm drain protection facilities. Storm drain protection facilities shall consist of the following three types:

1. Sandbag Gutter Inlet Sediment Barrier. This work consists of placing a sandbag barrier upstream of a gutter inlet prior to the placement of roadway pavement.

2. Silt Fence Catch Basin Inlet Protection. This work consists of placing filter fabric between frames and grates (beneath grates) of catch basins.

3. Baled Hay Catch Basin Inlet Protection. This work consists of placing baled hay around catch basin inlets. Baled hay inlet protection shall be constructed as indicated on the Drawings.

E. Stilling Basins for Water Pollution Control: Work shall consist of the provision of temporary and/or permanent stilling basins in accordance with the RIDEM Soil Erosion and Sediment Control Handbook.

F. Construction Accesses: Work shall consist of the provision of temporary construction accesses of stabilized stone pads for the purpose of reducing the amount of mud that construction vehicles track onto Town roadways.

1.03 QUALITY CONTROL.

A. Provide Quality Assurance / Quality Control services in accordance with Section 01400.

1.04 SUBMITTALS.

A. In accordance with Section 01300 submit a Stormwater Pollution Prevention Plan in conformance with the requirements specified in the General Permit for Storm Water Discharges Associated with Construction Activities (Section 01060).

1.05 REFERENCE STANDARDS.

A. Rhode Island Department of Environmental Management (RIDEM). 1988. Recommendations of the Stormwater Management and Erosion Control Committee Regarding the Development and Implementation of Technical Guidelines for Stormwater Management. RIDEM, Office of Environmental Coordination, Providence, RI.

B. Latest Version of RI Stormwater Design & Installation Standards Manual

C. Rhode Island Department of Environmental Management and USDA Soil Conservation Service (SCS). 1989. Rhode Island Soil Erosion And Sediment Control Handbook. RIDEM, Providence, RI.

D. Rhode Island Discharge Elimination System. General Permit for Discharges Associated with Construction Activities.

E. Rhode Island Department of Transportation Standard Specifications for Road and Bridge Construction, together with all errata addenda additional revisions, and supplemental specifications, (referred to as the Standard Specification).

F. American Society for Testing and Materials (ASTM)

1. ASTM B928/B928M-09 – Standard Specification for High Magnesium Aluminum Alloy Sheet and Plate for Marine Service and Similar Environments.

PART 2 PRODUCTS

2.01 MATERIALS

A. Perimeter Erosion Controls:

1. Compost Filter Socks: Filter sock materials and compost materials shall be in accordance with AASHTO Designation MP 9-06. Wooden stakes shall be 2 inch by 2 inch x 3 feet untreated hardwood, installed at 5-foot intervals on center, and of a length that shall project into the soil 1 foot leaving 3-4 inches protruding above the filter sock.

2. Silt Fence. The filter fabric shall be a material suitable for erosion control applications. Wood posts shall be oak, two (2) inch by two (2) inch in section, and at least four and one half (4-1/2) feet in length. Support netting shall be heavy-duty plastic mesh. For prefabricated silt fence, one (1) inch by one (1) inch wood posts will be permitted.

B. Check Dams:

1. Baled Hay Ditch and Swale Erosion Checks. Baled hay or straw shall be baled within twelve months of use. Bindings shall be sufficiently strong to act as handles when placing bales in position by hand. The minimum dimension of any bale shall be 18 inches. Wood stakes shall be oak, 1-inch by 1-inch in section, and at least three (3) feet in length.

2. Sand Bag Erosion Dikes. The sand bags and the sand material shall be of a quality acceptable to the Engineer. Dumped stone, when required, shall meet the requirements for Modified NSA Class R-4 riprap in Section 02220. The filled sand bags will weigh a minimum of 60 pounds.

3. Stone Check Dams. The stone shall meet the requirements for Filter Stone under Table I, Column V.

C. Temporary Dewatering Basins:

1. Dewatering Basins. Precast concrete barrier units shall conform to the RIDEM Soil Erosion and Sediment Control Handbook. Filter fabric shall conform to the applicable requirements of Article 2.01, Item A, Para. 2; Silt Fence, of these Specifications. Filter stone shall conform to the requirements of Section 02215. Sand bags shall be of a quality acceptable to the Engineer. Hay bales and wood stakes shall conform to the requirements of Article 2.01, Item A, Para. 1 of these Specifications.

D. Storm Drain Protection:

1. Sandbag Gutter Inlet Sediment Barrier. The sandbags and the sand material shall be of a quality acceptable to the Engineer.

2. Filter Fabric Catch Basin Inlet Protection. The filter fabric shall be a material suitable for erosion control applications utilized.

3. Baled Hay Catch Basin Inlet Protection. Baled hay or straw and wood stakes shall conform to the requirements of Article 2.01, Item A, Para. 1 of these Specifications.

E. Stilling Basins for Water Pollution Control: The various materials required for the construction of stilling basins will be determined by the Contractor and provided in the Soil Erosion and Sediment Control Plan for approval by the Engineer.

F. Construction Accesses: Construction access shall consist of crushed stone that meets the requirements of Section 02215. The filter fabric shall be a material suitable for erosion control applications utilized.

PART 3 EXECUTION

3.01 GENERAL.

A. Construction Methods: Those erosion and pollution controls indicated on the Drawings shall be installed to the satisfaction of the Engineer before the commencement of any construction.

3.02 INSTALLATION.

A. Perimeter Erosion Controls:

1. Compost Filter Socks: Filter socks shall be constructed at the locations, and in accordance with the details indicated on the Drawings to the satisfaction of the Design Builder. The following stipulations also apply:

a. Trenching is not required. Compost filter socks shall be placed over the top of ground, wooden stakes shall be driven through the center of the filter socks to anchor them to the ground. To ensure optimum performance, heavy vegetation shall be cut down or removed, and extremely uneven surfaces shall be graded to ensure that the compost filter sock uniformly contacts the ground surface.

b. Compost tubes may be vegetated by incorporating seed into the compost, prior to placing it in the tube.

c. Compost Filter Socks require no trenching in, but must be staked.

d. Installation: No trenching is required; therefore, soil is not disturbed upon installation. Once the filter sock is filled and put in place, it should be anchored. The preferred anchoring method is to drive stakes through the center of the sock at regular intervals; alternatively, stakes can be placed on the downstream side of the sock. The ends of the filter sock should be directed upslope, to prevent stormwater from running around the end of the sock. The filter sock may be vegetated by incorporating seed into the compost when filling the filter sock.

e. Since compost filter socks do not have to be trenched into the ground, they can be installed on frozen ground, pavement or cement. For placement on pavement or cement concrete blocks can placed to hold the sock in place.

2. Silt Fence. Silt fence shall be constructed at the locations, and in accordance with the details indicated on the Drawings, to the satisfaction of the Engineer. The following stipulations also apply:

a. A six (6) inch by six (6) inch minimum trench shall be dug where the fence is to be installed.
b. The fence shall be positioned in the trench with the fence posts set at eight (8) feet on center (maximum).
c. The sedimentation control fabric and the industrial netting shall be stapled to each post. When joints are necessary, filter fabric shall be spliced together only at support posts. Splices shall consist of a six (6) inch overlap, and shall be securely sealed.
d. Each wood post with industrial support netting and filter fabric attached shall be driven into the undisturbed soil in the trench as indicated on the Drawings.
e. The trench shall be backfilled and the soil compacted over the filter fabric.
f. The installed height of the fence shall be two and one half (2-1/2) feet (minimum). However, height shall not exceed 36-inches since higher barriers impound volumes of water sufficient to cause failure of the fence structure.

B. Check Dams:

1. Baled Hay Ditch and Swale Erosion Checks. Erosion checks shall consist of two or more bales placed and staked perpendicular to the flow line of a ditch formed by the intersection of its slopes. The following stipulations also apply:

a. A pair of erosion checks shall be placed a minimum of 12 feet apart at each location.
b. The ditch erosion checks shall be entrenched and backfilled. The trench shall be excavated the width of the bale(s) and the length of the check to a minimum depth of three (3) inches. After the bales are staked and chinked, the excavated soil shall be backfilled against the check. Backfill shall conform to the ground level on the downhill side and shall be built up to four (4) inches against the uphill side.

c. The bales are to be installed so that the bindings are oriented around the sides of the bales rather than their tops and bottoms.
d. The edges of overlapped bales shall overlap in such a manner that there will be no opening between the bales. Where bales butt together the gap between bales shall be chinked with loose straw to prevent water from escaping.
e. Each bale shall be securely anchored by a least two stakes driven through the bale. The first stake in each bale should be driven toward the previously laid bale to force the bales together.
f. All earth ditch areas are required to have the protection of baled hay ditch erosion checks prior to their outfall onto existing ground, or natural or man-made water courses.
g. The haybale barrier shall be extended such a length that the bottoms of the end bales are higher in elevation than the top of the lowest middle bale. This configuration will insure that the sediment-laden runoff will flow either through or over the barrier, but not around it.

2. Sand Bag Erosion Dikes. Sand bags will be placed a minimum of four layers high. Over the center of the ditch the top layer of sand bags will have a weir opening equal to one half the bottom ditch width. The sand bags shall be extended such a length that the bottom of the end sand bags are higher in elevation than the top of the lowest middle sand bag. When the sand bag dike is constructed across an earth ditch, the down stream side of the dike at the weir opening is to be protected with Modified NSA Class R-4 dumped riprap.

3. Stone Check Dams. Stone shall be placed across the ditch or swale to achieve complete coverage and shaped to the required configuration by the use of hand tools. The stone shall be sloped from the sides of the ditch/swale towards the center such that the center is six (6) inches lower than the stone at the sides of the ditch/swale. The check dam shall have two to one (2:1) horizontal to vertical side slopes and shall not exceed two (2) feet in height.

C. Temporary Dewatering Basins:

1. Dewatering Basin. The following stipulations shall apply:

a. The precast concrete barrier units shall be placed on level, or nearly level, ground.
b. Filter fabric shall be placed on the bottom of the entire area enclosed by the concrete barrier units. If more than one sheet of fabric is required, the adjacent section shall be overlapped a minimum of 12 inches to insure full coverage. Filter fabric shall be turned up along the inside face of the concrete barriers to the top of same, there to be folded across the top of the barriers. The fabric will be maintained in position by the placement of sand bags, end-to-end, along the top of the concrete barrier enclosure.
c. A minimum layer of six (6) inches of filter stone shall be spread over the bottom of the basin. Stone berms shall be constructed at 12 foot intervals along the length of the basin.

2. Filter Fabric Retention Basin. The following stipulations shall apply:

a. The filter fabric retention basin will be placed on stabilized and level, or nearly level, ground to prevent erosion by water exiting the basin.

b. A six (6) inch by six (6) inch minimum trench shall be dug where the basin is to be constructed.
c. The filter fabric and wire backing shall be three (3) feet wide (minimum) positioned in the trench and secured to metal posts positioned 4-feet on center (maximum).
d. The metal posts shall be driven into undisturbed soil next to the trench to a minimum depth of 12-inches.
e. Fill material shall be placed in the trench and compacted.
f. The installed height of the fence shall be two (2) feet (minimum).
g. A minimum layer of six (6) inches of filter stone (Modified NSA Class R-4 riprap) shall be spread evenly over the bottom of the basin.

D. Storm Drain Protection:

1. Sandbag Gutter Inlet Sediment Barrier. The following stipulations shall apply:

a. The sandbags shall be placed in a curved row extending from the curb or berm. The row shall be at least six (6) feet upstream of the inlet and should overlap the curb or berm.
b. Several layers of sandbags shall be placed over the first layer to a minimum height of one (1) foot. The bags shall be overlayed and packed tightly together.
c. A gap of one sandbag should be left in the middle of the top row to serve as a spillway. The spillway shall be a least eight (8) inches high.
d. Additional sediment storage capacity can be obtained by constructing a series of these barriers along the gutter upstream of the inlet.

2. Filter Fabric Catch Basin Inlet Protection. The following stipulations shall apply:

a. The filter fabric shall extend to a height between four (4) and six (6) inches above the top of the inlet grate around the entire perimeter of the grate.
b. Filter fabric shall be installed beneath the grate, secured between the frame and the grate.
c. Filter fabric shall be installed with sufficient excess material below the grate to provide at least six (6) inches of vertical clearance between the fabric and the bottom of the grate.

3. Baled Hay Catch Basin Inlet Protection. The baled hay inlet protection shall be constructed as indicated on the Drawings. The following stipulations shall also apply:

a. The bales shall be entrenched and backfilled. The trench shall be excavated the width of the bale and the length of the check to a minimum depth of three (3) inches. After the bales are staked and chinked, the excavated soil shall be backfilled against the check. Backfill shall conform to the ground level on the inside and shall be built up to four (4) inches around the outside.
b. The bales are to be installed so that the bindings are oriented around the sides of the bales rather than along their tops and bottoms.
c. Each bale shall be securely anchored by at least two stakes driven through the bale. The first stake in each bale should be driven toward the previously laid bale to force the bales together.
d. The gaps between bales shall be chinked (filled by wedging) with straw to prevent water from escaping between bales.

E. Stilling Basins for Water Pollution Control:

1. The stilling basins will be constructed in such a manner to allow any material which may cause a natural water course or the surrounding environment to be damaged to be retained in the basin. During the life of the Contract, the Contractor will be required to periodically clean the pool and to maintain the basin to the satisfaction of the Engineer. If the basin is temporary, the Contractor will be required to fill the basin with suitable material and to restore the area in which the basin was located to either its original condition or to the requirements of the Contract.

2. In all cases the stilling basins are to be constructed immediately after the clearing and grubbing operation and before commencement of any excavation and/or embankment. The single exception to this requirement is the construction of a leveling course to create a work platform. Excavation for stilling basins is to take place from the downstream end of the basin and to proceed upstream. Prior to the start of excavation, temporary baled hay ditch erosion checks are to be constructed immediately beyond the downstream end of the basin. When the basin is complete the above temporary erosion control measures are to be removed.

F. Construction Accesses: Construction accesses shall be constructed at the locations, and in accordance with the details as indicated on the Drawings, to the satisfaction of the Engineer. Construction accesses shall be constructed as detailed in Section 211 of the Standard Specifications.

3.03 MAINTENANCE AND CLEANING.

A. Definitions:

1. Cleaning consists of removing debris and accumulated sediment-laden deposits from the upstream side of perimeter controls, check dams and temporary drainage protection and from the bottom of temporary dewatering basins and stilling basins. All material so-removed shall be legally disposed of.

2. Maintenance consists of the repair and restoration to original configuration of damage sustained by erosion and pollution controls caused by "normal" rainfall events. (Abnormal weather events are defined in Article 3.03, Item 1)

B. Methods:

1. Erosion and pollution controls shall be maintained by the Contractor to the satisfaction of the Engineer. Erosion and pollution controls must be able to prevent, under normal weather conditions, both the movement of soil materials and the intrusion of sediment-laden discharges into environmentally sensitive areas.

2. Construction shall not commence or continue until all specified erosion and pollution controls are in place, properly installed and accepted by the Engineer.

3. Erosion and pollution controls shall be routinely inspected by the Engineer. The Engineer shall notify the Contractor immediately if problems develop. The Contractor shall commence cleaning and maintenance measures no later than the next consecutive calendar day after receiving a directive from the Engineer to perform such measures. The Contractor shall aggressively and expeditiously perform such cleaning and maintenance work until the original problem is remedied to the complete satisfaction of the Engineer. In the event of a weekend storm, the Contractor must have resources available to restore, and, if necessary, to replace any damaged controls.

C. Applicable Controls:

1. The specific erosion and pollution control facilities to be cleaned and maintained under this Section are outlined in Article 1.02 and consist of the following:

   a. Perimeter Controls:
      1) Baled Hay Erosion Checks
      2) Silt Fence
   b. Check Dams:
      1) Baled Hay Ditch and Swale Erosion Checks
      2) Sand Bag Erosion Dikes
      3) Stone Check Dams
   c. Temporary Dewatering Basins:
      1) Dewatering Basins
      2) Filter Fabric Retention Basins
   d. Storm Drain Protection:
      1) Sandbag Gutter Inlet Sediment Barrier
      2) Filter Fabric Catch Basin Inlet Protection
      3) Baled Hay Catch Basin Inlet Protection
   e. Stilling Basins
   f. Construction Accesses

D. Materials:

1. Materials required to repair and restore damaged erosion and pollution controls shall meet the applicable requirements of Article 2.01, Items A thru G; for Perimeter Erosion Controls, Check Dams, Temporary Dewatering Basins, Storm Drain Protection, Stilling Basins and Construction Accesses, respectively, of these Specifications.

E. Threshold for Cleaning Erosion Controls:

1. Erosion and pollution controls will be cleaned when directed by the Engineer, after a rainstorm, and when sediment deposits reach the heights indicated in the following table:

	Height
a. Perimeter Controls	
1) Baled Hay Erosion Checks	1/2 Bale Height
2) Silt Fence	6-inches
b. Check Dams	
1) Baled Hay Erosion Checks	1/2 Bale Height
2) Sand Bag Erosion Dike	1/2 Dike Height
3) Stone Check Dam	1/2 Dam Height
c. Temporary Dewatering Basins	
1) Dewatering Basins	1/2 Original Basin Height
2) Filter Fabric Retention Basin	1/2 Original Basin Height
d. Storm Drain Protection	
1) Sandbag Gutter Inlet Sediment Barrier	1/2 Dike Height
2) Filter Fabric Catch Basin Inlet Protection	4 inches
3) Baled Hay Catch Basin Inlet Protection	1/2 Bale Height
e. Stilling Basins	1/2 Depth Below Outlet Elevation

F. Other Requirements:

1. Perimeter Controls, Check Dams and Storm Drain Protection. The following requirements apply:

    a. Damaged controls will be repaired or replaced after each storm events.
    b. Before controls are removed all accumulated sediment on the upstream side shall be removed and legally disposed of.
    c. Erosion controls shall not be removed until the adjacent exposed areas are relatively free from future uncontrolled discharges.
    d. The Engineer has the authority to verify, enforce, and to specify maintenance activities and to ensure that erosion and pollution controls have been properly maintained.

2. Temporary Dewatering Basins and Stilling Basins. The following requirements apply:

    a. The basins will be periodically inspected for signs of erosion around the basin and downslope area.
    b. Repairs will be promptly carried.
    c. The Engineer has the authority to verify, enforce, and to specify maintenance activities and to ensure that controls have been properly maintained.

3. Construction Accesses. The following requirements apply:

    a. The construction access shall be maintained to keep mud and debris from tracking onto public roadways. This may require additional stone or additional length as required.
    b. Erosion controls shall not be removed until the adjacent exposed areas are relatively free from future uncontrolled discharges.
    c. The Engineer has the authority to verify, enforce, and to specify maintenance activities and to ensure that erosion and pollution controls have been properly maintained.

G. Failure of Erosion and Pollution Controls:

1. This Article 3.03; Maintenance and Cleaning, is based on the concept that erosion and pollution controls will essentially remain intact under normal rainfall events and that any damage sustained by said controls under normal rainfall may be repaired under the maintenance provisions set forth herein.

2. However, under abnormal weather events it is possible that erosion and pollution controls may be damaged to the extent that the Engineer may direct that they be replaced in their entirety. Under such abnormal conditions the Contractor will replace the particular facilities, and be compensated for same, under the applicable provisions set forth in regarding PERIMETER CONTROLS, CHECK DAMS, TEMPORARY DEWATERING BASINS, STORM DRAIN PROTECTION, STILLING BASINS, and SILT FENCE, respectively, of these Specifications.

H. Definition of Abnormal Weather Conditions:

1. For the purposes of Article 3.03, Item G, abnormal weather events are defined as follows:

    a. For a duration of 1-hour; rainfall equal to or greater than 1/2-inch.
    b. For a duration of 12-hours; rainfall equal to or greater than 2-inches.

c. For a duration of 24-hours; rainfall equal to or greater than 3-inches.
d. Extreme weather conditions such as hurricanes, tornadoes, floods, blizzards, etc. Daily rainfall records may be obtained from the National Weather Service.

3.04 REMOVAL.

A. Perimeter Erosion Controls:

1. Baled Hay Erosion Checks. All stakes must be removed from the haybales at a time designated by the Engineer. In general, the bales will be allowed to rot in place. If the Contract requires the haybales to be removed, they may be removed only when the adjacent exposed area has been stabilized, i.e., the area has an established grass or stone cover or has been paved, and is free from future uncontrolled discharges. Prior to such removal, however, all silt, mud, and debris entrapped by the haybales shall be removed and the area cleaned up in accordance with the applicable provisions of Article 3.03 of these Specifications. Immediately upon removal of the bales the remaining exposed areas (under the bales) will be backfilled, raked, and graded as necessary to match the surrounding grade and then seeded.

2. Silt Fence. This work will include the removal of the silt fence erosion checks and posts. Silt fence will not be left to rot in place. The silt fence may be removed only when the adjacent exposed area is stabilized, i.e., the area has an established grass or stone cover or has been paved, and is free from future uncontrolled discharges. Prior to such removal, however, all silt, mud, and debris entrapped by the silt fence shall be removed and the area cleaned up in accordance with the applicable provisions of Article 3.03 of these Specifications. Immediately upon removal of the bales the remaining exposed areas (under the bales) will be backfilled, raked, and graded as necessary to match the surrounding grade and then seeded.

B. Check Dams:

1. Baled Hay Ditch and Swale Erosion Checks. Bales of hay used in this work will not normally be left to rot in place. The bales may be removed only when the adjacent exposed area is stabilized, i.e., the area has an established grass or stone cover or has been paved, and is free from future uncontrolled discharges. Prior to such removal, however, all silt, mud, and debris entrapped by the respective erosion checks shall be removed and the area cleaned up in accordance with the applicable provisions of Article 3.03 of these Specifications. Immediately upon removal of the bales, the remaining exposed areas (under the bales) will be backfilled, raked, and graded as necessary to match the surrounding grade and then seeded.

2. Sand Bag Erosion Dikes. Sand bag erosion dikes will be removed prior to the completion of the project at a time designated by the Engineer. Prior to such removal, however, all silt, mud, and debris entrapped by the erosion dike shall be removed and the area cleaned up in accordance with the applicable provisions of Article 3.03 of these Specifications.

3. Stone Check Dams. Stone check dams will be removed prior to the completion of the project at a time designated by the Engineer. Prior to such removal, however, all silt, mud and debris entrapped by the check dam shall be removed and the area cleaned up in accordance with the applicable provisions of Article 3.03 of these Specifications.

C. Temporary Dewatering Basins:

1. Dewatering Basin. The dewatering basin will not be removed until all dewatering operations are complete. Prior to such removal, however, all accumulated sediment within the basin shall be removed and legally disposed of in accordance with the applicable requirements of Article 3.03 of these Specifications. The area covered by the basin shall be seeded and mulched immediately after the basin is removed.
2. Filter Fabric Retention Basin. Removal requirements for the filter fabric retention basin are the same as set forth above for the dewatering basin.

D. Storm Drain Protection:

1. Sandbag Gutter Inlet Sediment Barrier. The sandbag sediment barrier will be removed prior to the completion of the project at a time designated by the Engineer. Prior to such removal, however, all silt, mud, and debris entrapped by the sediment barrier shall be removed and the area cleaned up in accordance with the applicable provisions of Article 3.03 of these Specifications.
2. Filter Fabric Catch Basin Inlet Protection. The filter fabric inlet protection shall be removed and the area prepared for pavement construction once the contributing drainage area is free from future uncontrolled discharges. Prior to such removal, however, all silt, mud, and debris entrapped by the filter fabric shall be removed and the area cleaned up in accordance with the applicable provisions of Article 3.03 of these Specifications.
3. Baled Hay Catch Basin Inlet Protection. The baled hay inlet protection shall be removed and the area prepared for pavement construction the contributing drainage area is free from future uncontrolled discharges. Prior to such removal, however, all silt, mud, and debris entrapped by the baled hay shall be removed and the area cleaned up in accordance with the applicable provisions of Article 3.03 of these Specifications.

E. Construction Accesses: This work will include the removal of the construction accesses. The construction accesses may be removed only when the adjacent exposed area is stabilized, i.e., the area has an established grass or stone cover or has been paved, and is free from future uncontrolled discharges. The construction accesses shall be removed and the area prepared for final cover.

END OF SECTION

SECTION 02410

CURBING

PART 1 GENERAL

1.01 SUMMARY

A. Section Includes

1. Requirements for installation of curbs.
2. Restoration to include those areas designated by the Contract Drawings and those affected or damaged by the construction operations, outside the limits of Work.

B. Related Sections

1. Section 02200 - Earth Excavation, Backfill, Fill and Grading

1.02 REFERENCES

A. This specification makes reference to the requirements of additional specifications as listed. The Contractor shall obtain and familiarize himself with all requirements referenced by this specification prior to preparation and installation of any pavements.

B. Work shall be done in accordance with the Rhode Island Department of Transportation, Standard Specifications for Road and Bridge Construction, including all addenda, issued by the State of Rhode Island Department of Public Works, (referred to as the Standard Specification).

1.03. SUBMITTALS

A. Product info when requested by the Engineer.

PART 2 PRODUCTS

2.01 MATERIALS

A. Concrete Curb

1. Concrete curb shall be per the sizes as shown on the plans and shall conform to the requirements of the RIDOT Standard Specifications.

B. Granite Curb

1. Granite curb shall be per the sizes as shown on the plans and shall conform to the requirements of the RIDOT Standard Specifications.

C. Gravel

1. Gravel shall conform to the requirements of the RIDOT Standard Specifications.

PART 3 EXECUTION

3.01 PREPARATION

A. Before curbs are installed, the base shall be brought to the proper grade, and excess gravel base shall be removed.

3.02 INSTALLATION

A. General

1. Curbs: Installing curbs at the locations indicated on the Drawings or as directed by the Engineer shall be in accordance with appropriate sections of the RIDOT Standard Specification.

2. Install or Remove, Salvage and Reset granite curb at the locations indicated on the Drawings or as directed by the Engineer shall be in accordance with Section 906 of the State of Rhode Island Standard Specification.

END OF SECTION

SECTION 02500

PAVING

PART 1 GENERAL

1.01 SUMMARY

A. Section Includes

1. Requirements for construction of all temporary and permanent pavement on paved areas affected or damaged by the Contractors operations, whether inside or outside the normal trench limits, as indicated on the Drawings and as herein specified.

B. Related Sections

1. Section 02200 - Earth Excavation, Backfill, Fill and Grading

1.02 REFERENCES

A. This specification makes reference to the requirements of additional specifications as listed. The Contractor shall obtain and familiarize himself with all requirements referenced by this specification prior to preparation and installation of any pavements.

1. Rhode Island Department of Transportation, Standard Specifications for Road and Bridge Construction, 2004 Edition, including all addenda, issued by the State of Rhode Island Department of Public Works, (referred to as the Standard Specification).

1.03. PAVEMENT SCHEDULE

A. The Contractors attention is directed to the various pavements required under this contract, and their locations as detailed below.

B. All pavement thickness specified in this specification shall be of the thickness required after compaction.

Description:	**Temporary Trench Patch**
Requirements:	15” Gravel Base Course (Minimum)
	3" Temporary Patching Materials/Trenches

Description:	**Permanent Trench Patch**
Requirements:	12" Gravel Base Course (Minimum)
	4” Class 12.5 HMA Base Course **(Trench width)**

Description:	**Permanent Driveway Pavement – Full Depth Reclamation**
Requirements:	8” Reclaimed Sub-base Material 2.5” Class 12.5 HMA Base Course 1.5” Class 9.5 HMA Surface Course
Description:	**Permanent Roadway Pavement – R&D Full Pavement Structure**
Requirements:	12” Gravel Borrow Sub-base Course 2.5” Class 12.5 HMA Base Course 1.5” Class 9.5 HMA Surface Course
Description:	**HMA Driveway Aprons**
Requirements:	8” Gravel Borrow Sub-base Course 3.0” Class 9.5 HMA Surface Course

PART 2 PRODUCTS

2.01 MATERIALS

A. Asphalt Tack

1. Tack coat shall consist of emulsified asphalt, grade RS-1 conforming to the requirements of the Rhode Island Standard Specification Sections 403 and M03.01.

B. Bituminous Base

1. Bituminous Base shall conform to the requirements of the Rhode Island Standard Specification Sections 401 and Class 12.5 HMA for Base Course.

C. Bituminous Leveling Course

1. Bituminous Leveling Course shall conform to the requirements of the Rhode Island Standard Specification Sections 401 and Class 12.5 HMA for Leveling Course.

D. Bituminous Surface

1. Bituminous Surface Course shall conform to the requirements of the Rhode Island Standard Specification Sections 401 and Class 9.5 HMA for Surface Course.

E. Temporary Pavement

1. Temporary Pavement shall be Temporary Patching Material/Trenches conforming to the requirements of the State of Rhode Island Standard Specification, Subsection 410 and M03.04 for High Performance Cold Patching Material.

F. Gravel Base Course

1. Gravel base course in accordance with State of Rhode Island Standard Specification, Subsection M01.09, Meeting the gradation requirements of Table 1, Column 1a.

G. Gravel Borrow Subbase Course

1. Gravel borrow subbbase course shall conform to the requirements of the Rhode Island Standard Specification Subsections 302 and Subsection M.01.09, Meeting the gradation requirements of Table 1, Column 1a.

2.02 SOURCE QUALITY CONTROL

A. The paving plants used by the Contractor for preparation of bituminous paving materials shall be acceptable to the Engineer. The Engineer shall have the right to inspect the plant and the making of the material.

PART 3 EXECUTION

3.01 PREPARATION

A. Prior to placing pavement, all backfill shall have been properly compacted as specified under Section 02200 to eliminate settling of backfill. No pavement shall be placed over poorly compacted backfill. Backfill and gravel base course shall be compacted, brought to the proper elevation, and dressed so that new pavement construction shall be at the required grade. The Contractor shall maintain the surfaces of all excavated and disturbed areas until the pavement is placed. If there is a time lapse of more than 24 hours between completion of preparation of subgrade or placing of gravel base course and placing of paving, or if subgrade or gravel base course has been eroded or disturbed by traffic, the subgrade or gravel base course shall be restored before placing pavement.

B. When installing permanent pavement on bituminous concrete roadway the edges of existing pavement shall be cut back 12 inches, or more as required, from the trench excavation wall or damaged area to sound undamaged material, straightened, cleaned, and painted with an accepted asphalt emulsion to ensure a satisfactory bond between it and the newly placed surface courses. Existing surface courses shall be stripped from the bituminous concrete base course for at least a six (6) inch width and trimmed square and straight so that new permanent surfacing shall be placed on undisturbed bituminous concrete base course.

C. Before permanent pavement is installed, the base shall be brought to the proper grade, and temporary pavement and excess gravel base shall be removed.

D. The bituminous base course within the trench shall be brought to the surface (total 4-inches of base course installed) and then the entire width of roadway shall be cold planed to a depth of one and one half (1-1/2) inches.

E. Existing pavement shall be swept clean prior to placing any asphalt emulsion over it. Existing pavement that will be under new pavement shall be painted with asphalt emulsion to ensure a satisfactory bond.

F. All manhole covers, catch basin grates, valve and meter boxes, curbs, walks, walls and fences shall be adequately protected and left in a clean condition. Where required, the grades of manhole covers, catch basin grates, valve boxes, and other similar items shall be adjusted to conform to the finished pavement grade.

G. The Contractor shall remove and acceptably dispose of all surplus and unsuitable material.

H. The contractor shall install temporary driveway pavement course within 5 business days of finishing construction on property.

3.02 INSTALLATION

A. General

1. All construction methods and materials shall be satisfactory to the Engineer.
2. Unless indicated otherwise, all permanent bituminous pavement shall be installed in two (2) courses or more. Bituminous base courses shall be carefully spread and raked to a uniform surface and thoroughly rolled before application of the top course.
3. All top courses of permanent paving shall be applied with acceptable mechanical spreaders in widths of at least nine (9) feet.
4. The rolling for all bituminous and gravel base courses shall conform to the standards listed in the appropriate Subsection of the Standard Specification.
5. Pavement shall be placed so that the entire roadway or paved area shall have a true and uniform surface, and the pavement shall conform to the proper grade and cross section with a smooth transition to existing pavement.

B. Gravel Base Course

1. The gravel base shall be placed to such depth that the furnished compacted gravel base course is the depth as indicated on the drawings and specified herein.
2. The top of the compacted gravel base shall be below the furnish grade a distance required to accommodate the compacted pavement material as indicated on the drawings and specified herein.

C. Gravel Borrow Subbase Course

1. The gravel borrow subbase course shall be placed to such depth that the furnished compacted gravel borrow subbase course is the depth as indicated on the drawings and specified herein.
2. The top of the compacted gravel base shall be below the furnish grade a distance required to accommodate the compacted pavement material as indicated on the drawings and specified herein.

D. Temporary Pavement

1. Temporary pavement shall be placed over all trenches in paved areas where directed by the Engineer.
2. The Contractor, upon completing the backfilling and compaction of the trenches in the streets and the placing of the gravel base course, shall be required to construct temporary pavement at the end of each day.
3. Temporary Pavement shall be placed in one course and shall consist of 3-inch compacted thickness of hot bituminous mix on an 18-inch compacted thickness gravel base as directed by the Engineer.
4. The Contractor shall maintain temporary pavement in good repair and flush with the existing pavement at all times until the permanent pavement is placed.
5. Temporary patch shall be placed on a **daily basis** and shall cover the full extent of disturbance.

E. Bituminous Base

1. Bituminous Base shall be placed to the thickness as indicated in Part 1.03 of this specification and installed in accordance with the requirements of the Standard Specification and as detailed in the Contract Drawings.

G. Bituminous Surface

1. Bituminous Surface shall be placed to the thickness as indicated in Part 1.03 of this Specification and installed in accordance with the requirements of the Standard Specification and as detailed in the Contract Drawings.

I. Sidewalks, Driveways, Parking Lots and Curbing

1. Sidewalks, driveways, parking lots and curbing that are removed or damaged by the Contractor's operations shall be restored to a condition at least equal to that in which they are found immediately prior to the start of operations. Materials and methods used for such restoration shall be in conformance with the requirements of the State of Rhode Island Standard Specification.
2. Where the trench locations are in a sidewalk, the entire width of the sidewalk shall be replaced with new material. Side forms shall be set so as to obtain and preserve a straight edge along both sides of the walk.
3. Where trench is in a driveway, the driveway shall be repaved across its entire width with even edges.
4. Parking lots shall be repaved in accordance with Part 3.01 of this section.
5. Gravel base course under sidewalks and driveways shall not be less than 12 inches thick.
6. The disturbed portion of driveways shall be restored with temporary pavement no later than 5 business days after the CONTRACTOR completes the proposed work within the resident’s property. The ENGINNER is to determine the limits of the temporary driveway pavement.
7. Temporary pavement shall remain in place for a full winter season and shall be removed prior to the time limit of the Contract. Permanent driveway pavement shall not be placed without authorization from the Engineer or the Town.

J. Surface Maintenance

1. During the guarantee period, the Contractor shall maintain the bituminous surface and shall promptly make good all defects such as cracks, depressions, and holes that may occur. At all times, the surfacing shall be kept in a safe and satisfactory condition for traffic. If defects occur in surfacing constructed by the Contractor, the Contractor shall remove all bituminous concrete and base as is necessary to properly correct the defect. After removing bituminous concrete and base course, the Contractor shall correct the cause of the defect and replace the base course and bituminous concrete in accordance with these specifications.

END OF SECTION

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SECTION 02540

TRAFFIC SIGNS AND SUPPORTS

PART 1 - GENERAL

1.01 SECTION INCLUDES

A. Traffic signs.

B. Sign supports.

1.02 RELATED SECTIONS

A. Section 02200 - Earth Excavation, Backfill and Grading.

1.03 REFERENCES

A. This specification makes reference to the requirements of additional specifications as listed. The Contractor shall obtain and familiarize himself with all requirements referenced by this specification prior to preparation and installation of any signs.

a. Rhode Island Department of Transportation, Standard Specifications for Road and Bridge Construction, latest Edition, including all addenda, issued by the State of Rhode Island Department of Public Works, (referred to as the Standard Specification).

PART 2 - PRODUCTS

2.01 TRAFFIC SIGNS

A. Material and methods of placing traffic signs shall conform to the requirements of the relevant sections of the Standard Specifications.

2.02 SIGN SUPPORTS

A. Material and methods of placing sign supports shall conform to the requirements of the relevant sections of the Standard Specifications.

PART 3 - EXECUTION

3.01 TOLERANCES

A. See RIDOT Standard Specifications.

END OF SECTION

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SECTION 02550

PAVEMENT MARKINGS

PART 1 - GENERAL

1.01 SUMMARY

A. Section Includes

1. Epoxy Resin Pavement Markings – All Sizes and Colors.

B. Related Sections

1. Section 01025 - Measurement and Payment
2. Section 02500 – Paving

1.03 REFERENCES

A. Materials and construction methods shall conform, insofar as applicable, to the requirements of the Rhode Island Department of Transportation, Standard Specifications for Road and Bridge Construction, including all addenda, issued by the State of Rhode Island Department of Public Works, (referred to as the Standard Specification).

PART 2 - PRODUCTS

2.01 PERMANENT PAVEMENT MARKINGS

A. Permanent pavement markings shall be epoxy resin pavement markings and shall be in accordance with the requirements of the “Manual on Uniform Traffic Control Devices”, 2009, including all revisions.

B. Before placing the permanent pavement markings, the Contractor shall ensure that all existing pavement markings have been properly removed from the existing surfaces. For all permanent pavement markings, it is the Contractor’s responsibility to reflect the exact location of all existing pavement markings onto the final surface course, unless otherwise shown on the Plans. The Contractor shall make the necessary arrangements to enable him to reestablish these locations before any construction commences. Epoxy resin pavement markings shall be placed on the final surface course no sooner than 2 weeks but not later than 4 weeks from the completion of paving operation.

PART 3 - EXECUTION

3.01 PREPARATION

A. Before placing the permanent pavement markings, the Contractor shall ensure that all existing pavement markings have been properly removed from the existing surfaces. For all permanent pavement markings, it is the Contractor’s responsibility to reflect the exact location of all existing pavement markings onto the final surface course, unless otherwise shown on the Plans.

The Contractor shall make the necessary arrangements to enable him to reestablish these locations before any construction commences.

3.02 INSTALLATION

A. Epoxy resin pavement markings shall be placed on the final surface course no sooner than 2 weeks but not later than 4 weeks from the completion of paving operation.

3.03 TOLERANCES

A. See Rhode Island Standard Specifications.

END OF SECTION

SECTION 02607

PRECAST CONCRETE MANHOLES

PART 1 GENERAL

1.01 SUMMARY

A. Section Includes

1. Requirements for modular precast concrete manhole sections with tongue-and-groove joints, cast iron covers, accessories and appurtenances.

B. Related Sections

1. Section 02622 - Polyvinylchloride Gravity Sewer Pipe
2. Section 03300 - Cast-In-Place Concrete

1.02 REFERENCES

A. American Society for Testing and Materials (ASTM)

1. A48, Standard Specification for Gray Iron Castings.
2. A615 Standard Specification for Deformed and Plain Billet-Steel Bars for Concrete Reinforcement.
3. C32, Standard Specification of Sewer and Manhole Brick (Made from Clay or Shale), AASHTO Designation M91-42, Red Sewer Brick Only Grade SS.
4. C144, Standard Specification for Aggregate for Masonry Mortar.
5. C150, Standard Specification for Portland Cement.
6. C207, Standard Specification for Hydrated Lime for Masonry Purposes.
7. C443, Standard Specification for Joints for Concrete Pipe and Manholes Using Rubber Gaskets.
8. C478, Standard Specification for Precast Reinforced Concrete Manhole Sections.
9. C923, Standard Specification for Resilient Connectors Between Reinforced Concrete Manhole Structures, Pipes and Laterals.
10. C990-01a Standard Specification for Joints for Concrete Pipe, Manholes, and Precast Box Sections Using Preformed Flexible Joint Sealants
11. D4101, Standard Specification for Propylene Plastic Injection and Extrusion Materials.

B. This specification makes reference to the requirements of additional specifications as listed. The Contractor shall obtain and familiarize himself with all requirements referenced by this specification.

1. Rhode Island Department of Transportation, Standard Specifications for Road and Bridge Construction, including all addenda, (referred to as the Standard Specification).

1.03 SYSTEM DESCRIPTION

A. Design Requirements

1. Manholes shall conform in shape, size, dimensions, materials, and other respects to the details indicated in the Contract drawings.

2. All manholes shall have concrete bases. Invert channels may be formed in the concrete of the base or brickwork upon the base.
3. Manhole walls (barrels and cones) shall be precast concrete sections. The top of the cone (not to be more than 12-in.) shall be built of brickwork to permit adjustment of the frame to meet the finished surface.
4. The inverts shall conform accurately to the size of the adjoining pipes. Side inverts shall be curved and main inverts (where direction changes) shall be laid out in smooth curves of the longest possible radius which is tangent, within the manhole, to the centerlines of adjoining pipelines.

1.04 SUBMITTALS

A. Shop Drawings

1. In accordance with Specification SECTION 01300 - SUBMITTALS.

B. Samples

1. Provide representative samples of materials if requested by the Engineer.

PART 2 PRODUCTS

2.01 PRECAST CONCRETE SECTIONS

A. Conform to the ASTM C478 with the following exceptions and additional requirements:

1. All cast in place concrete shall be Class A and shall conform to the requirements specified under SECTION 03300.
2. Wall sections to be 5-inch thick minimum.
3. Type II cement in accordance with ASTM C150.
4. 4.0 feet and 5.0 feet diameter manholes minimum of 4,000 psi - 28 days compressive strength.
5. 6.0 foot diameter manhole minimum of 5,000 psi. - 28 days compressive strength. Except as otherwise permitted.
6. Sections shall be cured by subjecting them to thoroughly saturated steam at a temperature between 100 and 130 degrees F. for a period of not less than 12 hours or, when necessary for such additional item as may be needed to enable the sections to meet the strength requirements.
7. No more than two lift holes may be cast or drilled in each section.
8. The date of manufacture and the name of trademark of the manufacturer shall be clearly marked on the inside of the barrel.
9. Acceptance of the sections will be on the basis of material tests and inspection of the completed product.

B. Flat Slab Tops

1. Thickness and reinforcement as indicated on the drawings and in accordance with ASTM C-478.

C. Cones

1. Cones shall be precast sections of construction similar to above.

D. Bases

1. The tops of the bases shall be suitably shaped by means of accurate bell-ring forms to receive the barrel sections.
2. All holes for pipes shall be cast in the base sections so that there is a clear distance of four inches minimum between the inside bottom of the base section and the pipe invert.
3. Base pad shall be pre-cast with extended base as indicated on drawings and herein specified.
4. Openings for pipe and materials to be embedded in the wall of the base for these joints shall be cast in the base at the required locations during the manufacture of the base.

2.02 COMPONENTS

A. Pipe Seals

1. Premolded elastomeric-sealed joints fitted or cast integrally into the pipe opening of the manhole base and/or wall section.
2. Provide a watertight joint.
3. Maximum 10-degree omni-directional deflection.
4. Conform to ASTM C-923.
5. Seals to be:
   a. Lock Joint Flexible Manhole Sleeve made by Interpace Corp., Parsippany, NJ;
   b. Kor-N-Seal made by National Pollution Control Systems, Inc., Nashua, NH;
   c. A-LOK manhole pipe seal made by A-LOK Corp., Trenton, NJ;
   d. or an acceptable equivalent product.
6. All materials, accessories and construction methods used in making the joints shall be supplied or approved by the manufacturer of the premolded elastomeric-sealed joint. Furnish manufacturer's written instructions to the Engineer.

B. Aluminum Manhole Steps

1. Cast into walls of the precast sections to form a continuous ladder with a distance of twelve inches (12) between steps.
2. Aluminum drop-front type.
3. Stock No. 12653B made by Aluminum Company of America, Pittsburgh, PA.
4. Stock No. F-14-2-B made by New Jersey Aluminum Co., New Brunswick, N.J.,
5. Or an acceptable equivalent product.
6. Before the steps are built into the masonry and after thorough cleaning, those parts of aluminum steps which will be embedded shall be given a protective coating of an acceptable, heavy-bodied, bituminous material. The cleaning shall be done by suitable means and with suitable cleaning agents to ensure that the surfaces to be coated are free from all foreign matter such as dirt, oil, and grease. The steps shall be thoroughly rinsed and dried before the coating is applied and the coating shall have become thoroughly dry before the steps are built into the masonry.

C. Plastic Manhole Steps

1. Install in walls of the precast sections to form a continuous ladder with a distance of twelve inches (12) between steps.
2. Copolymer Polypropylene plastic manhole step Model PS2-PFSL as manufactured by M. A. Industries, Inc., Peachtree City, Georgia.
3. Plastic steps to be in conformance with ASTM D-4101 for type II propylene copolymers.
4. Plastic to encase 1/2-inch grade 60 steel reinforcing rod conforming to ASTM A-615.

D. Exterior Coating

1. The material shall be:

a. Minwax Fibrous Brush Coat made by the Minwax Co., New York, N.Y. or
b. Tremco 121 Foundation Coating made by the Tremco Inc., Cleveland, OH; or
c. Acceptable equivalent product.

E. Rubber Gaskets (between manhole sections)

1. In accordance with ASTM C443.
2. Gasket configuration per manufacturers recommendation.

F. Butyl Resin Gaskets (between manhole sections)

1. In accordance with ASTM C990.
2. Gasket configuration per manufacturers recommendation.

2.03 ACCESSORIES

A. Manhole Frames and Covers

1. Furnish all cast-iron manhole frames and covers conforming to the details shown on the drawings, or as hereinbefore specified.
2. Castings shall be of good quality, strong, tough, even-grained cast iron, smooth, free from scale, lumps, blisters, sandholes, and defects of every nature which would render them unfit for the service for which they are intended. Contact surfaces of covers and frame seats shall be machined to prevent rocking of covers.
3. Casting shall be thoroughly cleaned and subject to a careful hammer inspection.
4. Castings shall be at least Class 25 conforming to the ASTM A48.
5. Standard sewer manhole frames and covers to have 30 inch opening, and be E.L. LeBaron Foundry Co., Model LC326, or approved equal. Pattern of cover and lettering shall comply with the Owner’s standards.
6. Watertight sewer manhole frames to have 32 inch diameter covers with 4 bolts, and gasket, and be E.L. LeBaron Foundry Co., Model LCB326, or approved equal. Pattern of cover and lettering shall comply with the Owner’s standards.

B. Brick

1. Sound, hard, and uniformly burned brick, regular and uniform in shape and size, of compact texture, and satisfactory to the Engineer.
2. In accordance with ASTM C32, Red Sewer Brick Only Grade SS.
3. In accordance with AASHTO M91-42, Red Sewer Brick Only Grade SS.
4. Reject brick shall be immediately removed from the work.

C. Mortar for Brickwork

1. Composed of Portland cement, hydrated lime, and sand in which the volume of sand shall not exceed three times the sum of the volume of cement and lime.
2. The proportions of cement and lime shall be 1:1/4.
3. Cement shall be Type II Portland cement in accordance with Specification SECTION 03300.
4. Hydrated lime shall be Type S conforming to the ASTM C207.
5. Hydrated lime shall be "Mortaseal" manufactured by U.S. Gypsum or
6. "4X Hydrate" manufactured by the New England Lime Company or
7. An acceptable equivalent product.
8. The sand shall conform to ASTM C144.

2.04 STUBS IN MANHOLES

A. The stubs shall be of PVC pipe and shall have PVC stoppers sealed with premolded gasket joints in accordance with Specification SECTION 02622.

B. Lengths as indicated on the Drawings.

2.05 DROP INLETS

A. Construct with pipe as specified in SECTION 02622 or with precast concrete sections provided by the manhole manufacturer with all materials conforming to this Specification.

PART 3 EXECUTION

3.01 INSTALLATION

A. Manhole Sections

1. Set so as to be vertical and with sections and steps in true alignment.
2. Rubber gaskets shall be installed in all joints in accordance with the manufacturer's recommendations.
3. All holes in sections used for their handling shall be thoroughly plugged with rubber plugs made specifically for this purpose or with mortar. The mortar shall be one part cement to 1-1/2 parts sand, mixed slightly damp to the touch (just short of "balling"), hammered into the holes until it is dense and an excess of paste appears on the surface, and then finished smooth and flush with the adjoining surfaces.

B. Rubber and/or Butyl Resin Gaskets (between manhole sections)

1. In accordance with manufacturers recommendation.
2. Install in all joints between precast sections.

C. Brickwork

1. Only clean bricks shall be used.
2. Bricks shall be moistened by suitable means, until they are neither so dry as to absorb water from the mortar nor so wet as to be slippery when laid.
3. Each brick shall be laid in a full bed and joint of mortar without requiring subsequent grouting, flushing, or filling, and shall be thoroughly bonded.

D. Plastering And Curing Brick Masonry

1. Outside faces of brick masonry adjustment courses shall be plastered with mortar to a thickness of 1/2-inch.
2. If required, the masonry shall be properly moistened prior to application of the mortar.
3. The plaster shall be carefully spread and troweled. After hardening, the plaster shall be carefully checked by being tapped for bond and soundness.
4. Unbonded or unsound plaster shall be removed and replaced.
5. Brick masonry and plaster shall be protected from too rapid drying by the use of burlaps kept moist, or by other suitable means, and shall be protected from the weather and frost, to insure maximum strength.

E. Exterior Coating

1. The exterior surfaces of all manholes shall be given two coats of waterproofing material.
2. The waterproofing material shall be applied by brush or spray and in accordance with the instructions of the manufacturer.
3. Time shall be allowed between coats to permit sufficient drying so that the application of the second coat has no effect on the first coat.

3.02 SETTING MANHOLE FRAMES AND COVERS

A. Manhole frames shall be set with the tops conforming accurately to the grade of the pavement or finished ground surface or as indicated on the drawings or directed. Frames shall be set concentric with the top of the masonry and in full bed of mortar so that the space between the top of the manhole masonry and the bottom flange of the frame shall be completely filled and made watertight. A thick ring of mortar extending to the outer edge of the masonry shall be placed all around and on the top of the bottom flange. The mortar shall be smoothly finished and have a slight slope to shed water away from the frame.

B. Manhole covers shall be left in place in the frames on completion of work at the manholes.

3.03 INSTALLING STUBS IN MANHOLES

A. Stubs shall be set accurately to the required line and elevation and shall be installed in the manhole as indicated on the drawings and in accordance with Specification SECTION 02622.

3.04 DROP INLETS

A. Construct to the required line and elevations as indicated on the Drawings.

3.05 CLEANING

A. Manholes to be free of construction debris prior to final inspection.

3.06 STRUCTURES FOR DRAINAGE WORK

A. Installation of all Manholes, Inlets and Catch Basins to be used for drains shall be in accordance with Section 702 of the Rhode Island Standard Specification.

END OF SECTION

SECTION 02614

REINFORCED-CONCRETE DRAIN PIPE

PART 1 GENERAL

1.01 SUMMARY

A. Section Includes

1. Requirements for furnishing and installing the reinforced-concrete pipe as indicated on the drawings.

B. Related Sections

1. Section 02200 - Earthwork.
2. Section 02215 - Aggregate Materials.

1.02 QUALITY ASSURANCE

A. Reinforced-concrete pipe shall be made by a manufacturer of established good reputation in the industry and in a plant adapted to meet the design requirements of the pipe.

1.03 REFERENCES

A. American Association of State Highway and Transportation Officials.

1. M 170, Standard Specification for Reinforced Concrete Culvert, Storm Drain and Sewer Pipe.

B. American Society for Testing and Materials (ASTM).

1. C76, Specification for Reinforced Concrete Culvert, Storm Drain and Sewer Pipe.
2. C361, Specification for Reinforced Concrete Low-Head Pressure Pipe.
3. C443, Specification for Joints for Circular Concrete Culvert and Sewer Pipe, Using Rubber Gaskets.
4. C497, Standard Test Methods for Concrete Pipe, Manhole Sections, or Tile.

C. This specification makes reference to the requirements of additional specifications as listed. The Contractor shall obtain and familiarize himself with all requirements referenced by this specification.

1. Rhode Island Department of Transportation, Standard Specifications for Road and Bridge Construction, including all addenda, issued by the State of Rhode Island Department of Public Works, (referred to as the Standard Specification).

1.04 SUBMITTALS

A. In accordance with SECTION 01300 submit for review drawings showing the pipe dimensions reinforcement, joint, and other details for each type and class of pipe to be furnished for the project. All pipe furnished under the contract shall be manufactured only in accordance with the specifications and the reviewed drawings.

PART 2 PRODUCTS

2.01 PIPE

A. Each unit of pipe shall have an interior surface, which is free from roughness, projections, indentations, offsets, or irregularities of any kind. The pipe units shall be of the classes indicated on the drawings and shall conform to ASTM C76 and AASHTO M170 with the following exceptions and additions:

1. Type II cement shall be used unless otherwise permitted by the Engineer. Admixtures shall not be used except with the prior permission of the Engineer.
2. Aggregates shall conform to the requirements set forth hereinafter.
3. Elliptical reinforcement will not be permitted. Longitudinal reinforcement shall be continuous. Reinforcement shall have a minimum cover of 3/4 inches.
4. Absorption shall be as specified under "inspection, Tests and Acceptance."
5. Pipe units have a minimum laying length of 8 feet, except as otherwise indicated or permitted by the Engineer.
6. Pipe units shall be cured in accordance with ASTM C76.
7. No pipe shall be shipped until the pipe has meet strength requirements in accordance with ASTM C76.
8. There shall be no lift holes in the pipe.
9. Mortar used for repairs shall have a minimum compressive strength of 4,000 psi. at the end of 7 days and 5,000 psi. at the end of 28 days, when tested in 3-in. by 6 in. cylinders stored in the standard manner. Only those repairs permitted by the above-mentioned ASTM C76 will be allowed.
10. The date of manufacture, class of pipe unit, size of pipe unit, and trademark of the manufacturer shall be clearly and permanently marked on the inside and the outside at one end of each pipe unit.
11. Certified copies of tests on materials and the pipe units will be required.

B. Specials, if required, shall conform to the specifications for straight pipe insofar as applicable. Special design or construction necessary for specials shall be subject to acceptance by the Engineer.

2.02 JOINTS

A. Pipe joints shall be of the rubber gasket type in which the gaskets are in compression and which will permit both longitudinal and angular movement. Each unit of pipe shall be provided with proper ends made of concrete formed true to size and formed on machined rings to ensure accurate joint surface. Joints and gaskets shall be O-ring or ribbed gasket type and shall conform to the requirements of ASTM C443, and ASTM C361 and to the additional requirements specified.

2.03 INSPECTION, TESTS AND ACCEPTANCE

A. Acceptance will be on the basis of tests of materials, absorption tests, plant load-bearing tests, pressure tests, and inspection of the complete product. The required tests are enumerated hereinafter. The quality of all materials used in the pipe, the process of manufacture, and the finished pipe shall be subject to inspection by the Engineer. Inspection may be made at the place of manufacture, or on the work site after delivery, or both, and the pipe shall be subject to rejection at any time due to failure to meet any of the specification requirements, even though sample pipe units may have been accepted as satisfactory at the place of manufacture.

All pipe which is rejected shall be immediately removed from the project site by the Contractor.

B. Tests and certified copies in triplicate of test results will be required for the materials and the finished pipe units as described herein. If less than 100 units of a given size and class of pipe are required, the Contractor may submit certified copies of tests made on identical pipe units made by the same manufacturer within the past year. If more than 100 units of a given size and class of pipe are required, the Contractor shall, at his own expense, engage the services of an acceptable independent testing laboratory to perform or witness all tests, other than mill tests on reinforcing steel and cement, and certify the results. In addition, the Owner reserves the right to have any or all pipe units inspected or tested, or both, by an independent testing laboratory at either the manufacturer's plant or elsewhere. Such additional inspection and/or tests shall be at the Owner's expense and shall be the test results of record.

C. All pipe units to be tested shall be selected at random by the Engineer. Unless otherwise permitted, all load-bearing tests on pipe units shall be made in the presence of the Engineer.

D. All tests shall be made in accordance with the latest applicable ASTM specifications.

1. Reinforcing Steel--Mill test reports, or reports on samples taken from each shipment to the pipe manufacturer, shall be submitted for reinforcing steel to be used on this project stating that the reinforcing meets the specified requirements.
2. Cement--Mill test reports shall be submitted for each shipment to the pipe manufacturer of cement to be used on this project stating that the cement meets the specified requirements. All cement accepted for this project shall be kept segregated from other cement.
3. Aggregates--Tests reports shall be submitted stating that the aggregates to be used on this project meet the requirements for concrete aggregates as specified "Fine Aggregate" and "Coarse Aggregate" under SECTION 03300. The first report shall be submitted prior to the manufacturer of any pipe for this project. Additional tests and reports shall be made monthly thereafter during the production of the pipe.
4. Absorption Tests--Three cores shall be taken from each pipe unit that is to be load tested. The cores shall be taken before the load-bearing tests are performed. All cores shall be tested for absorption by the boiling absorption test. Average absorption shall not exceed 8 percent of the dry weight and no single test shall exceed 9 percent.
5. Pipe Unit Load-Bearing Tests (ASTM C497)--A load-bearing test shall be made on one pipe unit of each size and class and the report of the test submitted before delivery to the project of that size and class of pipe unit. An additional test will be required for each 200 units of each size and class of pipe. The load-bearing test shall be performed after the cores for the absorption tests have been taken. Each load-bearing test shall be carried to the specified load to produce the 0.01 in. crack. If the 0.01 in. crack is not formed, the pipe unit may be used in the project. Cored holes shall be plugged with the mortar specified above for repairs.
6. Pressure Test (ASTM C497)--A pressure test shall be made on two pipe units of each size and class to be used. Each pipe unit shall be bulkheaded independently and then joined together in a normal manner with the joint to be used in the work. The pipe units shall be held in place in such manner that no external compression force is exerted on the joint during the test. The test pressure shall be an average internal hydrostatic pressure of 12 psi and shall be maintained for at least 10 minutes without visible leakage from the joint. A description of the bulk-heading and pipe holding arrangement shall be submitted to the Engineer for review prior to performing the test. All pressure tests shall be made in the presence of the Engineer.

7. Concrete Cylinders--Compression tests shall be made on standard concrete cylinders for the first or test pipe unit and then for every 100 cubic yards of concrete used in pipe manufacture, or for each additional 200 units of pipe, whichever represents the lesser amount of concrete. Four cylinder shall be made for each test and they shall be broken at 7, 14, and 28 days with one cylinder as a spare to be used in the event of an unsatisfactory break. The reports shall be submitted within three days after each of the compression tests.

PART 3 EXECUTION

3.01 HANDLING PIPE

A. Each pipe unit shall be handled into its position in the trench only in such manner and by such means as is acceptable to the Engineer.

B. The Contractor will be required to furnish suitable devices to permit satisfactory support of all parts of the pipe unit when it is lifted.

3.02 INSTALLATION

A. Each pipe unit shall be inspected before being installed. Any pipe discovered to be defective either before or after installation shall be removed and replaced with a sound pipe.

B. Except as otherwise indicated on the drawings, the pipe shall be supported by compacted crushed stone. No pipe or fitting shall be permanently supported on saddles, blocking, or stones. Crushed stone shall be as specified under SECTION 02215.

C. Suitable bell holes shall be provided, so that after placement only the barrel of the pipe receives bearing pressure from the supporting material.

D. All pipe units shall be cleared of all debris, dirt, etc., before being installed and shall be kept clean until accepted in the completed work.

E. Pipe and fittings shall be installed to the lines and grades indicated on the drawings or as required by the Engineer. Care shall be taken to ensure true alignments.

F. Before any joint is made. the unit shall be checked to assure that a close joint with the next adjoining unit has been maintained and that the inverts are matched and conform to the required grade. The pipe shall not be driven down to the required grade by striking it with a shovel handle, timber, or other unyielding object.

G. All joint surfaces shall be cleaned. Immediately before jointing the pipe, the bell or groove shall be lubricated in accordance with the manufacturer's recommendation. Each pipe unit shall then be carefully pushed into place without damage to pipe or gasket. Suitable devices shall be used to force the pipe unit together so that they will fit with a minimum open recess inside and outside and have tightly seated joints. Care shall be taken not to use such force as to wedge apart and split the bell or groove ends. Joints shall not be pulled or cramped without the permission of the Engineer.

H. Immediately after the pipe joint is completed, the position of the gasket in the joint shall be inspected using a suitable feeler gage furnished by the Contractor, to be sure it is properly put

together and is tight. Joints in which the gasket is damaged or not properly positioned shall be pulled apart and remade using a new gasket.

I. Where any two pipe units do not fit each other closely enough to enable them to be properly jointed, they shall be removed and replaced with suitable units and new gaskets.

J. Details of gasket installation and joint assembly shall follow the directions of the manufacturer of the joint materials and of the pipe, all subject to acceptance by the Engineer. The resulting joints shall be watertight and flexible.

K. After each pipe to be supported on screened gravel has been properly bedded, enough gravel shall be placed between the pipe and the sides of the trench, and thoroughly compacted, to hold the pipe in correct alignment. Bell holes provided for jointing shall be filled with screened gravel and compacted, and then screened gravel shall be placed and compacted to complete the pipe bedding, as indicated on the drawings.

L. The Contractor shall take all necessary precautions to prevent floatation of the pipe in the trench.

M. At all times when pipe installation is not in progress, the open ends of the pipe shall be closed with temporary watertight plugs or by other suitable means. If water is in the trench when work is to be resumed, the plug shall not be removed until all conditions are suitable to prevent water, earth, or other material from entering the pipe.

N. Pipelines shall not be used as conductors for trench drainage during construction.

3.03 CLEANING

A. Care shall be taken to prevent earth, water, and other materials from entering the pipeline. As soon as possible after the pipe and manholes are completed, the Contractor shall clean out pipelines and manholes, being careful to prevent soil, water, and debris from entering any existing pipe.

END OF SECTION

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SECTION 02618

DUCTILE-IRON PIPE AND FITTINGS
FOR BURIED SERVICE

PART 1 GENERAL

1.01 SUMMARY

A. Section Includes

1. Requirements to furnish, lay, joint, and test ductile-iron pressure pipe, fittings (including special castings), and appurtenant materials and equipment indicated on the Drawings and specified in this Section.

B. Related Sections

1. Specification Section 15260 – Exterior Piping Installation

1.02 REFERENCES

A. American Water Works Association (AWWA)/American National Standards Institute (ANSI)

1. C104/A21.4, Cement-Mortar Lining for Ductile-Iron Pipe and Fittings for Water.
2. C105/A21.5, Polyethylene Encasement for Ductile Iron Pipe Systems
3. C110/A21.10, Ductile-Iron and Gray-Iron Fittings, 3-inch. through 48-inch., for Water and Other Liquids.
4. C111/A21.11, Rubber-Gasket Joints for Ductile-Iron and Pressure Pipe and Fittings.
5. C150/A21.50, Thickness Design of Ductile-Iron Pipe.
6. C151/A21.51, Ductile-Iron Pipe, Centrifugally Cast for Water.
7. C153/A21.53, Ductile-Iron Compact Fittings, 3 inches through 64 inches for Water Service
8. C219, Bolted, Sleeve-Type Couplings for Plain-End Pipe
9. C600, Installation of Ductile-Iron Water Mains and Their Appurtenances
10. C65l, Disinfecting Water Mains

B. American Society of Testing and Materials (ASTM)

1. A536, Standard Specification for Ductile Iron Castings

1.03 SUBMITTALS

A. In accordance with SECTION 01300 submit the following:

B. Shop Drawings

1. Piping layouts in full detail.
2. Location and type of backup block or device to prevent separation.
3. Schedules of all pipe, fittings, special castings, couplings, expansion joints, restrained joints and other appurtenances.
4. Detailed disinfection plan consistent with AWWA C651.

C. Certificates

1. Sworn certificates of shop tests showing compliance with appropriate standard.

D. Manufacturer's Literature

1. Catalog cuts of joints, couplings, harnesses, expansion joints, restrained joints gaskets, fasteners and other accessories.
2. Brochures and technical data of coatings and lining's and proposed method of application.

1.04 QUALITY ASSURANCE

A. Pipe and fittings to be inspected and tested at the foundry as required according to ANSI Standards.

B. Owner reserves right to inspect and/or test by independent service at manufacturer's plant or elsewhere at his own expense.

C. Owner reserves right to perform visual and hammer test prior to installation.

1.05 REQUIREMENTS

A. Water work shall be coordinated with the Kent County Water Authority (KCWA).

B. Ductile iron pipe used for water mains shall be cement lined Pressure Class 350 push-on joint, size as indicated on the drawings.

C. Ductile iron pipe used for sewer shall be ceramic, epoxy lined Pressure Class 350 boltless restrained joint pipe, size as indicated on the drawings.

D. For sewer pipeline use class as indicated.

E. Location of restrained joints shall be based on Thrust Restraint Design for Ductile Iron Pipe (Second Edition), published by Ductile Iron Pipe Research Association.

PART 2 PRODUCTS

2.01 PIPE

A. Ductile-Iron Pipe

1. Designed in accordance with AWWA/ANSI C150/ A21.50.
2. Manufactured in accordance with AWWA/ANSI C151/A21.51.
3. Ductile Iron Pipe to be used for sewer shall be Tyton joint pipe as manufactured by U.S. Pipe or approved equivalent.
4. Ductile Iron Pipe to be used for drain shall be in accordance with Section 701 and Subsection M.04.02 of the Rhode Island Standard Specification.
5. Unless otherwise indicated or specified, ductile-iron pipe shall be at least thickness Class 52.
6. Ductile Iron Pipe to be used for water shall be Class 54, zinc coated, and wrapped in V-BIO Enhanced Polywrap, or approved equal. Pipe shall meet the latest BWCA standards and requirements.

B. Pipe For Use With Couplings

1. As specified above except that the ends shall be plain (without bells or beads) cast or machined at right angles to the axis.

2.02 FITTINGS

A. General

1. Push-on or mechanical-joint fittings shall be all-bell fittings unless otherwise indicated or specified.
2. In accordance with AWWA/ANSI C110/A21.10.
   a. Fittings 24-inches in diameter and less shall be pressure Class 350.
   b. Fittings 30-inches to 48-inches in diameter shall be at least pressure Class 250.

Or

3. Compact fittings in accordance with AWWA/ANSI C153/A21.53 and shall have a working pressure rating of 350 psi

B. Nuts and Bolts

1. Ductile Iron or Kor-10 steel T bolts and nuts or approved equal.

C. Nonstandard Fittings

1. Fittings having nonstandard dimensions and cast especially for this project shall be of acceptable design.
2. Manufactured to meet the requirements of these specifications and shall have the same diameter and thickness as standard fittings, but their laying lengths and types of ends shall be determined by their positions in the pipelines and by the particular piping to which they connect.

2.03 ADAPTERS

A. Where it is necessary to joint pipes of different type, furnish and install the necessary adapters unless solid sleeves are indicated on the drawings or permitted. Adapters shall have ends, conforming to the above specifications for the appropriate type of joint, to receive the adjoining pipe. Adapters joining two classes of pipe may be of the lighter class provided that the annular space in bell-and-spigot type joints will be sufficient for proper jointing.

2.04 JOINTS

A. Push-On and Mechanical

1. In accordance with AWWA/ANSI C111/A21.11.
2. The plain end of push-on pipe shall be factory machined to a true circle and chamfered to facilitate fitting the gasket.
3. Push-on and mechanical-joint pipe and fittings shall be provided with sufficient quantities of accessories conforming to AWWA/ANSI C111/A21.11.

B. Restrained

1. Location of restrained joints shall be based on Thrust Restraint Design for Ductile Iron Pipe (Second Edition), published by Ductile Iron Pipe Research Association.
2. Restraining glands will be required on all fittings.
3. Pipe, fittings and appurtenances for restrained joints shall be in accordance with **[AWWA/ANSI C110/A21.10 for full body fittings] [AWWA/ANSI C153/A21.53 for compact fittings]**. Only restraining glands which impart multiple wedging action

against the pipe increasing its pressure as the pipe pressure increases will be allowed. Flexibility of the joint shall be maintained after burial. Glands shall be manufactured of ductile iron conforming to ASTM A536. Twist off nuts shall be used to insure proper actuating of the restraining device.

4. Mechanical joint restraint shall have a working pressure rating of at least 250 psi.
5. Manufactured by EBAA Iron, Inc., Eastland, Texas, or equal.

C. Gaskets

1. Gaskets shall be of a composition suitable for exposure to the product which the pipe is intended.

2.05 COUPLINGS

A. Flexible Connections

1. Where flexible connections in the piping are specified or indicated on the drawings, they shall be obtained by the use of sleeve-type couplings, split couplings, or mechanical-joint pipe and/or fittings as herein specified.

B. Sleeve Type Couplings

1. Pressure rating at least equal to that of the pipeline in which they are to be installed.
2. For sizes 2 1/2 to 16-inch diameter, up to 250 psi working pressure:
   a. Provide style 442 Long Sleeve, Cast Coupling by Smith Blair, Inc., Texarkana, Texas, or be acceptable equivalent products.
3. For sizes greater than 16-inch diameter, up to 150 psi working pressure:
   a. Provide style 411, with 10-inch long sleeve minimum, Steel Coupling by Smith Blair, Inc., Texarkana, Texas, or be acceptable equivalent products.
4. Nuts and Bolts to be **[galvanized-steel] [high strength, low alloy steel] [stainless steel],** unless noted otherwise.
5. Provided with gaskets of a composition suitable for exposure to the liquid within the pipe.
6. Provide with fusion bonded epoxy finish.
7. Conform to requirements of AWWA C219.

C. Solid Sleeve Couplings

1. Solid sleeve couplings and accessories shall be of a pressure rating at least equal to that of the pipeline in which they are to be installed.
2. Couplings shall be ductile iron with gaskets of a composition suitable for exposure to the liquid within the pipe.

2.06 ACCESSORIES

A. Tapped Connections

1. Tapped connections in pipe and fittings shall be made in such manner as to provide a watertight joint and adequate strength against pullout. The maximum size of taps in pipe or fittings without bosses shall not exceed the listed size in the appropriate table of the Appendix to the above-mentioned ANS A21.51 based on 3 full threads for cast iron and 2 full threads for ductile iron.
2. Where the size of the connections exceeds that given above for the pipe in question, a boss shall be provided on the pipe barrel, the tap shall be made in the flat part of the intersection of the run and branch of a tee or cross, or the connection shall be made by

means of a tapped tee, branch fitting and tapped plug or reducing flange, or tapping tee and tapping valve, all as indicated or permitted by the Engineer.

3. All drilling and tapping of cast-iron pipe shall be done normal to the longitudinal axis of the pipe; fitting shall be drilled and tapped similarly, as appropriate. Drilling and tapping shall be done only by skilled mechanics. Tools shall be adapted to the work and in good condition so as to produce good, clean-cut threads of the correct size, pitch, and taper.

2.07 FINISHES

A. Lining

1. Inside of pipe and fittings shall be coated with double thickness cement lining and bituminous seal coat conforming to AWWA/ANSI C104/A21.4.

B. Coating

1. Outside of pipe and fittings shall be coated with the standard bituminous coating conforming to AWWA/ANSI C151/A21.51

PART 3 EXECUTION

3.01 HANDLING

A. Pipe and Fittings

1. Every care shall be taken in handling and laying pipe and fittings to avoid damaging the pipe, scratching or marring machined surfaces, and abrasion of the pipe coatings.
2. Any fitting showing a crack and any pipe or fitting which has received a severe blow that may have caused an incipient fracture, even though no such fracture can be seen, shall be marked as rejected and removed at once from the Work.
3. In any pipe showing a distinct crack and in which it is believed there is no incipient fracture beyond the limits of the visible crack, the cracked portions, if so approved, may be cut off by and at the expense of the Contractor before the pipe is laid so that the pipe used is perfectly sound. The cut shall be made in the sound barrel at a point at least 12-inches from the visible limits of the crack.

3.02 CUTTING

A. Pipe

1. Except as otherwise approved, all cutting shall be done with a machine having rolling wheel cutters, knives, or saws adapted to the purpose. Hammer and chisel or so-called wheel span cutters shall not be used to cut pipe. All cut ends shall be examined for possible cracks caused by cutting.
2. Cut ends to be used with push-on joints shall be carefully chamfered to prevent cutting the gasket when the pipe is laid or installed.

3.03 INSTALLATION

A. Pipe and Fittings

1. No defective pipe or fittings shall be laid or placed in the piping, and any piece discovered to be defective after having been laid or placed shall be removed and replaced by a sound and satisfactory piece.

2. Each pipe and fitting shall be cleared of all debris, dirt, etc., before being laid and shall be kept clean until accepted in the complete work.
3. Pipe and fittings shall be laid accurately to the lines and grades indicated on the drawings or required. Care shall be taken to ensure a good alignment both horizontally and vertically.
4. Pipe shall have a firm bearing along its entire length. No pipe or fitting shall be permanently supported on saddles, blocking, or stones.
5. The deflection of alignment at a joint shall not exceed the appropriate permissible deflection as specified in the tabulation titled PIPE DEFLECTION ALLOWANCES.

PIPE DEFLECTION ALLOWANCES

Maximum permissible deflection, in.*

Size of pipe, in.	push-on joint	Mechanical joint
4	19	31
6	19	27
8	19	20
10	19	20
12	19	20
14	11	13-1/2
16	11	13-1/2
18	11	11
20	11	11
24	11	9
30	11	9
36	11	8
42	7-1/2	7-1/2
48	7-1/2	7-1/2
54	5-1/2	--

*Maximum permissible deflection for 18-ft. lengths; maximum permissible deflections for other lengths shall be in proportion of such lengths to 18 ft.

6. When mechanical joint, push-on joint or similar pipe is laid, the bell of the pipe shall be cleaned of excess tar or other obstructions and wiped out before the cleaned and prepared spigot of the next pipe is inserted into it. The new pipe shall be shoved firmly into place until properly seated and held securely until the joint has been completed.

B. Castings

1. Castings to be encased in masonry shall be accurately set with the bolt holes, if any, carefully aligned.
2. Immediately prior to being set, castings shall be thoroughly cleaned of all rust, scale and other foreign material.

C. Temporary Plugs

1. At all times when pipe laying is not actually in progress, the open ends of pipe shall be closed by temporary watertight plugs or by other approved means. If water is in the trench when work is resumed, the plug shall not be removed until all danger of water entering the pipe has passed.

D. Appurtenances

1. Valves, fittings and appurtenances shall be set and jointed as indicated on the drawings.

3.04 ASSEMBLING

A. Push-On Joints

1. Make up by inserting the gasket into the groove of the bell and applying a thin film of special nontoxic gasket lubricant uniformly over the inner surface of the gasket which will be in contact with the spigot end of the pipe.
2. The chamfered end of the plain pipe shall be inserted into the gasket and then forced past it until it seats against the bottom of the socket.

B. Bolted Joints

1. Before the pieces are assembled, rust-preventive coatings shall be removed from machined surfaces.
2. Pipe ends, sockets, sleeves, housings, and gaskets shall be thoroughly cleaned and all burrs and other defects shall be carefully smoothed.

C. Mechanical Joints

1. Surfaces against which the gasket will come in contact shall be thoroughly brushed with a wire brush prior to assembly of the joint. The gasket shall be cleaned. The gasket, bell, and spigot shall be lubricated by being washed with soapy water.
2. The gland and gasket, in that order, shall be slipped over the spigot, and the spigot shall be inserted into the bell until it is correctly seated.
3. The gasket shall then be seated evenly in the bell at all points, centering the spigot, and the gland shall be pressed firmly against the gasket.
4. After all bolts have been inserted and the nuts have been made up finger tight, diametrically opposite nuts shall be progressively and uniformly tightened all around the joint to the proper tension, preferably by means of a torque wrench.
5. The correct range of torque as indicated by a torque wrench and the length wrench (if not a torque wrench) used by an average man to produce such range of torque, shall not exceed the values specified in the tabulation titled TORQUE RANGE VALUES.

TORQUE RANGE VALUES

Nominal pipe size, in.	Bolt diameter, in.	Range of torque, ft.-lb.	Length of wrench, in.
3	5/8	40-60	8
4 thru 24	3/4	60-90	10
30, 36	1	70-100	12
42, 48	1-1/4	90-120	14

If the effective sealing of the joint is not attained at the maximum torque indicated above, the joint shall be disassembled and thoroughly cleaned, then reassembled. Bolts shall not be over stressed to tighten a leaking joint.

D. Restrained Joints

1. Install in accordance with manufacturers written instructions.
2. Do not exceed manufacturer’s permissible pipe deflection allowance.

E. Sleeve-Type Couplings

1. Prior to the installation of sleeve-type couplings, the pipe ends shall be cleaned thoroughly for a distance of 8-inches.
2. Soapy water may be used as a gasket lubricant.
3. A follower and gasket, in that order, shall be slipped over each pipe to a distance of about 6-inches from the end, and the middle ring shall be placed on the already laid pipe end until it is properly centered over the joint.
4. The other pipe end shall be inserted into the middle ring and brought to proper position in relation to the pipe already laid.
5. The gaskets and followers shall then be pressed evenly and firmly into the middle ring flares.
6. After the bolts have been inserted and all nuts have been made up finger tight, diametrically opposite nuts shall be progressively and uniformly tightened all around the joint, preferably by use of a torque wrench of the appropriate size and torque for the bolts. The correct torque as indicated by a torque wrench shall not exceed the manufacturers recommended values.
7. After assembly and inspection and before being backfield, all exterior surfaces of buried sleeve-type couplings, including the middle and follower rings, bolts, and nuts, shall be thoroughly coated with an approved heavy-bodied bituminous mastic. Care shall be taken and appropriate devices used to ensure that the undersides, as well as the more readily accessible parts, are well coated.

3.05 SOCKET PIPE CLAMPS, TIE RODS AND BRIDLES

A. Where indicated or necessary to prevent joints or sleeve couplings from pulling apart under pressure, suitable pipe clamps, tie rods or bridles shall be provided. Bridles and tie rods shall be at least 3/4 in. diameter except where they replace flange bolts of smaller size, in which case they shall be fitted with a nut on each side of the pair of flanges. The socket clamps, tie rods or bridles shall be coated with an approved bituminous paint after assembly or if necessary, prior to assembly.

3.06 PIPING SUPPORT (THRUST BLOCK)

A. Where necessary, bends, tees, and other fittings in pipelines buried in the ground may be backed up with 3000 psi concrete placed against undisturbed earth where firm support can be obtained. If the soil does not provide firm support, then restraining devices shall be provided.

3.07 CLEANING

A. Prior to the pressure and leakage tests, thoroughly clean piping of all dirt, dust, oil, grease and other foreign material. This work shall be done with care to avoid damage to linings and coatings.

3.08 TESTING

A. Except as otherwise directed, pipelines shall be given combined pressure and leakage tests in sections of approved length.

1. Provide 24 hour notice to Engineer for all testing

2. The Contractor shall make arrangements for procuring water for testing and be responsible for all associated fees.

B. Furnish and install suitable temporary testing plugs or caps; all necessary pressure pumps, pipe connections, meters, gages, relief valves, other necessary equipment; and all labor required.

C. Subject to approval and provided that the tests are made within a reasonable time considering the progress of the project as a whole, and the need to put the section into service, the Contractor may make the tests when he desires.

D. However, pipelines to be embedded in concrete shall be tested prior to placing of the concrete and exposed piping shall be tested prior to field painting.

E. Unless it has already been done, the section of pipe to be tested shall be filled with water of approved quality, and all air shall be expelled from the pipe. If hydrants or blow offs are not available at high points for releasing air the Contractor shall make the necessary excavations and do the necessary backfilling and make the necessary taps. After completion of the tests, if directed by the Engineer, remove corporations and plug said holes.

F. The section under test shall be maintained full of water for a period of 24 hours prior to the combined pressure and leakage test being applied.

G. The pressure and leakage test shall consist of first raising the water pressure (based on the elevation of the lowest point of the section under test and corrected to the gage location) to a pressure in pounds per square inch numerically equal to the pressure rating of the pipe but not to exceed 200 psi. Do not apply this pressure to items of equipment known to be incapable of withstanding such pressure.

H. If the Contractor cannot achieve the specified pressure and maintain it for a period of two hour with no additional pumping, the section shall be considered as having failed to pass the test.

I. If the section fails to pass the pressure and leakage test, the Contractor shall do everything necessary to locate, uncover, and repair or replace the defective pipe, fitting, or joint, all at his own expense and without extension of time for completion of the work. Additional tests and repairs shall be made until the section passes the specified test and is considered acceptable by the Engineer.

J. If, in the judgment of the Engineer, it is impracticable to follow the foregoing procedure exactly for any reason, modifications in the procedure may be made as required and approved by the Engineer, but in any event the Contractor shall be fully responsible for the ultimate tightness of the line within the above leakage and pressure requirement.

K. All testing to be witnessed by the Engineer.

3.09 DISINFECTING AND FLUSHING

A. The Contractor shall disinfect the lines carrying potable water.

B. Furnish all equipment and materials necessary to do the work of disinfecting, and shall perform the work in accordance with the procedure outlined in the AWWA Standard C651 except as otherwise specified herein.

C. During the disinfection period, care shall be exercised to prevent contamination of water in existing mains.

D. The dosage shall be such as to produce a chlorine concentration of not less than 10 PPM (mg/l) after a contact time of not less than 24 hours.

E. After treatment, the main shall be flushed with clean water until the residual chlorine content does not exceed 0.2 PPM (mg/l).

F. Before disposing of the water used in disinfecting and flushing water mains thoroughly neutralize it through the application of a reducing agent, as referenced in AWWA C651.

G. Dispose of the water used in disinfecting and flushing in an approved manner.

H. Bacteriological sampling and testing shall be done in accordance with AWWA C651 for each main and each branch. Sampling shall be accomplished with sterile bottles treated with sodium thiosulfate, as required by Standard Methods. No hose or fire hydrants shall be used in collection of samples. A corporation stop installed on the main, with a removable copper tube gooseneck assembly, is the recommended method.

I. Testing shall be done by a laboratory approved by the Engineer, in accordance with Standard Methods, and shall show the absence of coliform organisms. A standard plate count may be required at the option of the Engineer.

END OF SECTION

SECTION 02622

POLYVINYL CHLORIDE GRAVITY SEWER PIPE

PART 1 GENERAL

1.01 SUMMARY

A. Section Includes

1. Requirements for furnishing, installing and testing polyvinyl chloride (PVC) gravity sewer pipe and fittings.

B. Related Sections

1. Section 02200 - Earthwork
2. Section 02215 - Aggregate Materials

1.02 REFERENCES

A. American Society for Testing and Materials (ASTM) Publications

1. D3034, Specification for Type PSM Poly (vinyl chloride) (PVC) Sewer Pipe and Fittings.
2. D3212, Specification for Joints for Drain and Sewer Plastic Pipes Using Flexible Elastomeric Seals.
3. F477, Specification for Elastometric Seals (Gaskets) for Joining Plastic Pipe.
4. F679, Specification for Poly (vinyl chloride) (PVC) Large - Diameter Plastic Gravity Sewer Pipe and Fittings.

1.03 SUBMITTALS

A. Shop Drawings

1. In accordance with SECTION 01300 - SUBMITTALS.
2. Submit for review shop drawings showing pipe dimensions, joints, joint gaskets, and other details for each size of pipe to be furnished for the project.
3. All pipe furnished under the contract shall be manufactured only in accordance with the Specifications and the reviewed drawings.

B. Samples

1. Submit samples of products if requested by the Engineer.

1.04 QUALITY ASSURANCE

A. Certifications

1. All pipe delivered to the job site shall be accompanied by test reports certifying that the pipe and fittings conform to the herein-mentioned ASTM specifications.
2. Pipe shall be subject to thorough inspection and tests, the right being reserved for the Engineer to apply such tests as he deems necessary.

3. All tests shall be made in accordance with the methods prescribed by the herein-mentioned ASTM specifications, and the acceptance or rejection shall be based on the test results.
4. Assist the Engineer in inspecting the pipe upon delivery.
5. Pipe not conforming to the requirements of this contract will be rejected and shall be immediately removed from the site by the Contractor.

1.05 DELIVERY, STORAGE, AND HANDLING

A. Storage and Protection

1. All pipe shall be stored at the site until installation in accordance with the manufacturer's recommendations.

PART 2 PRODUCTS

2.01 MATERIALS

A. Pipe, Fittings, and Specials

1. Diameters 4-inch through 15-inch, in conformance with ASTM D3034.
2. Diameters 18-inch through 27-inch in conformance with ASTM F679, stiffness (PS) 175 psi
3. The pipe shall have pipe diameter to wall thickness ratio (SDR) of a maximum of 35, unless otherwise indicated and/or approved by the Engineer.

B. Straight Pipe

1. Lengths of not more than 13 ft...

C. Y-branches

1. Lengths of not more than 3 ft., unless otherwise permitted by the Engineer.
2. Saddle Y-branches will not be allowed.

D. Specials

1. Conform to the specifications for straight pipe as applicable and to the details indicated on the drawings or bound into the back of the specifications.

E. Joints

1. Conforming to ASTM D3212.
2. Push-on bell and spigot joints using elastomeric ring gaskets

F. Gaskets

1. Conforming to ASTM F477.
2. Securely fixed into place in the bells so that they cannot be dislodged during joint assembly.
3. Composition and texture which is resistant to common ingredients of sewage and industrial wastes, including oils and groundwater, and which will endure permanently under the conditions of the proposed use.

G. Lubricant

1. In accordance with manufacturer's requirements.

PART 3 EXECUTION

3.01 PREPARATION

A. Inspection of Pipe

1. Inspect each pipe unit before being installed.
2. No single piece of pipe shall be laid unless it is generally straight and undamaged.
3. The centerline of the pipe shall not deviate from a straight line drawn between the centers of the openings at the ends of the pipe by more than 1/16 in. per ft. of length.
4. If a piece of pipe fails to meet this required check for straightness, it shall be rejected and removed from the site.
5. Any pipe unit or fitting discovered to be defective either before or after installation shall be removed and replaced with a sound unit.

B. Handling of Pipe

1. Each pipe unit shall be handled into its position in the trench, by such means as acceptable to the Engineer. Care shall be taken to avoid damaging the pipe and fittings.

3.02 INSTALLATION

A. Placement

1. Except as otherwise indicated on the drawings, support pipe with compacted Crushed Stone in accordance with Specification SECTION 02215. No pipe or fitting shall be permanently supported on saddles, blocking, or stones.
2. Provide suitable depressions in crushed stone to accept pipe bells, so that after placement, only the barrel of the pipe receives bearing pressure from the supporting material.
3. Clear pipe and fittings of debris, dirt, etc., before being installed; keep clean until accepted in the completed work.
4. Install pipe and fittings to the lines and grades indicated on the drawings or as required by the Engineer. Care shall be taken to ensure true alignments and gradients.

B. Joining Pipe

1. Before any joint is made, the previously installed unit shall be checked to assure that a close joint with the adjoining unit has been maintained and that the inverts are matched and conform to the required grade.
2. The pipe shall not be driven down to the required grade by striking it with a shovel handle, timber or other unyielding object.
3. All joint surfaces shall be cleaned. Immediately before jointing the pipe, the bell or groove shall be lubricated in accordance with the manufacturer's recommendation.
4. Each pipe unit shall then be carefully pushed into place without damage to pipe or gasket.
5. Suitable devices shall be used to force the pipe units together so that they will fit with a minimum open recess inside and outside and have tightly sealed joints.
6. Care shall be taken not to use such force as to wedge apart and split the bell or groove ends.
7. Joints shall not be "pulled" or "cramped" unless permitted by the Engineer.
8. Where any two pipe units do not fit each other closely enough to enable them to be properly jointed, they shall be removed and replaced with suitable units.
9. Gasket installation and joint assembly shall follow the directions of the manufacturers of the joint material and of the pipe, all subject to review by the Engineer. The resulting joints shall be watertight and flexible.

10. Open ends of pipe and branches shall be closed with polyvinyl chloride stoppers secured in place in an acceptable manner.

C. Rejecting Pipe

1. Pipe of a particular manufacturer may be rejected if there are more than five unsatisfactory joint assembly operations or "bell breaks" in 100 consecutive joints, even though the pipe and joint conform to the appropriate ASTM Specifications as hereinbefore specified. If the pipe is unsatisfactory, as determined above, the Contractor shall, if required, remove all pipe of that manufacturer of the same shipment from the work and shall furnish pipe from another manufacturer which will conform to all of the requirements of these specifications.

D. Bedding Pipe

1. After each pipe has been properly placed, enough crushed stone shall be placed between the pipe and the sides of the trench, and thoroughly compacted, to hold the pipe in correct alignment.
2. Bell holes (depressions), provided for jointing, shall be filled with crushed stone and compacted, and then crushed stone shall be placed and compacted to complete the pipe bedding, as indicated on the drawings.

E. Protecting Pipe

1. Take all necessary precautions to prevent flotation of the pipe in the trench.
2. Close the open ends of the pipe with temporary watertight plugs; at all times pipe installation is not in progress.
3. If water is in the trench when work is to be resumed, the plug shall not be removed until suitable provisions have been made to prevent water, earth, or other substances from entering the pipe.
4. Pipelines shall not be used as conductors for trench drainage during construction.

F. Sleeve-Type Couplings

1. Prior to the installation of sleeve-type couplings, the pipe ends of the new pipe and the existing service pipe shall be cleaned thoroughly for a distance of eight (8) inches
2. After assembly and inspection and before being backfield, all exterior surfaces of buried sleeve-type couplings, shall be thoroughly coated with an approved heavy-bodied bituminous mastic. Care shall be taken and appropriate devices used to ensure that the undersides, as well as the more readily accessible parts, are well coated.

G. Backfilling Pipelines

1. In accordance with SECTION 02200.

3.03 ALLOWABLE PIPE DEFLECTION

A. Pipe provided under this specification shall be installed not exceeding a maximum deflection of 7.5 percent. Deflection shall be computed by multiplying the amount of deflection (nominal diameter less minimum diameter when measured) by 100 and dividing by the nominal diameter of the pipe.

B. Upon completion of a section of sewer, including placement and compaction of backfill, the Contractor shall measure the amount of deflection by pulling a specially designed gauge assembly through the completed section. The gage assembly shall be in accordance with the recommendations of the pipe manufacturer and be acceptable to the Engineer.

C. Should the installed pipe fail to meet this requirement, the Contractor shall do all work to correct the problem as the Engineer may require without additional compensation.

3.04 CLEANING

A. Care shall be taken to prevent earth, water, and other materials from entering the pipeline. As soon as possible after the pipe and manholes are completed, clean out the pipeline and manholes, being careful to prevent soil, water, and debris from entering any existing sewer.

3.05 FIELD QUALITY CONTROL

A. Pipeline Flushing

1. Care shall be taken to prevent earth, water, and other materials from entering the pipe... As soon as possible after the pipe and manholes are completed on any street, flush out the new pipeline, using a rubber ball ahead of the water, flushing water or debris will not be permitted to enter any existing sewer.

B. Inspection by Light

1. The alignment of the pipe will be checked by shining a flashlight through the pipe from one manhole to the adjacent manhole. The inspector must be able to see the full circumference of the lighted pipe for its entire length when looking through the pipe from the adjacent manhole towards the manhole from which the light is being emitted.

C. Leakage Tests

1. The pipeline shall be made as nearly watertight as practicable, and leakage tests and measurements shall be made after the pipeline has been backfilled.
2. Where the groundwater level is more than 1 ft. above the top of the pipe at its upper end, the Contractor shall conduct either infiltration tests or low pressure air tests.
3. Where the groundwater level is less than 1 ft. above the top of the pipe at its upper end, conduct either exfiltration tests or low-pressure air tests.
4. At the time of the test, determine the groundwater elevation from observation wells, excavations or other means, all subject to review by the Engineer.
5. For making the infiltration and exfiltration tests, furnish suitable test plugs, water pumps, and appurtenances, and all labor required to properly conduct the tests on sections of acceptable length.
6. The sewers shall be tested before any connections are made to buildings.
7. Provide all instruments, weirs, bulkheads, water and equipment required to test the sewer.
8. Should the sections under test fail to meet the requirements, the Contractor shall do all work of locating and repairing leaks and retesting as the Engineer may require without additional compensation.
9. If, the in the judgment of the Engineer, it is impracticable to follow the procedures specified in this Specification for any reason, acceptable modifications in the procedures shall be made as required, but in any event, the Contractor shall be responsible for the ultimate tightness of the line.

D. Low Pressure Air Test

1. For making the low-pressure air tests, use equipment specifically designed and manufactured for the purpose of testing sewer pipelines using low-pressure air. The equipment shall be provided with an air regulator valve or air safety so set that the internal air pressure in the pipeline cannot exceed 8 psig.

2. The leakage test using low pressure air shall be made on each manhole-to-manhole section of pipeline after placement of the backfill.
3. Pneumatic plugs shall have a sealing length equal to or greater than the diameter of the pipe to be tested. Pneumatic plugs shall resist internal test pressures without requiring external bracing or blocking.
4. All air used shall pass through a single control panel.
5. Low-pressure air shall be introduced into the sealed line until the internal air pressure reaches 4 psig. greater than the maximum pressure exerted by the groundwater that may be above the invert of the pipe at the time of the test. However, the internal air pressure in the sealed line shall not be allowed to exceed 8 psig. When the maximum pressure exerted by the groundwater is greater than 4 psig. conduct only an infiltration test.
6. At least two minutes shall be allowed for the air pressure to stabilize in the section under test. After the stabilization period, the low-pressure air supply hose shall be quickly disconnected from the control panel. The time required in minutes for the pressure in the section under test to decrease from 3.5 to 2.5 psig (greater than the maximum pressure exerted by groundwater that may be above the invert of the pipe) shall not be less than that shown in the following table:

Pipe diameter in inches	Minutes	Pipe diameter in inches	Minutes
6	3.0	18	9.0
8	4.0	21	10.0
10	5.0	24	11.5
12	5.5	27	13.0
15	7.5		

E. Infiltration Test

1. For making the infiltration tests, underdrains, if used, shall be plugged and other groundwater drainage shall be stopped to permit the groundwater to return to its normal level insofar as practicable.
2. Upon completion of a section of the sewer, dewater it and conduct a satisfactory test to measure the infiltration for at least 24 hours. The amount of infiltration, including manholes, tees, and connections, shall not exceed 100 gal. per inch diameter per mile of sewer per 24 hours.

F. Exfiltration Test

1. For making the exfiltration tests, the sewers shall be subjected to an internal pressure by plugging the pipe at the lower end and then filling the pipelines and manholes with clean water to a height of 2 ft. above the top of the sewer at its upper end. Where conditions between manholes, may result in test pressures which would cause leakage at the stoppers in branches, provisions shall be made by suitable ties, braces, and wedges to secure the stoppers against leakage resulting from the test pressure.
2. The rate of leakage from the sewers shall be determined by measuring the amount of water required to maintain the level 2 ft. above the top of the pipe.
3. Leakage from the sewers under test shall not exceed the requirements for leakage into sewers as hereinbefore specified.

END OF SECTION

SECTION 02629

UNDERGROUND UTILITY MARKING TAPE

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Requirements for furnishing and installing metallic (detectable) and non-metallic (non-detectable) marking tape over buried pipelines and conduits.

1.02 REFERENCES

A. APWA - American Public Works Association

1.03 SUBMITTALS

A. Shop Drawings

1. Submit in accordance with Section 01300.

B. Samples

1. Provide samples of submitted products.

1.04 DESCRIPTION

A. General

1. Marking tape to be installed over all sewer service lines, water lines and conduits installed under this Contract.
2. Marking tape for non-ferrous pipe or conduits to be Detectable, magnetic type.
3. Marking tape for ferrous pipe or conduits to be Non-detectable, non-magnetic type.
4. Tape to be 3 inches wide.

PART 2 PRODUCTS

2.01 MANUFACTURERS

A. Underground utility marking tape to be:

1. Detectable: Magnatec by THOR Enterprises, Inc., Sun Prairie, WI.
2. Non-detectable: Shieldtec by THOR Enterprises, Inc., Sun Prairie, WI.
3. Or product deemed equal by the Engineer.

2.02 MATERIALS

A. Detectable Underground Utility marking Tape

1. Minimum overall thickness: 5.0 mil (0.005”).
2. Aluminum foil core: 35 gauge (0.00035”) minimum.
3. Foil visible from both sides of tape.
4. Protective plastic jacket applied to both sides of foil.
5. Jacket adhesive applied directly to the film and foil.
6. No printing to extend to the edges of the tape.
7. No Dilutants, pigments or contaminants in the adhesive.
8. Adhesive formulated to resist degradation by elements normally found in soil.

B. Non-detectable Underground Utility marking Tape

1. Minimum overall thickness: 4.0 mil (0.004”).
2. Polyethylene plastic film: 100% virgin, low density acid and alkali-resistant.
3. Printing: Permanent, black, environmentally safe.
4. Coloring: color-fast, lead free, organic pigments suitable for direct burial and prolonged exposure to the elements normally found in soil.

C. Marking

1. Tape shall be printed with “BURIED *UTILITY* LINE BELOW”, replacing the word “*UTILITY”* with the word “WATER”, “SEWER”, “DRAIN”, “ELECTRIC’, “GAS”, or otherwise appropriate, repeating continuously every 30-inches max.

D. Color Code in accordance with APWA Standards as follows:

1.	Safety Red	Electric power and high voltage lines
2.	High Visibility Safety Yellow	Gas and oil distribution/Transmission Dangerous materials/Steam
3.	Safety Alert Orange	Fiber optic/telephone/CATV
4.	Safety Precaution Blue	Water and irrigation lines
5.	Safety Green	Sewer/storm/sanitary systems, non-potable water
6.	Safety Brown	Force mains and effluent lines
7.	Alert Purple	Reclaimed and effluent re-use lines

PART 3 EXECUTION

3.01 INSTALLATION

A. Install marking tape directly above the pipe line or conduit tape approximately 24 inches below the proposed finished grade.

B. Install marking tape in accordance with manufacturer’s recommendations.

C. Install marking tape over existing utilities disturbed by the Contractors operation.

END OF SECTION

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SECTION 02720

CATCH BASINS

PART 1 GENERAL

1.01 SUMMARY

A. Section Includes
1. Requirements to construct, adjust abandon, or rebuild all catch basins as indicated on the drawing and as specified.

B. Related Sections
1. Section 03300 - Cast-In-Place Concrete

1.02 REFERENCES

A. This specification makes reference to the requirements of additional specifications as listed. The Contractor shall obtain and familiarize himself with all requirements referenced by this specification.

1. Materials and construction methods shall conform, insofar as applicable, to the requirements of the Rhode Island Department of Transportation Standard Specifications for Road and Bridge Construction, together with all errata addenda additional revisions, and supplemental specifications, (referred to as the Standard Specification).

B. American Society for Testing and Materials (ASTM).

1. A48, Specification for Gray Iron Castings.
2. C32, Specification for Sewer and Manhole Brick (Made from Clay or Shale).
3. C139, Specification for Concrete Masonry Units for Construction of Catch Basins and Manholes.
4. C150, Specification for Portland Cement.
5. C207, Specification for Hydrated Lime for Masonry Purposes.
6. C478, Specification for Precast Reinforced Concrete Manhole Sections.

1.03 DESIGN REQUIREMENTS

A. Catch basins shall conform in shape, size, dimensions, materials, and other respects to the details indicated on the drawings or bound in the specifications or as ordered by the Engineer.

PART 2 PRODUCTS

2.01 MATERIALS

A. Catch basin walls shall be precast concrete masonry units. The top of the cone (not to exceed 6 inches.) shall be built of brickwork to permit adjustment of the frame to meet the finished surface.

B. Catch basin sumps shall be one piece precast concrete or concrete masonry units on cast-in-place or precast concrete bases.

C. The cast-iron frames and grates shall be the standard as indicated on the drawings.

D. All cast-in-place concrete shall be 4,000 psi and shall conform to the requirements specified under SECTION 03300.

2.02 PRECAST CONCRETE MASONRY UNITS

A. Precast concrete masonry units shall be machine-made solid segments, conforming to ASTM C139 with the following exceptions and additional requirements:
   1. Type II cement shall be used except as otherwise permitted.
   2. The width of the units shall be as indicated on the drawings.
   3. The inside and outside surfaces of the units shall be curved to the necessary radius and so designed that the interior surfaces of the structures shall be cylindrical, except the top batter courses shall be designed to reduce uniformly the inside section of the structure to the required size and shape at the top.
   4. Units shall be designed such that only full-length units are required to lay any one course.
   5. Acceptance of the units will be on the basis of material tests and inspection of the completed product.

2.03 PRECAST CONCRETE SUMPS

A. Precast concrete sumps shall conform to the ASTM C478, with the following exceptions and additional requirements:
   1. The wall section shall be not less than 6-inch thick.
   2. Type II cement shall be used except as otherwise permitted.
   3. Sumps shall be cured by subjecting them to thoroughly saturated steam at a temperature between 100 and 130 degrees. F. for a period of not less than 12 hours or, when necessary, for such additional time as may be needed to enable the sections to meet the strength requirements.
   4. No more than two lift holes may be cast or drilled in each sump.
   5. Acceptance of the sumps will be on the basis of material tests and inspection of the completed product.

B. All holes in sumps used for their handling shall be thoroughly plugged with rubber plugs made specifically for this purpose or with mortar. The mortar shall be one part cement to 1-1/2 parts sand, mixed slightly damp to the touch (just short of "balling"), hammered into the holes until it is dense and an excess of paste appears on the surface, and then finished smooth and flush with the adjoining surfaces.

2.04 BRICKS

A. The brick shall be sound, hard, and uniformly burned brick, regular and uniform in shape and size, of compact texture, and satisfactory to the Engineer. Brick shall conform to ASTM C32 for Grade SS, hard brick, except that the mean of five tests for absorption shall not exceed 8 percent by weight.

B. Rejected brick shall be immediately removed from the work.

2.05 MORTAR FOR BRICKWORK

A. The mortar shall be composed of Portland cement, hydrated lime, and sand, in which the volume of sand shall not exceed three times the sum of the volumes of cement and lime. The proportions of cement and lime shall be as directed and may vary from 1:1/4 for dense, hard-burned brick to 1:3/4 for softer brick. In general, mortar for Grade SS Brick shall be mixed in the proportions of 1-1/2:4-1/2.

B. Cement shall be Type II Portland cement conforming to the ASTM C150.

C. Hydrated lime shall be Type S conforming to the ASTM C207.

D. The sand shall comply with the specifications for fine aggregate, specified in Section 03300, except that all of the sand shall pass a No. 8 sieve.

2.06 MORTAR FOR MASONRY UNITS

A. Mortar shall be composed of one part Portland cement and two parts of sand by volume with sufficient water to form a workable mixture. Cement and sand shall be as specified for mortar for brickwork.

2.07 CATCH BASIN FRAMES AND GRATES

A. Furnish and install all cast-iron catch basin frames and grates conforming to the details indicated on the drawings and as specified.

B. Castings shall be of good quality, strong, tough, even-grained cast iron, smooth, free from scale, lumps, blisters, sand holes, and defects of every nature which would render them unfit for the service for which they are intended. Contact surfaces of grates and frame seats shall be machined to prevent cocking of grates.

C. All castings shall be thoroughly cleaned and subject to a careful hammer inspection.

D. Castings shall be at least Class 25 conforming to the ASTM A48.

E. Unless otherwise specified or indicated on the drawings, castings in paved areas shall be capable of withstanding AASHO H-20 loading and shall meet the requirements of the municipality in which they are installed.

2.08 CURB INLETS

A. Granite for curb inlets shall have a horizontal bed. The stone shall be sawn or peen hammered on top, and the front and back edges shall be pitched true to line. The back face for a distance of 3-inches down from the top shall have no projection greater than 1 inch. The front face shall be straight split, free from drill holes, and it shall have no projection greater than 1-inch or depression greater than 1/2 inch for a distance of 10-inch down from the top, and for the remaining distance there shall be no depression or projection greater than 1 inch. The ends shall be squared with the top for the depth of the face finish and so cut that the curb inlet can be set with joints of not more than 1/2 inch.

B. Granite curb inlet shall be 3 ft. minimum in length, plus or minus 1/2 inch, from 17 to 19 inches in depth, 7 inch wide at the top and at least 7 inches wide at the bottom.

C. A gutter mouth at least 3 inches in depth and at least 2 feet in length shall be cut in the front face of the stone as shown on the plans.

D. Where curb inlets are used to replace a section of existing curbing, the width of the curb inlet shall be the same as the adjoining existing curbing.

PART 3 EXECUTION

3.01 LAYING BRICKWORK AND GRADING RINGS

A. Only clean bricks and grading rings shall be used. Bricks shall be moistened by suitable means, as directed, until they are neither so dry as to absorb water from the mortar nor so wet as to be slippery when laid.

B. Each brick shall be laid in a full bed and joint of mortar without requiring subsequent grouting, flushing, or filling, and shall be thoroughly bonded as directed.

C. Each grading ring shall be laid in a full bed of mortar and shall be thoroughly bonded.

3.02 PLASTERING AND CURING BRICK MASONRY

A. Outside faces of brick masonry shall be plastered with mortar from 1/4 in. to 3/8 in. thick. If required, the masonry shall be properly moistened prior to application of the mortar. The plaster shall be carefully spread and troweled. After hardening, the plaster shall be carefully checked by tapping for bond and soundness. Unbounded or unsound plaster shall be removed and replaced.

B. Brick masonry and plaster shall be protected from too rapid drying by the use of burlaps kept moist, or by other acceptable means, and shall be protected from the weather and frost, all as required.

3.03 SETTING CASTINGS

A. Curb inlets and frames shall be set with the tops conforming accurately to the grade of the pavement or finished ground surface or as indicated on the drawings or directed. Circular frames shall be set concentric with the top of the masonry and in a full bed of mortar so that the space between the top of the manhole masonry and the bottom flange of the frame shall be completely filled and made watertight. A thick ring of mortar extending to the outer edge of the masonry shall be placed all around and on the top of the bottom flange. The mortar shall be smoothly finished and have a slight slope to shed water away from the frame.

B. Grates shall be left in place in the frames on completion of other work at the manholes.

3.04 CATCH BASINS ADJUSTED TO GRADE

A. Existing catch basin tops shall be adjusted to line and grade as indicated on the drawings or as directed by the Engineer.

B. All catch basins adjusted to grade shall be provided with concrete grading rings or brick as specified for new drain manholes.

3.05 REBUILDING OF EXISTING CATCH BASIN

A. Cut suitable openings in existing structures to make connections to drains as indicated on the drawings and as specified or directed. In doing so, confine the cutting to the smallest amount possible consistent with the work to be done.

B. After the drains are installed, carefully fit around, close up, and repair the structures watertight, all as acceptable to the Engineer.

C. Prior to starting work, assembled all tools, materials, and construction equipment required to complete the work in the shortest possible time.

END OF SECTION

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SECTION 02750

ABANDONMENT OF EXISTING SEWERS AND DRAINS

PART 1 GENERAL

1.01 SUMMARY

A. Section Includes

1. Requirements for abandoning existing combined sewers, sanitary sewers, storm drains and manholes as indicated on the Drawings and as specified.

B. Related Sections

1. Section 02149 – Maintaining Existing Flows
2. Section 02200 – Earth Excavation
3. Section 02224 – Controlled Density Fill
4. Section 03300 - Cast-In-Place Concrete

1.02 REFERENCES

A. American Society for Testing and Materials (ASTM)

1. C32, Standard Specification of Sewer and Manhole Brick (Made from Clay or Shale), AASHTO Designation M91-42, Red Sewer Brick Only Grade SS.
2. C144, Standard Specification for Aggregate for Masonry Mortar.
3. C150, Standard Specification for Portland Cement.
4. C207, Standard Specification for Hydrated Lime for Masonry Purposes.

1.03 SUBMITTALS

A. Shop Drawings

1. In accordance with Specification SECTION 01300 - SUBMITTALS.

B. Samples

1. Provide representative samples of materials if requested by the Engineer.

PART 2 PRODUCTS

2.01 PLUGS

A. General

1. Plugs shall meet the following thickness requirements:

Sewer/Drain Diameter	Thickness of Plug Concrete	Brick & Mortar
15-inch and less	12-inch	8-inch
15 to 30-inch	24-inch	16-inch
Greater than 30-inch	36-inch	24-inch

2. For non-circular pipes, the largest cross-sectional dimension shall govern in determining the size of the plug.
3. Bricks with more than one layer of thickness shall be interlocked.
4. Mechanical plugs will not be allowed.

B. Cement

1. Minimum 4,000 psi cement concrete materials in accordance with Section 03300, or brick masonry.

C. Brick

1. Sound, hard, and uniformly burned brick, regular and uniform in shape and size, of compact texture, and satisfactory to the Engineer.
2. In accordance with ASTM C32, Red Sewer Brick Only Grade SS.
3. In accordance with AASHTO M91-42, Red Sewer Brick Only Grade SS.

D. Mortar for Brickwork

1. Composed of Portland cement, hydrated lime, and sand in which the volume of sand shall not exceed three times the sum of the volume of cement and lime.
2. The proportions of cement and lime shall be 1:1/4.
3. Cement shall be Type II Portland cement in accordance with ASTM C150.
4. Hydrated lime shall be Type S conforming to the ASTM C207.
5. Hydrated lime shall be "Mortaseal" manufactured by U.S. Gypsum or
6. "4X Hydrate" manufactured by the New England Lime Company or
7. An acceptable equivalent product.
8. The sand shall conform to ASTM C144.

E. Pipe Fill Material

1. Class II Controlled Density Fill (excavatable fill, very flowable)

F. Manhole Fill Material

1. Sand in accordance with Section 03300, Fine Aggregate.

PART 3 EXECUTION

3.01 INSTALLATION

A. Plugs

1. Plug existing combined sewers, sanitary sewers and storm drains, as indicated on the Drawings and as specified.
2. Plugs shall withstand the full soil and groundwater pressure.
3. Pipe entering a manhole or catch basin that are to be abandoned shall have a plug installed that is flush with the interior of the structure.
4. Sewer and drain services 6-inches or 8-inches in diameter shall be plugged with a precast concrete plug. Such plugs shall be made watertight with an application around the plug of an approved watertight compound.

B. Pipe Fill

1. Existing combined sewers, sanitary sewers and storm drains to be abandoned that are greater or equal to 12-inches in diameter shall be abandoned, plugged and filled with Class II Controlled Density Fill (excavatable fill, very flowable). Fill a minimum of 95% of the total inside volume of the pipe.
2. Existing combined sewers, sanitary sewers and storm drains to be abandoned that are less than 12-inches in diameter shall be abandoned and plugged, but not filled.
3. Underdrains shall be filled as indicated.

C. Manhole Fill

1. Clean manhole of all special waste and debris.
2. Plug pipelines entering manhole as specified above.
3. Remove and dispose frame and cover and all concrete and masonry to a minimum depth of four (4) feet below existing ground surface.
4. Bottom of manhole to be core drilled, drilled or broken to allow unrestricted migration of groundwater through the manhole.
5. Fill remaining manhole structure with compacted sand.
6. Backfill excavation in accordance with Section 02200,

END OF SECTION

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SECTION 02831

CHAIN LINK FENCES AND GATES

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Requirements to furnish and install chain-link fences, gates, and accessories.

1.02 DESIGN REQUIREMENTS

A. The fence shall be of the height indicated and shall have a top rail and bottom tension wire.

B. Fence materials and installation shall meet or exceed the standards of the Chain Link Fence Manufacturers Institute, Columbia, MD., except as otherwise specified in this section; also fence materials shall meet or exceed Fed. Spec. RR-F-191G/GEN for Fencing, Wire and Post Metal (and Gates, Chain-link Fence Fabric, and Accessories), and shall conform to the ASTM Standards noted in this Specification.

1.03 RELATED SECTIONS

A. Section 03300 - Cast-In-Place Concrete.

B. Section 11152 - Parking Gate

1.04 REFERENCES

A. Fed. Spec. RR-F-191/1A, Type V, for Fencing, Wire and Post, Metal (Chain-link Fence Fabric).

B. American Society for Testing and Materials (ASTM).

1. A121, Specification for Zinc-Coated (Galvanized) Steel Barbed Wire.
2. A392, Specification for Zinc-Coated Steel Chain-Link Fence Fabric.
3. A491, Specification for Aluminum-Coated Steel Chain Link Fence Fabric.
4. A824, Specification for Metallic-Coated Steel Marcelled Tension Wire for Use with Chain Link Fence.
5. F 626, Specification for Fencing Fittings
6. F668, Standard Specification for Poly (Vinyl Chloride) (PVC)-Coated Steel Chain Link Fence Fabric.
7. F669, Standard Specification for Strength Requirements of Metal Posts and Rails for Industrial Chain Link Fence.
8. F900, Standard Specification for Industrial and Commercial Swing Gates.
9. F934, Standard Specification for Standard Colors for Polymer Coated Chain Link Fence Materials.
10. F1043, Specification for Strength and Protective Coatings on Metal Industrial Chain Link Fence Framework

11. F1083, Specification for Pipe, Steel, Hot-Dipped Zinc-Coated (Galvanized) Welded, for Fence Structures.
12. F1183, Specification for Aluminum Alloy Chain Link Fence Fabric.
13. F1184, Specification for Industrial and Commercial Horizontal Slide Gates.
14. F1234, Protective Coatings on Steel Framework for Fences.
15. F1664, Specification for Poly (Vinyl Chloride) (PVC)-Coated Steel Tension Wire Used with Chain Link Fence.
16. F1665, Specification for Poly (Vinyl Chloride) (PVC)-Coated Steel Barbed Wire Used with Chain Link Fence.

1.05 SUBMITTALS

A. Shop Drawings, submit in accordance with SECTION 01300.

1. Include detailed information, specifications, sizes and dimensions for all materials, accessories, and finishes.

B. Samples

1. Submit samples of the fencing materials to be used, in accordance with the requirements of SECTION 01300.
2. Each sample shall be identified by mark or tag.
3. Samples to include:
   a. 2-inch length of each type of post.
   b. 2-inch length of each type of brace and railing.
   c. 2-inch length of framework for gates.
   d. 2-inch length of diagonal truss brace.
   e. 2-inch length of tension wire.
   f. Each type of fitting used at terminal posts.
   g. Fittings used at line posts.
   h. Fittings for the gate leaf frame.
   i. Gate hinge.
   j. Gate latch.
   k. Stretcher bar, 2-inch length.
   l. Bolt and nut fastener.
   m. Fence fabric, 2 weaves, 2 meshes long.
   n. Tie.
   o. Padlock with key and steel chain, 6-inch length.
4. Accompanying the samples, the Contractor shall submit a written statement that samples submitted comply with the requirements of these Contract Documents.
5. Samples shall be submitted for review at least 30 days prior to fence installation.

C. Quality Control Submittals

1. Manufacturer’s recommended installation instructions.
2. Evidence of Supplier and installer qualifications.

PART 2 PRODUCTS

2.01 GENERAL

A. Match style, finish, and color of each fence component with that of other fence components.

B. All fittings, post, fence and gate framework, and all accessories shall be galvanized steel, then coated with PVC.

2.02 CHAIN LINK FABRIC

A. Fabric shall be woven in 2-inch mesh from 9-gage wire, (standard industrial). Diamond count shall be manufacturer's standard.

B. Zinc-Coated Steel in accordance with ASTM A392, Class 2 (weight of zinc coating not less than 1.2 oz/sf); galvanized after weaving.

C. Polyvinylchloride coated (PVC) chain-link fabric in accordance with ASTM F668, Class 2A PVC coating extruded onto wire that is zinc coated .

D. Aluminum coated fabric conforming to ASTM A491.

E. Aluminum Alloy fabric conforming to ASTM F1183.

F. Fabric Height: 72 inches unless otherwise shown.

G. Selvages: Fabric with 2 inch or 2-1/8 inch mesh, in heights less than 72-inches high, both selvages to be knuckled. For fences with fabric 72-inches high and greater, one selvage to be knuckled and one selvage to be twisted.

H. Color of the PVC coating: as indicated on the plans, or shall match the color of the total fence system.

2.03 FENCE POSTS, RAILS AND BRACES

A. General

1. In accordance with ASTM F669, Heavy Industrial Fence.
2. Protective Coatings: Zinc Coating; ASTM F1234, Type A external and internal coating.
3. Color coating: ASTM F934, minimum 10 mils thickness of PVC over zinc coating to match color of chain link fabric.

B. Line Posts

1. 2.375 inch outside diameter steel pipe weighing not less than 3.65 lb. per ft.,

C. End, Corner, and Pull Posts

1. 2.875 inch outside diameter steel pipe weighing not less than 5.79 lb. per ft.,

D. Top and bottom railings and railings for top, middle and bottom braces between terminal posts and adjacent line posts.

1. 1 5/8 inch outside diameter steel pipe weighing not less than 2.26 lb. per ft.,

2.04 TENSION WIRE

A. No. 7-gage, marcelled, coated steel wire conforming to ASTM A824 Type l, Aluminum coated, 0.40 oz/sf.

2.05 TIE WIRES

A. 9 gage (outside diameter) galvanized steel wire for fastening fence fabric to line posts and rails.

2.06 STRETCHER BARS

A. Flat bars with minimum cross section dimensions of not less than 3/16 inch by 3/4 inch.

B. Not less than 2 inches shorter than height of the fabric with which they are to be used.

2.07 BANDS OR CLIPS

A. Bar bends of not less than 11-gage sheet steel, ¾ inches wide for posts 4 inch OD or less and 7/8 inches wide for posts greater than 4 inch OD, in accordance with ASTM F626, and bolted with 5/16 inch diameter galvanized carriage bolts and nuts.

2.08 DIAGONAL TRUSS

A. Use between terminal and adjacent line posts and for gate framework.

1. 3/8 inch diameter steel rod.

2.09 FITTINGS

A. Malleable iron or pressed steel of suitable size to produce strong construction.

B. Post Caps

1. Accommodate passage of top rail.

2.10 SWING GATES

A. General

1. In accordance with ASTM F900.
2. Gate capable of being opened and closed easily by one person.
3. Paint welded steel joints with zinc-based paint.
4. Attach chain link fabric securely to gate frame at intervals not exceeding 15 inches.

B. Gate posts for gate leaves up to and including 6 ft. wide.

1. 2.875 inch outside diameter steel pipe weighing not less than 4.64 lb. per ft.,
2. or 3.50 inch by 3.50 inch roll-formed, steel corner section weighing not less than 5.00 lb. per ft.

C. Gate posts for gate leaves over 6 ft. up to and including 12 ft. wide.

1. 4.00 inch outside diameter steel pipe weighing not less than 8.65 lb. per ft.,

D. Gate Posts for gate leaves over 13 ft. wide and up to and including 18 ft. 6.625 in. outside diameter steel pipe weighing not less than 18.02 lb. per ft.

E. Gate Leaf framework

1. 1 7/8 inch outside diameter steel pipe weighing not less than 2.72 lb. per ft.

F. Hinges

1. Heavy pattern of adequate strength for the gate size.
2. Large bearing surfaces for clamping or bolting in position.

G. Gate Stops

1. Mushroom type or flush plate with anchors, suitable for setting in concrete.

H. Locking Mechanism

1. Provide with a suitable latch accessible from both sides and with provision for padlocking.
2. Double leaf swing gates shall have a center bolt, center stop, and automatic backstops to hold leaves in open position.
3. Padlocks
   a. Solid brass cases.
   b. Hardened steel shackles.
   c. Removable core cylinders.
   d. Galvanized steel chains attached to the shackle by a clevis.
   e. Padlocks shall be manufactured by Eaton Corp Lock & Hardware Div., Yale Marketing Dept., Charlotte, N.C.; & P&F. Corbin, Div. of Emhart Corp., Berlin, Conn.; Best Universal Lock Co., Inc., Indianapolis, Ind.; or be an acceptable equivalent product.
   f. Padlocks shall be furnished with four keys each.

2.11 FOUNDATIONS

A. Concrete for post foundation bases shall be in accordance with SECTION 03300.

B. Grout for posts set in solid rock shall consist of one part Portland cement and three parts of clean, sharp, well-graded sand with just enough water for proper workability.

PART 3 EXECUTION

3.01 GENERAL

A. The fence and gates shall be erected by skilled mechanics.

B. Any change in direction of the fence line of 30 degrees or more shall be considered corners. Pull posts shall be used at any abrupt change in grade.

C. Maximum area of unbraced fence shall not exceed 1,500 square feet.

D. Terminal posts shall be braced to adjacent posts with horizontal brace rails and diagonal truss rods brought to proper tension so that posts are plumb.

E. There shall be no loose connections or sloppy fits in the fence framework. The fence framework shall withstand all wind and other forces due to the weather.

3.02 POST SETTING

A. Post spacing shall be uniform with maximum spacing of 10 ft. in fences erected along straight lines. All posts shall be placed plumb and centered in the concrete foundations.

B. Post foundations in earth shall be concrete cylinders with a minimum diameter of 12 inches, crowned at grade to shed water, and shall not be less than 36 inches deep in the ground. Posts shall be set in the full depth of the foundations except for 3 inch of concrete under the posts.

C. Coat portion of galvanized or aluminum-coated steel post that will be embedded in concrete with Bitumastic Super Service Black, manufactured by the Koppers Co.; 450 Heavy Themecol, manufactured by Tnemec Co., North Kansas City, MO; or an acceptable equivalent product. Extend coating to 1-inch above top of finished concrete.

D. If foundation holes are excavated in peat or other unstable soil, the Engineer shall be notified for determination of suitable construction precautions.

E. If solid ledge is encountered without overburden of soil, posts shall be set into the rock a minimum depth of 12 inch for line posts and 18 inch for terminal posts. Post holes shall be at least 1 inch greater in diameter that the post and the grout shall be thoroughly worked into the hole so as not to leave voids, and shall be crowned at the top to shed water. Where solid rock is covered by an overburden, the total setting depth shall not exceed the depths required for setting in earth, and the posts shall be grouted into the rock as described.

3.03 FENCE FABRIC

A. Fabric shall be stretched taut and tied to posts, rails, and tension wires with the bottom edge following the finished grade not more than 2 inch above the grade. The fabric shall be installed on the security side of the fence and shall be anchored to the framework so that the fabric remains in tension after pulling force is released. The fabric shall be attached to line posts with tie wires spaced at not more than 15 inch intervals and to rails and braces at not more than 24 inch intervals. The fabric shall be attached to the tension wire with hog ring ties on 24 inch centers.

3.04 GATES

A. Gates shall be installed plumb, level, and secure for the full width of the opening and the hardware adjusted for smooth operation.

END OF SECTION

SECTION 02850
LOUVERED FENCE AND GATE

PART 1 – GENERAL

1.1. DESCRIPTION

A. This section describes the following fence system:

1. Fixed louver modular fencing panels fabricated with extruded aluminum louvers and flat aluminum bars including extruded aluminum fence posts and aluminum louver gates. Louvered security fence and gates shall be furnished and installed as shown on the plans and specified herein, overall height of vertical louver framework shall be 10’ tall.

1.2. REQUIREMENTS

A. Furnish materials, labor, expertise and equipment necessary to complete all work specified in this section and as shown on the drawings.

B. Structural Performance: Provide product and installation capable of withstanding the effects of gravity lads and the following loads and stresses within limits and under conditions indicated.
1. Uniform pressure of 30 lbf/sq. ft. acting inward or outward.
2. Thermal Movements resulting from a temperature change (range) of 120 degrees Fahrenheit ambient and 180 degrees Fahrenheit material surfaces.

1.3. SUBMITTALS

A. Shop drawings and manufacturer's literature: Provide specifications and construction detail drawings to substantiate quality of materials and provide details of fabrication and installation.

B. Submittals shall be in accordance with standard construction practices to include complete detailed layout of all panels, posts, gates. Submittals shall include plan layout, elevations and section views of panels, posts and gates.

C. Certificate: manufacturer's certification that materials meet specification requirements.

1.4. REFERENCES

A. ASTM B 209 – Standard Specification for Aluminum and Aluminum-Alloy Sheet and Plate.

B. ASTM B 221 – Standard Specification for Aluminum and Aluminum-Ally Extruded Bars, Rods, Wire, Profiles and Tubes.

C. ASTM D3363 – Standard Test Method for Film Hardness by Pencil Test.

D. ASTM D2794 – Standard Test Method for Resistance of Organic Coatings to the Effects of Rapid Deformation.

E. ASTM B117 – Standard Practice for Operating Salt Spray Apparatus.

F. ASTM D822 – Standard Practice for Filtered Open-Flame Carbon-Arc Exposures of Paint and Related Coatings.

G. AWS D!.2 Structural Welding Code – Aluminum.

1.5. QUALITY ASSURANCE

A. Installation of fence and materials shall conform to the requirements of the fence manufacturer.

B. The fence shall be warranted from any defects in materials and workmanship for a period as specified in the relevant section of the contract documents.

PART 2 – PRODUCTS

2.1. MATERIALS

A. Louvered security fence:

1. Louvered Fence System, Manufacturer:

a. “Palm Shield”, American Fence Company
b. Or equal

2. Material Descriptions:

a. Extruded Aluminum: ASTM B 221, Alloy 6063 – Temper T-6.

b. Sheet Aluminum: ASTM B211, Alloy 6063 – Temper T6.

c. Powder Coating Material Hardness: ASTM 3363 2H.

2. Louver Panel Description:

a. Louver Panel Height: 10’

b. Louver Panel Width: Not to exceed 6’.

c. Louver fencing system consisting of horizontal, fixed louver, modular fence panels fabricated with extruded aluminum framing bars and supported by extruded aluminum fence posts.

d. Extended Flange to allow for a minimum of ½ inch overlap of louvers for 100% direct visual screening.

e. Fixed Louver Bars: 0.1250 inch thick louver with an installed profile of 2 inch X 2.873 inch tall.

f. Louver Vertical Framework: 3 inch x 3 inch x ¼ inch aluminum angle. Framework supporting the louvers shall be solid welded and mitered.

g. Louver Horizontal Top Cap: 3 inch x 3 inch x ¼ inch aluminum top cap.

h. Louver Horizontal Bottom Cap: 3 inch x 3 inch x ¼ inch angle bottom cap.

i. Cross Bar: 2 inch x 1/8 inch aluminum flat bar.

3. Fence Posts:

a. Panel posts shall be 4 inch square by ¼ inch minimum extruded tubular aluminum sections with solid aluminum caps. Length as specified on the contract drawings.

b. On center post spacing shall be as specified by manufacturer.

c. All fence posts to be plated with 10" x 10" x ¾" aluminum plates with four ¾" hole for anchors.

4. Fittings and accessories: All fittings and accessories shall be stainless steel and sized as specified by the fence manufacturer. Fence panels to be attached to posts with ¼" x 1" stainless steel screws. Panels and posts are predrilled to support level installation.

5. Anchor Bolts: Anchor bolts shall be bolted to concrete foundations and adequate to support loads based on screening height, exposures and loading.

6. Gates: Swing to exterior of enclosure, size as shown on contract drawings.

a. Louver spacing, style and appearance shall be identical to fence panels.

b. Gate hinges to be Gorilla barrel hinge with ¾" rod, ball bearing, and grease zert. Hinge plate to be ½" thick plates offset to create a 5/8" gap. Standard hardware as required by the gate manufacturer for complete functional operation. Hinges to be bolted to gate frame and field welded to steel gate posts.

c. Gate latch to be internal lock with exterior grab handles. Lock may be keyed and rekeyed. Lock is accessible from both sides of gate.

d. Welded frame, size as shown on the contract drawings, extruded aluminum tubing with aluminum fixed louver panels to match fencing material.

e. Drop rods to be 1" schedule 40 pipe and through bolted to gate frame.

f. Hardware: Size and type as determined by the manufacturer. Provide three hinges per leaf.

1. Provide 1 inch diameter center cane bolt assembly and strike, each door.

2. Provide lockable slide bolt assembly.

g. Gate shall have welded frame fabricated from extruded aluminum tubing

with aluminum fixed louver panels to match fencing material. Frame configurations shall be as indicated on the contract drawings.

h. Gate posts shall be as determined by manufacture. Gate posts to be specified to support gates.

6. Factory Finish: Aluminum fence panels, posts and gates shall receive polyester powder coating.

a. Polyester powder coating: Electrostatically applied colored polyester powder coating heat cured to chemically bond finish to metal substrate.

b. Color shall be as selected by Owner.

c. Minimum hardness measured in accordance with ASTM D3363 2H.

d. Direct impact resistance tested in accordance with ASTM D2794. Withstand 160 inch-pounds.

e. Salt spray resistance tested in accordance with ASTM B117: No undercutting, rusting, or blistering after 500 hours in 5 percent salt spray at 95° F and 95% relative humidity after 1,000 hours, less than 3/16 inches undercutting.

f. Weatherability tested in accordance with ASTM D822: No film failure and 88 percent gloss retention after 1 year exposure in South Florida with test panels tilted 45°.

PART 3 – EXECUTION

3.1 INSPECTION

A. Verify that final grading in fence location is completed and without irregularities which will interfere with fence installation. PalmShield is designed to be installed on a level surface. Variations in height, slopes, stairs steeping shall be shown on contract drawings and on submittal drawings.

B. Field verify all fence dimensions and layout prior to commencing installation.

C. Do not commence work until unsatisfactory conditions have been corrected.

3.2 INSTALLATION

A. Install fence in accordance with manufacturer's installation instructions.

B. Install fence plumb and level. Posts are plated and mounted to top of surface.

C. Do not install bent, bowed or otherwise damaged panels. Remove damaged components from site and replace.

D. Secure fence panels with stainless with ¼" x 1" stainless steel screws to fence posts. All posts and panels will be predrilled to support level installation.

E. Gates - Install gates and adjust hardware for smooth operation.

END OF SECTION

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SECTION 02860

SCREEN FENCE

PART 1 GENERAL

1.01 SUMMARY

A. Section Includes

1. The work of this Section consists of providing all labor, equipment, materials, incidental work, and construction methods necessary to purchase, deliver and install the screen fence in locations as shown and detailed on the Drawings.

1.02 REFERENCES

A. This specification refers to the requirements of additional specifications as listed. The Contractor shall obtain and familiarize himself with all requirements referenced by this specification prior to preparation and installation of any SCREEN FENCE.

1. Rhode Island Department of Transportation, Standard Specifications for Road and Bridge Construction, including all addenda, issued by the State of Rhode Island Department of Public Works, (referred to as the Standard Specification

1.03 SUBMITTALS

A. Manufacturer's product data for the following

1. Slats, posts, brackets, and hardware

B. Shop drawing based on field measurements for the following:

1. Screen fence

1.04 DELIVERY, STORAGE AND HANDLING

A. Screen fence shall be protected against theft and damage. Missing or damaged items shall be replaced at no additional cost to the Owner.

PART 2 PRODUCTS

2.01 HARDWOOD SLATS

A. 1" X 3" thermally modified ash slat or other approved hardwood lengths per drawings

2.02 WOOD POSTS

A. 4" x 4" Douglas fir timbers

1. Posts to be pressure treated to prevent rot and decay

2.03 POST BRACKETS

A. ¼" thick galvanized steel post brackets for 4" x 4", open on 2 sides, 8" height min.

2.04 HARDWARE

A. Slat to post hardware shall be Stainless steel.

B. Post hardware shall be galvanized steel

2.05 DESIGN PANELS

A. 1 Sign panel: Graphics panels shall be manufactured as Custom High-Pressure Laminate (CHPL). CHPL graphic sign material is composed of several layers of phenolic resin impregnated kraft filler paper, a digitally imaged graphic, a layer of melamine resin, surfaced by a layer of translucent exterior UV / graffiti overlay protection. The entire panel, including exterior overlay, must be bonded under heat and extreme pressure to form a composite panel. The finish must be smoothly textured with reflectivity of 30 + or – 5 gloss units. The CHPL graphics must be warranted for a minimum of 10 years against fading, de-lamination, and weather deterioration. Panels must be able to be cleaned with any solvent and not restrict use of products containing lacquer thinner or acetone. All cutting and finishing to be done using a CNC router. Graphics must be made using 12-Color High-Definition printing technology. Vendor shall provide a sample from a supplied file to confirm quality. Panels must be entirely made in the U.S.A. see Fossil Graphics Home - Fossil Industries Inc, CHPL (Custom High Pressure Laminate) (fossilgraphics.com) or approved equivalent.

PART 3 EXECUTION

3.01 GENERAL

A. Fence to comply with state and local building code and the Current edition of the ADA Standards for Accessible Design

3.02 FABRICATION

A. Fabricate Screen Fence to comply with requirements indicated for design, dimensions, member sizes and spacing, details, finish, and anchorage, but not less than that required to support structural loads.

B. Cut wood in the shop to greatest extent possible to minimize field assembly. Disassemble units only as necessary for shipping and handling limitations. Clearly mark units for reassembly and coordinated installation.

C. Miter slats at corners

3.03 INSTALLATION

A. Install in locations shown on the Drawings. Install level and plumb.

B. Securely Anchor bracket to concrete per manufacturer’s instructions.

C. Pre-drill holes in slats and posts to receive hardware

D. Provide additional structural components as needed to provide adequate support

3.04 CLEANING

A. Cleaning: Remove excess dirt, debris, stains, grit, etc. from exposed surfaces; wash and scrub clean.

3.05 PROTECTION

A. Protect completed work from damage due to subsequent construction activity on the site.

END OF SECTION

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SECTION 02870

SITE AMENITIES

PART 1 GENERAL

1.01 SUMMARY

A. Section Includes

1. The work of this Section consists of providing all labor, equipment, materials, incidental work, and construction methods necessary to purchase, deliver and install site Amenities in locations as shown and detailed on the Drawings.

1.02 SUBMITTALS

A. Submit manufacturer's product data, shop drawings and standard manufacturer warranty for the following:

1. Collapsible Bollard

1.03 DELIVERY, STORAGE AND HANDLING

A. Site Amenities shall be protected against theft and damage. Missing or damaged items shall be replaced at no additional cost to the Owner.

PART 2 PRODUCTS

A. Collapsible Bollards shall be

1. Model MCSP-SS1 Collapsible Bollard by Maxiforce Bollards | Blue Ember Technologies or approved equal. 7560 Main Street, Sykesville, MD 21784. Phone: (410) 552-9888. Website: www.maxiforcebollards.com E-mail: sales@maxiforcebollards.com

a. Head Style: Standard Style 1
b. Base Type: Simple Base
c. Padlock Operated Unit; Standard One (1) Sided Operating Locking Bolt
d. Breakaway Feature: P-145 Standard Aluminum
e. Steel Plate: A36; ASTM A36/A36M
f. Steel Tube: A500; ASTM A500
g. Fasteners: Series 300 Stainless Steel
h. Finish: Powder Coat; standard color options by Owner or Owner’s Representative.
i. Base (Ground Sleeve) Unit: Powder Coated Black Textured
j.
k. Locate and install as shown on the drawings.

PART 3 EXECUTION

3.01 PREPARATION

A. Prior to excavating, confirm site furnishing locations and measure to verify clearances.

B. Positively verify that there are no utilities present in conflict with the excavation.

C. Inspect all abutting conditions and confirm final line and grade prior to starting work.

3.02 INSTALLATION

A. General

1. Review the manufacturer's data.
2. Place amenities in position and confirm location with the Owner or Owner's Representative.

B. Install amenities per manufacturer's recommendations at locations as shown on the drawings. Install plumb and level. Repair minor damage to finish in accordance with manufacturer's instructions and as approved by the Owner or Owner's Representative. Remove and replace any damaged components that cannot be successfully repaired. Clean promptly after installation per manufacturer's instructions using materials that will not damage the finish.

C. Drill and set tamper-proof epoxy anchor bolts to secure the amenities as shown on drawings. Size bolts as per manufacturer's recommendations.

END OF SECTION

SECTION 02872

ENTRY SIGNAGE

PART 1 GENERAL

1.01 SUMMARY

A. Section Includes

1. The work shall consist of fabricating and installing Entry Signage. These items shall include the furnishing of all labor, materials, and equipment required to provide and install Entry Signage. All Entry Signage shall be constructed to the line(s), grade(s), dimensions and details as shown on the plans, as prescribed by this specification, and/or to the satisfaction of the engineer. All work shall be completed in accordance with State and local building codes, and by experienced and competent tradesmen.

1.02 REFERENCES

A. This specification refers to the requirements of additional specifications as listed. The Contractor shall obtain and familiarize himself with all requirements referenced by this specification prior to preparation and installation of any signage.

1. Rhode Island Department of Transportation, Standard Specifications for Road and Bridge Construction, including all addenda, issued by the State of Rhode Island Department of Public Works, (referred to as the Standard Specification

1.03 SUBMITTALS

A. Provide the following submittals for approval before proceeding with the work.

1. Shop Drawings
    a. Submit shop drawings, including plans, elevations, sections, details, and attachments, modular unit lengths, reinforcement, expansion and construction joint locations, exposed faces, anchors and anchoring method recommendations, and annotation of cast stone types and location.
2. Samples
    a. Submit sample pieces that represent general range of texture and color proposed to be furnished for project including but not limited to cast stone caps, masonry units, mortars, etc.

1.04 COLD AND HOT WEATHER PROCEDURES:

A. If work on the Entry Signage is done outside of the normal temperature range as required per masonry and other applicable trade organization standards. Provide detailed information on modified work techniques etc. to maintain standards.

PART 2 PRODUCTS

2.01 CONCRETE MASONRY UNITS (CMUS).

A. Cmu’s shall meet astm c 90 width and sizes as shown in drawings.

2.02 CMU HORIZONTAL REINFORCEMENT

A. Cmu horizontal reinforcement shall be installed per the drawings and all applicable trade organization procedures

2.03 SEALANT AND BACKER ROD

A. Sealant shall be polyurethane elastomeric joint sealant meeting the applicable requirements. Joint sealant color shall match the color of the adjacent cast concrete stone. Color shall not be white. The contractor shall supply samples prior to starting work for approval.

2.04 FLASHING

A. Mill galvanized steel: sheet metal: astm a 653/a 653m, g60 coating.

2.05 REINFORCEMENT MATERIALS

A. Reinforcing bars: astm a 615/a 615m, grade 60, deformed.

B. Steel wire: astm a 82, plain, cold drawn steel

C. Supports for reinforcing: chairs spacers, bolsters, and any other device for supporting, placing and and fastening reinforcing bars and welded wire fabric in place. Use wire bar type supports complying with crsi specifications.

2.06 CAST STONE

A. Cast concrete stone shall include cast concrete cap sizes as indicated on the plans and shall conform to the following:

B. Compliance: astm c 1364.

C. Color and texture to be determined by Engineer.

2.07 BRICK

A. Contractor to verify brick type to be used for each wall area by the engineer in writing prior to ordering material.

B. Facing brick: astm c216, type fbs, grade sw.

C. Color and texture to be the following or equal as judged by the architect:

D. Color to match city hall bulding or

E. Nominal size: modular 2 1/4" x 3 5/8" x 7 5/8".

F. Special shapes: molded shaped units not required.

G. Efflorescence: provide brick that has been tested according to astm c 67 and is rated "not effloresced."

2.08 GROUT

A. Grout shall be astm c 476 grout shall adhere to all applicable trade standards. Color of grout shall match building brick veneer grout. The contractor shall supply samples of all mortar types to the engineer for approval prior to starting work. Aggregates for grout must comply with astm c 404

2.09 MORTAR

A. Mortar shall be astm c 270, type n. Color of mortar shall match building brick veneer mortar. The contractor shall supply samples of all mortar types to the engineer for approval prior to starting work.

2.10 GRAVEL

A. Gravel materials shall consist of compacted gravel (m1.03.0, type b)

2.11 STAINLESS STEEL PINS

A. Stainless steel pins to anchor stone to new concrete shall be type 304 and meet the requirements of astm a-582. Shall be of sizes indicated on the drawings

2.12 EPOXY

A. Epoxy shall be a high strength non-shrink grout that is suitable for outdoor use. It shall have a minimum compressive strength of 8,000 psi after 28 days as determined by testing under astm c109. The epoxy shall not exhibit any measurable decrease in volume during curing. All epoxy materials must be on the massdot approved materials list. Epoxy color shall match the color of the adjacent stone.

2.13 RAISED LETTERS

A. Name plate letters shall be reviewed for suitability as individual letters and if not, provided as a single plate per manufacturer.

B. Letters shall be made of Cast Bronze Trajan Bold Prismatic with Oxidized Bronze Finish - Stud Mount with Drill Pattern by Gemini Signage Products as shown on drawings and specified herein.

PART 3 EXECUTION

3.01 GENERAL

A. The Wall shall be installed at locations shown on the Plans, as outlined on the details, as outlined below or as directed by the Engineer.

3.02 EXAMINATION

A. Examine conditions, with Installer present, for compliance with requirements for installation tolerances and other conditions affecting performance of work.

B. Proceed with installation only after unsatisfactory conditions have been corrected.

3.03 INSTALLATION, GENERAL

A. Use full-size units without cutting if possible. If cutting is required to provide a continuous pattern or to fit adjoining construction, cut units with motor-driven saws; provide clean, sharp, unchipped edges. Allow units to dry before laying unless wetting of units is specified. Install cut units with cut surfaces and, where possible, cut edges concealed.

B. Select and arrange units for exposed unit masonry to produce a uniform blend of colors and textures.

C. Mix units from several pallets or cubes as they are placed.

D. Matching Building Masonry: Match coursing, bonding, color, and texture of existing masonry.

E. Wetting of Brick: Wet brick before laying if initial rate of absorption exceeds 30 g/30 sq. in. per minute when tested per ASTM C 67. Allow units to absorb water so they are damp but not wet at time of laying.

F. Comply with construction tolerances in ACI 530.1/ASCE 6/TMS 602 and with the following

G. For conspicuous vertical lines, such as expansion and control joints, do not vary from plumb by more than 1/4 inch in 20 feet maximum.

H. For vertical alignment of exposed head joints, do not vary from plumb by more than 1/4 inch in 10 feet maximum.

I. For conspicuous horizontal lines, such as do not vary from level by more than 1/8 inch in 10 feet maximum.

J. For exposed bed joints, do not vary from thickness indicated by more than plus or minus 1/8 inch with a maximum thickness limited to 1/2 inch Do not vary from bed-joint thickness of adjacent courses by more than 1/8 inch

K. For exposed head joints, do not vary from thickness indicated by more than plus or minus 1/8 inch. Do not vary from adjacent bed-joint and head-joint thicknesses by more than 1/8 inch.

L. For faces of adjacent exposed masonry units, do not vary from flush alignment by more than 1/16 inch except due to warpage of masonry units within tolerances specified for warpage of units.

3.04 LAYING MASONRY WALLS

A. Lay out walls in advance for accurate spacing of surface bond patterns with uniform joint thicknesses and for accurate location of openings, movement-type joints, returns, and offsets. Avoid using less-than-half-size units, particularly at corners, jambs, and, where possible, at other locations.

B. Bond Pattern for Exposed Masonry: Unless otherwise indicated, lay exposed masonry in the same bonding patterns as adjacent building veneer; do not use units with less than nominal 4-inch horizontal face dimensions at corners or jambs.

C. Lay concealed masonry with all units in a wythe in running bond. Bond and interlock each course of each wythe at corners. Do not use units with less than nominal 4-inch (100-mm) horizontal face dimensions at corners.

D. Stopping and Resuming Work: Stop work by racking back units in each course from those in course below; do not tooth. When resuming work, clean masonry surfaces that are to receive mortar, remove loose masonry units and mortar, and wet brick if required before laying fresh masonry.

E. Built-in Work: As construction progresses, build in items specified in this and other Sections. Fill in solidly with masonry around built-in items.

F. Coordinate all reinforcement materials through hollow CMU's with Drawings, if no reinforcement is shown provide #6 rebar at 8" O.C. vertically

G. Fill cores in hollow concrete masonry units with grout unless otherwise indicated.

3.05 MORTAR BEDDING AND JOINTING

A. Lay solid masonry units with completely filled bed and head joints; butter ends with sufficient mortar to fill head joints and shove into place. Do not deeply furrow bed joints or slush head joints.

B. Set cast-stone trim units in full bed of mortar with full vertical joints. Fill dowel, anchor, and similar holes.

C. Clean soiled surfaces with fiber brush and manufacturer recommended cleaning solution and rinse thoroughly with clear water.

D. Wet joint surfaces thoroughly before applying mortar.

E. Tool exposed joints slightly concave when thumbprint hard, using a jointer larger than joint thickness, unless otherwise indicated.

3.06 COMPOSITE MASONRY

A. Bond wythes of composite masonry together using one of the following methods:

1. Where bed joints of wythes do not align, use adjustable (two-piece) type ties.

B. Masonry Joint Reinforcement: Installed in horizontal mortar joints.

1. Where bed joints of both wythes align, use ladder-type reinforcement extending across both wythes.
2. Where bed joints of wythes do not align, use adjustable (two-piece) type reinforcement[with continuous horizontal wire in facing wythe attached to ties].

C. Bond wythes of composite masonry together using bonding system indicated on Drawings.

D. Corners: Provide interlocking masonry unit bond in each wythe and course at corners, unless otherwise indicated.

E. Provide continuity with masonry joint reinforcement at corners by using prefabricated L-shaped units as well as masonry bonding.

F. Intersecting and Abutting Walls: Unless vertical expansion or control joints are shown at juncture, bond walls together as follows:

G. Provide horizontal reinfocement not more than 16 inches o.c. vertically

3.07 CAVITY WALLS

A. Bond wythes of cavity walls together using one of the following methods as required per manufacturer’s recommendations and applicable trade organization standards

1. Individual Metal Ties: Provide ties as shown installed in horizontal joints, but not less than one metal tie 24 inches o.c. horizontally and 16 inches o.c. vertically. Stagger ties in alternate courses. Provide additional ties within 12 inches (305 mm) of openings and space not more than 36 inches apart around perimeter of openings. At intersecting and abutting walls, provide ties at no more than 24 inches o.c. vertically.

3.08 CONTROL AND EXPANSION JOINTS

A. General: Install control and expansion joint materials in unit masonry as masonry progresses. Do not allow materials to span control and expansion joints without provision to allow for in-plane wall or partition movement.

B. Form control and expansion joints in concrete masonry at locations shown on plans and match locations in concrete wall and in a manner that matches adjacent brick building veneer. Do not start work if control or expansion joints are not shown on plans and inform project engineer in writing.

3.09 FLASHING, WEEP HOLES, CAVITY DRAINAGE, AND VENTS

A. General: Install embedded flashing and weep holes in masonry at shelf angles, lintels, ledges, other obstructions to downward flow of water in wall, and where indicated

1. Install flashing as follows, unless otherwise indicated:
2. Prepare masonry surfaces so they are smooth and free from projections that could puncture flashing. Where flashing is within mortar joint, place through-wall flashing on sloping bed of mortar and cover with mortar. Before covering with mortar, seal penetrations in flashing with adhesive, sealant, or tape as recommended by flashing manufacturer.

B. Install weep holes in head joints in exterior wythes of first course of masonry immediately above embedded flashing and as follows:

C. Use open head joints to form weep holes.

1. Space weep holes 24 inches o.c., unless otherwise indicated.

3.10 REPAIRING, POINTING, AND CLEANING

A. Remove and replace masonry units that are loose, chipped, broken, stained, or otherwise damaged or that do not match adjoining units. Install new units to match adjoining units; install in fresh mortar, pointed to eliminate evidence of replacement.

B. Pointing: During the tooling of joints, enlarge voids and holes, except weep holes, and completely fill with mortar. Point up joints, including corners, openings, and adjacent construction, to provide a neat, uniform appearance. Prepare joints for sealant application, where indicated.

C. In-Progress Cleaning: Clean unit masonry as work progresses by dry brushing to remove mortar fins and smears before tooling joints.

D. Final Cleaning: After mortar is thoroughly set and cured, clean exposed masonry as follows:

1. Remove large mortar particles by hand with wooden paddles and nonmetallic scrape hoes or chisels.
2. Test cleaning methods on sample wall panel; leave one-half of panel uncleaned for comparison purposes. Obtain Architect's approval of sample cleaning before proceeding with cleaning of masonry.
3. Clean brick by bucket-and-brush hand-cleaning method described in BIA Technical Notes 20.
4. Clean cast stone trim to comply with cast stone supplier's written instructions.

3.11 MASONRY WASTE DISPOSAL

A. Salvageable Materials: Unless otherwise indicated, excess masonry materials are Contractor's property. At completion of unit masonry work, remove from Project site.

3.12 ADJUSTING AND CLEANING

A. Clean by washing thoroughly with clean water and soap and rinsing with clean water.

3.13 PROTECTION OF THE WORK

A. Protect finishes of railings from damage during construction period with temporary protective coverings approved by railing manufacturer. Remove protective coverings at time of Substantial Completion.

END OF SECTION

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SECTION 02930

LOAMING AND SEEDING

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Requirements for loaming, fertilizing, seeding, and related work in areas disturbed in the process of performing the Work under this contract.

1.02 SUBMITTALS

A. In accordance with SECTION 01300 submit the following:

1. Submit with seed, certificates confirming seed mixture, purity, germinating value, and crop year identification.
2. Submit one pound samples of loam and soil additives in this section.
3. Testing shall be at the Contractor's expense. Collect samples per the requirements of the testing laboratory. Contractor shall deliver all samples to testing laboratories via overnight courier and shall have the testing report sent directly to the Engineer. Perform all tests for gradation, organic content, soil chemistry and pH by UMASS Soil and Plant Tissue Laboratory, West Experiment Station, North Pleasant Street, Engineer of Massachusetts, Amherst, MA 01003, (413) 545-2311 or approved equal.
    a. Loam analysis shall include:
        1) soil pH by water pH and buffer (smp) pH tests, percentage organic content, nitrate nitrogen, ammonium nitrogen, phosphorus, potassium, calcium, aluminum, magnesium, manganese, Micronutrients, Toxins including but not limited to lead, cadmium, arsenic and mercury, Saturated hydraulic conductivity per ASTM D5856, Calculated CEC
        2) Soil analysis tests shall show recommendations for new lawns for soil additives to correct soils deficiencies as necessary, and for additives necessary to accomplish the work as specified.
        3) Test results: test data and recommendations for soil amendments including but not limited to: nitrogen, phosphorus, potassium and limestone.
4. Limestone: Submit supplier's certification that the limestone being supplied conforms to these Specifications
5. Fertilizer: Submit product data of sodding fertilizer and certificates showing composition and analysis. Submit fertilization rates for fertilizer product based upon soil testing, analysis, and recommendations as specified, performed and paid for under in this Section.

1.03 DELIVERY, STORAGE AND HANDLING

A. Fertilizer:

1. Delivered mixed as specified in standard size, unopened containers showing weight, analysis, and name of manufacturer.
2. Store in weather proof place.

B. Seed:

1. Delivered in original unopened containers with mixture listed.

PART 2 PRODUCTS

2.01 LOAM

1. Loam shall be "fine sandy loam" or "sandy loam" determined by mechanical analysis (ASTM D-422) and based on the "USDA Classification System". Loam shall have the following mechanical analysis:

Textural Class	% of Total Weight	Avg%
Sand (0.05 - 2.0 mm dia. range)	50 - 70	60
Silt (0.002-0.05 mm dia. range)	25 - 35	30
Clay (less than 0.002 mm dia. range)	5 - 15	10

2. Loam shall contain not less than 3.5 percent nor more than 5.5 percent organic matter as determined by the loss on ignition of oven-dried samples.

3. Loam shall be free of debris and other extraneous matter. It shall be uncontaminated by salt water, foreign matter and substances harmful to plant growth. It shall not contain toxic elements or pollutants harmful to humans. The electrical conductivity (EC2) of a 1:2 soil-water suspension shall be equal to or less than 1.0 millimhos/cm. (Test minus sieve #10 material). Soils shall not have levels of extractable aluminum greater than 200 parts per million. Soil shall come from a natural source.

4. No loam shall be delivered to the site until the review and approval of loam test results by the Engineer.

5. Loam shall be altered per the testing recommendations to support seed germination and turf establishment. Amend as required to ensure the following:

   a. The loam shall have an acidity range of 6.2 pH to 6.8 pH.

   b. Macro and Micro nutrients levels recommended per the test report.

2.02 LIME, FERTILIZER AND SEED

A. Ground agricultural limestone containing not less than 85 percent of total carbonates.

B. Complete fertilizer, at least 50 percent of nitrogen derived from natural organic sources of ureaform and containing following percentages by weight:

   Nitrogen 10% Phosphorus 10% Potash 10%

C. Turf grass seed, clean, high in germinating value and latest year's crop mixture as follows:

Name	**Minimum Proportion by Weight**	**Percent Purity**	**Percent Germination**
Kentucky bluegrass	20%	87%	85%
Merion Kentucky bluegrass	20%	87%	85%
Red Chewings fescue	45%	98%	85%

Italian rye	15%	98%	90%

PART 3 EXECUTION

3.01 GENERAL

A. Supply suitable quantities of water, hose and appurtenances.

3.02 LOAM

A. Spread loam on areas to 6-inch depth after compaction, fine grade and compact.

3.03 LIME, FERTILIZER AND SEEDING

A. Apply lime and fertilizer per soil test report.

B. Remove weeds or replace loam and reestablish finish grades, if any delays in seeding lawn areas and weeds grow on surface or loam is washed out prior to sowing seed and without additional compensation. Sow seed at rate of 175 pounds per acre on calm day, by mechanical means. "Hydro-Seeding" not permitted unless otherwise permitted or required by Engineer. Sow one-half of seed in one direction, and other half at right angles to original direction. Rake seed lightly into loam, to depth of not more than 1/4 inch and compact by means of an acceptable lawn roller weighing 100 to 150 pounds per linear foot of width.

C. Water lawn areas adequately at time of sowing and daily thereafter with fine spray, and continue throughout maintenance and protection period.

D. Seed during approximate time periods of April 1 to May 15 and August 15 to October 1, and only when weather and soil conditions are suitable for such work, unless otherwise permitted.

3.04 MAINTENANCE OF SEEDED AREAS

A. Maintain lawn areas and other seed areas at maximum height of 2-1/2 inches by mowing at least three times. Weed thoroughly once and maintained until time of final acceptance. Reseed and refertilize with original mixtures, watering or whatever is necessary to establish over entire area of lawn and other seeded areas a close stand of grasses specified, and reasonably free of weeds and undesirable coarse native grasses.

B. Begin maintenance immediately after each portion of lawn is seeded and continue for minimum of 45 days.

C. Repair or replace all seeded areas which, in judgment of Engineer, have not survived and grown in satisfactory manner, for a period of one year after acceptance.

D. Seeding replacement, same seed mixture as specified and furnished and installed as specified.

3.05 TEMPORARY COVER CROP

A. Sow a temporary cover crop of buckwheat, domestic rye grass or other acceptable seed if there is insufficient time in the planting season to complete seeding, fertilizing, and

permanent seeding at the option of Contractor or order of Engineer. Cut and water cover crop as necessary until the beginning of the following planting season, at which time it shall be plowed or harrowed into soil, the areas shall be fertilized and permanent seed crop sown as specified.

END OF SECTION

SECTION 02950

PLANTINGS

PART 1 - GENERAL

1.01 DESCRIPTION OF WORK

A. This Work under this Item consists of furnishing new plant material: planting, watering, mulching, staking and guying trees of the type and sizes indicated on the Plans, in accordance with these Specifications and/or as directed by the Owner's Representative or Owner.

B. The principal work of this section includes, but may not be limited to, the following:

1. Transplanting Operations
2. Layout and Excavation of Plant Holes
3. Planting and Backfilling
4. Watering
5. Pre-emergent Weed Control
6. Mulching
7. Fertilizing
8. Tags and Labels
9. Maintenance of trees and shrubs
10. Plant Replacement Guarantee

1.02 REFERENCES

ANSI Z-60.1 - Nursery Stock, latest edition (American Association of Nurserymen, Inc.).

SPN: "Standardized Plant Names," latest edition, by the American Joint Committee on Horticultural Nomenclature.

AOAC: Association of Official Agricultural Chemist."

Pruning Standards: ANSI A300 Practices for Trees, Shrubs &Other Woody Plant Maintenance: Secretariat, National Arborist Association, P. O. Box 1094 Amherst, MA.

1.03 QUALITY ASSURANCE

A. The Contractor shall Sub-contract planting work to a firm specializing in such work unless the Contractor is fully experienced and qualified. The Landscape Contractor shall have five years continuous experience and expertise in management, handling, and installation of ornamental plant material in large scale landscape construction projects. Site foreman shall have at least five years' experience and shall be on-site during all times of transplanting and plant installation.

B. The Landscape Contractor shall be responsible to coordinate with plant material suppliers in sufficient time to ensure that all of the plants as specified in the contract plant list are available in sufficient quantity for installation.

C. Do not make substitutions without written approval. If specified landscape material is not available, obtain approval for substitution from the Owner or Owner's Representative.

D. The Owner's Representative reserves the right to inspect all plant materials for compliance with specifications, and to reject unsatisfactory or defective work at any time during progress of work.

1.04 SUBMITTALS

A. Certified clean analysis and source of off-site loam, used to backfill to be provided. Certification shall list soil additives to topsoil, rates and type.
B. Ce

C. Certifications and/or labels of proposed plant materials or substitutions, listing common, scientific names and sizes of each.

1.05 PRODUCT DELIVERY, STORAGE AND HANDLING

A. Protect all products from weather or other damaging or deteriorating conditions.

B. Plants which have been damaged or have deteriorated in transit or storage are not acceptable.

C. Keep plants moist, fresh, and protected against exposure to sun, wind, and freezing temperatures whether in the receiving yard, in transit, while being handled, or at the job site awaiting planting.

D. Planting Dates: The Landscape Contractor should provide a proposed planting schedule. Schedule dates for landscape work during normal seasons for such work. Once accepted, revise dates only as approved in writing, after documentation of reasons for delays.

Planting Window:	Spring – April 30 to June 30 Fall - August 15 to October 15

E. Those species known to be fall digging hazards shall be dug during the spring season only. Fall planting of these species shall be permitted only with certification, from the nursery, of the time of digging and at the discretion of the Owner's Representative.

F. Correlate planting schedule with specified maintenance periods to provide maintenance to date of acceptance.

G. Coordination with Lawns: Plant shrubs, and groundcover after final grades are established and prior to planting of lawns, unless otherwise acceptable to Owner's Representative. If planting of trees and shrubs occurs after lawn work, protect lawn areas and promptly repair damage to lawns resulting from planting operations.

1.06 SPECIAL CONDITIONS

A. Should discrepancies exist between plant quantities or plant sizes as shown in the Planting Schedule and on the Planting Plan, quantities and sizes shown on the Planting Plan shall govern. Contractor shall install all plants as shown on the plan at no additional cost to the Owner.

1.07 WARRANTY

A. Provide a warranty for plant material for a minimum of one year including one continuous growing season. Commence warranty on date identified in the Certificate of Final Acceptance.

B. Warranty: Include coverage of plants from death or unhealthy conditions.

C. Replacements: Plants of same size and species as specified, planted as soon as possible in the next growing season, with a new warranty and an extended maintenance service commencing on date of replacement.

1.08 MAINTENANCE

A. Maintenance of all plant material to be performed by installer includes:
- Replacing of dead plant material
- Resetting plants to proper grades, or to upright position

PART 2 - PRODUCTS

2.01 LOAM:

A. Certified Clean, the Loam shall contain not less than 5 1/2 percent nor more than 10 percent organic matter as determined by the loss on ignition of oven-dried samples. The loam shall have an acidity range of 5.5 pH to 7.6 pH.

B. Loam shall be free of debris and other extraneous matter. It shall be uncontaminated by salt water, foreign matter and substances harmful to plant growth. The electrical conductivity (EC2) of a 1:2 soil-water suspension shall be equal to or less than 1.0 milliohms/cm. (Test minus sieve #10 material). Soils shall not have levels of extractable aluminum greater than 200 parts per million.

C. No loam shall be delivered to the site until the review and approval of loam test results by the Owner or Owner’s Representative, but such approval shall not constitute final acceptance. The Owner or Owner’s Representative will reject any material delivered to the site which, after on-site, post-delivery testing, does not meet these specifications.

2.02 ANTIDESSICANT

A. Anti-desiccant shall be an emulsion which permits transpiration while retarding excessive loss of moisture from plants.

B. Deliver in manufacturer's fully identified containers and mix according to manufacturer's direction. Use "Wiltproof" or approved equal.

2.03 FERTILIZER:

A. Complete fertilizer in granular form, from commercial sources bearing manufacturer’s analysis; 10-10-10 ratio of N-P-K.

B. Significant quantities of trace elements such as iron, boron, etc. shall be contained in the fertilizer.

C. Fifty percent (50%) of available nitrogen shall be in a slow release form as found in certain urea form products or natural organic forms or a combination of both.

D. Salt index shall not exceed 35.

2.04 PRE-EMERGENT WEED CONTROL:

A. Pre-Emergent weed control for application in mulch areas shall be granular and have the active ingredient "Trifluralin 5.0%". All application rates and product use shall be in accordance with manufactures guidelines.

2.05 MULCH:

A. Pine Bark Mulch shall be derived from evergreen tree bark aged to a minimum of six months and no more than eighteen months. The bark shall be shredded so that the resulting pieces are no more than 1/2 inch thick and no longer than 3 inches. The mulch shall be ninety-eight percent (98%) organic matter with a pH of 3.5 to 4.5. The mulch shall be free of stringy material and shall not contain an excess of fine particles. The mulch shall be brown in color, free of leaves, twigs, sod, weeds, shavings and other foreign materials which are injurious to health plant growth.

2.06 WATER:

A. Clean, fresh potable water free from injurious chemicals and other toxic substances harmful to plant life. No brackish water will be permitted.

B. The Owner's Representative may reject any water delivered to the site which, after on-site, post-delivery testing, does not meet these specifications.

2.07 PLANT MATERIALS:

A. Plant materials shall conform in size, grade and quality to the "American Association of Nurserymen Standards for Nursery Stock." As approved by the United States of America standards institute, in effect at the time of bidding.

B. Plants of other kinds than those named in the Plant Schedule on the Drawings shall not be accepted without written approval of the Owner's Representative.

C. Unless otherwise approved by Owner's Representative, all plants shall be nursery-grown in accordance with good horticultural practices and shall have been grown under climatic conditions similar to those in the locality of the project for at least two years. They shall have been transplanted or root pruned at least nine months previous to moving to the site.

D. Plants shall be dug, handled and transported so as to prevent damage of any sort including but not limited to breakage of branches or limbs, scraped or bruised trunk or broken root ball. Plants shall be protected from desiccation during digging, storage and transportation by watering, covering and application of anti-desiccants as necessary to ensure their continued health and viability.

E. All plant material shall comply with the state and federal law with respect to inspection for plant disease and insect infestation.

F. Replacement plants larger in size than existing may be used if approved by the Owner's Representative provided use of larger plants does not increase Contract price.

G. If use of larger plants is approved, increase ball of earth of spread of roots in proportion to size of plant.

PART 3 - EXECUTION

3.01 TRANSPLANTING OPERATIONS

A Transplanting: The Landscape Contractor shall coordinate with the Owner and work with the Owner's Representative to review locations and determine how best to transplant the two trees indicated to maximize plant health and minimize stress to the plants. Apply anti-desiccant. Provide adequate staking and guying. Mulch in place. Establish regular watering schedule.

3.02 PLANTING OPERATIONS

A. Layout: Determine location of underground utilities and layout plants so as to avoid possible damage to such structures. Plant shown graphically and/or verbally on plans, shall be staked on ground by contractor and approved by the Owner's Representative prior to excavation. Should discrepancies exist between plant quantities in Planting Schedule and Planting Plan, quantities shown on the Planting Plan shall govern. Adjustments in locations and outline shall be made as directed in field. Labor, equipment, and new smooth stakes are to be furnished by the Contractor for this purpose.

B. Excavation: Planting locations shall conform to the approved staked locations and outlines. Holes dug for plantings shall in all cases be large enough to include the complete root system of the plant (tree, shrub, and groundcover) to be received and also sufficient amounts of approved backfill around the periphery of the root ball. All sod, weeds, roots, cobbles, and stones and other objectionable materials excavated from the plant holes, which is unsuitable for backfill shall be removed from the site immediately and legally disposed of.

C. Plant Hole Size: The minimum plant hole size, unless otherwise specified, shown on the plans or directed by the Owner or Owner's Representative shall be as follows:

1. Trees - The planting hole shall be twice the diameter of the root ball in width and no deeper than 2 inches less than the distance from the bottom of the root ball to the root collar (i.e. a 12 inch tall ball will require a 10 inch deep hole). Any excavation in excess of that required shall be replaced and compacted to eighty-five percent (85%) of maximum density.

D. Any rocks or underground obstructions shall be removed to a depth necessary for planting as specified, unless alternate locations for the planting are approved by the Owner or Owner's Representative. If removal of obstructions results in a deeper hole than specified for planting, backfill material shall be added and compacted to eighty-five percent (85%) of maximum density to the correct depth.

E. Backfill Mix: Add loam to suitable soil excavated from the planting hole to create mix for planting pits. Backfill mix shall be at least thirty-three percent (33%) loam.

3.03 SETTING PLANTS

A. Plants shall be handled in such a manner that the soil of the root ball will not be loosened from the roots. Carefully place plant into the prepared hole. Set plants plumb and fill in around the root ball to one-half the depth of the hole with backfill mix. Thoroughly tamp the backfill mix to eighty-five percent (85%) of maximum density.

B. Fill remaining area of planting hole with water. Once the water has completely drained loosen burlap and peel down at least the top one-third. If required wire baskets to be cut off and removed. Roots that have been wrapped around the ball within the burlap shall be made to lay in as natural a manner as possible. Cut broken or frayed roots cleanly.

C. Fill remaining area of hole with backfill mix and thoroughly tamp to eighty-five percent (85%) of maximum density. Form a saucer around the edge of through backfill hole by constructing a berm. The finish height of the compacted berm shall be 4 inches higher than the surrounding grade. No excess soil shall be allowed to remain within the plant saucer. Fill saucer with water.

3.04 PRUNING OF NEW PLANT MATERIAL

A. After planting, prune only dead, broken or deformed branches and in such manner as to preserve natural character of plant.

B. Perform all pruning with sharp tools, with cuts flush and clean. Do not apply paint or asphalt emulsion tree wound compound on cut area.

C. Trees which have had their leaders cut, or so damaged that cutting is necessary, will not be accepted. There shall be no abrasion of bark, nor fresh cuts of limbs over ½ inch.

3.05 WATERING

A. The plants shall be watered immediately following planting.

B. Soak the plants thoroughly again within a twenty-four hour period after the initial planting.

C. Additional watering shall be made at least once every three weeks, or as directed by the Owner or Owner's Representative based on weather conditions, until final acceptance of the plant material.

3.06 FERTILIZING

A. During backfill operations, place fertilizer in upper foot of back fill around perimeters at a rate of two ounces per foot of diameter of plant pit, or as recommended by manufacturer.

3.07 MULCHING PLANTS

A. Application of mulch should only occur after planting operations have been completed and initial watering has taken place. Mulch shall be applied no later than forty-eight hours after planting.

B. Prior to the placement of mulch, the contractor shall apply a pre-emergent weed control with the entire area to be mulched. Pre-emergent weed control shall be applied by a commercial applicator, licensed by the State of Rhode Island at a rate in accordance with the manufacturer's instructions.

C. Mulch shall be applied a minimum of 3 inches in depth for all individual trees and planting beds, as indicated graphically or verbally on the drawings.

D. Where mulch abuts seeded lawn areas or other finish grade materials, edge of planting bed shall be cut smooth and cleanly. Mulch shall be placed carefully so as not to spill into adjacent areas. Any excess or spilled mulch shall be promptly removed from the project area. The cost of the mulch is incidental to new plantings.

3.10 ANTIDESSICANT SPRAYING

A. Spray anti-desiccants as directed by the manufacturer's recommendations if so directed by the Owner's Representative and or Owner.

3.11 TAGS AND LABELS

A. Leave all tree tag and label seals unbroken and visible on plant material until final inspection. Remove all seals immediately after final inspection.

3.12 MAINTENANCE

A. Contractor is responsible for protection and maintenance of all work prior to final acceptance. No plants will be accepted unless they show a healthy growth and satisfactory condition.

3.13 PLANT REPLACEMENT GUARANTEE

A. Guarantee that, upon completion and final acceptance tree, shrub and groundcover planting conforms to requirements of contract documents and that all plants except transplant materials are healthy and will remain so for a period of one year. Such period shall commence with date of final acceptance.

B. At any time within period of guarantee, Contractor shall replace any planting which for any reason, other than vandalism, has died or is in a dying condition, or which has failed to flourish in such a manner or to such a degree that its usefulness or appearance has been impaired.

C. The Owner or Owner's Representative will not maintain plantings until after guarantee period. Contractor shall not have any claim that materials have failed to flourish as a result of Owner's Representative's maintenance operations, or lack of maintenance, and shall abide by terms stated herein for guarantee and replacement of plant materials.

D. Decision of Owner's Representative as to necessity to replace any plant materials or repair any defects on workmanship, or cause of any destruction or loss, impairment or failure to flourish, shall be conclusive and binding upon Contractor. Replacements shall be of same species and size as specified on Plant List. All plant replacements shall be inspected, sealed, furnished, planted and mulched as specified herein at Contractor's expense.

E. "Vandalism," is intended to mean any acts, whether intentional or accidental, by other persons occurring following final acceptance, which clearly result in breakage or other damage to individual plants or plant beds, and which may reasonable be considered to be beyond Contractor's reasonable control, as determined by the Owner's Representative.

END OF SECTION

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SECTION 02999

GROUND IMPROVEMENTS

PART 1 GENERAL

1.01 DESCRIPTION

The work under this Section shall consist of the design and installation of ground improvement as discussed in the Contract Drawings, as well as related performance testing and quality control during construction. The ground improvement Specialty Contractor shall furnish all engineering, supervision, labor, material, equipment, and related services necessary to perform the work as shown on the Contract Drawings and as specified in this Section.

Test borings B-1 through B-6 performed within the footprint of the proposed building and ice rink canopy encountered a soil profile generally consisting of 5 to 13 feet of very loose to medium dense granular fill overlying native deposits of very loose to dense sand. A layer of silt fill was encountered in B-4 between at a depth of 5 to 7 feet below ground surface (bgs). Below the native sands, these borings, with the exception of B-5, encountered a medium dense to very dense silty sand and gravel depths varying from about 23 and 28 feet bgs. Borings B-1, B-3, B-5 and B-6 were terminated in the native sand and gravel at depths ranging from 22 to 32 feet bgs. Borings B-2 and B-4 encountered refusal surfaces (probable bedrock) at depths ranging from about 26 to 32 feet bgs.

Saturated soils were encountered within the borings at a depth of about 20 feet bgs, corresponding to an approximate elevation of 10.6 feet NAVD 88. Long term groundwater information is not available. It should be anticipated that groundwater levels will fluctuate, particularly in response to periods of snowmelt and precipitation, as well as changes in site use. It is not anticipated that groundwater will be encountered during construction unless deep excavations are required for removal of obstructions in the fill.

Foundation support for the Warwick City Hall Plaza building, ice rink, and shade structure will be provided by spread footing foundations and slab-on-grade floors bearing on ground improved with Rapid Impact Compaction (RIC). Footings should bear on at least 6-inches of compacted Crushed Stone overlying ground improved with Rapid Impact Compaction. On-grade floor slabs should bear on at least 12-inches of properly compacted Structural Fill overlying ground improved with Rapid Impact Compaction. All remnant structures, foundations and debris encountered must be removed from beneath the proposed building and ice rink as encountered during construction. Overexcavations to remove structures, foundations and debris should be replaced with compacted Granular Borrow or Structural Fill.

Any excess soils generated during construction may potentially be re-used on site at the discretion of the Geotechnical Engineer or be legally disposed of off-site at an acceptable facility. Handling and disposal costs of any excessive spoils generated by the Specialty Contractor resulting from the installation of ground improvement elements shall be the responsibility of the Specialty Contractor. Excavated soils are expected to consist of granular fills and silty gravelly sand. These materials are unsuitable for re-use as Structural Fill, but may be suitable for re-use as Granular Borrow, provided they are free of deleterious materials and at a compactable moisture content at the time of construction.

1.02 INTENT

The intent of the ground improvement program specified herein is to provide support for the applied building and slab loads, improve the allowable bearing capacity of the on-site soils, and control settlement of the building to less than the maximum values specified herein. Ground improvement methods shall also be selected such that existing unsuitable soils remain in place and negligible amounts of spoils are generated during installation.

1.03 STANDARDS AND REFERENCES

All material testing to determine compliance with the specifications will be provided by the geotechnical engineer. Load testing shall be performed by the Specialty Contractor.

A. The most recent version of the following testing methods or standards shall be employed:

1. ASTM D1143: Piles Under Static Axial Compressive Load
2. ASTM D1194: Bearing Capacity of Soil for Static Load and Spread Footings
3. ASTM D3689: Deep Foundations Under Static Axial Tensile Load
4. ASTM D6913: Particle-Size Distribution (Gradation) of Soils Using Sieve Analysis

B. Reference documents to be used by the ground improvement Specialty Contractor shall include:

1. Contract Documents, including General and Supplementary Conditions and General Requirements, apply to the work of this Section.

2. All Contract Drawings and all other Sections of the Specifications including:
   a. Structural Drawings by Camera – O'Neill Consulting Engineers
   b. Site Civil Drawings by BETA Group, Inc.
   c. Section 02200 – Earth Excavation, Backfill, Fill and Grading

3. International Building Code with The Rhode Island State Building Code, latest editions, including all amendments and revisions.

4. Geotechnical Information:
   a. Report titled "Explorations and Geotechnical Engineering Services, Proposed Ice Rink, Canopy, and Recreational Building, 100 Veterans Memorial Drive Warwick, Rhode Island", prepared by S.W. Cole Engineering, Inc., dated March 20, 2023

5. Occupational Safety and Health Administration (OSHA) Regulation 29 CFR Part 1926 - Occupational Safety and Health.

1.04 DEFINITIONS

The key terms used in this specification are defined below.

A. Ground Improvement: The modification of in-situ soil properties in order to achieve the specified performance criteria. Method shall include rapid impact compaction, or approved alternative.

B. Specialty Contractor: Ground improvement designer and installer.

C. Geotechnical Engineer: S.W. Cole Engineering, Inc.

D. Suitable Soils: Soils meeting project specifications that can readily by incorporated into the work. These may be off-site soils, crushed stone, or on-site soils.

E. Unsuitable Soils: Soils that do not meet project specifications and cannot be readily incorporated into the work. This includes soils that contain high concentrations of debris, trash, rubble, or other deleterious materials. On-site soils not meeting project specifications may be re-used at the discretion of the Geotechnical Engineer.

1.05 SCOPE OF WORK

The scope of work shall consist of the design, construction, monitoring, and testing of the chosen ground improvement method to meet the performance criteria specified herein. In general, the scope of the work includes the following tasks:

A. The Specialty Contractor shall provide all labor, materials, and equipment to accomplish the following items of work:

1. Construction/implementation of ground improvement to the locations, grades, and criteria detailed on the approved design submittal and approved shop drawings.
2. Monitor installation parameters utilizing a data acquisition system or other approved method.
3. Complete QA/QC program as specified herein.

B. The Specialty Contractor shall prepare a design submittal and shop drawings for review and approval by the Geotechnical Engineer. Refer to Section 1.06 of this specification for further information.

C. Performance Criteria:

1. Provide the specified bearing pressure/capacity of 3.0 ksf kips per square-foot (ksf) at the spread footing foundation and slab-on-grade locations.
2. Limit total static settlement of any foundation to 1-inch.
3. Limit differential static settlement between adjacent column bays to ½-inch.

1.06 SUBMITTALS

A. The following shall be submitted to the Geotechnical Engineer for review and approval at least two weeks prior to the start of the work:

1. A list of at least five previously completed projects of similar scope and purpose. The list shall include a description of the project, relative size, and contact person with phone number and/or email address.
2. Resumes of the management, supervisory, and key personnel.
3. Engineered shop drawings and calculation package for ground improvements prepared and sealed by a Professional Engineer registered in the State of Rhode Island that demonstrates that the ground improvement program achieves the specified performance criteria provided herein.
4. Written description of work procedures, equipment cut sheets, and any Quality Control procedures to be implemented by the Specialty Contractor during the work.
5. Refusal criteria for specific equipment/installation methods.

6. Load test schedule, details, general description test procedures, loading increments, and acceptance criteria. Load tests shall be performed on each method of ground improvement utilized on the project (i.e., rapid impact compaction or alternative).
7. A shop drawing indicating production element layout/locations, test element locations, element numbering, construction requirements, and details/cross sections showing ground improvement elements below footings, mat foundations, and slabs on grade.
8. Tolerances or allowable deviation in planned element location versus as-built location below footings, mat foundation, and slabs on grade.

B. The following shall be submitted to the Geotechnical Engineer by the Specialty Contractor during the work:

1. Any change in the predetermined ground improvement program necessitated by a change in the subsurface conditions shall be communicated to the Geotechnical Engineer immediately.
2. Load test report including test element installation records, raw load test data, analysis of the data including comparison to acceptance criteria described in the design submittal, and verification of the design parameters for the ground improvement program. The load test report shall be prepared by a Professional

C. The following shall be submitted to the Geotechnical Engineer by the Specialty Contractor within 15 business days of the completion of the ground improvement work.

1. As-built drawings documenting the as-built conditions of the ground improvement work, including element locations and lengths. Note any deviation in as-build element locations versus the tolerances established in the approved design submittal.
2. A warranty document good for ten years from the date of ground improvement work completion.

1.07 QUALIFICATIONS

The qualifications for the Specialty Contractor and personnel are defined below.

A. The ground improvement program shall be performed by a Specialty Contractor with at least five years of documented experience in the particular ground improvement construction methods being proposed (rapid impact compaction).

B. The Specialty Contractor shall provide experienced management, supervisory, and key personnel as required to implement the ground improvement program, as follows:

1. The project manager shall have at least three years of experience in ground improvement construction, with at least the last two years in the full-time employment of the ground improvement Specialty Contractor.
2. The superintendent shall have at least three years of experience in ground improvement construction.

1.08 QUALITY ASSURANCE

A. Comply with all rules, regulations, laws and ordinances of the State of Rhode Island, City of Warwick, and of all other authorities having jurisdiction. All labor, materials, equipment, and services necessary to make work comply with such requirements shall be provided without additional cost to Owner

B. Specialty Contractor shall visit the site to review all details of the Work and working conditions and to verify dimensions in the field. Notify the Geotechnical Engineer in writing of any discrepancy before performing any work.

C. Field Monitoring and Testing:

1. Quality assurance monitoring and materials testing during ground improvement installation shall be performed by the Geotechnical Engineer.

D. As-built surveys shall be conducted and approved prior to equipment de-mobilization. The survey will be conducted by a Professional Land Surveyor registered in the State of Rhode Island. The as-built survey will be conducted at the subgrade elevation for each element and the location of each element shall be recorded at its center once exposed at the subgrade elevation.

PART 2 MATERIALS

2.01 EQUIPMENT

The equipment used in ground improvement construction consists of the common construction equipment, specialty equipment, and data acquisition systems required to perform the work.

A. The Specialty Contractor shall supply equipment in good operating condition capable of performing the work specified herein. The choice of equipment is largely dictated by subsurface conditions and ground improvement technique. Selection of equipment is left to the experience of the Specialty Contractor.

B. The Specialty Contractor shall provide instrumentation (measuring devices) to provide real time measurements and recordings of performed ground improvement work.

2.02 MATERIALS

A. The materials incorporated in this work shall be in accordance with the approved design submittal and shop drawings.

PART 3 EXECUTION

3.01 SITE VISIT

Site visits are necessary in order to be aware of conditions at the work site.

A. Prior to submitting a bid price for the ground improvement program, the Specialty Contractor shall visit the site to identify readily visible conditions in order to account for them in the bid.

3.02 SITE PREPARATION

The following shall be performed by the General Contractor in support of the ground improvement Specialty Contractor:

A. Removal of all surface or subsurface topsoil, brush, organic material, and other unacceptable material in accordance with the requirements of the Contract Documents. Removal of any surface or subsurface obstructions.

B. Site shall be graded to an agreed working elevation. A dry, level, and stable working platform shall be provided and maintained throughout the work.

C. Provisions for all-weather access and maintenance thereof for the Specialty Contractor's equipment and workforce, and for delivery of materials to the worksite.

D. Horizontal and vertical survey control and survey layout of building corners, grid lines, footing locations, embankment limits, utilities etc., for reference by the Specialty Contractor for layout and performance of the ground improvement work.

3.03 GROUND IMPROVEMENT

Ground improvement shall be implemented in accordance with the approved design and shop drawings.

A. Ground improvement shall be implemented at the locations shown on the approved shop drawings.

B. Ground improvement shall be performed using methods that do not generate spoils.

C. Installation criteria shall be as follows:

1. Obstructions encountered during ground improvement work that will prevent installation/implementation, or cause the ground improvement tooling to redirect from its design location shall be removed by the General Contractor.

    a. Obstructions include, but are not limited to: boulders, timbers, concrete, bricks, utility lines, etc. that prevent installation/implementation or cause the ground improvement tooling to redirect from the design location. Dense natural soil, natural rock or weathered rock shall not be considered obstructions. The Geotechnical Engineer shall be immediately notified of any obstructions or unexpected early refusal to verify the revised location and/or depth are acceptable.

    b. All remnant structures, foundations and debris encountered must be removed from beneath the proposed building and ice rink as encountered during construction. Overexcavations to remove structures, foundations and debris should be replaced with compacted Granular Borrow or Structural Fill.

    c. Ground improvement shall be constructed/implemented to the depth/elevation shown on the approved shop drawings or to the specified refusal criteria.

    d. Specific refusal criteria will depend on ground improvement technique and equipment used. Refusal criteria of the ground improvement tooling shall be established in the approved design submittal.

    e. Ground improvement shall be installed

2. Prior to initiating the work, a pre-construction condition survey of structures in the immediate vicinity of the work shall be performed by the Contractor to document the pre-construction conditions of those structures and submitted to the Engineer at least 14 days prior to the start of the ground improvements work. No more than 30 days after substantial completion, the Contractor shall submit a post-construction condition survey of all adjacent structures identified in the Contract Documents. Pre- and Post-Construction Condition Surveys shall be performed in accordance with Section 01399.

3. Construction vibrations shall be monitored by the Contractor during the work. Adjacent structure(s) may also be monitored by the Contractor for movement during the work. The work shall be stopped and/or modified if any negative impacts are observed (excessive construction vibrations, settlement, increase in crack width, etc.).

    a. The installation methods will be modified as necessary in order to limit vibrations at existing structures to a resultant peak particle velocity (rppv) of 0.5 inches- per-second (ips) for frequencies less than 60 hz and 1.0-ips for frequencies greater than 90 hz. Should vibration levels be exceeded, the Specialty Contractor shall take whatever means necessary to reduce vibrations to within acceptable levels.

3.04 QUALITY ASSURANCE/ QUALITY CONTROL

The details of the quality assurance/ quality control program are as follows:

A. All ground improvement construction, including all test areas and all production areas, shall be performed under the observation of the Geotechnical Engineer.

B. The Specialty Contractor shall execute a load test program to determine compliance with these specifications and confirm assumptions made by the Specialty Contractor’s design engineer. A load test shall be performed for each type of ground improvement to be utilized on the project. Load testing shall be completed under the observation of the Geotechnical Engineer.

C. Layout of ground improvement locations and maintenance of those locations is the responsibility of the Specialty Contractor.

D. A quality control program shall be included in the submittal describing sampling and testing procedures, frequency, and performance criteria to ensure that all construction materials are meeting the design requirements.

3.05 ACCEPTANCE CRITERIA

The acceptance of the ground improvement work shall be solely based on the following:

A. The test program demonstrates that ground improvement meets the requirements established in the approved design submittal prepared by the Specialty Contractor.

B. All ground improvement is installed to the lines and grades shown on the approved shop drawings.

    a. Locations of ground improvement elements will be determined by as-built survey. As-built surveys shall be conducted and approved prior to equipment de-mobilization. The survey will be conducted by a Professional Land Surveyor

registered in the State of Rhode Island and provided by the Contractor. The as-built will be conducted at the subgrade elevation for each element and the location of each element shall be recorded at its center once exposed at the subgrade elevation.

C. All ground improvement is installed by the means and methods established in the approved design submittal.

D. All ground improvement construction is monitored by the Geotechnical Engineer.

E. Ground improvement may be rejected if it is installed in an incorrect location than what is shown on the approved shop drawings as determined by as-built survey. Ground improvement may also be rejected if it is installed to the incorrect elevation or by incorrect methods from what is indicated in the approved design submittal. If ground improvement is rejected, the Specialty Contractor shall replace/reperform the ground improvement at the direction of the Geotechnical Engineer. Replacement of the ground improvement may be avoided if alternate remedial procedures are approved by the Geotechnical Engineer. Replacement ground improvement shall be installed at no additional cost to the Owner.

3.06 RESTRICTIONS

The following restrictions apply to the performance of the work.

A. The Contractor shall be responsible for obtaining any State and municipal permits (if required).

B. The Contractor shall be responsible for the precise delineation of all above and below ground utilities and obstructions and shall accurately mark their layout at the site. Utilities which cannot be removed shall be exposed and made known to the Specialty contractor prior to adjacent ground improvement work.

C. Other restrictions (i.e., environmental restrictions, work boundaries, hours for construction, etc.) as described in the Contract Documents.

END OF SECTION

DIVISION 3

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SECTION 03300 - CAST-IN-PLACE CONCRETE

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 1 Specification Sections, apply to this Section.

1.2 SUMMARY

A. This Section specifies cast-in-place concrete, including formwork, reinforcement, concrete materials, mixture design, placement procedures, and finishes, for the various classes of concrete.

B. Class Application $f'c$ Exposure

1. Footings and Foundation walls; exposed to moderate sulfate, no exposure.
2. Interior slabs on grade, no exposure.
3. Exterior walks and slabs; exposed to freeze-thaw, deicing chemicals, and moderate sulfate, no exposure.

1.3 SUBMITTALS

A. Product Data: For each type of manufactured material and product indicated.

B. Design Mixes: For each concrete mix, include alternate mix designs when characteristics of materials, project conditions, weather, test results, or other circumstances warrant adjustments.

C. Concrete Mix Data:

1. Submit field or laboratory test records used to document that proposed mixture will achieve the required average compressive strength for each class of concrete.
2. Specified compressive strength, $f'c$
3. Average compressive strength of proposed mixture(s), $f'cr$
4. Documentation of strength test results of similar concrete mixtures indicating the standard deviation in accordance with ACI 318
5. Slump
6. Air content
7. Density
8. w/cm ratio
9. Maximum aggregate size
10. Sources and designations of ingredient materials proposed for use.

11. Submit delivery ticket for each batch of concrete delivered to the jobsite in accordance with ASTM C 94 and indicate:

    a. The maximum quantity of jobsite water addition permitted.

    b. Document the actual amount water added at the jobsite with initials of the person requesting the addition.

12. Indicate amounts of mix water to be withheld for later addition at Project site.

D. Steel Reinforcement Shop Drawings: Details of fabrication, bending, and placement, prepared according to ACI 315, "Details and Detailing of Concrete Reinforcement." Include material, grade, bar schedules, stirrup spacing, bent bar diagrams, arrangement, and supports of concrete reinforcement. Include special reinforcement required for openings through concrete structures.

E. Welding Certificates: Copies of certificates for welding procedures and personnel.

F. Material Test Reports:

1. Cementitious materials and aggregates.
2. Admixtures.
3. Curing materials.
4. Floor and slab treatments.
5. Vapor retarders.

1.4 QUALITY ASSURANCE

A. Installer shall employ an on-site supervisor of the finishing crew who is qualified as ACI Certified Concrete Flatwork Technician or equivalent. Qualifications: An experienced installer who has completed concrete Work similar in material, design, and extent to that indicated for this Project and whose work has resulted in construction with a record of successful in-service performance.

B. Manufacturer Qualifications: A firm experienced in manufacturing ready-mixed concrete products complying with ASTM C 94 requirements for production facilities and equipment.

1. Manufacturer must be certified according to the National Ready Mixed Concrete Association's Certification of Ready Mixed Concrete Production Facilities.

C. Testing Agency Qualifications: An independent testing agency, acceptable to authorities having jurisdiction, qualified according to ASTM C 1077and ASTM E 329 to conduct the testing indicated, as documented according to ASTM E 548.

1. Personnel conducting field tests shall be certified as ACI Concrete Field Testing Technician Grade I or equivalent.

2. Personnel conducting laboratory tests shall be certified as ACI Concrete Strength Testing Technician or ACI Concrete Laboratory Testing Technician – Grade I or equivalent.
3. Test results for the purpose of acceptance shall be certified by a Registered Professional Engineer employed with the Testing Agency.

D. Source Limitations: Obtain each type or class of cementitious material of the same brand from the same manufacturer's plant, each aggregate from one source, and each admixture from the same manufacturer.

E. Welding: Qualify procedures and personnel according to AWS D1.4, "Structural Welding Code--Reinforcing Steel."

F. Tolerances: Comply with the following, unless more stringent provisions are indicated:

1. ACI 301, "Specifications for Structural Concrete."
2. ACI 117, "Specifications for Tolerances for Concrete Construction and Materials."

G. Coordinate all foundation penetrations with Architect, plumbing, mechanical, electrical contractors and local agencies.

H. Pre-Installation Conference: Conduct conference at Project site to comply with requirements in Division 1 Section "Project Management and Coordination."

1. Require representatives of each entity directly concerned with cast-in-place concrete to attend, including:

a. Architect
b. Structural Engineer
c. Contractor
d. Concrete Contractor
e. Pumping Contractor
f. Ready-mix concrete producer
g. Independent testing agency

1.5 DELIVERY, STORAGE, AND HANDLING

A. Deliver, store, and handle steel reinforcement to prevent bending and damage.

PART 2 - PRODUCTS

2.1 FORM-FACING MATERIALS

A. Prefabricated Forms (Void Forms):

1. Wall/Grade Beam and Structural Slab Void Forms: (for structurally suspended slabs only)

a. Function: Create void space directly under grade beams, structural slabs or walls.
b. Composition: Corrugated paper material with a moisture resistant exterior and having an interior fabrication of a uniform, cellular configuration composed of non-wax impregnated components.
c. Depth: As indicated on the drawings.
d. Profile: Provide trapezoidal, Trapvoid form.
e. Strength: Forms must be capable of sustaining a working load of 1,600 psf.
f. Accessories: Seam pads to eliminate concrete flow in void forms and end caps to seal off void form end.
g. Acceptable Manufacturer: Trapvoid, seam pads and end caps as manufactured by Sure Void Products, Inc., Englewood, Co., phone (800) 458-5444.

2. Void Forms at Entry Paving: Biodegradable paper surface, treated for moisture resistance, structurally sufficient to support weight of plastic concrete and other superimposed loads.

2.2 STEEL REINFORCEMENT

A. Reinforcing Bars: ASTM A 615/A 615M, Grade 60, deformed.

B. Steel Bar Mats: ASTM A 184/A 184M, assembled with clips.

C. Plain-Steel Welded Wire Fabric: ASTM A 185, fabricated from as-drawn steel wire into flat sheets.

2.3 REINFORCEMENT ACCESSORIES

A. Bar Supports: Bolsters, chairs, spacers, and other devices for spacing, supporting, and fastening reinforcing bars and welded wire fabric in place. Manufacture bar supports according to CRSI's "Manual of Standard Practice" from steel wire, plastic, or precast concrete or fiber-reinforced concrete of greater compressive strength than concrete.

B. Joint Dowel Bars: Plain-steel bars, ASTM A 615/A 615M, Grade 60. Cut bars true to length with ends square and free of burrs.

2.4 CONCRETE MATERIALS

A. Cementitious Materials: use materials meeting the following requirements with limitations specified in Section 2 “Concrete Mixtures.”

1. Cement: ASTM C 150 or ASTM C 1157 or ASTM C 595
2. Fly Ash: ASTM C 618, Type C.
3. Ground Granulated Blast-Furnace Slag: ASTM C 989
4. Silica Fume: ASTM C 1240

B. Normal weight Aggregate: ASTM C 33

C. Water: ASTM C 1602

D. Admixtures:

1. Air-Entraining Admixtures: ASTM C 260.
2. Water-Reducing Admixture: ASTM C 494, Type A.
3. Retarding Admixture: ASTM C 494, Type B.
4. Accelerating Admixtures: ASTM C 494, Type C (non chloride).
5. Water-Reducing and Retarding Admixture: ASTM C 494, Type D.
6. Water-Reducing and Accelerating Admixtures: ASTM C 494, Type E.
7. High-Range, Water-Reducing Admixture: ASTM C 494, Type F.
8. Plasticizing Admixture: ASTM C 1017, Type I
9. Plasticizing and Retarding Admixture: ASTM C 1017, Type II
10. Other admixtures for specific use with the permission of the design professional

2.5 FIBER REINFORCEMENT

A. Synthetic Fiber: Fibrillated polypropylene fibers engineered and designed for use in concrete, complying with ASTM C 1116, Type III, 1/2 to 1-1/2 inches long.

B. Products: Subject to compliance with requirements, provide one of the following:

1. Fibrillated Fibers:

a. Fibrasol F; Axim Concrete Technologies.
b. Fibermesh; Fibermesh, Div. of Synthetic Industries.
c. Forta; Forta Corporation.
d. Grace Fibers; W. R. Grace & Co., Construction Products Div.

2.6 WATERSTOPS

A. Self-Expanding Strip Waterstops: Manufactured rectangular or trapezoidal strip, sodium bentonite or other hydrophylic material for adhesive bonding to concrete.

1. Products: Subject to compliance with requirements, provide one of the following:

a. Volclay Waterstop-RX; Colloid Environmental Technologies Co.
b. Conseal CS-231; Concrete Sealants Inc.
c. Swellseal Joint; De Neef Construction Chemicals (U.S.) Inc.
d. Hydrotite; Greenstreak.
e. Mirastop; Mirafi Moisture Protection, Div. of Royal Ten Cate (USA), Inc.
f. Adeka Ultra Seal; Mitsubishi International Corporation.
g. Superstop; Progress Unlimited Inc.

2.7 VAPOR RETARDERS

A. Vapor Retarder: ASTM E 1745, Class A with a water vapor transmission rate of 0.012 perms or less as tested by ASTM E 96, not less than 10 mils thick.

2.8 CURING MATERIALS

A. Absorptive Cover: AASHTO M 182, Class 2, burlap cloth made from jute or kenaf, weighing approximately 9 oz./sq. yd. dry.

B. Moisture-Retaining Cover: ASTM C 171, polyethylene film or white burlap-polyethylene sheet.

C. Water: Potable.

D. Clear, Waterborne, Membrane-Forming Curing and Sealing Compound: ASTM C 1315, Type 1, Class A; 25 percent solids minimum.

E. Clear, Waterborne, Membrane-Forming Curing Compound: ASTM C 309, Type 1, Class B, 18 to 22 percent solids.

F. Products: Subject to compliance with requirements, provide one of the following:

1. Evaporation Retarder:

a. Cimfilm; Axim Concrete Technologies.
b. Finishing Aid Concentrate; Burke Group, LLC (The).
c. Spray-Film; ChemMasters.
d. Aquafilm; Conspec Marketing & Manufacturing Co., Inc.
e. Sure Film; Dayton Superior Corporation.
f. Eucobar; Euclid Chemical Co.
g. Vapor Aid; Kaufman Products, Inc.
h. Lambco Skin; Lambert Corporation.
i. E-Con; L&M Construction Chemicals, Inc.
j. Confilm; Master Builders, Inc.
k. Waterhold; Metalcrete Industries.
l. Rich Film; Richmond Screw Anchor Co.
m. SikaFilm; Sika Corporation.
n. Finishing Aid; Symons Corporation.
o. Certi-Vex EnvioAssist; Vexcon Chemicals, Inc.

2. Clear, Waterborne, Membrane-Forming Curing and Sealing Compound:

a. Cureseal 1315 WB; Burke by Edoco,
b. Sealcure 1315 WB; Conspec Marketing & Manufacturing Co., Inc., a Dayton Superior Company
c. Super Diamond Clear VOX; Euclid Chemical Company
d. Lumiseal WB Plus; L&M Construction Chemicals
e. Vexcon Starseal 1315; Vexcon Chemicals, Inc."

2.9 RELATED MATERIALS

A. Joint-Filler Strips: ASTM D 1751, asphalt-saturated cellulosic fiber.

2.10 CONCRETE MIXES

A. Prepare design mixtures for each class of concrete on the basis of laboratory trial mixtures or field test data, or both according to ACI 318, Chapter 5. Design mixtures shall meet the following requirements.

1. Class 1 (Footings and foundation walls, exposed to moderate sulfate):

    a. Specified Compressive Strength: As noted on structural drawing.
    b. Nominal maximum aggregate size: 1-1/2 in. Smaller size maximum aggregate may be used.
    c. Cement: ASTM C 150 Type II or ASTM C 595 (MS designation).
    d. Maximum w/cm: 0.50
    e. Admixtures: no calcium chloride containing admixtures

2. Class 1 (Footings and foundations walls, no exposure):

    a. Specified Compressive Strength: As noted on structural drawing.
    b. Nominal maximum aggregate size: 1-1/2 in. Smaller size maximum aggregate may be used.

3. Class 2 (Interior Slabs on Grade, no exposure):

    a. Specified compressive strength: As noted on structural drawing.
    b. Nominal maximum aggregate size: 1-1/2 in. Smaller size maximum aggregate may be used.
    c. Non air entrained. Air content shall not exceed 3%.

4. Class 3 (Exterior walks and slabs, exposed to freeze-thaw, deicing chemicals, and moderate sulfate):

    a. Specified Compressive Strength: As noted on structural drawing.
    b. Nominal maximum aggregate size: 1-1/2 in. Smaller size maximum aggregate may be used.
    c. Air content: 5.5% +/- 1.5% or adjusted for max aggregate size from ACI 211.1
    d. Cement: ASTM C 150, Type II, ASTM C 1157 Type MS, or ASTM C 595 (MS designation)
    e. As appropriate, the following limits shall be complied with:

        1) Fly Ash: Maximum 25% by weight
        2) Slag: Maximum 50% by weight

3) Silica Fume: Maximum 10% by weight
4) Total of fly ash, slag, and silica fume: Maximum 50% by weight
5) Total of fly ash and silica fume: Maximum 35% by weight

6) Maximum w/cm: 0.45
7) Admixtures: no calcium chloride containing admixtures

5. Class 3 (Exterior walks and slabs, no exposure):

a. Specified Compressive Strength: As noted on structural drawing.
b. Nominal maximum aggregate size: 1-1/2 in. Smaller size maximum aggregate may be used.

2.11 FABRICATING REINFORCEMENT

A. Fabricate steel reinforcement according to CRSI's "Manual of Standard Practice."

2.12 CONCRETE MIXING

A. Ready-Mixed Concrete: Measure, batch, mix, and deliver concrete according to ASTM C 94 and ASTM C 1116, and furnish batch ticket information.

1. When air temperature is between 85 and 90 deg F, reduce mixing and delivery time from 1-1/2 hours to 75 minutes; when air temperature is above 90 deg F, reduce mixing and delivery time to 60 minutes.

PART 3 - EXECUTION

3.1 FORMWORK

A. Design, erect, shore, brace, and maintain formwork, according to ACI 301, to support vertical, lateral, static, and dynamic loads, and construction loads that might be applied, until concrete structure can support such loads.

B. Construct formwork so concrete members and structures are of size, shape, alignment, elevation, and position indicated, within tolerance limits of ACI 117.

C. Limit concrete surface irregularities, designated by ACI 347R as abrupt or gradual, as follows:

3.2 EMBEDDED ITEMS

A. Place and secure anchorage devices and other embedded items required for adjoining work that is attached to or supported by cast-in-place concrete. Use Setting Drawings, templates, diagrams, instructions, and directions furnished with items to be embedded.

1. Install anchor bolts, accurately located, to elevations required.
2. Install reglets to receive top edge of foundation sheet waterproofing and to receive through-wall flashings in outer face of concrete frame at exterior walls, where flashing is shown at lintels, shelf angles, and other conditions.
3. Install dovetail anchor slots in concrete structures as indicated.

3.3 VAPOR RETARDERS

A. Vapor Retarder: Place, protect, and repair vapor-retarder sheets according to ASTM E 1643 and manufacturer's written instructions.

3.4 STEEL REINFORCEMENT

A. General: Comply with CRSI's "Manual of Standard Practice" for placing reinforcement.

1. Do not cut or puncture vapor retarder. Repair damage and reseal vapor retarder before placing concrete.

B. Clean reinforcement of loose rust and mill scale, earth, ice, and other foreign materials.

C. Accurately position, support, and secure reinforcement against displacement. Locate and support reinforcement with bar supports to maintain minimum concrete cover. Do not tack weld crossing reinforcing bars.

1. Shop- or field-weld reinforcement according to AWS D1.4, where indicated.

D. Set wire ties with ends directed into concrete, not toward exposed concrete surfaces.

E. Install welded wire fabric in longest practicable lengths on bar supports spaced to minimize sagging. Lap edges and ends of adjoining sheets at least one mesh spacing. Offset laps of adjoining sheet widths to prevent continuous laps in either direction. Lace overlaps with wire.

3.5 JOINTS

A. General: Construct joints true to line with faces perpendicular to surface plane of concrete.

B. Construction Joints: Install so strength and appearance of concrete are not impaired, at locations indicated or as approved by Architect.

1. Place joints perpendicular to main reinforcement. Continue reinforcement across construction joints, unless otherwise indicated.
2. Form from preformed galvanized steel, plastic keyway-section forms, or bulkhead forms with keys, unless otherwise indicated. Embed keys at least 1-1/2 inches into concrete.

C. Contraction Joints in Slabs-on-Grade: Form weakened-plane contraction joints, sectioning concrete into areas as indicated. Construct contraction joints for a depth equal to at least one-fourth of concrete thickness, as follows:

1. Grooved Joints: Form contraction joints after initial floating by grooving and finishing each edge of joint to a radius of 1/8 inch. Repeat grooving of contraction joints after applying surface finishes. Eliminate groover tool marks on concrete surfaces.
2. Sawed Joints: Form contraction joints with power saws equipped with shatterproof abrasive or diamond-rimmed blades. Cut 1/8-inch- wide joints into concrete when cutting action will not tear, abrade, or otherwise damage surface and before concrete develops random contraction cracks.

D. Dowel Joints: Install dowel sleeves and dowels or dowel bar and support assemblies at joints where indicated.

1. Use dowel sleeves or lubricate or asphalt-coat one-half of dowel length to prevent concrete bonding to one side of joint.

3.6 WATERSTOPS

A. Flexible Waterstops: Install in construction joints as indicated to form a continuous diaphragm. Install in longest lengths practicable. Support and protect exposed waterstops during progress of Work. Field-fabricate joints in waterstops according to manufacturer's written instructions.

B. Self-Expanding Strip Waterstops: Install in construction joints and at other locations indicated, according to manufacturer's written instructions, bonding or mechanically fastening and firmly pressing into place. Install in longest lengths practicable.

3.7 CONCRETE PLACEMENT

A. Before placing concrete, verify that installation of formwork, reinforcement, and embedded items is complete and that required inspections have been performed.

B. Do not add water to concrete during delivery, at Project site, or during placement unless:

1. Batch ticket indicates an amount of mixing water that was withheld for later addition at Project site.
2. Addition of water at Project site must be certified by the Testing Agency that the maximum water/cement ratio per the approved mix design is not exceeded.

C. Deposit concrete continuously or in layers of such thickness that no new concrete will be placed on concrete that has hardened enough to cause seams or planes of weakness. If a section cannot be placed continuously, provide construction joints as specified. Deposit concrete to avoid segregation.

D. Deposit and consolidate concrete for floors and slabs in a continuous operation, within limits of construction joints, until placement of a panel or section is complete.

1. Consolidate concrete during placement operations so concrete is thoroughly worked around reinforcement and other embedded items and into corners.
2. Maintain reinforcement in position on chairs during concrete placement.
3. Screed slab surfaces with a straightedge and strike off to correct elevations.
4. Slope surfaces uniformly to drains where required.
5. Begin initial floating using bull floats or darbies to form a uniform and open-textured surface plane, free of humps or hollows, before excess moisture or bleedwater appears on the surface. Do not further disturb slab surfaces before starting finishing operations.

E. Cold-Weather Placement: Comply with ACI 306.1 and as follows. Protect concrete work from physical damage or reduced strength that could be caused by frost, freezing actions, or low temperatures.

1. When air temperature has fallen to or is expected to fall below 40 deg F, uniformly heat water and aggregates before mixing to obtain a concrete mixture temperature of not less than 50 deg F and not more than 80 deg F at point of placement.
2. Do not use frozen materials or materials containing ice or snow. Do not place concrete on frozen subgrade or on subgrade containing frozen materials.
3. Do not use calcium chloride, salt, or other materials containing antifreeze agents or chemical accelerators, unless otherwise specified and approved in mix designs.

F. Hot-Weather Placement: Place concrete according to recommendations in ACI 305R and as follows, when hot-weather conditions exist:

1. Cool ingredients before mixing to maintain concrete temperature below 90 deg F at time of placement. Chilled mixing water or chopped ice may be used to control temperature, provided water equivalent of ice is calculated to total amount of mixing water. Using liquid nitrogen to cool concrete is Contractor's option.
2. Cover steel reinforcement with water-soaked burlap so steel temperature will not exceed ambient air temperature immediately before embedding in concrete.
3. Fog-spray forms, steel reinforcement, and subgrade just before placing concrete. Keep subgrade moisture uniform without standing water, soft spots, or dry areas.

3.8 FINISHING FLOORS AND SLABS

A. General: Comply with recommendations in ACI 302.1R for screeding, restraightening, and finishing operations for concrete surfaces. Do not wet concrete surfaces.

B. Float Finish: Consolidate surface with power-driven floats or by hand floating if area is small or inaccessible to power driven floats. Restraighten, cut down high spots, and fill low spots. Repeat float passes and restraightening until surface is left with a uniform, smooth, granular texture.

1. Apply float finish to surfaces indicated, to surfaces to receive trowel finish, and to floor and slab surfaces to be covered with fluid-applied or sheet waterproofing, built-up or membrane roofing, or sand-bed terrazzo.

C. Trowel Finish: After applying float finish, apply first trowel finish and consolidate concrete by hand or power-driven trowel. Continue troweling passes and restraighten until surface is free of trowel marks and uniform in texture and appearance. Grind smooth any surface defects that would telegraph through applied coatings or floor coverings.

1. Apply a trowel finish to surfaces indicated and to floor and slab surfaces exposed to view or to be covered with resilient flooring, carpet, or another thin film-finish coating system
2. Finish surfaces to the following tolerances, measured within 24 hours according to ASTM E 1155/E 1155M for a randomly trafficked floor surface:

    a. Specified overall values of flatness, F(F) 25; and levelness, F(L) 20; with minimum local values of flatness, F(F) 17; and levelness, F(L) 15.

3. Finish and measure surface so gap at any point between concrete surface and an unleveled freestanding 10-foot- long straightedge, resting on two high spots and placed anywhere on the surface, does not exceed the following:

    a. 1/4 inch.
    b. 3/16 inch.
    c. 1/8 inch.

3.9 MISCELLANEOUS CONCRETE ITEMS

A. Filling In: Fill in holes and openings left in concrete structures, unless otherwise indicated, after work of other trades is in place. Mix, place, and cure concrete, as specified, to blend with in-place construction. Provide other miscellaneous concrete filling indicated or required to complete Work.

B. Curbs: Provide monolithic finish to interior curbs by stripping forms while concrete is still green and by steel-troweling surfaces to a hard, dense finish with corners, intersections, and terminations slightly rounded.

C. Equipment Bases and Foundations: Provide machine and equipment bases and foundations as shown on Drawings. Set anchor bolts for machines and equipment at correct elevations, complying with diagrams or templates of manufacturer furnishing machines and equipment.

D. Steel Pan Stairs: Provide concrete fill for steel pan stair treads, landings, and associated items. Cast-in inserts and accessories as shown on Drawings. Screed, tamp, and trowel-finish concrete surfaces.

3.10 CONCRETE PROTECTION AND CURING

A. General: Protect freshly placed concrete from premature drying and excessive cold or hot temperatures. Comply with ACI 306.1 for cold-weather protection and with recommendations in ACI 305R for hot-weather protection during curing.

B. Evaporation Retarder: Apply evaporation retarder to unformed concrete surfaces if hot, dry, or windy conditions cause moisture loss approaching 0.2 lb/sq. ft. x h before and during finishing operations. Apply according to manufacturer's written instructions after placing, screeding, and bull floating or darbying concrete, but before float finishing.

C. Unformed Surfaces: Begin curing immediately after finishing concrete. Cure unformed surfaces, including floors and slabs, concrete floor toppings, and other surfaces, by one or a combination of the following methods:

1. Moisture Curing: Keep surfaces continuously moist for not less than seven days with the following materials:

    a. Water.
    b. Continuous water-fog spray.
    c. Absorptive cover, water saturated, and kept continuously wet. Cover concrete surfaces and edges with 12-inch lap over adjacent absorptive covers.

2. Moisture-Retaining-Cover Curing: Cover concrete surfaces with moisture-retaining cover for curing concrete, placed in widest practicable width, with sides and ends lapped at least 12 inches, and sealed by waterproof tape or adhesive. Cure for not less than seven days. Immediately repair any holes or tears during curing period using cover material and waterproof tape.

    a. Moisture cure or use moisture-retaining covers to cure concrete surfaces to receive floor coverings.
    b. Moisture cure or use moisture-retaining covers to cure concrete surfaces to receive penetrating liquid floor treatments.
    c. Cure concrete surfaces to receive floor coverings with either a moisture-retaining cover or a curing compound that the manufacturer recommends for use with floor coverings.

3. Curing Compound: Apply uniformly in continuous operation by power spray or roller according to manufacturer's written instructions. Recoat areas subjected to heavy rainfall within three hours after initial application. Maintain continuity of coating and repair damage during curing period.
4. Curing and Sealing Compound: Apply uniformly to floors and slabs indicated in a continuous operation by power spray or roller according to manufacturer's written instructions. Recoat areas subjected to heavy rainfall within three hours after initial application. Repeat process 24 hours later and apply a second coat. Maintain continuity of coating and repair damage during curing period.

3.11 FIELD QUALITY CONTROL

A. Testing Agency: Engage a qualified independent testing and inspecting agency to sample materials, perform tests, and submit test reports during concrete placement according to requirements specified in this Article.

B. Testing Agency: Owner will engage a qualified independent testing and inspecting agency to sample materials, perform tests, and submit test reports during concrete placement. Sampling and testing for quality control may include those specified in this Article.

C. Testing Services: Testing of composite samples of fresh concrete obtained according to ASTM C 172 shall be performed according to the following requirements:

1. Testing Frequency: Obtain at least one composite sample for each 100 Cu. Yd. or fraction thereof of each concrete mix placed each day.

    a. When frequency of testing will provide fewer than five compressive-strength tests for each concrete mix, testing shall be conducted from at least five randomly selected batches or from each batch if fewer than five are used.

2. Slump: ASTM C 143; one test at point of placement for each composite sample, but not less than one test for each day's pour of each concrete mix. Perform additional tests when concrete consistency appears to change.
3. Air Content: ASTM C 231, pressure method, for normal-weight concrete; ASTM C 173, volumetric method, for structural lightweight concrete; one test for each composite sample, but not less than one test for each day's pour of each concrete mix.
4. Compression Test Specimens: ASTM C 31/C 31M; cast and laboratory cure one set of four standard cylinder specimens for each composite sample.

    a. Cast and field cure one set of four standard cylinder specimens for each composite sample.

5. Compressive-Strength Tests: ASTM C 39; test two laboratory-cured specimens at 7 days and two at 28 days.

    a. Test two field-cured specimens at 7 days and two at 28 days.
    b. A compressive-strength test shall be the average compressive strength from two specimens obtained from same composite sample and tested at age indicated.

D. When the average strength of two cylinders tested at 7 days is less than 70 percent of the specified compressive strength the contractor shall evaluate mix designs and construction procedures an make appropriate adjustments to assure strength requirements are met at 28 days for subsequent concrete work.

E. Strength of each concrete mix will be satisfactory if every average of any three-consecutive compressive-strength tests conducted at 28 days equals or exceeds specified compressive strength and no compressive-strength test value falls below specified compressive strength by more than 500 psi.

F. Test results shall be reported in writing to Architect, concrete manufacturer, and Contractor within 48 hours of testing. Reports of compressive-strength tests shall contain Project identification name and number, date of concrete placement, name of concrete testing and inspecting agency, location of concrete batch in Work, design compressive strength at 28 days, concrete mix proportions and materials, compressive breaking strength, and type of break for both 7-and 28-day tests.

G. Nondestructive Testing: Impact hammer, sonoscope, or other nondestructive device may be permitted by Architect but will not be used as sole basis for approval or rejection of concrete.

H. Additional Tests: Testing and inspecting agency shall make additional tests of concrete when test results indicate that slump, air entrainment, compressive strengths, or other requirements have not been met, as directed by Architect. Testing and inspecting agency may conduct tests to determine adequacy of concrete by cored cylinders complying with ASTM C 42 or by other methods as directed by Architect.

END OF SECTION 03300

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SECTION 03350

CONCRETE PAVING

PART 1 GENERAL

1.01 SECTION INCLUDES

1. The work of this Section consists of providing all labor, equipment, materials, incidental work, and construction methods necessary to perform all concrete paving work and related items as indicated on the Drawings and as specified in this Section and includes, but is not limited to, concrete walkways, pedestrian ramps and other misc. exterior concrete work.

1.02 REFERENCES

A. American Society for Testing and Materials (ASTM)

1. A185, Specification for Steel Welded Wire Fabric, Plain, for Concrete Reinforcement.
2. A615, Specification for deformed and Plain Billet-Steel Bars for Concrete Reinforcement.
3. C31, Practice for Making and Curing Concrete Test Cylinders in the Field.
4. C33, Specification for Concrete Aggregates.
5. C39, Test Method for Compressive Strength of Cylindrical Concrete Specimens.
6. C42, Test Method for Obtaining and Testing Drilled Cores and Sawed Beams of Concrete.
7. C94, Specification for ready Mixed Concrete.
8. C143, Test Method for Slump of Hydraulic Cement Concrete.
9. C150, Specification for Portland Cement.
10. C172, Practice for Sampling Freshly Mixed Concrete.
11. C231, Test Method for Air Content of Freshly Mixed Concrete by the Pressure Method.
12. C260, Test Method for Air-Entraining Admixtures for Concrete.
13. C494, Specification for Chemical Admixtures for Concrete.
14. C920, Specification for Elastomeric Joint sealants.
15. D994, Specification for Preformed Expansion Joint Filler for Concrete (Bituminous Type)
16. D1056, Specification for Flexible Cellular Materials-Sponge or Expanded Rubber.
17. D1751, Specification for Preformed Expansion Joint Filler for Concrete Paving and Structural Construction (Nonextruding and Resilient Bituminous Types).

B. American Concrete Institute (ACI):

1. ACI 301, Specification for Structural Concrete for Buildings.
2. ACI 304, Recommended Practice for Measuring, Mixing, Transporting, and Placing Concrete.
3. ACI 305, Recommended Practice for Hot Weather Concreting.
4. ACI 306, Recommended Practice for Cold Weather Concreting.
5. ACI 315, Building Code Requirements for Reinforced Concrete.
6. ACI 347, Guide to Formwork for Concrete.

C. Concrete Reinforcing Steel Institute (CRSI):

1. Manual of Standard Practice.

1.03 SUBMITTALS

A. Submit Shop Drawings in accordance with SECTION 01300 for the following:

1. Reinforcing Steel
   a. Furnish in detail and completeness that all fabrication and placement at the site can be accomplished without the use of contract drawings for reference.
   b. Include number of pieces, sizes, and grade of reinforcing steel, accessories, and any other information required for fabrication and placement.
   c. Show joint layout and design
   d. Check structural and site drawings for anchor bolts, anchors, inserts, conduits, sleeves, and any other items which are required to be embedded in concrete, and make necessary provisions as required so that reinforcing steel will not interfere with the placement of such embedded items.
2. Concrete mix designs.
3. Grout manufacturer/design mix (if included in this section)
4. Manufacturer's data for ancillary materials such as joint fillers and sealants, epoxy bonding compound.
5. Shop drawing showing locations of all expansion joints and control joints in concrete walkways and in concrete base for unit pavers. Hand drawn in red on full sized bid drawing is acceptable.

1.04 QUALITY ASSURANCE

A. Selection of testing laboratory in accordance with SECTION 01410.

B. Sample and Test Concrete as follows:

1. Test Specimens: Make, cure and have tested, a minimum of one set of four test specimens from the concrete of each day's pour and for each fifty cubic yards of concrete cast in accordance with ASTM C172, C31 and C39. One cylinder shall be broken after seven days and three cylinders after twenty-eight day.
2. Slump: A slump test shall be made for each truckload of concrete in accordance with ASTM C143. Slumps greater than design mix limit will be grounds for rejection of the concrete.
3. Air Content: An air content test shall be made from each day's pour of concrete by the pressure method in accordance with ASTM C231. Air contents above or below the limits specified will be grounds for rejection of the concrete.
4. In the event the compressive strength of the cylinders, when tested, is below the specified minimum, the Engineer may require test cores of the hardened structure to be taken by the Testing Laboratory in accordance with ASTM C42. If such test indicates that the core specimen is below the required strength, the concrete in question shall be removed and replaced without cost to the Owner. Any other work damaged as a result of this concrete removal shall be replaced with new materials to the satisfaction of the Engineer at no additional cost to the Owner. The cost of coring will be deducted from the contract amount. Where the Testing Laboratory has taken core cylinders and the concrete proves to be satisfactory, core holes shall be filled in a manner satisfactory to the Engineer at no additional cost to the Owner.
5. The Contractor shall coordinate the date and location of tests with the Engineer before any concrete work is started.

C. Mockup:

1. Install a 3 ft x 3 ft concrete mockup showing saw cut jointing at a stagger joint “T”
2. This area will serve as the standard by which the workmanship will be judged.
3. Subject to acceptance by Engineer, mock-up may be retained as part of finished work.
4. If mock-up is not retained, remove and dispose legally.

1.05 PRODUCT DELIVERY, STORAGE AND HANDLING

A. Reinforcing steel.

1. Transport to the site, store, and cover in a manner which will ensure that no damage shall occur to it from moisture, dirt, grease, or any other cause that might impair bond to concrete or chip protective epoxy coating.
2. Store on the site at all times, a supply of approved reinforcing steel to ensure that there will be no delay of the work.
3. Identification of steel shall be maintained after bundles are broken.

PART 2 PRODUCTS

2.01 MATERIALS

A. Gravel Borrow

1. In accordance with State of Rhode Island Standard Specification, Subsection M.01.02, Meeting the gradation requirements of Table 1, Column 1, with 100% Passing 3-inch Square Mesh Sieves.

B. Welded Wire Fabric

1. Welded wire fabric (WWF) reinforcement shall conform to the applicable requirements of ASTM A 185. Fabric reinforcement shall be furnished in flat sheets. Fabric reinforcement in rolls will not be permitted.
   a. Provide 6 inches x 6 inches W4 x W4 WWM for 8 inches thick concrete pavement and 6 inches x 6 inches W1.4 x W1.4 WWM for 6 or 4 inches concrete pavement.

C. Aggregates

1. Fine aggregate, in accordance with ASTM C33, clean and graded from ¼ inch to fines.
2. Coarse aggregate, in accordance with ASTM C33, clean and graded from ¼ inch to maximum sizes hereinafter specified.

D. Cement Concrete

1. Cast-in-place concrete shall be air-entrained concrete with minimum 28-day compressive strength of 4,000 pounds per square inch, conforming to the requirements and applicable provisions of RIDOT Standard Specifications.

E. Expansion Joints

1. Provide expansion joints as indicated and in accordance with the following:
   a. Unless otherwise indicated on the Drawings, expansion joints shall be located 20 feet on-center, maximum, in walkways.
2. Expansion Joint Filler:
   a. Closed cell polymer foam meeting requirements of ASTM D 1752, Sections 3.1 to 3.4, based on compression requirement of 10 pounds per square inch minimum and 25 pounds per square inch maximum. Recovery rate following 50 percent compression shall exceed 99 percent recovery, per ASTM D 545.

3. Joint Sealant and Backer Rod
    a. Joint sealant and backer rod shall be Type 1A and shall conform to the requirements of Section 905 of the Rhode Island Standard Specifications and its amendments.

F. Detectable Warning Tile

    a. Detectable Warning Tile and shall conform to the requirements of Section 905 of the Rhode Island Standard Specifications and its amendments.
    b. Detectable warning surfaces shall comply with the detectable warnings on walking surfaces section of the Americans with Disabilities Act (Title 49 CFR Transportation, Part 37.9 Standards for Accessible Transportation Facilities, Appendix A, Section 4.29.2 Detectable Warnings on Walking Surfaces).

G. Air Entraining Agent.

1. In accordance with ASTM C260.

H. Water Reducing Agent.

1. In accordance with ASTM C494 Type A.

I. Microsilica Admixture.

1. Packaged in easily dispersing form.

J. Water.

1. Clean and potable,
2. Free of impurities detrimental to concrete.

K. Reinforcing Bars.

1. New, deformed billet steel bars, in accordance with ASTM A615, Grade 60.

L. Form Coatings.

1. Non-grain raising and non-staining type that will not leave residual matter on surface of concrete or adversely affect proper bonding of subsequent application of other material applied to concrete surface.
2. "Nox-Crete Form Coating" as manufactured by Nox-Crete Company, or approved equal.
3. Coatings containing mineral oils or the non-drying ingredients will not be permitted.

M. Grout.

1. High-strength, non-shrink grout with saltwater resistance.
2. Five Star Special Grout 120 or equivalent.

2.02 CONCRETE STRENGTHS AND PROPORTIONS

A. Cast-in-place concrete shall have the minimum compressive strength at 28 days as indicated on the Drawings.

B. The exact proportions for the mix, including amounts admixture (if any), and water, shall be determined by the concrete supplier.

C. The proportions of aggregate to cement for any concrete shall be such as to produce a mixture which will work readily into the corners and angles of the forms and around reinforcement with the method of placing employed not he work, but without permitting the materials to segregate or excess free water to collect on the surface.

D. Air-Entrainment: The air content in all concrete shall be maintained at 5 to 7 percent.

PART 3 EXECUTION

3.01 FORMWORK

A. Falsework for Forms

1. Build and maintain necessary false work for the forms.

B. Construction of Forms

1. General
   a. Construct in accordance with ACI 347.
   b. Construct of sound material, to the correct shape and dimensions, mortar tight, of sufficient strength, and so braced and tied together that the movement of men, equipment, materials, or placing and vibrating the concrete will not throw them out of line or position.
2. Embedded Items
   a. Make provisions for pipes, sleeves, anchors, inserts, reglets, anchor slots, nailers, water stops, and other features.
   b. Do not embed wood, other than necessary nailing blocks, in concrete.
   c. Extended complete cooperation to suppliers of embedded items in their installation.
   d. Secure information for embedded items from other trades as required.
   e. Securely anchored embedded items in correct location and alignment prior to placing concrete.
3. Openings for Items Passing Through Concrete
   a. Establish exact locations, sizes, and other conditions required for openings and attachment of work specified under other sections.
   b. Coordination work of this nature in order that there will be no unnecessary cutting and patching of concrete.
   c. Cutting and repairing of concrete as a result of failure to provide for such openings shall be paid for by the Contractor at no additional expense to the Owner.

C. Removing Forms and False work

1. Forms shall not be removed for at least 72 hours after concrete has been placed.
2. Forms shall not be removed until the concrete has attained sufficient strength to insure stability.

3.02 REINFORCING STEEL

A. General

1. Place reinforcing steel in accordance with the drawings and approved shop drawings and the applicable requirements of the CRSI, Manual of Practice.
2. Install reinforcement accurately and secure against movement, particularly under the weight of workmen and the placement of concrete.

B. Reinforcing Steel Supports

1. Support bars on approved plastic or dielectric-coated metal chairs or spacers, accurately placed and securely fastened to forms or steel reinforcement in place.

2. Supply additional bars, whether specifically shown on the drawings or not, where necessary to securely fasten reinforcement in place.
3. Support legs of accessories in forms without embedding in form surface.
4. Spacing of chairs and accessories shall conform to CRSI, Manual of Standard Practice. Accurately space hoops and stirrups and wire to the reinforcement.
5. Permit no loose wood inside forms.
6. Lifting of welded wire fabric into proper position while concrete is being poured rather than supporting fabric on chairs will not be permitted.

C. Placing and Tying

1. Set in place, space, and rigidly and securely tie or wire with tie wire at all splices and at all crossing points and intersections in the positions shown, or as directed.
2. Rebending of bars on the job to accommodate the job to accommodate existing conditions will not be permitted without the written approval of the Engineer
3. Point ends of wire ties away from forms.

D. Spacing

1. Minimum center to center distance between parallel bars shall be in accordance with the details on the drawings, or, where not shown, the clear spacing shall be 2 times the bar diameter but in no case less than 1½ inches or less than 1½ times the maximum size aggregate.

E. Splices

1. Maximum 50% of steel spliced occurring within lap length.
2. Top bars shall be 1.3 times values given in 3.01.D.5.c.
3. Splice lengths.
   a. #6 bars and smaller: 50-bar diameter
   b. #7 bars and larger: 60-bar diameter

F. Concrete Covering

1. In accordance with ACI 315, except where shown otherwise on drawings.

3.03 CONCRETE

A. Mixing of Concrete

1. All concrete shall be ready-mixed concrete, and shall be mixed and delivered in accordance with ASTM C 94. The batch plant of the concrete producer shall be certified for compliance with the standards established by the National Ready-Mixed Concrete Association.
2. In the event concrete is mixed at a central batching plant, the delivery shall be arranged so that intervals between batches are kept to a minimum, and in any event not more than thirty (30) minutes. Trucks shall be in first class condition and kept in constant rotation during delivery.
3. Concrete shall be placed within 90 minutes after cement has been mixed with aggregate or 45 minutes after addition of water and admixtures.
4. No admixtures, except those mentioned in paragraph 2.1 shall be used. Calcium chloride will not be permitted.
5. Truck delivery slips of all concrete delivered to the job shall indicate the quantity and quality of concrete, additives, date and time of batching and delivery, and the location of placement. Delivery slips shall be forwarded to the Engineer at the end of each pour.

B. Cold Weather Concreting.

1. In accordance with ACI 306.
2. Concrete shall not be mixed or placed when the temperature is below 40 degrees F, or when conditions indicate that the temperature will fall below 40 degrees F within 72 hours unless precautions are taken to protect the concrete.
3. Concrete temperature shall be maintained, when deposited, at not less than 60 degrees F. Reinforcement, forms, and ground which concrete will contact must be completely free of frost.
4. Concrete and formwork must be kept at a temperature of not less than 50 degrees F. for not less than 96 hours after placing.
5. Calcium chloride shall not be used.

C. Hot Weather Concreting.

1. In accordance with ACI 305.
2. The maximum temperature of the concrete, when deposited, shall be 85 degrees F. If the weather causes the placing temperature to exceed 85 degrees F., the mix shall be cooled by methods approved by the Engineer.
3. No concrete shall be deposited when the air temperature is greater than 90 degrees F.

D. Conveying and Placing Concrete.

1. In accordance with ACI 304.
2. Notification: Before placing concrete, forms shall be thoroughly inspected. All chips, dirt, etc., shall be removed, all temporary bracing and cleats taken out, all openings for pipes, etc., properly boxed, all forms properly secured in their correct position and made tight, all reinforcement, anchors, and embedded items secured in their proper places. Concrete which may be on the forms or reinforcement, and which is set and dry, shall be cleaned off, and the forms and steel washed off before proceeding. Remove all foreign matter from forms and excavations.
3. Water shall be removed from place of deposit before concrete is placed unless otherwise permitted by the Engineer. Any flow of water into an excavation shall be diverted through proper side drains into a sump, or shall be removed by other approved methods which will avoid washing away the freshly deposited concrete.
4. Soil on which concrete will be poured shall be thoroughly wetted (except in freezing weather).
5. Anchors and Embedded Items: Anchors, bolts, sleeves, inserts, wood blocking, and any other items to be embedded in concrete shall be accurately secured in position before the concrete is placed. Aluminum shall not be embedded in concrete.
6. Handling and Depositing
    a. Before any concrete is placed, notify all whose work is in any way connected with or influenced by the concrete work, and give them reasonable time to complete all portions of their work that must be completed before concrete is deposited.
    b. Immediately before concrete is placed, inspect all forms to insure that they are in proper position, sufficiently rigid, thoroughly clean, properly oiled and free from foreign materials, and that all reinforcement is in proper position.
    c. Concreting, once started, shall be carried on as a continuous operation until the section of approved size and shape is completed.
    d. Concrete shall be conveyed as rapidly as practicable from the mixer to the place of final deposit by methods that prevent the separation or loss of ingredients. It shall be deposited, as nearly as practicable, in its final position to avoid re-handling or flowing.

e. Concrete shall not be dropped freely where reinforcement will cause segregation, nor shall it be dropped freely more than six (6) feet. Concrete shall be deposited to maintain a plastic surface approximately horizontal.
f. Concrete that has partially hardened shall not be deposited in the work.

7. Pumping
   a. Concrete may be placed by pumping if first approved in writing by the Engineer for the location proposed.
   b. Equipment for pumping shall be of such size and design as to ensure a practically continuous flow of concrete at the delivery end without separation of materials.
   c. The concrete mix shall be designed to the same requirements as herein before specified, and may be richer in lubricating components in order to allow proper pumping.
   d. Concrete shall not be pumped through aluminum pipes.
8. Vibrating and Compacting
   a. All concrete shall be thoroughly consolidated and compacted by suitable means during the operation of placing, and shall be thoroughly worked around reinforcement, embedded items, and into the corners of the forms. All concrete against forms shall be thoroughly spaded. Internal vibrators shall be used under experienced supervision, and shall be kept out of contact with reinforcement and wood forms. Vibrators shall not be used in a manner that forces mortar between individual form members.
   b. Vibrators shall be flexible electric type or approved compressed air type, adequately powered and capable of transmitting to the concrete not less than 7,000 impulses per minute. Vibration shall be sufficiently intense to cause the concrete to flow or settle readily into place without separation of the ingredients. A sufficient number of vibrators shall be employed so that complete compaction is secured throughout the entire volume of each layer of concrete. At least one (1) vibrator shall be kept in readiness as a spare for emergency use. Vibrators shall be such that the concrete becomes uniformly plastic with their use.
   c. Vibration shall be close to the forms but shall not be continued at one spot to the extent that large areas of grout are formed or the heavier aggregates are caused to settle. Care shall be taken to not disturb concrete that has its initial set.
   d. Where conditions make compacting difficult, or where the reinforcement is congested, batches of mortar containing the same proportions of cement to sand as used in the concrete shall first be deposited in the forms, to a depth of at least one (1) inch.
   e. The responsibility for providing fully filled out, smooth, clean, and properly aligned surfaces free from objectionable pockets shall rest entirely with the Contractor.

3.04 CONSTRUCTION JOINTS

A. Construction joints shall be located a maximum of 40 feet apart. If, for any reason, the contractor feels a change is necessary, he shall prepare a placing plan and submit it to the Engineer for approval.

B. Where a joint is to be made, the surface of the concrete shall be sandblasted or thoroughly picked, thoroughly cleaned, and all laitance removed. In addition to the foregoing, joints shall be thoroughly wetted, but not saturated, and slushed with a coat of grout immediately before the placing of new concrete.

C. Approved keys shall be used at all joints, unless detailed otherwise.

D. Forms shall be retightened before placing of concrete is continued. There shall be an interval of at least 48 hours between adjacent pours.

E. Bonding Concrete at Construction Joints

1. To new concrete construction joints:
   a. Thoroughly clean and saturate joint with water.
   b. Cover horizontal wall surfaces as specified in this Section, and immediately place concrete.
   c. Limit concrete lift placed immediately on top of bonding compound to 12 inches thick.
   d. Thoroughly vibrate to mix and consolidate bonding compound and concrete together.

F. Bonding new concrete to old concrete:

1. Mechanically roughen existing concrete surfaces to a clean, rough surface using appropriate mechanical means to remove the existing concrete surface, and provide a minimum roughness profile of 1/4 inch.
2. Saturate surface with water for 24 hours, cover with epoxy bonding compound and place concrete as specified for new concrete.

G. Expansion Joints

1. Expansion joints shall be located as shown on the contract drawings.
2. The joint shall include a joint filler, a bond breaker, and joint sealant and installed as indicated on contract drawings.

H. Joint Sealants.

1. Prepare surface in accordance with manufacturer’s directions.
2. Apply primer as recommended by sealant manufacturer.
3. Install sealant with the proper tools and methods as directed by the sealant manufacturer.

I. Patching

1. Immediately after stripping forms, patch minor defects, form-tie holes, honeycombed areas, etc., before concrete is thoroughly dry.
2. Repair gravel pockets by cutting out to solid surface, form key, and thoroughly wet before placing patching mortar consisting of 1 part cement to 2 parts fine sand; compact into place and neatly finish. Honeycombed areas or gravel pockets which, in the Engineer's opinion are too large and unsatisfactory for mortar patching as described above, shall be cut out to solid surface, keyed, and packed solids with matching concrete to produce firm bond and surface.
3. The Contractor shall do all the cutting as required by himself or other trades. All such work shall be of the minimum size required. No excessive cutting will be permitted, or shall any structural members or reinforcement be cut.
4. The Contractor shall do all patching after work by other trades has been installed, where required, using Portland Cement Mortar 1:2 mix.

J. Protection and Curing

1. Protect concrete from injurious action of the elements and defacement of any nature during construction operations.
2. Keep concrete in a thoroughly moist condition from the time it is placed until it has cured, for at least seven (7) days.
3. Carefully protect exposed concrete corners from damage.

4. Allow no slabs to become dry at any time until curing operations are complete. In general, slabs shall be cured with non-staining curing paper, hosing or fog spray; vertical surfaces shall be curing with Burlene or fog spray or an approved curing compound.
5. Protect fresh concrete from drying winds, rain, damage, or spoiling. Curing paper shall be lapped 4 inches minimum at joints and sealed with waterproof tape.

K. Concrete Finishes

1. Unexposed Surfaces: All unexposed surfaces shall have any form finish, at the Contractor's option.
2. Wearing Surface Finish: Float the surface by hand using a wooden or magnesium float. Finish with a flexible bristle broom. Permit surface to harden sufficiently to retain the scoring or ridges. Broom perpendicular to traffic or at right angles to the slope of the slab.
3. Addition of Material: The addition of cement, sand, water, or mortar to slab surfaces while finishing concrete is strictly prohibited.

L. Defective Work

1. The following concrete work shall be considered defective and may be ordered by the Engineer to be removed and replaced at Contractor's expense:
   a. Incorrectly formed.
   b. Not plumb or level.
   c. Not specified strength.
   d. Containing rock pockets, voids, honeycomb, or cold joints.
   e. Containing wood or foreign matter.
   f. Otherwise not in accordance with the intent of the Drawings and Specifications.

END OF SECTION

SECTION 03450

PRECAST ARCHITECTURAL CONCRETE

1 PART 1 GENERAL

1.1 SECTION INCLUDES

A. Precast column base coping.

B. Precast pilaster base coping.

C. Supports, anchors, attachments.

D. Grouting, adhesives.

1.2 RELATED SECTIONS

A. Section 03200 – Concrete Reinforcing

B. Section 03300 – Cast in Place Concrete: Admixtures

C. Section 06200 – Finish Carpentry

D. Section 07620 – Metal Fabrications and Flashings

E. Section 07920 – Joint Sealers

1.3 REFERENCES

A. ACI 301 – Specifications for concrete construction.

B. ACI 318 – Building code requirements for structural concrete.

C. ASTM A153 / A153M – Zinc coatings for Iron and Steel.

D. ASTM A767 / A767M – Zinc coated Steel Reinforcement.
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E. ASTM C33/C33M – Concrete Aggregates.

F. ASTM C150 / C150M – Portland Cement.

G. ASTM C979 / C979M – Pigments.

1.4 SUBMITTALS FOR REVIEW

A. Materials per requirements of Section 01300.

B. Product Data: Manufacturers information on products, accessories including pigment, admixtures, inserts, and anchors, color charts, etc.

C. Shop Drawings indicating unit layout, configuration, connection details, and dimensions.

D. Design mix and test results.

E. Samples: 2, 6” x 6” samples illustrating material, color, finish, and texture.

F. Fabricators Qualifications Statement showing a minimum of five (5) year’s experience in production of precast concrete architectural units.

1.5 DELIVERY AND STORAGE

A. Protect units to prevent staining, chipping, or cracking.

2 PART 2 PRODUCTS

2.1 FABRICATION

A. Concrete 5000 psi minimum 28 day strength.

B. Color: Light tan as approved by Architect.

C. Finish: Light sandblast all exposed surfaces.

D. Reinforce units to maintain stability and prevent cracking.

E. Units to be of the configuration and dimensions shown on the architectural drawings.

F. Coordinate embedment of anchorages as necessary for installation. Connections indicated are suggested. Final connection design is the responsibility of the contractor.

2.2 CONCRETE MATERIAL

A. ASTM 0150 / C150M Cement Type 1 Normal.

B. Neutral color, fine aggregates to compliment color of pigments and produce a homogenous appearance.

C. Color / Pigment as Selected by Architect. Pigments to be synthetic mineral oxides.

2.2 ANCHORS

A. All anchors to be concealed (pins, clips, straps).

B. All anchors to be hot dipped galvanized or stainless steel.

C. All fasteners to be stainless steel.

2.3 TOLERANCES

A. Maximum variation from face dimensions + or – 1/8”.

B. Joint dimensions 3/8”.

3 PART 3 EXECUTION

3.1 EXAMINATION

A. Verify that building structure, anchors, devices, and openings are ready to receive work of this section.

3.2 PREPARATION

A. Provide for erection procedures and induced loads during erection. Maintain temporary bracing in place until final support is provided.

3.3 ERECTION

A. Erect units without damage to shape or finish. Replace or repair damaged panels.

B. Erect units level and plumb within allowable tolerances.

C. Align and maintain uniform horizontal and vertical joints as erection progresses.

D. When units require adjustments beyond design or tolerance criteria, discontinue affected work; advise Architect.

E. Fasten units in place with mechanical connections.

F. Install ice and water shield isolating between precast and wood framing / sheathing.

3.4 CLEANING

A. Clean all units to remove any foreign materials or excess mortar.

3.5 PROTECTION OF FINISHED WORK

A. Protect all finished work from damage.

END OF SECTION

DIVISION 4

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SECTION 04200 - UNIT MASONRY

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Concrete masonry units for single wythe and cavity wall construction.

B. Face brick units for cavity wall construction.

C. Mortar for masonry units.

D. Reinforcement, anchorage and accessories.

E. Masonry flashings.

F. Masonry sealer coating.

1.02 PRODUCTS INSTALLED BUT NOT FURNISHED UNDER THIS SECTION

A. Section 05500 - Metal Fabrications: Placement of loose steel lintels.

1.03 RELATED SECTIONS

A. Section 01020 - Allowances: Cash Allowances.

B. Section 04430 – Stone Masonry

C. Section 05500 - Metal Fabrications: Placement of loose steel lintels

D. Section 07100 – Waterproofing and Dampproofing: Application of dampproofing at cavity wall construction.

E. Section 76200 – Sheet Metal Flashing & Trim

F. Section 07900 - Joint Sealers: Rod and sealant at control joints.

1.04 REFERENCES

A. ANSI/ASTM A82 - Cold-Drawn Steel Wire for Concrete Reinforcement.

B. ANSI/ASTM C652 - Hollow Brick (Hollow Masonry Units Made From Clay or Shale).

C. ASTM A123 - Zinc (Hot-Dip Galvanized) Coatings on Iron and Steel Products.

D. ASTM A615 - Deformed and Plain Billet Steel Bars for Concrete Reinforcement.

E. ASTM B370 - Copper Sheet and Strip for Building Construction.

F. ASTM C90 - Hollow Load Bearing Concrete Masonry Units.

G. ASTM C145 - Solid Load Bearing Concrete Masonry Units.

H. ASTM C144 - Aggregate for Masonry Mortar.

I. ASTM C150 - Portland Cement.

J. ASTM C207 - Hydrated Lime for Masonry Purposes.

K. ASTM C270 - Mortar for Unit Masonry.

L. ASTM C387 - Packaged, Dry, Combined Materials, for Mortar and Concrete.

M. ASTM C404 - Aggregates for Masonry Grout.

N. ASTM C476 - Grout for Masonry.

O. ASTM C780 – Pre-construction and Construction Evaluation of Mortars for Plain and Reinforced Unit Masonry.

P. ASTM C1019 - Method of Sampling and Testing Grout.

Q. IMIAC - International Masonry Industry All-Weather Council: Recommended Practices and Guide Specification for Cold Weather Masonry Construction.

R. UL - Underwriters' Laboratories.

1.05 SUBMITTALS

A. Submit product data under provisions of Section 01340.

B. Submit samples under provisions of Section 01340.

C. Submit four samples of face brick units to illustrate color, texture and extremes of color range.

D. Include mortar design mix; indicate Proportion or Property method used, required environmental conditions and admixture limitations.

E. Samples: Submit two ribbons of mortar color, illustrating color and color range.

F. Submit manufacturer's certificate under provisions of Section 01340 that products meet or exceed specified requirements.

1.06 QUALIFICATIONS

A. Installer: Company specializing in performing the work of this Section with minimum five years documented experience.

1.07 REGULATORY REQUIREMENTS

A. Conform to requirements for masonry construction.

1.08 MOCK-UP

A. Provide mock-up of face brick masonry under provisions of Section 01400.

B. Erect face brick to 4 x 4 feet panel size, include specified mortar and accessories.

C. When accepted, mock-up will demonstrate minimum standard for the Work. Mock-up may not remain as part of the Work.

1.09 PRE-INSTALLATION CONFERENCE

A. Convene one week prior to commencing work of this Section at Architect's discretion.

1.10 DELIVERY, STORAGE AND HANDLING

A. Deliver products to site under provisions of Section 01600.

B. Store and protect products under provisions of Section 01600.

C. Accept face brick units on site. Inspect for damage.

1.11 ENVIRONMENTAL REQUIREMENTS

A. Strictly comply with recommendations of the International Masonry Industry All-Weather Council – Recommended Practices and Guide Specifications for Cold (Hot) Weather Masonry Construction; The Portland Cement Assoc.

1.12 SEQUENCE AND SCHEDULING

A. Coordinate work under provisions of Section 01040.

B. Coordinate the masonry work with brick veneer and installation of window anchors.

PART 2 PRODUCTS

2.01 MANUFACTURERS – CONCRETE MASONRY UNITS

A. Park Avenue Cement Block Company.

B. Substitutions: Under provisions of Section 01600.

2.02 CONCRETE MASONRY UNITS

A. Hollow Load Bearing Block Units: ASTM C90, Grade N, Type I - Moisture Controlled; normal weight.

B. Veneer Block Units: ASTM C145, Grade N-1; Architectural split face, natural color.

C. Masonry Units: Nominal modular sizes of 4 x 16 x 8 inches, 6 x 16 x 8 inches, and 8 x 16 x 8 inches. Provide special units for 90 degree corners, bond beams, lintels and control joints.

2.05 MORTAR MATERIALS – CONCRETE MASONRY UNITS

A. Portland Cement: ASTM C150, Type I.

B. Aggregates: ASTM C144, standard masonry type; clean, dry, protected against dampness, freezing and foreign matter.

C. Hydrated Lime: ASTM C207, Type S.

D. Water: Clean and free from injurious amounts of oil, alkali, organic matter or other deleterious material.

E. Use no admixtures unless written approval is obtained from Architect.

F. Color: As selected by Architect.

2.06 MORTAR MIXES – CONCRETE MASONRY UNITS

A. Mortar for Load Bearing Walls and Partitions: ASTM C270, Type S, using the Property Method, 1800 psi compressive strength.

B. Mortar for Reinforced Masonry; ASTM C270, Type S using the Property Method, 1800 psi compressive strength.

2.07 GROUT MIXES

A. Grout: ASTM C476; consistency which will completely fill all spaces intended to receive grout.

B. Bond Beams and Lintels: 3,000 psi strength at 28 days; 7-8 inches slump; premixed type in accordance with ASTM C94 or mixed in accordance with ASTM C476, fine and course grout.

C. Engineered Masonry: 3,000 psi strength at 28 days; 7- 8 inches slump; premixed type in accordance with ASTM C94 or mixed in accordance with ASTM C476, fine and course grout.

2.12 ADMIXTURES

A. The use of air entraining, antifreeze compounds or calcium chloride admixtures or other substances is not allowed.

2.13 REINFORCEMENT AND ANCHORAGE

A. CMU: Truss type, welded wire units fabricated from 9 gage ASTM A82 cold-drawn galvanized steel wire with deformed side wire and smooth cross wire; Space reinforcing at 16” on center vertically maximum. Provide one side rod for each concrete masonry shell face.

B. CMU AND BRICK VENEER: Composite wall ties with two legged, galvanized steel adjustable eye and pintle type units with minimum 3/16” wire diameter; Spaced anchors at 16” on center horizontally and at 16”on center vertically.

C. Joint Stabilizing Anchors: To connect new masonry walls to existing masonry walls at vertical control joints; Cold-drawn steel; hot dip galvanized; spaced at 16” on center vertically; “D/A 2200,” manufactured by Dur-O-Wall, Inc.”

D. Reinforcing Steel: ASTM A615, 60 ksi 276, 414, 517 MpA yield grade, deformed billet bars, unprotected finish..

E. Substitutions: Under provisions of Section 01600.

2.14 MASONRY FLASHINGS

A. Membrane Flashings: Grace Construction Products, Inc. –“Perm-A-Barrier” self-sealing, self-healing, fully adhered wall flashing; 32 mil thick, pliable and highly adhesive rubberized asphalt compound bonded completely and integrally to 8 mil thick, high density 4 ply cross-laminated fill; 40 mil overall thickness.

B. Substitutions: Under provisions of Section 01600.

2.15 ACCESSORIES

A. Preformed Control Joints: Neoprene material conforming to ASTM D1056, Class RE41; provide with heat-fused joints; thickness as required to suit masonry condition; manufactured by "AA Wire Products Company".

B. Weep Holes: Preformed plastic tubes.

C. CLEANING SOLUTIONS: ProSoCo, Inc. “SureKlean 600" detergent masonry cleaner; Non-acidic, not harmful to masonry work or adjacent materials.

D. Substitutions: Under provisions of Section 01600.

2.16 MASONRY SEALER COATING

A. Sealer Coating: ProSoCo, Inc. “Sure Klean” products.

1. “Sure Klean Blok-Guard”; For use on CMU veneer surfaces.

PART 3 EXECUTION

3.01 EXAMINATION

A. Verify that field conditions are acceptable and are ready to receive work.

B. Verify items provided by other Sections of work are properly sized and located.

C. Verify that built-in items are in proper location, and ready for roughing into masonry work.

D. Beginning of installation means installer accepts existing conditions.

3.02 PREPARATION

A. Direct and coordinate placement of metal anchors supplied to other Sections.

B. Provide temporary bracing during installation of masonry work. Maintain in place until building structure provides permanent bracing.

3.03 COURSING

A. Establish lines, levels and coursing indicated; protect from displacement.

B. Maintain masonry courses to uniform dimension. Form vertical and horizontal joints of uniform thickness.

C. Lay concrete masonry units in running bond. Course one unit and one mortar joint to equal 8 inches. Form concave mortar joints.

D. Lay brick units in running bond. Course three brick units and three mortar joints equal to 8 inches. Form
concave mortar joints.

3.04 PLACING AND BONDING

A. Lay solid masonry units in full bed of mortar, with full head, bed, and collar joints, uniformly jointed with other work.

B. Lay hollow masonry units with face shell bedding on head and bed joints.

C. Buttering courses of joints or excessive furrowing of mortar joints are not permitted.

D. Remove excess mortar as Work progresses.

E. Interlock intersections and external corners.

F. Do not shift or tap masonry units after mortar has achieved initial set. Where adjustment must be made, remove mortar and replace.

G. Perform jobsite cutting of masonry units with proper tools to provide straight, clean, unchipped edges. Prevent broken masonry unit corners or edges.

H. Cut mortar joints flush where insulation bitumen dampproofing is applied.

3.05 WEEPS

A. If required, install weep holes in masonry veneer in accordance with architect’s specifications and/or details

3.06 CAVITY WALL

A. Do not permit mortar to drop or accumulate into cavity air space or to plug weep holes.

3.07 REINFORCEMENT AND ANCHORAGES – SINGLE WYTHE MASONRY

A. Install horizontal joint reinforcement 16 inches oc.

B. Place masonry joint reinforcement in first horizontal joints above and below openings. Extend minimum 16 inches each side of opening.

C. Place joint reinforcement continuous in first joint below top of walls.

D. Lap joint reinforcement ends minimum 6 inches. Extend minimum 16 inches each side of openings.

E. Reinforce joint corners and intersections with prefabricated corner pieces 16 inches oc.

3.08 REINFORCEMENT AND ANCHORAGES – CAVITY WALL VENEER MASONRY

A. Install veneer anchors at 16” on center horizontally and 16” on center vertically; at one course above all openings, extending three feet beyond each side of opening; and within 8 inches of corners and abutting masonry veneer.

3.09 MASONRY THROUGH-WALL FLASHINGS

A. Install through wall flashing on top of masonry base course or at locations shown on the Drawings. Terminate flashing at top by extending up and behind sheathing as shown on the Drawings. Overlap adjacent pieces by 2” and roll all overlaps with a steel hand roller or blunt object.

B. Trim bottom edge ½” back from exposed face of building. Apply a bead or trowel coat of bituthene mastic along termination’s seams, cuts, penetrations and punctures.

C. Fill cavity to depth of 8” with 3/8” pea stone.

3.10 LINTELS

A. Install loose steel lintels over window openings and door openings as specified on the drawings.

B. Install reinforced unit masonry lintels over openings as specified on the drawings.

C. Openings up to 48 Inches Wide: Place two, No. 5 reinforcing bars 1 inch from bottom web, unless noted otherwise.

D. Openings Over 48 Inches. Reinforce openings as detailed.

F. Use single piece reinforcing bars only.

G. Support and secure reinforcing bars from displacement. Maintain position within 1/2 inch of dimensioned position.

H. Place and consolidate grout fill without displacing reinforcing.

I. Allow masonry lintels to attain specified strength before removing temporary supports.

J. Maintain minimum 8 inch bearing on each side of opening (unless otherwise specified).

3.11 BITUMINOUS DAMPPROOFING

A. Apply Bituminous dampproofing to face of concrete masonry backer units at cavity wall construction.

3.12 GROUTED COMPONENTS

A. Reinforce bond beams as shown on drawings, placed 1 inch from bottom of web.

B. Lap splices minimum 24 bar diameters.

C. Support and secure reinforcing bars from displacement. Maintain position within 1/2 inch of dimensioned position.

D. Place and consolidate grout fill without displacing reinforcing.

E. At bearing locations, fill masonry cores with grout for a minimum 12 inches either side of opening.

3.13 ENGINEERED MASONRY

A. Lay masonry units with core cells vertically aligned and cavities between wythes clear of mortar and unobstructed.

B. Place mortar in masonry unit bed joints back 1/4 inch from edge of unit grout spaces, bevel back and upward. Permit mortar to cure 7 days before placing grout.

C. Reinforce masonry unit cores with reinforcement bars and grout as indicated.

D. Retain vertical reinforcement in position at top and bottom of cells and at intervals not exceeding 192 bar diameters. Splice reinforcement in accordance with Section 03300.

E. Wet masonry unit surfaces in contact with grout just prior to grout placement.

F. Grout spaces less than 2 inches in width with fine grout using low lift grouting techniques. Grout spaces 2 inches or greater in width with course grout using low lift grouting techniques.

G. When grouting is stopped for more than one hour, terminate grout 1 1/2 inch below top of upper masonry unit to form a positive key for subsequent grout placement.

H. Low Lift Grouting: Place first lift of grout to a height of 16 inches and rod for grout consolidation. Place subsequent lifts in 8 inch increments and rod for grout consolidation.

3.14 CONTROL JOINTS

A. Do not continue horizontal joint reinforcement through control joints.

B. Install preformed control joint device in continuous lengths. Seal butt and corner joints in accordance with manufacturer's instructions.

C. Size control joint in accordance with Section 07900 for sealant performance.

D. Provide control joints at 20 feet on center, maximum, unless noted otherwise.

3.15 BUILT-IN WORK

A. As work progresses, build in metal door frames, window frames, wood nailing strips, anchor bolts, plates, lintels and other items furnished by other Sections.

B. Build in items plumb and level.

C. Bed anchors of metal door frames in adjacent mortar joints. Fill frame voids solid with grout. Fill adjacent masonry cores with grout minimum 12 inches from framed openings.

D. Do not build in organic materials subject to deterioration.

3.16 TOLERANCES

A. Maximum Variation From Unit to Adjacent Unit: 1/32 inch.

B. Maximum Variation From Plane of Wall: 1/4 inch in 10 feet and 1/2 inch in 20 feet or more.

C. Maximum Variation From Plumb: 1/4 inch per story non-cumulative; 1/2 inch in two stories or more.

D. Maximum Variation From Level Coursing: 1/8 inch in 3 feet and 1/4 inch in 10 feet; 1/2 inch in 30 feet.

E. Maximum Variation of Joint Thickness: 1/8 inch in 3 feet.

F. Maximum Variation From Cross Sectional Thickness of Walls: 1/4 inch.

3.17 CUTTING AND FITTING

A. Cut and fit for concealed items as required. Coordinate with other Sections of Work to provide correct size, shape and location.

B. Obtain Architect approval prior to cutting or fitting masonry work not indicated or where appearance or strength of masonry work may be impaired.

3.18 CLEANING

A. Clean work under provisions of Section 01700.

B. Remove excess mortar and mortar smears.

C. Replace defective mortar. Match adjacent work.

D. Clean soiled surfaces with cleaning solution.

E. Use non-metallic tools in cleaning operations.
F. Do not use strong acids for cleaning.

3.19 PROTECTION OF FINISHED WORK

A. Protect finished installation under provisions of Section 01500.

B. Without damaging completed work, provide protective boards at exposed external corners which may be damaged by construction activities.

3.20 SCHEDULES

A. Exterior wall systems; Locations of wall types shown on drawings.

END OF SECTION 04200

SECTION 04224

UNIT PAVERS

PART 1 GENERAL

1.01 SUMMARY

A. Section Includes

1. The work of this Section consists of providing all labor, equipment, materials, incidental work, and construction methods necessary to perform unit paver work and related items as indicated on the Drawings and as specified in this Section.

1.02 QUALITY ASSURANCE

A. Paving Contractor Qualifications: Utilize an installer having successfully completed concrete paver installation similar in design, material, and extent indicated on this project.

B. Concrete Pavers shall be cut to fit at structures (drains, manholes, etc.) that interface with the pavers to a tolerance of 1/8”.

C. Paving work shall be done only after excavation and construction work which might injure them has been completed. Damage caused during construction shall be repaired before acceptance.

D. Existing paving areas shall, if damaged or removed during course of this project, be repaired or replaced under this. Workmanship and materials for such repair and replacement, except as otherwise noted, shall match as closely as possible those employed in existing work installed under this Contract.

E. Install Concrete Pavers only on unfrozen and dry Setting Bed Sand.

F. Install Polymeric Joint Sand only when ambient temperature is above 40°F (5°C), under dry conditions with no rain forecast for 24 hours and when surface of pavement is completely dry.

G. Provide a minimum of 5% additional material for overage to be used during construction.

H. The contractor shall convene a pre-construction meeting on site with all parties involved in the installation and related work prior to the start of any work.

I. Mockup:

1. Install a 5 ft x 5 ft paver area per each paving pattern.

2. Use this area to determine surcharge of the Setting Bed Sand layer, joint sizes, lines, laying pattern(s), blend of paver colors and levelness. This area will serve as the standard by which the workmanship will be judged.

3. Subject to acceptance by City Engineer, mock-up may be retained as part of finished work.

4. If mock-up is not retained, remove and dispose legally.

1.03 REFERENCES

A. This specification makes reference to the requirements of additional specifications as listed. The Contractor shall obtain and familiarize himself with all requirements referenced by this specification prior to preparation and installation of any pavements.

1. ASTM International, latest edition:

a. C 33, Standard Specification for Concrete Aggregates.

b. C 67, Standard Test Methods for Sampling and Testing Brick and Structural Clay Tile, Section 8, Freezing and Thawing.

c. C 136, Standard Test Method for Sieve Analysis of Fine and Coarse Aggregates.

d. C 140, Standard Test Methods for Sampling and Testing Concrete Masonry Units and Related Units.

e. C 144 Standard Specifications for Aggregate for Masonry Mortar.

f. D 448, Standard Classification for Sizes of Aggregate for Road and Bridge Construction.

g. C 936, Standard Specification for Solid Concrete Interlocking Paving Units.

h. C 979, Standard Specification for Pigments for Integrally Colored Concrete.

i. D 698 Test Methods for Moisture Density Relations of Soil and Soil Aggregate Mixtures Using a 5.5 lb (24.4 N) Rammer and 12 in. (305 mm) drop.

j. D 1557 Test Methods for Moisture Density Relations of Soil and Soil Aggregate Mixtures Using a 10-lb (44.5 N) Rammer and 18 in. (457 mm) drop.

k. C1645 Standard Test Method for Freeze-thaw and De-icing Salt Durability of Solid Concrete Interlocking Paving Units

l. D 1883, Test Method for California Bearing Ratio of Laboratory-Compacted Soils.

m. D 2940 Graded Aggregate Material for Bases or Subbases for Highways or Airports.

n. D 4254, Standard Test Methods for Minimum Index Density and Unit Weight of Soils and Calculation of Relative Density.

1.04 SUBMITTALS

A. Installer Qualifications

B. Submit Samples

1. Concrete Pavers: Five representative full-size samples of each paver type, thickness, color and finish that indicate the range of color variation and texture expected upon project completion.

C. Submit manufacturer's product data for the following:

1. Concrete Pavers
2. Polymeric Joint Sand
3. Bedding Sand

PART 2 PRODUCTS

2.01 MATERIALS

A. Concrete Pavers

1. Concrete Pavers shall be manufactured by Unilock
   a. Unit Paver shall match the size and color of the adjacent pavers at the Station Fire memorial to the great degree feasible.
2. Provide pavers meeting the minimum material and physical properties set forth in ASTM C 936, Standard Specification for Interlocking Concrete Paving Units.
3. Average compressive strength 8000 psi (55MPa) with no individual unit under 7,200 psi (50 MPa).
4. Average absorption of 5% with no unit greater than 7% when tested according to ASTM C 140.
5. Resistance to 50 freeze-thaw cycles, when tested according to ASTM C1645, with no breakage greater than 1.0% loss in dry weight of any individual unit. Conduct this test method not more than 12 months prior to delivery of units.

B. POLYMERIC JOINT SAND

1. Provide Polymeric Joint Sand as manufactured by: Techniseal RG+ Product Type: Dry mix, contains polymeric binding agent, activated with water or approved equal. Final Color shall be determined by City Engineer.

C. Setting Bed Sand

1. Provide Setting Bed Sand as follows:

a. Washed, clean, non-plastic, free from deleterious or foreign matter, symmetrically shaped, natural or manufactured from crushed rock.

b. Do not use limestone screenings, stone dust, or sand material that does not conform to conform to the grading requirements of ASTM C 33.

c. Do not use mason sand or sand conforming to ASTM C 144.

d. Conform to the grading requirements of ASTM C 33 with modifications as shown in Table 2 below:

TABLE 2 – SETTING BED SAND
GRADATION REQUIREMENTS FOR SETTING BED SAND

ASTM C 33	
Sieve Size	Percent Passing
3/8 in (9.5 mm)	100
No. 4 (4.75 mm)	95 to 100
No. 8 (2.36 mm)	85 to 100
No. 16 (1.18 mm)	50 to 85
No. 30 (0.600 mm)	25 to 60
No. 50 (0.300 mm)	10 to 30
No. 100 (0.150 mm)	2 to 10
No. 200 (0.075)	0 to 1

PART 3 EXECUTION

3.01 PREPARATION

A. Verify the Concrete Underlayment is cured, clean and dry, certified by General Contractor as meeting material, installation and grade specifications.

B. Stockpile Setting Bed Sand and Joint Sand such that they are free from standing water, uniformly graded, free of any organic material or sediment, debris, and ready for placement.

3.02 INSTALLATION

A. SETTING BED SAND

1. Provide and spread Setting Bed Sand evenly over the Concrete Underlayment and screed to a nominal thickness of 1 in. (25 mm).

a. Protect screeded Setting Bed Sand from being disturbed by either pedestrian or vehicular traffic.

b. Screed only the area which can be covered by pavers in one day.

c. Do not use Setting Bed Sand material to fill depressions greater than depths showing the drawings in the base surface.

2. Keep moisture content constant and density loose and constant until Concrete Pavers are set and compacted.

3. Screed the Setting Bed Sand using either an approved mechanical spreader (e.g.: an asphalt paver) or by the use of screed rails and boards.

4. Carefully maintain spread Setting Bed Sand in a loose condition, and protected against incidental compaction, both prior to and following screeding. Loosen any incidentally compacted sand or screeded sand left overnight before further paving units are placed.

5. Provide lightly screeded Setting Bed Sand in a loose condition to the predetermined depth, only slightly ahead of the paving units.

6. Fully protect screed Setting Bed Sand against incidental compaction, including compaction by rain. Remove any screeded Setting Bed Sand that is incidentally compacted prior to laying of the paving units. Do not permit either pedestrian or vehicular traffic on the screeded Setting Bed Sand.

7. Inspect the Setting Bed Sand course prior to commencing the placement of the Concrete Pavers. Acceptance of the Setting Bed Sand occurs with the initiation of Concrete Paver placement.

B. CONCRETE PAVERS

1. Replace Concrete Pavers with chips, cracks, voids, discolorations, and other defects that might be visible in finished work.

2. Mix each color of Concrete Pavers from a minimum of three (3) bundles simultaneously drawing the paver vertically rather than horizontally, as they are placed, to produce uniform blend of colors and textures. (Color variation occurs with all concrete products. This phenomenon is influenced by a variety of factors, e.g. moisture content, curing conditions, different aggregates and, most commonly, from different production runs. By installing from a minimum of three (3) bundles simultaneously, variation in color is dispersed and blended throughout the project).

3. Exercise care in handling face mix concrete pavers to prevent surfaces from contacting backs or edges of other units.

4. Provide Concrete Pavers using laying pattern as indicated. Adjust laying pattern at pavement edges such that cutting of edge pavers is minimized. Cut all pavers exposed to vehicular tires no smaller than one-third of a whole paver.

5. Use string lines or chalk lines on Setting Bed Sand to hold all pattern lines true.

6. Set surface elevation of pavers 1/8 in. (3 mm) above adjacent drainage inlets, concrete collars or channels.

7. Place units hand tight against spacer bars. Adjust horizontal placement of laid pavers to align straight.

   a. When installation is performed with mechanical equipment, use only unit pavers with spacer bars on sides of each unit.

8. Provide space between paver units of 1/32 in. (1 mm) wide to achieve straight bond lines.

9. Prevent joint (bond) lines from shifting more than ±1/2 in. (±13 mm) over 50 ft. (15 m) from string lines.

10. Fill gaps between units or at edges of the paved area that exceed 3/8 inch (10 mm) with pieces cut to fit from full-size unit pavers.

11. Prevent all traffic on installed Concrete Pavers until Joint Sand has been vibrated into joints. Keep skid steer and forklift equipment off newly laid Concrete Pavers that have not received initial compaction and Joint Sand material.

12. Vibrate Concrete Pavers into leveling course with a low-amplitude plate vibrator capable of a to 5000-lbf (22-kN) compaction force at 80 to 90 Hz. Perform at least three passes across paving with vibrator. Vibrate under the following conditions:

    a. After edge pavers are installed and there is a completed surface or before surface is exposed to rain.

    b. Compact installed Concrete Pavers to within 6 feet (2 meters) of the laying face before ending each day's work. Cover Concrete Pavers that have not been compacted and leveling course on which pavers have not been placed, with nonstaining plastic sheets to prevent Setting Bed Sand from becoming disturbed.

13. Protect face mix Concrete Paver surface from scuffing during compaction by utilizing a urethane pad.

14. Remove any cracked or structurally damaged Concrete Pavers and replace with new units prior to installing Joint Sand material.

C. JOINT SAND

1. Polymeric Joint Sand

    a. Install Polymeric Joint Sand per manufacturers recommended instructions.Protect surfaces from pedestrian and vehicular traffic for a minimum of 24 hours

3.03 FIELD QUALITY CONTROL

A. Verify final elevations for conformance to the drawings after sweeping the surface clean.

1. Prevent final Concrete Paver finished grade elevations from deviating more than ±3/8 in. (±10 mm) under a 10 ft (3 m) straightedge or indicated slope, for finished surface of paving.

B. Lippage: No greater than 1/32 in. (0.8 mm) difference in height between Concrete Pavers and adjacent paved surfaces.

3.04 REPAIRING, CLEANING AND SEALING

A. Remove and replace unit pavers that are loose, chipped, broken, stained, or otherwise damaged or that do not match adjoining units. Provide new units to match adjoining units and install in same manner as original units, with same joint treatment and with no evidence of replacement.

B. Cleaning: Remove excess dirt, debris, stains, grit, etc. from exposed paver surfaces; wash and scrub clean.

1. Clean Concrete Pavers in accordance with the manufacturer's written recommendations.

2. Clean pavers discolored and stained by concrete cutters slurry immediately. Do not let pavers site with foreign materials on the surface.

3.05 PROTECTION

A. Protect completed work from damage due to subsequent construction activity on the site.

END OF SECTION

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SECTION 04225

PERMEABLE PAVERS

PART 1 GENERAL

1.01 SUMMARY

A. Section Includes

1. The work of this Section consists of providing all labor, equipment, materials, incidental work, and construction methods necessary to perform unit paver work and related items as indicated on the Drawings and as specified in this Section.

1.02 QUALITY ASSURANCE

A. Paving Contractor Qualifications: Utilize an installer having successfully completed concrete paver installation similar in design, material, and extent indicated on this project.

B. Concrete Pavers shall be cut to fit at structures (drains, manholes, etc.) that interface with the pavers to a tolerance of 1/8”.

C. Paving work shall be done only after excavation and construction work which might injure them has been completed. Damage caused during construction shall be repaired before acceptance.

D. Existing paving areas shall, if damaged or removed during course of this project, be repaired or replaced under this. Workmanship and materials for such repair and replacement, except as otherwise noted, shall match as closely as possible those employed in existing work installed under this Contract.

E. Provide a minimum of 5% additional material for overage to be used during construction.

F. The contractor shall convene a pre-construction meeting on site with all parties involved in the installation and related work prior to the start of any work.

G. Mockup:

1. Install a 5 ft x 5 ft paver area per each paving pattern.
2. Use this area to determine joint sizes, lines, laying pattern(s), blend of paver colors and levelness. This area will serve as the standard by which the workmanship will be judged.
3. Subject to acceptance by City Engineer, mock-up may be retained as part of finished work.
4. If mock-up is not retained, remove and dispose legally.

1.03 REFERENCES

A. This specification makes reference to the requirements of additional specifications as listed. The Contractor shall obtain and familiarize himself with all requirements referenced by this specification prior to preparation and installation of any pavements.

1. ASTM International, latest edition:

a. C 29 Bulk Density and Voids in Aggregate Materials.

b. C 33, Standard Specification for Concrete Aggregates.

c. C 136, Standard Test Method for Sieve Analysis of Fine and Coarse Aggregates.

d. C 140, Standard Test Methods for Sampling and Testing Concrete Masonry Units and Related Units.

e. D 448, Standard Classification for Sizes of Aggregate for Road and Bridge Construction.

f. C 936, Standard Specification for Solid Concrete Interlocking Paving Units.

g. C 979, Standard Specification for Pigments for Integrally Colored Concrete.

h. D 698 Test Methods for Moisture Density Relations of Soil and Soil Aggregate Mixtures Using a 5.5 lb (24.4 N) Rammer and 12 in. (305 mm) drop.

i. D 1557 Test Methods for Moisture Density Relations of Soil and Soil Aggregate Mixtures Using a 10-lb (44.5 N) Rammer and 18 in. (457 mm) drop.

j. C1645 Standard Test Method for Freeze-thaw and De-icing Salt Durability of Solid Concrete Interlocking Paving Units

k. D 4254, Standard Test Methods for Minimum Index Density and Unit Weight of Soils and Calculation of Relative Density.

1.04 SUBMITTALS

A. Installer Qualifications

B. Submit Samples

1. Concrete Pavers: Five representative full-size samples of each paver type, thickness, color and finish that indicate the range of color variation and texture expected upon project completion.

C. Submit manufacturer's product data for the following:

1. Concrete Pavers

2. Aggregates

PART 2 PRODUCTS

2.01 MATERIALS

A. Concrete Pavers

1. Concrete Pavers shall be manufactured by Unilock

ECO-PRIORA™

a. Finish: Classic
b. Color: ALMOND GROVE (Final color to be selected by owners' rep, provide samples for options)
d. Size: Manufacture the sizes indicated with a maximum tolerance of plus or minus 1/16 inch for length and width. Maximum height tolerance of plus or minus 1/8 inch. 4 3/4 x 9 1/2 x 3 1/8" (120 x 240 x 80mm)

2. Provide pavers meeting the minimum material and physical properties set forth in ASTM C 936, Standard Specification for Interlocking Concrete Paving Units.

3. Average compressive strength 8000 psi (55MPa) with no individual unit under 7,200 psi (50 MPa).

4. Average absorption of 5% with no unit greater than 7% when tested according to ASTM C 140.

5. Resistance to 50 freeze-thaw cycles, when tested according to ASTM C1645, with no breakage greater than 1.0% loss in dry weight of any individual unit. Conduct this test method not more than 12 months prior to delivery of units.

B. Permeable Joint Opening Aggregate

1. Provide permeable joint opening aggregate materials conforming to astm c 33 and gradation requirements of astm d 448 no. 9 as shown in table 1.

TABLE 1 - ECO- PRIORA
PERMEABLE JOINT OPENING AGGREGATE
GRADATION REQUIREMENTS
(CRUSHED GRANITE STONE)
Acceptable vendor GATOR AQUA ROCK or equal

ASTM No. 9	
Sieve Size	**Percent Passing**
3/8in. (9.5mm)	100
No.4 (4,75mm)	85 to 100
No.8 (2,36mm)	10 to 40
No. 16 (1,18mm)	0 to 10
No. 50 (0.300mm)	0 to 5

A. Permeable Setting Bed Aggregate

Provide Permeable Setting Bed Aggregate materials conforming to ASTM C 33 and gradation requirements of ASTM D 448 No. 8 as presented in Table 3.

TABLE 3
PERMEABLE SETTING BED AGGREGATE
GRADATION REQUIREMENTS

ASTM No. 8	
Sieve Size	**Percent Passing**
½ in (12.5 mm)	100
3/8 in (9.5 mm)	85 to 100
No. 4 (4.75 mm)	10 to 30
No. 8 (2.36 mm)	0 to 10
No. 16 (1.18 mm)	0 to 5

Permeable Base Aggregate

Provide Permeable Base Aggregate materials conforming to ASTM C 33 and gradation requirements of ASTM D 448 No. 57 as presented in Table 4.

TABLE 4
PERMEABLE BASE AGGREGATE
GRADATION REQUIREMENTS

ASTM No. 57	
Sieve Size	**Percent Passing**
1-1/2 in (37.5 mm)	100
1 in (25 mm)	95 to 100
1/2 in (12.5 mm)	25 to 60
No. 4 (4.75 mm)	0 to 10
No. 8 (2.36 mm)	0 to 5

Permeable Subbase Aggregate

Provide Permeable Subbase Aggregate materials conforming to ASTM C 33 and gradation requirements of ASTM D 448 No. 2 as presented in Table 5.

TABLE 5
PERMEABLE SUBBASE AGGREGATE
GRADATION REQUIREMENTS

ASTM No. 2	
Sieve Size	**Percent Passing**
3 in (75 mm)	100

2-1/2 in (63 mm)	90 to 100
2 in (50 mm)	35 to 70
1-1/2 in (37.5 mm)	0 to 15
3/4 (19 mm)	0 to 5

PART 3 EXECUTION

3.01 PREPARATION

A. Verify the Concrete Underlayment is cured, clean and dry, certified by General Contractor as meeting material, installation and grade specifications.

B. Stockpile Setting Bed Sand and Joint Sand such that they are free from standing water, uniformly graded, free of any organic material or sediment, debris, and ready for placement.

3.02 INSTALLATION

A. PERMEABLE BASE AND SUBBASE AGGREGATE

1. Provide the Permeable Subbase Aggregate in uniform lifts not exceeding 6 in., (150 mm) loose thickness and compact to at least 95 percent as per ASTM D 4254 to depths as indicated.
2. Compact the Permeable Subbase Aggregate material with at least two passes in the vibratory mode then at least two in the static mode with a minimum 10 ton vibratory roller until there is no visible movement. Do not crush aggregate with the roller.
3. Tolerance: Do not exceed the specified surface grade of the compacted Permeable Subbase Aggregate material more than ±3/4 in. (20 mm) over a 10 ft. (3 m) long straightedge laid in any direction.
4. Provide the Permeable Base Aggregate material in uniform lifts not exceeding 6 in. (150 mm) over the compacted Permeable Subbase Aggregate material and compact to at least 95 percent as per ASTM D 4254 to depths as indicated.
   a. As indicated, provide Unilock DriveGrid geogrid material.
   b. Place minimum 3 in. lift, compact Permeable Base Aggregate.
   c. Place Unilock DriveGrid geogrid material. Overlap ends and edges a minimum of 18 in. (450 mm).
5. Compact the Permeable Base Aggregate material with at least two passes in the vibratory mode then at least two in the static mode with a minimum 10 ton vibratory roller until there is no visible movement. Do not crush aggregate with the compaction device.
6. Tolerance: Do not exceed the specified surface grade of the compacted Permeable Base Aggregate material more than ±1/2 in. (13 mm) over a 10 ft. (3 m) long straightedge laid in any direction.
7. Grade and compact the upper surface of the Permeable Base Aggregate material sufficiently to prevent infiltration of the Permeable Setting Bed Aggregate material both during construction and throughout its service life.

B. PERMEABLE SETTING BED AGGREGATE

1. Provide, spread and screed Permeable Setting Bed aggregate evenly over the Permeable Base Aggregate course.
    a. Protect screeded Permeable Setting Bed Aggregate from being disturbed.
    b. Screed only the area which can be covered by pavers in one day.
    c. Do not use Permeable Setting Bed Aggregate material to fill depressions in the base surface.
2. Keep moisture content constant and density loose and constant until Concrete Pavers are set and compacted.
3. Inspect the Permeable Setting Bed Aggregate course prior to commencing the placement of the permeable concrete pavers.
4. Inspect the Setting Bed Aggregate course prior to commencing the placement of the Permeable Concrete Pavers. Acceptance of the Setting Bed Aggregate occurs with the initiation of Permeable Concrete Paver placement.

C. PERMEABLE CONCRETE PAVERS

1. Replace unit pavers with chips, cracks, voids, discolorations, and other defects that might be visible in finished work.
2. Mix Concrete Pavers from a minimum of three (3) bundles simultaneously drawing the paver vertically rather than horizontally, as they are placed, to produce uniform blend of colors and textures. (Color variation occurs with all concrete products. This phenomenon is influenced by a variety of factors, e.g. moisture content, curing conditions, different aggregates and, most commonly, from different production runs. By installing from a minimum of three (3) bundles simultaneously, variation in color is dispersed and blended throughout the project).
3. Exercise care in handling face mix pavers to prevent surfaces from contacting backs or edges of other units.
4. Provide Permeable Concrete Pavers using joint pattern as indicated. Adjust joint pattern at pavement edges such that cutting of edge pavers is minimized. Cut all pavers exposed to vehicular tires no smaller than one-third of a whole paver.
5. Use string lines or chalk lines on Permeable Setting Bed aggregate to hold all pattern lines true.
6. Set surface elevation of pavers 1/8 in. (3 mm) above adjacent drainage inlets, concrete collars or channels.
7. Place units hand tight against spacer bars. Adjust horizontal placement of laid pavers to align straight.
    a. When installation is performed with mechanical equipment, use only unit pavers with spacer bars on sides of each unit.
8. Provide space between paver units of 1/32 in. (1 mm) wide to achieve straight bond lines.
9. Prevent joint (bond) lines from shifting more than ±1/2 in. (±15 mm) over 50 ft. (15 m) from string lines.
10. Fill gaps between units or at edges of the paved area that exceed 3/8 inch (10 mm) with pieces cut to fit from full-size unit pavers.
11. Cut unit pavers with motor-driven masonry saw equipment to provide clean, sharp, unchipped edges. Cut units to provide pattern indicated and to fit adjoining work neatly. Use full units without cutting where possible. Hammer cutting is not acceptable.
12. Prevent all traffic on installed pavers until Permeable Joint Aggregate has been vibrated into joints. Keep skid steer and forklift equipment off newly laid pavers that have not received initial compaction and Permeable Joint Aggregate material. .

13. Vibrate pavers into leveling course with a low-amplitude plate vibrator capable of a to 5000-lbf (22-kN) compaction force at 80 to 90 Hz. Perform at least three passes across paving with vibrator. Vibrate under the following conditions:
    a. After edge pavers are installed and there is a completed surface.
    b. Compact installed concrete pavers to within 6 feet (1,800 mm) of the laying face before ending each day's work. Cover pavers that have not been compacted and leveling course on which pavers have not been placed, with nonstaining plastic sheets to prevent Permeable Setting Bed Aggregate from becoming disturbed.
14. Protect face mix Concrete Paver surface from scuffing during compaction by utilizing a urethane pad.
15. Remove any cracked or structurally damaged pavers and replace with new units prior to installing Permeable Joint Opening Aggregate material.
16. Provide, spread and sweep Permeable Joint Opening Aggregate into joints immediately after vibrating pavers into Permeable Setting Bed course until full. Vibrate pavers and add Permeable Joint Aggregate material until joints are completely filled, then remove excess surface material.
17. Remove excess Permeable Joint Aggregate broom clean from surface when installation is complete.

FIELD QUALITY CONTROL

A. Verify final elevations for conformance to the drawings after sweeping the surface clean.
    1. Prevent final Concrete Paver finished grade elevations from deviating more than ±3/8 in. (±10 mm) under a 10 ft (3 m) straightedge or indicated slope, for finished surface of paving.
B. Lippage: Paver-to-Paver Lippage:
    1. No greater than 3 mm (1/8 inch) difference in height between adjacent pavers.

3.05 REPAIRING, CLEANING AND SEALING

A. Remove and replace unit pavers that are loose, chipped, broken, stained, or otherwise damaged or that do not match adjoining units. Provide new units to match adjoining units and install in same manner as original units, with same joint treatment and with no evidence of replacement.
B. Cleaning: Remove excess dirt, debris, stains, grit, etc. from exposed paver surfaces; wash and scrub clean.
    1. Clean Permeable Concrete Pavers in accordance with the manufacturer’s written recommendations.
C. Seal as indicated
    1. Apply Sealer for Permeable Concrete Pavers in accordance with the sealer and paver manufacturer’s written recommendations.

3.03 PROTECTION

A. Protect completed work from damage due to subsequent construction activity on the site.

END OF SECTION

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DIVISION 5

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SECTION 05120 - STRUCTURAL STEEL

PART 1 - GENERAL

1.1 SUMMARY

A. This Section includes structural steel.

1.2 SUBMITTALS

A. Product Data: For each product indicated.

B. Shop Drawings: Show fabrication of structural-steel components, including connections, splices, holes, welds, and bolts.

C. Mill certificates.

D. Welding certificates.

1.3 QUALITY ASSURANCE

A. Fabricator Qualifications: A qualified fabricator who participates in the AISC Quality Certification Program and is designated an AISC-Certified Plant, Category I, conventional steel structures.

B. Comply with applicable provisions in AISC's “Specification for Structural Steel Buildings--Allowable Stress Design and Plastic Design" and RCSC's "Specification for Structural Joints Using ASTM A 325 or A 490 Bolts".

C. Welding: Qualify procedures and personnel according to AWS D1.1, "Structural Welding Code--Steel."

1.4 STORAGE AND PROTECTION

A. Store steel members off ground and protect steel members and packaged materials from erosion and deterioration.

B. Store fasteners in a protected place. Clean and relubricate bolts and nuts that become dry or corroded before use.

PART 2 - PRODUCTS

2.1 MATERIALS

A. Structural-Steel W Shapes: ASTM A 992/A992 M.

B. Structural-Steel Plates, Channels, Angles, and Bars: ASTM A 36/A 36M, carbon steel.

C. Cold-Formed Structural-Steel Tubing: ASTM A 500, Grade B.

D. Anchor Rods, Bolts, Nuts: ASTM F 1554, headed bolts, Type 1, heavy hex steel structural bolts and heavy hex carbon-steel nuts.

E. Non-high-Strength Bolts, Nuts, and Washers: ASTM F 1554, carbon-steel, hex-head bolts; carbon-steel nuts; and flat, unhardened steel washers, uncoated.

F. High-Strength Bolts, Nuts, and Washers: ASTM A 325, Type 1, heavy hex steel structural bolts, heavy hex carbon-steel nuts, and hardened carbon-steel washers, uncoated.

G. Primer: Fabricator's standard lead- and chromate-free, non-asphaltic, rust-inhibiting primer.

H. Nonmetallic, Shrinkage-Resistant Grout: Premixed, ASTM C 1107, of consistency suitable for application.

2.2 FABRICATION

A. Fabricate and assemble structural steel in shop to greatest extent possible. Fabricate structural steel according to AISC specifications referenced in this Section and in Shop Drawings.

1. Comply with fabrication tolerance limits in AISC's "Code of Standard Practice for Steel Buildings and Bridges" for structural steel and architectural exposed structural steel.
2. Shop install and tighten non high-strength bolts, except where high-strength bolts are indicated.
3. Shop install and tighten high-strength bolts according to RCSC's "Specification for Structural Joints Using ASTM A 325 or A 490 Bolts."

    a. Connection Type: Snug tightened, unless indicated as slip-critical, direct-tension, or tensioned shear/bearing connections.

4. Weld Connections: Comply with AWS D1.1 for procedures, appearance and quality of welds, and methods used in correcting welding work.

B. Shop Priming: Shop prime steel, except surfaces embedded in concrete or mortar, surfaces to be field welded, surfaces to be high-strength bolted with slip-critical connections, and surfaces to receive sprayed-on fireproofing.

1. Surface Preparation: SSPC-SP 2, "Hand Tool Cleaning," or SSPC-SP 3, "Power Tool Cleaning."
2. Priming: Immediately after surface preparation, apply primer according to manufacturer's written instructions and at rate recommended by SSPC to provide a dry film thickness of not less than 1.5 mils. Use priming methods that result in full coverage of joints, corners, edges, and exposed surfaces.

C. Hot-Dip Galvanized Finish: Apply zinc coating by the hot-dip process according to ASTM A 123 to structural steel indicated to be galvanized.

2.3 SOURCE QUALITY CONTROL

A. Owner will engage an independent testing and inspecting agency to perform shop tests and inspections and to prepare test reports. Comply with Part 3 "Field Quality Control" Article.

PART 3 - EXECUTION

3.1 ERECTION

A. Examination: Verify elevations of concrete and masonry bearing surfaces and locations of anchorages for compliance with requirements.

B. Erect structural steel accurately in locations and to elevations indicated and according to AISC specifications referenced in this Section.

C. Base and Bearing Plates: Clean concrete and masonry bearing surfaces of bond-reducing materials and roughen surfaces before setting base and bearing plates. Clean bottom surface of base and bearing plates and set on wedges, shims, or setting nuts as required.

1. Tighten anchor bolts, cut off wedges or shims flush with edge of base or bearing plate, and pack grout solidly between bearing surfaces and plates.

D. Maintain erection tolerances of structural steel and architecturally exposed structural steel within AISC's "Code of Standard Practice for Steel Buildings and Bridges."

E. Install and tighten non high-strength bolts, except where high-strength bolts are indicated.

F. Install and tighten high-strength bolts according to RCSC's "Specification for Structural Joints Using ASTM A 325 or A 490 Bolts."

1. Connection Type: Snug tightened, unless indicated as slip-critical, direct-tension, or tensioned shear/bearing connections.

G. Weld Connections: Comply with AWS D1.1 for procedures, appearance and quality of welds, and methods used in correcting welding work.

3.2 CLEANING

A. Touchup Painting: Immediately after erection, clean field welds, bolted connections, and abraded areas of shop paint. Apply paint to exposed areas using same material as used for shop painting.

1. Apply by brush or spray to provide a minimum dry film thickness of 1.5 mils.

B. Galvanized Surfaces: Clean field welds, bolted connections, and abraded areas and apply galvanizing repair paint according to ASTM A 780.

3.3 FIELD QUALITY CONTROL

A. Owner will engage a qualified testing and inspecting agency to perform field tests and inspections and to prepare test reports.

1. Correct deficiencies in or remove and replace structural steel that test reports and inspections indicate do not comply with specified requirements.
2. Additional testing, at Contractor's expense, will be performed to determine compliance of corrected Work with specified requirements.
3. High-strength bolted connections will be tested and inspected according to RCSC's "Specification for Structural Joints Using ASTM A 325 or A 490 Bolts."
4. In addition to visual inspection, welded connections will be tested and inspected according to AWS D1.1 procedures.

END OF SECTION 05120

SECTION 05210 - STEEL JOISTS

PART 1 - GENERAL

1.1 SUMMARY

A. This Section includes the following:

1. Open-web, K-series steel joists.
2. KCS-type, open-web, K-series steel joists.
3. Joist girders.

1.2 SUBMITTALS

A. Product Data: For each type of joist, accessory, and product indicated.

B. Shop Drawings: Showing layout, mark, number, type, location, and spacings of joists. Include joining and anchorage details, bracing, bridging, accessories; splice and connection locations and details; and attachments to other construction.

C. Welding certificates.

D. Mill certificates.

E. Research/Evaluation Reports: Evidence of steel joists' compliance with building code in effect for Project, from a model code organization acceptable to authorities having jurisdiction.

1.3 QUALITY ASSURANCE

A. Manufacturer Qualifications: A firm experienced in manufacturing joists similar to those indicated for this Project and with a record of successful in-service performance.

1. Manufacturer must be certified by SJI to manufacture joists complying with SJI standard specifications and load tables.

B. SJI Specifications: Comply with SJI's "Standard Specifications Load Tables and Weight Tables for Steel Joists and Joist Girders" (hereafter, "Specifications"), applicable to types of joists indicated.

C. Welding: Qualify procedures and personnel according to AWS D1.1, "Structural Welding Code--Steel," and AWS D1.3, "Structural Welding Code--Sheet Steel."

1.4 DELIVERY, STORAGE, AND HANDLING

A. Deliver, store, and handle joists as recommended in SJI's "Specifications."

PART 2 - PRODUCTS

2.1 MATERIALS

A. Steel: Comply with SJI's "Specifications" for chord and web members.

B. High-Strength Bolts and Nuts: ASTM A 325, Type 1, heavy hex steel structural bolts, heavy hex carbon-steel nuts, and hardened carbon-steel washers; plain, uncoated.

2.2 PRIMERS

A. Primer: SSPC-Paint 15, Type I, red oxide; FS TT-P-636, red oxide; or manufacturer's standard shop primer complying with performance requirements of either of these red-oxide primers.

2.3 STEEL JOISTS

A. Manufacture steel joists according to SJI's "Specifications," with steel-angle top- and bottom-chord members, and as follows:

1. Manufacture K-series and KCS-type K-series steel joists according to "Standard Specifications for Open Web Steel Joists, K-Series," with steel-angle top- and bottom-chord members, underslung ends, and parallel top chord.

B. Comply with AWS requirements and procedures for shop welding, appearance, quality of welds, and methods used in correcting welding work.

2.4 JOIST GIRDERS

A. Manufacture joist girders according to "Standard Specifications for Joist Girders," in SJI's "Specifications," with steel-angle top- and bottom-chord members; with end and top-chord arrangements indicated.

B. Comply with AWS requirements and procedures for shop welding, appearance, quality of welds, and methods used in correcting welding work.

2.5 JOIST ACCESSORIES

A. Bridging: Provide bridging anchors and number of rows of horizontal or diagonal bridging of material, size, and type required by SJI's "Specifications" for type of joist, chord size, spacing, and span.

B. Bridging: Schematically indicated. Detail and fabricate according to SJI's "Specifications."

C. Supply miscellaneous accessories, including splice plates and bolts required by joist manufacturer to complete joist installation.

2.6 SHOP PAINTING

A. Clean and remove loose scale, heavy rust, and other foreign materials from fabricated joists and accessories by hand-tool cleaning, SSPC-SP 2 or power-tool cleaning, SSPC-SP 3.

B. Apply 1 shop coat of primer to joists and joist accessories to be primed to provide a continuous, dry paint film not less than 1 mil thick.

PART 3 - EXECUTION

3.1 INSTALLATION

A. Do not install joists until supporting construction is in place and secured.

B. Install joists and accessories plumb, square, and true to line; securely fasten to supporting construction according to SJI's "Specifications," joist manufacturer's written recommendations, and requirements in this Section.

C. Field weld joists to supporting steel bearing plates. Coordinate welding sequence and procedure with placement of joists. Comply with AWS requirements and procedures for welding, appearance and quality of welds, and methods used in correcting welding work.

D. Bolt joists to supporting steel framework using carbon-steel bolts, unless otherwise indicated.

E. Bolt joists to supporting steel framework using high-strength structural bolts, unless otherwise indicated. Comply with RCSC's "[**Allowable Stress Design Specification for Structural Joints Using ASTM A 325 or ASTM A 490 Bolts**] [**Load and Resistance Factor Design Specification for Structural Joints Using ASTM A 325 or ASTM A 490 Bolts**]" for high-strength structural bolt installation and tightening requirements.

F. Install and connect bridging concurrently with joist erection, before construction loads are applied. Anchor ends of bridging lines at top and bottom chords if terminating at walls or beams.

3.2 FIELD QUALITY CONTROL

A. Testing Agency: Owner will engage a qualified independent testing and inspecting agency to inspect field welds and high-strength bolted connections.

B. Field welds will be visually inspected according to AWS D1.1

C. Correct deficiencies in Work that inspections and test reports have indicated are not in compliance with specified requirements.

D. Additional testing will be performed to determine compliance of corrected Work with specified requirements.

3.3 REPAIRS AND PROTECTION

A. Touchup Painting: After installation, promptly clean, prepare, and prime or reprime field connections, rust spots, and abraded surfaces of prime-painted joists, accessories, and abutting structural steel.

1. Clean and prepare surfaces by hand-tool cleaning, SSPC-SP 2, or power-tool cleaning, SSPC-SP 3.
2. Apply a compatible primer of the same type as the shop primer used on adjacent surfaces.

B. Provide final protection and maintain conditions, in a manner acceptable to manufacturer and Installer, that ensures joist and accessories are without damage or deterioration at time of Substantial Completion.

END OF SECTION 05210

SECTION 05310 - STEEL DECK

PART 1 - GENERAL

1.1 SUMMARY

A. This Section includes the following:

1. Non-composite form deck.

1.2 SUBMITTALS

A. Product Data: For each type of deck, accessory, and product indicated.

B. Shop Drawings: Include layout and types of deck panels, anchorage details, reinforcing channels, pans, deck openings, special jointing, accessories, and attachments to other construction.

C. Product certificates.

D. Welding certificates.

E. Research/Evaluation Reports: Evidence of steel deck's compliance with building code in effect for Project, from a model code organization acceptable to authorities having jurisdiction.

1.3 QUALITY ASSURANCE

A. Welding: Qualify procedures and personnel according to AWS D1.1, "Structural Welding Code--Steel," and AWS D1.3, "Structural Welding Code--Sheet Steel."

B. Testing Agency Qualifications: An independent testing agency, acceptable to authorities having jurisdiction, qualified according to ASTM E 329 to conduct the testing indicated, as documented according to ASTM E 548.

C. Fire-Test-Response Characteristics: Where indicated, provide steel deck units identical to those steel deck units tested for fire resistance per ASTM E 119 by a testing and inspection agency acceptable to authorities having jurisdiction.

1. Fire-Resistance Ratings: Indicated by design designations from UL's "Fire Resistance Directory" or from the listings of another testing and inspecting agency.
2. Steel deck units shall be identified with appropriate markings of applicable testing and inspecting agency.

D. AISI Specifications: Calculate structural characteristics of steel deck according to AISI's "Specification for the Design of Cold-Formed Steel Structural Members."

PART 2 - PRODUCTS

2.1 NONCOMPOSITE FORM DECK

A. Noncomposite Steel Form Deck: Fabricate ribbed-steel sheet noncomposite form deck panels to comply with "SDI Specifications and Commentary for Noncomposite Steel Form Deck," in SDI Publication No. 29, the minimum section properties indicated, and the following:

1. Galvanizing: ASTM A 525; G60, 0.60 oz./sq. ft.
2. Profile Depth: 9/16 inch.
3. Design Uncoated-Steel Thickness: 0.0179 inch.

2.2 ACCESSORIES

A. Accessories: Steel deck manufacturer's standard accessory materials, including mechanical fasteners, closure strips, pour stops, and closures for deck.

B. Shear Connectors: ASTM A 108, Grades 1010 through 1020 headed stud type, cold-finished carbon steel, AWS D1.1, Type B, with arc shields.

C. Galvanizing Repair Paint: High zinc-dust content paint for repair of damaged galvanized surfaces complying with Military Specifications MIL-P-21035 (Ships).

PART 3 - EXECUTION

3.1 INSTALLATION

A. Install deck panels and accessories according to applicable specifications and commentary in SDI Publication No. 29, manufacturer's written instructions, requirements in this Section and on Contract drawings.

B. Place deck panels on supporting frame and adjust to final position with ends accurately aligned and bearing on supporting frame before being permanently fastened. Do not stretch or contract side-lap interlocks.

C. Place deck panels flat and square and fasten to supporting frame without warp or deflection.

D. Cut and neatly fit deck panels and accessories around openings and other work projecting through or adjacent to decking.

E. Provide additional reinforcement and closure pieces at openings as required for strength, continuity of decking, and support of other work per deck manufacturers specifications.

F. Comply with AWS requirements and procedures for manual shielded metal arc welding, appearance and quality of welds, and methods used for correcting welding work.

G. Pour Stops and Girder Fillers: Weld steel sheet pour stops and girder fillers to supporting structure according to SDI recommendations, unless otherwise indicated.

H. Floor Deck Closures: Weld steel sheet column closures, cell closures, and Z-closures to deck, according to SDI recommendations, to provide tight-fitting closures at open ends of ribs and sides of decking. Weld cover plates at changes in direction of floor deck panels, unless otherwise indicated.

I. Repairs and Protection:

1. Repair Painting: Wire brush and clean rust spots, welds, and abraded areas on both surfaces of prime-painted deck immediately after installation, and apply repair paint.

3.2 FIELD QUALITY CONTROL

A. Testing: Owner will engage a qualified independent testing agency to perform field quality-control testing.

B. Field welds will be subject to inspection.

C. Remove and replace work that does not comply with specified requirements.

D. Additional testing and inspecting, at Contractor's expense, will be performed to determine compliance of corrected work with specified requirements.

3.3 REPAIRS AND PROTECTION

A. Repair Painting: Wire brush and clean rust spots, welds, and abraded areas on surfaces of prime-painted deck immediately after installation, and apply repair paint.

B. Provide final protection and maintain conditions to ensure that steel deck is without damage or deterioration at time of Substantial Completion.

END OF SECTION 05310

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SECTION 05500
METAL FABRICATIONS

PART 1 GENERAL

1.01 SUMMARY

A. Section Includes

1. Requirements to fabricate, furnish, erect, set, fasten and install miscellaneous metalwork as indicated on the Drawings and as specified.
2. The work of this Section shall be included in the sub-bid titled **Miscellaneous and Ornamental Metals** and is based on **[portions]** of Drawings Nos. ____ and any and all Drawings referenced thereon. For additional work, the bidders shall completely review all related project Contract Drawings.
3. The work described in the following Related Sections shall not be included in the **Miscellaneous and Ornamental Metals** sub-bid unless stated otherwise in the individual section. Related Sections shall not require filed sub-bids in another category unless stated in the individual specification.

B. Related Sections

1. Section 03300 – Cast In Place Concrete
2. Section 03600 – Grout

1.02 REFERENCES

A. American Society for Testing and Materials (ASTM)

1. A36, Specification for Carbon Structural Steel.
2. A48, Specification for Gray Iron Castings.
3. A53, Specification for Pipe, Steel, Black and Hot-Dipped, Zinc Coated, Welded Seamless.
4. A123, Specification for Zinc (Hot-Dipped Galvanized) Coatings on Iron and Steel Products.
5. A153, Specification for Zinc Coating (Hot-Dip) on Iron and Steel Hardware.
6. A167, Specification for Stainless and Heat-Resisting Chromium-Nickel Steel Plate, Sheet, and Strip.
7. A276, Specification for Stainless Steel Bars and Shapes.
8. A307, Specification for Carbon Steel Bolts and Studs, 60,000 PSI Tensile Strength.
9. A325, Specification for Structural Bolts, Steel, Heat Treated, 120/105 ksi Minimum Tensile Strength.
10. A489, Specification for Carbon Steel Lifting Eyes.
11. A500, Specification for Cold-Formed Welded and Seamless Carbon Steel Structural Tubing in Rounds and Shapes.
12. A501, Specification for Hot-Formed Welded and Seamless Carbon Steel Structural Tubing.
13. B209, Specification for Aluminum and Aluminum-Alloy Sheet and Plate.
14. B221, Specification for Aluminum and Aluminum-Alloy Extruded Bars, Rods, Wire, Profiles, and Tubes.
15. B308, Specification for Aluminum-Alloy 6061-T6 Standard Structural Profiles.
16. B429, Specification for Aluminum-Alloy Extruded Structural Pipe and Tube.
17. B632, Specification for Aluminum-Alloy Rolled Tread Plate.
18. B660, Standard Practices for Packaging/Packing of Aluminum and Magnesium Products.

19. F436, Specification for Hardened Steel Washers.
20. F468, Specification for Nonferrous Bolts, Hex Cap Screws, Studs for General Use.
21. F593, Specification for Stainless Steel Bolts, Hex Cap Screws and Studs.
22. F594, Specification for Stainless Steel Nuts.
23. F844, Specification for Washers, Steel, Plain (Flat), Unhardened for General Use.

1.03 SUBMITTALS

A. In accordance with Section 01300 submit the following:

1. Manufacturer's technical data sheets for the following:
   a. Bitumastic coating.
   b. Grout.
   c. Chemical Anchors
2. Shop Drawings:
   a. Details of the fabrication and erection of each metal fabrication indicated on the Drawings.
   b. Plans, elevations, sections, and details of metal fabrications and their connections.
   c. Anchorage and accessory items.
   d. The shop drawings shall furnish the required information in sufficient detail and completeness that the work may be accomplished without the use of the Contract Drawings as a reference.
3. Welding Certificates: Copies of certificates for welding procedures and personnel.
4. Qualification Data: Firms and persons specified in the "Quality Assurance" Article shall demonstrate their capabilities and experience. Firms shall include a list of at least three (3) recently completed projects with project names and addresses. The name, address, and phone number of a contact (architect, engineer, or owner) shall be provided for each project in the list, as well as any other required information hereinafter or hereinbefore specified.

1.04 QUALITY ASSURANCE

A. Fabricator Qualifications:

1. Fabrication Company to be experienced in the production of metal fabrications similar to those indicated for this Project, with a record of successful in-service performance.
2. Fabrication Company to possess sufficient production capacity to produce the work required and complete the work within the duration of the contract.

B. Welding:

1. Procedures and personnel shall be qualified according to the latest revisions of the following American Welding Society designation:
   a. AWS D1.1, Structural Welding Code - Steel.
   b. AWS D1.2, Structural Welding Code - Aluminum.
   c. AWS D1.6, Structural Welding Code - Stainless Steel.
   d. Certification shall be provided stating that each welder has passed the AWS qualification tests for the welding processes involved and has maintained that certification as required by AWS.

1.05 DELIVERY STORAGE AND HANDLING

A. Aluminum to be delivered to the fabricator in accordance with ASTM B 660, complying with the commercial packing and preservation requirements.

B. Epoxy Adhesive

1. Store epoxy cartridges on pallets or shelving in a covered storage area.
2. Control temperature above 60 degrees F and dispose of cartridges if shelf life has expired.

C. Vinyl Ester Products

1. Store components on pallets or shelving in a covered storage area with locking door.
2. Control temperature within 41 to 77 degrees F and dispose of product if shelf life has expired.

1.06 PROJECT CONDITIONS

A. Field Measurements: Where metal fabrications are indicated to fit within reinforced concrete walls and other construction, dimensions shall be verified by field measurements before fabrication. The fabrication schedule shall be coordinated with the Construction Progress Schedule to avoid delaying the Work.

1. Established Dimensions: Where field measurements cannot be made without delaying the Work, proceed with fabricating metal fabrications upon receipt of Engineer reviewed and approved shop drawings, without field measurements. Allowance shall be made for trimming and fitting.

1.07 SCHEDULING

A. Installation of anchorages for metal fabrications shall be coordinated with the Contractor. Setting drawings, templates, and instructions for installing anchorages, including sleeves, concrete inserts, anchor bolts, items with integral anchors, and any items that are to be embedded in concrete shall be provided to the Contractor. Items to be embedded in concrete shall be delivered to Project site sufficiently in advance to allow time for installation, as determined by the Contractor.

PART 2 PRODUCTS

2.01 MATERIALS

A. Steel, in accordance with the following ASTM Designations unless otherwise indicated:

1.	Steel plates and structural shapes	ASTM A36.
2.	Steel Pipe	A501 or A53, Type E or S, Grade B
3.	Structural Steel Tubing	A500, Grade B
4.	Steel Bolts and Nuts:	
	a. Carbon Steel	A307 or A36
	b. High-Strength	A325, Type 3
	c. Galvanized Steel Bolts and Nuts	A307 or A36, with A153 Zinc Coating, and ANSI B1.1
	d. Eyebolts	A489
	e. Threaded Rods	A36
	f. Flat Washers (Unhardened)	F844; use A153 for Zinc Coating
	g. Flat Washers (Hardened)	F436

B. Stainless Steel, Type 316 and in accordance with the following ASTM designations unless otherwise indicated:

1. Bars and Shapes A276, AISI Type 316
2. Plate, Sheet, and Strip A167, AISI Type 316
3. Bolts and Threaded Rods F593, AISI Type 316,
4. Nuts F594, AISI Type 316,
5. Welding Rods and Bare Electrodes: Compatible with the material to be welded per the AWS D1.6 specifications.

C. Aluminum, in accordance with the following ASTM designations and alloy and temper designations of The Aluminum Association:

1. Structural shapes B 308, 6061-T6 mill finish.
2. Extruded shapes B 221, 6061-T6 mil finish
3. Structural Plates B 209, 6061-T6 mil finish
4. Sheets Alclad 3003-H14 and 3003
5. Bolts and nuts F468, 2024-T4
6. Aluminum Tread Plate:
   a. In accordance with ASTM B 632, 6061-T6.
   b. Provide a clear, Class II, anodized finish in accordance with Aluminum Association Designation AA-A31, 0.4 mils thick minimum.
7. Structural Aluminum Tubes ASTM B 429, 6063-T52, mill finish.
8. Welding Rods and Bare Electrodes:
   a. Compatible with the material to be welded per the AWS D1.2 specifications.
   b. Aluminum items to be anodized shall not be welded using 4043 weld rod.

D. Cast Iron

1. In accordance with ASTM A48, Class 35.

2.02 GROUT

A. In accordance with SECTION 03600.

2.03 FASTENERS

A. Provide Stainless steel fasteners for all connections unless indicated otherwise

B. Bolts:

1. Stainless steel in accordance with ASTM F 593, Alloy Group 2, Type 316,
2. CW with hexagonal heads shall be provided for connections.

C. Nuts:

1. Stainless steel in accordance with ASTM F 594, Alloy Group 2, Type 316,
2. CW with hexagonal heads, and thread designation to match stainless steel bolts shall be provided for connections.

D. Washers:

1. In accordance with ASTM F 436, except that the material shall be Type 316 stainless steel in accordance with ASTM A 276.

E. Stainless steel fasteners for framing connections

1. Provide bolts, nuts, and washers of the size and quantity as indicated on the Drawings. One nut shall be provided per each bolt unless otherwise indicated on the Drawings. A washer shall be provided at the contact surface between framing members or clips and the heads of bolts and nuts, minimum two (2) washers per bolt.

F. Machine Screws:

1. Stainless steel in accordance with ASME B18.6.3, Type 316.

2.04 ALUMINUM FRAMING AND SUPPORTS FOR COVERS AND GRATING

A. Fabricated from structural aluminum shapes, structural aluminum tubes, and aluminum extrusions, of the size and quantity as indicated on the Drawings.

2.05 PIPE BOLLARDS

A. Fabricated from Schedule 40, welded, galvanized steel pipe in accordance with ASTM A53

B. Provide size and quantity indicated on the Drawings.

2.06 ANCHOR BOLTS

A. To be Stainless Steel.

B. Configuration and specific type as specified, as listed in the associated equipment specifications and as detailed on the Contract Drawings.

C. Provide Antiseizing Lubricant for all stainless steel threads.

D. Anchor Bolt Sleeves

1. High Density Polyethylene Plastic:
   a. Single unit construction with deformed sidewalks such that the concrete and grout lock in place.
   b. The top of the sleeve shall be self-threading to provide adjustment of the threaded anchor bolt projection.
   c. Material requirements:
      1) Plastic: High density polyethylene.
      2) Density: ASTM D 1505
   d. Manufacturer:
      1) Sinco West, Simi Valley, CA
      2) Or equal
2. Fabricated Steel Sleeve
   a. A 36 steel.

E. Neoprene Gasket

1. ASTM D 1056 RE-41-E, soft, closed-cell, neoprene gasket material, suitable for exposure to sewage and sewage gases, unless otherwise shown.
2. Thickness: Minimum 1/4 inch.
3. Furnish without skin coat.
4. Furnish two spare gaskets for each location shown requiring neoprene gaskets, and furnish one roll of 4-inch wide by 50-foot long neoprene gasket material with 1 pint of manufacturer's recommended adhesive.
5. Manufacturers and Product:
   a. Rubatex Division of Great American Industries, Bedford, VA; Rubatex No. R-411-N.
   b. Garlock Manufacturing, San Francisco, CA.
   c. Or equal.

2.07 TRENCH DRAIN COVERS

A. Gray cast iron trench drain solid covers and frames where indicated on the Drawings in accordance with ASTM A48, class 35 heavy duty use. Provide castings of uniform quality, free from blow holes, shrinkage defects, swells, cracks or other defects. Casting to be free of fins, burrs and slag.

1. Covers: Solid with checkered pattern top.
2. Bolt trench drain covers to frames with stainless steel cap screws.
3. Trench drain cover assembly to support AASHTO H20 rated load.

2.08 MISCELLANEOUS ITEMS

A. Provide hangers, supports, brackets, anchors, bolts and other miscellaneous metalwork not previously specified, of the shape, size, material and detail indicated on the Drawings for the purpose intended.

2.09 FABRICATION

A. General

1. Metals shall be sheared and punched cleanly and accurately. Burrs shall be removed.
2. Exposed edges shall be rounded to a radius of approximately 1/32 inch, unless otherwise indicated. Bent-metal corners shall be formed to the smallest radius possible without causing grain separation or otherwise impairing the work.
3. Corners and seams shall be welded continuously to comply with the following:
   a. Materials and methods shall be used that minimize distortion and develop strength and corrosion resistance of the base metals.
   b. Fusion shall be obtained without undercut or overlap.
   c. Welding flux shall be removed immediately.
   d. At exposed connections, exposed welds and surfaces shall be finished smooth and blended so that no roughness is apparent and the contour of the welded surface matches that of the adjacent surface.
4. Joints that will be exposed to weather shall be fabricated in a manner to exclude water. Drain holes shall be provided where water may accumulate.
5. Fabrications exposed to view in the completed Work, shall be provided with smooth, flat surfaces without blemishes.
6. Fabrications with exposed pitting, seam marks, roller marks, rolled trade names, or roughness shall not be used.

B. Shop Assembly:

1. Items shall be preassembled in shop to greatest extent possible to minimize field splicing and assembly.
2. Units shall be disassembled only as necessary for shipping and handling limitations.
3. Connections shall maintain the structural value of joined pieces through the use of properly sized holes, proper spacing and gage distances, tolerances, and other requirements as determined in the applicable codes listed elsewhere in this specification.
4. Units shall be clearly marked for reassembly and coordinated installation.

2.10 FINISHES

A. Fabrications shall be finished after shop assembly.

B. Anodized aluminum finishes to be in accordance with the Aluminum Association's standards for Anodized Architectural Aluminum as published by the American Architectural Manufacturer's Association (AAMA).

C. Anodized finishes damaged in the field during installation or transit shall be repaired using brush anodizing to restore the coating to its specified Class and thickness.

D. Galvanizing

1. Items of miscellaneous ironwork and steel work indicated on the Drawings or specified to be galvanized shall be zinc-coated by the hot-dip process in accordance with ASTM Standard Specification for Zinc (Hot-Galvanized) Coatings on Products Fabricated from Rolled, Pressed, and Forged Steel Shapes, Plates, Bars, and Strip, Designation A123; or ASTM Standard Specifications for Zinc Coating (Hot-Dip) on Iron and Steel Hardware, Designation A153, as appropriate.

E. Aluminum Surfaces in Contact with Concrete

1. Paint-on coating suitable for embedment in, or surface mounting to, concrete to prevent adverse reaction between aluminum and concrete surfaces.
2. Apply one coat of the following;
   a. Coal Tar 46-465 H. B. Tnemecol, Tnemec Company, North Kansas City, MO.
   b. Bitumastic Super Service Black, KOP-COAT, Inc., Pittsburgh, PA.
   c. Tarmastic 100 Porter Coatings Division, Porter Paint Co., Louisville, KY.
   d. Or equal.

PART 3 EXECUTION

3.01 INSTALLATION

A. Field Assembly:

1. Metal fabrications shall be cut, reinforced, drilled, and tapped cleanly and accurately to receive finish hardware, screws, and similar items.
2. Exposed work shall be formed true to line and level, with accurate angles and surfaces, and straight rounded edges.
3. Sharp or rough areas shall be removed on exposed traffic surfaces.
4. Exposed connections shall be formed with hairline joints, flush and smooth, using concealed fasteners where possible.
5. Exposed fasteners of type indicated on the Drawings shall be used; when not indicated, Phillips flat-head (countersunk) screws or bolts shall be used. Joints shall be located where least conspicuous.

B. Erection Tolerances

1. Maximum Variation from Plumb: 1/4 inch per story, noncumulative.
2. Maximum Offset from True Alignment: 1/4 inch.

C. Anchorage:

1. Coordinated type of anchorage with supporting structure.
2. Anchoring devices shall be fabricated and spaced to secure metal fabrications in place and to support indicated loads.

D. Fastening to In-Place Construction:

1. Anchorage devices and fasteners shall be provided where necessary for securing metal fabrications to in-place construction.

E. Cutting, Fitting, and Placement:

1. Cutting, drilling, and fitting for the installation of metal fabrications shall be performed as required.
2. Metal fabrications shall be set accurately in location, alignment, and elevation; with edges and surfaces level, plumb, true, and free of rack; and measured from established lines and levels.

F. Temporary bracing or anchors shall be provided in formwork for items that are to be built into concrete.

G. Exposed connections shall fit together to form hairline joints. Welded connections that can not be made in the shop due to shipping limitations shall be made in the field. Do not weld, cut, or abrade surfaces of exterior units that have been anodized after fabrication and are for bolted or screwed field connections.

H. Field Welding: Comply with the following requirements:

1. Materials and methods shall be used that minimize distortion and develop strength and corrosion resistance of base metals.
2. Fusion shall be obtained without undercut or overlap.
3. Welding flux shall be removed immediately.
4. At exposed connections, welds and surfaces shall be finished smooth and blended so that no roughness shows after finishing and the contour of the welded surface matches that of adjacent surface.

3.02 SETTING BEARING AND LEVELING PLATES

A. Concrete bearing surfaces shall be cleaned of bond-reducing materials, and roughened to improve bond to surfaces. The bottom surface of plates shall be cleaned.

B. Bearing and leveling plates shall be set on wedges, shims, or leveling nuts. After bearing members have been positioned and plumbed, anchor bolts shall be tightened. Wedges and shims shall not be removed but, if protruding, shall be cut off flush with the edge of bearing plate before packing with grout.

1. Provide grout in accordance with SECTION 03600.
2. Grout shall be solidly packed between bearing surfaces and plates to ensure that no voids remain.

3.03 ANCHOR BOLTS (CAST IN PLACE)

A. Accurately locate and hold anchor bolts in place with templates at the time concrete is placed.

B. Use sleeves for location adjustment and provide two nuts and one washer per bolt of same material as bolt. Minimum bolt size: 1/2-inch diameter by 12 inches long, unless otherwise shown.

C. All anchors and anchor bolts shall be properly located and shall be built into the connecting work when the work is built. Expansion bolts shall be inserted into drilled holes.

3.04 ANCHORING SYSTEMS (CURED CONCRETE)

A. Begin installation only after concrete or masonry receiving anchors have attained design strength.

B. Do not install an anchor closer than six times its diameter to either an edge of concrete or masonry, or to another anchor, unless specifically shown otherwise.

C. Install in accordance with manufacturer's specific quality control submittal instructions. Hole diameters are critical to installation, use only drills recommended by anchor manufacturer. Follow manufacturer's safe handling instructions.

D. Epoxy or Adhesive Anchors: Do not install when temperature of concrete is below 40 degrees F or above 100 degrees F, unless stated otherwise in manufacturer's written instructions.

E. Follow specific manufacturer safe handling practices when handling and installing concrete anchors.

3.05 FASTENER SCHEDULE:

Service Use and Location	Product	Remarks
Anchor Bolts Cast Into Concrete for Equipment Bases:		
Dry Areas	Stainless steel bolts, unless otherwise specified with equipment	
Submerged or Wet Areas	Stainless steel bolts with fusion bond coating unless otherwise specified with equipment	See Section 09900, Painting and Protection Coating
Anchor Bolts Cast Into Concrete for Metal Fabrications and Structural Components.		
Dry or Protected Areas Exterior, Wet, Washdown, and Chemical Handling Areas	Stainless steel bolts with fusion bond coating	See Section 09900, Painting
Anchors for Metal Components to Concrete: e.g. Electrical Panels and Equipment:		
Dry Areas	Stainless steel wedge or expansion anchors	
Wet and Damp Areas	Epoxy or adhesive stainless steel anchors	
Submerged or Buried in Earth	Epoxy or adhesive stainless steel anchors	
Connections for Structural Steel Components:		
Exterior and Interior	High-strength zinc-coated steel bolts	See Section 05120, Structural Steel
Connections for Steel Fabrications:		
Exterior and Interior	Zinc-coated steel bolts	See Section 05120, Structural Steel
Connections for Aluminum Components:		
Exterior and Interior	Stainless steel bolts	
All Others:		
Exterior and Interior	Stainless steel fasteners	

A. Do not use epoxy anchors to support fire-resistive construction or where ambient temperature will exceed 120 degrees F.

3.06 PIPE BOLLARDS

A. Anchored in place with concrete footings as detailed in the Contract Drawings. Bollards shall be supported and braced in position until their footings are cured.

B. Fill pipe solidly with 3,000 psi concrete, mounding the top surface.

C. Paint bollards Safety Yellow in accordance with:

1. Exterior Steel - Non-Immersion
   a. Shop Surface Preparation: SSPC SP6 Commercial Blast Cleaning
   b. Shop Primer Coat: Series 91-K97 Organic Zinc
      1) Dry Film Thickness: 2.5 to 3.5 mils
   c. Full Field Prime Coat: Series 66-color Hi-Build Epoxoline
      1) Dry Film Thickness: 3.0 to 5.0 mils
   d. Finish Coat: Series 73-color Endura-Shield
      1) Dry Film Thickness: 2.5 to 5.0 mils
   e. Total Dry Film Thickness: 8.0 to 13.5 mils.

3.07 MISCELLANEOUS ITEMS

A. Metal Fabrication Subcontractor shall furnish items to be embedded in the Work to the Contractor for installation.

3.08 ALUMINUM WORK PROTECTION

A. Areas where the coating has been damaged by abrasion or other cause shall be cleaned and repainted as directed so that the aluminum will have a complete protective film when brought into contact with the material against which it is being protected. Before application of coating, the surface shall be cleaned of all dirt, heavy deposits of grease or oil, and other foreign substances, and shall be immersed in or swabbed with an acceptable solvent. Next, the surfaces shall be rinsed with clear water and thoroughly dried.

C. Protect against electrolysis where aluminum is to be used in conjunction with dissimilar metals.

D. Where a shop coating of methacrylate lacquer has been specified on aluminum work to protect the surface from stain, the protective coating of lacquer worn off due to handling or erection shall be replaced in the field by a new coating of lacquer of the same type.

E. During construction, care shall be taken to prevent damage to the aluminum work from splashing or by the accumulation of paint, concrete, mortar, or other similar materials.

3.09 CLEANING AND TOUCHUP

A. Painted Surfaces: Clean and touchup paint field welds, bolted connections, and abraded areas of shop paint as specified in SECTION 09900 or as approved by the Engineer.

B. Anodized Surfaces: Clean field welds, bolted connections, and abraded areas and repair anodizing to match the quality of the coating provided by the shop.

C. After aluminum has been erected, it shall be cleaned with mild soap and water, followed by a clear water rinse.

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DIVISION 6

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SECTION 06100 - ROUGH CARPENTRY

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 1 Specification Sections, apply to this Section.

1.2 SUMMARY

A. This Section includes the following:

1. Framing with dimension lumber.
2. Wood blocking and nailers.
3. Utility shelving.
4. Wood furring.
5. Wood Sheathing.
6. Plywood backing panels.

1.3 DEFINITIONS

A. Rough Carpentry: Carpentry work not specified in other Sections and not exposed, unless otherwise indicated.

B. Lumber grading agencies, and the abbreviations used to reference them, include the following:

1. NELMA - Northeastern Lumber Manufacturers Association.
2. NLGA - National Lumber Grades Authority.
3. SPIB - Southern Pine Inspection Bureau.
4. WCLIB - West Coast Lumber Inspection Bureau.
5. WWPA - Western Wood Products Association.

1.4 SUBMITTALS

A. Product Data: For each type of process and factory-fabricated product. Indicate component materials and dimensions and include construction and application details.

1. Include data for wood-preservative treatment from chemical treatment manufacturer and certification by treating plant that treated materials comply with requirements. Indicate type of preservative used, net amount of preservative retained, and chemical treatment manufacturer's written instructions for handling, storing, installing, and finishing treated material.

2. Include data for fire-retardant treatment from chemical treatment manufacturer and certification by treating plant that treated materials comply with requirements. Include physical properties of treated materials, both before and after exposure to elevated temperatures when tested according to ASTM D 5516 and ASTM D 5664.
3. Include copies of warranties from chemical treatment manufacturers for each type of treatment.

B. Material Certificates: For dimension lumber specified to comply with minimum allowable unit stresses. Indicate species and grade selected for each use and design values approved by the American Lumber Standards Committee Board of Review.

C. Research/Evaluation Reports: For the following, showing compliance with building code in effect for Project:

1. Preservative-treated wood.
2. Fire-retardant-treated wood.
3. Metal framing anchors.

1.5 QUALITY ASSURANCE

A. Source Limitations for Fire-Retardant-Treated Wood: Obtain each type of fire-retardant-treated wood product through one source from a single producer.

1.6 DELIVERY, STORAGE, AND HANDLING

A. Stack lumber, plywood, and other panels; place spacers between each bundle to provide air circulation. Provide for air circulation around stacks and under coverings.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

1. Boise Cascade Corporation.
2. Metal Framing Anchors:
   a. Simpson Strong-Tie Company, Inc.

2.2 WOOD PRODUCTS, GENERAL

A. Lumber: DOC PS 20 and applicable rules of lumber grading agencies certified by the American Lumber Standards Committee Board of Review.

1. Factory mark each piece of lumber with grade stamp of grading agency.

2. Where nominal sizes are indicated, provide actual sizes required by DOC PS 20 for moisture content specified. Where actual sizes are indicated, they are minimum dressed sizes for dry lumber.
3. Provide dressed lumber, S4S, unless otherwise indicated.
4. Provide dry lumber with 19 percent maximum moisture content at time of dressing for 2-inch nominal thickness or less, unless otherwise indicated.

B. Wood Structural Panels:

1. Plywood: Either DOC PS 1, unless otherwise indicated.
2. Oriented Strand Board: DOC PS 1.
3. Thickness: As needed to comply with requirements specified but not less than thickness indicated.
4. Factory mark panels according to indicated standard.

2.3 WOOD-PRESERVATIVE-TREATED MATERIALS

A. Preservative Treatment by Pressure Process: AWPA C2 (lumber) and AWPA C9 (plywood), except that lumber that is not in contact with the ground and is continuously protected from liquid water may be treated according to AWPA C31 with inorganic boron (SBX).

1. Preservative Chemicals: Acceptable to authorities having jurisdiction and one of the following:

a. Chromated copper arsenate (CCA).
b. Ammoniacal copper zinc arsenate (ACZA).
c. Ammoniacal, or amine, copper quat (ACQ).

B. Kiln-dry material after treatment to a maximum moisture content of 19 percent for lumber and 15 percent for plywood. Do not use material that is warped or does not comply with requirements for untreated material.

C. Mark each treated item with the treatment quality mark of an inspection agency approved by the American Lumber Standards Committee Board of Review.

D. Application: Treat items indicated on Drawings, and the following:

1. Nailers, equipment support bases, blocking, stripping, and similar members in connection with roofing, flashing, vapor barriers, and waterproofing.
2. Wood sills, sleepers, blocking, furring, stripping, and similar concealed members in contact with masonry or concrete.
3. Wood framing members less than 18 inches above grade.

2.4 FIRE-RETARDANT-TREATED MATERIALS

A. General: Where fire-retardant-treated materials are indicated, provide materials that comply with performance requirements in AWPA C20 (lumber) and AWPA C27 (plywood). Identify fire-retardant-treated wood with appropriate classification marking

of UL, U.S. Testing, Timber Products Inspection, or another testing and inspecting agency acceptable to authorities having jurisdiction.

1. Use treatment for which chemical manufacturer publishes physical properties of treated wood after exposure to elevated temperatures, when tested by a qualified independent testing agency according to ASTM D 5664, for lumber and ASTM D 5516, for plywood.
2. Use treatment that does not promote corrosion of metal fasteners.
3. Use Exterior type for exterior locations and where indicated.
4. Use Interior Type A High Temperature (HT), unless otherwise indicated.

2.5 DIMENSION LUMBER

A. General: Provide dimension lumber of grades indicated according to the American Lumber Standards Committee National Grading Rule provisions of the grading agency indicated.

2.6 MISCELLANEOUS LUMBER

A. General: Provide lumber for support or attachment of other construction, including the following:

1. Blocking.
2. Nailers.
3. Furring.

B. For items of dimension lumber size, provide Construction, or No. 1 grade lumber with 19 percent maximum moisture content and any of the following species:

1. Mixed southern pine (for preservative treated lumber); SPIB.
2. Douglas fir-larch (DF)
3. Spruce-Pine-Fir (SPF)

C. For concealed boards, provide Construction, or No. 1 grade lumber with 19 percent maximum moisture content and any of the following species and grades:

1. Mixed southern pine (for preservative treated lumber); SPIB.
2. Douglas fir-larch (DF)
3. Spruce-Pine-Fir (SPF)

D. For furring strips for installing plywood or hardboard paneling, select boards with no knots capable of producing bent-over nails and damage to paneling.

2.7 WOOD SHEATHING

A. Plywood Floor Sheathing: Tongue and Groove Structural 1 sheathing.

1. Span Rating: Not less than 40/20.
2. Thickness: See drawings.

B. Plywood Roof Sheathing: Exterior, Tongue and Groove Structural I sheathing.

1. Span Rating: Not less than 48/24

2. Thickness: Not less than 5/8 inch tongue and groove

2.8 PLYWOOD BACKING PANELS

A. Telephone and Electrical Equipment Backing Panels: DOC PS 1, Exposure 1, C-D Plugged, fire-retardant treated, in thickness indicated or, if not indicated, not less than 1/2 inch thick.

2.9 FASTENERS

A. General: Provide fasteners of size and type indicated that comply with requirements specified in this Article for material and manufacture.

1. Where rough carpentry is exposed to weather, in ground contact, or in area of high relative humidity, provide fasteners with hot-dip zinc coating complying with ASTM A 153/A 153M.

B. Nails, Brads, and Staples: ASTM F 1667.

C. Power-Driven Fasteners: CABO NER-272.

D. Wood Screws: ASME B18.6.1.

E. Screws for Fastening to Cold-Formed Metal Framing: ASTM C 954, except with wafer heads and reamer wings, length as recommended by screw manufacturer for material being fastened.

F. Lag Bolts: ASME B18.2.1..

G. Bolts: Steel bolts complying with ASTM A 307, Grade A; with ASTM A 563 hex nuts and, where indicated, flat washers.

H. Expansion Anchors: Anchor bolt and sleeve assembly of material indicated below with capability to sustain, without failure, a load equal to 6 times the load imposed when installed in unit masonry assemblies and equal to 4 times the load imposed when installed in concrete as determined by testing per ASTM E 488 conducted by a qualified independent testing and inspecting agency.

1. Material: Carbon-steel components, zinc plated to comply with ASTM B 633, Class Fe/Zn 5.

2.10 METAL FRAMING ANCHORS

A. General: Provide framing anchors made from metal indicated, of structural capacity, type, and size indicated, and as follows:

1. Research/Evaluation Reports: Provide products acceptable to authorities having jurisdiction and for which model code research/evaluation reports exist that show compliance of metal framing anchors, for application indicated, with building code in effect for Project.
2. Allowable Design Loads: Provide products with allowable design loads, as published by manufacturer, that meet or exceed those indicated. Manufacturer's published values shall be determined from empirical data or by rational engineering analysis and demonstrated by comprehensive testing performed by a qualified independent testing agency.

2.11 MISCELLANEOUS MATERIALS

A. Building Paper: Asphalt-saturated organic felt complying with ASTM D 226, Type I (No. 15 asphalt felt), unperforated.

B. Building Wrap: Air-retarder sheeting made from polyolefins; cross-laminated films, woven strands, or spun-bonded fibers; coated or uncoated; with or without perforations; and complying with ASTM E 1677, Type I.

1. Thickness: Not less than 3 mils.
2. Permeance: Not less than 10 perms.
3. Flame-Spread Index: 25 or less per ASTM E 84.
4. Allowable Exposure Time: No more than three months.

PART 3 - EXECUTION

3.1 INSTALLATION, GENERAL

A. Set rough carpentry to required levels and lines, with members plumb, true to line, cut, and fitted. Fit rough carpentry to other construction; scribe and cope as needed for accurate fit. Locate furring, nailers, blocking, and similar supports to comply with requirements for attaching other construction.

B. Do not use materials with defects that impair quality of rough carpentry or pieces that are too small to use with minimum number of joints or optimum joint arrangement.

C. Securely attach rough carpentry work to substrate by anchoring and fastening as indicated, complying with the following:

1. IBC 2015
2. Published requirements of metal framing anchor manufacturer.

3.2 WOOD BLOCKING, AND NAILER INSTALLATION

A. Install where indicated and where required for attaching other work. Form to shapes indicated and cut as required for true line and level of attached work. Coordinate locations with other work involved.

B. Attach items to substrates to support applied loading. Recess bolts and nuts flush with surfaces, unless otherwise indicated. Build anchor bolts into masonry during installation of masonry work. Where possible, secure anchor bolts to formwork before concrete placement.

END OF SECTION 06100

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SECTION 06175 – WOOD TRUSSES

PART 1 - GENERAL

1.1 SUMMARY

A. Provide prefabricated and pre-engineered wood trusses.

1.2 SUBMITTALS

A. Product Data: Submit manufacturer's product data and installation instructions for each material and product used.

B. Shop Drawings: Submit shop drawings indicating material characteristics, details of construction, connections, and relationship with adjacent construction.
   1. Shop drawings shall be prepared and stamped by a qualified engineer licensed in the jurisdiction of the project.
   2. All roof trusses and overhanging wood members shall be held down with uplift anchors per truss manufacturer's requirements.
   3. Wood truss fabricator shall submit to the architect for approval prior to fabrication, shop drawings bearing seal and signature of the design professional engineer, registered in the state of jurisdiction.
   4. Shop drawings shall be reviewed and approved by the general contractor and architect of record prior to submitting to engineer of record.
   5. Shop drawings shall include but are not limited to: truss layout plan; truss detail sheets showing configuration, dimensions, loads, member sizes and grades, member forces, connection plate sizes, permanent bracing requirements, truss connection hangers for flush framing, temporary bracing requirements, uplift anchorage hardware (designed and specified by truss designer), handling and on site storage requirements, etc.
   6. Truss designer shall include all loads required by the applicable state building code and all further requirements included in the structural and architectural contract documents. Additional requirements may include, but are not limited to additional design loads due to wind and/or earthquake, snow drifting, point loads and/or additional loading from other framing members, special top chord slope requirements for drainage, etc.
   7. Truss designer shall design, manufacture, and furnish all floor trusses which meet a live load deflection criteria of L/600 unless specifically approved otherwise. All roof trusses shall meet a total load deflection criteria of the lesser of 3/4" or L/360 unless specifically approved otherwise.
   8. All trusses shall be designed to bear on Spruce-Pine-Fir (SPF) top plates without exceeding the allowable bearing stress of either the truss or the top plates (F'c perp).

1.3 QUALITY ASSURANCE

A. Comply with governing codes and regulations. Provide products of acceptable manufacturers, which have been in satisfactory use in similar service for three years. Use

experienced installers. Deliver, handle, and store materials in accordance with manufacturer's instructions.

B. Standards: TPI 1, "National Design Standard for Metal Plate Connected Wood Truss Construction." and fabricate wood trusses within manufacturing tolerances in TPI 1

C. Design Engineering: Qualified engineer licensed in the jurisdiction of the project.

D. Fire-Retardant Treatment: AWPA C20 for lumber; non-corrosive type.

PART 2 - PRODUCTS

2.1 MATERIALS

A. Wood Trusses:
1. Lumber Standard: PS 20 American Softwood Lumber Standard.
2. Dressing: Dressed four sides.
3. Species: Manufacturer's option
4. Grade: Manufacturer's option
5. Moisture Content: Seasoned, 19 percent maximum.

B. Connectors, Fasteners, and Metal Framing Anchors:
1. Nails, Wire, Brads, and Staples: FS FF-N-105.
2. Power Driven Fasteners: CABO NER-272.
3. Wood Screws: ASME B18.6.1
4. Lag Bolts: ASME B18.2.1.
5. Bolts: ASTM A 307, Grade A; ASTM A 563 for hex nuts and, where indicated, flat washers.
6. Metal Framing Anchors: Hot-dip galvanized steel sheet, ASTM A 653, G60.
7. Truss Tie-Downs: Bent strap tie for fastening roof trusses to wall studs below; Stainless-Steel Sheet, ASTM A 666, Type 304.
8. Connectors: Hot-dip galvanized steel sheet, ASTM A 653, G60.
9. Connectors: Electrolytic zinc-coated steel sheet, ASTM A 653; ASTM A 591, Coating Class C.
10. Connectors: Aluminum-zinc, alloy-coated steel sheet, ASTM A 653; ASTM A 792, Coating Designation AZ 50.
11. Connectors: Stainless steel sheet, ASTM A 653; ASTM A 666, Type 304.

PART 3 - EXECUTION

3.1 INSTALLATION

A. Install and brace trusses according to TPI recommendations and within installation tolerances in TPI 1.

B. Install materials and systems in accordance with manufacturer's instructions and approved submittals. Install materials and systems in proper relation with adjacent construction. Coordinate with work of other sections.

C. Install trusses plumb, square, and true to line and securely fasten to supporting construction.

D. Restore damaged components. Clean and protect work from damage.

E. Wood truss erector shall be responsible for design and installation of all temporary erection bracing.

F. Truss spacing shown in structural engineering plans are for reference only. General contractor shall refer to approved truss shop drawings for actual truss layout and spacing (for both bidding and construction purposes).

END OF SECTION 06175

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SECTION 06200

FINISH CARPENTRY

1 PART 1 GENERAL

1.1 SECTION INCLUDES

A. Finish carpentry items.

B. Wood casing, trim, and moldings.

C. Wood handrails.

D. Molded millwork.

E. Hardware and attachment accessories.

1.2 RELATED SECTIONS

A. Section 05500 – Metal Fabrications.

B. Section 06111 – Framing and Sheathing: Execution requirements for recessed wood blocking specified by this section.

C. Section 07462 – Exterior Siding.

D. Section 08143 – Stile and Rail Wood Doors.

E. Section 08172 – Integrated Wood Door Opening Assemblies.

F. Section 08520 – Wood Windows.

G. Section 08710 – Door Hardware: Product requirements for hardware and attachment accessories for placement by this section.

H. Section 09910 – Painting: Painting and finishing of finish carpentry items.

I. Section 12353 – Residential Casework: Shop fabricated cabinet work.

J. Division 22 – Plumbing: Plumbing utilities and fixtures.

K. Division 26 – Electrical: Power wiring.

L. Division 27 – Communications: Signal and Data Wiring.

1.3 REFERENCES

A. AHA A135.4 - Basic Hardboard; American Hardboard Association.

B. ANSI A208.1 and A208.2 - Wood Particleboard.

C. ASTM C1036 - Standard Specification for Flat Glass.

D. ASTM C1048 - Standard Specification for Heat-Treated Flat Glass - Kind HS, Kind FT Coated and Uncoated Glass

E. ASTM E84 - Standard Test Method for Surface Burning Characteristics of Building Materials

F. AWI P-200 - Architectural Woodwork Quality Standards; Architectural Woodwork Institute

G. AWPA C2 - Lumber, Timbers, Bridge Ties and Mine Ties - Preservative Treatment by Pressure Processes; American Wood Preservers Association

H. BHMA A156.9 - American National Standard for Cabinet Hardware

I. FSC (Forest Stewardship Council)

J. HPVA HP-1 - Voluntary Standard for Hardwood and Decorative Plywood; Hardwood Plywood Manufacturer's Association

K. NEMA LD 3 - High Pressure Decorative Laminates; National Electric Manufacturer's Association

L. NWWDA I.S.4 - Industry Standard for Water-Repellent Preservative Non-Pressure Treatment for Millwork; National Wood Window and Door Association

M. NIST PS 1 - Construction and Industrial Plywood

N. NIST PS 20 - American Softwood Lumber Standard

1.4 SUBMITTALS FOR REVIEW

A. Section 01000 – Basic Requirements: Procedures for submittals.

B. Product Data:
1. Provide instructions for attachment hardware, finish hardware, and accessories.

C. Shop Drawings: Indicate materials, component profiles, fastening methods, jointing details, and accessories to a minimum scale of 1-1/2 inch (38 mm) to 1 ft (300 mm), (1:8).

1.5 QUALITY ASSURANCE

A. Perform work in accordance with AWI Architectural Woodwork Quality Standards, Custom Grade.

B. Fabricator: Company specializing in fabricating the products specified in this section with minimum three years documented experience.

C. Wood Products: Originate in Certified Well-Managed forests as determined by standards endorsed by FSC.

1.6 REGULATORY REQUIRMENTS

A. Conform to applicable code for fire retardant requirements.

1.7 DELIVERY, STORAGE, AND PROTECTION

A. Section 01000 – Basic Requirements: Transport, handle, store, and protect products.

B. Protect work from moisture damage.

1.8 PROJECT CONDITIONS

A. Section 010001 – Basic Requirements.

B. Sequence installation to ensure utility connections are achieved in an orderly and expeditious manner.

C. Coordinate the work with plumbing rough-in, electrical rough-in, and installation of associated and adjacent components.

2 PART 2 PRODUCTS

2.1 LUMBER MATERIALS

A. Softwood Lumber: PS 20; Graded in accordance with AWI Custom; Idaho Pine species, or as indicated on Drawings, plain sawn, maximum moisture content of 6 percent; with vertical, mixed, or flat grain as indicated on Drawings, of quality suitable for transparent finish.

B. Hardwood Lumber: Graded in accordance with AWI Custom ; Honduras Mahogany species, or as indicated on Drawings, maximum moisture content of 6 percent; with vertical, mixed, flat, or plain sawn grain as indicated on Drawings, of quality suitable for transparent finish.

2.2 SHEET MATERIALS

A. Softwood Plywood: PS 1 Grade A-C; Graded in accordance with AWI Custom; veneer, lumber or particleboard core; Idaho Pine face species or as indicated on Drawings, rotary cut.

B. Hardwood Plywood: HPVA HP-1; Graded in accordance with AWI Custom; veneer, lumber, or particleboard core, type of glue recommended for application; Honduras Mahogany face species or as indicated on Drawings, rift cut.

C. Wood Particleboard: ANSI A208.1 Type 1; AWI standard, composed of wood chips, sawdust, or flakes of medium density, made with high waterproof resin binders or water-resistant adhesive as applicable; of grade to suit application; sanded faces.

D. MDF Wood Particleboard: ANSI A208.2; AWI standard, composed of wood chips, sawdust, or flakes of medium density, made with high waterproof resin binders or water-resistant adhesive as applicable; of grade to suit application; sanded faces.

E. Hardboard: AHA A135.4; Pressed wood fiber with resin binder, tempered grade, 1/4 inch (6 mm) thick, smooth one sides.

F. Pegboard: Pressed wood fiber with resin binder, tempered grade; 1/8 inch (3 mm) thick with 3/16 inch (4 mm) diameter holes at 1 inch (25 mm) on center or 1/4 inch (6 mm) thick with 9/32 inch (7 mm) diameter holes at 1 inch (25 mm) on center as indicated on Drawings.

G. MDF Plywood: Per AWI standard, core material of particleboard, face veneer of resin impregnated paper overlay.

H. Medium Density Overlay (MDO): APA Medium Density Overlay, Exterior Exposure Durability, One Face MDO.

I. Fiberboard: Recycled wood fiberboard, UL, Class A fire-rated, 1/2 inch (50 mm) thickness, Noise Reduction Coefficient of 0.20; NCFR Homasote manufactured by Homasote Company.

2.3 PLASTIC LAMINATE MATERIALS

A. Plastic Laminate: NEMA LD 3, PF 42 Post Forming, GP-30 Vertical Grade, and GP-50 General Purpose type; color, pattern, and gloss, matte, textured, or furniture surface texture as selected by Architect; manufactured by Wilsonart, Arborite, or Formica Corporation.

B. Laminate Backing Sheet: NEMA LD 3 BK20 backing grade, undecorated plastic laminate.

2.4 SOLID SURFACING

A. Solid composite surfacing countertops: type and color, size, 1-1/4 inch (32mm) thickness, finish, and pencil edge, details as indicated on the Drawings or selected by the Architet from Standard Color.

2.5 ADHESIVE

A. Adhesive: Type recommended by AWI and laminate manufacturer to suit application.

B. Contact Adhesives: FS MMM-A-130; solvent release type.

C. Wall Adhesive: Solvent release, cartridge type, compatible with wall substrate, capable of achieving durable bond.

2.6 FASTENERS

A. Fasteners: Of size and type to suit application; galvanized in wet locations, mill finish in concealed locations and satin chromium finish in exposed locations.

B. Concealed Joint Fasteners: Threaded Steel.

2.7 ACCESSORIES

A. Lumber for Shimming, Blocking, and Reveals: Softwood lumber of Pine species.

B. Plastic Edge Trim: Extruded convex or flat shaped; smooth finish; self locking serrated tongue; of width to match component thickness; color as selected by Architect.

C. Aluminum Edge Trim: Extruded convex or flat shape; smooth surface finish; self locking serrated tongue; of width to match component thickness; natural mill, clear anodized, or bronze anodized finish as selected by Architect.

D. Glass: Type as indicated on Drawings and as specified in Section 08800.

E. Primer: Alkyd primer sealer type.

F. Wood Filler: Solvent or oil base, tinted to match surface finish color.

2.8 CASINGS, MOLDINGS, AND TRIM

A. Millwork items: Styles, sizes, and types as indicated on the Drawings, manufactured by Forester, Inc., Windsor One, or Brockway-Smith Company.

2.9 WOOD TREATMENT

A. Wood Preservative by Pressure Treatment: AWPA Treatment P5 using water borne preservative with 0.25 percent retainage.

B. Wood Preservative by Pressure Treatment: Cellon type; clear color; manufactured by Koppers Company, Inc.

C. Water Repellant Preservative Treatment by Dipping Method: NWWDA I.S.4, with 0.25 percent retainage.

D. Wood Preservative (Surface Application): Clear and colored as applicable, Cuprinol Clear No. 20 and Green manufactured by Sherwin Williams.

E. Shop pressure treat treatment to wood materials requiring fire rating and preservatives to concealed wood blocking.

F. Provide identification on fire retardant treated material.

G. Deliver fire retardant treated materials cut to required sizes. Minimize field cutting.

H. Redry or kiln dry wood after pressure treatment to maximum 11 percent moisture content.

2.10 HARDWARE

SEE DOOR HARDWARE SCHEDULE

2.11 FABRICATION

A. Fabricate to AWI Custom standards.

B. Shop assemble work for delivery to site, permitting passage through building openings.

C. Fit exposed sheet material edges with 1/4 inch (6 mm) matching hardwood, matching veneer, plastic or aluminum edging as indicated on Drawings. Use one piece for full length only.

D. Cap exposed plastic laminate finish edges with material of same finish and pattern.

E. Shop prepare and identify components for book match grain matching during site erection.

F. When necessary to cut and fit on site, provide materials with ample allowance for cutting. Provide trim for scribing and site cutting.

G. Apply plastic laminate finish in full uninterrupted sheets consistent with manufactured sizes. Fit corners and joints hairline; secure with concealed fasteners. Slightly bevel arises. Locate counter butt joints minimum 2 feet (600 mm) from sink cut-outs.

2.12 SHOP FINISHING

A. Sand work smooth and set exposed nails and screws.

B. Apply wood filler in exposed nail indentations and plug exposed screw indentations.

C. On items to receive transparent finishes, use wood filler which matches surrounding surfaces and of types recommended for applied finishes.

D. Shop finish work in accordance with AWI Factory Finishing Section 1500, or as indicated on Drawings.

E. Transparent Finish: AWI System Number TR-6, catalyzed polyurethane; Custom.

F. Opaque Finish: AWI System Number OP-6, catalyzed polyurethane; Custom.

G. Seal internal surfaces and semi-concealed surfaces. Brush apply only.

H. Prime paint or seal surfaces in contact with cementitious materials.

3 PART 3 EXECUTION

3.1 EXAMINATION

A. Section 01000 – Basic Requirements: Verification of existing conditions before starting work.

B. Verify adequacy of backing and support framing.

C. Verify mechanical, electrical, and building items affecting work of this section are placed and ready to receive this work.

3.2 INSTALLATION

A. Install work in accordance with AWI Custom quality standard.

B. Set and secure materials and components in place, plumb and level.

C. Carefully scribe work abutting other components, with maximum gaps of 1/32 inch (1 mm). Do not use additional overlay trim to conceal larger gaps.

D. Install components, trim and moldings with nails, screws, bolts with blind fasteners and wall adhesive by gun application, as indicated on drawings or directed.

E. Install hardware supplied by Section 087100 in accordance with manufacturer's instructions.

3.3 SITE APPLIED WOOD TREATMENT

A. Apply preservative treatment in accordance with manufacturer's instructions.

B. Brush apply two coats of preservative treatment on wood in contact with cementitious materials, roofing and related metal flashings, and wet materials. Treat site-sawn cuts.

C. Allow preservative to dry prior to erecting members.

3.4 PREPARATION FOR SITE FINISHING

A. Set exposed fasteners. Apply wood filler in exposed fastener indentations. Sand work smooth.

B. Site Finishing: Refer to Section 09910.

C. Before installation, prime paint surfaces of items or assemblies to be in contact with cementitious materials.

3.5 ERECTION TOLERANCES

A. Maximum Variation from True Position: 1/16 inch (1.5 mm).

B. Maximum Offset from True Alignment with Abutting Materials: 1/32 inch (0.7 mm).

END OF SECTION

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SECTION 06640

FRP WALL PANELS, WAINSCOT

1 PART 1 GENERAL

1.1 SUMMARY

A. Section Includes:

1. FRP bathroom wall wainscot panels and trim channels.

B. Related Requirements:

1. Section 06200 – Finish Carpentry.

1.2 REFERENCES

A. Reference Standards: In addition to requirements, comply with applicable provisions of following for design, materials, fabrication, and installation of component parts:

1. ANSI / NEMA LD-3: High Pressure Decorative Laminates.

2. ASTM E84 - Standard Test Method for Surface Burning Characteristics of Building Materials.

3. ASTM E84 - Standard Test Method for Surface Burning Characteristics of Building Materials

4. Class 1 / A Fire-rated (ASTM E-84).

5. SEFA 8.1 approved.

2. ASTM G 22 Bacterial Growth Resistance.

3. ASTM E 162: Standard Test Method for Surface Flammability of Materials Using a Radiant Heat Energy Source.

4. NFPA 101: Life Safety Code.

5. Architectural Woodwork Quality Standards.

1.3 PREINSTALLATION MEETINGS

A. Preinstallation Conference: Conduct conference at Project site.

1.4 SUBMITTALS FOR REVIEW

A. Section 01000 – Basic Requirements: Procedures for submittals.

B. Product Data:

1. Provide instructions for attachment hardware, finish hardware, and accessories.

C. Shop Drawings: Each installation.

1. Anchorages to other construction, including requirements for concealed supports.

2. Use same unit designations used on Drawings.

D. Verification Samples: Not less than 5 by 7 inches (127 by 177.8 mm) for each type, color, pattern, and surface finish. Provide actual color samples. Electronic color samples will not be accepted.

1.5 INFORMATIONAL SUBMITTALS

A. Qualification Data: For fabricator and installer.

B. Product Certificates: For the following:

1. FRP Wall Panels.

C. Evaluation Reports: For fire-retardant-treated materials, from ICC-ES.

1.6 CLOSEOUT SUBMITTALS

A. Maintenance Data: Manufacturer’s written maintenance instructions.

B. Manufacturer warranties transferrable to Owner.

1.7 QUALITY ASSURANCE

A. Installer Qualifications: Company specializing in fabricating and installing decorative plastic laminate finished work with a minimum 3 years experience.

B. Fabricator Qualifications: Shop that employs skilled workers who custom fabricate products similar to those required for this Project and whose products have a record of successful in-service performance with a minimum 3 years experience.

C. Acceptable mock-ups may remain as part of the Work if undamaged at time of Substantial Completion.

D. Acceptable mock-ups shall be comparison standard for remaining Work.

1.8 DELIVERY, STORAGE, AND PROTECTION

A. Section 01000 – Basic Requirements: Transport, handle, store, and protect products.

B. Package and ready materials according to manufacturer's instructions.

C. Store products inside building protected from light, heat, and moisture and never store in contact with floor or outside wall surfaces. Do not expose to continuous direct sunlight.

1. Store panels on flat, dry surface in the area where they'll be installed. Never store panels directly on the floor or concrete.

2. Sheets must be handled by two people.

3. Stored at a temperature per Formica Corporation technical guide requirements – 65° - 75° F and 35% - 50% humidity. The area must be environmentally controlled with permanent HVAC system operational.

D. Provide protective coverings of suitable material. Take special precautions at corners.

1.9 PROJECT CONDITIONS

A. Section 010001 – Basic Requirements.

B. Coordinate sizes and locations of cut-outs and other related Work specified in other Sections to ensure that interior laminate construction can be supported and installed as indicated.

2 PART 2 PRODUCTS

2.1 PERFORMANCE REQUIREMENTS

A. Fire-Test-Response Characteristics: Provide decorative protection panels with the following surface burning characteristics as determined by testing identical products per ASTM E 84 by UL or another testing and inspecting agency acceptable to authorities having jurisdiction:

1. Flame-Spread Index: 25 or less.

2. Smoke-Developed Index: 450 or less.

B. Source Limitations: Obtain decorative protection panels materials through one source from a single manufacturer.

2.2 MANUFACTURER

A. Basis of Design: Marlite.

B. FRP Wainscott

1. Description: Decorative protection panels.

   a. Impact resistant panels.

2. Panel Core Material: Treated fiberglass core. Class A Fire-Rated. Homegenous, impact resistant wall panel consisting of fiberglass, calcium carbonate, and resin.

3. Laminate Grade:

   a. Grade H1, 0.0677 inches – 0.0827 inches (1.72mm – 2.1mm).

4. Laminate Color:

   a. As selected by Architect from manufacturer’s line of standard textured colors.

5. Laminate Finish: textured.

6. Laminate Application(s): Wainscots.

2.3 ACCESSORY MATERIALS

A. PVC trim and mouldings at top, bottom, ends, and panel joints. Seal all joints.

1. Stainless steel fasteners required.

B. Profile Types:

a. Inside corners.

b. Outside corners.

c. Division bars.

d. End caps.

C. Colors. Finish, and Patterns: to match panels.

a. Substrate: Only standard white board drywall is acceptable. Minimum level 3 finished, non-painted drywall. Painted or primed finished drywall must be sanded prior to installation, as noted in the installation guide.

b. Adhesives:

1. Bonding Laminate: GE Supreme Silicone Clear Adhesive (Window & Door or Kitchen & Bath) or Franklin Advanced Polymer adhesive recommended. See Formica technical guide for recommended adhesive application method.

c. Seam Filler:

1. Color Coordinated Seam Filler: 100% silicone caulk material by Color-Rite Incorporated recommended.

2.4 FABRICATION

A. Conform to manufacturer's written practices, procedures, conditions including preconditioning, acclimation, material recommendations, machining, equipment, and workmanship.

B. Router base should be clean and free of burrs and debris. Circular saws should be clean, flat, and free of burrs.

3 PART 3 EXECUTION

3.1 INSTALLATION

A. Section 01000 – Basic Requirements: Verification of existing conditions before starting work.

B. General: Install decorative protection panels in accordance with manufacturer's installation instructions, approved submittals.

C. Provide templates and rough-in measurements.

D. Accessory Materials: Install in accordance with manufacturer's written installation instructions.

3.2 CLEANING AND PROTECTING

A. Cleaning:

1. Clean decorative protection panels and aluminum trims in accordance with manufacturer's instructions.

B. Protection:

1. Do not permit construction near unprotected surfaces.

END OF SECTION

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DIVISION 7

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SECTION 07212

BOARD INSULATION

1 PART 1 GENERAL

1.1 SECTION INCLUDES

A. Board insulation at perimeter foundation wall, and underside of floor slabs.

B. Interior side of exterior furred walls behind gypsum board wall finish.

C. Roof deck below membrane roofing system.

1.2 RELATED SECTIONS

A. Section 06111 - Framing and Sheathing.

B. Section 07532 – Single Ply Roofing-Fully Adhered: Rigid insulation at roof system.

1.3 REFERENCES

A. ASTM C208 - Insulating Board (Cellulosic Fiber), Structural and Decorative.

B. ASTM C578 - Preformed, Cellular Polystyrene Thermal Insulation.

C. ASTM D2842 - Water Absorption of Rigid Cellular Plastics.

D. ASTM E84 - Test Method for Surface Burning Characteristics of Building Materials.

E. ASTM E96 - Test Methods for Water Vapor Transmission of Materials.

F. NFPA 255 - Test of Surface Burning Characteristics of Building Materials.

G. UL 723 - Tests for Surface Burning Characteristics of Building Materials.

1.4 SYSTEM DESCRIPTION

A. Materials of this section: Provide continuity of thermal barrier at building enclosure elements in conjunction with thermal insulating materials in Section 07213.

1.5 SUBMITTALS

A. Submit under provisions of Section 01000.

B. Product Data: Provide data on product characteristics, performance criteria, and limitations.

C. Manufacturer's Installation Instructions: Indicate special environmental conditions required for installation, installation techniques, and special precautions.

D. Manufacturer's Certificate: Certify that products meet or exceed specified requirements.

1.6 ENVIRONMENTAL REQUIREMENTS

A. Do not install adhesives when temperature or weather conditions are detrimental to successful installation.

1.7 COORDINATION

A. Coordinate the work under provisions of Section 01000.

B. Coordinate the work with Sections 03300, 04200, and 32000.

2 PART 2 PRODUCTS

2.1 MANUFACTURERS INSULATION MATERIALS

A. Dow Chemical Company.

B. Owens Corning Company.

C. Tenneco Building Products.

D. Johns Manville.

E. Substitutions: Under provisions of Section 01000.

2.2 INSULATION MATERIALS

A. Extruded Polystyrene Insulation: ASTM C578 Type IV; cellular type, Foamular manufactured by Owens-Corning Company; conforming to the following:

1. Board Density: 1.6 lb/cu ft (26 kg/cu m).
2. Board Size: 16 x 96 inch (400 x 2400 mm) or 24 x 96 inch (600 x 2400 mm) as applicable.
3. Board Thickness: 2 inches (50 mm) or as indicated on Drawings.
4. Thermal Resistance: R of 5.0 (RSI of 0.87).
5. Water Absorption: In accordance with ASTM D2842 0.1 percent by volume maximum.
6. Compressive Strength: Minimum 25 psi (175 kPa).
7. Board Edges: Square, shiplap, or Tongue and groove edges as indicated on Drawings.
8. Flame/Smoke Properties: 5/175 in accordance with ASTM E84 and UL 723.

2.3 ADHESIVES

A. Adhesive: Type recommended by insulation manufacturer for application.

2.4 ACCESSORIES

A. Tape: Polyethylene self-adhering type, mesh reinforced, 2 inch (50mm) wide.

3 PART 3 EXECUTION

3.1 EXAMINATION

A. Verify site conditions under provisions of Section 01000.

B. Verify that substrate, adjacent materials, and insulation boards are dry and ready to receive insulation and adhesive.

C. Verify substrate surface is flat, free of honeycomb, fins, irregularities, materials, or substances that may impede adhesive bond.

3.2 INSTALLATION

A. Install on roof deck. Fasten per manufacturer’s requirements to resist uplift. Fit insulation tightly to adjacent surfaces and wood blocking.

3.3 PROTECTION OF FINISHED WORK

A. Protect finished Work under provisions of Section 01000.

B. Do not permit work to be damaged prior to covering insulation.

END OF SECTION

SECTION 07213

BATT INSULATION

1 PART 1 GENERAL

1.1 SECTION INCLUDES

A. Batt insulation with vapor barrier in exterior wall, ceiling and roof construction.

B. Batt insulation for filling perimeter window and door shim spaces crevices in exterior wall and roof.

C. Batt insulation for sound attenuation.

1.2 RELATED SECTIONS

A. Section 06100 - Rough Carpentry.

B. Section 06193 - Plate Connected Wood Trusses.

C. Section 09260 - Gypsum Board Systems.

D. Section 07212 - Board Insulation.

E. Section 09511 - Suspended Acoustical Ceilings.

1.3 REFERENCES

A. FS HH-I-521 - Insulation Blankets, Thermal, (Mineral Fiber for Ambient Temperatures).

B. FS HH-I-1252 - Insulation Thermal, Reflective (Aluminum Foil).

1.4 PERFORMANCE REQUIREMENTS

A. Materials of this Section shall provide a thermal and vapor and air barrier at building enclosure elements.

1. Attic: R-38
2. Walls: R-20

1.5 SUBMITTALS

A. Submit product data indicating characteristics and performance criteria under provisions of Section 01300.

B. Submit manufacturer's installation instructions under provisions of Section 01300.

C. Manufacturer's Certificate: Certify that products meet or exceed specified requirements.

2 PART 2 PRODUCTS

2.1 ACCEPTABLE MANUFACTURERS

A. Manville Corporation.

B. Owens-Corning Fiberglass Corporation.

C. Certainteed Corporation.

D. Substitutions: Under provisions of Section 01600.

2.2 MATERIALS

A. Batt Insulation: FS HH-I521; preformed glass fiber batt and roll; Type I - without membranes and Type III- with reflective covering one side.

B. Reflective Barrier: FS HH-I-1252, aluminum foil.

C. Nails or Staples: Steel Wire; electroplated or galvanized; type and size to suit application.

D. Tape: Bright aluminum self-adhering type; 2 inch wide.

E. Spindle Fasteners: Galvanized wire spindle on flat metal base; self-adhering backing.

F. Wire Mesh: Galvanized steel, hexagonal wire mesh.

3 PART 3 EXECUTION

3.1 EXAMINATION

A. Verify site conditions under provisions of Section 01039.

B. Verify substrate, insulation and adjacent materials are dry and ready to receive installation.

C. Verify mechanical and electrical services within walls have been installed and tested.

3.2 INSTALLATION

A. Install batt and blanket insulation in accordance with manufacturer's instructions.

B. Install batt and blanket insulation, in exterior walls, roof and ceiling spaces without gaps or voids.

C. Trim insulation neatly to fit spaces. Use batts free of damage.

D. Fit insulation tight in spaces and tight to exterior side of mechanical and electrical services within the plane of insulation. Leave no gaps or voids.

E. Install insulation with factory applied membrane facing warm side of building spaces. Lap ends and side flanges of membrane over framing members. Staple or nail in place at maximum 6 inches o.c. Tape in place. Retain in place with spindle fasteners. Tape seal butt ends and lapped side flanges. Tape seal tears or cuts in membrane.

3.3 SCHEDULE

A. Install Batt and Blanket insulation to thickness, R-value and type at locations indicated herein and on the Drawings.

END OF SECTION

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SECTION 07311

ASPHALT SHINGLES

1 PART 1 GENERAL

1.1 SECTION INCLUDES

A. Granular surfaced asphalt shingle roofing.

B. Ice dam protection, moisture shedding underlayment, eave, valley, and ridge protection.

C. Associated metal flashings and accessories.

1.2 RELATED SECTIONS

A. Section 06111 – Framing and Sheathing: Roof sheathing and framed openings.

B. Section 07532 – Single Ply Roofing-Fully Adhered.

C. Section 07610 – Custom Sheet Metal Roofing.

D. Section 07712 – Gutters and Downspouts.

E. Section 07920 – Joint Sealers.

1.3 REFERENCES

A. ASTM B209/B209M – Aluminum and Aluminum Alloy Sheet and Plate.

B. ASTM D225 – Asphalt Shingles Surfaced with Mineral Granules.

C. ASTM D226 – Asphalt Saturated Organic Felt Used in Roofing and Waterproofing.

D. ASTM D228 – Testing Asphalt Roll Roofing, Cap Sheets and Shingles.

E. ASTM D1970 – Self-Adhering Polymer Modified Bituminous Sheet Materials Used as Steep Roofing Underlayment for Ice Dam Protection.

F. ASTM D6380 – Asphalt Roll Roofing (Organic Felt).

G. ASTM D2178 – Asphalt Glass (Felt) Used in Roofing and Waterproofing.

H. ASTM D2822 – Asphalt Roof Cement.

I. ASTM D3018 – Class A Asphalt Shingles Surfaced with Mineral Granules.

J. ASTM D3161 – Standard Test Method for Wind-Resistance of Asphalt Shingles (Fan-Induced Method).

K. ASTM D3462 – Asphalt Shingles Made from Glass Felt and Surfaced with Mineral Granules.

L. ASTM D4586 – Asphalt Roof Cement, Asbestos Free.

M. NRCA – Steep Roofing Manual.

N. UL 580 – Tests for Wind Uplift Resistance of Roof Assemblies.

O. UL 790 – Tests for Fire Resistance of Roof Covering Materials.

P. UL 2390/ASTM D6381 – Test Method for Wind Resistant Shingles with Sealed Tabs.

Q. ASTM D228 – Testing Asphalt Roll Roofing, Cap Sheets, and Shingles.

R. ASTM D1970 – Self-Adhering Polymer Modified Bituminous Sheet Materials Used as Steep Roofing Underlayment for Ice Dam Protection.

1.4 SUBMITTALS FOR REVIEW

A. Section 01000 – Basic Requirements: Procedures for submittals.

B. Product Data: Provide data indicating material characteristics, performance criteria, and limitations for the following:

1. Shingles and underlayment materials.
2. Ridge, peak, flashing and soffit vents.
3. Metal flashings.
4. Snow guards.

C. Samples: Submit two samples indicating color range and finish texture/pattern for color selection. Color and finish to match existing.

1.5 SUBMITTALS FOR INFORMATION

A. Section 01000 – Basic Requirements: Procedures for submittals.

B. Manufacturer's Instructions: Indicate installation criteria and procedures.

C. Manufacturer's Certificate: Certify that Products meet or exceed specified requirements.

1.6 QUALITY ASSURANCE

A. Perform Work in accordance with NRCA Steep Roofing Manual.

1.7 REGULATORY REQUIREMENTS

A. Conform to applicable code for ASTM D3018 Class A and UL 580 wind uplift for shingle types specified.

1.8 ENVIRONMENTAL REQUIREMENTS

A. Section 01000 – Basic Requirements: Environmental conditions affecting products on site.

B. Do not install eave edge protection and shingles when surface, ambient air, or wind chill temperatures are below 45 degrees F (7 degrees C).

1.9 EXTRA MATERIALS

A. Section 01000 – Basic Requirements.

B. Provide 100 sq ft (10 sq m) of extra shingles of each color selected.

1.10 WARRANTY

A. Provide manufacturer's 40 year warranty under provisions of Section 010001.

B. Warranty Supplement: Provide manufacturer's supplemental warranty (CertainTeed SureStart or SureStart Plus) to cover labor and materials in the event of a material defect for the following period after completion of application of shingles:

1. First five years.

C. Warranty Transferability Clause: Make available to Owner shingle manufacturer's standard option for transferring warranty to a new Owner.

2 PART 2 PRODUCTS

2.1 ASPHALT SHINGLES

A. Manufacturers:

1. Certainteed, P.O. Box 860 Valley Forge, PA, 19482. 800-233-8990

2. GAF

3. Owens Corning

B. Asphalt Shingles: ASTM D3462, ASTM D3018 Type I – Self-Sealing; ASTM D3161-03b Class F Wind Resistance (110-MPH); ASTM D3161-99a 110-mph Wind Resistance; UL997 Wind Resistance UL 2390/ASTM D6380 Class H and ASTM D7158 Class H Wind Resistance, and UL Class A Fire Resistance; heavy-duty glass fiver mat base; ceramically colored/UV resistant mineral surface granules across entire face of shingle; 235 lb / 100 sq feet (11.5 kg/sq m) weight; four-tab type, algae-resistant; dual self-sealing sealant strips; designed to resist blowing off in high wind conditions up to 110 mph; color as selected by the Architect.

C. Dual Layer Shingle – basis of design Certainteed Landmark Pro or Approved Equal

2.2 ACCESSORIES

A. Nails: Standard round wire shingle type with large head, hot dipped zinc coated steel type, of sufficient length to penetrate minimum 3/4 inch (19 mm) into roof sheathing.

B. Plastic Cement: ASTM D2822, Asphalt type with mineral fiber components, free of toxic solvents, capable of setting within 24 hours at temperatures of 75 degrees F (24 degrees C) and 50 percent RH.

C. Lap Cement: Fibrated cutback asphalt type, recommended for use in application of underlayment, free of toxic solvents.

D. Ridge Vents: Plastic, extruded or formed with vent openings that do not permit direct water or weather entry; flanged to receive shingles; Shinglevent II style manufactured by CertainTeed Corporation.

E. Snow Guards: Copper; Loop the Loop Snow Guard manufactured by Berger Building Products.

2.3 FLASHING MATERIALS

A. Sheet Flashings and Trim: ASTM B209/B209M; 0.03 inch (0.76 mm) thick aluminum; precoating of PVC, color as selected.

B. Nails: Standard round wire roofing type, hot dipped zinc coated steel; of sufficient length to penetrate minimum 1/2 inch (13 mm) into wood substrate.

3 PART 3 EXECUTION

3.1 EXAMINATION

A. Section 01000 – Basic Requirements: Verification of existing conditions prior to beginning work.

B. Verify that roof penetrations and plumbing stacks are in place and flashed to deck surface.

C. Verify roof openings are correctly framed.

D. Verify deck surfaces are dry, free of ridges, warps, or voids.

3.2 PREPARATION

A. Fill knot holes and surface cracks with latex filler at areas of bonded eave protection.

B. Broom clean deck surfaces under eave protection and underlayment.

3.3 INSTALLATION - EAVE (ICE DAM) PROTECTION

A. Place eave edge and gable edge metal flashings tight with fascia boards. Weather lap joints 2 inches (50 mm) and seal with plastic cement. Secure flange with nails spaced 12 inches (300mm) oc.

B. Apply rubberized asphalt/polyethylene sheet eave protection in accordance with manufacturer’s instructions.

C. Apply lap cement at rate of approximately 1-1/4 gal/100sq ft (0.5 L/sq m) over underlayment starter strip.

D. Starting from lower edge of starter strip, lay additional 36 inch (900mm) wide strips of underlayment in lap cement, to produce a two-ply membrane. Weather lap plies minimum 19 inches (475 mm) and nail in place. Lap ends minimum 6 inches (150 mm). Stagger end joints of each consecutive ply.

E. Extend eave protection membrane minimum 3 ft. (900mm) up-slope beyond interior face of exterior wall.

3.4 INSTALLATION - PROTECTIVE UNDERLAYMENT

A. Place one ply of underlayment over area not protected by eave protection, with ends and edges weather lapped minimum 6 inches (150mm). Stagger end laps of each consecutive layer. Nail in place.

B. When less than 4:12 roof slope, place a second ply of underlayment over first layer with ends and edges weather lapped minimum 6 inches (150mm). Stagger end laps of each consecutive layer. Nail in place.

C. Install protective underlayment perpendicular to slope of roof and weather lap minimum four (4) inches (100mm) over eave protection.

D. Weather lap and seal watertight with plastic cement items projecting through or mounted on roof.

3.5 INSTALLATION – VALLEY PROTECTION

A. Sheet Rubberized Asphalt: Place rubberized asphalt/polyethylene sheet, minimum 36 inches (900mm) wide as valley protection in accordance with manufacturer’s instructions.

3.6 INSTALLTION – METAL FLASHING AND ACCESSORIES

A. Weather lap joint minimum 2 inches (50mm) and seal weather tight with plastic cement.

B. Secure in place with nails at 12 inches (300mm) oc. Conceal flashings.

C. Flash and seal work weather tight, projecting through or mounted on roofing with plastic cement.

3.7 INSTALLATION – ASPHALT SHINGLES

A. Install shingles in accordance with manufacturer’s instructions.

B. Place shingles in straight coursing pattern with 5 inch (125mm) weather exposure to produce double thickness over full roof area. Provide double course of shingles at eaves.

C. Project first course of shingles ¾ inch (19mm) beyond fascia boards.

D. Extend shingles ½ inch (13mm) beyond face of gable edge fascia boards.

E. Closed Cut Valley: Extend shingles on one slope across valley and fasten. Trim shingles from other slope 2 inches (50mm) from valley center line to achieve closed cut valley, concealing the valley protection.

F. Cap hips and ridges with individual shingles, maintaining 5 inch (125mm) weather exposure. Place to avoid exposed nails.

G. Install snow guards to pattern and quantity in accordance with manufacturer's instructions, or as indicated on the Drawings.

H. After installation, place one daub of plastic cement, one inch (25mm) diameter under each individual shingle tab exposed to weather, to prevent lifting.

I. Coordinate installation of roof mounted components or work projected through roof with weather tight placement of counter flashings.

J. Complete installation to provide weather tight service.

3.8 PROTECTION OF FINISHED WORK

A. Section 01000 – Basic Requirements: Protecting installed work.

B. Do not permit traffic over finished roof surface.

END OF SECTION

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SECTION 07462

EXTERIOR SIDING

1 PART 1 GENERAL

1.1 SUMMARY

A. Section includes

1. Fiber Cement Lap Siding – Smooth Surface
2. Fiber Cement Panels – Smooth Surface

1.2 RELATED SECTIONS

A. Section 06100 – Framing and Sheathing

B. Section 06200 – Finish Carpentry

C. Section 07620 – Metal Fabrications and Flashing

D. Section 09910 – Painting

1.3 REFERENCES

A. AS D3359 – Standard Test Method for Measuring Adhesion by Tape Test, Tool and Tape.

B. AS E136 – Standard Test Method for Behavior of Materials in a Vertical Tube Furnace at 750 degrees C.

1.4 SUBMITTALS FOR REVIEW

A. Submit under provisions of Section 01300.

B. Product Data: Manufacturer’s data sheets on each product to be used, including:

1. Preparation instructions and recommendations.
2. Storage and handling requirements and recommendations.
3. Installation methods.

C. Shop Drawings: Provide detailed drawings of atypical non-standard applications of cementitious siding materials which are outside the scope of the standard details and specifications provided by the manufacturer.

D. Selection Samples: For each finish product specified, two complete sets of color chips representing manufacturer's full range of available colors and patterns.

E. Verification Samples: For each finish product specified, two samples, minimum size 4 by 6 inches (100 by 150mm), representing actual product, color, and patterns.

1.5 QUALITY ASSURANCE

A. Installer Qualifications: Minimum of 2 year's experience with installation of similar products.

1.6 DELIVERY, STORAGE, AND HANDLING

A. Store products in manufacturer's unopened packaging until ready for installation.

B. Store siding on edge or lay flat on a smooth level surface. Protect edges and corners from chipping. Store sheets under cover and keep dry prior to installing.

C. Store and dispose of solvent-based materials, and materials used with solvent-based materials, in accordance with requirements of local authorities having jurisdiction.

1.7 PROJECT CONDITIONS

A. Maintain environmental conditions (temperature, humidity, and ventilation) within limits recommended by manufacturer for optimum results. Do not install products under environmental conditions outside manufacturer's absolute limits.

1.8 WARRANTY

A. 30 year, non-prorated warranty on siding material.

2 PART 2 PRODUCTS

2.1 MANUFACTURERS

A. Acceptable Manufacturer: James Hardie Building Products, Inc. which is located at: 26300 La Alameda Suite 400; Mission Viejo, CA. 92691; Web: www.jameshardiepros.com or approved equal. Provide samples, specification and warranty for review.

2.2 SIDING AND TRIM

A.
1. Fiber-cement siding – complies with ASTM C 1186 Type A Grade II.
2. Fiber-cement siding – complies with ASTM E 136 as a noncombustible material.
3. Fiber-cement siding – complies with ASTM E 84 Flame Spread Index = 0, Smoke Developed Index = 5
4. CAL-FIRE, Fire Engineering Division Building Materials Listing – Wildland Urban Interface (WUI) Listed Product.
5. ICC-ES evaluation reports ESR-2290, ESR-1844, ESR-2273 (IBC, IRC, CBC, CRC)
6. City of Los Angeles, Research Report No. 24862.
7. Miami Dade County – Notice of Acceptance – 15-0122.04.
8. US Department of Housing and Urban Development Materials Release – 1263f.
9. California DSA PA-019.
10. City of New York M EA 223-93-M.
11. Florida State Product Approval FL13192, FL13223, and FL 13265.
12. Texas Department of Insurance Product Evaluation EC-23.

B. Lap Siding to be smooth finish, 5 ¼” (5” exposure) – factory primed, field painted.

C. Stainless steel fasteners in compliance with manufacturer’s requirement for size and spacing.

3 PART 3 EXECUTION

3.1 EXAMINATION

A. Do not begin installation until substrates have been properly prepared.

B. If framing preparation is the responsibility of another installer, notify Architect of unsatisfactory preparation before proceeding.

3.2 PREPARATION

A. Clean surfaces thoroughly prior to installation.

B. Prepare surfaces using the methods recommended by the manufacturer for achieving the best result for the substrate under the project conditions.

C. Install a water-resistive barrier required in accordance with local building code requirements.

D. The water-resistive barrier is required in accordance with penetration and junction flashing in accordance with local building code requirements.

E. Install Engineered for Climate HardieWrap weather barrier in accordance with local building code requirements.

F. Use Seam Tape and joint and laps.

G. Install flashing.

3.3 INSTALLATION

A. Install materials in strict accordance with manufacturer’s installation instructions.

B. Starting: Install a minimum ¼ inch (6mm) thick lath starter strip at the bottom course of the wall. Apply planks horizontally with minimum 1-1/4 inches (32mm) wide laps at the top. The bottom edge of the first plank overlaps the starter strip.

C. Allow minimum vertical clearance between the edge of siding and any other material in strict accordance with the manufacturer’s installation instructions.

D. Align vertical joints of the planks over framing members.

E. Butt joints must not fall within 4 inches (102 mm) of a stud. Do not nail within 2 inches (51mm) of the end of planks.

F. Maintain clearance between siding and adjacent finished grade.

G. Locate splices at least one stud cavity away from window and door openings.

H. For proper fastener selection and fastening schedules for various wind load requirements and framing options, refer to the Technical Data Sheet at www.aspyredesign.com.

3.4 INSTALLATION - TRIM

A. Install materials in strict accordance with manufacturer's installation instructions. Install flashing around all wall openings.

B. Fasten through trim into structural framing or code complying sheathing. Fasteners must penetrate minimum ¾ inch (19mm) or full thickness of sheathing. Additional fasteners may be required to ensure adequate security.

C. Place fasteners no closer than ¾ inch (19mm) and no further than 2 inches (51mm) from side edge of trim board and no closer than 1 inch (25mm) from end. Fasten maximum 16 inches (406mm) on center.

D. Maintain clearance between trim and adjacent finished grade.

E. Trim inside corner with a single board trim both side of corner.

F. Outside Corner Board Attach Trim on both sides of corner with 16 gauge corrosion resistant finish nail ½ inch (13mm) from edge spaced 16 inches (406mm) apart, weather cut each end spaced minimum 12 inches (305mm) apart.

G. Allow 1/8 inch gap between trim and siding.

H. Seal gap with high quality, paintable caulk.

I. Shim frieze board as required to align with corner trim.

J. Fasten through overlapping boards. Do not nail between lap joints.

K. Overlap siding with single board of outside corner board then align second corner board to outside edge of first corner board. Do not fasten HardieTrim boards to HardieTrim boards.

L. Shim frieze board as required to align with corner trim.

M. Install HardieTrim Fascia boards to rafter tails or to sub fascia.

3.5 FINISHING

A. Finish factory primed siding with a minimum of 2 (two) coats of high-quality 100 percent acrylic or latex or oil based exterior grade paint within 180 days of installation. Follow paint manufacturer's written product recommendation and written application instructions.

3.6 PROTECTION

A. Protect installed products until completion of project.

B. Touch-up, repair or replace damaged products before Substantial Completion.

END OF SECTION

SECTION 07532

SINGLE PLY ROOFING – FULLY ADHERED

1 PART 1 GENERAL

1.1 SECTION INCLUDES

A. Rigid insulation over wood deck surface.

B. Cricket and saddle insulation.

C. Overlayment board. Class A fire rating.

D. Fleece backed PVC membrane roofing, base flashings roofing membrane expansion joints, crickets, counter flashings, and roof edge termination.

1.2 RELATED SECTIONS

A. Section 06111 – Framing and Sheathing: Roof deck substrate and wood nailers, and wood deck.

B. Section 07311 – Asphalt Shingles.

C. Section 07712 – Gutters and Downspouts.

1.3 REFERENCES

A. ASTM C79 – Gypsum Sheathing Board.

B. ASTM C177 – Test Method for Steady State Thermal Transmission Properties by Means of the Guarded Hot Plate.

C. ASTM C1013 – Standard Specification for Membrane Faced Rigid Cellular Polyurethane Roof Insulation.

D. ASTM D412 – Rubber Properties in Tension.

E. ASTM D471 – Standard Test Method for Rubber Property Effect of Liquids.

F. ASTM D624 – Rubber Property Tear Resistance.

G. ASTM D746 – Brittleness Temperature of Plastics and Elastomeric by Impact.

H. ASTM D822 – Practice for Operating Light and Water Exposure Apparatus (Carbon Arc) Type or Testing Paint, Varnish, Lacquer, and Related Products.

I. ASTM D1004 – Initial Tear Resistance of Plastic Film and Sheeting.

J. ASTM E96 – Water Vapor Transmission of Materials.

K. FM 4470 – (Factory Mutual Engineering Corporation) Roof Assembly Classifications.

L. NRCA – (National Roofing Contractors Association) Roofing and Waterproofing Manual.

M. UL 790 – Fire Hazard Classifications.

1.4 SYSTEM DESCRIPTION

A. Fully adhered fleece backed PVC membrane roofing system 115 mil. polyester reinforced (type 2) over Dens-deck primed substrate board, 1/2" thick. System to achieve a class 'A' fire rating.

1.5 SUBMITTALS FOR REVIEW

A. Section 01000 – Basic Requirements: Procedures for submittals.

B. Product Data: Provide characteristics on membrane materials, flashing materials, insulation, sheathing, overlayment board, adhesives, and fasteners.

C. Shop Drawings: Indicate setting plan for crickets and saddles insulation, joint or termination detail conditions, and conditions of interface with other materials.

D. Samples: Submit two 6 x 6 inch (15 x 15 cm) in size illustrating insulation, sheathing, overlayment board, and membrane.

1.6 SUBMITTALS FOR INFORMATION

A. Section 01000 – Basic Requirements: Procedures for submittals.

B. Manufacturer's Installation Instructions: Indicate special precautions required for seaming the membrane.

C. Manufacturer’s Certificate: Certify that products meet or exceed specified requirements.

D. Manufacturer’s Field Reports: Submit under provisions of Section 01000.

E. Reports: Indicate procedures followed; ambient temperatures, humidity, and wind velocity during application.

1.7 QUALITY ASSURANCE

A. Manufacturer: Company specializing in manufacturing the products specified in this section with three years documented experience.

B. Applicator: Company specializing in performing the work of this section with three years documented experience and approved by roofing system manufacturer.

C. Perform Work in accordance with NRCA Roofing and Waterproofing Manual and manufacturer’s instructions.

1.8 REGULATORY REQUIREMENTS

A. Conform to applicable code for roof assembly fire hazard requirements.

B. UL 790: Class A Fire Hazard Classification.

C. FM 4470: Roof Assembly Classification, of Class 1 Construction, wind uplift requirement of I 90, in accordance with FM Construction Bulletin 1 28.

D. FM I-44: Edge metal and perimeter blocking technical requirements per Factory Mutual Standards.

1.9 MOCK UP

A. Section 01000 – Basic Requirements: Requirements for mock up.

B. Mock up Size: 10 x 10 feet (3 x 3 m), roof membrane system and associated components including sheathing, insulation, typical base and counter flashings, and roof edge termination.

C. Locate where directed.

D. Mock up may remain as part of the Work.

1.10 PRE INSTALLATION MEETING

A. Section 01000 – Basic Requirements: Pre- installation meeting.

B. Convene one week before starting work of this section.

1.11 DELIVERY, STORAGE, AND PROTECTION

A. Section 01000 – Basic Requirements: Transport, handle, store, and protect products.

B. Store products in weather protected environment, clear of ground and moisture.

1.12 ENVIRONMENTAL REQUIREMENTS

A. Section 01000 – Basic Requirements: Environmental conditions affecting products on site.

B. Do not apply roofing membrane during inclement weather when ambient temperatures below 40 degrees F (4 degrees C) or above 95 degrees F (35 degrees C).

C. Do not apply roofing membrane to damp or frozen deck surface.

D. Do not expose materials vulnerable to water or sun damage in quantities greater than can be weatherproofed during same day.

1.13 COORDINATION

A. Coordinate work under provisions of Section 01000.

B. Coordinate the work with the installation of associated metal flashings, as the work of this section proceeds.

1.14 WARRANTY

A. Provide Warranty under provisions of Section 01000 – Basic Requirements.

B. Provide manufacturer’s 20-year Total System Warranty covering both labor and material with no dollar limitation. The maximum wind speed coverage shall be peak gusts of 80 measured at 10 meters above ground level. Certification is required with bid submittal indicating the manufacturer has reviewed and agreed to such wind coverage. Warranty to be non-prorated with no dollar cap.

C. Provide documentation of warranty reserve fund.

2 PART 2 PRODUCTS

2.1 MANUFACTURERS MEMBRANE MATERIAL

A. Carlise Syntec System, Design “A” Adhered System manufactured by Carlisle Corporation.

B. Substitutions: Under provisions of Section 010001.

2.2 MEMBRANE MATERIALS

A. PVC grey fleeceback 115-mil reinforced PVC (polyvinyl chloride) membrane. Membrane thickness over the reinforcing serim (top-ply) thickness) shall be nominal .024-mil or thicker. Membrane sheets are 10’ wide and 80’ long for 115-mil.

B. Membrane with color shall have an SRI (solar reflectance index) not less than 107 in accordance with ASTME 1980.

C. Membrane Weathering Performance: The PVC membrane shall be formulated with a minimum of 30% Elvaloy polymer to withstand:

1. ASTM D 3045: 56 days exposure @ 176˚ F and 670 hours at 240˚

2. ASTM G 155 (xenon arc): a minimum of 17,640 kj/m² resistance at 63˚ C without cracking or showing signs of material failure.

D. Seaming Materials: Heat weld all seams - see details.

2.3 ADHESIVE MATERIALS

A. All products shall be furnished by Carlisle and specifically formulated for the intended purpose.

B. Membrane and Insulation Adhesives:

1. Flexible FAST Adhesive: An elongating impact resistant two component insulating urethane adhesive used to attach insulation and FleeceBACK membrane. Packaging formats include 50- and 15-gallon drums.

a. Adhesive to provide 150% elongation in conjunction with fleece backed membrane - ASTM D412.

b. MDI content of Part A material less than 25%.

2. FAST Adhesive: A two component insulating urethane adhesive used to attach insulation and FleeceBACK membrane. Packaging formats include 50- and 15-gallon drums as well as Dual Cartridges and 5-gallon Bag in a Box formats.

C. PVC Bonding Adhesive: A high strength, synthetic rubber adhesive used for bonding Sure-Flex membrane to various surfaces. The adhesive is applied to both the membrane and the substrate at a coverage rate of approximately 45 - 50 square feet per gallon per finished surface (includes coverage on both surfaces.)

2.4 SUBSTRATE COVERING MATERIALS

A. Fire Barrier Board (Sheathing): ASTM C1177, 1/2 inch (17 mm) thick, DensDeck manufactured by Georgia Pacific Corporation.

2.5 OVERLAYMENT MATERIALS

A. Glass Mat Gypsum Recovery Board: ASTM C1177, 1/2 inch (13 mm) thick, DensDeck Primed manufactured by Georgia Pacific Corporation.

2.6 MANUFACTURERS - INSULATION MATERIALS

A. Manufacturer: Polyisocyanurate HP insulation manufactured by Carlisle Corporation.

B. Substitutions: Under provisions of Section 01000.

2.7 INSULATION MATERIALS

A. Insulation: ASTM C1013, polyisocyanurate rigid board, both faces finished with medium weight glass fiber reinforced facer, with following characteristics:

1.	Board Density	2 lb/cu ft (32 kg/cu m)
2.	Board Size	4 x 8 ft (1.2 x 2.4 m)
3.	Board Thickness	Tapered
4.	Thermal Resistivity	Minimum R Value 6.0/inch
5.	Compressive Strength	20 psi (1.4 kg/sq cm)
6.	Board Edges	Square
7.	Flame Spread	Maximum 25

B. Cricket and Saddle Insulation: Polyisocyanurate rigid board, both faces finished with medium weight fiber reinforced felt, with the following characteristics:

1.	Board Density	2 lb/cu ft (32 kg/cu m)
2.	Board Size	4 x 8 ft (1.2 x 2.4 m)
3.	Board Thickness	Tapered
4.	Thermal Resistivity	Minimum R Value of 21.6
5.	Compressive Strength	25 psi
6.	Board Edges	Square
7.	Flame Spread	Maximum 25

2.8 FLASHINGS

A. Flexible Flashings: Same material as membrane, uncured EPDM; black color; manufactured by membrane manufacturer.

B. Counterflashings: Aluminum metal as indicated on Drawings or required to complete installation.

C. Special Flashing: Termination bar by membrane manufacturer.

2.9 ACCESSORIES

A. Roofing Nails: Galvanized, hot dipped, stainless steel, or non-ferrous type, size as required to suit application.

B. Insulation Fasteners: Appropriate for purpose intended and approved by Factory Mutual and provided by system manufacturer; length required for thickness of material with metal washers.

C. Sealants: As recommended by membrane manufacturer.

D. Strip Reglet Devices: Galvanized steel; maximum possible lengths per location, with attachment flanges.

E. Stack Boots: Flexible boot and collar for pipe stacks through membrane.

3 PART 3 EXECUTION

3.1 EXAMINATION

A. Verify that surfaces and site conditions are ready to receive work.

B. Verify deck is supported and secure.

C. Verify deck is clean and smooth, free of depressions, waves, or projections, properly sloped to drains valleys, or eaves.

D. Verify deck surfaces are dry and free of snow or ice. Confirm dry deck by moisture meter with 12 percent moisture maximum.

E. Verify roof openings, curbs, pipes, sleeves, ducts, and vents through roof are solidly set, and cant strips, wood nailing strips and reglets are in place.

3.2 PREPARATION - WOOD DECK

A. Verify flatness of decking.

B. Install gypsum sheathing and insulation on deck.

C. Lay sheathing with long side at right angle to decking; stagger end joints; provide support at ends.

D. Cut sheathing cleanly and accurately at roof breaks and protrusions to provide smooth surface. Tape joints.

E. Position sheathing at full roof area.

3.3 INSULATION APPLICATION WITH MECHANICAL FASTENERS

A. Ensure substrate surface is clean and dry.

B. Mechanically fasten gypsum sheathing and insulation to deck in accordance with insulation manufacturer’s instructions.

C. Mechanically fasten sheathing, overlayment board, and insulation at full roof area using 12 fasteners with washers per insulation board. 20 fasteners per board at corners and edges or as required by manufacturer and ASCE7 for 72 mph wind speed.

D. Place the constant thickness first layer and the tapered thickness insulation second layer to the required slope pattern in accordance with manufacturer's instructions.

E. Minimum Total Insulation Thickness: As indicated on Drawings.

F. Place boards perpendicular to deck flutes with edges over flute surface for bearing support.

G. Lay boards with edges in moderate contact without forcing. Cut insulation to fit neatly to perimeter blocking and around penetrations through roof.

H. Lay tapered boards or cut boards to slope for a distance of 24 inches (600 mm) back from roof drains for positive drainage.

I. Apply no more insulation than can be covered with membrane in same day.

3.4 CRICKET AND SADDLE INSULATION APPLICATION WITH MECHANICAL FASTENERS

A. Ensure substrate surface is clean and dry.

B. Mechanically fasten cricket and saddle insulation to deck in accordance with insulation manufacturer's instructions.

3.5 MEMBRANE APPLICATION

A. Apply membrane and primer in accordance with manufacturer's instructions.

B. Apply primer and adhesive at rate as recommended by membrane manufacturer.

C. Roll out membrane, free from air pockets, wrinkles, or tears. Firmly press sheet into place without stretching.

D. Bond sheet to substrate except those areas directly over or within 3 inches (75 mm) of a control or expansion joint.

E. Overlap edges and ends and heat weld, minimum 6 inches (150 mm). Seal permanently waterproof. Apply uniform bead of sealant to joint edge.

F. Shingle joints on sloped substrate in direction of drainage.

G. Extend membrane up cant strips a minimum of 8 inches (200 mm) onto vertical surfaces.

H. Seal membrane around roof penetrations.

3.6 FLASHINGS AND ACCESSORIES

A. Apply flexible flashings to seal membrane to vertical elements.

B. Secure to nailing strips at 4 inches (100 mm) oc and reglets.

C. Fabricate roofing control and expansion joints to isolate roof into areas as indicated.

D. Coordinate installation of roof drains, sumps, gutters, scuppers and related flashings.

E. Seal flashings and flanges of items penetrating membrane. Apply sealant at edges of flashings.

F. Install walkway pads. Space pad joints to permit drainage.

3.7 FIELD QUALITY CONTROL

A. Section 01000 – Basic Requirement: Field inspection.

B. Correct identified defects or irregularities.

C. Require site attendance of roofing and insulation materials' manufacturers during installation of the Work.

3.8 CLEANING

A. Section 01000 – Basic Requirements: Cleaning installed work.

B. In areas where finished surfaces are soiled by Work of this section, consult manufacturer of surfaces for cleaning advice and conform to their documented instructions.

C. Repair or replace defaced or disfigured finishes caused by Work of this section.

3.9 PROTECTION OF FINISHED WORK

A. Section 01000 – Basic Requirements: Protecting installed work.

B. Protect building surfaces against damage from roofing work.

C. Where traffic must continue over finished roof membrane, protect surfaces.

END OF SECTION

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SECTION 07620

METAL FABRICATIONS AND FLASHING

1 PART 1 GENERAL

1.1 SECTION INCLUDES

A. Lead coated copper

1. Window and door hood flashing.

B. Aluminum

1. Concealed flashings - mill finish.
2. Step flashings - mill finish.
3. Drip edges - white finish.
4. Rake return flashing - white finish.
5. Window head flash - white.

1.2 RELATED SECTIONS

A. Section 06200 - Finish Carpentry: receive eave, rake, and other exterior trim for application of trim wrap to be provided by this section.

B. Section 07462 - Composite Siding

C. Section 07712 – Gutters and Downspouts.

D. Section 07920 - Joint Sealers.

E. Section 08111 – Metal Doors and Frames – 6 roll-up aluminum doors.

F. Section 08520 – Thermal Pane Clad Wood Window Sash and Frames

1.3 REFERENCES

A. ANSI/ASTM B32 - Solder metal.

B. ASTM B370 - Copper Sheet and Strip for Building Construction.

C. ASTM B209 - Standard Specification for Aluminum and Aluminum Alloy sheet and plate.

D. CDA (Copper Development Association) - Contemporary Copper, A Handbook of Sheet Copper Fundamentals, Design, Details and Specifications.

E. FS SS-C-153 - Cement, Bituminous, Plastic.

F. FS 0-F-506 - Flux, Soldering, Paste and Liquid.

G. FS QQ-S-571 - Solder, Tin Alloy.

H. NAAMM - Metal Finishes Handbook.

I. NRCA (National Roofing Contractors Association) - Roofing Manual.

J. SMACNA - Architectural Sheet Metal Manual, 5th edition.

1.4 QUALITY ASSURANCE

A. Applicator: Company specializing in sheet metal flashing work with documented three years minimum experience.

1.5 SUBMITTALS

A. Submit shop drawings and product data under provisions of Section 01300.

B. Describe material profile, jointing pattern, joining details, fastening methods, and installation details.

C. Submit manufacturer’s installation instructions under provisions of Section 01300.

D. Submit samples under provisions of Section 01300.

E. Provide sample of metal flashing(s) illustrating typical material and finish.

F. Provide swatches illustrating available colors.

G. Provide sample of aluminum eave and rake trim wrap assembly.

1.6 STORAGE AND HANDLING

A. Store products to protect for damage. Coordinate location with the Owner.

B. Stack preformed and prefinished material to prevent twisting, bending, or abrasion, and to provide ventilation.

C. Prevent contact with materials during storage which may cause discoloration, staining, or damage.

2 PART 2 PRODUCTS

2.1 SHEET MATERIALS

A. Aluminum Sheet: ASTM B209 alloy, 3003-H14 temper; 0.040 inch thick; smooth finish; AA-C22-A42. Factory finish: Fluoropolymer system; color: white.

B. Copper: ASTM B370; cold-rolled copper; 16 oz./sq.ft.

2.2 ACCESSORIES

A. Fasteners: Copper with soft neoprene washers at exposed fasteners. Finish exposed fasteners same as flashing metal.

B. Protective Backing Paint: Bituminous.

C. Sealant: Specified in Section 07920.

D. Bedding Compound: Rubber-asphalt type.

E. Plastic Cement: FS SS-C-153, Type I-asphaltic base cement.

F. Solder: ANSI/ASTM B32; 50/5O Type.

G. Flux: FS O-F-506.

2.3 FABRICATION / ALUMINUM

A. Form pieces in longest practical lengths.

B. Hem exposed edges on underside 1/2 inch; miter and seam corners.

C. Form material with flat or lock or cover plate seam.

D. Fabricate corners from one piece with minimum 18 inch long legs; seam for rigidity, seal with sealant.

E. Fabricate vertical faces with bottom edge formed outward 1/4 inch and hemmed to form drip.

F. Fabricate flashings to allow toe to extend over roofing as indicated. Return and brake edges.

2.4 FABRICATED/COPPER

A. Pre-tin edges of copper sheet.

B. Solder and seal metal joints; remove flux and clean solder joints.

3 PART 3 EXECUTION

3.1 INSPECTION

A. Verify window and door head dimensions.

B. Verify eave rake return dimensions.

C. Beginning of installation means acceptance of existing conditions.

3.2 PREPARATION

A. Field measure site conditions prior to fabricating work.

B. Install starter and edge strips, and cleats before starting installation.

3.3 INSTALLATION

A. Secure flashings in place using concealed fasteners. Use exposed fasteners only in locations approved by Architect.

B. Lap, cleat or seam and seal all joints.

C. Fit flashings tight in place. Make corners square, surfaces true and straight in planes, and lines accurate to profiles.

D. Seal formed metal joints watertight.

E. Solder copper joints watertight for full copper surface contact. After soldering, wash copper clean with neutralizing solution and rinse with water.

F. Conform to drawing details and requirements included in AA, NAAMM, SMACNA AND NRCA manuals.

END OF SECTION

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SECTION 07712

GUTTERS, DOWNSPOUTS, AND C.I. DRAIN BOOT

1 PART 1 GENERAL

1.1 SECTION INCLUDES

A. Aluminum gutters, leaders, conductor box, and downspouts.

1.2 RELATED SECTIONS

A. Section 06200 – Finish Carpentry

B. Section 07620 – Metal Fabrications and Flashing

C. Section 09910 – Painting

1.3 REFERENCES

A. ASTM B209 – Standard Specification for Aluminum and Aluminum-Alloy Sheet and Plate.

B. FS TT-C-494 – Coating Compound, Bituminous, Solvent Type, Acid Resistant.

C. SMACNA (Sheet Metal and Air Conditioning Contractors National Association) – Architectural Sheet Metal Manual.

1.4 DESIGN REQUIREMENTS

A. Conform to applicable code for size and method of rainwater discharge.

B. Maintain one copy of each document on site.

1.5 SUBMITTALS FOR REVIEW

A. Section 01300 – Submittals: Procedures for submittals.

B. Shop Drawings: Indicate locations, configurations, jointing methods, fastening methods, and installation details.

C. Product Data: Provide data on prefabricated components.

D. Samples: Submit two samples, 6 inch (150 mm) long of each component illustrating design, finish, color, and configuration.

E. Roof runoff and component calculation sheet.

1.6 DELIVERY, STORAGE, and PROTECTION

A. Stack material to prevent twisting, bending, or abrasion, and to provide ventilation. Slope to drain.

B. Prevent contact with materials during storage which may cause discoloration, staining, or damage.

1.7 PROJECT CONDITIONS

A. Coordinate the work with downspout discharge pipe inlet.

2 PART 2 PRODUCTS

2.1 MANUFACTURERS

A. Berger Building Products Corporation.

B. Alcoa Aluminum Products

C. J.R. Hoe Cast Iron

D. Substitutions: Equal as approved by the Architect.

2.2 COMPONENTS

A. Aluminum Gutters: Profiles to be 5” “K” style.

B. Leaders and Downspouts: Round smooth profile with “fan” corrugated elbows as indicated on Drawings.

C. Anchoring and Supports: Profiled to suit gutters and downspouts.

1. Anchors Devices: circle and adjustable shank as recommended by fabricator.
2. Gutter Supports: Brackets, straps, or as indicated on Drawings.

3. Downspout Supports: Hinged Hook Anchors.

D. Fasteners: Same material and finish as gutters and downspouts.

E. Cast iron drain boot - 6” diameter by 24” long with rust inhibitive primer, painted black.

2.3 FABRICATION

A. Shop fabricate metal flashing, trim, expansion joints, gutters, downspouts, and similar items to comply with profiles and sizes shown, and to comply with standard industry details by SMACNA in the “Architectural Sheet Metal Manual.” Provide soldered flat-lock seams, and fold back metal to form a hem on the concealed side of exposed edges.

B. Fabricate with required connection pieces.

C. Form sections square, true, and accurate in size, in maximum possible lengths, free of distortion or defects detrimental to appearance or performance. Allow for expansion at joints spaced 15 feet apart minimum.

D. Hem exposed edges of metal.

E. Weather seal joints.

F. Fabricate gutter and downspout accessories, seal watertight.

2.4 LIFTS, LADDERS AND SCAFFOLDING

A. Provide all necessary lifts, ladders and scaffolding to safely complete the work in this section.

3 PART 3 EXECUTION

3.1 EXAMINATION

A. Coordinate areas of work prior to the start of work. Maintain access to all areas for use by Owner and Tenants.

B. Verify that surfaces are ready to receive work.

3.2 PREPARATION

A. Paint concealed metal surfaces and surfaces in contact with dissimilar metals with protective backing paint to a minimum dry film thickness of 15 mil (0.4 mm).

3.3 INSTALLATION

A. Install gutters, downspouts, leaders, and accessories in accordance with manufacturer's instructions.

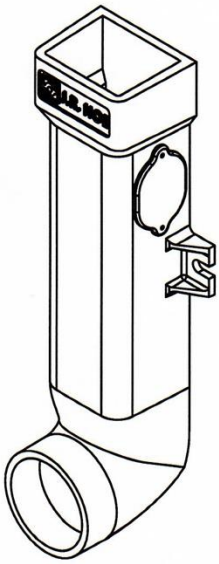
B. Sheet Metal: Join lengths with formed seams sealed watertight. Flash and seal gutters to downspouts and accessories.

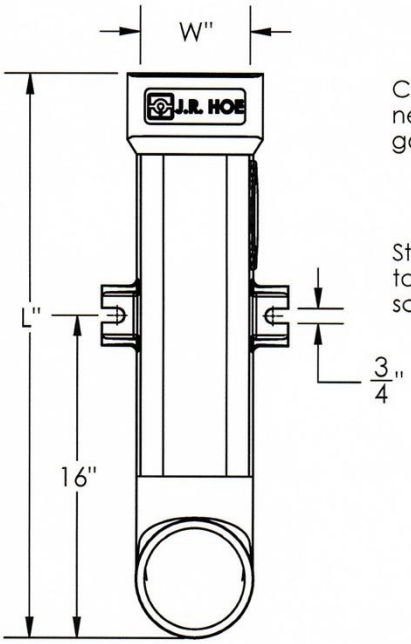
C. Slope gutters to downspouts at 1/16" = 1'-0".

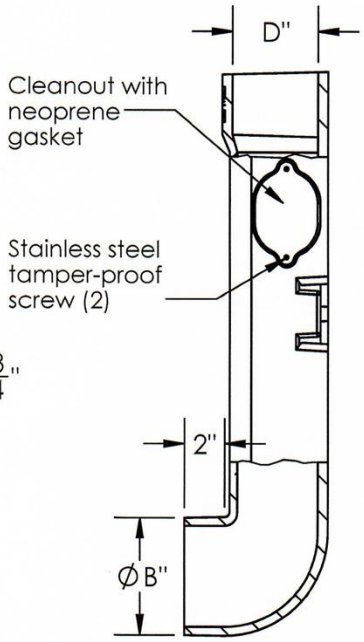
D. Drill hole in shingle prior to driving hinged hook hanger into plywood sheathing.

E. Connect leaders to leader boots as indicated on Drawings.

N-Series: Ninety Degree Downspout Boots







NOTES:

As manufactured by:
J.R. Hoe & Sons Inc.
101 Ironwood Rd., Middlesboro, KY 40965
1-800-245-5521 | www.downspoutboots.com

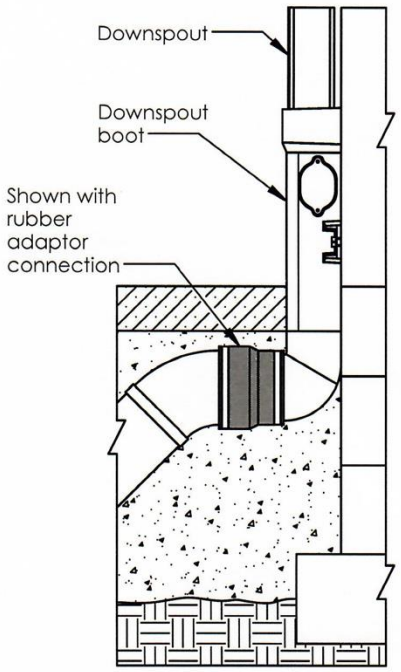
Manufactured from ASTM A-48 Class 30 Gray Iron

Side cleanout a standard option for all downspout boots 20" or greater in length. Cast iron cover with neoprene gasket is fastened over cleanout window on main body with stainless steel tamper proof screws.

Downspout boots over 40" in length are supplied in 2-piece assemblies for ease of installation.

Install downspout boots with stainless steel expansion anchors where integral lug slots meet the building wall.

Downspout boots feature contoured, flow-efficient interior design; no boxed corners, weld seams, or choke points that increase risk of clogging.



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SECTION 07920

JOINT SEALERS

1 PART 1 GENERAL

1.1 SECTION INCLUDES

A. Sealants and joint backing.

1.2 RELATED SECTIONS

A. Section 06200 - Finish carpentry

B. Section 09910 - Painting

1.3 REFERENCES

A. ASTM C834 - Standard Specification for Latex Sealing Compounds.

B. ASTM C920 - Standard Specification for Elastomeric Joint Sealants.

C. ASTM C1193 - Standard Guide for Use of Joint Sealants.

D. ASTM D1056 - Standard Specification for Flexible Cellular Materials - Sponge or Expanded Rubber.

E. ASTM D1565 - Standard Specification for Flexible Cellular Materials Vinyl Chloride Polymers and Copolymers (Open-Cell Foam).

F. ASTM D1667 - Standard Specification for Flexible Cellular Materials Vinyl Chloride Polymers and Copolymers (Closed-Cell Foam).

1.4 SUBMITTALS FOR REVIEW

A. Section 01000 – Basic Requirements: Procedures for submittals.

B. Product Data: Provide data indicating sealant chemical characteristics, performance criteria, substrate preparation, limitations, and color availability.

C. Samples: Submit two samples, adequate in size illustrating sealant colors for selection.

1.5 SUBMITTALS FOR INFORMATION

A. Manufacturer’s Installation Instructions: Indicate special procedures, surface preparation, and perimeter conditions requiring special attention.

1.6 QUALITY ASSURANCE

A. Maintain one copy of each referenced document covering installation requirements on site.

B. Manufacturer Qualifications: Company specializing in manufacturing the Products specified in this section with minimum three years documented experience.

C. Applicator Qualifications: Company specializing in performing the work of this section with minimum three years documented experience or approved by manufacturer.

1.7 ENVIRONMENTAL REQUIREMENTS

A. Maintain temperature and humidity recommended by the sealant manufacturer during and after installation.

1.8 COORDINATION

A. Section 01000 – Basic Requirements : Coordination requirements.

B. Coordinate the work with all sections referencing this section.

1.9 WARRANTY

A. Section 01000 – Basic Requirements.

B. Correct defective work within a one-year period after Date of Substantial Completion.

C. Warranty: Include coverage for installed sealants and accessories which fail to achieve airtight seal, watertight seal, and exhibit loss of adhesion or cohesion, or do not cure.

2 PART 2 PRODUCTS

2.1 MANUFACTURERS

A. Pecora Corporation.

B. General Electric Company.

C. Tremco Inc.

D. Morton International Inc.

E. Sika.

F. Sonneborn-Chemrex Inc.

G. Substitutions: Under provisions of Section 01000.

2.2 SEALANTS

A. General Purpose Exterior Sealant: Polyurethane or Polysulfide; ASTM C920, Grade NS, Class 25, Uses M, G, and A; single or multi-component.

1. Colors as selected.
2. Applications:

a. Control, expansion, and soft joints in masonry.
b. Joints between concrete and other materials.
c. Joints between metal frames and other materials.
d. Other exterior joints for which no other sealant is indicated.

B. Exterior Metal Lap Joint Sealant: Butyl or polyisobutylene, non-drying, non-skinning, non-curing.

1. Applications:

a. Concealed sealant bead in sheet metal work.
b. Concealed sealant bead in siding overlaps.

C. General Purpose Interior Sealant: Acrylic emulsion latex; ASTM C834, single component, paintable.

1. Colors as selected.
2. Applications:

a. Interior wall and ceiling control joints.
b. Joints between door and window frames and wall surfaces.
c. Other interior joints for which no other type of sealant is indicated.

2.3 ACCESSORIES

A. Primer: Non-staining type, recommended by sealant manufacturer to suit application.

B. Joint Cleaner: Non-corrosive and non-staining type, recommended by sealant manufacturer; compatible with joint forming materials.

C. Joint Backing: Round foam rod compatible with sealant; ASTM D1667, closed cell; oversized 30 to 50 percent larger than joint width; No. 92 Green Rod Closed Cell Polyurethane manufactured by manufacturer of sealant.

D. Bond Breaker: Pressure sensitive tape recommended by sealant manufacturer to suit application.

3 PART 3 EXECUTION

3.1 EXAMINATION

A. Verify that substrate surfaces and joint openings are ready to receive work.

B. Verify that joint backing and release tapes are compatible with sealant.

3.2 PREPARATION

A. Remove loose materials and foreign matter which might impair adhesion of sealant.

B. Clean and prime joints in accordance with manufacturer’s instructions.

C. Perform preparation in accordance with manufacturer’s instructions and ASTM C1193.

D. Protect elements surrounding the work of this section from damage or disfiguration.

3.3 INSTALLATION

A. Perform installation in accordance with sealant manufacturer’s requirements for preparation of surfaces and material installation instructions.

B. Perform installation in accordance with ASTM C1193.

C. Perform acoustical sealant application work in accordance with ASTM C920.

D. Measure joint dimensions and size joint backers to achieve width-to-depth ratio, neck dimension, and surface bond area as recommended by manufacturer, except where specific dimensions are indicated.

E. Install bond breaker where joint backing is not used.

F. Install sealant free of air pockets, foreign embedded matter, ridges, and sags.

G. Apply sealant within recommended application temperature ranges. Consult manufacturer when sealant cannot be applied within these temperature ranges.

H. Tool joints concave or as detailed.

3.4 CLEANING

A. Section 01000 – Basic Requirements: Cleaning installed work.

B. Clean adjacent soiled surfaces.

3.5 PROTECTION OF FINISHED WORK

A. Section 01000 – Basic Requirements: Protecting installed work.

B. Protect sealants until cured.

END OF SECTION

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SECTION 08111

METAL DOORS AND FRAMES

1 PART 1 GENERAL

1.1 SECTION INCLUDES

A. Non-rated and fire-rated rolled steel doors and frames.

B. Interior light frames.

1.2 RELATED SECTION:

A. Section 04200 – Unit Masonry

B. Section 07900 - Joint Sealers

C. Section 08712 - Door Hardware.

D. Section 08800 - Glazing.

E. Section 09260 - Gypsum Board Systems.

F. Section 09900 - Painting.

1.3 PRODUCTS FURNISHED BUT INSTALLED UNDER OTHER SECTIONS

A. Furnish Steel Doors and Frames to Section 06100 – Rough Carpentry, for door and frame installation.

1.4 REFERENCES

A. ASTM E152 - Methods of Fire Tests of Door Assemblies.

B. DHI - Door Hardware Institute: The Installation of Commercial Steel Doors and Steel Frames, Insulated Steel Doors in Wood Frames and Builder's Hardware.

C. NFPA 80 - Fire Doors and Windows.

D. NFPA 252 - Fire Tests for Door Assemblies.

E. SDI-100 - Standard Steel Doors and Frames.

F. SDI-105 - Recommended Erection Instructions for Steel Frames.

G. UL IOB - Fire Tests of Door Assemblies.

1.5 QUALITY ASSURANCE

A. Conform to requirements of SDI-100.

B. Fire rated door, panel and frame construction to conform to ASTM E152, and NFPA 252.

C. Installed frame and door assembly to conform to NFPA 80 for fire rated class indicated on Drawings.

1.6 REGULATORY REQUIREMENTS

A. Conform to Commonwealth of Massachusetts Building Code for fire rated frames and doors.

1.7 SUBMITTALS

A. Submit shop drawings and product data under provisions of Section 01300.

B. Indicate frame configuration, anchor types and spacings, location of cutouts for hardware, reinforcement, and finish.

C. Indicate door elevations, internal reinforcement, closure method, and cutouts for glazing.

D. Submit manufacturer's installation instructions under provisions of Section 01300.

1.8 DELIVERY, STORAGE AND PROTECTION

A. Protect products under provisions of Section 01600.

B. Protect doors and frames with resilient packaging sealed with heat shrunk plastic.

C. Break seal on-site to permit ventilation.

2 PART 2 PRODUCTS

2.1 ACCEPTABLE MANUFACTURERS

A. Steelcraft.

B. Ceco Corporation.

C. Amweld.

D. Substitutions: Under provisions of Section 01600.

2.2 DOORS AND FRAMES

A. Exterior Doors: SDI-100 Grade II Heavy-Duty 1-3/4 inch Model 2, Seamless - Hollow Steel Construction.

B. Interior Doors: SDI-100 Grade II heavy duty 1 3/4 inch Model 2, seamless-hollow steel construction.

C. Exterior Frames: 16 gage thick material.

D. Interior Frames: 16 gage thick material.

2.3 DOOR CORE

A. Core: Styrene Insulation at exterior doors; impregnated hardboard honeycomb at interior doors.

B. Insulated door insulation value of R-6.

2.4 ACCESSORIES

A. Rubber Silencers: Resilient rubber.

B. Glazing Stops: Rolled steel channel shape Prepared for countersink style tamperproof screws.

2.5 PROTECTIVE COATINGS

A. Bituminous Coating: Fibered asphalt emulsion. Field applied.

B. Primer: Zinc chromate type.

2.6 FABRICATION

A. Fabricate frames as welded unit type unless noted otherwise.

B. Mullions for Double Doors: Removable type.

C. Provide metal Z or T shaped astragals for double doors.

D. Fabricate frames and doors with hardware reinforcement plates welded in place. Provide mortar guard boxes.

E. Reinforce frames wider than 48 inches with roll formed steel channels fitted tightly into frame head, flush with top.

F. Prepare frame for silencers. Provide three single rubber silencers for single doors on strike side, and two single silencers on frame head at double doors without mullions.

G. Attach fire rated label to each frame and door unit.

H. Close top edge of exterior door flush with inverted steel channel closure. Seal joints watertight.

I. Fabricate frames for masonry wall coursing with head member size as indicated on Drawings.

2.7 FINISH

A. Factory-applied prime finish.

B. Coat inside of frame profile with bituminous coating to a thickness of 1/16 inch. Coating may be shop or field applied.

3 PART 3 EXECUTION

3.1 INSTALLATION

A. Install frames in accordance with SDI-105.

B. Install doors in accordance with DHI.

C. Coordinate with appropriate Section wall construction for anchor placement.

D. Coordinate installation of glass and glazing.

F. Install hardware on steel doors.

3.2 TOLERANCES

A. Maximum Diagonal Distortion: 1/16 inch measured with straight edge, corner to corner.

3.3 ADJUSTING AND CLEANING

A. Adjust hardware for smooth and balanced door movement.

END OF SECTION

SECTION 08330

ROLLING ALUMINUM SERVICE DOORS

** COORDINATE WIND LOADING

1 PART 1 GENERAL

1.1 SECTION INCLUDES

A. Rolling service doors and operators.

1.2 RELATED SECTIONS

A. Section 05500 - Metal Fabrications: Support framing and framed opening.

B. Section 06200 - Finish Carpentry: Wood jamb and head trim.

C. Section 08333 - Security Grilles.

D. Section 08710 - Door Hardware: Product Requirements for cylinder core and keys.

E. Section 09900 - Painting: Field applied finish.

F. Section 16130 - Raceway and Boxes: Conduit from electric circuit to door operator and from door operator to control station.

G. Section 16150 - Wiring Connections: Power to disconnect.

1.3 REFERENCES

A. ANSI/DASMA 108 - American National Standards Institute Standard Method For Testing Sectional Garage Doors And Rolling Doors: Determination Of Structural Performance Under Uniform Static Air Pressure Difference.

B. NFRC 102 - Test Procedure for Measuring the Steady-State Thermal Transmittance of Fenestration Systems.

C. ASTM E 90 - Standard Test Method for Laboratory Measurement of Airborne Sound Transmission Loss of Building Partitions and Element.

D. ASTM E 330 - Standard Test Method for Structural Performance of Exterior Windows, Doors, Skylights and Curtain Walls by Uniform Static Air Pressure Difference.

E. ASTM A 653 - Standard Specification for Steel Sheet, Zinc-Coated (Galvanized) or Zinc-Iron Alloy-Coated (Galvannealed) by the Hot-Dip Process.

F. ASTM A 666 - Standard Specification for Austenitic Stainless-Steel Sheet, Strip, Plate, and Flat Bar.

G. ASTM A 924 - Standard Specification for General Requirements for Steel Sheet, Metallic-Coated by the Hot-Dip Process.

H. ASTM B 221 - Standard Specification for Aluminum and Aluminum-Alloy Extruded Bars, Rods, Wire, Profiles, and Tubes.

I. NEMA 250 - Enclosures for Electrical Equipment (1000 Volts Maximum).

J. NEMA MG 1 - Motors and Generators.

1.4 DESIGN / PERFORMANCE REQUIREMENTS

A. Single-Source Responsibility: Provide doors, tracks, motors, and accessories from one manufacturer for each type of door. Provide secondary components from source acceptable to manufacturer of primary components.

B. Products Requiring Electrical Connection: Listed and classified by Underwriters Laboratories, Inc. acceptable to authority having jurisdiction as suitable for purpose specified.

1.5 SUBMITTALS

A. Submit under provisions of Section 01300.

B. Product Data: Manufacturer's data sheets on each product to be used, including:

1. Preparation instructions and recommendations.

2. Storage and handling requirements and recommendations.

3. Details of construction and fabrication.

4. Installation instructions.

C. Shop Drawings: Include detailed plans, elevations, details of framing members, anchoring methods, required clearances, hardware, and accessories. Include relationship with adjacent construction.

D. Selection Samples: For each finish product specified, two complete sets of color chips representing manufacturer's full range of available colors and patterns.

E. Verification Samples: For each finish product specified, two samples, minimum size 6 inches (150 mm) long, representing actual product, color, and patterns.

F. Manufacturer's Certificates: Certify products meet or exceed specified requirements.

G. Operation and Maintenance Data: Submit lubrication requirements and frequency, and periodic adjustments required.

1.6 QUALITY ASSURANCE

A. Manufacturer Qualifications: Company specializing in performing Work of this section with a minimum of five years' experience in the fabrication and installation of security closures.

B. Installer Qualifications: Installer Qualifications: Company specializing in performing Work of this section with minimum three years and approved by manufacturer.

C. Mock-Up: Provide a mock-up for evaluation of surface preparation techniques and application workmanship.

1. Finish areas designated by Architect.

2. Do not proceed with remaining work until workmanship, color, and sheen are approved by Architect.

3. Refinish mock-up area as required to produce acceptable work.

1.7 DELIVERY, STORAGE, AND HANDLING

A. Store products in manufacturer's unopened packaging until ready for installation.

B. Protect materials from exposure to moisture. Do not deliver until after wet work is complete and dry.

C. Store materials in a dry, warm, ventilated weathertight location.

1.8 PROJECT CONDITIONS

A. Maintain environmental conditions (temperature, humidity, and ventilation) within limits recommended by manufacturer for optimum results. Do not install products under environmental conditions outside manufacturer's absolute limits.

1.9 COORDINATION

A. Coordinate Work with other operations and installation of adjacent materials to avoid damage to installed materials.

1.10 WARRANTY

A. Warranty: Manufacturer's limited door and operator system, except the counterbalance spring and finish, to be free from defects in materials and workmanship for 3 years or 20,000 cycles, whichever occurs first.

B. Warranty: Manufacturer's limited door system warranty for 2 years for all parts and components.

C. PowderGuard Finish

1. PowderGuard Premium Applied to curtain, guides, bottom bar, headplates: Manufacturer's limited Premium Finish warranty for 2 years.

2. PowderGuard Zinc Base Coat applied to guides, bottom bar, headplates plus PowderGuard Premium applied to curtain and top coat for guides, bottom bar, headplates: Manufacturer's limited Zinc Finish warranty for 4 years.

3. PowderGuard Textured: Applied to curtain, guides, bottom bar, headplates: Manufacturer's limited Textured Finish warranty for 3 years.

4. PowderGuard Zinc Base Coat applied to guides, bottom bar, headplates plus PowderGuard Textured applied to curtain and top coat for guides, bottom bar, headplates: Manufacturer's limited Zinc Finish warranty for 4 years.

5. PowderGuard Max: Applied to curtain, guides, bottom bar, headplates: Manufacturer's limited Max Finish warranty for 5 years.

2 PART 2 PRODUCTS

1.11 MANUFACTURERS

A. Acceptable Manufacturer: Overhead Door Corporation, 2501 S. State Hwy. 121, Suite 200, Lewisville, TX 75067. ASD. Tel. Toll Free: (800) 275-3290. Phone: (469) 549-7100. Fax: (972) 906-1499. Web Site: www.overheaddoor.com. E-mail: info@overheaddoor.com.

B. Substitutions.

C. Requests for substitutions will be considered in accordance with provisions of Section 01600.

1.12 ROLLING SERVICE DOORS

A. Heavy Duty Industrial Doors: Overhead Door Corporation, Model 620 Stormtite Rolling Service Doors.

1. Curtain: Interlocking roll-formed slats as specified following. Endlocks shall be attached to each end of alternate slats to prevent lateral movement.

a. Flat profile type F-265 for doors up to 18 feet 4 inches (5.59 m) wide, fabricated of:

1) .040 inch (1 mm) aluminum.

2. Slats and Hood Finish:

    a. Galvanized Steel: Slats and hood galvanized in accordance with ASTM A 653 and receive rust-inhibitive, roll coating process, including 0.2 mils thick baked-on prime paint, and 0.6 mils thick baked-on polyester top coat.

    b. Finish: 2B mill finish.

    c. Aluminum: Slats and hood shall be aluminum finished as follows.

    d. Powder Coat

        Powder Coat:

        (a) PowderGuard Premium powder coat color as selected by the Architect.

3. Weatherseals:

    a. Vinyl bottom seal, exterior guide and internal hood seals.

    b. Interior guide weatherseal.

    c. Lintel weatherseal.

4. Bottom Bar:

    a. Extruded aluminum for doors up to 15 feet 4 inches (4.67 m) wide.

    b. Two primed steel angles for doors over 15 feet 4 inches (4.67 m) wide.

    c. Two galvanized steel angles.

5. Guides: Three structural steel angles.

6. Brackets:

    a. Hot rolled prime painted steel to support counterbalance, curtain and hood.

    b. Galvanized steel to support counterbalance, curtain and hood.

7. Finish; Bottom Bar, Guides, Headplate and Brackets:

    a. PowderGuard Premium powder coat in black color.

8. Counterbalance: Helical torsion spring type housed in a steel tube or pipe barrel, supporting the curtain with deflection limited to 0.03 inch per foot of span. Counterbalance is adjustable by means of an adjusting tension wheel.

9. Hood: Provide with internal hood baffle weatherseal.

    a. Aluminum hood with intermediate supports as required.

10. Electric Motor Operation: Provide UL listed electric operator, size as recommended by manufacturer to move door in either direction at not less than 2/3 foot nor more than 1 foot per second.

    a. Sensing Edge Protection:

        1) Electric sensing edge.

    b. Operator Controls:

        1) Key operation with open, close, and stop controls.

        2) Controls for both interior and exterior location.

        3) Controls surface mounted.

    c. Motor Voltage: 115/230 single phase, 60 Hz.

11. Wind Load Design:

    a. Standard wind load shall be 20 PSF.

    b. Miami-Dade County NOA ___.

    c. FBC certification FL# ___.

    d. TDI Approval # ___.

12. Operation: Design door assembly, including operator, to operate for not less than 20,000 cycles.

13. Locking:

    a. Interior slide bolt lock for electric operation with interlock switch.

14. Wall Mounting Condition:

    a. Face-of-wall mounting.

    b. Between jambs mounting.

3 PART 3 EXECUTION

3.1 EXAMINATION

A. Verify opening sizes, tolerances and conditions are acceptable.

B. Examine conditions of substrates, supports, and other conditions under which this work is to be performed.

C. If substrate preparation is the responsibility of another installer, notify Architect of unsatisfactory preparation before proceeding.

3.2 PREPARATION

A. Clean surfaces thoroughly prior to installation.

B. Prepare surfaces using the methods recommended by the manufacturer for achieving the best result for the substrate under the project conditions.

3.3 INSTALLATION

A. Install in accordance with manufacturer's instructions.

B. Use anchorage devices to securely fasten assembly to wall construction and building framing without distortion or stress.

C. Securely and rigidly brace components suspended from structure. Secure guides to structural members only.

D. Fit and align assembly including hardware; level and plumb, to provide smooth operation.

E. Coordinate installation of electrical service with Section 16150. Complete wiring from disconnect to unit components.

F. Coordinate installation of sealants and backing materials at frame perimeter as specified in Section 07900.

G. Install perimeter trim and closures.

H. Instruct Owner’s personnel in proper operating procedures and maintenance schedule.

3.4 ADJUSTING

A. Test for proper operation and adjust as necessary to provide proper operation without binding or distortion.

B. Adjust hardware and operating assemblies for smooth and noiseless operation.

3.5 CLEANING

A. Clean curtain and components using non-abrasive materials and methods recommended by manufacturer.

B. Remove labels and visible markings.

C. Touch-up, repair or replace damaged products before Substantial Completion.

3.6 PROTECTION

A. Protect installed products until completion of project.

END OF SECTION

SECTION 08360

GLAZED ALUMINUM SECTIONAL OVERHEAD DOORS

** COORDINATE WIND LOADING

1 PART 1 GENERAL

1.1 SECTION INCLUDES

A. Glazed Aluminum Sectional Overhead Doors

B. Electric Operators and Controls.

C. Operating Hardware, tracks, interior slide bolt locking system, and support.

1.2 RELATED SECTIONS

A. Section 03300 - Cast-In-Place Concrete: Prepared opening in concrete. Execution requirements for placement of anchors in concrete wall construction.

B. Section 04810 - Unit Masonry Assemblies: Prepared opening in masonry. Execution requirements for placement of anchors in masonry wall construction.

C. Section 05500 - Metal Fabrications: Steel frame and supports.

D. Section 06114 - Wood Blocking and Curbing: Rough wood framing and blocking for door opening.

E. Section 07900 - Joint Sealers: Perimeter sealant and backup materials.

F. Section 08710 - Door Hardware: Cylinder locks.

G. Section 09900 - Paints and Coatings: Field painting.

H. Section 11150 – Parking Control Equipment: Remote door control.

I. Section 16130 - Raceway and Boxes: Empty conduit from control station to door operator.

J. Section 16150 - Wiring Connections: Electrical service to door operator.

1.3 REFERENCES

A. ANSI/DASMA 102 - American National Standard Specifications for Sectional Overhead Type Doors.

1.4 DESIGN / PERFORMANCE REQUIREMENTS

A. Wind Loads: Design and size components to withstand loads caused by pressure and suction of wind acting normal to plane of wall as calculated in accordance with applicable code.

B. Wiring Connections: Requirements for electrical characteristics.

1. 115 volts, single phase, 60 Hz.

2. 230 volts, single phase, 60 Hz.

3. 230 volts, three phase, 60 Hz.

4. 460 volts, three phase, 60 Hz.

C. Single-Source Responsibility: Provide doors, tracks, motors, and accessories from one manufacturer for each type of door. Provide secondary components from source acceptable to manufacturer of primary components.

1.5 SUBMITTALS

A. Submit under provisions of Section 01300.

B. Product Data: Manufacturer's data sheets on each product to be used, including:

1. Preparation instructions and recommendations.

2. Storage and handling requirements and recommendations.

3. Installation methods.

C. Shop Drawings: Indicate plans and elevations including opening dimensions and required tolerances, connection details, anchorage spacing, hardware locations, and installation details.

D. Manufacturer's Certificates: Certify products meet or exceed specified requirements.

E. Operation and Maintenance Data.

1.6 QUALITY ASSURANCE

A. Manufacturer Qualifications: Company specializing in manufacturing products specified in this section with minimum five years documented experience.

B. Installer Qualifications: Authorized representative of the manufacturer with minimum five years documented experience.

C. Products Requiring Electrical Connection: Listed and classified by Underwriters Laboratories, Inc. acceptable to authority having jurisdiction as suitable for purpose specified.

1.7 DELIVERY, STORAGE, AND HANDLING

A. Store products in manufacturer's unopened labeled packaging until ready for installation.

B. Protect materials from exposure to moisture until ready for installation.

C. Store materials in a dry, ventilated weathertight location.

1.8 PROJECT CONDITIONS

A. Pre-Installation Conference: Convene a pre-installation conference just prior to commencement of field operations, to establish procedures to maintain optimum working conditions and to coordinate this work with related and adjacent work.

B. Wiring Connections: Requirements for electrical characteristics.

2 PART 2 PRODUCTS

2.1 MANUFACTURERS

A. Acceptable Manufacturer: Overhead Door Corp., 2501 S. State Hwy. 121, Suite 200, Lewisville, TX 75067. ASD. Tel. Toll Free: (800) 275-3290. Phone: (469) 549-7100. Fax: (972) 906-1499. Web Site: www.overheaddoor.com.
E-mail: sales@overheaddoor.com.

B. Basis of Design, 521 Series Aluminum Sectional Overhead Door as manufactured by Overhead Door Corp.

C. Substitutions: Submit to architect for review.

D. Requests for substitutions will be considered in accordance with provisions of Section 01600.

2.2 GLAZED ALUMINUM SECTIONAL OVERHEAD DOORS

A. Glazed Sectional Overhead Doors: 521 Series Aluminum Doors by Overhead Door Corporation.

1. Door Assembly: Stile and rail assembly secured with 1/4-inch (6 mm) diameter through rods.

a. Panel Thickness: 1-3/4 inches (44 mm).

b. Center Stile Width: 2-11/16 inches (68mm)

c. End Stile Width: 3-5/16 inches (84 mm)

d. Intermediate Rail Pair Width: 3-11/16 inches (94mm).

e. Top Rail Width:

1. 2-3/8 inches (60mm)

2. 3-3/4 inches (95 mm)

f. Bottom Rail Width:

1. 3-3/4 inches (95mm)

2. 4-1/2 inches (114mm)

g. Aluminum Panels: 0.050 inch (1.3 mm) thick, aluminum.

h. Stiles and Rails: 6063 - T6 aluminum.

i. Springs: 50,000 cycles.

j. Glazing: 1/2 inch (12.5 mm) Tempered Insulating glass.

2. Finish and Color:

a. Powder Coating Finish: Color as selected by Architect from manufacturer's standard colors.

3. Windload Design: Provide to meet the Design/Performance requirements specified.

4. Hardware: Galvanized steel hinges and fixtures. Ball bearing rollers with hardened steel races.

5. Lock: Interior galvanized single unit.

6. Weatherstripping:

a. Flexible bulb-type strip at bottom section.

b. Flexible Jamb seals.

c. Flexible header seal.

7. Track: Provide track as recommended by manufacturer to suit loading required and clearances available.

8. Manual Operation: Chain hoist.

3 PART 3 EXECUTION

3.1 EXAMINATION

A. Do not begin installation until openings have been properly prepared.

B. Verify wall openings are ready to receive work and opening dimensions and tolerances are within specified limits.

C. Verify electric power is available and of correct characteristics.

D. If preparation is the responsibility of another installer, notify Architect of unsatisfactory preparation before proceeding.

3.2 PREPARATION

A. Clean surfaces thoroughly prior to installation.

B. Prepare surfaces using the methods recommended by the manufacturer for achieving the best result for the substrate under the project conditions.

3.3 INSTALLATION

A. Install overhead doors and track in accordance with approved shop drawings and the manufacturer’s printed instructions.

B. Coordinate installation with adjacent work to ensure proper clearances and allow for maintenance.

C. Anchor assembly to wall construction and building framing without distortion or stress.

D. Securely brace door tracks suspended from structure. Secure tracks to structural members only.

E. Fit and align door assembly including hardware.

3.4 CLEANING AND ADJUSTING

A. Adjust door assembly to smooth operation and in full contact with weatherstripping.

B. Clean doors, frames, and glass.

C. Remove temporary labels and visible markings.

3.5 PROTECTION

A. Do not permit construction traffic through overhead door openings after adjustment and cleaning.

B. Protect installed products until completion of project.

C. Touch-up, damaged coatings and finishes and repair minor damage before Substantial Completion.

END OF SECTION

SECTION 08550

ALUMINUM CLAD WOOD WINDOWS

1 PART 1 GENERAL

1.1 SECTION INCLUDES

A. Extruded aluminum clad, wood double, casement, and fixed windows, basis of design Kolbe Ultra Series, unit sizes as shown on the drawings and window schedule.

B. Glazing.

C. Accessories.

1.2 RELATED SECTIONS

A. Section 06100 - Rough Carpentry: Framed openings.

B. Section 06200 - Finish Carpentry: Interior wood casing.

C. Section 07213 - Batt Insulation: Batt insulation at window perimeter.

D. Section 07460 - Exterior Siding.

E. Section 07900 - Joint Sealers: Perimeter joint sealant and backer rod.

F. Section 09900 - Painting: Finishing interior wood, including grilles.

1.3 REFERENCES

A. American Architectural Manufacturers Association (AAMA):

1. AAMA 603.8 – Voluntary Performance Requirements and Test Procedures for Pigmented Organic Coatings on Extruded Aluminum.

B. American National Standards Institute (ANSI):

1. ANSI Z97.1 - Safety Performance Specifications and Methods of Test for Safety Glazing Material Used In Buildings.

C. American Society for Testing and Materials (ASTM):

1. ASTM C 1036 – Specification for Flat Glass.

2. ASTM C 1048 – Specification for Heat Treated Flat Glass - Kind HS, Kind FT Coated and Uncoated Glass.

3. ASTM E 90 – Standard Test Method for Laboratory Measurement of Airborne-Sound Transmission Loss of Building Partitions.

4. ASTM E 283 – Test Method for Rate of Air Leakage Through Exterior Windows, Curtain Walls, and Doors.

5. ASTM E 330 – Test Method for Structural Performance of Exterior Windows, Curtain Walls, and Doors by Uniform Static Air Pressure Difference.

6. ASTM E 413 – Classification for Rating Sound Insulation.

7. ASTM E 547 – Test Method for Water Penetration of Exterior Windows, Curtain Walls, and Doors by Cyclic Static Air Pressure Differential.

8. ASTM E 773 – Test Method for Seal Durability of Sealed Insulating Glass Units.

9. ASTM E 774 – Specification for Seal Durability of Sealed Insulating Glass Units.

10. ASTM F 588 – Test Methods for Resistance of Window Assemblies to Forced Entry Excluding-Glazing.

D. Consumer Product Safety Commission (CPSC):

1. CPSC 16CFR-1201, Safety Standard for Architectural Glazing Materials.

E. National Fenestration Rating Council (NFRC):

1. NFRC 100, Procedure for Determining Fenestration Product Thermal Properties.

2. NFRC 200, Procedure for Determining Solar Heat Gain Coefficient.

F. National Wood Window & Door Association (NWWDA):

1. NWWDA Industry Standard I.S. 2, Industry Standard for Wood Window Units.

2. NWWDA Industry Standard I.S. 4, Industry Standard for Water-Repellent Preservative Treatment for Millwork.

1.4 PERFORMANCE REQUIREMENTS

A. Aluminum clad wood windows to comply with the minimum performance requirements specified in NWWDA Industry Standard I.S. 2, DP 30, except where more stringent requirements are specified.

B. Air Infiltration: When tested in accordance with ASTM E 283 at a static pressure of 1.57 psf, total air infiltration to average less than or equal to 0.13 cfm per square foot of unit.

C. Water Penetration: No water penetration beyond the interior face of window unit when tested in accordance with ASTM E 547 at a static pressure of 4.50 psf.

D. Structural Performance: No glass breakage, damage to hardware, or permanent deformation (set) which would cause any malfunction or impair the operation of the unit, or residual deflection greater than 0.4% of span when tested in accordance with ASTM E 330 at a test pressure of 45 psf.

E. Design Criteria: Design and size window components to withstand loads imposed by wind to a pressure of 30 psf when measured in accordance with ASTM E 330. Limit deflection to L/175.

F. Thermal Performance:

1. Fenestration U-factor: Fenestration Products shall be rated, certified and labeled in accordance with NFRC 100. U-factors shall be as follows:

a. Residential size (60" x 36"): High Performance 0.33 Low E4.

2. Fenestration Solar Heat Gain Coefficient (SHGC): Fenestration Products shall be rated, certified and labeled in accordance with NFRC 200. SHGC shall be as follows:

a. Residential size (60" x 36"): High Performance 0.29

G. Sound Transmission Ratings: Windows to provide a sound transmission class (STC) of 28 when tested in accordance with ASTM E 90 and ASTM E 413.

H. Forced Entry Resistance: Window units to comply with requirements for Performance Level 20 when tested in accordance with ASTM F 588.

I. Sustained Operational Force: 5 pounds or less.

1.5 SUBMITTALS

A. Product Data, Installation Instructions, Shop Drawings and Samples: Submit the following under provisions of Section 01330:

1. Product Data: Submit manufacturer's product literature for all products and accessories furnished.

2. Installation Instructions: Submit manufacturer's installation instruction sheets for all products and accessories furnished.

3. Detail Drawings: Submit detail drawings indicating direction of operating sash, location and type of glazing material, and typical jamb, head and sill details.

4. Color Samples:

a. Submit samples of white interior and standard color exterior finishes

b. Hardware: Submit samples indicating typical finish on window hardware. (satin nickel estate series hardware)

B. Quality Control Submittals: Submit the following under provisions of Section 01400:

1. Reference List: Submit reference lists as specified under Quality Assurance article.

C. Contract Closeout Submittals: Submit the following under provisions of Section 01700:

1. Owner's Manual: Submit bound manual clearly identified with project name, location and completion date. Identify type and size of window units installed. Provide recommendations for periodic inspections, care and maintenance. Identify common causes of damage with instructions for temporary patching until permanent repair can be made.

1.6 QUALITY ASSURANCE

A. Manufacturer Qualifications: Company having at least 25 years experience in the manufacture of wood window products. Provide a reference list of at least 3 projects of similar scale and complexity successfully completed during the past three years. Provide project names, locations, completion dates, names and telephone numbers of General Contractor's and Owner's contact person.

B. Installer Qualifications: Company experienced in the installation of wood window products. Installer to provide a reference list of at least 3 projects of similar scale and complexity successfully completed during the past three years. Provide project names, locations, completion dates, names and telephone numbers of General Contractor's and Owner's contact person.

C. Safety Glazing: Comply with safety glazing requirements of CPSC 16CFR 1201. (Where required by code.)

D. Insulating Glass Units: Provide insulating glass units permanently marked with certification label of Insulating Glass Certification Council (IGCC) indicating compliance with Class CBA.

1.7 WARRANTY

A. Manufacturer’s Warranty: Manufacturer agrees to repair or replace wood windows that fail in materials or workmanship within specified warranty period.

1. Warranty Period:

a. Window: 10 years from date of shipment and issued to owner at Substantial Completion.

b. Glazing Units: 20 years from date of shipment and issued to owner at Substantial Completion.

c. Aluminum-Cladding Finish: 20 years from date of shipment and issued to owner at Substantial Completion.

1.8 DELIVERY, STORAGE AND HANDLING

A. In addition to general delivery, storage and handling requirements specified in Section 01600, comply with the following:

1. Deliver materials to job site in sealed, unopened cartons. Protect uncartoned set-up multiple units from rubbing.

2. Identify each carton with material name, date of manufacture and lot number.

3. Store windows and accessories off ground, under cover, protected from weather and construction activities.

1.9 PROJECT CONDITIONS

A. Install windows in strict accordance with safety and weather conditions required by manufacturer's product literature.

B. Extra caution must be exercised when temperature drops below 32 degrees F., and extreme care below 0 degrees F.

2 PART 2 PRODUCTS

2.1 MANUFACTURERS

A. Kolbe Windows – 715-842-5666, www.kolbewindows.com

B. Pella Windows – 866-209-4260, pro.pella.com

C. Substitutions: Refer to Section 01600 - Product Requirements.

2.2 MATERIALS

A. Anderson 400 Woodwright series, sizes as shown on Drawings.

B. Permanently applied interior and exterior muntin bars with spacer. Munitn bars – High definition 7/8” muntin bars.

C. Interior color: white. Exterior color: As selected from standard finishes.

D. Aluminum Cladding: Fluoropolymer tru coat system – 70% PVDS resin by weight per AAMA 2605 color as selected by Architect.

2.3 GLAZING

A. General: Insulating glass units certified through the Insulating Glass Certification Council as conforming to the requirements of IGCC Class CBA when tested in accordance with ASTM E 773 and E 774. Provide dual sealed units consisting of polyisobutylene primary seal and silicone secondary seal. Metal spacers to have bent or soldered corners.

2.4 HARDWARE

A. Estate Series: satin nickel finish.

2.5 ACCESSORIES

A. Insect Screens: Removable, ½ screens at all double hung units.

B. Extension Jambs: Wood members machined from clear material approved in NWWDA/ANSI Industry Standard I.S. 2. Provide pre-drilled for application of extension jambs.

C. Nailing fins, preformed flashing, installation clips to meet sites required design pressure.

2.6 FABRICATION

A. Preservative Treatment: Treat wood sash and frame members after machining with a water repellent preservative in accordance with NWWDA I.S. 4.

B. Glazing: Factory glaze with high performance glazing sealant.

C. Factory apply weatherstripping.

D. Factory install locking system, except handle to be field installed.

3 PART 3 EXECUTION

3.1 INSPECTION

A. Inspect opening before installation is commenced.

1. Verify concrete surfaces are dry and free of excess mortar, rocks, sand and other construction debris.

2. Verify rough opening or masonry opening is square and dimensions are correct. Verify sill plate is level.

3. Verify wood frame walls are dry, clean, sound and well nailed, and/or glued, free of voids and without offsets at joints. Ensure that nail heads are driven flush with all surfaces in opening and within 3" of rough opening.

3.2 PREPARATION

A. Open carton and remove window and all parts. Inspect window. Verify that window is not damaged and all parts are included before disposing of carton. Do not remove protective packing until unit is installed.

B. Leave sash locked.

3.3 JOINING SYSTEMS

A. Assemble joining system where required for window combinations according to window manufacturer's instructions.

B. Apply head flashing with silicone sealant at each vertical mullion head joint.

3.4 INSTALLATION

A. Completely wrap rough opening with self adhered flashing. Follow Manufacturer requirements for sill drainage.

B. Install window units, hardware, operators, accessories and other window components according to window manufacturer's installation instruction sheets.

C. Set units plumb, level true to line, without warp or rack in frames or sash. Remove protective packing.

D. Install batt insulation in shim space around window perimeter to maintain continuity of building insulation. Do not use expanding foam insulation.

E. Extend vapor barrier to interior face of window frame and attach.

3.5 EXTERIOR FINISHING

A. Hold back exterior siding or other finish materials from edge of window to allow for expansion and contraction and the installation of a proper sealant joint with backing materials.

B. Seal perimeter of window after exterior finish is applied in accordance with the requirements of Section 07900.

C. Application of Mullion Covers:

1. Install according to window manufacturer's installation instruction sheets.

D. Application of Casing Trim:

1. Install according to window manufacturer's instructions.

3.6 INTERIOR FINISHING

A. Finish interior wood window components according to window manufacturer's instructions and requirements specified in Section 09900.

3.7 ACCESSORIES

A. Insect Screens: Install insect screens according to window manufacturer's instructions.

B. Extension Jambs: Install according to window manufacturer's instructions.

C. Interior Wood Casing: Install interior wood casing according to window manufacturer's instructions.

D. Exterior Trim and Mullion Joiners: Install according to manufacturer's installation instructions.

3.8 CLEANING

A. Clean vinyl surfaces to remove dirt. Use cleaning materials specifically recommended by window manufacturer.

B. Protect glass and hardware from masonry cleaning solutions. Contact with the solution could etch the glass and cause seal failure of the insulating glass unit.

C. Remove debris from work site.

D. Leave window units in closed and locked position.

E. Protect interior and exterior of window units until structure is sealed from the weather.

END OF SECTION

SECTION 08623

SKYLIGHTS

1 PART 1 GENERAL

1.1 SECTION INCLUDES

A. Factory-assembled aluminum-clad wood skylights, fixed units, weather stripping, glass and glazing, and flashing.

B. Factory-assembled molded polycarbonate fixed unit skylights with integral curb.

C. Anchorages, attachments, and shims.

1.2 RELATED SECTIONS

A. Section 06111 - Framing and Sheathing.

B. Section 07212 – Board Insulation.

C. Section 07213 – Batt Insulation.

D. Section 07311 - Asphalt Shingles.

E. Section 07610 – Custom Sheet Metal Roofing.

F. Section 09910 - Painting.

1.3 REFERENCES

A. ASTM C1048 - Heat-treated Flat Glass.

B. ASTM E283 - Rate of Air Leakage through Exterior Windows, Curtain Walls and Doors.

C. ASTM E330 - Structural Performance of Exterior Windows, Curtain Walls and Doors by Uniform Static Air Pressure Difference.

D. ASTM E547 - Water Penetration of Exterior Windows, Curtain Walls and Doors by Cyclic Static Air Pressure Differential.

E. National Wood Window and Door Association (NWWDA): NWWDA I.S.-7 - Industry Standard for Skylight/Roof Windows.

F. National Wood Window and Door Association (NWWDA): NWWDA I.S.-4 - Industry Standard for Water-Repellent Preservative Treatment for Millwork.

G. American Architectural Manufacturers Association (AAMA): AAMA 605.2-Voluntary Specification for High Performance Organic Coatings on Architectural Extrusions and Panels.

H. American Architectural Manufacturers Association (AAMA): AAMA 502 - Voluntary Specification for Field Testing of Windows and Sliding Doors.

I. Federal Specifications (FS): FS L-S-125B - Screening, Insect Non-metallic.

J. ANSI/ASTM E331 - Test Method for Water Penetration of Exterior Windows, Curtain Walls, and Doors by Static Air Pressure Difference.

K. ANSI/ASTM E1886 – Standard Test Method for Performance of Exterior Windows, Curtain Walls, Doors, and Storm Shutters Impacted by Missile(s) and Exposed to Cyclic Pressure Differentials. (impact glazing only)

L. ANSI/ASTM 1996 – Standard Specification for Performance of Exterior Windows, Curtain Walls, Doors, and Storm Shutters Impacted by Windborne Debris in Hurricanes. (impact glazing only)

M. AAMA/WDMA 1600/IS7 - Voluntary Specifications for Skylights.

N. ICBO Evaluation Services Acceptance Criteria AC 17 – Acceptance Criteria for Sloped Glass Glazing in Solariums, Patio Covers and Prefabricated Skylights.

O. National Evaluation Service Committee Report No. NER-216.

P. National Fenestration Rating Council, NFRC – 100, Procedure for Determining Fenestration Product U-factors.

Q. National Fenestration Rating Council, NFRC – 200, Procedure for Determining Fenestration Product Solar Heat Gain Coefficients at Normal Incidence.

R. National Fenestration Rating Council, NFRC 300, Procedures for Determining Solar Optical Properties of Simple Fenestration Products.

S. Occupational Safety & Health Administration, OSHA (Standards – 29 CFR 1910.23, Guarding Floor and Wall Openings and Holes.

1.4 PERFORMANCE REQUIREMENTS – VENTING SKYLIGHTS

A. Manually operated venting skylight to withstand dead and live loads caused by pressure and uplift of wind acting normal to plane of roof as tested in accordance with National Evaluation Services, Inc. to a design pressure of 12-182 psf (575 – 8714 Pa) and an uplift pressure of 22-96 psf (1053 – 4597 Pa) as measured in accordance with AAMA/WDMA 1600/IS7 and ANSI/ASTM E330.

B. Limit member deflection to flexure limit of glass with full recovery of glazing materials.

C. System to accommodate, without damage to components or deterioration of seals, movement between sash and frame and perimeter framing.

D. Unit air leakage, when tested in accordance with AAMA/WDMA 1600/IS7 and ASTM E283 at 1.57 psf (75 Pa) (25 mph), must be 0.17 (0.86 l/s/m²) cfm/sq ft or less.

E. No water penetration when tested in accordance with AAMA/WDMA 1600/IS7 and ASTM E547 under static pressure of 2.86 psf (140 Pa) (33 mph), after 3 cycles of 5 minutes each, with water applied at a rate of 5 gallons per hour per square foot.

F. Gasketing designed to drain water entering joints, condensation occurring in glazing channel, or migrating moisture occurring within system, to exterior by drainage network.

G. Thermal Performance: Tested and certified in accordance with NFRC 100 and 200 procedures.

H. Fall Protection: Laminated glass (0074) tested to meet or exceed the intent of OSHA 29 CFR 1910.23(e)(8) for fall protection. Tested to 1400 ft/lbs. with no glass breakage.

1.5 SUBMITTALS

A. Submit shop drawings and product data in accordance with Section 01000.

B. Indicate pertinent dimensioning, general construction, component connections and locations, anchorage methods and locations, hardware location, accessories, and installation details.

1.6 SAMPLES

A. Provide samples in accordance with Section 01000.

B. Provide sample of unit illustrating glazing system, quality of construction, and color of finish.

1.7 MOCKUP

A. Provide mockup for field testing unit performance requirements and to determine acceptability of unit installation methods.

B. Approved mockup will represent minimum quality for the Work.

C. Mockup may be used with the Work.

1.8 DELIVERY, STORAGE, AND HANDLING

A. Deliver, store and handle products under provisions of Section 01000.

B. Deliver materials to job site in manufacturers or distributor's packaging undamaged, complete with installation instructions.

C. Store off ground, under cover, protected from weather and construction activities.

1.9 WARRANTY

A. Manufacturer's 20-year warranty on the insulated glass units, 10-year warranty on all factory glazed unit components.

2 PART 2 PRODUCTS

2.1 MANUFACTURER

A. Vellux-America Inc.

B. Substitutions: Under provisions of section 01000.

2.2 MANUFACTURED UNITS

A. Factory-assembled aluminum-clad wood, skylights with outward opening sash, with required flashing and counter flashing, size as indicated on Drawings.

2.3 COMPONENTS

A. Frame: Select softwood water-repellent preservative-treated in accordance with NWWDA IS-4. Interior exposed surfaces clear pine, vent units clad with structural aluminum members assembled with screws and concealed cast corner locks.

B. Flashing: Copper prefabricated, and factory installed on frame, type as indicated on Drawings. Copper counter flashings to be field applied.

1. Type EDM Flashing: Prefabricated flashing system designed for use with metal roofing materials and for roof slopes of 15 to 85 degrees. Sill flashing section consists of corrugated apron to allow form fit of roofing material profile.

C. Exterior Cladding: Roll formed aluminum pre-finished production engineered and fabricated to fit exterior exposed surfaces.

D. Glazing Type 0099 10 (Snowload Glazing) Laminated Low-E Gas Filled: Exterior lite 3.0 mm (1/8 inch) clear tempered with Low-E2 coating on surface #2, 11.1 mm (0.44 inch) air space filled with argon gas, interior lite two plies of 3.mm (1/8 inch) tempered laminated with 0.76 mm (0.030 inch) vinyl interlayer.

E. Weatherstripping: Leaf-type vinyl and compression seal at exterior and a flexible vinyl bulb that compresses against glass at interior and thermally isolates sash from interior exposure for condensation protection.

2.4 TOLERANCES

A. Windows to accommodate the following opening tolerances:

1. Vertical Dimensions between High and Low Points: Plus 1/4 inch or minus 0 inch.

2. Width Dimensions: Plus 1/4 inch or minus 0 inch.

2.5 FINISH

A. Aluminum Roll-formed Powdercoated finish.

B. Interior Finish: Unfinished, ready for site finishing, refer to section 09910.

3 PART 3 EXECUTION

3.1 INSTALLATION

A. Install skylights in accordance with manufacturer's recommendations and approved shop drawings to achieve weathertight and freely operating installation.

B. Maintain alignment with adjacent work. Secure assembly to framed openings, plumb and square, without distortion.

C. Coordinate installation of flashings and counter flashings with roofing materials.

D. Place insulation in shim spaces around unit perimeter to maintain continuity of building thermal barrier.

3.2 FINAL CLEANING

A. Clean skylight frames and glass in accordance with Section 01000.

B. Remove labels and visible markings.

3.2 SCHEDULE

A. Locations, models, sizes, flashings, and configurations as scheduled or indicated on Drawings.

END OF SECTION

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SECTION 08712

DOOR HARDWARE

1 PART 1 GENERAL

1.1 SECTION INCLUDES

A. Hardware for hollow steel doors and wood doors.

B. Thresholds.

C. Gasketing and Weather-stripping.

D. Lock Cylinders.

1.2 PRODUCTS FURNISHED BUT INSTALLED UNDER OTHER SECTIONS

A. Furnish templates to Section 08111 – Standard Steel Doors, and Section 08215 – Prefinished Wood Doors, for door and frame preparation.

B. Furnish Door Hardware for installation under Section 06100 – Rough Carpentry.

1.3 REFERENCES

A. ANSI A117.1 - Specifications for Making Buildings and Facilities Accessible to and Usable by Physically Handicapped People.

B. ANSI/NFPA 80 - Fire Doors and Windows.

C. AWI - Architectural Woodwork Institute.

D. BHMA - Builders' Hardware Manufacturers Association.

E. DHI - Door and Hardware Institute.

F. NAAMM - National Association of Architectural Metal Manufacturers.

G. NFPA 101 - Life Safety Code.

H. SDI - Steel Door Institute.

1.4 COORDINATION

A. Coordinate work of this Section with other directly affected Sections involving manufacturer of any internal reinforcement for door hardware.

1.5 QUALITY ASSURANCE

A. Manufacturers: Companies specializing in manufacturing door hardware with minimum five years documented experience.

B. Hardware Supplier: Company specializing in supplying commercial institutional door hardware with five years documented experience.

C. Hardware Supplier Personnel: Employ an Architectural Hardware Consultant (AHC) to assist in the work of this Section.

1.6 REGULATORY REQUIREMENTS

A. Conform to Massachusetts State Building Code for requirements applicable to fire rated doors and frames.

B. Conform to the applicable sections of Chapter 5 of NFPA 101.

C. Conform to ANSI 117.1 for requirements of physically handicapped accessibility.

1.7 CERTIFICATIONS

A. Architectural Hardware Consultant shall inspect complete installation and certify that hardware and installation has been furnished and installed in accordance with manufacturer's instructions and as specified herein.

B. Provide two copies of certifications to Contract Officer.

1.8 SUBMITTALS

A. Submit schedule, shop drawings, and product data under provisions of Section 01300.

B. Indicate locations and mounting heights of each type of hardware.

C. Provide product data on specified hardware.

D. Submit manufacturer's parts lists, templates, and installation instructions under provisions of Section 01300.

E. Submit manufacturer's certificate under provisions of Section 01400 that fire rated hardware meets or exceeds specified requirements.

1.9 OPERATION AND MAINTENANCE DATA

A. Submit operation and maintenance data under provisions of Section 01700.

B. Include data on operation hardware, lubrication requirements, and inspection procedures related to preventative maintenance.

1.10 DELIVERY, STORAGE, AND HANDLING

A. Deliver products to site under provisions of Section 01600.

B. Store and protect products under provisions of Section 01600.

C. Package hardware items individually; label and identify package with door opening code to match hardware schedule.

D. Deliver keys to Owner by security shipment direct from hardware supplier.

E. Protect hardware from theft by cataloging and storing in secure area.

1.11 WARRANTY

A. Provide five-year warranty under provisions of Section 01700.

1.12 MAINTENANCE MATERIALS

A. Provide special wrenches and tools applicable to each different or special hardware component.

B. Provide maintenance tools and accessories supplied by hardware component manufacturer.

2 PART 2 PRODUCTS

2.1 ACCEPTABLE MANUFACTURERS

A.	Hinges:	Hager, Stanley
B.	Lock & Latch Sets:	Schlage, Sargent
C.	Closers:	LCN, Sargent
D.	Panic Device:	VonDuprin, Sargent
E.	Cylinder Locks:	Schlage, Sargent
F.	Protection Plates:	Rockwood, Ives
G.	Wall Bumpers:	Rockwood, Ives
H.	Coordinators:	Door Controls International, H.B. Ives, Glynn Johnson

I. Thresholds: Pemko

J. Weather-strip: Pemko

K. Drop Seals: Pemko

L. Astragals: Pemko

M. Substitutions: Under provisions of Section 01600.

2.2 HINGES, BUTTS AND PIVOT:

A. Templates: Except for hinges and pivots to be installed entirely (both leaves) into wood doors and frames, provide only template produced units.

B. Screws: Phillips flat-head all-purpose or machine screws for installation of units, except furnish Phillips flat-head all-purpose or wood screws for installation of units into wood. Finish screws heads to match surface of hinges and pivots.

C. Tips: Flat button and matching plug, finished to match leaves, except where hospital tip (HT) indicated.

D. Hinge Type: Exterior doors - non-ferrous, heavyweight hinges, with stainless steel, non-removable pins; Hager BB1199.

E. Hinge Type: Interior Doors - Steel, standard weight, with steel, non-rising pins; Hager BB1279. Unless noted otherwise.

F. Spring Hinge: Hager 1250.

G. Hinge Size: 1-3/4" thick doors up to 3'4" wide shall have 4.5 x 4.5 hinges; 1-3/4" thick doors over 3'4" wide, up to 4'0" wide shall have 5" x 4.5" hinges.

2.3 LOCKS, LATCHES AND BOLTS

A. Strikes: Manufacturer's standard wrought box strike for each latch or lock bolt, with curved lip extended to protect frame, finished to match hardware set.

B. Provide dust-proof strikes for foot bolts, except where special threshold construction provides non-recessed strike for bolt.

C. Lock Throw: 1/2" minimum throw of latchbolt; comply with UL requirements for throw of bolts and latch bolts on rated fire openings.

D. Flush Bolt Heads: Minimum of 1/2" diameter rods of brass, bronze, or stainless steel, with minimum 12" long rod.

E. Exit Device Dogging: Except on fire-rated doors, wherever closers are provided on doors equipped with exit devices, equip the units with keyed dogging device to hold the push bar down and the latch bolt in the open position.

F. Locksets: Sargent "10" Line, Schlage “D” Series.

G. Exit Devices: Sargent 80 and 90 Series with lever handle; VonDuprin 98 and 88 Series U.N.O.

H. Door Closers: LCN 4110 Series and 1460 Series.

I. Silencers: Provide all frame with rubber silencers - Ives #20R except frames with door seals.

2.5 ACCESS-FREE CLOSERS

A. Access-Free Manual Closers: Where manual closers are indicated for doors required to be accessible to the physically handicapped, provide adjustable units complying with ANSI A117.1 provisions for door opening force and delayed action closing.

B. Provide grey resilient parts for exposed bumpers.

2.6 DOOR TRIM UNITS

A. Fasteners: Manufacturer's standard exposed fasteners for door trim units (kick plates, edge trim and similar units); either machine screws of self-tapping screw.

B. Fabricate protection plates (armor, kick or mop) not more than 1-1/2" on stop side smaller than the door width, 8" high.

2.7 WEATHER-STRIPPING AND SEALS

A. Thresholds:

1. See Door Schedule.

B. Weather-strip - Pemko 193 CS.

C. Astragals - Pemko Model 293CP.

D. Door Drip - Pemko 420AV.

2.8 KEYING

A. Door Cylinders: Building master keyed.

B. Supply 2 change keys for each lock; 6 master keys for each set.

C. Detailed Keying to be determined in consultation with the Architect and Contract Officer. Coordinate with existing building system.

D. Provide a key control system including envelopes, labels, tags with self-locking key clips, receipt forms, 3-way visible card index, temporary markers, permanent markers, and standard metal cabinet, with capacity for 150% of the number of locks required for the project; provide hinged-panel type cabinet, for wall mounting.

2.9 FINISHES

A. Finishes: All hardware, brushed stainless.

3 PART 3 EXECUTION

3.1 EXAMINATION

A. Verify that doors and frames are ready to receive work and dimensions are as indicated on shop drawings.

B. Verify that power supply is available to power operated devices.

C. Beginning of installation means acceptance of existing conditions.

3.2 INSTALLATION

A. Install hardware in accordance with manufacturer's instructions and requirements of SDI, ANSI/NFPA 80 and DHI, except as noted otherwise on Drawings or Schedule.

B. Use the templates provided by hardware item manufacturer.

C. Conform to ANSI A117.1 for positioning requirements for the handicapped.

3.3 ADJUSTING AND CLEANING

A. Clean exposed surfaces.

B. Adjust operating items of hardware for correct function and smooth operation.

3.4 DEMONSTRATION

A. Demonstrate operation, operating components, adjustment features, lubrication requirements, maintenance and cleaning procedures to Owner under provisions of Section 01600.

3.5 SCHEDULE NOTE: KEY ALL HARDWARE PER OWNER REQUIREMENT

Hardware Schedule

Heading #01

Item #1 — 1 Single door 7 — LHR

36" x 84" x 1 3/4" - HM DR x HM FR

3	Standard Hinge	Hager ECBB1101 4 1/2" x 4 1/2" NRP US32D	US32D
1	Lockset	Schlage L9044 06A 626 LHR L283-712 L283-722	626
1	Dead Lock	Schlage B663 J 626 Less Core	626
1	Surface Closer	LCN 4040XP RWPA 689 1 3/4"	689
1	Kick Plate	Rockwood K1050 8" x 34" US32D BEV CSK	US32D
1	Floor Door Stop	Ives FS18S	
1	Threshold	Pemko 272A36"	A
1	Weatherstripping	Pemko 315CN-36"	C
1	Weatherstripping	Pemko 316APK-36" x 84"	A

Heading #02

Item #2 — 1 Single door 6 — RHR

Item #3 — 1 Single door 8 — LHR

36" x 84" x 1 3/4" - HM DR x HM FR

6	Standard Hinge	Hager ECBB1101 4 1/2" x 4 1/2" NRP US32D	US32D
2	Dead Lock	Schlage B663 J 626 Less Core	626
2	Door Pull	Rockwood 110 x 70B US32D	US32D
2	Push Plate	Rockwood 70C-RKW US26D	US26D
2	Surface Closer	LCN 4040XP RWPA 689 1 3/4"	689
2	Kick Plate	Rockwood K1050 8" x 34" US32D BEV CSK	US32D
2	Floor Door Stop	Ives FS18S	
2	Threshold	Pemko 272A36"	A
2	Weatherstripping	Pemko 315CN-36"	C
2	Weatherstripping	Pemko 316APK-36" x 84"	A

Warwick Ice Rink

Heading #03

Item #4	1 Single door 1	RHR
Item #5	1 Single door 2	RHR
Item #6	1 Single door 3	LHR
Item #7	1 Single door 4	RHR
Item #8	1 Single door 5	LHR
Item #9	1 Single door 12	LHR

36" x 84" x 1 3/4" - HM DR x HM FR

18	Standard Hinge	Hager ECBB1101 4 1/2" x 4 1/2" NRP US32D	US32D
3	Exit Device	Von Duprin 99-L-626-36" x 84" Door 1 3/4"-LHR-996L-R/626	626/626
3	Exit Device	Von Duprin 99-L-626-36" x 84" Door 1 3/4"-RHR-996L-R/626	626/626
6	Cylinder	Schlage 20-079 Open 626 Less Core	626
6	Surface Closer	LCN 4040XP RWPA 689 1 3/4"	689
6	Kick Plate	Rockwood K1050 8" x 34" US32D BEV CSK	US32D
6	Floor Door Stop	Ives FS18S	
6	Threshold	Pemko 272A36"	A
6	Weatherstripping	Pemko 315CN-36"	C
6	Weatherstripping	Pemko 316APK-36" x 84"	A

Heading #04

Item #10	1 Single door 10	RHR

36" x 84" x 1 3/4" - HM DR x HM FR - BW

3	Standard Hinge	Hager ECBB1101 4 1/2" x 4 1/2" NRP US32D	US32D
1	Exit Device	Von Duprin 99-L-F-626-36" x 84" Door 1 3/4"-RHR-996L-R/626	626/626
1	Cylinder	Schlage 20-079 Open 626 Less Core	626
1	Surface Closer	LCN 4040XP RWPA 689 1 3/4"	689
1	Kick Plate	Rockwood K1050 8" x 34" US32D BEV CSK	US32D
1	Floor Door Stop	Ives FS18S	
1	Threshold	Pemko 272A36"	A
1	Weatherstripping	Pemko 315CN-36"	C
1	Weatherstripping	Pemko 316APK-36" x 84"	A

Warwick Ice Rink

Heading #05

Item #11 — 1 Single door 9 — LHR

36" x 84" x 1 3/4" - HM DR x HM FR - BW

3	Standard Hinge	Hager ECBB1101 4 1/2" x 4 1/2" NRP US32D	US32D
1	Lockset	Schlage L9080 J 06A 626 LHR	626
1	Surface Closer	LCN 4040XP RWPA 689 1 3/4"	689
1	Kick Plate	Rockwood K1050 8" x 34" US32D BEV CSK	US32D
1	Floor Door Stop	Ives FS18S	
1	Threshold	Pemko 272A36"	A
1	Weatherstripping	Pemko 315CN-36"	C
1	Weatherstripping	Pemko 316APK-36" x 84"	A

Heading #05

Item #12 — 1 Single door 11 — LH

36" x 84" x 1 3/4" - HM DR x HM FR

3	Standard Hinge	Hager ECBB1101 4 1/2" x 4 1/2" NRP US32D	US32D
1	Lockset	Schlage L9080 J 06A 626 LH	626
1	Surface Closer	LCN 4040XP RWPA 689 1 3/4"	689
1	Kick Plate	Rockwood K1050 8" x 34" US32D BEV CSK	US32D
1	Floor Door Stop	Ives FS18S	
1	Threshold	Pemko 272A36"	A
1	Weatherstripping	Pemko 315CN-36"	C
1	Weatherstripping	Pemko 316APK-36" x 84"	A

Warwick Ice Rink

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SECTION 08800

GLAZING

1 PART 1 GENERAL

1.1 SECTION INCLUDES

A. Glazing for windows and doors in related sections.

B. Mirrors for Men’s and Women’s Restrooms.

1.2 RELATED SECTIONS

A. Section 07900 - Joint Sealers: Sealant and backup materials.

B. Section 08111 - Standard Steel Doors and Frames.

C. Section 08215 - Prefinished Wood Doors.

D. Section 08410 – Aluminum Entrances and Storefronts.

1.3 REFERENCES

A. ANSI/ASTM E330 - Structural Performance of Exterior Windows, Curtain Walls, and Doors by Uniform Static Air Pressure Difference.

B. ANSI Z97.1 - Safety Performance Specifications and Methods of Test for Safety Glazing Used in Buildings.

C. ASTM C1036 - Flat Glass.

D. ASTM C1048 - Heat-Treated Flat Glass - Kind HS, Kind FT Coated and Uncoated Glass.

E. ASTM E546 - Test Method for Frost Point of Sealed Insulating Glass Units.

F. ASTM E576 - Test Method for Dew/Frost Point of Sealed Insulating Glass Units in Vertical Position.

G. ASTM E773 - Test Method for Seal Durability of Sealed Insulating Glass Units.

H. ASTM E774 - Sealed Insulating Glass Units.

I. FGMA - Glazing Manual.

J. FGMA - Sealant Manual.

K. FS TT-C-00598 - Calking Compound, Oil and Resin Base Type.

L. FS TT-S-001657 - Sealing Compound, Single Component, Butyl Rubber Based, Solvent Release Type.

M. FS TT-S-00227 - Sealing Compound, Rubber Base, Two Component.

N. FS TT-S-00230 - Sealing Compound, Synthetic-Rubber Base, Single Component, Chemically Curing.

0. FS TT-S-01543 - Sealing Compound, Silicone Rubber Base.

P. FS TT-G-410 - Glazing Compound, Sash (Metal) for Back Bedding and Face Glazing (Not for Channel or Stop Glazing).

Q. Laminators Safety Glass Association - Standards Manual.

R. SIGMA - Sealed Insulated Glass Manufacturers Association.

S. NAMM (National Association of Mirror Manufacturers) – Tips for the Professional on the Care and Handling of Mirrors.

1.4 PERFORMANCE REQUIREMENTS

A. Size glass to withstand dead loads and positive and negative live loads acting normal to plane of glass as calculated in accordance with R.I. State Building Code.

B. Limit glass deflection to 1/200 or flexure limit of glass with full recovery of glazing materials, whichever is less.

1.5 QUALITY ASSURANCE

A. Conform to Flat Glass Marketing Association (FGMA) Glazing Manual and Glazing Sealing Systems Manual for glazing installation methods.

1.6 SUBMITTALS

A. Submit product data under provisions of Section 01300.

B. Provide structural, physical and environmental characteristics, size limitations, special handling or installation requirements.

C. Provide chemical, functional and environmental characteristics and limitations and special application requirements data on glazing compounds. Identify colors available.

D. Submit samples under provisions of Section 01300.

E. Submit two samples, 4 x 4 inches in size, illustrating glass unit, coloration and design.

F. Submit 6 inch long bend of glazing sealant, color(s) as selected by Architect.

G. Submit sealed glass unit manufacturer's certificate under provisions of Section 01400 indicating units meet or exceed specified requirements.

1.7 DELIVERY, STORAGE, AND PROTECTION

A. Deliver products to site under provisions of Section 01600.

B. Store and protect products under provisions of Section 01600.

1.8 PRE-INSTALLATION CONFERENCE

A. Convene one week prior to commencing work of this Section, under provisions of Section 01039.

1.9 ENVIRONMENTAL REQUIREMENTS

A. Do not install glazing when ambient temperature is less than 50 degrees F.

B. Maintain minimum ambient temperature before, during and 24 hours after installation of glazing compounds.

1.10 FIELD MEASUREMENTS

A. Verify that field measurements are as indicated on Drawings or as instructed by the manufacturer.

1.11 COORDINATION

A. Coordinate Work under provisions of Section 01039.

B. Coordinate the Work with glazing frames, wall openings and adjacent work.

1.12 WARRANTY

A. Provide ten-year manufacturer's warranty under provisions of Section 01700.

B. Warranty: Include coverage of sealed glass units from seal failure, interpane dusting or misting, and replacement of same.

2 PART 2 PRODUCTS

2.1 ACCEPTABLE GLASS MANUFACTURERS

A. PPG Industries, Inc.

B. AFG Industries, Inc.

C. Libbey-Owens-Ford Company.

D. Hordis Brothers, Inc.

E. Substitutions: Under provisions of Section 01600.

2.2 FLAT GLASS MATERIALS

A. Wire Glass: Clear, ASTM C1036, polished both sides; square mesh of woven stainless steel wire of 1/2 inch grid size; 1/4 inch thick.

B. Safety Insulated Glass Units: ASTM E774 and E773 double pane with glass elastomer or glass to mastic edge seal; outer pane of 1/4" clear laminated safety glass, inner pane of 1/4" clear laminated safety glass total unit thickness of one inch, interpane space purged with dry hermetic air.

C. Tempered Safety Glass: ASTM C1048, kind FT; fully tempered; Condition A uncoated; Type 1 transparent flat, Class 1 clear; ¼ inch (6 mm) thick minimum; Quality Q3 glazing select; conforming to ANSI Z97.1.

D. Float Glass: ASTM C1036, Type 1 transparent flat, Class 1 clear, Quality Q3 glazing select; ¼ inch (6 mm) minimum thick.

E. Mirror Glass: ASTM 1036, Type 1 transparent flat, Class 1 clear, Quality 1 mirror select; float type with copper and silver coating, organic overcoating, square and lapped edges, ¼ inch (6 mm) thick minimum, sizes as indicated on Drawings.

2.3 ACCEPTABLE GLAZING COMPOUND MANUFACTURERS

A. Pecora.

B. Dow Corning.

C. Tremco.

D. Substitutions: Under provisions of Section 01600.

2.4 GLAZING COMPOUNDS

A. Polysulphide Sealant: FS TT-S-00227; Class A, Type II; two component; cured Shore A hardness of 15-25; color(s) selected by Architect.

B. Silicone Sealant: FS TT-S-01543; Class A; single component; solvent curing; capable of water immersion without loss of properties; cured Shore A hardness of 15-25; color(s) selected by Architect.

2.5 ACCEPTABLE GLAZING ACCESSORIES MANUFACTURERS

A. Woodmont Products, Inc.

B. Tremco.

C. PTI.

D. Substitutions: Under provisions of Section 01600.

2.6 GLAZING ACCESSORIES

A. Setting Blocks: Neoprene, EPDM or Silicone; 80-90 - Shore A durometer hardness; minimum 4 inch long x width of glazing rabbit space minus 1/16 inch x height to suit glazing method and pane weight and area.

B. Spacer Shims: Neoprene, EPDM or Silicone; 50-60 Shore A durometer hardness; minimum 3 inch long x one half the height of the glazing stop x thickness to suit application; self adhesive one face.

C. Glazing Tape: Preformed butyl compound with integral resilient tube spacing device; 10-15 Shore A durometer hardness; coiled on release paper; 3/8 x 1/16 inch size; black color.

D. Glazing Splines: Resilient polyvinylchloride extruded shape to suit glazing channel retaining slot; color as selected.

E. Mirror Attachment Accessories: Stainless steel J-profile channels and plywood back panels.

3 PART 3 EXECUTION

3.1 EXAMINATION

A. Verify prepared openings under provisions of Section 01039.

B. Verify surfaces of glazing channels or recesses are clean, free of obstructions, and ready for work of this Section.

C. Beginning of installation means acceptance of substrate.

3.2 PREPARATION

A. Clean contact surfaces with solvent and wipe dry.

B. Seal porous glazing channels or recesses with substrate compatible primer or sealer.

C. Prime surfaces scheduled to receive sealant.

3.3 EXTERIOR-WET METHOD (SEALANT AND SEALANT)

A. Place setting blocks at 1/4 points and install glass pane or unit.

B. Install removable stops with pane centered in space by inserting spacer shims both sides at 24-inch intervals, 1/4 inch below sightline.

C. Fill gaps between pane and stops with polysulphide or silicone type sealant to depth equal to bite of frame on pane, but not more than 3/8 inch below sightline.

D. Apply sealant to uniform line, flush with sightline. Tool or wipe sealant surface with solvent for smooth appearance.

3.4 INTERIOR-DRY METHOD (TAPE AND TAPE)

A. Cut glazing tape to length and set against permanent stops, projecting 1/16 inch above sightline.

B. Place setting blocks at 1/4 points.

C. Rest glass on setting blocks and push against tape for full contact at perimeter of pane.

D. Place glazing tape on free perimeter of pane in same manner described above.

E. Install removable stop without displacement of tape. Exert pressure on tape for full continuous contact.

F. Knife trim protruding tape.

3.5 MIRROR INSTALLATION

A. Set mirrors with J-channels. Anchor rigidly to substrate.

B. Place plumb, level and without visible distortion.

C. Store, protect, and install mirrors in accordance with NAMM.

3.6 CLEANING

A. Clean Work under provisions of Section 01700.

B. Remove glazing materials from finish surfaces.

C. Remove labels after work is completed.

D. Clean glass.

3.7 PROTECTION OF FINISHED WORK

A. Protect finished Work under provisions of Section 01600.

B. After installation, mark pane with an "X" using removable plastic tape or paste.

END OF SECTION

DIVISION 9

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SECTION 09211

GYPSUM BOARD SYSTEMS

1 PART 1 GENERAL

1.1 SECTION INCLUDES

A. Gypsum board and joint treatment

B. Cementitious backer board.

C. Accessories.

1.2 RELATED SECTIONS

A. Section 04200 - Unit Masonry.

B. Section 06111 - Framing and Sheathing.

C. Section 06120 - Structural Panels.

D. Section 07212 – Board Insulation.

E. Section 07213 – Batt Insulation.

F. Section 09261 - Gypsum Veneer Plaster.

G. Section 09300 – Ceramic Tile.

H. Section 09910 – Painting.

I. Section 10281 - Toilets and Bath Accessories.

1.3 REFERENCES

A. ASTM C1396 - Standard Specification for Gypsum Board.

B. ASTM C475 - Standard Specification for Joint Compound and Joint Tape for Finishing Gypsum Board.

C. ASTM C514 - Standard Specification for Nails for the Application of Gypsum Wallboard.

D. ASTM C557 - Standard Specification for Adhesives for Fastening Gypsum Wallboard to Wood Framing.

E. ASTM C840 - Standard Specification for Application and Finishing of Gypsum Board.

F. ASTM C1002 - Standard Specification for Steel Drill Screws for the Application of Gypsum Board or Metal Plaster Bases.

G. ASTM E90 - Standard Test Method for Laboratory Measurement of Airborne - Sound Transmission Loss of Building Partitions.

H. ASTM E119 - Standard Test Methods for Fire Tests of Building Construction and Materials.

I. GA-214 - Recommended Specification: Levels of Gypsum Board Finish.

J. GA-216 - Recommended Specifications for the Application and Finishing of Gypsum Board.

K. GA-600 - Fire Resistance Design Manual.

L. UL - Fire Resistance Directory.

M. WH (Warnock Hersey) - Certification Listings.

1.4 SYSTEM DESCRIPTION

A. Acoustic Attenuation for Identified Interior Partitions: STC rating in accordance with ASTM E90 as indicated on Drawings.

1.5 SUBMITTALS FOR REVIEW

A. Section 01000 – Basic Requirements: Procedures for submittals.

B. Shop Drawings: Indicate special details associated with fireproofing, acoustic seals, and fire ratings.

C. Product Data: Provide data on metal framing, acoustic accessories, special fasteners, anchors and clips, gypsum board, joint tape, batten; decorative finish, and edge trim.

D. Samples: Submit two samples of sound isolation clips, special fasteners, anchors and clips.

1.6 QUALITY ASSURANCE

A. Perform Work in accordance with ASTM C840, GA-214, GA-216 and GA-600.

B. Applicator Qualifications: Company specializing in performing the work of this section with minimum three years documented experience.

1.7 REGULATORY REQUIREMENTS

A. Conform to applicable code for fire rated assemblies in conjunction with related sections as follows:

1. Fire Rated Partitions: Listed assembly by UL, WH, or GA File No. UL as indicated on Drawings.

2. Fire Rated Ceiling and Soffits: Listed assembly by UL, WH, or GA File No. as indicated on Drawings.

3. Fire Rated Structural Column Framing: Listed assembly by UL, WH, or GA File No. as indicated on Drawings.

4. Fire Rated Structural Beam Framing: Listed assembly by UL, WH, or GA File No. as indicated on Drawings.

2 PART 2 PRODUCTS

2.1 MANUFACTURERS – GYPSUM BOARD ASSEMBLIES

A. United States Gypsum Company.

B. Gold Bond Building Products, Division of National Gypsum Company.

C. Georgia-Pacific Corporation.

D. Louisiana-Pacific Corporation.

E. Substitutions: Refer to Section 01000 – Basic Requirements.

2.2 FRAMING MATERIALS

A. Studs, Furring, Framing, and Accessories: Specified in Section 061112.

B. Fasteners: ASTM C514 for nails and ASTM C1002 for screws or GA-216.

C. Anchorage to Substrate: Tie wire, nails, screws, and other metal supports, of type and size to suit application; to rigidly secure materials in place.

D. Adhesive: ASTM C557 or GA-216.

2.3 GYPSUM BOARD MATERIALS

A. Standard Gypsum Board: ASTM C1396; 3/8, 1/2, and 5/8 inch (10, 13, and 16 mm) thick as indicated on Drawings, maximum available length in place; ends square cut, tapered edges.

B. Fire Rated Gypsum Board: ASTM C1396; fire resistive type, UL or WH rated; 1/2 and 5/8 inch (13 and 16 mm) thick as indicated on Drawings, maximum available length in place; ends square cut, tapered edges.

C. Moisture Resistant Gypsum Board: ASTM C1396; 1/2 and 5/8 inch (13 and 16 mm) thick as indicated on Drawings, maximum available length in place; ends square cut, tapered edges.

D. Gypsum Backing Board: ASTM C1396; standard and fire rated type; 3/8, 1/2 and 5/8 inch (10, 13 and 16 mm) thick as indicated on Drawings; square edges, ends square cut, maximum available size in place.

E. Cementitious Backing Board: High density, glass fiber reinforced, 1/2 inch (13 mm) thick; 2 inch (50 mm) wide, coated glass fiber tape for joints and corners; Durock manufactured by United States Gypsum Company.

2.4 ACCESSORIES

A. Acoustic Insulation: As specified in Section 07211.

B. Acoustic Sealant: Non-hardening, non-skinning, for use in conjunction with gypsum board; USG Acoustic Sealant manufactured by United States Gypsum Company.

C. Corner Beads: Metal or metal and paper combination.

D. Edge Trim: GA-216; Type L and U exposed reveal bead as indicated on Drawings.

E. Joint Materials: ASTM C475, and GA-201 and GA-216; reinforcing tape, joint compound, adhesive, and water.

F. Fasteners: ASTM C1002, Type W for wood, and GA-216.

3 PART 3 EXECUTION

3.1 EXAMINATION

A. Section 01000 – Basic Requirements: Verification of existing conditions before starting work.

B. Verify that site conditions are ready to receive work and opening dimensions are as indicated on shop drawings and instructed by the manufacturer.

3.2 WALL FURRING INSTALLATION

A. Erect wall furring for direct attachment to concrete unit masonry, brick and concrete walls.

B. Install thermal insulation in conjunction with Section 07211 between Z-furring channels directly attached to substrate walls in accordance with manufacturer's instructions.

C. Erect stud framing tight to substrate walls or as indicated on Drawings.

3.3 FURRING FOR FIRE RATINGS

A. Install furring as required for fire resistance ratings indicated and to GA-600 requirements.

3.4 ACOUSTIC ACCESSORIES INSTALLATION

A. Install resilient channels at maximum 24 inches (600 mm) on center or as indicated on Drawings. Locate joints over framing members.

B. Install resilient furring channels perpendicular to framing members.

C. Locate first resilient furring channel parallel to floor and maximum of 3 inches (75 mm) above floor and 1 furring channel maximum of 6 inches (150 mm) from ceiling.

D. Place acoustic insulation in partitions tight within spaces, around cut openings, behind and around electrical and mechanical items within or behind partitions, and tight to items passing through partitions.

E. Install acoustic sealant within partitions in accordance with manufacturer's instructions.

F. Install acoustic sealant at gypsum board perimeter at:

1. Framing: Two beads.

2. Base Layer.

3. Face Layer.

4. Caulk all penetrations of partitions by conduit, pipe, duct work, and rough-in boxes.

G. Gypsum Board: Install gypsum board in vertical or horizontal position with 1/8 inch (3-mm) to 1/4-inch (6-mm) gap around perimeter for acoustical sealant application.

H. Acoustical Sealant:

1. Seal potential air leaks with acoustical sealant to achieve best Field Sound Transmission Class (FSTC.)

2. Seal electrical outlets and penetrations with acoustical sealant.

3. Apply fire-rated acoustical sealant at locations where fire-rated assembly is required.

I. Putty Pad Sealant: Acoustically seal electrical boxes in walls and ceilings in which resilient sound isolation clips are used with putty pads.

3.5 GYPSUM BOARD INSTALLATION

A. Install gypsum board in accordance with GA-216 and GA-600 and manufacturer's instructions.

B. Erect single layer standard gypsum board in most economical direction, with ends and edges occurring over firm bearing.

C. Erect single layer fire rated gypsum board vertically, with edges and ends occurring over firm bearing.

D. Erect exterior gypsum sheathing horizontally, with edges butted tight and ends occurring over firm bearing.

E. Use screws when fastening gypsum board to wood furring or framing.

F. Double Layer Applications: Use gypsum backing board for first layer, placed parallel to framing or furring members. Use fire rated gypsum backing board for fire rated partitions and ceilings.

G. Place second layer perpendicular to first layer. Offset joints of second layer from joints of first layer.

H. Erect exterior gypsum soffit board perpendicular to supports, with staggered end joints over supports.

I. Treat cut edges and holes in moisture resistant gypsum board and exterior gypsum soffit board with sealant.

J. Place control joints consistent with lines of building spaces as indicated on Drawings or as directed.

1. Control Joint Spacing: Maximum 12 feet (3.5 m) for linear work.

2. Locate above metal door frames directly above each jamb.

3. Fill joints constructed of back-to-back casing beads with a low modulus sealant capable of flexible joint movement.

K. Place corner beads at external corners as indicated. Use longest practical length. Place edge trim where gypsum board abuts dissimilar materials as indicated.

L. Install backing board over studs in accordance with manufacturer's instructions.

M. Apply gypsum board to curved walls in accordance with GA-216.

3.6 JOINT TREATMENT

A. Finish in accordance with GA-214 Level 4.

B. Tape, fill, and sand exposed joints, edges, and corners to produce smooth surface ready to receive finishes.

C. Feather coats on to adjoining surfaces so that camber is maximum 1/32 inch (0.8 mm).

D. Taping, filling, and sanding is not required at surfaces behind adhesive applied ceramic tile.

E. Fill and finish joints and corners of cementitious backing board.

3.7 TOLERANCES

A. Maximum Variation of Finished Gypsum Board Surface from True Flatness: 1/8 inch in 10 feet (3 mm in 3 m) in any direction.

3.8 SCHEDULES

A. Finishes, not scheduled for veneer plaster finish, in accordance with GA-214 Level:

1. Level 2: Above finished ceilings concealed from view.

2. Level 4: Walls and ceilings exposed to view.

END OF SECTION

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SECTION 09511

SUSPENDED ACOUSTICAL CEILINGS

1 PART 1 GENERAL

1.1 SECTION INCLUDES

A. Suspended metal grid ceiling system.

B. Acoustical panels.

C. Perimeter trim.

1.2 RELATED SECTIONS

A. Division 15 - Mechanical: Sprinkler work and heads.

B. Division 15 - Mechanical: Mechanical work and air diffusion devices.

C. Division 16 - Electrical: Electrical work and light fixtures.

1.3 REFERENCES

A. ASTM C635 - Metal Suspension Systems for Acoustical Tile and Lay-in Panel Ceilings.

B. ASTM C636 - Installation of Metal Ceiling Suspension Systems for Acoustical Tile and Lay-in Panels.

C. FS HH-I-521 - Insulation Blankets, Thermal Mineral Fiber, for Ambient Temperatures.

1.4 QUALITY ASSURANCE

A. Manufacturer: Company specializing in manufacture of ceiling suspension system and ceiling tile with three years minimum documented experience.

B. Installer: Company with three years minimum documented experience.

1.5 REGULATORY REQUIREMENTS

A. Conform to applicable code for fire rated assembly and combustibility requirements for materials.

1.6 SUBMITTALS

A. Submit product data and samples on metal grid system components, acoustic units, and acoustic insulation under provisions of Section 01300.

B. Submit two samples, full size, illustrating material and finish of acoustic units.

C. Submit two samples each, 6 inches long, of suspension system main runner, cross runner, edge trim and hold-down clips.

D. Submit manufacturer's installation instructions under provisions of Section 01300.

1.7 ENVIRONMENTAL REQUIREMENTS

A. Maintain uniform temperature of minimum 60 degrees F, and humidity of 20 to 40 percent prior to, during, and after installation.

1.8 SEQUENCING/SCHEDULING

A. Do not install acoustical ceilings until dust generating activities have terminated, and overhead work is completed, tested, and approved.

B. Schedule installation of acoustic units after interior wet work is dry.

1.9 EXTRA STOCK

A. Provide 1 extra carton of each type acoustic panel to Owner under provisions of Section 01700.

2 PART 2 PRODUCTS

2.1 ACCEPTABLE MANUFACTURERS - SUSPENSION SYSTEM

A. Armstrong.

B. Donn Corporation.

C. National Rolling Mills, Inc.

D. Substitutions: Under provisions of Section 01600.

2.2 SUSPENSION SYSTEM MATERIALS

A. Grid: ASTM C635, Armstrong Suprafine ML, 24 x 24 inch grid, non-fire rated and fire rated as indicated on Drawings, exposed T; components die cut and interlocking.

B. Accessories: Stabilizer bars, clips, splices and shadow edge moldings and hold-down clips required for suspended grid system.

C. Grid Materials: Commercial quality cold rolled steel with galvanized coating.

D. Grid Finish: Factory applied, white color.

E. Support Channels and Hangers: Primed steel (galvanized in wet areas); size and type to suit application, to rigidly secure acoustic ceiling system including integral mechanical and electrical components with maximum deflection of 1/360.

2.3 ACCEPTABLE MANUFACTURERS - ACOUSTIC UNITS

A. Armstrong.

B. Substitutions: Under provisions of Section 01600.

2.4 ACOUSTIC UNIT MATERIALS

A. 24" x 24" x 3/4" thick; Class 25 - U. L. Label; non-combustible composition, square edge, lay-in panel; Scored beveled Tigular Cirrus by Armstrong.

2.5 ACCESSORIES

A. Gypsum Board: UL fire rated type, 5/8 inch thick, ends and edges square, paper faced.

3 PART 3 EXECUTION

3.1 INSPECTION

A. Verify that existing conditions are ready to receive work.

B. Verify that layout of hangers will not interfere with other work.

C. Beginning of installation means acceptance of existing conditions.

3.2 INSTALLATION

A. Install system in accordance with ASTM C636 and as supplemented in this Section.

B. Install system capable of supporting imposed loads to a deflection of 1/360 maximum.

C. Install after major above ceiling work is complete. Coordinate the location of hangers with other work.

D. Provide and install hangers and inserts as required to appropriate Sections.

E. Hang system independent of walls, columns, ducts, pipes and conduit. Where carrying members are spliced, avoid visible displacement of face plane of adjacent members.

F. Where ducts or other equipment prevent the regular spacing of hangers, reinforce the nearest affected hangers and related carrying channels to span the extra distance.

G. Center system on room axis leaving equal border units according to reflected plan.

H. Do not support components on main runners or cross runners if weights causes total dead load to exceed deflection capability. Support fixture loads by supplementary hangers located within 6 inches of each corner; or support components independently.

I. Do not eccentrically load system, or produce rotation of runners.

J. Install edge molding at intersection of ceiling and vertical surfaces, using longest practical lengths. Miter corners. Provide edge molding at junctions with other interruptions. Field rabbett tile or panel edge. Where bullnose concrete corners occur, provide preformed closers to match edge molding.

K. Fit acoustic units in place, free from damaged edges or other defects detrimental to appearance and function.

L. Lay directional patterned units one way with pattern parallel to longest room axis. Fit border neatly against abutting surfaces.

M. Install acoustic units level, in uniform plane, and free from twist, warp and dents.

N. Install hold-down clips to retain panels tight to grid system within 20 feet of an exterior door.

3.3 TOLERANCES

A. Variation from Flat and Level Surface: 1/8 inch in 10 ft.

B. Variation from Plumb of Grid Members Caused by Eccentric Loads: Two degrees maximum.

END OF SECTION

SECTION 09910

PAINTING

1 PART 1 GENERAL

1.1 SECTION INCLUDES

A. Surface preparation.

B. Field application of paints, stains, varnishes, and other coatings.

1.2 RELATED SECTIONS

A. Section 06200 - Finish Carpentry.

B. Section 07462 - Exterior Siding.

C. Section 07920 - Joint Sealers.

1.3 REFERENCES

A. ASTM D16 - Standard Terminology Relating to Paint, Varnish, Lacquer, and Related Products.

B. ASTM D4442 - Standard Test Methods for Direct Moisture Content Measurement of Wood and Wood-Base Materials.

C. NACE (National Association of Corrosion Engineers) - Industrial Maintenance Painting.

D. NPCA - Guide to U.S. Government Paint Specifications; National Paint and Coatings Association.

E. PDCA - Architectural Specifications Manual; Painting and Decorating Contractors of America.

F. SSPC - Steel Structures Painting Manual; Steel Structures Painting Council.

G. ASTM D1730 – Preparation of Aluminum and Aluminum-Alloy Surfaces for Painting.

1.4 DEFINITIONS

A. Conform to ASTM D16 for interpretation of terms used in this section.

1.5 SUBMITTALS FOR REVIEW

A. Section 01000 – Basic Requirements: Procedures for submittals.

B. Product Data: Provide data on all finishing products and special coatings.

C. Samples:

1. Submit two paper chip samples, 2-1/2 x 2-1/2 inch (64 x 64 mm) in size illustrating range of colors and textures available for each surface finishing product scheduled.
2. Submit two painted samples, illustrating selected colors and textures for each color and system selected with specified coats cascaded. Submit on tempered hardboard, 12 x 12 inch (300 x 300 mm) in size.

1.6 SUBMITTALS FOR INFORMATION

A. Manufacturer's Instructions: Indicate special surface preparation procedures, and substrate conditions requiring special attention.

1.7 QUALITY ASSURANCE

A. Manufacturer Qualifications: Company specializing in manufacturing the products specified in this section with minimum ten years documented experience.

B. Applicator Qualifications: Company specializing in performing the work of this section with minimum three years documented experience or approved by manufacturer.

1.8 REGULATORY REQUIREMENTS

A. Conform to applicable code for flame and smoke rating requirements for products and finishes.

1.9 DELIVERY, STORAGE, AND PROTECTION

A. Section 01000 – Basic Requirements: Transport, handle, store, and protect products.

B. Deliver products to site in sealed and labeled containers; inspect to verify acceptability.

C. Container Label: Include manufacturer's name, type of paint, brand name, lot number, brand code, coverage, surface preparation, drying time, cleanup requirements, color designation, and instructions for mixing and reducing.

D. Paint Materials: Store at minimum ambient temperature of 45 degrees F (7 degrees C) and a maximum of 90 degrees F (32 degrees C), in ventilated area, and as required by manufacturer's instructions.

1.10 ENVIRONMENTAL REQUIREMENTS

A. Section 01000 – Basic Requirements: Environmental conditions affecting products on site.

B. Do not apply materials when surface and ambient temperatures are outside the temperature ranges required by the paint product manufacturer.

C. Do not apply exterior coatings during rain or snow, or when relative humidity is outside the humidity ranges required by the paint product manufacturer.

D. Minimum Application Temperatures for Latex Paints: 45 degrees F (7 degrees C) for interiors; 50 degrees F (10 degrees C) for exterior; unless required otherwise by manufacturer's instructions.

E. Minimum Application Temperature for Varnish and Shellac Finishes: 65 degrees F (18 degrees C) for interior or exterior, unless required otherwise by manufacturer's instructions.

F. Provide lighting level of 80 ft candles (860 lx) measured mid-height at substrate surface.

1.11 PROJECT CONDITIONS

A. Section 01000 – Basic Requirements.

B. Sequence application to the following:

1. Do not apply finish coats until paintable sealant is applied.
2. Back prime wood trim before installation of trim.

1.12 EXTRA MATERIALS

A. Section 01000 – Basic Requirements.

B. Supply 1 gallon (4 L) of each color, type, and surface texture; store where directed.

C. Label each container with color, type, texture, and room locations in addition to the manufacturer's label.

2 PART 2 PRODUCTS

2.1 MANUFACTURERS

A. Manufacturers - Paint

1. Benjamin Moore and Company.
2. PPG Industries.
3. Sherwin Williams
4. Or equal as approved by Architect.

2.2 MATERIALS

A. Coatings: Ready mixed, except field catalyzed coatings. Prepare pigments:

1. To a soft paste consistency, capable of being readily and uniformly dispersed to a homogeneous coating.
2. For good flow and brushing properties.
3. Capable of drying or curing free of streaks or sags.

B. Accessory Materials: Linseed oil, shellac, turpentine, paint thinners and other materials not specifically indicated but required to achieve the finishes specified; commercial quality.

C. Patching Materials: Latex filler.

D. Fastener Head Cover Materials: Latex filler.

2.3 FINISHES

A. Refer to schedule at end of section for surface finish.

2.4 LADDERS AND SCAFFOLDING

A. Provide all necessary lifts, ladders and scaffolding to safely complete the work in this section.

3 PART 3 EXECUTION

3.1 EXAMINATION

A. Section 01000 – Basic Requirements: Verification of existing conditions before starting Work.

B. Verify that surfaces and substrate conditions are ready to receive Work as instructed by the product manufacturer.

C. Examine surfaces scheduled to be finished prior to commencement of work. Report any condition that may potentially affect proper application.

D. Test shop applied primer for compatibility with subsequent cover materials.

E. Measure moisture content of surfaces using an electronic moisture meter. Do not apply finishes unless moisture content of surfaces are below the following maximums:

1. Plaster and Gypsum Wallboard: 12 percent.
2. Masonry, Concrete, and Concrete Unit Masonry: 12 percent.
3. Interior Wood: 15 percent, measured in accordance with ASTM D4442.
4. Exterior Wood: 15 percent, measured in accordance with ASTM D4442.
5. Concrete Floors: 8 percent.

3.2 PREPARATION

A. Surface Appurtenances: Remove or mask electrical plates, hardware, light fixture trim, escutcheons, and fittings prior to preparing surfaces or finishing.

B. Surfaces: Correct defects and clean surfaces which affect work of this section. Remove or repair existing coatings that exhibit surface defects.

C. Marks: Seal with shellac those which may bleed through surface finishes.

D. Interior Wood Items to Receive Paint Finish: Wipe off dust and grit prior to priming. Seal knots, pitch streaks, and sappy sections with sealer. Fill nail holes and cracks after primer has dried; sand between coats.

E. Exterior Wood to Receive Paint Finish

1. New Siding and Trim:
Remove dust, grit, and foreign matter. Seal knots, pitch streaks, and sappy sections. Caulk all joints in compliance with Section 079200 Joint Sealers. Fill nail holes with tinted exterior caulking compound after prime coat has been applied.

3.3 APPLICATION

A. Apply products in accordance with manufacturer's instructions.

B. Do not apply finishes to surfaces that are not dry. Allow applied coats to dry before next coat is applied.

C. Apply each coat to uniform appearance. Apply each coat of paint slightly darker than preceding coat unless otherwise approved.

D. Sand wood and metal surfaces lightly between coats to achieve required finish.

E. Vacuum clean surfaces of loose particles. Use tack cloth to remove dust and particles just prior to applying next coat.

F. Prime concealed surfaces of interior and exterior woodwork with primer paint.

3.4 FIELD QUALITY CONTROL

A. Section 01000 – Basic Requirements: Field inspection and testing.

B. Inspect and test questionable coated areas.

3.5 CLEANING

A. Section 01000 – Basic Requirements: Cleaning installed work.

B. Collect waste material which may constitute a fire hazard, place in closed metal containers, and remove daily from site.

3.6 SCHEDULE - EXTERIOR PAINT SYSTEMS, Benjamin Moore - Basis of Design

A. Provide following paint systems for various substrates, as indicated.

B. Use deep base primers where required for proper coverage.

C. General Painted Wood and Trim

1. Soft Gloss Finish: 2 Finish coats over primer.

a. Prime Coat: Exterior Primer Coating.
Benjamin Moore: Moorewhite Primer (100).

b. First and Second Finish Coats: Acrylic Latex.
Benjamin Moore: Moorglo Latex House and Trim Paint (096).

3.7 SCHEDULE - INTERIOR PAINT SYSTEMS, Benjamin Moore - Basis of Design.

A. Provide the following paint systems for the various substrates, as indicated.

B. Painted Woodwork

1. Satin Enamel Finish: 3 Coats.

a. First Coat: Interior Enamel Undercoat.
Benjamin Moore: Moore’s Alkyd Enamel Underbody (217).

b. Second and Third Coats: Interior Satin Enamel.
Benjamin Moore: Satin Impervo Enamel (235).

3.8 SCHEDULE – 2-Part Epoxy System (Oil Base), Sherwin Williams – Basis of Design.

Protective & Marine Coatings
PRODUCT DATA SHEET

MACROPOXY® 646
FAST CURE EPOXY MASTIC

Revised: January 20, 2023

PRODUCT DESCRIPTION

MACROPOXY 646 Fast Cure Epoxy Mastic is a high solids, high build, fast drying, polyamide epoxy designed to protect steel and concrete in industrial exposures. Ideal for maintenance painting and fabrication shop applications. The high solids content ensures adequate protection of sharp edges, corners, and welds. This product can be applied directly to marginally prepared steel surfaces.

INTENDED USES

- Recommended for marine applications, refineries, offshore platforms, fabrication shops, chemical plants, tank exteriors, power plants, water treatment plants, and mining and minerals industry
- Factory ground formulas are available for subsea/immersion service. For a full list of shades please consult Sherwin-Williams

PRODUCT DATA

Finish: Semi-Gloss

Colors: Mill White, Black and a wide range of colors available through tinting

Volume Solids: 72% ± 2%, mixed, Mill White

VOC (mixed): <250 g/L; 2.08 lb/gal

Mix Ratio: 1:1 by volume

Typical Thickness:

Recommended Spreading Rate per coat:

	Minimum	Maximum
Wet mils (microns)	**7.0** (175)	**13.5** (338)
Dry mils (microns)	**5.0*** (125)	**10.0** (250)
~Coverage sq ft/gal (m^2/L)	**115** (2.9)	**230** (5.8)
Theoretical coverage **sq ft/gal** (m^2/L) @ 1 mil / 25 microns dft	**1152** (28.2)	

*May be applied at 3.0-10.0 mils (75-250 microns) dft as an intermediate in a multicoat system.

NOTE: Brush or roll application may require multiple coats to achieve maximum film thickness and uniformity of appearance.

Shelf Life: 36 months, unopened
Store indoors at 40°F (4.5°C) to 110°F (43°C).

Flash Point: 91°F (33°C), TCC, mixed

Reducer/Clean Up[1]: VOC Restricted Areas (<250 g/L): use Reducer #111 or Oxsol 100

Weight: 12.9 ± 0.2 lb/gal ; 1.55 Kg/L, mixed, may vary by color

[1]Other areas (<340 g/L): use Reducer #111, Oxsol 100, Reducer #15, Reducer #58, or MEK up to 10%. Choose a reducer that is compliant in your area. Confirm compliance with state and local air quality rules before use.

Average Drying Times @ 7.0 mils (175 microns) wet:

	35°F (1.7°C) *50% RH*	77°F (25°C) *50% RH*	100°F (38°C) *50% RH*
Touch:	4-5 hours	2 hours	1.5 hours
Handle:	48 hours	8 hours	4.5 hours
Recoat:			
minimum:	48 hours	8 hours	4.5 hours
maximum:	1 year	1 year	1 year
Cure to service:			
atmospheric:	10 days	7 days	4 days
immersion:	14 days	7 days	4 days

Average Drying Times as intermediate @ 5.0 mils (125 microns) wet:

Touch:	3 hours	1 hour	1 hour
Handle:	48 hours	4 hours	2 hours
Recoat:			
minimum:	16 hours	4 hours	2 hours
maximum:	1 year	1 year	1 year

If maximum recoat time is exceeded, abrade surface before recoating.
Drying time is temperature, humidity, and film thickness dependent.
Paint temperature must be 40°F (4.5°C) minimum.

Pot Life:	10 hours	4 hours	2 hours
Sweat-in-time:	30 minutes	30 minutes	15 minutes

SURFACE PREPARATION

Surface must be clean, dry, and in sound condition. Remove all oil, dust, grease, dirt, loose rust, and other foreign material to ensure adequate adhesion.

Minimum recommended surface preparation:

Iron & Steel:	Atmospheric: SSPC-SP2/3/ ISO8501-1:2007 St 2 or SSPC-SP WJ-3 / NACE WJ-3L Immersion: SSPC-SP10 / NACE 2/ ISO8501-1:2007 Sa 2.5, 2-3 mil (50-75 micron) profile or SSPC-SP WJ-2/NACE WJ-2L
Stainless Steel:	Atmospheric: SSPC-SP16, 1 mil (25 micron) profile
Aluminum & Galvanizing:	SSPC-SP1. If surface has not be weathered for more than 6 months, follow SSPC-SP1 then SSPC-SP16. For fire proofing projects, consult a Sherwin-Williams representative for surface preparation requirements.
Concrete & Masonry:	Atmospheric: SSPC-SP13/NACE 6, or ICRI No. 310.2R CSP 1-3 Immersion: SSPC-SP13/NACE 6-4.3.1
Ductile Iron Pipe:	Atmospheric: NAPF 500-03-03 Power Tool Cleaning Buried & Immersion: NAPF 500-03-04 Abrasive Blast Cleaning Cast Ductile Iron Fittings: NAPF 500-03-05 Abrasive Blast Cleaning

Protective & Marine Coatings
PRODUCT DATA SHEET

MACROPOXY® 646
FAST CURE EPOXY MASTIC

APPLICATION

Airless Spray*
Pump 30:1
Pressure ..... 2800-3000 psi (193-206 bar)
Hose ..... 1/4" ID (6.3 mm)
Tip ..... .017"-.023" (0.43-0.58 mm)
Filter ..... 60 mesh
Reduction ..... As needed up to 10% by volume

Conventional Spray*
Gun ..... DeVilbiss MBC-510
Fluid Tip ..... E
Air Nozzle 704
Atomization Pressure ..... 60-65 psi (4.1-4.5 bar)
Fluid Pressure ..... 10-20 psi (0.7-1.4 bar)

Brush*
Brush ..... Nylon/Polyester or Natural Bristle

Roller*
Cover ..... 3/8" woven with solvent resistant core

Plural Component Spray .... Acceptable

*Reduction[1] ..... VOC Restricted Areas (<250 g/L): use Reducer #111 or Oxsol 100

[1]Other areas (<340 g/L): use Reducer #111, Oxsol 100, or Reducer #15 up to 10%. Choose a reducer that is compliant in your area. Con firm compliance with state and local air quality rules before use.

If specific application equipment is not listed above, equivalent equipment may be substituted.

RECOMMENDED SYSTEMS

Dry Film Thickness / ct.		Mils	(Microns)
Steel & Ductile Iron, Immersion & Atmospheric			
2 Cts.	Macropoxy 646	5.0-10.0	(125-250)
Steel, Organic Zinc Primer, Atmospheric			
1 Ct.	Zinc Clad IV (85)	3.0-5.0	(75-125)
1 Ct.	Macropoxy 646	5.0-10.0	(125-250)
Steel, Inorganic Zinc Primer, Atmospheric			
1 Ct.	Zinc Clad II (85)	2.0-4.0	(50-100)
1 Ct.	Macropoxy 646	5.0-10.0	(125-250)
Steel, Organic Zinc/Epoxy/Urethane Topcoat			
1 Ct.	Zinc Clad IV (85)	3.0-5.0	(75-125)
1 Ct.	Macropoxy 646	3.0-10.0	(75-250)
1 Ct.	Acrolon 7300	2.0-4.0	(50-100)
Steel, Inorganic Zinc/Epoxy/Urethane Topcoat			
1 Ct.	Zinc Clad II (85)	2.0-4.0	(50-100)
1 Ct.	Macropoxy 646	3.0-10.0	(75-250)
1 Ct.	Acrolon 7300	2.0-4.0	(50-100)
Steel, Organic Zinc/Epoxy/Polysiloxane Topcoat, Atmospheric			
1 Ct.	Zinc Clad IV (85)	3.0-5.0	(75-125)
1 Ct.	Macropoxy 646	3.0-10.0	(75-250)
1-2 Cts.	Sher-Loxane 800	2.0-4.0	(50-100)
Steel: Norsok M501 System 7B/Subsea			
2 Cts.	Macropoxy 646	7.0	(175)
Concrete/Masonry, Smooth, Immersion & Atmospheric			
2 Cts.	Macropoxy 646	5.0-10.0	(125-250)

The systems listed above are representative of the product's use, other systems may be appropriate.

WARRANTY

The Sherwin-Williams Company warrants our products to be free of manufacturing defects in accord with applicable Sherwin-Williams quality control procedures. Liability for products proven defective, if any , is limited to replacement of the defective product or the refund of the purchase price paid for the defective product as determined by Sherwin-Williams. NO OTHER WARRANTY OR GUARANTEE OF ANY KIND IS MADE BY SHERWIN-WILLIAMS, EXPRESSED OR IMPLIED, STATUTORY, BY OPERATION OF LAW OR OTHERWISE, INCLUDING MERCHANTABILITY AND FITNESS FOR A PARTICULAR PURPOSE.

APPLICATION CONDITIONS

Temperature:
Air: 35°F (1.7°C) minimum, 120°F (49°C) maximum
Surface*: 35°F (1.7°C) minimum, 250°F (120°C) maximum
Material: 40°F (4.5°C) minimum
At least 5°F (2.8°C) above dew point

Relative humidity: 85% maximum

*Application to surfaces above 120°F (49°C) is not recommended in VOC Restricted Areas (250 g/L). When spraying a surface above 120°F (49°C) in other areas (>250 g/L), please consult with your Sherwin-Williams representative.

APPROVALS

- Suitable for use in USDA inspected facilities
- Acceptable for use in Canadian Food Processing facilities, categories: D1, D2, D3 (Con firm acceptance of specific part numbers/rexes with your SW Sales Representative)
- Conforms to AWWA D102 OCS #5
- Conforms to MPI # 108
- This product meets specific design requirements for non-safety related nuclear plant applications in Level II, III and Balance of Plant, and DOE nuclear facilities
- Meets Class A requirements for Slip Coe cient, 0.36 @ 6 mils / 150 microns dft (Mill White only)
- Approved intermediate for NEPCOAT System B
- Approved to Norsok M501 system 7B (limited colors)
- ISO 12944:2018 approved for C2 to CX

ADDITIONAL NOTES

Tint Part A with Maxitoners at 150% strength. Five minutes minimum mixing on a mechanical shaker is required for complete mixing of color.

Tinting is not recommended for immersion service.

Quick-Kick Epoxy Accelerator is acceptable for use. See data page for details.

Acceptable for concrete floors.

Application to surfaces above 120°F (49°C) is not recommended in VOC Restricted Areas (250 g/L). When spraying a surface above 120°F (49°C) in other areas (>250 g/L), please consult with your Sherwin-Williams representative. Spray apply only . Product will produce an orange peel appearance when applied at elevated temperatures.

Topcoating: It is recommended to apply a thinned-down, low wet film thickness mist coat over zinc rich primers to help avoid outgassing. Allow it to tack up and seal the surface. Then apply a full wet film thickness coat as directed.

Mix contents of each component thoroughly with low speed power agitation. Make certain no pigment remains on the bottom of the can. Then combine one part by volume of Part A with one part by volume of Part B. Thoroughly agitate the mixture with power agitation. Allow the material to sweat-in as indicated prior to application. Re-stir before using.

HEALTH AND SAFETY

Refer to the SDS sheet before use.
Published technical data and instructions are subject to change without notice. Contact your Sherwin-Williams representative for additional technical data and instructions.

DISCLAIMER

The information and recommendations set forth in this Product Data Sheet are based upon tests conducted by or on behalf of The Sherwin-Williams Company. Such information and recommendations set forth herein are subject to change and pertain to the product o ered at the time of publication. Consult your Sherwin-Williams representative to obtain the most recent Product Data Sheet.

ArmorSeal Heavy Duty Floor Coatings

ARMORSEAL HS POLYURETHANE FLOOR ENAMEL

PART A	B65-220	SERIES
PART B	B65V220	HARDENER

Revised: March 24, 2022

PRODUCT INFORMATION

8.46

PRODUCT DESCRIPTION

ARMORSEAL HS POLYURETHANE FLOOR ENAMEL is a heavy duty, two component, exterior/interior, high solids, polyester-aliphatic urethane industrial floor coating. Provides a high gloss, excellent chemical resistance, color retention, and chalk resistance.

- Outstanding resistance a wide range of chemical, weather, and mechanical conditions
- Abrasion and impact resistant
- Superior exterior color and gloss retention
- Outstanding application properties

PRODUCT CHARACTERISTICS

Finish:	Gloss
Color:	Wide range of colors available
Volume Solids:	71% ± 2%, mixed, may vary by color
Weight Solids:	90% ± 2%, mixed, may vary by color
VOC (EPA Method 24):	<250 g/L; 2.1 lb/gal, mixed
Mix Ratio:	2:1 by volume

Recommended Spreading Rate per coat:

	Minimum	Maximum
Wet mils (microns)	**3.0** (75)	**4.5** (112)
Dry mils (microns)	**2.0** (50)	**3.0** (75)
~Coverage sq ft/gal (m^2/L)	**380** (9.3)	**570** (14.0)
Theoretical coverage **sq ft/gal** (m^2/L) @ 1 mil / 25 microns dft	**1136** (27.8)	

NOTE: Brush or roll application may require multiple coats to achieve maximum film thickness and uniformity of appearance.

Drying Schedule @ 3.0 mils wet (75 microns):

	@ 50°F/10°C	@ 77°F/25°C *50% RH*	@ 100°F/38°C
To touch:	16 hours	2 hours	30 minutes
To handle:	24 hours	10 hours	2 hours
foot traffic:	24 hours	12 hours	8 hours
heavy traffic:	5 days	72 hours	48 hours
To recoat:			
minimum:	24 hours	12 hours	2 hours
maximum:	3 days	48 hours	24 hours
To cure:	7 days	7 days	5 days
Pot Life:	5 hours	4 hours	45 minutes
Sweat-in-Time:		None required	

If maximum recoat time is exceeded, abrade surface before recoating.
Drying time is temperature, humidity, and film thickness dependent.

Shelf Life:	Part A: 36 months, unopened Part B: 24 months, unopened Store indoors at 40°F (4.5°C) to 100°F (38°C)
Flash Point:	102°F (39°C), TCC, mixed
Reducer*:	VOC Restricted Areas (<250 g/L): Reduction not recommended
Clean Up:	Reducer R6K30 or R7K225

*Other areas (<340 g/L): Reducer R6K30 or R7K225 up to 5% by volume. Choose a reducer that is compliant in your area. Confirm compliance with state and local air quality rules before use.

RECOMMENDED USES

- For industrial, commercial, or marine floor use where a heavy duty polyurethane floor coating is required
- For use over prepared concrete and steel
- Resists splash, spillage, and fumes of dilute acids, alkalies, solvents, and fuels
- Exterior floors (helipads)
- Auto service centers, computer rooms
- Airport hangars (skydrol resistance)
- Suitable for use in USDA inspected facilities.

PERFORMANCE CHARACTERISTICS

Test Name	Test Method	Results
Abrasion Resistance	ASTM D4060, CS17 wheel, 1000 cycles, 1 kg load	63 mg loss (average of 5 trials)
Adhesion, steel (epoxy primer)	ASTM D3359 Method B; ASTM D4541	5B, 100% Retention (ASTM D3359); 1200 psi (ASTM D4541)
Adhesion, concrete (epoxy primer)	ASTM D4541	350 psi, 100% concrete failure
Direct Impact Resistance	ASTM D2794	100 in. lb.
Dry Heat Resistance	ASTM D2485	200°F (93°C), 250°F (121°C) intermittent
Exterior Durability	2 years at 45° South	Excellent, 87% gloss retention
Flexibility	ASTM D522, 180° bend, 1/4" mandrel	Passes
Humidity Resistance	ASTM D4585, 100°F (38°C), 2000 hours	No blistering, cracking, softening or delamination
Pencil Hardness	ASTM D3363	H
Salt Fog Resistance, with primer	ASTM B117, 1000 hours	Rating 10 per ASTM D610 for rusting, less than 1/16" creepage at scribe. No blistering, cracking, softening, or delamination of the film.
Slip Resistance, Floors	ASTM C1028**, .60 Minimum Static Co-efficient of Friction	Passes wet and dry without SharkGrip Additive, and dry with SharkGrip Additive

**Test method withdrawn in 2014 without replacement

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ArmorSeal Heavy Duty Floor Coatings

ARMORSEAL HS POLYURETHANE FLOOR ENAMEL

PART A B65-220 **SERIES**
PART B B65V220 **HARDENER**

Revised: March 24, 2022

PRODUCT INFORMATION

8.46

RECOMMENDED SYSTEMS

		Dry Film Thickness / ct. Mils	(Microns)
Concrete/Wood:			
1 ct.	ArmorSeal 1000HS (reduced 1 pt/gal with R7K54)		
2 cts.	ArmorSeal HS Polyurethane Floor Enamel	2.0-3.0	(50-75)
Steel:			
1 ct.	Recoatable Epoxy Primer	4.0-5.0	(100-125)
2 cts.	ArmorSeal HS Polyurethane Floor Enamel	2.0-3.0	(50-75)
Painted Surfaces in Sound Condition:			
1-2 cts.	ArmorSeal HS Polyurethane Floor Enamel	2.0-3.0	(50-75)

The systems listed above are representative of the product's use, other systems may be appropriate.

SURFACE PREPARATION

Surface must be clean, dry, and in sound condition. Remove all oil, dust, grease, dirt, loose rust, and other foreign material to ensure adequate adhesion.

Refer to product Application Bulletin for detailed surface preparation information.

Minimum recommended surface preparation:
* Iron & Steel: SSPC-SP6/NACE 3
* Concrete: SSPC-SP13/NACE 6, or ICRI No. 310.2R, CSP 1-3

* Primer required

Surface Preparation Standards

	Condition of Surface	ISO 8501-1 BS7079:A1	Swedish Std. SIS055900	SSPC	NACE
White Metal		Sa 3	Sa 3	SP 5	1
Near White Metal		Sa 2.5	Sa 2.5	SP 10	2
Commercial Blast		Sa 2	Sa 2	SP 6	3
Brush-Off Blast		Sa 1	Sa 1	SP 7	4
Hand Tool Cleaning	Rusted	C St 2	C St 2	SP 2	-
	Pitted & Rusted	D St 2	D St 2	SP 2	-
Power Tool Cleaning	Rusted	C St 3	C St 3	SP 3	-
	Pitted & Rusted	D St 3	D St 3	SP 3	-

TINTING

Tint Part A with Maxitoner Colorant at 100% tint strength (white tint base and ultradeep tint base only). Five minutes minimum mixing on a mechanical shaker is required for complete mixing of color.

APPLICATION CONDITIONS

Temperature: 40°F (4.5°C) minimum, 100°F (38°C) maximum (air, surface, and material) At least 5°F (2.8°C) above dew point

Relative humidity: 75% maximum

Refer to product Application Bulletin for detailed application information.

ORDERING INFORMATION

Packaging:
Part A: 1 gal (3.78L) and 5 gal (18.9L)
Part B: 1 gal (3.78L) and 5 gal (18.9L)

Weight: 10.45 ± 0.2 lb/gal ; 1.25 Kg/L mixed, may vary with color

SAFETY PRECAUTIONS

Refer to the SDS sheet before use.

Published technical data and instructions are subject to change without notice. Contact your Sherwin-Williams representative for additional technical data and instructions.

DISCLAIMER

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WARRANTY

The Sherwin-Williams Company warrants our products to be free of manufacturing defects in accord with applicable Sherwin-Williams quality control procedures. Liability for products proven defective, if any, is limited to replacement of the defective product or the refund of the purchase price paid for the defective product as determined by Sherwin-Williams. NO OTHER WARRANTY OR GUARANTEE OF ANY KIND IS MADE BY SHERWIN-WILLIAMS, EXPRESSED OR IMPLIED, STATUTORY, BY OPERATION OF LAW OR OTHERWISE, INCLUDING MERCHANTABILITY AND FITNESS FOR A PARTICULAR PURPOSE.

ArmorSeal Heavy Duty Floor Coatings

ARMORSEAL HS POLYURETHANE FLOOR ENAMEL

PART A B65-220 **SERIES**
PART B B65V220 **HARDENER**

Revised: March 24, 2022

APPLICATION BULLETIN

8.46

SURFACE PREPARATIONS

Surface must be clean, dry, and in sound condition. Remove all oil, dust, grease, dirt, loose rust, and other foreign material to ensure adequate adhesion.

Iron & Steel
Remove all oil and grease from surface by Solvent Cleaning per SSPC-SP1. Minimum surface preparation is Commercial Blast Cleaning per SSPC-SP6/NACE 3. For better performance, use Near White Metal Blast Cleaning per SSPC-SP10/NACE 2. Blast clean all surfaces using a sharp, angular abrasive for optimum surface profile (1-2 mils / 25-50 microns). Prime any bare steel the same day as it is cleaned or before flash rusting occurs. Primer Required.

Concrete and Masonry
For surface preparation, refer to SSPC-SP13/NACE 6, or ICRI No. 310.2R, CSP 1-3. Surfaces should be thoroughly clean and dry. Concrete and mortar must be cured at least 28 days @ 75°F (24°C). Remove all loose mortar and foreign material. Surface must be free of laitance, concrete dust, dirt, form release agents, moisture curing membranes, loose cement and hardeners. Fill bug holes, air pockets and other voids with Steel-Seam FT910. Primer required.

Follow the standard methods listed below when applicable:
ASTM D4258 Standard Practice for Cleaning Concrete.
ASTM D4259 Standard Practice for Abrading Concrete.
ASTM D4260 Standard Practice for Etching Concrete.
ASTM F1869 Standard Test Method for Measuring Moisture Vapor Emission Rate of Concrete.
SSPC-SP 13/Nace 6 Surface Preparation of Concrete.
ICRI No. 310.2R Concrete Surface Preparation.

Previously Painted Surfaces:
If in sound condition, clean the surface of all foreign material. Smooth, hard or glossy coatings and surfaces should be dulled by abrading the surface. Apply a test area, allowing paint to dry one week before testing adhesion. If adhesion is poor, or if this products attacks the previous finish, removal of the previous coating may be necessary. If paint is peeling or badly weathered, clean surface to sound substrate and treat as a new surface as above.

Surface Preparation Standards

	Condition of Surface	ISO 8501-1 BS7079:A1	Swedish Std. SIS055900	SSPC	NACE
White Metal		Sa 3	Sa 3	SP 5	1
Near White Metal		Sa 2.5	Sa 2.5	SP 10	2
Commercial Blast		Sa 2	Sa 2	SP 6	3
Brush-Off Blast		Sa 1	Sa 1	SP 7	4
Hand Tool Cleaning	Rusted	C St 2	C St 2	SP 2	-
	Pitted & Rusted	D St 2	D St 2	SP 2	-
Power Tool Cleaning	Rusted	C St 3	C St 3	SP 3	-
	Pitted & Rusted	D St 3	D St 3	SP 3	-

APPLICATION CONDITIONS

Temperature:	40°F (4.5°C) minimum, 100°F (38°C) maximum (air, surface, and material) At least 5°F (2.8°C) above dew point
Relative humidity:	75% maximum

APPLICATION EQUIPMENT

The following is a guide. Changes in pressures and tip sizes may be needed for proper spray characteristics. Always purge spray equipment before use with listed reducer. Any reduction must be compliant with existing VOC regulations and compatible with the existing environmental and application conditions.

Reducer* ..... VOC Restricted Areas (<250 g/L): Reduction not recommended
Clean Up ..... Reducer R6K30 or R7K225

*Other areas (<340 g/L): Reducer R6K30 or R7K225 up to 5% by volume. Choose a reducer that is compliant in your area. Confirm compliance with state and local air quality rules before use.

Airless Spray
Pressure ..... 2400 - 3000 psi
Hose ..... 3/8" ID
Tip ..... .013" - .017"
Filter ..... 60 mesh
Reduction ..... Not recommended

Conventional Spray
Gun ..... Binks 95
Cap 63P
Tip 66
Atomization Pressure ..... 50 - 60 psi
Fluid Pressure ..... 20 - 30 psi
Reduction ..... Not recommended

Brush
Brush ..... Natural Bristle
Reduction ..... Not recommended

Roller
Cover ..... 1/4" woven with solvent resistant core
Reduction ..... Not recommended

If specific application equipment is not listed above, equivalent equipment may be substituted.

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ArmorSeal Heavy Duty Floor Coatings

ARMORSEAL HS POLYURETHANE FLOOR ENAMEL

PART A	B65-220	SERIES
PART B	B65V220	HARDENER

Revised: March 24, 2022

APPLICATION BULLETIN

8.46

APPLICATION PROCEDURES

Surface preparation must be completed as indicated.

Mix contents of each component thoroughly with low speed power agitation. Make certain no pigment remains on the bottom of the can. Then combine two parts by volume of Part A with one part by volume of Part B. Thoroughly agitate the mixture with power agitation. Allow the material to sweat-in as indicated. Re-stir before using.
If reducer is used, add only after both components have been thoroughly mixed.
If an anti-slip finish is desired, the additive is mixed into the final coat just prior to application. (EXCEPTION: If anti-slip is desired with Clear finish, it should be hand broadcast). A 3/4" pile roller is recommended for the final coat when anti-slip aggregate is used.

Apply paint at the recommended film thickness and spreading rate as indicated below:

Recommended Spreading Rate per coat:

	Minimum	Maximum
Wet mils (microns)	**3.0** (75)	**4.5** (112)
Dry mils (microns)	**2.0** (50)	**3.0** (75)
~Coverage sq ft/gal (m^2/L)	**380** (9.3)	**570** (14.0)
Theoretical coverage **sq ft/gal** (m^2/L) @ 1 mil / 25 microns dft	**1136** (27.8)	

NOTE: Brush or roll application may require multiple coats to achieve maximum film thickness and uniformity of appearance.

Drying Schedule @ 3.0 mils wet (75 microns):

	@ 50°F/10°C	@ 77°F/25°C *50% RH*	@ 100°F/38°C
To touch:	16 hours	2 hours	30 minutes
To handle:	24 hours	10 hours	2 hours
foot traffic:	24 hours	12 hours	8 hours
heavy traffic:	5 days	72 hours	48 hours
To recoat:			
minimum:	24 hours	12 hours	2 hours
maximum:	3 days	48 hours	24 hours
To cure:	7 days	7 days	5 days
Pot Life:	5 hours	4 hours	45 minutes
Sweat-in-Time:		None required	

If maximum recoat time is exceeded, abrade surface before recoating.
Drying time is temperature, humidity, and film thickness dependent.

Application of coating above maximum or below minimum recommended spreading rate may adversely affect coating performance.

CLEAN UP INSTRUCTIONS

Clean spills and spatters immediately with Reducer R6K30 or R7K225. Clean tools immediately after use with Reducer R6K30 or R7K225. Follow manufacturer's safety recommendations when using any solvent.

DISCLAIMER

The information and recommendations set forth in this Product Data Sheet are based upon tests conducted by or on behalf of The Sherwin-Williams Company. Such information and recommendations set forth herein are subject to change and pertain to the product offered at the time of publication. Consult your Sherwin-Williams representative to obtain the most recent Product Data Information and Application Bulletin.

PERFORMANCE TIPS

Stripe coat all crevices, welds, and sharp angles to prevent early failure in these areas.

When using spray application, use a 50% overlap with each pass of the gun to avoid holidays, bare areas, and pinholes. If necessary, cross spray at a right angle.

Spreading rates are calculated on volume solids and do not include an application loss factor due to surface profile, roughness or porosity of the surface, skill and technique of the applicator, method of application, various surface irregularities, material lost during mixing, spillage, overthinning, climatic conditions, and excessive film build.

Excessive reduction of material can affect film build, appearance, adhesion and potentially cause color float.

Do not apply the material beyond recommended pot life.

Do not mix previously catalyzed material with new.

In order to avoid blockage of spray equipment, clean equipment before use or before periods of extended downtime with Reducer R6K30 or R7K225.

Mixed coating is sensitive to water. Use water traps in all air lines. Moisture contact can reduce pot life and affect gloss and color.

Additive of anti-slip aggregate produces only a light nonslip texture. Product should not be used in place of a nonskid finish when safety is a concern.

Material cannot be sprayed if anti-slip aggregate is used.

Shot blasted floors will require a high build primer.

When rolling this product, always maintain a wet edge to avoid roller marks. Roll as close to any cut-in areas as possible to eliminate visual imperfections. Roller application must be from a roller tray, not by pouring the material onto the surface.

Coated surfaces may discolor under tires due to tire plasticizer migration.

Refer to Product Information sheet for additional performance characteristics and properties.

SAFETY PRECAUTIONS

Refer to the SDS sheet before use.

Published technical data and instructions are subject to change without notice. Contact your Sherwin-Williams representative for additional technical data and instructions.

WARRANTY

The Sherwin-Williams Company warrants our products to be free of manufacturing defects in accord with applicable Sherwin-Williams quality control procedures. Liability for products proven defective, if any, is limited to replacement of the defective product or the refund of the purchase price paid for the defective product as determined by Sherwin-Williams. NO OTHER WARRANTY OR GUARANTEE OF ANY KIND IS MADE BY SHERWIN-WILLIAMS, EXPRESSED OR IMPLIED, STATUTORY, BY OPERATION OF LAW OR OTHERWISE, INCLUDING MERCHANTABILITY AND FITNESS FOR A PARTICULAR PURPOSE.

www.sherwin-williams.com/protective

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DIVISION 10

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SECTION 10160

TOILET COMPARTMENTS

1 PART 1 GENERAL

1.1 SECTION INCLUDES

A. Toilet compartments, floor mounted, head-rail braced.

B. Urinal screens, wall mounted.

C. Accessories.

D. Attachment hardware.

1.2 RELATED SECTIONS

A. Section 09260 - Gypsum Board Systems.

B. Section 10800 - Toilet Accessories.

1.3 REFERENCES

A. ANSI 117.1 - Specifications for Making Buildings and Facilities Accessible to and Usable by Physically Handicapped People.

B. FSRR-P-1352-Partitions, Toilet, Complete.

C. ASTM A526 - Steel Sheet, Zinc-Coated (Galvanized) by the Hot-Dip Process, Commercial Quality.

D. ASTM A167 - Stainless and Heat Resisting Chromium Nickel Steel, Plate, Sheet and Strip.

1.4 SUBMITTALS

A. Submit shop drawings and product data under provisions of Section 01330.

B. Indicate partition layouts, swing of doors, elevations, anchorage and mounting details, panel construction, components hardware, finishes and all relevant dimensions.

C. Submit manufacturer's product data and installation instructions under provisions of Section 01330.

D. Submit samples under provisions of Section 01330.

E. Provide sample colors and minimum 3 x 3 inch sized sample of actual base metal.

1.5 REGULATORY REQUIREMENTS

A. Conform to ANSI A117.1 and R.I. State Building Code for provisions for the physically handicapped.

1.6 FIELD MEASUREMENTS

A. Verify field measurements as shown on Drawings.

2 PART 2 PRODUCTS

2.1 ACCEPTABLE MANUFACTURERS

A. Santana Products Inc., P. O. Box 2021, Scranton, PA 18501, telephone: (800) 368-5002, or approved equal.

B. Substitutions: Under provisions of Section 01600.

2.2 TYPES:

A. Toilet Compartments: Floor mounted, headrail braced system FMOB4004 manufactured by Santana Products Inc.

B. Urinal Screens: Wall mounted, manufactured by Santana Products Inc.

2.3 MATERIALS

A. Toilet compartment shall be floor-mounted, overhead-braced with non-corrosive doors, panels, and pilasters similar and equal to Poly-Mar HD®, Poly-Marble HD®, or Poly-Granite HD® compartments as manufactured by Santana Products Inc., Scranton, PA, or an approved equal by specifier or design professional prior to bid date with hardware as specified herein.

B. Panels, doors, and pilasters shall be fabricated from High Density Polyethylene (HDPE) containing minimum of 10% recycled material manufactured under high pressure forming a single component section which is waterproof, non-absorbent and has a self-lubricating surface that resists marking with pens, pencils, or other writing utensils. All panels, doors, and pilasters to arrive at job-site with special protective plastic covering.

C. Characteristics:

1. Dual component compression molded High Density Polyethylene (HDPE) of solid Poly-Mar HD®, Poly-Marble HD®, or Poly-Granite HD® virgin resin materials in colors that extend throughout the surface; the panels, doors, and pilasters shall have combined recycled and/or virgin material (HDPE) as the core material.

2. Doors, panels and pilasters shall be a minimum of 1” thick and all edges machined to a radius of .250” and all exposed surfaces to be free of saw marks.

D. Fabrication:

1. Dividing panels shall be 55” high and mounted at 14” above finished floor.

2. Doors shall be 55” and mounted at 14” above finished floor.

3. Pilasters shall be 82” high, mounted within a one-piece plastic shoe with star-head security pin, stainless steel barrel bolts.

4. Finish of doors, panels, and pilasters shall be similar and equal to Santana Products, Inc. “Plastic-Glaze 280” color of doors, panels and pilasters to be selected from the standard Poly-Mar HD®, Poly-Marble HD®, or Poly-Granite HD® color range.

5. Aluminum edging strips to be fastened to the bottom edge of all doors and panels using vandal-proof stainless steel fasteners.

E. Manufacturer to supply a written warranty covering all plastic components and plastic hardware against breakage, corrosion and delamination for a period of 15 years.

2.4 HARDWARE

A. Door hardware shall be as follows:

1. Hinges shall be integral hinge system. Pilaster to be machined to accept door and hinge mechanism. Hinge mechanism consists of a 2-piece ½” diameter nylon pin with “Cam Action” and a 3/16” stainless steel pin inserted into lower portion of pilaster and door. A one-piece ½” diameter, 4” long nylon pin to be inserted into the top portion of the pilaster and door. Door closures to be factory set to accommodate all conditions and allow for a positive opening and closing action free of impediment.

2. Each handicapped door to include: (1) door pull (1) wall stop.

3. Door strike and keeper shall be fabricated from heavy aluminum extrusion (6463-T5 Alloy) with bright-dipped anodized finish, surface mounted and thru-bolted to door with star-head security pin, stainless steel barrel bolts. Size of strike shall be 6” in length.

4. Door latch housing shall be fabricated from heavy aluminum extrusion (6463-T5 Alloy) with bright-dipped anodized finish, surface mounted and thru-bolted to door with star-head security pin, stainless steel barrel bolts. Slide bolt and button shall be heavy aluminum with “Tuff-Coat Black” anodized finish.

B. Solid plastic pilaster shoes shall be anchored to finished floor with plastic anchors and #14 x 1-1/2” star-head security pin, stainless steel screws.

C. Full length continuous plastic wall brackets weighing not less than .822 lbs. per linear foot. Brackets shall be used for all panels to pilaster, pilasters to wall and panel to wall connections. Wall brackets shall be thru-bolted to panels and pilasters with star-head security pin, stainless steel barrel bolts. Attachment of brackets to adjacent wall construction shall be accomplished #14 x 1-1/2" star-head security pin, stainless steel screws anchored directly behind the vertical edge of panels and pilasters at 13" intervals along the full length of bracket and at each 13" interval alternately spaced between anchor connections.

D. Headrail shall be heavy aluminum extrusion (6463-T5 Alloy) with bright-dipped anodized finish in anti-grip configuration weighing not less than 1.188 lbs. per linear foot as manufactured by Santana Products Inc. Headrail shall be fastened to tops of pilasters and headrail brackets by thru-bolting with star-head security pin, stainless steel barrel bolts (no cadmium plated bolts allowed).

E. Headrail brackets shall be 18-gauge stainless steel.

3 PART 3 EXECUTION

3.1 EXAMINATION

A. Examine site conditions to which work is to be applied. Report discrepancies to Architect in writing.

B. Verify site dimensions affecting this Work.

C. Verify correct spacing of plumbing fixtures.

D. Verify correct location for built-in framing, anchorage, and bracing, where required.

3.2 INSTALLATION

A. Install partitions secure, plumb, level, and square in accordance with manufacturer's instructions.

B. Maintain 1/2-inch space between wall and panels and between wall and end plasters.

C. Attach panel brackets securely to walls using anchor devices.

D. Attach panels and pilasters to bracket with through sleeve tamperproof bolts and nuts. Locate headrail joints at pilaster centerlines.

E. Install 30-inch-wide x 42-inch-high stainless steel protective splash panels on partitions adjacent to urinals. Fasten with stainless steel screws spaced not over 8 inch on center.

F. Anchor urinal screen panels to walls with two panel brackets and vertical upright consisting of pilaster anchored to floor.

G. Provide for adjustment of floor variations with screw jack through steel saddles integral with pilaster. Conceal floor fastenings with stainless steel shoes.

H. Equip each door with two hinges, one door latch, and one coat hook and bumper.

I. Install door strike keeper with and door bumper on each pilaster in alignment with door latch.

3.3 ADJUSTING

A. Adjust and align hardware to uniform clearance at vertical edges of doors not exceeding 3/16 inch.

B. Adjust hinges to locate doors in partial open position when unlatched, except that out-swing doors shall return to closed position.

3.4 CLEANING

A. Clean Work under provisions of Section 01780.

B. Remove protective maskings and clean surfaces and hardware.

3.5 PROTECTION OF FINISHED WORK

A. Protect finished installation under provisions of Section 01500.

B. Field touch-up of finished surfaces will not be permitted. Replace damaged components.

END OF SECTION

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SECTION 10281

TOILET ACCESSORIES

1 PART 1 GENERAL

1.1 SECTION INCLUDES

A. Toilet accessories.

B. ADA Compliant Grab Bars

C. Rough-in frames furnished to other Section.

D. Attachment hardware.

1.2 RELATED SECTIONS

A. Section 06100- Rough Carpentry: Wood anchor reinforcement in walls.

B. Section 09260 - Gypsum Board Systems.

1.3 REFERENCES

A. ANSI/ASTM A167 - Stainless and Heat-Resisting Chromium-Nickel Steel Plate, Sheet, and Strip.

B. ANSI/ASTM A366 - Cold-Rolled Carbon Steel Sheets, Commercial Quality.

C. ANSI A117.1 - Specifications for Making Buildings and Facilities Accessible to and Usable by Physically Handicapped People.

D. ANSI/ASTM A123 - Zinc - (Hot-Dip Galvanized) Coatings on Products Fabricated from Rolled, Pressed, and Forged Steel Shapes, Plates, Bars and Strips.

E. ANSI/ASTM A386 - Zinc Coating (Hot-Dip) on Assembled Steel Products.

F. ANSI/ASTM B456 - Electrodeposited Coatings of Copper Plus Nickel Plus Chromium and Nickel Plus Chromium.

G. ASTM A269 - Seamless and Welded Austenitic Stainless Steel Tubing for General Service.

H. NEMA LD-3 - High Pressure Decorative Laminates.

1.4 SUBMITTALS

A. Submit manufacturers product data under provisions of Section 01300.

B. Provide product data to illustrate each accessory describing size, finish, details of function and attachment methods.

C. Submit manufacturer's installation instructions under provisions of Section 01300.

1.5 DELIVERY, STORAGE, AND HANDLING

A. Deliver, store and handle products under provisions of Section 01600.

B. Do not deliver accessories to site until rooms in which they are to be installed are ready to receive them.

C. Pack accessories individually in a manner to protect accessory and its finish.

1.6 KEYING

A. Supply 3 keys for each accessory to Owner.

B. Master key all accessories.

1.7 REGULATORY REQUIREMENTS

A. Install Work in accordance with all regulations in the State of Rhode Island.

1.8 SEQUENCING AND SCHEDULING

A. Coordinate the Work of the Section with the placement of internal wall reinforcement and reinforcement of toilet partitions and shower and dressing compartments to receive anchor attachment.

1.9 PROTECTION

A. Protect adjacent or adjoining finished surfaces and work from damage during installation of work of this Section.

2 PART 2 PRODUCTS

2.1 ACCEPTABLE MANUFACTURERS

A. Bobrick Dispensers, Inc.

B. A & J United Machine and Metal Products Corporation.

C. The Charles Parker Company.

D. Substitutions: Under provisions of Section 01600.

2.2 MATERIALS

A. Sheet Steel: ASTM A366, cold rolled stretcher leveled; 125 oz./sq. ft. galvanized coating.

B. Stainless Steel Sheet: ASTM 167, commercial grade, 22 gage.

C. Stainless Steel Tubing: ASTM A269, commercial grade, seamless welded.

D. Adhesive: Epoxy type or contact cement type, waterproof.

E. Fasteners, Screws, and Bolts: Hot dip galvanized, tamperproof.

F. Expansion Shields: Fiber, lead, or rubber as recommended by accessory manufacturer for component and substrate.

2.3 FACTORY FINISHES

A. Chrome/Nickel Plating: ANSI/ASTM B456, satin finish.

B. Stainless Steel: No. 4 satin luster finish. ADA Compliant Finish at all grab bars.

C. Shop Primed Ferrous Metals: Pretreat and clean, spray apply one coat primer and bake.

D. Enamel: Pretreat to clean condition, apply one coat primer and minimum two coats epoxy or electrostatic baked enamel.

E. Galvanizing: ANSI/ASTM A123 and A386 to 1.25 oz./sq. yd.

2.4 FABRICATION

A. Weld and grind smooth joints of fabricated components.

B. Form exposed surfaces from one sheet of stock, free of joints.

C. Provide steel anchor plates and anchor components for installation on building finishes.

D. Form surfaces flat without distortion. Maintain flat surfaces without scratches or dents.

E. Back paint components where contact is made with building finishes to prevent electrolysis.

F. Hot dip galvanize ferrous metal anchors and fastening devices.

H. Shop assemble components and package complete with anchors and fittings.

3 PART 3 EXECUTION

3.1 EXAMINATION

A. Verify that site conditions are ready to receive work and dimensions are as indicated on Drawings or instructed by manufacturer.

B. Beginning of installation means acceptance of existing conditions.

3.2 PREPARATION

A. Deliver inserts and rough-in frames to jobsite at appropriate time for building-in.

B. Provide templates and rough-in measurements as required.

C. Before starting work notify Architect in writing of any conflicts detrimental to installation or operation of units.

D. Verify with Architect exact location of accessories for installation.

3.3 INSTALLATION

A. Install fixtures, accessories and items in accordance with manufacturer's instructions.

B. Install true, plumb, and level, securely and rigidly anchored to substrate.

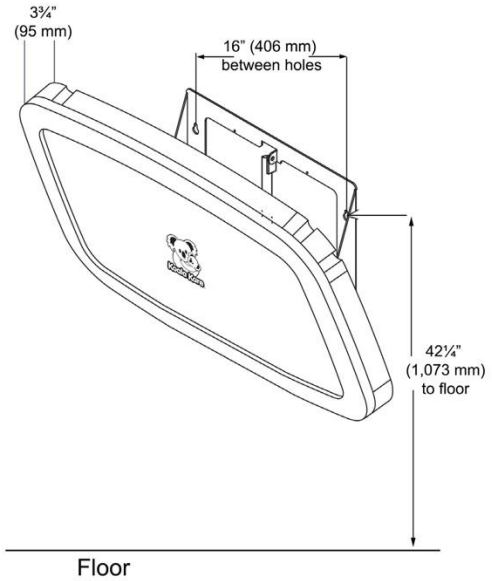
C. Use tamper-proof fasteners.

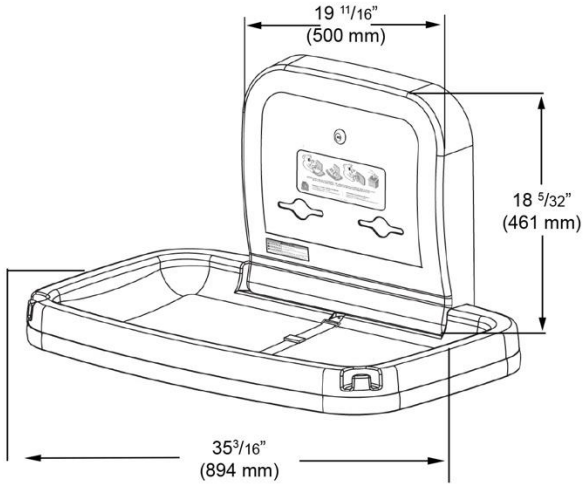
3.4 SCHEDULE OF ACCESSORIES

A. Bobrick Dispensers, Inc. model numbers used in Schedule. See Architectural Drawings.

KOALA KARE PRODUCTS
KB200 HORIZONTAL WALL MOUNTED BABY CHANGING STATION

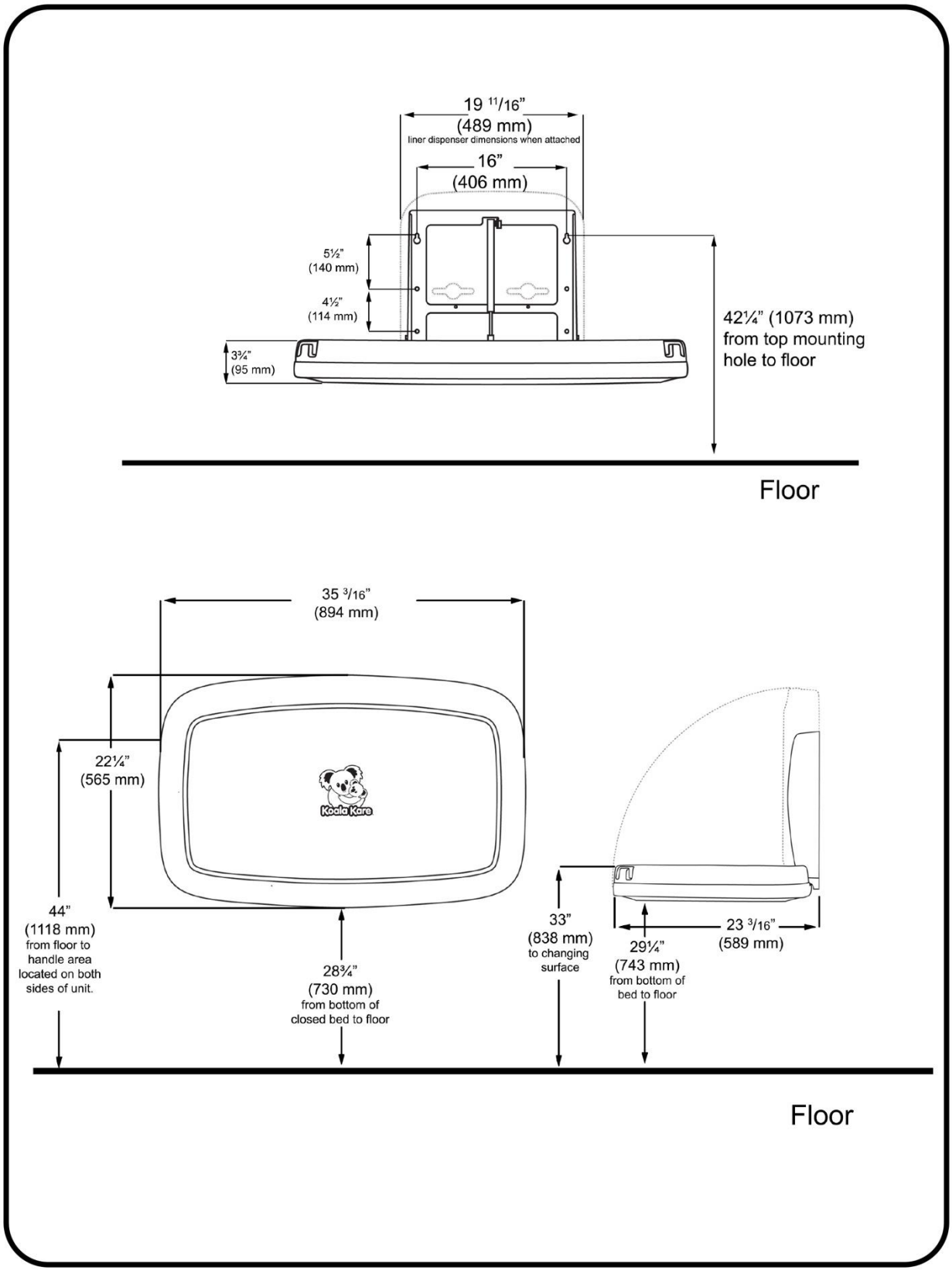
KB200-00 CREAM
KB200-01 GREY
KB200-05 WHITE GRANITE





Koala Kare

KB200 TECHNICAL DATA SHEET


19 11/16"
(489 mm)
liner dispenser dimensions when attached
16"
(406 mm)
5½"
(140 mm)
4½"
(114 mm)
3¾"
(95 mm)
42¼" (1073 mm)
from top mounting
hole to floor
Floor
35 3/16"
(894 mm)
22¼"
(565 mm)
Koala Kare
44"
(1118 mm)
from floor to
handle area
located on both
sides of unit.
28¾"
(730 mm)
from bottom of
closed bed to floor
33"
(838 mm)
to changing
surface
29¼"
(743 mm)
from bottom of
bed to floor
23 3/16"
(589 mm)
Floor

MATERIALS:

Injection-molded polypropylene with Microban® antimicrobial additive embedded into the bed surface. Reinforced steel-on-steel hinge mechanism and metal mounting chassis with mounting hardware included. Labelled usage instructions and safety messages in four languages. Optional Braille label available. Contoured changing surface area is 450 sq. in (2903 sq. cm) and comes complete with nylon safety strap and bag hooks. Dual cavity liner dispenser holds approximately 50 KB150-99 bed liners.

OPERATION:

Concealed pneumatic cylinder and metal mounting chassis provides controlled, slow opening and closing of bed. Polypropylene is easy to clean and resists odors and bacterial growth. Complies with ASTM static load performance requirements when properly installed.

Warning: To ensure that the unit supports the intended loads, baby changing stations must be properly installed according to the manufacturer's instructions.

SPECIFICATION:

Baby changing station body shall be durable, injection-molded polypropylene. Design of unit shall be surface-mounted. Unit shall be equipped with a pneumatic cylinder for controlled opening and closing of bed. Bed shall be secured to metal mounting chassis with a concealed steel-on-steel hinge. No hinge structure shall be exposed on interior or exterior surfaces. Unit shall have mounting hardware included. Unit shall have Microban® antimicrobial embedded into plastic material on the changing surface. Unit shall comply with ADA regulations when properly installed. Bed shall have smooth concave changing area with a nylon safety strap and two hooks for bags or purses. The design and manufacture of Koala products is intended to be compliant with the 2010 ADA Standards for Accessible Design and the 2009 ICC A117.1, Accessible and Usable Buildings and Facilities. Unit shall conform to ASTM F 2285-04 Standard Safety Performance Specification for Diaper Changing Tables for Commercial Use, ANSI Z535.4 Product Safety Signs and Labels, EN 12221:2008, ASTM G22 Antibacterial standards or local code if more stringent installation requirements are applicable for Barrier-Free accessibility.

Unit shall have a built-in Liner Dispenser for use with 3-ply chemical free biodegradable bed liners, instructional graphics and safety messages in 4 languages. Optional Braille label is available. Unit shall be backed by manufacturer's 5-year limited warranty on materials and workmanship and include a provision for replacement caused by vandalism. Unit shall be manufactured in the U.S.A.

INSTALLATION:

To ensure proper installation and compliance to building codes, it is recommended that a qualified person or carpenter perform the installation of the unit. The unit must be properly installed onto a permanent wall that is capable of supporting significant weight and can accommodate the supplied installation hardware. The Koala Baby Changing Station meets ADA regulations when properly installed. Installer should account for the space that a unit occupies when in the down position and with the caregiver (whether standing or seated) in front of the unit. Locate the unit so that paths of travel are maintained around it when being used.

1. Remove changing station from the shipping container and check for any freight damage. If damage is found, please call Koala Kare Products' Customer Service at 888.733.3456. Remove "Installation Kit" and "Operator Kit" from box. Please give "Operator Kit" to facility manager or operator. Box should contain two pieces: the bed and metal mounting chassis and the wall mount liner dispenser. Identify the best location for installing the unit.
2. Remove the bed and chassis from the box and select the wall area where the unit will be installed. Make sure you have taken into consideration the operating clearance of 9½" (241 mm) on both sides of the exposed chassis and 23 3/16" (589 mm) from wall surface when open.

   For Wood Stud Wall- Measure from the floor 42¼" (1073 mm) on stud center and mark the wall. The mounting holes are designed for 16" (406 mm) stud centers. Ensure the locations you have marked for the mounting holes are level before drilling. Drill pilot holes for keyhole mounting using a 1/8" regular drill bit. If the wall has wooden studs that are not on 16" (406 mm) centers, you will need to use toggles to secure one side of the unit. The other side should be secured to the stud using the screws provided. You must allow for space inside the wall for the toggles to turn. This will vary depending on the toggles used.

   For Masonry or Tile over Stud Wall- Use a 7/32" (5 mm) masonry drill bit for the pilot hole until you hit the stud. Change bit to 1/8" (3 mm) regular drill bit.

   For Metal Stud or Concrete Block- If the wall has metal studs or an underlying surface of concrete block, you will need to use toggles to secure one side of the unit. The other side should be secured to the stud using the screws provided. You must allow for space inside the wall for the toggles to turn. This will vary depending on the toggles used.
3. Screw two of the mounting screws into the pilot holes leaving ¼" (6 mm) exposed to allow keyhole slots to be easily mounted over the screw heads. Place chassis over screws. After securing the unit using the keyhole slots, verify that the unit is level. Tighten top two screws so that they are flush with the wall. Use the four lower holes as a guide to mark and drill pilot holes. Use remaining four screws and four washers to complete installation of bed and metal mounting bracket. Insert washers over lower four screws. All SIX screws and four washers must be mounted to the chassis.
4. Ensure liner dispenser is free from damage. Remove key, unlock, and open liner dispenser lid. This will expose liner dispenser mounting holes. Line up dispenser mounting holes onto chassis and secure with the four screws provided. Close and lock the liner dispenser door.
5. Clean work area and inspect unit to ensure it opens and closes smoothly. Give Operator Kit and key to the facility operator.

Replacement Parts: For a list of replacement parts for this product (such as straps, shocks and labels), please visit koalabear.com. Replacement parts and additional liners can be purchased from your local distributor or direct from Koala at koalabear.com.

The illustrations and descriptions herein are applicable to production as of the date of this Technical Data Sheet. The manufacturer reserves the right to, and does from time to time, make changes and improvements in designs and dimensions without notice.

Koala Kare Products | 6982 S Quentin St. | Centennial, CO 80112 Toll Free: 888.733.3456 | 303.539.8300 | Fax: 303.539.8399
www.koalabear.com

P/N AB005 April 2023

AMGOOD

Stainless Steel Wall Shelf, 36 Long X 12 Deep

Zoro #: G007698405 **Mfr #:** AMG WS-1236

0 0 reviews Write a Review

Tap to zoom

+4

Help us improve our product images

$54.00

In Stock

Ships in **1 business day**

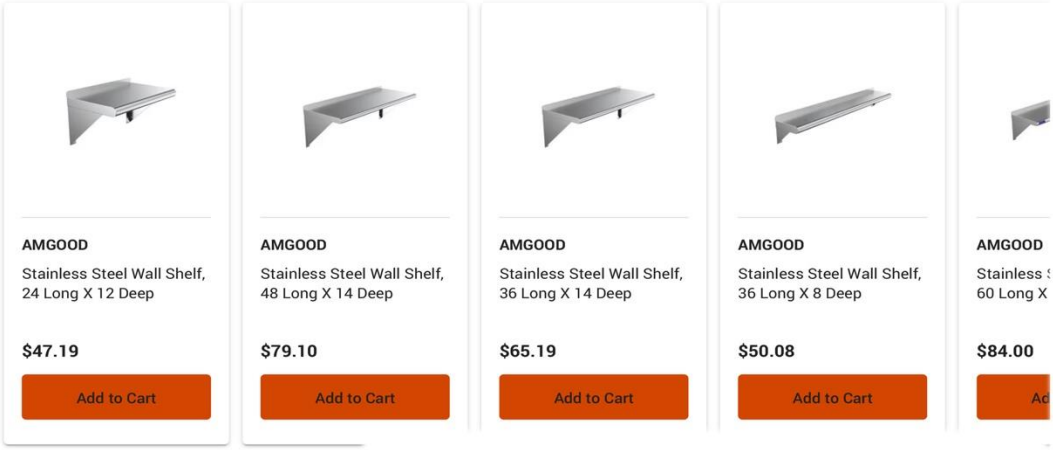
Key Features

Width: 12
Height: 11
Material: Stainless Steel
Color: Silver
Gauge: 18 Gauge
Weight Capacity: 230 Lbs
Standards: NSF
Package Quantity: 1

See all product information

Description

This heavyduty multifunctional stainless wall shelf is made with 18 gauge stainless steel The design features a 1 backsplash and bullnose edge It's made with durable welded corners and support bracketsIts professional, modern and sleek design makes this metal floating shelf perfect for use in any residential or commercial kitchen, food truck, garage, closet, laundry room, utility and equipment room, lab, appliance shelf for toaster and microwave, etcNSF certified to meet the strictest standards for public health protection The industrialquality manufacturing process meets the highest regulatory requirements for construction, safety, and durabilityThis corrosionresistant wall mount shelf can handle anything you throw at it and will last for years to come Easy to clean and sterilize, metal shelves are superior to wood or glass Food and liquid wont get stuck or ruin the integrity of the surface Easily wipe away excess with no fuss, mess, or contaminationThe shelf ships knocked down Brackets, hardware, and installation manual are included Installation takes less than 15 minutes



Product Information

Brand	Amgood
MFR #	AMG WS-1236
Zoro #	G007698405
UPC #	810095250026
Country of Origin	China
Category	Wall Shelving

Need Help?

Our customer service team is here for you.

Frequently Asked Questions

Contact Us

Dimensions

Width	12
Height	11

Details

Item	Stainless Steel Wall Shelf
Material	Stainless Steel
Color	Silver
Gauge	18 Gauge
Weight Capacity	230 Lbs
Standards	NSF
Package Quantity	1

END OF SECTION

SECTION 10508

METAL LOCKERS, BENCH, SKATE RACKS

1 PART 1 GENERAL

1.1 SECTION INCLUDES

A. Locker units with hinged doors.

B. Bench

C. Skate Storage Racks

1.2 SUBMITTALS FOR REVIEW

A. Section 01300 – Submittals: Procedures for submittals.

B. Product Data: Provide data on locker types, sizes, and accessories. Colored catalog sheets.

C. Samples: Submit two samples 3 X 6 inches (75 X 150 mm) in size, of each color scheduled or selected, applied to specified base metal.

1.3 SYSTEM DESCRIPTION

A. Painted Steel Standard Metal Lockers: With 6” metal legs, flat tops, latch handle with padlock hasps.

1. Size 12” W. X 15” D. X 72” H.
2. Type: 3 wide, triple tier. (6 compartments)

B. Hardwood Slab Bench, 17” high, 9-1/2” wide, 8’-0” long with powder coated steel supports bolted to the floor

C. Powder Coated Steel Skate Storage Rack System, approximate dimensions, 8’-0” high maximum, 4’-0” long with adjustable height shelves and fixed blade channel to hold skates, approximate capacity 30 pairs per unit.

1.4 MATERIALS AND FINISHES

A. Skate Rack Uprights: The powder coated steel skate uprights shall be fabricated to allow for either single-sided or double-sided shelving. Wall mount brackets to be included if shelves are mounted against walls. Each upright shall have a ¼" x 5” x 6” base plate (single sided shelves) or ¼” x 5” x 8” base plate (double sided shelves) welded to the bottom so that each upright can be anchored to the concrete floor. Two ¼” gusset plates will be added for additional support for systems not anchored to a wall. Each 6” x 6” plate to have three or four holes depending on post location, 5/8” diameter holes punched into it so that the plate can be anchored and adjusted to the floor.

B. Upright posts to be installed either 36” or 48” on center depending on the shelf configuration required.

C. 1/2" LDT concrete anchors (three per post) to anchor each upright post.

D. All racks not anchored to a wall must be secured to the ceiling structure. Examples being steel bracket, Unistrut, threaded rod. Actual method to be determined during installation based on overhead room design.

E. Additional “blocking” required when installing adjacent to a “stud wall.” Blocking to be furnished and installed by others.

F. Shelving 36” and 48” wide, powder coated, steel shelves shall be installed (six per section) with adjustment track factory installed shelves.

G. Shelving depth: Standard shelf depth – 10” shelf for single deep skate storage (9.5” skate holders).

H. PVC Adjustment Track: Each standard 10” shelf shall have two adjustment tracks attached to allow for lateral adjustment of the skate holders to accommodate different size skates. The adjustment tracks shall be attached to the shelving using aluminum rivets.

I. PVC Skate Holders: Skate holders, to be installed by owner, onto the adjustment track, after the skate rack uprights and shelves are installed. (Final positioning of skate holders by owner, based on skate sizes). Each single deep shelf to be supplied with the following number or skate holders: 36” shelves – 4 pair (8 holders) 48” shelves – 5 pair (10 holders). Each skate holder to be furnished with two square aluminum nuts and two bolts for the attachment to the adjustment tracks.

J. Skate rack uprights and shelves to be furnished in a beige colored powder coat painted finish. All fasteners to be supplied with zinc plated finish unless otherwise specified. Plastic adjustment track and skate holders to be furnished in a beige color to match shelving and uprights.

1.5 DELIVERY, STORAGE, AND PROTECTION

A. Protect locker finish and adjacent surfaces from damage.

2 PART 2 PRODUCTS

2.1 MANUFACTURERS

A. Lyon Metal Products, Inc.
(800) 323-0082

B. Global Industrial
(888) 978-7759

C. DC Tech Inc.

(816) 842-9090

D. Becker Arena Products
(800) 234-5522

E. Section 01600 – Materials and Equipment: Product options and substitutions.

2.2 ACCESSORIES

A. For Each Locker: Three single prong wall hooks, and one double prong ceiling hook, metal number plate, and rubber bumper.

3 PART 3 EXECUTION

3.1 INSTALLATION

A. Install in accordance with manufacturer's instructions.

B. Install items plumb and square.

C. Secure lockers and other items with anchor devices to suit substrate materials. Minimum Pullout Force: 100 1b (445 N).

D. Install accessories.

E. Replace components that do not operate smoothly.

F. Clean locker interiors and exterior surfaces.

END OF SECTION

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SECTION 10522

FIRE EXTINGUISHERS, CABINETS, AND ACCESSORIES

1 PART 1 GENERAL

1.1 SECTION INCLUDES

A. Fire extinguishers.

B. Cabinets.

C. Accessories.

D. Locations as shown on drawings.

1.2 RELATED SECTIONS

A. Section 06100 – Framing and Sheathing.

B. Section 09211 - Gypsum Board Systems: Roughed-in wall openings.

C. Section 09910 - Painting.

1.3 REFERENCES

A. NFPA 10 - Portable Fire Extinguishers.

1.4 QUALITY ASSURANCE

A. Conform to NFPA 10 requirements for extinguishers.

B. Conform to requirements of Fire Marshal having jurisdiction.

1.5 SUBMITTALS

A. Submit product data under provisions of Section 01300.

B. Include physical dimensions, operational features, color and finish, wall-mounting brackets with mounted measurements, anchorage details, rough-in measurements, location, and details.

C. Submit manufacturer's installation instructions under provisions of Section 01300.

1.6 OPERATION AND MAINTENANCE DATA

A. Submit manufacturer's operation and maintenance data under provisions of Section 01700.

B. Include test, refill or recharge schedules, procedures, and re-certification requirements.

1.7 ENVIRONMENTAL REQUIREMENTS

A. Do not install extinguishers when ambient temperatures may cause freezing.

2 PART 2 - PRODUCTS

2.1 ACCEPTABLE MANUFACTURERS

A. Larsen's Manufacturing Company.

B. J.L. Industries.

C. Walter Kidde.

D. Substitutions: Under provisions of Section 01600.

2.2 EXTINGUISHERS

A. Multi-Purpose Dry Chemical Type: Steel tank, Model MP6 manufactured by Larsen's Manufacturing Company; with pressure gage, 3A-4OB:C U.L. size and classification.

2.3 CABINETS

A. Cabinet: Formed sheet steel, 18 gage, white baked acrylic enamel coated; fully recessed mounted type, inside size 24 x 9-1/2 x 6 inches; Architectural Series, Model No. 2409-R-3 as manufactured by Larsen's Manufacturing Company.

B. Trim: 2 1/2 inch rolled edge, white baked acrylic enamel finish steel.

C. Door: White baked acrylic enamel finish steel, 18 gage thick, reinforced for rigidity; lock with break glass access.

D. Glass: 1/8-inch-thick float glass.

E. Mounting Hardware: Appropriate to cabinet.

F. Graphic Identification: None.

2.4 ACCESSORIES

A. Fire Extinguisher Brackets: "B" Series, Model No. B-2; white baked acrylic enamel finish as manufactured by Larsen's Manufacturing Company.

2.5 FABRICATION

A. Form body of cabinet with tight inside corners and seams.

B. Predrill holes for anchorage.

C. Form perimeter trim and door stiles by welding, filling, and grinding smooth.

D. Hinge doors for 180 degree opening with continuous piano hinge. Provide nylon roller type catch.

E. Glaze doors with resilient channel gasket glazing.

2.6 FINISHES

A. Extinguisher: Red enamel.

B. Cabinet, Trim and Door: White baked acrylic enamel finish.

C. Cabinet Interior: White baked acrylic enamel finish.

3 PART 3 EXECUTION

3.1 EXAMINATION

A. Verify rough openings, wall surfaces and blocking for cabinet are correctly sized and located.

B. Beginning of installation means acceptance of existing conditions.

3.2 INSTALLATION

A. Install cabinets plumb and level in or on walls 60 inches from finished floor to top of cabinet or as indicated on Drawings.

B. Install fire extinguisher brackets plumb and level as indicated on Drawings.

C. Secure rigidly in place in accordance with manufacturer's instructions.

D. Charge, tag and install fire extinguishers.

END OF SECTION

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DIVISION 12

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SECTION 12360

COUNTERTOPS

1 PART 1 GENERAL

1.1 SECTION INCLUDES

A. Solid surfacing countertops at bathrooms.

B. Laminate countertops at concession area.

C. Adhesives and sealants.

D. Steel support brackets.

E. Miscellaneous blocking and plywood backer boards.

1.2 RELATED SECTIONS

A. Section 01300 – Submittals.

B. Section 06200 – Finish Carpentry.

C. Section 07629 – Metal Fabrications.

1.3 REFERENCES

A. ANSI Z124.3: American National Standard for Plastic Lavatories.

B. ANSI Z124.6: American National Standard for Plastic Sinks.

C. ASTM C 834: Standard Specification for Latex Sealants.

D. ASTM C 920: Standard Specification for Elastomeric Joint Sealants.

E. ASTM D 256: Standard Test Methods for Determining the Izod Pendulum Impact Resistance of Plastics.

F. ASTM D 570: Standard Test Method for Water Absorption of Plastics.

G. ASTM D 638: Standard Test Method for Tensile Properties of Plastics

H. ASTM D 696: Standard Test Method for Coefficient of Linear Thermal Expansion of Plastics Between -30oC and 30oC with a Vitreous Silica Dilatometer.

I. ASTM D 790: Standard Test Methods for Flexural Properties of Unreinforced and Reinforced Plastics and Electrical Insulating Materials.

J. ASTM D 792: Standard Test Methods for Density and Specific Gravity (Relative Density) of Plastics by Displacement.

K. ASTM D 2583: Standard Test Method for Indentation Hardness of Rigid Plastics by Means of a Barcol Impressor.

L. ASTM E 84: Standard Test Method for Surface Burning Characteristics of Building Materials.

M. ASTM E 84: Standard Test Method for Surface Burning Characteristics of Building Materials.

N. ASTM G 21: Standard Practice for Determining Resistance of Synthetic Polymeric Materials to Fungi.

O. ASTM G 22: Standard Practice for Determining Resistance of Synthetic Polymeric Materials to Bacteria.

P. ASTM G 155: Standard Practice for Operating Xenon Arc Light Apparatus for Exposure of Non-Metallic Materials.

Q. ASTM G 155: Standard Practice for Operating Xenon Arc Light Apparatus for Exposure of Non-Metallic Materials.

R. NEMA LD-3: High Pressure Decorative Laminates.

S. NSF/ANSI Standard 51: Food Equipment Materials.

T. SCAQMD Rule 1168: Adhesive and Sealant Applications.

U. UL 2818: GREENGUARD Certification Program for Chemical Emissions for Building Materials, Finishes and Furnishings.

1.4 SUBMITTALS FOR REVIEW

A. Submit under provisions of Section 01300 – Submittals.

B. Product Data:

1. Submit product date for each specified product. Include manufacturer's technical data sheets and published instruction instructions.

2. Submit Material Safety Data Sheets (MSDS) for adhesives and sealants.

C. Shop Drawings:

1. Submit fully dimensioned shop drawings showing countertop layouts, joinery, terminating conditions, substrate construction, cutouts and holes. Show plumbing installation provisions. Include elevations, section details, and large-scale details.

F. Samples:

1. Submit selection and verification samples for each color, pattern, and finish required.

G. Quality Assurance Submittals:

1. Test Reports: Submit certified test reports showing compliance with specified performance characteristics and physical properties, if required.

2. LEED Submittals: Submit applicable LEED documentation for potential credits specified in this Section.

3. Warranty: Specimen copy of specified warranty.

H. Maintenance Data: Submit manufacturer's published maintenance manual with closeout submittals.

1.5 REGULATORY REQUIREMENTS

A. Accessibility Requirements: Comply with the U.S. Architectural & Transportation Barriers Compliance Board ADA-ABA Accessibility Guidelines for Buildings and Facilities.

B. Adhesives, Sealants, and Sealant Primers:

1. SCAQMD (South Coast Air Quality Management District) Rule 1168.

1.6 QUALITY ASSURANCE

A. Qualifications:

1. Fabricator Qualifications: Minimum of three years documented experience in fabricating solid surfacing countertops similar in scope and complexity to this Project. Currently certified by the manufacturer as an acceptable fabricator.

2. Installer Qualifications: Minimum of three years documented installation experience for projects similar in scope and complexity to this Project, and currently certified by the manufacturer as an acceptable installer.

1.7 DELIVERY, STORAGE, AND HANDLING

A. Delivery: Deliver materials in protective packaging.

B. Storage and Protection: Store materials protected from exposure to harmful weather conditions, at temperature and humidity conditions recommended by manufacturer. Store sheet materials flat on pallets or similar rack-type storage to preclude damage.

1.8 PROJECT CONDITIONS

A. Field Measurements: Verify actual measurements and openings by field measurements before fabrication; show recorded measurements on shop drawings. Coordinate field measurements and fabrication schedule with construction progress to avoid construction delays.

B. Adhesive: Acclimatize adhesives to occupancy room temperatures with maximum temperature not to exceed 75 deg F.

1.9 WARRANTY

A. Manufacturer’s Limited Warranty: Provide manufacturer’s standard 10 Year Commercial Limited Warranty against defects in solid surface sheet materials.

2 PART 2 PRODUCTS

2.1 MANUFACTURER – Solid Surface Counters

A. Basis of Design: Wilsonart LLC.

2.2 SOLID SURFACE SHEET MATERIALS

A. Acceptable Product: "Wilsonart Solid Surface," Corian Solid Surface, or HIMACS Solid Surface.

B. Composition: Acrylic resins, fire-retardant mineral fillers, and proprietary coloring agents. Through-the-body color for full thickness of sheet material.

C. Material Thickness: 1/2 inch, nominal.

D. Conformance Standards:

1. UL 2828:

a. GREENGUARD – Emission levels in UL 2818, Section 7.1 are applicable for furniture products.

b. GREENGUARD Gold – Emission levels in UL 2818, Section 7.2 are applicable for building materials, finishes, and furnishings.

E. Physical Characteristics:

1. Tensile Strength: [6800 psi]; ASTM D 638.

2. Tensile Modulus: [1.5 x 106 psi]; ASTM D 638.

3. Tensile Elongation: 0.4 percent minimum; ASTM D 638.

4. Flexural Strength: [10,000 psi]; ASTM D 790.

5. Flexural Modulus: [1.5 x 106 psi]; ASTM D 790.

6. Thermal Expansion Coefficient: 1.37 x 105 in./in.oF; ASTM D 696.

7. Hardness (Barcol Impressor): 55-62; ASTM D 2583.

8. Impact Resistance: [144 in.] drop with no fracture; NEMA LD-3, Method 3.8.

9. Izod Impact: 0.28 (ft-lb.)/in.; ASTM D 256, Method A.

10. Light Resistance - Xenon: No effect; NEMA LD-3, Method 3.3.

11. Stain Resistance: Pass; ANSI Z 124.3, modified.

12. Wear and Cleanability: Pass; ANSI Z 124.3.

13. Fungi Resistance: Pass; ASTM G 21.

14. Bacterial Resistance: Pass; ASTM G 22.

15. Boiling Water Resistance: No effect; NEMA LD-3, Method 3.5.

16. High Temperature Resistance: No effect; NEMA LD-3, Method 3.6.

17. Weatherability: Delta E less than 5; ASTM G 155.

18. Moisture Absorption: Less than 0.25 percent; ASTM D 570, long term.

19. Specific Gravity: [1.7 gram/cm3]; ASTM D 792.

20. Weight: [4.4 lb./ft.^{2}].

21. Surface Burning Characteristics: Class I and Class A; ASTM E 84.

2.3 ACCESSORY MATERIALS

A. Joint Adhesive: Methacrylate-based adhesive for chemically bonding solid surfacing seams. Color complementary to solid surfacing sheet material. UL 2818 GREENGUARD Gold certified and complies with SCAQMD Rule 1168.

1. Product: “Wilsonart Hard Surface Adhesive.”

B. Elastomeric Sealant: Mildew-resistant silicone sealant for filling gaps between countertops and terminating substrates in wet environment applications. Complies with ASTM C 920, Type S (single component), Grade NS (nonsag).

1. Product: Accetable to countertop manufacturer.

2. Color: [Complementary to solid surfacing color] [Clear] [Selected from sealant manufacturer’s standard offerings].

C. Siliconized Acrylic Sealant: Siliconized acrylic latex sealant. For general applications to fill gaps between countertops and at terminating substrates. Complies with ASTM C 834, Type OP, Grade NF, and SCAQMD Rule 1168.

1. Product: ”Wilsonart Color Matched Caulk”.

2. Color: [Complementary to solid surfacing color] [Clear] [Selected from sealant manufacturer’s standard offerings].

D. Construction Adhesive: Countertop manufacturer’s recommended silicone-based construction adhesive for backsplashes, endsplashes, and other applications according to manufacturer’s published fabrication instructions.

2.4 PLASTIC LAMINATE MATERIALS:

A. Plastic Laminate: NEMA LD-3; 0.050 inch General Purpose and Chemical Resistant, 0.028 inch Vertical and Fire Resistive Grade; color, pattern, and surface finish as selected by Architect.

B. Plastic Laminate Backing: High pressure paper base laminate without a decorative finish; 0.020 inch thick, smooth surface finish manufactured by Wilsonart.

C. Core: ¾” particleboard, CS 236, high density.

D. Acceptable Laminate Manufacturers:

1. Wilsonart by Ralph Wilson Plastics Company.

2. Nevamar Corporation.

3. Micarta Division, Westinghouse Electric Corporation.

4. Substitutions: Under provisions of Section 01600.

2.5 FABRICATION

A. Fabricate components in shop, to greatest extent practicable, in sizes and shapes indicated according to approved shop drawings and Wilsonart published fabrication requirements.

B. Form joint seams between solid surfacing components with specified seam adhesive. Completed joints inconspicuous in appearance and without voids. Provide joint reinforced if required by manufacturer for particular installation conditions.

C. Provide holes and cutouts indicated on approved shop drawings. Rout cutouts and complete by sanding all edges smooth.

3 PART 3 EXECUTION

3.1 EXAMINATION

A. Examine substrates and conditions that could adversely affect the work of this Section.

B. Substrates must be sound, flat, smooth, and free from dust or other surface contaminants.

C. Commencement of work will constitute acceptance of substrates and conditions to receive the work.

3.2 COUNTERTOP INSTALLATION

A. Install solid surfacing components plumb, level, and true according to approved shop drawings and manufacturer's published installation instructions. Use woodworking and specialized fabrication tools acceptable to manufacturer.

B. Form joint seams with specified seam adhesive. Seams to be inconspicuous in completed work. Seams in locations shown on approved shop drawings and acceptable to manufacturer. Promptly remove excess adhesive.

C. Provide minimum 1/2-inch radius for countertop inside corners.

D. Fill gaps between countertop and terminating substrates with specified silicone sealant.

E. Rout sink cutouts to manufacturer's template. Adhere solid surface cast sink units to countertops with specified adhesive.

F. Install backsplashes and endsplashes where indicated on Drawings. Adhere to countertops with specified construction adhesive.

G. Vanities: Secure front panels to solid substrate with specified construction adhesive. Maintain 1/16-inch gap between fixed and removable panels.

1. ADA Vanities: Angled front panel to permit wheelchair access to comply with referenced accessibility standard.

3.3 REPAIRS

A. If permissible to Architect, minor surface marring for solid surfacing components may be repaired according to manufacturer’s published installation instructions.

B. Remove and replace solid surfacing components that are damaged and cannot be satisfactorily repaired.

3.4 CLEANING AND PROTECTION

A. Clean solid surfacing components according to manufacturer’s published maintenance instructions. Completely remove excess adhesives and sealants from finished surfaces.

B. Protect completed work from damage during remainder of construction period.

3.5 SCHEDULE

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DIVISION 13

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SECTION 13400
PRE-ENGINEERED SHADE STRUCTURE

PART 1 GENERAL

1.01 SUMMARY

A. Section Includes

1. Requirements to fabricate, furnish, erect, set, fasten and install a Pre-Engineered Metal Shade Structure as indicated on the Drawings and as specified including:
   a. Metal Building System Components
      1) Clear span rigid frame
      2) 14’-11” minimum clearance at knee.
      3) 20” inch depth straight exterior columns.
      4) Bay spacing of 6 bays @ 20’-0”. As shown on drawings.
      5) Roof Slope 5” in 12”
      6) Primary Framing: Rigid frame of rafter beams and columns
      7) Secondary Framing: Purlins, eave struts, flange bracing, and other items detailed.
      8) Lateral Bracing: Horizontal loads not resisted by main frame action shall be resisted by portal frames in the sidewall. Clear span rigid frames in the endwall. Cable bracing in the roof.
      9) Wall and Roof System: Preformed steel panels, liner sheets, and accessory components.
      10) Accessories: The structure shall have cutouts at sizes and locations as needed for electrical access, lighting, and speakers.

B. Related Sections

1. Section 03300 – Cast In Place Concrete
2. Section 02630 - Storm Drainage & Culverts

1.02 REFERENCES

AISI S100, *North American Specification for the Design of Cold-Formed Steel Structural Members*, Washington, DC, 2016

B. AISC 360, *Specification for Structural Steel Buildings*, American Institute of Steel Construction, Chicago, IL 2016.

C. AISC, Steel Design Guide Series 3, *Serviceability Design Considerations for Steel Buildings*, Chicago, IL, Second Edition, 2003.

D. ANSI/ASHRAE/IES Standard 90.1, *Energy Standard for Buildings Except Low-Rise Residential Buildings*, Atlanta, GA, 2016.

E. ASTM A36-14, *Standard Specification for Carbon Structural Steel*, West Conshohocken, PA.

F. ASTM A123-17, *Standard Specification for Zinc (Hot-Dip Galvanized) Coatings on Iron and Steel Products*, West Conshohocken, PA.

G. ASTM A153-16a, *Standard Specification for Zinc Coating (Hot Dip) on Iron and Steel Hardware*, West Conshohocken, PA.

H. ASTM A307-14e1, *Standard Specification for Carbon Steel Bolts, Studs and Threaded Rod 60,000 psi Tensile Strength*, West Conshohocken, PA.

I. ASTM A325-14, *Standard Specification for Structural Bolts, Steel, Heat Treated, 120/105 ksi Minimum Tensile Strength*, West Conshohocken, PA.

J. ASTM A463-15, *Standard Specification for Steel Sheet, Aluminum-Coated, by the Hot-Dip Process*, West Conshohocken, PA.

K. ASTM A475-03(2014), *Standard Specification for Zinc-Coated Steel Wire Strand*, West Conshohocken, PA.

L. ASTM A490-14a, *Standard Specification for Structural Bolts, Alloy Steel, Heat Treated, 150 ksi Minimum Tensile Strength*, West Conshohocken, PA.

M. ASTM A500-13, *Standard Specification for Cold-Formed Welded and Seamless Carbon Steel Structural Tubing in Rounds and Shapes*, West Conshohocken, PA.

N. ASTM A501-14, *Standard Specification for Hot-Formed Welded and Seamless Carbon Steel Structural Tubing*, West Conshohocken, PA.

O. ASTM A529-14, *Standard Specification for High-Strength Carbon-Manganese Steel of Structural Quality*, West Conshohocken, PA.

P. ASTM A572-15, *Standard Specification for High-Strength Low-Alloy Columbium-Vanadium Structural Steel*, West Conshohocken, PA.

Q. ASTM A653-17, *Standard Specification for Steel Sheet, Zinc-Coated (Galvanized) or Zinc-Iron Alloy-Coated (Galvannealed) by the Hot-Dip Process*, West Conshohocken, PA.

R. ASTM A792-10(2015), *Standard Specification for Steel Sheet, 55% Aluminum-Zinc Alloy-Coated by the Hot-Dip Process*, West Conshohocken, PA.

S. ASTM A1011-14, *Standard Specification for Steel, Sheet and Strip, Hot Rolled, Carbon, Structural, High Strength Low-Alloy, High Strength Low-Alloy with Improved Formability, and Ultra-High Strength* West Conshohocken, PA.

T. ASTM C665-17, *Standard Specification for Mineral-Fiber Blanket Thermal Insulation for Light Frame Construction and Manufactured Housing*, West Conshohocken, PA.

U. ASTM D1494-17, *Standard Test Method for Diffuse Light Transmission Factor of Reinforced Plastic Panels*, West Conshohocken, PA.

V. ASTM E1514-98(2017)e1, *Standard Specification for Structural Standing Seam Steel Roof Panel Systems*, West Conshohocken, PA.

W. ASTM E1592-05(2017), *Standard Test Method for Structural Performance of Sheet Metal Roof and Siding Systems by Uniform Static Air Pressure Difference*, West Conshohocken, PA.

X. ASTM E1646-95(2011), *Standard Test Method for Water Penetration of Exterior Metal Roof Panel Systems by Uniform Static Air Pressure Difference*, West Conshohocken, PA.

Y. ASTM E1680-16, *Standard Test Method for Rate of Air Leakage through Exterior Metal Roof Panel Systems*, West Conshohocken, PA.

Z. AWS A2.4, *Standard Symbols for Welding Brazing, and Nondestructive Examination*, Miami, FL, 1998.

AA. AWS D1.1, *Structural Welding Code - Steel*, Miami, FL, 2015.

AB. AWS D1.3, *Structural Welding Code - Sheet Steel*, Miami, FL, 2008.

AC. MBMA, *Metal Building Systems Manual*, Metal Building Manufacturers Association, Cleveland, OH, 2018.

AF. SSPC, (The Coatings Society) - SP2 - *Specification for Hand Tool Cleaning*, 2004 (Part of Steel Structures Painting Manual, Vol. Two)

AG. SSPC, - Paint 15 - *Steel Joist Shop Primer/Metal Building Primer*; ; 2004 (Part of Steel Structures Painting Manual, Vol. Two)

AI. UL 580, - *Standard for Tests for Uplift Resistance of Roof Assemblies*, 2006 (with Revisions through July 2009).

1.03 DESIGN REQUIREMENTS

A. The building shall be designed by the Manufacturer as a complete system. All components of the system shall be supplied or specified by the same manufacturer.

B. Design Code:

1. Design shall be in accordance with IBC 18 w/ SBC-1 RI State Building Code 2021

C. Energy Code: None – Uninsulated Structure

D. Risk Category: III

E. Dead Loads:

1. The dead load shall be the weight of the Metal Building System and as determined by the system manufacturer.

F. Collateral Loads:

1. The collateral load shall be 10 psf or as shown on the contract drawings. Collateral Loads shall not be applied to the roof panels.

G. Live Loads:

1. The building system shall be capable of supporting a minimum uniform live load of 20 psf., non-reducible

H. Snow Loads:

1. The design roof snow loads shall be 30 psf or as defined on the contract drawings.

I. Wind Loads:

1. The basic design wind speed for the metal building system shall Be 136 mph or as defined on the contract documents.

J. Seismic Loads:

1. Seismic load shall be determined based upon a spectral response acceleration factors S_s =.174, S_1 = .060

K. Rainfall Intensity:

1. All exterior gutters and downspouts shall be designed for rainfall intensity based upon a 5-year recurrence interval for a five-minute duration. All interior gutters, valleys and downspouts shall be designed for rainfall intensity based upon a 25-year recurrence interval based on a five-minute duration.

L. Deflection and drift requirements shall be in accordance with the applicable recommendations of the AISC *Steel Design Guide Series 3 - Serviceability Design Considerations for Steel Buildings*

1. Deflections shall be limited as follows:
   a. Primary Framing:
      1) L/240 for roof snow load.

M. Secondary Framing:

1. Roof snow load; but not less than that required to maintain positive drainage for the greater of dead load + 1/2 roof snow load or dead load + 5 psf.
   a. L/180 for roof snow load (but not less than 20 psf) on sheeting.
2. Metal Panels:
   a. L/180 for 10-year wind load on walls and roof
3. Drift shall be limited as follows:
   a. H/60 10-year wind load.

N. Thermal Effects:

1. Standing Seam roof panels shall be free to move in response to the expansion and contraction forces resulting from a temperature variation.
2. Assembly to permit movement of components without buckling, failure of joint seals, undue stress on fasteners or other detrimental effects.

1.04 SUBMITTALS

A. Submit under provisions of Section 01300.

B. Submit anchor rod placement plan, column reactions, in advance of erection drawings.

C. Product Data: Manufacturer's data sheets on each product to be used, including:
1. Preparation instructions and recommendations.
2. Storage and handling requirements and recommendations.
3. Installation methods

D. Shop Drawings: Shop or Erection Drawings: Indicate assembly dimensions, locations of structural members, connections, attachments, openings, cambers, and loads, wall and roof system dimensions, panel layout, general construction details, anchorages and method of anchorage

E. Selection Samples: For each finish product specified, two complete sets of color chips representing manufacturer's full range of available colors and patterns.

F. Certifications: Shop drawings and letter of certificiation shall bear the professional seal and signature of a licensed professional engineer registered in the state of Rhode Island

1.05 QUALITY ASSURANCE

Fabricate structural steel members in accordance with MBMA Metal Building Systems Manual, and, for items not covered, AISC - Specification for Structural Steel Buildings.

1.06 QUALIFICATIONS

A. Manufacturer: The company manufacturing the products specified in this Section shall have a minimum of 10 years experience in the manufacture of metal building systems. The metal building systems manufacturer shall be accredited under the International Accreditation Service, *Accreditation Criteria for Inspection Programs for Manufacturers of Metal Building Systems (AC472)*.

B. Structural framing and covering shall be the design of a Registered Professional Engineer experienced in design of this work.

C. Erector shall have specialized experience in the erection of steel building systems for a period of at least 3 years.

1.07 DELIVERY, STORAGE AND HANDLING

A. Delivery and Acceptance Requirements: Deliver materials to site in manufacturer's original, unopened containers and packaging, with labels clearly identifying product name and manufacturer.

B. Storage and Handling Requirements:
   1. Store and handle materials in accordance with manufacturer's instructions.
   2. Keep materials in manufacturer's original, unopened containers and packaging until installation.
   3. Do not store materials directly on ground.
   4. Store materials on flat, level surface, raised above ground, with adequate support to prevent sagging.
   5. Protect materials and finish during storage, handling, and installation to prevent damage.

C. Maintain environmental conditions (temperature, humidity, and ventilation) within limits recommended by manufacturer for optimum results. Do not install products under environmental conditions outside manufacturer's absolute limits.

D. Store and dispose of hazardous materials, and materials contaminated by hazardous materials, in accordance with requirements of local authorities having jurisdiction.

1.08 WARRANTY

A. Building manufacturer shall provide a material warranty of 20 years.

B. Metal building contractor shall provide a workmanship warranty of 2 years.

1.09 ADMINISTRATION

A. All nomenclature shall conform to the MBMA *Metal Building Systems Manual*.

B. Coordination and administration of the work shall be in accordance with the MBMA *Metal Building Systems Manual - Chapter IV Common Industry Practices.*

1.10 PROJECT CONDITIONS

A. Field Measurements: Where metal fabrications are indicated to fit within reinforced concrete foundations and other construction, dimensions shall be verified by field measurements before fabrication. The fabrication schedule shall be coordinated with the Construction Progress Schedule to avoid delaying the Work.

1. Established Dimensions: Where field measurements cannot be made without delaying the Work, proceed with fabricating metal fabrications upon receipt of Engineer reviewed and approved shop drawings, without field measurements. Allowance shall be made for trimming and fitting.

1.11 SCHEDULING

A. Installation of metal shade structure shall be coordinated with the Contractor. Setting drawings, templates, and instructions for installing anchorages, including sleeves, concrete inserts, anchor bolts, items with integral anchors, and any items that are to be embedded in concrete shall be provided to the Contractor. Items to be embedded in concrete shall be delivered to Project site sufficiently in advance to allow time for installation, as determined by the Contractor.

PART 2 PRODUCTS

2.01 MANUFACTURERS

A. Acceptable Manufacturer:
Package Steel Systems, Inc.
15 Harback Road
Sutton, MA 01590

1. Substitutions: Or Equal

2.02 MATERIALS

A. Materials - Roof System

1. Sheet Steel Stock: aluminum-zinc coated to AZ55 as required by manufacturer's design.
2. Roof Insulation: None
3. Standing Seam Roofing: Minimum 24 gauge trapazodial leg profile, ASTM E1592 tested, UL 580, Class 90 uplift rating, mechanical seam joining sides, with factory applied sealant.
4. Soffit Panels: Minimum 24 gauge Artisan 12” profile unperforated.
5. Almond color as selected from manufacturer's standard colors.
6. Closures: Manufacturer's standard type, closed cell or metal.
7. Fasteners: Manufacturer's standard type, Size and design to maintain load and weather tightness requirements. Fasteners to be stainless steel cap with carbon shank, self drilling and tapping.
8. Sealant: Manufacturer's standard type.

9. Exterior Surfaces of Roof Panels: Precoated steel of polyvinylidene fluoride (PVDF) finish, Midnight Bronze color as selected from manufacturer's standard colors.
10. Interior Surfaces of Roof Panels: Precoated steel with wash coat of silicone polyester manufacturer's standard finish.

B. Materials - Wall Systems

1. None

C. Materials - Trim

1. Flashings, Internal and External Corners, Closure Pieces, Same material and finish as adjacent material, profile to suit system, formed as detailed. Match adjacent panel color as selected from manufacturer's standards.

D. Materials - Metal Personnel Doors And Frames

1. None

E. Materials - Doors And Frames, Other Than Personnel

1. None

F. Materials – Windows

1. None

G. Materials - Light-Transmitting Plastic Panels

1. None

H. Materials – Accessories

1. None

I. Fabrication - Primary Framing

1. Framing Members: Clean and prepare in accordance with SSPC-SP2 as a minimum, and coat with primer meeting SSPC No. 15, coat with building manufacturer's standard primer
   a. Frame shall be painted - color shall midnight bronze; final color be chosen by by owners rep.
   b. Coating shall be applied within six hours after surface preparation has been completed and accepted. The Contractor shall take all necessary measures to ensure that prepared parts are kept clean and not exposed to dirt, dust, grease, or oil while being handled or staged prior to application of the coating. Final acceptance of the coating system will occur at the jobsite after erection of the coated items, and after all required repairs have been completed.
   c. The coating system shall consist of a polyamide epoxy and a catalyzed aliphatic urethane. Coating shall be applied in accordance with the RIDOT specifications and the coating manufacturer’s product datasheet. Contractor to confirm appropriate paint type and application with manufactuer prior to installation.

2. Hot rolled members shall be fabricated in accordance with AISC Specification for pipe, tube, and rolled structural shapes.
3. Fabricate built-up members in accordance with MBMA *Metal Building Systems Manual, Chapter IV Common Industry Practices.*

J. Fabrication - Secondary

1. Framing Members: Members formed from G90 galvanized flat material, galvanize to ASTM A123, Class B
2. Cold-Formed Members: Cold-formed structural shapes shall be fabricated in accordance with MBMA *Metal Building Systems Manual, Chapter IV Common Industry Practices*.

K. Fabrication - Gutters, Downspouts, Flashings And Trim

1. Fabricate gutters, flashings and trims from manufacturer's standard. Color to be Midnight Bronze, as selected from manufacturer's standard offering.
2. Fabricate or furnish downspouts with elbows from manufacturer's standard. Color to be Midnight Bronze, as selected from manufacturer's standard offering.
3. Form gutters and downspouts to standard profile and size to collect and remove water. Fabricate with connection pieces.
4. Form flashing and trim sections in maximum possible lengths. Hem exposed edges.
5. Fabricate or furnish gutter support straps of manufacturer's standard material, design and finish.
6. Fabricate or furnish downspout clips or support straps of manufacturer's standard material. Finish color as selected.

L. AV Integration - The structure shall have cutouts at sizes and locations as needed for electrical access, lighting, and speakers. Contractor shall coordinate work as needed.

PART 3 EXECUTION

3.01 EXAMINATION

A. Examine substrates, areas, and conditions, with Erector present, for compliance with requirements for installation tolerances and other conditions affecting performance of work.

B. Before erection proceeds, survey elevations and locations of concrete and masonry bearing surfaces and locations of anchor rods, bearing plates and other embedment’s to receive structural framing, with Erector present, for compliance with requirements and metal building system manufacturer’s tolerances.

C. Proceed with erection only after unsatisfactory conditions have been corrected.

3.02 ERECTION - FRAMING

A. Erect framing in accordance with MBMA Metal Building Systems Manual, Chapter *IV* Common Industry Practices

B. Use templates for accurate setting of anchor rods. When required, level bearing plate area with steel wedges, shims or grout. Check all previously placed anchorages.

C. Erect building frame true and level with vertical members plumb and bracing properly installed. Maintain structural stability of frame during erection.

D. Ream holes requiring enlargement to admit bolts. Burned holes for bolted connections are not permitted without written approval by designer. Burned holes to be reamed.

E. Tighten bolts and nuts in accordance with RCSC Specification for Structural Joints Using High-Strength Bolts, using specified procedure. Snug tight, Turn-of-the-nut tightening to assure correct tightening.

F. The erector shall furnish temporary guys and bracing where needed for squaring, plumbing, and securing the structural framing against loads, such as wind loads acting on the exposed framing and seismic forces, as well as loads due to erection and erection operation, but not including loads resulting from the performance of work by others. Bracing furnished by the manufacturer for the metal building system cannot be assumed to be adequate during erection and are not to be used to pull frames into plumb condition.

G. The temporary guys, braces, falseworks and cribbing are the property of the erector, and the erector shall remove them immediately upon completion of erection.

H. Do not field cut or modify structural members without approval of the metal building manufacturer.

I. After erection, erector to prime welds, abrasions, and surfaces not shop primed, galvanized or needing touch-up.

3.03 ERECTION - WALL AND ROOFING SYSTEMS

A. Install all wall and roofing systems in accordance with manufacturer's instructions and details.

B. Exercise care when cutting prefinished material to ensure cuttings do not remain on finish surface.

C. Fasten cladding system to structural supports, using proper fasteners aligned level and plumb.

D. Set purlins and girts at right angle and bolt to appropriate clips. Attach to clips as required to satisfy design loads and as shown on drawings.

E. Place Standing Seam Roof panels at right angle to purlins. Attach with sliding concealed clip where expansion and contraction must be accounted for. Lap panel ends as determined by manufacturer's standard and panel notch. Place end laps above purlin with backup plate and cinch strap so panel end-lap fasteners do not penetrate purlin. Follow manufacturer’s instructions for fastening and sealing end laps.

3.04 ERECTION - GUTTER, DOWNSPOUT, FLASHINGS AND TRIM

A. Install gutters and downspouts, flashings and trim in strict accordance with manufacturer's instructions, using proper sheet metal procedures.

B. Install downspouts boots to utilize drainage connection.

3.05 ERECTION - TRANSLUCENT PANELS

A. N/A

3.06 INSTALLATION - ACCESSORIES

A. All roof and wall accessories to be installed weathertight.

3.07 TOLERANCES

A. All work shall be performed by experienced workmen in a workmanlike manner to published tolerances.

B. Install framing in accordance with MBMA *Metal Building Systems Manual, Chapter IV Common Industry Practices*.

3.08 PROTECTION

A. Protect installed products until completion of project.

B. Touch-up, repair or replace damaged products before Substantial Completion.

END OF SECTION

SECTION 13811

ICE RINK GENERAL REQUIREMENTS

PART 1 - GENERAL

1.01 SECTION INCLUDES

A. Quality assurance - prequalification criteria.

B. General description of ice system requirements including ice rink floor, refrigeration system, and waste heat recovery systems.

C. Reinspection.

D. Submittal and project closeout requirements.

E. Electrical requirements.

F. General concrete requirements.

G. Start-up and shutdown procedures.

H. Building first ice sheet.

1.02 QUALITY ASSURANCE

A. To demonstrate the qualifications to perform the Work, the Ice Rink Contractor shall submit the information requested below with their Bid. Ice Rink Contractor is defined as the contractor responsible for completing all Division 13 work and all work shown on the "R" drawings. Subcontractors performing the work identified below shall also meet the qualifications. Qualification document submitted by the low bidder will be evaluated after the bid opening to determine if the Ice Rink Contractor meets these qualifications.

1. As evidence and assurance of the contractor's ability to construct the project and support the Owner's system with service the contractor installing and constructing the primary and secondary refrigeration systems must have successfully installed and constructed refrigeration systems and ice rink floors for **five (5) ice rink construction projects that are similar to this project and completed within the past five (5) years.** Submit information on each project. Submittal shall be on company letterhead, signed by an authorized representative of the company and include project description, portion of project completed by the company, location, construction cost, completion date, owner's name, owner's representative, phone number and completion date of work.

2. As evidence and assurance of the contractor's concrete subcontractor's ability to construct the project the contractor placing and finishing the concrete must have successfully completed the placement and finishing of concrete on **eight (8) concrete ice rink floor construction projects within the past five (5) years.** Submit information on each project. Submittal shall be on company letterhead, signed by an authorized representative of the company and include project description, portion of project completed by the company, location, construction cost, completion date, owner's name, owner's representative, phone number and completion date of work.

3. As evidence and assurance of the contractor's controls subcontractor's ability to construct the project the control subcontractor must have successfully completed the programming and installation of two (2) ice rink construction projects that are similar to this project that were completed within the past five (5) years. Submit information on each project.

Submittal shall be on company letterhead, signed by an authorized representative of the company and include project description, portion of project completed by the company, location, construction cost, completion date, owner's name, owner's representative, phone number and completion date of work.

4. As evidence and assurance of the contractor's expansion joint subcontractor's ability to construct the project the ice rink floor expansion joint subcontractor must have successfully completed twenty (20) construction projects that use the same type of joint. Submit information on each project. Submittal shall be on company letterhead, signed by an authorized representative of the company and include project description, portion of project completed by the company, location, construction cost, completion date, owner's name, owner's representative, phone number and completion date of work.

5. Submit the name of at least one (1) person employed by the company that will supervisor the fusion welding process along with their certifications, training and qualifications for performing the fusion welding process for high density polyethylene pipe (HDPE).

B. Contractors wishing to bid on this project shall perform an on-site investigation prior to submitting a bid for the project. Contractor shall field verify all equipment and materials that will be affected by the work of this project and report any concerns to the Engineer at least ten (10) business days prior to the bid opening date.

1.03 GENERAL PROJECT DESCRIPTION

A. The following is a general description of the project and may not include all materials and labor required or covered elsewhere in the contract documents.

1. Furnish and install a complete ice system including refrigeration system, ice rink floor, and waste heat recovery system for snow melting.

2. Furnish and install an indirect refrigeration system including equipment, piping, insulation, valves, refrigerant, glycol, gas monitoring system, controls, motor control center, electrical, accessories and all other necessary materials and labor required for a complete operating system.

3. Furnish and install a concrete ice rink floor including floor insulation, vapor barrier, pipe supports, piping, reinforcement, concrete, expansion joint, accessories and all other necessary materials and labors required for a complete operating system.

4. Furnish and install waste heat recovery systems for snow melting including, piping, coil for pit, heat exchanger, pump, valves, glycol, controls, electrical, accessories and all other necessary materials and labor required for complete operating systems.

5. Schedule and pay for all testing and start up services required by the contract documents pertaining to the ice system.

1.04 REINSPECTION

A. In addition to the Engineer's standard site visits throughout the project, the Engineer will be on-site at the end of the project to generate a list of uncompleted, or unsatisfactorily completed items, (i.e., punch list) after the project is reported complete by the Contractor and prior to the project's required completion date. If the items are not satisfactorily completed and should additional site visits be required to follow up on uncompleted items, the Engineer shall be compensated at the typically hourly rate for each person involved in the re-inspection. The Contractor will be back charged the amount of the additional inspections.

1.05 RELATED SECTIONS

A. Division 0, Division 1, General and Supplementary Conditions.

B. Section 13812 - Ice Rink Refrigeration System.

C. Section 13813 - Ice Rink Floor System.

D. Section 13814 - Ice Rink Piping, Valves and Accessories.

E. Section 13815 - Ice Rink Waste Heat Recovery Systems.

1.06 REFERENCES

A. ACI 301 - Specifications for Structural Concrete for Buildings.

B. ACI 305 - Hot Weather Concreting.

C. ACI 306 - Cold Weather Concreting.

D. ACI 309 - Recommended Practices for Consolidation of Concrete.

E. ASHRAE/ANSI - 15 Safety Code for Mechanical Refrigeration.

F. ASME B31.5 - Refrigeration Pressure Piping Code.

G. IEEE Standard 112 - Standard Test Procedure for Polyphase Induction Motors and Generators (Method B).

H. NECA - Standard of Installation.

I. NEMA ICS2 - Industrial Control Devices, Controllers and Assemblies.

J. NEMA -MG - Motor and Generators.

K. NEMA TC2 - Electrical Plastic Tubing (EPT) and Conduit (EPC-40 and EPC-80).

L. NEMA-WC5 - Thermoplastic Insulated Wire and Cable.

M. NEMA -WC7 - Cross Linked Thermosetting Poly Insulated Wire and Cable.

N. NEMA 250 - Enclosures for Electrical Equipment.

O. NFPA 70 - National Electrical Code.

P. UL-83 - Thermoplastic - Insulated Wires and Cables.

Q. UL 360 - Liquid-Tight Flexible Steel Conduit.

R. UL 508 - Industrial Control Equipment.

S. UL 651 - Schedule 40 and 80 PVC Conduit.

T. UL 797 - Electrical Metallic Tubing.

U. UL 810 – Capacitors.

V. UL 845 - Control Panels.

W. International Fire Code.

X. International Building Code.

Y. International Mechanical Code.

1.07 CODES AND STANDARDS

A. All parts of the project shall be performed in accordance with the most recent version of the following codes and standards and all amendments:

1. State Building Codes.
2. State Electrical Codes.
3. State Mechanical Codes.
4. National Fire Protection Association Codes.
5. ANSI/ASHRAE 15 -Safety Code for Mechanical Refrigeration.
6. ASHRAE 34-Number Designations and Safety Classification of Refrigerants .
7. OSHA.
8. American Standard Code for Pressure Piping ASA B31.1.
9. American Standard Code for Refrigeration Piping ASA B31.
10. American Standard Code for Pressure Vessels.

1.08 SUBMITTALS

A. See General Conditions, Division 0 and additional requirements below.

B. The Contractor's approval stamp is required on all submittals and indicates that the Contractor has reviewed all materials and has a completed understanding of the specifications and requirements. Contractor shall clearly mark all deviations from the contract documents on all submittals.

C. Progress Schedule. Submit progress schedule before project begins.

D. Shop Drawings. All submittals shall conform to the requirements the General Conditions and these specifications.

E. Test Reports. Submit one (1) electronic copy of test reports to the Engineer when specified.

F. Certifications. Submit one (1) electronic copy of certifications to the Engineer when specified.

G. Operation and Maintenance Manuals

1. Submit one (1) electronic copy for initial review. After reviewed by the Engineer and all changes are made, submit one (1) final electronic copy and two (2) final printed copies for the Owners use.
2. Prepare manuals, instructions and data by personnel experienced in maintenance and operation of described products.
3. Prepare data in form of an instructional manual.
4. Binders: Commercial quality, 8 ½ x 11-inch text pages, three D size, 3 ring binders with durable plastic covers, 2-inch maximum ring size. When multiple binders are used, correlate data into related consistent groupings.
5. Provide tabbed dividers for each separate product and system, with typed description of product and major component parts of equipment.
6. Sheets: Printed sheets in Part 1 shall have page protectors for each sheet. Printed sheets at the start and end of each additional section of the manual shall have page protectors.

7. Drawings: Provide with reinforced edges.
8. Manual covers to have printed title "OPERATION AND MAINTENANCE INSTRUCTIONS", title of project, and subject matter of manual when multiple manuals are required.
9. Contents of Manuals:
    a. Table of Contents: Provide for each volume with each product or system identified, typed on white paper.
    b. **Part 1**: Directory, listing names, addresses, and telephone numbers of Engineer, Contractor, subcontractors, and major equipment suppliers for each product or system.
    c. **Part 2**: Operation and maintenance instructions arranged by system and subdivided by specification section. For each category, identify names, addresses, and telephone numbers of subcontractors and suppliers. Identify the following:
        1) Provide logical sequence of instructions for each procedure, incorporating manufacturer's instructions.
        2) Description of each unit, equipment or system.
        3) Significant design criteria, normal operating characteristics and limiting conditions for each equipment and system. Include performance curves, engineering data and tests.
        4) Operating Procedures: Include start-up, break-in, routine normal operating instructions, sequences, and shutdown of the system including, but not limited to, system checks, controls, stopping, valve number references, typical fluid levels in all vessels, emergency instructions, etc. Include winter, summer, and any other special operating instructions.
        5) Start-up and shut-down procedure description including a step by step written description of how to start up and shutdown the system including, but not limited to, system checks, safety device checks, valves number references, typical levels in vessels, etc.
        6) Instructions of care and maintenance instructions for equipment and systems including, but not limited to, manufacturer's recommendations for cleaning agents and methods, precautions against detrimental cleaning agents and methods, and recommended schedule for cleaning and maintenance.
        7) Maintenance Requirements: Include routine maintenance procedures and guide for preventative maintenance and troubleshooting; disassembly, repair, and reassembly instructions; and alignment, adjusting, balancing, and checking instructions.
        8) Detailed description of control system including a step-by-step written description of how to operate the control system. See Section 13812 - Ice Rink Refrigeration System for additional requirements.
        9) List of equipment.
        10) Parts list for each component.
        11) Valve list that includes valve number, description, manufacturer, operation (normal closed or open, etc.). Provide schematic drawing of refrigeration system that shows locations of each valve.
        12) Servicing and lubrication schedule, list of lubricants required.
        13) Troubleshooting information.
    d. **Part 3**: Project documents and certificates, including the following:
        1) Approved shop drawings and product data.
        2) Manufacturer's printed operation and maintenance instructions.

3) Detailed wiring diagrams of all electrical and control systems and all other electrical and control information.
4) Product Data: Mark each sheet to clearly identify specific products and component parts, and data applicable to installation. Delete inapplicable information.
5) Air and water balance reports.
6) Test records
    a) Material and fluid tests for concrete, sand, glycol, etc.
    b) Pipe pressure tests for refrigeration system piping, rink floor piping, and transmission mains.
7) Certifications of inspections by regulatory agencies.
8) Warranties. Including project warranty and all equipment and material warranties.
9) Maintenance Drawings – Supplement product data to illustrate relations of component parts of equipment and systems, to show control and flow diagrams. Do not use Project Record Documents as maintenance drawings.
10) Record Drawings including pipe routing, joint locations on all underground transmission mains, wiring diagrams, equipment layout, valve locations, etc. Reduce to half size and insert into back of manual
11) Training and reporting forms.
    a) Provide daily checklist form for recording operation of refrigeration system.

1.09 WARRANTY/GUARANTY

A. In addition to the standard manufacturer's warranty on all equipment and materials, the contractor shall provide a standard one-year materials and labor warranty on all work performed for this project.

1.10 PRODUCT DELIVERY, STORAGE AND HANDLING REQUIREMENTS

A. Transport, handle, store and protect products in accordance with manufacturer's recommendations. Secure products at all times.

B. Store products with seals and labels intact and legible.

C. Store products in a secure environment at all times.

D. Provide adequate labor to handle products and prevent damage.

E. All damaged materials and equipment will be rejected.

PART 2 - PRODUCTS

2.01 ELECTRICAL

A. See requirements in Section 13812 - Ice Rink Refrigeration Systems.

2.02 GENERAL CONCRETE REQUIREMENTS

A. This section refers to all concrete work outside the ice rink floor unless otherwise noted. For concrete ice rink floor see Section 13813 - Ice Rink Floor.

B. Concrete Mix:

1. Submit mix design fourteen (14) business days prior to placement.

2. Concrete shall be produced by a Ready-Mix Plant approved by the Engineer. Concrete shall meet the requirement of ASTM C94 - Standard Specifications for Ready Mix Concrete.

3. Mix Design Requirements

Minimum 28-day compressive strength	4000 psi
Coarse aggregate size	3/4 inch to #44 (ASTM C33 No. 67)
Maximum water to cement ratio	0.45
Maximum pozzolan content	25% of cement content
Minimum cement plus pozzolan content	564 lbs/cy
Slump	3 inches +/- 1 inch
Entrained air content	6% +/- 1.5%

C. Material Requirements

1. Cement: Shall meet ASTM C150, Type 1

2. Aggregates: Shall meet ASTM C33

3. Water: Shall be clean, potable water.

4. Admixtures:

   a. Air Entrainment: Shall meet ASTM C260
   b. Water Reducing Agent: Shall meet ASTM C494, Type A
   c. Fly Ash: Shall meet ASTM C618 class C or F.

D. Reinforcement and Formwork

1. Formwork shall meet ACI 347 - Recommended Practice for Concrete Formwork.

2. Reinforcement shall be tagged and conform to ASTM A615 Grade 60. Installation shall meet ACI 315.

3. Tire wire: Shall be 16-gauge black annealed wire or heavier.

E. Related General Materials

1. Polyethylene Sheeting: Shall conform to ASTM C171.

2. Finishing Compound: Thoroseal by Thoro System Products or equal.

3. Expansion Joint: Bituminous fiber type meeting ASTM D1751.

4. Joint Sealant: Two part - self leveling, polyurethane sealant. MasterSeal SL2 by BASF or equal.

5. Anchor Adhesive: For anchoring dowels. Hilti HIT Doweling Adhesive C-100 by Hilti Fastening Systems, Powers Pure 110+, or equal.

PART 3 - EXECUTION

3.01 CONSTRUCTION UTILITIES AND FACILITIES

A. Unless specified elsewhere, all temporary utilities and facilities required to complete the project shall be the responsibility of the contractor and costs for these utilities and facilities shall be incidental to the project costs.

3.02 INSPECTION

A. The Contractor shall notify the Engineer a minimum of seven (7) business days prior to the following phases of the work:

1. Completion of subgrade preparation.
2. Completion of transmission main installation
3. Start of floor insulation.
4. Completion of floor insulation.
5. Start of rink piping and header piping.
6. Completion of rink piping and header piping.
7. Final flushing of all piping systems.
8. Start of concrete placement.
9. Start of refrigeration piping insulation installation.
10. Start and completion of all pressure tests.
11. Start up and Training

B. See Section 1.04 of this section for requirements regarding re-inspection of uncompleted or unsatisfactorily completed items.

3.03 CLEANING, PAINTING AND RESTORATION

A. Contractor shall be responsible for cleaning the immediate construction area including the rink floor, perimeter concrete where work or demolition is conducted and the mechanical rooms where work is being performed.

B. Patch and paint all holes caused or left by construction and demolition work. Match adjacent textures and colors.

C. Clean all equipment and piping to original condition after project has been completed.

D. Touch up all equipment paint, using paint provided by the manufacturer, after the installation is complete.

E. All piping, valves, and other items related to the ice system resulting from required demolition shall be removed and disposed of off-site by the contractor unless specifically designated to be salvaged.

F. Clean out snow melt pit.

3.04 CONCRETE WORK

A. Reinforcement shall be installed with a minimum of 2" of cover. Adequately support reinforcement with concrete blocks or wire/plastic chairs. Splices shall be installed with minimum lapping distances shown on the plans and bars wired tightly together.

B. Concrete Placement: shall conform to ACI 309 - Consolidation, ACI 306 - Cold Weather Placement, ACI 307 - Hot Weather Placement.

C. All new concrete adjacent to the ice rink floor shall be placed at the same tolerance as specified for the ice rink floor and shall use the same benchmark, unless otherwise noted.

D. Finishing: Apply float finish and uniform textured surface to all interior slabs. Apply broom finish to exterior slabs. Edge or chamfered the edge of all concrete that is adjacent an expansion or construction joint.

E. Curing: Cover with burlap-polyethylene and damp cure for a minimum of 7 days.

F. Testing: Contractor shall hire a testing agency to perform the following tests and shall pay for all testing and laboratory costs. Tests shall include air content (ASTM C 231), slump (ASTM C143) and compressive strength (ASTM C31, C39) for all concrete placed. Three (3) copies of the results shall be submitted to the Engineer.

3.05 START-UP AND FOLLOW UP SERVICES

A. **The refrigeration system shall not be started until all local and state governing authorities have inspected and provided written approval for all systems related to, and including the refrigeration, piping, controls, ventilation, ice equipment room and building and all other related systems; and all alarms and controls have been thoroughly tested for all conditions and modes of operations.**

B. Provide documentation of all piping pressures tests and vacuum tests on systems. All tests shall be witnessed by Owner or Owner's representatives.

C. After all piping systems have been tested according to the specifications and current codes and have been thoroughly cleaned, fill all piping systems with a complete charge of the specified primary and secondary refrigerants. Remove all free air from the systems. The contractor shall be responsible for removing air from the system throughout the warranty period of the project. The contractor shall take every precaution to fill the piping system in such a manner that results in maximum air removal and avoids trapping air in the system (for example, the ice rink floor). If air becomes trapped in the piping system, the contractor shall remove the fluid and refill the system as many times as required until the air is removed. Provide field report for each site visit where air is removed, or systems checked clearly detailing processes and observations.

D. Provide all additional primary and secondary refrigerants necessary to maintain fully charged systems throughout the warranty period of the project. Test all refrigerants at frequency specified in Section 13812 – Ice Rink Refrigeration System and provide final test reports of each refrigerant (including moisture content, inhibitor concentration, solids, refrigerant content, etc.).

E. Provide a factory trained technician for a minimum of 30 hours to completely check the operation of the refrigeration system and equipment and all associated systems and equipment during start up. Provide documentation and certification from trained technician with completed, detailed, check list.

F. Concrete ice rink floors shall cure a minimum of 28 days prior to lowering the temperature of the ice rink floor. After the 28-day cure, lower the temperature of the ice rink floor at a maximum rate of 1-degree F per hour until a slab temperature of 34 degrees F and then 1-degree F every 2 hours until a slab temperature of 12-14 degrees F or as desired by the Owner. Apply water only after the desired operating temperature is reached. Provide documentation that procedure was witnessed by Owner or Owner representative.

G. Provide the Owner's operating staff with fourteen (14) hours of hands-on instructions on the safe operation of the entire ice system. This shall be provided in a minimum of two (2) separate days. Include detailed instructions on how to build the first ice sheet. Operation and Maintenance Manuals must be completed and approved at by this time so they can be reviewed during the training sessions. Provide a minimum of fourteen (14) days' notice for all training sessions. Training sessions shall be coordinated with Owner's schedule.

H. Demonstrate that all control and alarm systems are working as required by code and specified in the contract documents. All necessary adjustments, additions, and electrical modifications shall be made to provide these systems. Provide documentation that procedure was witnessed by Owner or Owner representative.

I. The Contractor shall provide the following follow-up services, at minimum. The cost of these services shall be incidental.

1. Forty-Eight (48) hours after the system has been operating, shutdown the system and remove the construction bags from the compressor and clean strainers and screens on the compressor and rink pump that has been operating throughout this period. Clean strainers and screens on all other valves and equipment. Start operation of second compressor and rink pump.

2. Forty-Eight (48) hours after the second compressor and rink pump start up, shutdown the system and remove the construction bags from the compressor and clean the screens on the compressor and rink pump that has been operating throughout this period. Repeat this step for additional equipment. Provide field report and documentation of all work performed and observations.

3. Thirty (30) days after start-up change filter dryer cores. Provide field report and documentation of all work performed and observations.

4. Provide one complete oil change of compressors at runtime recommended by manufacturer. Provide documentation of work.

5. Site visits during the warranty period as required to make adjustments to control settings, equipment functions, and any other parts of the system as required to optimize the operation of the ice system.

J. Variable Frequency Drives: Provide start up services by a certified manufacturer's representative to provide an additional 1-year warranty. Provide field report and documentation of all work performed and observations.

K. Build the first ice sheet on each ice rink floor. The ice sheet shall be built in thin layers of water and in accordance with industry standard practices. This includes:

1. Build the black ice layer of ice (ice layer prior to painting).

2. Furnish and install white paint on entire ice skating floor. Paint shall be applied at rates recommended by the paint manufacturer and supplier (3 coats minimum for the white paint) and to achieve full uniform coverage of the ice surface, etc.

3. Build the ice over the ice paint to the ice thickness desired by the Owner.

4. Train the Owners staff in building the first ice sheet.

3.06 SHUTDOWN SERVICES

A. Provide the Owner's operating staff with ten (10) hours of hands-on instructions on the shutdown procedures of the system after the first ice season has finished. Provide a minimum of fourteen (14) days' notice for all training sessions. Training sessions shall be coordinated with Owner's schedule.

3.07 COORDINATION OF WORK

A. The contractor shall be responsible for coordinating all work in Division 13 – Ice Rink. The contractor shall also work closely with the other subcontractors on the project and help coordinate all associated structural, electrical and mechanical systems.

3.08 PERMITS

A. The contractor shall apply for and obtain all permits required to construct the project at no additional cost to the Owner unless specified otherwise.

END OF SECTION

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SECTION 13812

ICE RINK REFRIGERATION SYSTEM

PART 1 - GENERAL

1.01 SECTION INCLUDES

A. General system description, design criteria and control criteria.

B. Packaged Refrigeration System.

C. Motor Starters.

D. Motors.

E. Other Electrical Components (enclosures, emergency switch, dialer, meter, etc.).

F. Rink Pumps.

G. Condenser System

H. Gas Monitoring System.

I. Primary Refrigerant.

J. Secondary Refrigerant.

1.02 RELATED SECTIONS

A. Division 0, Division 1, General and Supplementary Conditions.

B. Section 13811 - Ice Rink General Requirements.

C. Section 13813 - Ice Rink Floor System.

D. Section 13814 - Ice Rink Piping, Valves and Accessories.

E. Section 13815 - Ice Rink Waste Heat Recovery Systems.

1.03 GENERAL REQUIREMENTS

A. General Refrigeration System Description:

1. Furnish and install a complete ice rink refrigeration system including but not limited to chiller, compressors, pumps, condenser system, piping, valves, controls, motor control center, and all related electrical components and connections necessary for a completely automatic refrigeration system with alarms, operating at the conditions described in, and meeting the requirements of, the contract documents.

B. Refrigeration System Design Criteria:

1. Design Parameters: See Ice Equipment Schedule on drawings.

2. All primary refrigeration piping shall be sized by the Contractor unless otherwise specified or indicated on the drawings. The piping shall be sized for the full capacity of the system except where manufacturer recommends a different size to optimize operation of the system.

3. Furnish and install all isolation valves and unions required for servicing equipment and system components whether or not they are shown on the drawings.

4. The cost of all piping, electrical, equipment, controls, or other changes required for the proper installation of all equipment shall be included in the Contractors bid. If equipment substitutions require revisions in the design of the systems or facility, the Contractor shall reimburse the Owner for the cost of the redesign services.
5. The Contractor shall provide all electrical work, design, materials and equipment necessary for a complete, operational ice system. All work, materials and equipment shall meet the required electrical codes for the Project's location. A licensed electrician shall perform all electrical work. The main electrical feed for each piece of equipment shall be routed beneath the floor slab, not overhead. Provide all low voltage wiring required for alarms, controls and other related system for a complete operating system.

1.04 SUBMITTALS

A. Shop Drawings. All submittals shall conform to the requirements of the General Conditions and these specifications.

1.05 WARRANTY/GUARANTY

A. As required in Section 13811 - Ice Rink General Requirements and as follows:
1. Manufacturer’s standard warranties that exceed the specified warranty.
2. Motors and Variable Frequency Drives: In addition to the standard 1-year warranty, provide start-up services from a certified manufacturer’s representative to provide an additional 1-year warranty.
3. Test and maintain chemical balance of all refrigerants in all systems including inhibitors in all solutions during warranty period.

1.06 PRODUCT DELIVERY, STORAGE AND HANDLING REQUIREMENTS

A. As required in Section 13811 - Ice Rink General Requirements.

PART 2 - PRODUCTS

2.01 PACKAGED REFRIGERATION SYSTEM

A. Factory assembled, single piece industrial indoor skid package, liquid chiller with dual (2) independent refrigerant circuits and remote air-cooled condenser. Contained within one-unit cabinet shall be all factory wiring, piping, controls, refrigerant charge, and special features required prior to field start-up. Approved manufacturers: Zero Zone, Hill Phoenix or approved equal.

B. Compressors:
1. Approved manufacturers: Bitzer or approved equal.
2. Semi-hermitic reciprocating compressors with discharge check valve.
3. Each compressor shall be equipped with discharge shutoff valve.
4. Shall be provided with unloaders.

C. Oil Separator:
1. Shall be tested and stamped in accordance with ASME Code (USA) for a refrigerant working-side pressure of 450 psig

2. Design shall incorporate two (2) independent circuits.

3. Refrigeration Components:

    a. Refrigerant circuit components shall include oil separator, high and low side pressure relief devices, discharge and liquid line shutoff valves, filter driers, moisture indicating sight glass, expansion valve, vessels (accumulators, receivers, and etc), complete charge of oil and a complete charge of refrigerant.

D. Control System:

1. Controls: Unit controls shall include the following minimum components:

    a. Manufacturer: Allen Bradley, Microthermal, approved equal.
    b. Microprocessor with non-volatile memory. Battery backup system will not be accepted.
    c. Power and control circuit terminal blocks.
    d. ON/OFF control switch
    e. Replaceable solid-state relay panels.
    f. Thermistor installed to measure saturated condensing temperature, cooler saturation temperature, compressor return gas temperature, and cooler entering and leaving fluid temperature.
    g. Chilled fluid thermal dispersion flow switch.
    h. System must be fully accessible through the web.

2. Unit controls shall include the following functions as standard:

    a. Automatic circuit lead/lag.
    b. Capacity control based on leaving chilled fluid temperature and compensated by rate of change of return-fluid temperature with temperature set point accuracy to 0.1F.
    c. Limiting the chilled fluid temperature pull-down rate at start-up to an adjustable range of 0.2F to 2.0F per minute to prevent excessive demand spikes at start-up.
    d. Seven-day time schedule.
    e. Leaving chilled fluid temperature reset from return fluid, outdoor-air temperature, space temperature, or 4 to 20 mA input. Control on return fluid temperature.
    f. Demand limit control with 2-stage control (0 to 100% each) or through 4 to 20 mA input (0 to 100%)
    g. Chilled pump start/stop control.
    h. Dual chiller control for series chiller applications without addition of hardware modules or additional thermistors.
    i. Dual chiller control for parallel flow applications use one additional sensor.
    j. Amperage readout per compressor with % MTA (must trip amps) per compressor.

3. NEMA 1 housing. Display menus shall provide clear language descriptions of all menu items, operating modes, configuration points and alarm diagnostics. Reference to factory codes shall not be accepted. Display controller module shall have NEMA 1 housing suitable for use in outdoor environments. Display shall be touch screen and have backlight and contrast adjustment for easing viewing in bright sunlight or night conditions.

4. The chiller controller shall include multiple connection ports for communicating with the local equipment network and the ability to access all chiller control functions from any point on the chiller.

5. The control system shall allow software upgrade without the need for new hardware modules.

6. Refrigeration package control system shall incorporate all controls for the refrigeration package including the gas monitoring system, the pumps, snowmelt pumps, condenser, and all other related control points.

E. Safeties:

1. Units shall be equipped with thermistors and all necessary components in conjunction with the control system to provide the unit the following protections:

a. Loss of refrigerant charge.
b. Reverse rotation.
c. Low chilled fluid temperature.
d. Low oil pressure (each compressor circuit)
e. Ground current fault.
f. Thermal overload.
g. High pressure.
h. Electrical overload.
i. Loss of phase.
j. Current imbalance.
k. Loss of flow.

F. Diagnostics:

1. The display module shall be capable of indicating the safety lockout condition by displaying the information in clear language at the display. Information included for display shall be:

a. Compressor lockout.
b. Loss of charge.
c. Low fluid flow.
d. Low oil pressure.
e. Cooler freeze protection.
f. High or low suction superheat.
g. Thermistor malfunction.
h. Entering and leaving-fluid temperature.
i. Condenser pressure. Condenser is remote.
j. Electronic expansion valve position.
k. All set points.
l. Time of day.

2. Display module, in conjunction with the microprocessor, must also be capable of displaying the output results of a service test. User shall be able to force each output device.

3. Diagnostics shall include the ability to review a list of the 20 most recent alarms with clear language descriptions of the alarm event.

4. An alarm history buffer shall allow the user to store no less than 20 alarms event with clear language descriptions, time and date stamp event entry.

G. Electrical Requirements:

1. Unit primary electrical power supply shall enter the unit at a single location.

a. An electrical feeder (with phase loss protection) will be brought into the ice mechanical room by the Division 26 electrical subcontractor and connection made to the refrigeration package panel. Verify the size of the electrical feeder with electrical subcontractor prior to ordering equipment. Verify that size of electrical feeder is adequate for ice system equipment. All electrical requirements inside the refrigeration

package, including the design of the electrical system, and to the ice system equipment are the responsibility of the Ice Rink Contractor.

2. Unit shall operate on 480v, 3-phase power at the voltage shown in the equipment schedule.
3. Control voltage shall be 115v, 60 Hz, single-phase, separate power source.
4. Unit shall be shipped with factory control and power wiring installed.

H. Special Features:

1. Cross the line starter: Provide factory installed starter to minimize inrush current.
2. Factory settings shall be factory modified to start and operate at leaving chiller fluid temperature as specified on equipment schedule.
3. Minimum Load Control: Unit shall be equipped with factory installed, microprocessor-controlled, minimum load control that shall permit unit operation down to 10% of full capacity.
4. Suction Service Valves: Unit shall be supplied with factory installed suction service valves to isolate compressors from evaporator and condenser.
5. Energy Management Module: A factory installed module shall provide the follow energy management capabilities: 4 to 20 mA signals for leaving fluid temperature reset, cooling setpoint reset or demand limit control; 2-point demand limit control (from 0 to 100%) activated by a remote contact closure; and discrete input for "Ice Done" indication for ice storage system interface.
6. BACnet Communication: Provide factory installed communications capability with a BACnet MS/TP network. Allows integration with BACnet building automation system and other ice rink control systems as specified in this section.

I. Ice System Controls. See description in this section.

J. All glycol piping on the refrigeration package shall be Sch. 40 Welded Steel

2.02 ICE SYSTEM CONTROLS

A. General Design Criteria:

1. In general, the refrigeration system shall automatically maintain a set ice rink floor temperature by sensing the return secondary refrigerant temperature. This set point shall be easily adjustable.
2. In general, the individual components of the refrigeration system shall be controlled as follows.
    a. Refrigeration package: By secondary refrigerant temperature returning from the rink floor. Typical starting set points for the compressors are starting at 16F ON and 13F OFF as an example. These may vary slightly depending on the application.
    b. Condenser: By compressor discharge head pressure. Condensing pressure shall be controlled by variable fan speed to maintain the specified condensing temperature. Typical starting set points are as follows:
    c. Rink Pumps: By manual operation and speed control by variable frequency drives using signal from floor sensors and control system.
    d. Waste Heat Recovery System: None
3. Control system shall include but not limited to the following:

a. Adjustable control input based on secondary refrigerant temperature returning from rink floor.
b. Adjustable control outputs for each compressor including but not limited to the following:
    1) Adjustable lead/lag control for each compressor and sequence of operation.
    2) Adjustable time control for staging compressors.
    3) Adjustable capacity control (up and down) per pair of cylinders on each compressor.
c. Adjustable controls for alarm conditions including but not limited to:
    1) Shutdown system for low flow to chiller.
    2) Shutdown system for low secondary refrigerant temperature.
    3) Shutdown system for refrigerant detection.
    4) Shutdown system for emergency shutdown switch activation.
    5) Monitor and alarm for compressor oil pressure.
    6) All other alarms and controls recommended by the compressor manufacturer.
d. Pressure controls for high and low refrigerant discharge pressure with settings described herein.
e. Monitor capability for all ice rink floor sensors.

B. Other:

1. Furnish and install all necessary controls, electrical, wiring, lights, housings, relays and other electrical devices and systems required for a complete automatically controlled ice system.

2. The refrigeration systems shall have sufficient manual controls to allow the system to operate without the computer control system if the computer control system fails.

2.03 MOTOR STARTERS AND VARIABLE FREQUENCY DRIVES

A. Approved Manufacturers: Cutler Hammer Westinghouse, Allen Bradley, General Electric, Siemens, Square D.

B. Each motor shall have its own dedicated starter device.

C. Across-the-Line Starters: For motors smaller than 75-HP.

1. NEMA ICS 2, Class A, magnetic, full voltage, non-reversing.

2. Overload and phase failure protection.

3. Integral control transformer for required control power voltage.

4. Hand-Off-Auto selector switch and red indicator light on cover.

D. Solid State Starters (Soft Starts): Required for motors 75-HP and greater. Shall be UL listed and include isolation contacts, current limiting fuses, capacitors for noise protection, microprocessors and all other circuitry required to function properly, overload protection, LED indicators, auxiliary contacts, heat sink, integral cooling fan, phase loss and stall protection, soft stop, adjustable starting and stopping times, and adjustable initial voltage level to adjust torque for motor starts. Shall have standard handle with four positions; ON, OFF, TRIPPED, and RESET. Part winding or wye-delta starters will not be accepted.

E. All motors for use with Variable Frequency Drives shall be listed suitable for use with VFD equipment to prevent premature bearing failure as specified in the VFD section.

F. Variable Frequency Drive (VFD):

1. Approved Manufacturers: ABB, Allen Bradley, Bell & Gossett, Cutler Hammer, Schnider Electric, or equal.
2. Materials and Construction: NEMA 1 Enclosure, pad lockable input disconnect switch, electronic overload protection, input fuses, HOA switch, selectable operating modes, protection circuits, UL/CSA Approved.
3. Display: Output frequency and voltage, motor current, kwh meter, fault indication with text, % torque, % power (kW), and speed (RPM).
4. Voltage Tolerance: +/- 10%.
5. Options: Manual bypass (2 contactors).
6. All motors for use with Variable Frequency Drives shall be listed suitable for use with VFD equipment to prevent premature bearing failure. This includes, but is not limited to, providing NDE and DE bearings and shaft grounding rings or system, etc. Shall be installed prior to start-up.

2.04 MOTORS

A. Motors shall be 460 volts, 3 phase, 60 Hz, squirrel cage induction motors with a service factor of 1.15. Shall have adequate torque to accelerate the load at operating conditions without exceeding the nameplate rating, not including the service factor. Motors shall be designed, constructed and tested in accordance with ANSI/NEMA Publication No.MG-1 and meet NEMA specifications. Shall be premium efficiency design as determined by IEEE Standard 112, Method B. Minimum motor efficiencies shall meet the following.

Table for Premium Efficiency Motors (ODP type)

Motor HP	**1200 RPM**	**1800 RPM**	**3600 RPM**
1	82.5	85.5	77.0
1.5	86.5	86.5	84.0
2	87.5	86.5	85.5
3	88.5	89.5	85.5
5	89.5	89.5	86.5
7.5	90.2	91.0	88.5
10	91.7	91.7	89.5
15	91.7	93.0	90.2
20	92.4	93.0	91.0
25	93.0	93.6	91.7
30	93.6	94.1	91.7
40	94.1	94.1	92.4
50	94.1	94.5	93.0
60	94.5	95.0	93.6
75	94.5	95.0	93.6
100	95.0	95.4	93.6
125	95.0	95.4	94.1
150	95.4	95.8	95.0
200	95.4	95.8	95.0

B. Motor enclosures shall be open drip proof (ODP). Bearings shall be shielded and regreasable steel ball bearings. Stator windings shall be copper. Insulation shall be Class F non-hygroscopic materials.

C. Motor shall be factory aligned and if necessary, shall be realigned by the Contractor after installation and prior to start-up.

D. Motors shall be inverter duty where VFDs are being used.

2.05 OTHER ELECTRICAL COMPONENTS

A. All electrical components if not specified elsewhere shall be UL listed where possible, meet all code requirements and approved for specific application.

B. Enclosures: Enclosures shall be NEMA 1 rated for indoor applications and NEMA 3R for outdoor applications.

C. Disconnects: Approved Manufacturers for disconnects: Cutler Hammer, General Electric, Square D, Westinghouse or equal. Enclosure shall be NEMA rated for environment where it will be located.

D. Fuses: Provide one spare fuse for each type and size used on the project.

E. Emergency Devices

1. Furnish and install an emergency remote control push/pull button (off-only control) and all associated electrical for a complete system to stop the operation of all electrically energized equipment related to the refrigeration system as required by the current state and local mechanical codes.

2. For interior devices and locations, furnish and install a clear Plexiglass protective, lockable, wall mounted case for devices.

3. For exterior devices and locations, furnish and install NEMA Type 3R, continuous hinge, lockable enclosure (Weigmann RHC121206 or equal). Emergency ventilation remote switch provided by others will also be installed by others in this enclosure. Verify enclosure space needs with ventilation contractor.

4. See Gas Monitoring section for additional requirements.

5. Provide all low voltage wiring and connections required for alarms, controls and all other related devices for complete operating systems.

F. Automatic Alarm Dialer.

1. Furnish and install a complete automatic alarm dialer system, compatible with the Owner's telephone system, that will monitor the following alarm conditions and points.

2. Before ordering the dialer system, the contractor shall verify with the Owner the type of phone system that is being used (standard dial type telephone system, Voice over Internet Protocol (VoIP) system, etc.). The contractor shall select the correct dialer system for their application. If VoIP is available, that system shall be selected.

3. Monitor the following alarm conditions and points:
   a. Refrigerant leak detection.
   b. High glycol temperatures from compressor microprocessor.
   c. Power loss to emergency mechanical ventilation system's dedicated circuit branch.
   d. Start/Fail for the emergency ventilation system's fan.
   e. High brine temperatures from compressor microprocessor.

f. Alarm conditions from compressor microprocessor to be named later by Owner.
g. Power failure to refrigeration system.

4. Manufacturer: Sensaphone 800 system, Sensaphone Sentinel Monitoring System with Cellular Modem or equal.
5. Unit to provide up to 12 different status conditions.
6. Dial a minimum of eight (8) different phone numbers.
7. Uninterrupted Power Supply (UPS) for 20 minutes.
8. Additional requirements for standard telephone system:
   a. Operate with standard dial telephone line.
   b. Respond to status interrogation from any touch-tone telephone.
9. Additional requirements for VoIP system:
   a. Include 12-month subscription to cellular dialer system for time of startup. Coordinate with City on selection of service provider.
   b. Shall instantly sends alerts via phone, text or email over cellular connection.
   c. Shall deliver event reports, and audit logs.
   d. Shall store all data in the cloud, with unlimited information storage and allows multiple devices to be managed from one account. No software shall be required.
   e. Shall be accessible by any web-enabled device.

G. Phase Loss Protection:

1. Approved Manufactures: Zelio by Telemecanique (Schneider Electric), Macromatic, or equal.
2. Furnish and install phase loss protection at each motor. Devices shall monitor 3-Phase supplies and sequence of phases L1, L2, and L3 and total loss of one or more phases.
3. Function:
   a. Phase sequence
   b. Phase failure
   c. Asymmetry
4. Materials and Construction:
   a. Product certifications: UL, CSA
   b. Conforming standards: NF EN 60255-6 and IEC 60255-6
   c. Vibration resistance: 0.035 mm from 10-150 Hz.
   d. Degree of protection: Casing IP 30, Terminals IP 20.
   e. Overvoltage category: III
   f. Insulation resistance: >500 mega ohms, 500 Vdc.
   g. Rated insulation voltage: 400 V
   h. Insulation test voltage: Dielectric = 2kV, 50 Hz, 1 min. on VAC
   i. Wire: Solid cable range one 14-20 AWG.
   j. Housing material: Self-extinguishing plastic.
   k. Rated supply voltage: 208-480 Vac.
   l. Operating range: 183-528 Vac.
   m. Voltage limits (of power supply circuit): -12%, +10%
   n. Frequency: 50/60 Hz +/- 10%
   o. Maximum power consumption: 1.8 VA on VAC
   p. Output type: 1 or 2 C/O contacts.
   q. Contact type: Cadmium-free

r. maximum switching voltage: 250 Vac/Vdc
s. Rated breaking capacity: 1250 VA
t. Minimum breaking current: 10/5 Vdc mA.
u. Maximum operating rate: 360 operations/hour under full load
v. Maximum response time (fault event): 100 ms
w. Delay on pick-up: 500 ms
x. Relay status and fault signaling shall be indicated by LEDs.

2.06 RINK PUMPS

A. Approved Manufacturers: Aurora Series 340/360, Xylem Inc. Bell and Gossett Series e1510, Armstrong or equal.

B. Design Parameters: See Ice Equipment Schedule on drawings. Motor size is based on the pump manufacturer listed in the schedule on the drawings. If the motor size increases due to the use of pump another manufacturer, the contractor is responsible for all changes associated with the motor size change at no additional cost to the Owner.

C. Pump Construction and Materials

1. Centrifugal, end suction design, base mounted, single stage. Shall be serviceable without disconnecting to piping system. Pumps shall be capable of continuous operation without fault. Pump shall be rated at 175 psi.

2. Volute: Heavy-duty cast-iron conforming to ASTM A48, Class 30, integrally cast pedestal support. Provide drain and vent plugs. When calcium chloride (CaCl2) is specified as the secondary refrigerant or brine all surfaces in contact with the liquid shall have an epoxy coating.

3. Impellers: Enclosed type, cast bronze conforming to ASTM B584 (for glycol use only), vacuum cast, keyed to shaft with non-corrosive fasteners, statically and dynamically balanced. When calcium chloride (CaCl2) is specified as the secondary refrigerant or brine the impeller material shall be cast iron conforming to ASTM A48, Class 30 or stainless-steel conforming to AISI 316.

4. Shafts: Carbon steel conforming to AISI C1045 machined and polished. Replaceable bronze sleeve conforming to ASTM B62. Maximum deflection of 0.002 inches at the seal face under a maximum load condition. Provide ANSI/OSHA-compliant coupling guard with slotted viewing window. When calcium chloride (CaCl2) is specified as the secondary refrigerant or brine the sleeve shall be stainless steel conforming to AISI 316 when using calcium chloride.

5. Bearings: Heavy duty, grease lubricated, regreasable, ball bearings with B10 minimum bearing life of 50,000 hours per AFBMA test procedures. Shall be replaceable without disconnecting pump from pipe system.

6. Seal Assembly:

Material	**Glycol Systems**
Elastomer	EPR (Ethylene Propylene Rubber)
Rotating Face	Silicon Carbide
Stationary Face	Silicon Carbide
Hardware	Stainless Steel
Spring	18-8-Stainless Steel
Other	Internal flushing capabilities
Other	Easily Inspected

Other	Replaceable

7. Wearing Ring:

Material	**Glycol Systems**
Material	Bronze
ASTM Specification	B62
Type	Replaceable

8. Motor: Shall conform to the requirements of this Section.
9. Energy Rating. After January 27, 2020, all pump and motor assemblies shall be in compliance with the pump energy efficiency regulations by the U.S. Department of Energy. Provide all documents with the shop drawing submittal and as required for the Owner to apply for a rebate through the electrical utility.
10. Accessories: See Section on Ice Rink Piping, Valves, and Accessories and other requirements herein.

2.07 CONDENSER (AIR COOLED)

A. Approved Manufacturers: Russell, KeepRite, Bohn, RefPlus, or equal.

B. Design Parameters: See Ice Equipment Schedule on drawings.

C. Casing: Galvanized steel metal casing assembled with zinc plated bolts. Fan sections individually partitioned by full height aluminum divider panels and clean-out panels.

D. Coils: Manufactured from die formed corrugated aluminum. Tubes shall be seamless 1/2" OD copper, arranged in staggered pattern and mechanically expanded into the fins and tube sheets. Headers shall be constructed of heavy wall copper tubing, brazed to the coil using high temperature brazing process. All tubes shall be pressure tested to 380 psig. Fins shall be same material as existing units.

E. Fan/Motor: Shall be individually balanced. Blades shall be aluminum blades riveted to a galvanized steel spider assembly. Fan guards shall be fabricated from heavy gauge steel rod and epoxy coated. All fans shall be baffled to prevent short circuiting of air during fan cycling. Motor assemblies shall be supported in all-welded, heavy gauge wire and zinc-chromate coated support structures. All motors shall have built in thermal protection, permanently lubricated, ball bearing system.

F. Fan Speed Controls: All fan in each refrigerant circuit shall be controlled by a variable speed EC motor manufactured by Marathon or equal to control of condenser pressure by sensing pressure and automatically adjusting fan motor speed. Shall include NEMA rated enclosures. EC motor system shall be operated by pressure at the condenser for the respective circuits. All controls shall be self-contained in the condenser's electrical enclosure and installed by the condenser manufacturer.

G. Options: Provide motor fusing, fan cycling control, built in power disconnect switch, 120-volt control voltage.

H. Electrical. Electrical panels shall be weather resistant heavy gauge galvanized steel construction mounted. Provide all electrical required for complete operating system.

2.08 REFRIGERANT GAS MONITORING SYSTEM

A. Approved Manufacturer: Bacharach (Pat McClernon, Control House Ltd. 952-746-3485), Calibration Technologies, Inc., Cool Air Mechanical, or equal

B. Provide one (1) complete refrigerant gas monitoring system for the specified refrigerant. System shall continuously monitor for refrigerant leaks and meet ASHRAE 15 Standard current edition.

C. System shall include:

1. One (1) Main Controller Panel mounted inside ice equipment room.
2. One (1) Remote Display Panel mounted outside the main door to the refrigeration room.
3. Sensors, strobes and audible devices as defined herein.
4. One (1) Uninterruptable Power Supply (UPS) to provide power for 20 minutes.

D. Features:

1. Multi-zone detection with expandable capabilities.
2. Main Controllers and remote displays shall have a front panel display with backlit graphic LCD, system and alarm status indicators, and keypad.
3. Displays shall show zone specific refrigerant concentration for all sensors.
4. Four (4) SPDT relays contacts (minimum).
5. 4-20 mA analog output.
6. Sampling: Automatic and continuous or manual.
7. Automatic reboot and system alarm reset after power failure.
8. Trend / Data Logging: Graphic display of trend data, alarm log and fault log.
9. NEMA 4X, UL-listed, CSA, IEC, IP66 enclosure.
10. Unit shall not require calibration for a minimum of 10 years. Provide manufacture's verification.
11. Provide a silence and reset switch at the gas monitoring panel inside the refrigeration room as required by code.

E. Sensors and transmitters

1. Approved type of sensors:
    a. Infrared transmitters and sensors with a sensing range of 25ppm to 10,000ppm.
    b. Electrochemical transmitters and sensors
    c. Solid state
2. Accuracy of +/- 5% of value.
3. Zero Drift: Less than 0.1% of full-scale.
4. Response time: less than 20 seconds
5. Linearity: +/- 1% of full-scale
6. Ranges:
    a. Provide ranges most suitable for the ranges specified in the table below except that one sensor in the ice equipment room must have a high range of 1,000 ppm.
7. Certification: ETL listed to UL standard.
8. Sensors shall be installed in the locations shown on the plans (if indicated) and in accordance with the table below. The exact locations shall be verified during construction.

Location	Sensor Type	Quantity
Ice Equipment Room	Infrared/Electrochemical/SS	2

F. Alarm Settings

1. Alarm concentration levels shall be adjustable. Initial settings and sequences shall be in accordance with the table below.

Refrigerant Concentration	***Description or Action***
50 ppm	1. Notify Ice Rink Control System a. Notification sent to facility personnel 2. Controller to initiate the following alarm sequences: a. All strobes and audible alarms activated.
150 ppm	1. Notify Ice Rink Control System a. Notification sent to facility personnel. 2. Controller to initiate the following alarm sequences: a. All strobes and audible alarms activated. b. Emergency purge ventilation system is activated. c. Send signal to fire alarm system.
250 ppm	1. Notify Ice Rink Control System a. Notification sent to facility personnel. 2. Controller to initiate the following alarm sequences: a. All strobes and audible alarms activated. b. De-energize pumps, compressors, and normally closed automatic refrigerant valves that are not part of an emergency control system.

G. Alarm Devices

1. Alarm devices shall be combination strobe lights and audible alarms.
2. Strobe light single color shall be selected by Owner.
3. Furnish and install as required by current state and local mechanical codes.
4. Device locations shall be as shown on the plans and in accordance with the table below. The exact locations shall be verified during construction.

Location	Alarm Device	Quantity
Inside Refrigeration Room	Strobe & Audible	3
Outside Refrigeration Room Doors	Strobe & Audible	3

H. Provide all necessary auxiliary equipment relays as required to operate strobes / audible devices, start emergency ventilation, shut down refrigeration system, fire alarm system notification, etc.

I. Leak detector shall turn on exhaust fan even when control panel is powered off or not functioning.

J. Connection from the emergency ventilation to the auxiliary relay will be by building electrical or mechanical contractor.

K. Connection from the fire alarm system to the auxiliary relay will be by fire alarm contractor.

L. Provide connection to ice rink control system for monitoring concentrations and alarms.

2.09 PRIMARY REFRIGERANT

A. Furnish and install a complete operating charge of R-455A refrigerant to fill entire refrigeration system.

2.10 SECONDARY REFRIGERANT

A. Ethylene Glycol Solution

1. Furnish and install a complete operating charge of 45% by volume of inhibited ethylene glycol and deionized water. The fluid shall be an industrial heat transfer fluid specifically designed for HVAC systems.

2. Approved Manufacturers: Dow Chemical Company Dowtherm SR-1, Texaco Texcool E100, or equal.

3. The solution shall have a factory mixed corrosion inhibitor or neutralizing agent and anti-foaming agent to minimize air entrainment.

4. The solution mixture shall meet the following parameters:

Parameter	**45% EG**
Specific Gravity @ 15F	1.077
Viscosity @10F	12.20
Freezing Point	-22.75 F
pH	8.0 to 9.2
Density @ 10F	67.35 lbs./cf
Specific Heat @10F	0.779 BTU/lb. F
Thermal Conductivity @10F	0.207 BTU/hr-SF

5. The deionized water shall conform to the following properties in maximum allowable concentrations:

Calcium Carbonate Hardness	100 ppm
Chlorides	25 ppm
Sulfates	25 ppm

B. Submit a product data sheet and MSDS sheet for the solution including the inhibitor and/or neutralizing agent.

C. Provide a weather resistant tag on the fill valve for the system that includes description of fluid, freezing and burst point, total gallons of system, Material Safety Data Sheet reference and date of original charge.

D. Provide certified test results for all solutions in systems. At minimum samples for the secondary refrigerant solution shall be drawn at the following times:

1. 3 months after start-up.

2. 11 months after start-up.

2.11 SIGNAGE

A. Furnish and install legible permanent signs on the outside of all ice rink equipment mechanical room doors as detailed on the drawings and as follows:

1. All signs informative signs, emergency signs, charts and labels shall be in accordance with NFPA 704, ANSI/IIAR, ANSI Z535.2 and the International Mechanical Code.

2. Provide all other signs required by code even if not shown on the drawings.

B. Furnish and install signage, as detailed on the drawings, next to each strobe light and audible alarm.

C. Furnish and install signage, as detailed on the drawings, next to each refrigeration system emergency stop button and ventilation enable switch.

D. Furnish and install schematic drawing or panel giving directions for operation of the system per ASHRAE-15 paragraph 11.7.

E. If Owner requires the format (font, size, colors, etc.) of the signage to match other signage in the facility, provide the format required by the Owner unless it does not meet code requirements.

PART 3 - EXECUTION

3.01 EQUIPMENT INSTALLATION

A. All equipment shall be installed per manufacturer's requirements.

B. All equipment bases shall be bolted down and filled with concrete unless otherwise specified or noted. Adjust level of concrete as required to provide access to anchor bolts for compressors, motors, etc.

C. All equipment shall be installed and designed such that vibration is minimal and meets acceptable limits. If the amount of vibration is in question, the Contractor shall be responsible for hiring a certified, experienced vibration company to perform the necessary test. A certified test report shall be submitted to the Engineer. If results are not satisfactory, the Contractor shall be responsible for correcting the problem and retesting for vibration as previously specified.

D. All meters, gauges, and readouts shall be mounted at eye level.

E. All equipment, vessels, and tanks shall be fully supported with a structural steel framing system anchored to the wall and floor and not to the roof structure unless otherwise approved.

F. Tanks. If tanks (for example, sump, water, diffusion, expansion, etc.) do not fit through existing or proposed door opening, make all necessary accommodations, including removal and replacement of door(s) and wall(s) for required access.

3.02 VARIABLE FREQUENCY DRIVES (VFD)

A. Provide start-up services by a certified representative of the manufacturer.

3.03 MOTORS

A. Provide motor circuits as required by NFPA 70 including a motor grounding conductor.

B. Testing:

1. Voltage and current measurements shall be performed on all motor driven equipment to confirm that the voltage and current is within the operating range of the motor and the nameplate rating.

2. Perform an insulation resistance test or megger test on each 460-volt motor by applying 500 Vdc phase to ground on each phase for 10 minutes with readings taken at the end of one (1) minute and ten (10) minutes. Minimum acceptable reading is 5 megaohms.

3.04 CONDENSER SUPPORTS

A. Mount condenser in location and on supports as shown on the drawings. All supports including, but not limited to, beams, columns, roof curbs, etc. and all related fasteners, bracing, etc. shall be furnished and installed by the ice rink contractor unless specifically noted otherwise. Supports shall be provided as necessary for the installations whether or not shown on drawings.

3.05 ELECTRICAL

A. Provide all electrical work necessary for a complete, operational ice system. All work shall meet the required electrical codes for the Project's location. A licensed electrician shall perform all electrical work. The main electrical feed for each piece of equipment shall be routed beneath the floor slab, not overhead.

B. Locate the Emergency Remote Control button(s), protective case(s), audible alarm(s) and strobe light(s) outside the ice mechanical room at a distance from the entrance door(s) to the ice mechanical room as required by code. Locate other strobe lights and audible alarm assemblies were shown on the drawings and as required by code.

3.06 REFRIGERANT GAS MONITORING SYSTEM

A. Monitoring and display units shall be mounted at eye level.

B. Recalibrate unit at both the unit and each sensor after final completion of project. Provide verification that the unit has been calibrated. Provide calibration and test kits from the manufacturer as required to calibrate the unit per manufacturers recommendations and as specified.

3.07 PAINTING AND FINISHES

A. All structural supports and framing shall be painted with one coat of primer and one coat of alkyd egg-shell enamel.

B. Touch up paint on all equipment, vessels, supports and exposed pipes after project is complete.

C. Provide additional touch up paint for equipment and vessels for Owners use.

D. Touch up damaged galvanized coatings and corrosion protection systems on condenser and remote sump.

3.08 CLEANING

A. Clean and vacuum all debris from inside the Motor Control Center and all other electrical enclosures. Do not use compressed air to clean out panel.

B. Thoroughly clean equipment of all temporary protective coatings and foreign material prior to assembly of erection.

C. After project completion thoroughly clean all equipment and piping systems.

3.09 START UP AND SHUTDOWN SERVICES

A. See Section 13811 - Ice Rink General Requirements.

END OF SECTION

SECTION 13813

ICE RINK FLOOR SYSTEM

PART 1 - GENERAL

1.01 SECTION INCLUDES

A. Sand.

B. Insulation, jacketing and vapor barrier.

C. Pipe and reinforcement support chairs.

D. Reinforcement.

E. Pipe and fittings.

F. Expansion joint.

G. Concrete.

H. General materials.

I. Temperature sensors and monitors for sub-floor and ice rink floor.

J. Subgrade preparation.

1.02 RELATED SECTIONS

A. Division 0, Division, General and Supplementary Conditions.

B. Section 13811 - Ice Rink General Requirements.

C. Section 13815 - Ice Rink Waste Heat Recovery Systems.

1.03 REFERENCES

A. ACI 301 - Specifications for Structural Concrete for Buildings.

B. ACI 304 - Concrete Placement.

C. ACI 305 - Hot Weather Concreting.

D. ACI 306 - Cold Weather Concreting.

E. ACI 309 - Recommended Practices for Consolidation of Concrete.

F. ASTM C94 - Standard Specifications for Ready Mix Concrete.

G. ASTM D 2513 - Thermoplastic Gas Pressure Pipe.

H. ASTM D 2683 - Socket Type Polyethylene Fittings.

I. ASTM D 3261 - Butt Fusion Polyethylene Fittings.

J. ASTM D 3350 - Standard Specification for Polyethylene Plastic Pipe and Fittings.

K. NSF Standard 61 - Plastic Piping Components and Related Materials.

L. AWWA C901 - Polyethylene Pipe.

M. The Plastic Pipe Institute Handbook of Polyethylene Pipe.

N. Pipe Manufacturer for fusion welding procedure.

1.04 SUBMITTALS

A. Shop Drawings. All submittals shall conform to the requirements of the General Conditions and Section 13811 - Ice Rink General Requirements.

B. Test Reports. Submit four (4) copies of test reports to the Engineer when specified.

C. Gradation of clean sand fill.

D. Concrete mix design. Submit fifteen (15) business days prior to placement.

E. Two (2) samples of a typical fusion welded pipe to fitting connection. Samples shall come from a demonstration performed in the field prior to placement of polyethylene pipe.

F. Rink subgrade and top of pipe surveys.

1.05 WARRANTY/GUARANTY

A. As required in Section 13811 - Ice Rink General Requirements

1.06 PRODUCT DELIVERY, STORAGE AND HANDLING REQUIREMENTS

A. As required in Section 13811 - Ice Rink General Requirements.

PART 2 - PRODUCTS

2.01 SAND

A. Sub-Floor: Clean sand consisting of sound, durable particles. Material gradation shall meet 100% passing the #4 sieve and not more than 5% passing the 200 sieve. Material shall be clean, free of all debris, roots, or other foreign material or chemicals.

2.02 INSULATION, JACKETING AND VAPOR BARRIER

A. Approved manufacturers: Styrofoam brand by the Dow Chemical Company, CertainTeed, Ownes-Corning, DiversiFoam, or equal.

B. Floor Insulation: Insulation material shall meet ASTM C 578 Type VI with a minimum compressive strength of 40 psi, maximum water absorption of 0.1% by volume (ASTM C272) and an R-value per inch at 75 F of 5 Fxsfxh/Btu. Provide in sheet dimensions as indicated on the drawings.

C. Pipe Insulation System:

1. Direct Bury: As specified in Section 13814 – Ice Rink Piping, Valves and Accessories.

D. Accessories: Provide all adhesive, sealants and other products as required by the manufacturer to provide a completely sealed system. Provide vapor barrier for the piping that is non-flammable and fire resistant for all systems operating below 65 F.

E. Vapor Barrier (for Rink Floor):

1. Concrete Rink Floor: Shall conform to ASTM D-4397 for Clear Polyethylene Film except the thickness shall be 6-mil. Tensile strength shall be a minimum of 1700 psi (long direction) and Elongation shall be a minimum of 225% (long direction). The materials shall be supplied in 20’-0” x 100’-0” minimum size sheets. Provide tape manufactured for sealing the seams of poly sheeting.

2.03 PIPE AND REBAR SUPPORT CHAIR

A. Approved Manufacturers: Hunter Wire Products or equal.

B. U-type or M-type configuration designed for both supporting rink piping and reinforcement or equal. Six (6) foot long sections.

C. Material: Wire shall be a minimum of #7-gauge (0.187") steel. Base plate shall be a minimum of 20-gauge steel for sand floors and 24-gauge steel for concrete floors except that 20-gauge steel shall be used on all rink floor with steel rink piping.

D. Shims (for adjusting pipe elevation): Shims shall be plastic or steel and shall be a minimum size of 2" wide x 2" long to provide full support beneath the pipe and rebar support chair.

2.04 REINFORCEMENT

A. Reinforcement: Shall be tagged and conform to ASTM A615 Grade 60.

B. Wire Mesh: 6x6 W2.9/W2.9 (6 gauge) steel mesh conforming to ASTM 1064, Epoxy Coated conforming to ASTM 884/A884M-12. Class A coating.

C. Tie Wire: Shall be 16-gauge yellow-coated annealed wire or heavier.

2.05 PIPE AND FITTINGS

A. Polyethylene Pipe:

1. SDR 17, pressure rating 100 psi (rink transmission pipe only)

Nominal I.D.	1"	6"	8"
Actual O.D.	1.135	6.625"	8.625"
Wall Thickness*	0.077"	0.390"	0.507

*Minimum thickness. Wall thickness shall be within 10% of that specified.

2. SDR 11, pressure rating 200 psi (rink piping and headers).

Nominal I.D.	3/4"	1"	3"	6"	8"	10"
Actual O.D.	1.050"	1.315"	3.5"	6.625"	8.625"	10.750"
Wall Thickness*	0.095"	0.119"	0.318"	0.602"	0.784	

*Minimum thickness. Wall thickness shall be within 10% of that specified.

3. Shall be high density polyethylene complying with requirements of ASTM D3350 cell classification and have a Plastic Pipe Institute (PPI) designation of PE4710. Minimum density shall be 58 lbs/cf (0.957 gm/cc).

4. Joints/Connections: Fusion welded. Welding process shall be performed by fully trained personnel in the fusion welding process.

5. Fittings:

   a. Approved manufacturers: Charter Plastics, Performance Pipe, Rahn, Georg Fisher, Polycam or equal.
   b. All fittings shall be socket type and conform to ASTM 2683. Fittings shall be manufactured and not field or shop fabricated. The inside diameter of the fittings shall be equal to the inside diameter of the pipe.
   c. Rink piping return bends: Construct as detailed on the drawings.
   d. Use manufacturer recommended coupling when fusion welding pipe of different gauges or wall thickness.

6. The pipe shall have product traceability by inclusion of product code on the exterior of the pipe and include the manufacturer, the date of manufacture, the lot and supplier of the raw

material, the location of the manufacture, and the production shift of which the product was produced.

2.06 COMPRESSION SEAL AND EXPANSION JOINT MATERIALS

A. Compression Seals: Shall be D.S. Brown Delastic, EMSEAL, WABO or equal.

1. Material shall be polyethylene, non-absorbent, non-staining, UV stable.
2. D.S. Brown Delastic Catelog Numbers shall be as follows:
   a. For 1" joint (width at time concrete placement) shall be Catalog No. CV-1752.
   b. For 1½" joint (width at time of concrete placement) shall be Catalog No. CV-2250.
   c. Provide dimension as required for the joint width shown on the drawings.
3. Compression seal material shall meet the parameters for the specified D.S Brown product.
4. Color: Black
5. Expansion Joint Material: Ceramar by W.R. Meadows or extruded polystyrene insulation (thickness of expansion joint by depth of rink floor) in one piece with top scored to depth of expansion joint material or as recommended by the manufacturer.

2.07 CONCRETE

A. This section refers to concrete for the ice rink floor only. For perimeter slab concrete and other miscellaneous concrete requirements see Ice Rink General Requirements Section.

B. Concrete Mix:

1. Submit mix design fifteen (15) business days prior to placement.
2. Concrete shall be produced by a Ready-Mix Plant approved by the Engineer. Concrete shall meet the requirement of ASTM C94 - Standard Specifications for Ready Mix Concrete.
3. Mix Design Requirements. Prepare design mix for type and strength of concrete in accordance with applicable provisions of ASTM C94, Alternative #3.

Minimum 28-day compressive strength	5000 psi
Coarse aggregate size	3/4" to #4 (ASTM C33 size67)
Maximum water to cement ratio	0.40
Minimum cement content	600 lbs/cy
Fly ash	15% of cement content max.
High Range Water Reducing Admixture	
Slump (prior to addition of HRWRA)	3 inches maximum
Slump (after addition of HRWRA)	7 inches maximum
Air content	6% +/- 1% maximum

4. Proportion aggregates such that the concrete mix adequately flows into all corners and around reinforcement without segregating, leaving voids or producing honeycombs. There shall be no free water in the mix.
5. The consistency of the concrete mix shall be uniform and such that the cement and other ingredients are uniformly distributed throughout the mix and such that the mortar clings to the coarse aggregate.

C. Material Requirements

1. Cement: Shall be Portland Cement that meets ASTM C150, Type I or Type I/II. Only the specified manufacturer submitted with design mix will be allowed.

2. Fine Aggregates: Shall be clean, natural sand free of loam, clay and other deleterious or foreign materials. Shall meet ASTM C33 and come from a single source.

3. Coarse Aggregates: Shall be clean, processed aggregates free of loam, clay or other deleterious or foreign materials. Shall be crushed stone or crushed gravel.

4. Water: Shall be clean, potable water. Maximum concentration of chloride ions of 0.1%.

5. Admixtures: All admixtures shall conform to ASTM C494. A representative for the HRWRA supplier shall be on-site at the start of the concrete placement until consistency in the mix has been proven by the testing agency. No changes are allowed once the design mix is approved.

    a. Air Entrainment:
        1) Shall meet ASTM C260.
        2) Approved manufacturers:
            Axim Concrete Tech. - Catexol AE 260, VR
            Euclid Chem. Co. - AEA 92S, AEA 92, Air Mix 250
            General Resource Tech - Polychem AE, VR
            GCP – Applied Technologies - Darex II AEA, Daravair 1000, 1400, Airalon 3000
            Master Builders - MB VR standard, Micro Air, MasterAir AE 90
            Sika Corporation – Sika AEA-14, Sika Multi AIR 25
            Premiere – ConAir
    b. Water Reducing Admixture:
        1) Shall meet ASTM C494, Type A and shall not contain more chloride ions than in potable water source with a maximum of 0.1%.
        2) Approved manufacturers:
            Axim Concrete Tech. - Catexol 800N, 1000N, 2000N
            Euclid Chem. Co. - Eucon MR, WR, WR-91
            General Resource Tech - Polychem 1000, KB1000, 400NC
            GCP – Applied Technologies - WRDA 82, MIRA 110
            Master Builders - Pozzolith 220N, MasterPolyhead 997
            Sika Corporation - Sikament HP, Plastocrete 169, 161
            Premiere – OptiFlo MR
    c. High Range Water Reducing Admixture (HRWRA) Superplasticizer
        1) Shall meet ASTM C494, Type F or G and shall not contain more chloride ions than in potable water source with a maximum of 0.1%.
        2) Approved manufacturers:
            Euclid Chem. Co. - Eucon 37
            GCP – Applied Technologies - ADVA 140M, ADVA CAST 575, 600
            Sika Corporation – Sikament 686
            Master Builders – MasterGlenium 7500
            Premiere – OptiFlo MR

2.08 GENERAL MATERIALS

A. Nylon Ties: Shall be 3/16" wide and UL recognized. For sand rink floor ties shall have a minimum tensile strength of 100 lbs, with metal tabs. For concrete rink floor ties shall have a minimum tensile strength of 50 lbs.

B. Moisture Curing Covers: Shall be a curing cover such Ultra Cure by McTech Group, Hydrocure by PNA Construction Technologies or equal. Polyethylene sheeting is not approved.

2.09 TEMPERATURE SENSOR AND MONITORS

C. Provide sensors for the rink floor. See drawings for number and location. Provide one (1) monitor with selector switch for both sensors.

D. Approved Manufacturers: Omega Engineering, Thermokon, Kele, Honeywell, or equal.

E. Sensor (thermistor or RTD):

1. Accuracy: +/- 1% accuracy of measuring range.
2. Sensor pocket shall be aluminum.
3. Protection: Shall be protected against humidity, vibration and mechanical overstress.
4. Construction: Shall be suitable for temperature extremes and immune to the effects of moisture and condensation.
5. Provide wiring as required by monitor manufacturer.
6. Other control systems – provide compatible 4-20mA sensor.

F. Box: Iron or steel construction with 3/4" hub size, threaded connections, flat removable iron or steel cover with neoprene gasket.

G. Conduit: Schedule 80 PVC from box to mechanical room and from box to depth of sensor to prevent heat transfer.

H. Wire: Provide all wiring size for application and per code requirements.

I. Monitor: Omega Model DP400 series, Honeywell T775, or equal.

2.10 HEADER VENT ASSEMBLIES

A. Pipe: 1” SDR 11 polyethylene pipe.

B. Insulation: Type 5B (see Section 131814)

C. Vent Box: Minimum 12” long, 12” wide, 12” deep HDPE valve box with removable lid, double seal, stainless steel bolts to lock down lid, dirt skid and seal on bottom.

PART 3 - EXECUTION

3.01 INSPECTION

A. The Contractor shall notify the Engineer a minimum of seven (7) business days prior to the phases of work described in the Ice Rink General Requirements Section. Piping shall not be covered without notifying the Engineer.

3.02 EXCAVATION AND BACKFILL

D. The Contractor shall be responsible for verifying the location of all existing piping, electrical, and other utilities prior to excavation.

E. Benchmark: Contractor shall provide an elevation survey of the existing perimeter concrete, every 10 linear feet, to the Engineer. The Engineer will review and determine the best location for a benchmark.

F. Excavation: All excavation shall be performed in accordance with OSHA regulations, to the depths shown on the drawings, and to the tolerances specified in the table below. The ice rink floor subgrade shall be graded to the required elevation by the earthwork contractor on the project.

Area	Tolerance
Pipe trenches and non-rink floor areas	+/- 0.03 feet (3/8")
Rink floor subgrade for rink floor without a subfloor heating system	+/- 0.015 feet (3/16")

D. Verification Surveys: The ice rink contractor shall provide verification surveys in the following areas. Submit surveys to Engineer for review prior to installation of new rink floor system.

1. Perimeter concrete. Survey top of perimeter concrete within 2" of the rink floor edge every 10 feet around the entire perimeter of the rink floor. This information will be used by the Engineer to establish a benchmark to construct the rink floor.

2. Top of sand layer. Prior to installation of the floor insulation, survey 10-foot x 10-foot grid pattern across the entire final and finished ice rink floor sand layer for the subfloor heating system and include the benchmark elevation that was established in item 1 above.

E. Backfilling: All excavated areas shall be backfilled as soon as possible but not before compaction tests have been taken and approved where required. Backfill materials shall be placed in lifts less than 12 inches thick, uniformly compacted and follow requirements of the geotechnical report, if report is available. Backfilled areas shall be fine graded to the tolerances specified in the table below. Care shall be taken while backfilling to protect the pipe from damage.

Area	Tolerance
Pipe trenches and non-rink floor areas	+/- 0.03 feet (3/8")
Rink floor subgrade for rink floor without a subfloor heating system	+/- 0.015 feet (3/16")

F. Compaction: Backfill material shall be uniformly compacted to the densities shown in the table below.

Area	Standard Proctor Density
Pipe trenches within building footprint and other structural areas	98%
Rink floor sand layers 6" thick or less	95%

3.03 INSTALLATION OF PIPE

A. No changes to pipe alignment or elevation shall be made without approval from the Engineer.

B. All pipe shall be cleaned out prior to installation. Inspect pipe for defects and damage.

C. Buried piping shall be bedded in material recommended by the pipe manufacturer.

D. Rink and header piping shall be supported as shown on the drawings.

E. Support all piping in such a manner as to prevent all vibration and vertical or horizontal movement.

F. For polyethylene pipe, butt or socket fusion welds shall be used to connect pipe and fittings. Electro fusion welded couplings should only be used where it is not possible to make a butt and socket weld due to space constraints. In addition, electro fusion welded couplings and fittings shall not be used in the following locations:

1. In or beneath the ice rink floor system. This includes, but is not limited to, the header pipe systems for the rink floor and the rink floor piping systems.
2. Under permanent bleacher systems except where transmission mains connect to header pipe outside of the rink floor perimeter.
3. Above ground piping systems.

3.04 INSULATION, JACKETING AND VAPOR BARRIER

A. Install floor insulation with staggered joints as required on the drawings. Ends shall be tightly butted together and secured. All cuts must be performed with a sharp-edged tool.

B. Install vapor barrier over insulation with a minimum of 18" overlap at all joint. All joints shall be taped.

C. Install pipe insulation on transmission mains as specified.

3.05 PIPE AND REBAR SUPPORT CHAIR

A. Install as shown on the drawings.

B. Additional supports shall be placed as close to the ice rink piping return bends as possible.

3.06 REINFORCEMENT

A. Reinforcement shall be installed as shown on the drawings.

B. Installation shall meet ACI 315. Reinforcement shall be installed with a minimum of 2" of cover unless otherwise noted on the drawings. Adequately support reinforcement with support chair where specified and concrete blocks. Terminate rebar 2” from the rink edge.

C. Splices shall be installed with minimum lapping distances shown on the plans and bars wired tightly together. If lapping distances are not shown on the plans the following lapping distances shall apply.

Reinforcement Bar Size	**Lap Splice (inches)**	**90º Hook End**
#4	25	8
#5	31	10
#6	37	12

D. Wire mesh shall be placed over rink piping. Loose ends of the wire mesh shall be bent down. The wire mesh sheets shall be overlapped by a minimum of 6" and wired securely to the reinforcement bars at a minimum of 18" on center or as noted on drawings (whichever is the tighter spacing) in both directions and along all edges of mesh. The mesh shall be tightly wired down in all locations. Terminate mesh 2" from the rink edge. Turn all wires down. Contractor shall monitor the location of the wire mesh throughout the concrete placement and finishing processes and provide additional securing as needed.

3.07 PIPE AND FITTINGS

A. All sub-floor heating and rink piping shall be continuous. There shall be no joints, splices or additional fittings other than were indicated on the drawings. Header and transmission main piping shall be supplied in typical lengths.

B. All piping and fittings shall be connected by fusion welding. Contractor shall perform and demonstration in the field for the Engineer prior to placement of polyethylene pipe. Submit two (2) samples of a typical fusion welded joint from the demonstration.

C. All connections to the header pipe shall be at a 90-degree angle to the header pipe. No connections shall be made at an angle.

D. Contractor shall inspect the interior and exterior of all butt and socket joints wherever possible to assure there are no blockages and that joints are formed to manufacturer's specifications.

E. Fasten rink piping to chair supports with specified nylon ties as necessary to secure pipe in position. Varying temperatures may require less restrictions to allow pipe to move. End of ties shall be turned downward.

F. Placement:

1. Rink piping shall be installed within +/- 1/4" of the elevation shown on the drawings. Shims shall be used to adjust pipe elevations if necessary.

2. Pipe Survey: When rink piping installation is complete the Contractor shall provide a survey of the top of the rink pipe. The survey shall be performed by an independent surveying companying and signed by a professional engineer or registered land surveyor licensed in the state of the project. The survey equipment used must have recent documented certification of calibration and must be of the highest accuracy to document the very tight tolerances specified for this work. At minimum, the survey locations shall include the following:

   a. Top of pipe in a 10-foot x 10-foot grid pattern over the entire rink surface.
   b. In addition, top of pipe on each header pipe at a 10-foot spacing.
   c. In addition, top of pipe along radii and ends of rink at a 10-foot spacing, 1 foot from edge of perimeter concrete.
   d. In addition, top of pipe along the row of support chairs on each side of the header trench at a 10-foot spacing.
   e. In addition, perimeter concrete at edge of rink floor every 20 linear feet around entire perimeter of concrete.

   The information shall be recorded and submitted to the engineer clearly showing top of pipe elevation in reference to the top of concrete elevation and the difference between the two elevations. The survey shall be completed in adequate time for the Engineer to verify the information and the Contractor to make adjustments prior to the concrete pour.

3. Flushing: Thoroughly flush all piping systems before installation of secondary Refrigerants and remove all water or other fluids used during the testing and flushing procedures. The Engineer shall be notified to observe final flushing procedures.

G. Testing:

1. The entire rink piping system including the header and transmission mains shall be hydrostatically tested as two separate systems at 100 psi each for the first four (4) hours and reduced to 60 psi for an additional 20 hours with no pressure drop at either setting. While each test is being set up the Contractor will likely need to add water for the first 2 to 3 hours as the pipe may stretch slightly. Each test shall not begin until the Contractor is confident all air is removed from the system and the system is completely filled with water. An Owner’s representative shall witness and approve the test.

2. Once the initial testing is approved, the pressure shall be lowered to 50 psi and maintained until 48 hours after the sand and concrete placement is complete.

3. Gauges used for pressure tests must be designed for pressures greater than the test pressure. For example, a 100-psi gauge cannot be used for a 100-psi test. The scale on the gauge must be the next increment up from 100 psi.

H. Fill rink piping system with secondary refrigerant as specified in Section 13812 - Ice Rink Refrigeration System.

I. Temporarily cover rink and rink piping with white polyethylene sheeting to minimize influences of direct sunlight and temperature variation on poly rink piping.

3.08 COMPRESSION SEAL AND EXPANSION JOINT MATERIAL

A. Install extruded polystyrene insulation (thickness of expansion joint by depth of rink floor) in one piece with top scored to depth of expansion joint material or as recommended by the manufacturer.

B. After concrete has been placed and cured, remove top piece of insulation.

C. Clean all dirt, debris and water from space between perimeter concrete and rink floor using a brush, vacuum or compressed air and as recommended by the manufacturer.

D. Install when concrete substrate is clean, sound, dry and cured for a minimum of 14 days and as recommended by the manufacturer.

E. Install the compression seal material in longest pieces possible and as recommended by the manufacturer. A series of small sections will not be accepted.

F. Install adhesive per manufacturer’s recommendations. Do not allow to freeze prior to installation. Store all components out of direct sunlight in a clean, dry location between 50 F and 90 F.

G. Install adhesive per manufacturer’s recommendations.

H. Install compression seal per manufacturer’s recommendations.

3.09 CONCRETE WORK

A. Quality Control:

1. A prepour meeting will be scheduled with the Engineer or Owner's representative to discuss the methods of placement, equipment, and quality control procedures.

2. A benchmark shall be approved by the Engineer prior to starting the pour.

3. The survey of the rink floor piping must be approved by the Engineer prior to concrete placement.

4. Prior to placement, an inspection of the rink floor shall be conducted and all debris, soil, trash, and standing water shall be removed before placement begins.

5. Concrete shall not be placed until authorized by the Engineer or the Owner's representative.

6. At least two (2) standby concrete trucks shall be available in case of equipment failure or loads are rejected.

7. Standby pumping equipment shall be on-site in case primary pumping equipment fails. Hand pushed wheelbarrows will not be accepted.

8. An extra vibrator shall be kept on-site.

9. The concrete placement for the rink floor shall take place as one continuous pour from start to finish. Method of placement, leveling, finishing and curing shall be approved by the Engineer and the Contractor responsible for the ice rink work.
10. Quality control personnel from the ready-mix company, HRWRA admixture supplier and the Contractor shall be present during the pour.
11. All concrete not meeting the approved design mix parameters will be rejected.
12. Testing:
    a. Contractor shall hire a testing agency to perform the following tests and shall pay for all testing and laboratory costs.
    b. Temperature: Measure the concrete temperature for each truck.
    c. Slump: Measure the slump before and after adding the High Range Water Reducing Admixture (HRWRA)/Super Plasticizer for each truck. Tests shall be performed in accordance with ASTM C143.
    d. Air Content: Tests shall be taken before and after adding the High Range Water Reducing Admixture (HRWRA)/Super Plasticizer during casting of cylinders. Tests shall be performed in accordance with ASTM C231.
    e. Compressive Strength:
        1) Make and cure at least one (1) set of test cylinders, consisting of four (4) individual cylinders, for every 50 cubic yards of concrete placed or fraction thereof. Test specimens and testing shall be performed in accordance with ASTM C31 and ASTM C39.
        2) For each set of cylinders, test one specimen at seven (7) days, two specimens at twenty-eight (28) days and one hold. Acceptance shall be based on the average of the two 28-day tests.
    f. All sampling and tests shall be taken at the point of placement unless otherwise specified.
    g. An electronic copy of the test results shall be submitted to the Engineer as soon as the tests are completed.

B. Placement:

1. All concrete shall be placed and consolidated in accordance with ACI 304 (measuring, mixing, transporting), 305 (hot weather) and 306 (cold weather).
2. The method and manner of placing the concrete shall be such as to minimize the possibility of segregation of the aggregate, the displacement of the reinforcement, pipe or supports and damage to the floor insulation. Place concrete as near to the final position as possible. The vibrator shall not be used to transport or to flow concrete to the extents that causes segregation.
3. The pumping equipment used for conveyance of concrete the equipment shall be suitable for this type of work and have adequate capacity for the work. The pump shall be operated such that a continuous stream of concrete without air pockets is produced.
4. Proper precautions shall be taken to prevent the polyethylene headers from floating up during the pour.
5. Concrete shall be placed in maximum 12" layers in the header trench. Each layer shall be adequately consolidated before the next layer is placed.
6. Mechanical vibration shall be used to consolidate the concrete. Provide and use two (2) vibrators during the pour. Vibrators shall be capable of operating at frequencies sufficient to achieve thorough and uniform consolidation, but not less than 7000 impulses per minute.

Methods such as spading shall be used to consolidate concrete in locations where it's impossible to reach with a vibrator. Vibration shall not be applied directly to the reinforcement or piping. Placement and duration of the vibration shall be such to thoroughly consolidate the concrete without causing segregation or localized areas of grout.

7. Bridge screeds or super screeds shall not be used.

8. Concrete that has been contaminated by foreign materials shall not be deposited or shall be removed from the rink area. Concrete that has been partially hardened shall not be reworked or re-tempered and shall be removed from the rink area.

C. Finishing:

1. Immediately after placement and consolidation, the concrete shall be struck off, screeded, and leveled to the required elevation. Begin floating when the surface is ready and bleed water is no longer visible. Floating may be conducted either by hand or with a machine. Check for levelness, fill or cut as necessary, and refloat surface to a smooth, uniform, granular texture.

2. Chemical finishing aids or fogging system shall be used at the Contractor's discretion to prevent rapid surface moisture loss. Water shall not be added to the concrete at any time.

3. After floating, apply a trowel finish using a power-driven trowel. The Contractor shall determine the time to start troweling. Perform final troweling by a combination of hand and power-driven trowels. Provide a lightly textured surface.

4. Tolerance: The top of slab elevation for the rink shall be continuously checked by the Contractor throughout the finishing operation with survey equipment and final elevation shall be within +/- 1/4" from a true level plane.

5. The perimeter edge of the rink floor, adjacent to the expansion joint, shall be edged or chamfered to 1/4" radius.

D. Concrete Surface Survey: When concrete placement installation for the rink floor is complete the Contractor shall provide a survey of the concrete surface. The survey shall be performed by an independent surveying companying and signed by a professional engineer or registered land surveyor licensed in the state of the project. At minimum, the survey locations shall include the following:

1. Top of concrete rink floor in a 10-foot x 10-foot grid pattern over the entire rink surface.

2. In addition, survey along radii and ends of rink at a 10-foot spacing, 1 foot from edge of perimeter concrete.

The information shall be recorded and submitted to the engineer clearly showing top of concrete elevation in reference to the benchmark used to build the rink floor and the difference between the two elevations. The survey shall be completed the same day of the rink pour and according to ASTM and ACI standards.

E. Curing: After finishing and as soon as possible provide a wet cure for a minimum of 14 days by covering the entire surface with curing blankets. The curing blankets shall be installed to prevent air pockets and discoloration in the concrete surface. The Contractor is responsible for maintaining the wet condition for the entire 14 days. The curling blankets shall be removed all at one time to avoid potential damage due to differential shrinkage. Approved manufacturers: Ultra Cure by McTech Group, Hydrocure by PNA Construction Technologies or equal. Polyethylene sheeting is not approved.

F. The concrete floor shall not be refrigerated or open to equipment traffic for 28 days from time of pour. See startup procedures in the Ice Rink General Requirements Section.

3.10 TEMPERATURE SENSORS

A. Install temperature sensors in accordance with manufacturer's recommendations. Sub-soil temperature sensor shall be installed to 1'-6" depth to bottom of sensor. For each sensor, the top of the box cover shall be even with the top of the ice rink slab for easy access and sensor replacement.

3.11 HEADER VENT ASSEMBLIES

A. Connect vent pipes to supply and return header pipes using fusion welded saddle.

B. Vent boxes shall be installed in perimeter concrete or landscaped area so that the top of the removable cover is level with the top of the concrete or finished grade.

C. Insulate 1" HDPE vent pipe between the vent box and the rink floor to allow a slip surface and prevent pipe damage as concrete cures.

3.12 CLEANING

A. The ice rink floor shall be completely cleaned of all debris, spills, stains, etc. If requested by the Engineer, the contractor shall wash and mop the entire floor to assure floor is clean.

B. Clean all other material, equipment, and debris from other areas of the building on a daily basis and thoroughly clean at the end of the project.

END OF SECTION

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SECTION 13814

ICE RINK PIPING, VALVES AND ACCESSORIES

PART 1 - GENERAL

1.01 SECTION INCLUDES

A. Pipe and Fittings.

B. Valves and Accessories.

C. Pipe Hangers.

D. Pipe and Equipment Markers.

E. Expansion Tank.

F. Pressure Gauges.

G. Thermometers.

H. Insulation.

I. Sealing and Firestopping.

1.02 RELATED SECTIONS

A. Division 0, Division 1, General and Supplementary Conditions.

B. Section 13811 - Ice Rink General Requirements.

C. Section 13812 - Ice Rink Refrigeration System.

D. Section 13813 - Ice Rink Floor.

E. Section 13815 - Ice Rink Waste Heat Recovery Systems.

1.03 SUBMITTALS

A. Shop Drawings. All submittals shall conform to the requirements of the General Conditions and Section 13811 - Ice Rink General Requirements.

1.04 WARRANTY/GUARANTY

A. As required in Section 13811 - Ice Rink General Requirements.

1.05 PRODUCT DELIVERY, STORAGE AND HANDLING REQUIREMENTS

A. As required in Section 13811 - Ice Rink General Requirements.

PART 2 - PRODUCTS

2.01 PIPE AND FITTINGS

A. Polyethylene.

1. Rink pipe and transmission mains. As specified in Section 13813 – Ice Rink Floor.

B. Steel.

1. Secondary refrigerant piping.
2. Material shall be carbon steel and meet the following:
3. 1 3/4 inch to 12 inches diameter shall conform to ASTM A53, Grade B Schedule 40.
4. Joints shall be welded end type. No threaded joints.
5. Fittings shall be carbon steel with welded end type and shall meet ANSI B16.9. Fittings shall be manufactured and not shop or field fabricated.
6. Flanges shall be of the same material as the pipe and shall be rated for a minimum of 150 psi. Shall meet ANSI B16.5

C. Copper

1. Shall meet ASTM B88, ASTM Type L and be seamless tubing with copper sweat fittings. Copper pipe shall not be used for refrigeration piping.
2. Copper pipe can be used for refrigerant piping and shall be standard iron-pipe size copper and conform to ASTM B 42 and ASTM B 43.
3. Copper tube used for refrigerant pipe shall be seamless copper tube of Type ACR (hard or annealed) conforming to ASTM B280.

D. Stainless Steel (Snow melt Coil)

1. Fabricate coil from 2" Schedule 10 304L stainless steel pipe and fittings as shown on the plans. All connections shall be welded except for the flanged connection at the pit wall.
2. Pipe supports shall be 3” high 304L stainless steel square stock, spaced at 3’ on center to support the snow melt coil. If the snow melt pit is specified with a membrane liner, pipe supports shall be steel tubing, all edges shall be rounded to prevent puncturing liner and supports shall be tack welded to coil.
3. Verify size of snow melt pit and location of drain pipe prior to fabricating the coil.

2.02 VALVES AND ACCESSORIES

A. Primary Refrigerant Valves and Accessories

1. Approved Manufacturers: Hansen Technologies, Henry, Refrigeration Specialties, Cyrus Shank Company, Parker, Danfoss, Superior Refrigeration Productions, or equal.
2. Minimum working pressure rating: 450 psig.
3. Body: Heavy duty ductile iron, cast steel or forged brass.
4. Internal parts: Stainless steel or chrome plated steel.
5. Gaskets and Seats: Neoprene O-rings or flat composite gaskets, Teflon seats.
6. Packing nut and hand wheel: Zinc chromate plated steel.
7. Pressure relief valves to meet requirements of Section IV of the ASME Boiler and Pressure Vessel Code. Maximum release pressure should match vessel pressure rating. Provide discharge indicator such as Pop Eye by Hanson Technologies or equal. Secondary side (glycol/brine) should be set at 150 psi unless otherwise stated.
8. Refrigerant Strainers: Shall include stainless steel screen and body. Shall be easily serviceable in-line.

9. Filter Dryer: Steel shell with corrosion resistant finish, aluminum cover plate with 1/8" FPT connection for valve, and copper fittings.
10. All hand expansion valves, solenoid valves, and regulators shall be supplied with seal caps on the adjusting stem.
11. Check valves: Shall be Hanson HCK4 LR Gravity Drain check valves for low pressure drop applications of 0.25 psid, Danfoss, or equal.
12. Solenoid Valves: Shall be Hansen Model HS4A, Danfoss or equal. Piston and spring mechanism shall be pressure operated. Valves using plunger-needle type assemblies shall not be used."
13. Pressure Regulating Valve(s): Shall be Hansen Standard Regulator HA4A, Danfoss, or equal. The pressure regulating valve for the compressor discharge line(s) shall include a high range (up to 185 psi) spring assembly.
14. All ball valves shall include dual stem design with Teflon packing and secondary seal system.
15. Temperature Controllers:
    a. Surface Mounted: On/off, line voltage signal, 110V, SPDT, JC A19DAC-1 or equal.

B. Secondary Refrigerant Valves and Accessories

1. Approved Manufacturers: Apollo, Aurora, Bell & Gossett, Crane, Flowseal, Milwaukee, Mueller, Nibco, Stockham or equal.
2. Minimum working pressure rating: 125 psig
3. Provide valve neck extensions where needed.
4. Butterfly Valves: Cast iron body with stainless steel shaft; Teflon (PTFE), nylatron, or acetal bearings; EPDM resilient seat.
5. Check Valves: Non-slam design; cast iron body, bonnet, disc plate, and disc cage meeting ASTM A-126 Class B.
6. Combination Valves: Operates as a non-slam check valve, shutoff valve and throttling valve. Cast iron body, brass seat, and bronze disc with EDPM seat insert, stainless steel stem and spring, Teflon-graphite packing.
7. Ball Valves: Bronze body, 316 stainless-steel ball, Teflon seats.
8. Air Release Valves: Cast iron or bronze body. Provide ball valve and drain line to floor. Include 1/2" FPT and 3/4" MPT connections.
9. 3-Way Mixing Valves: Cast iron body, flanged. Controls to operate valve based on fluid temperature.
10. Poly to Steel Transition Fittings:
    a. Approved manufacturers: Krausz USA (Hymax Cplg), Polycam
11. Suction Diffuser/Strainer:

a.	Body and Cover:	Cast iron, ASTM A48, flanged.
b.	Vanes & Orifice Cyl:	Steel for glycol systems Stainless steel for calcium chloride systems.
c.	Strainer:	5/32" perforated, 304 stainless steel.
d.	Start-up Screen:	20 mesh, 304 stainless steel.

e. O-ring: Buna-N
f. Purge/Drain Plug: Wrought steel
g. Cap Screws: Wrought steel, SAE Grade 5
h. Pipe Supports: Steel, adjustable

12. Flexible Connectors: 150 lb plate or carbon steel - flat face type, flexible stainless-steel hose and braid material, and stainless-steel braid collar.

13. Flow Switch or Differential Pressure Switch:

    a. Approved manufacturers: Johnson Controls, United Electric Controls, Hansen, or equal.
    b. Must be compatible with the system fluid.
    c. Gold-plated contacts for improved electrical performance.
    d. Stainless steel paddle or opposing metal bellows (seal bellows) to detect pressure differences between two sources
    e. Adjustable set points.
    f. Epoxy coated enclosure.

14. Flow Meter:

    a. Approved manufacturers: Onicon Incorporated, or equal
    b. Electronic Impedance Sensing turbine insertion flow meter (non-magnetic, non-photoelectric). Single or dual turbine as required based on length of straight pipe run available for fully conditioned flow.
    c. Accuracy: +/- 0.5% of reading at calibrated velocity, +/- 1-2% of reading over a 50:1 flow range.
    d. Output: Analog 4-20mA and 0-10 VDC signals.
    e. Materials: 316 stainless steel for wetted metal components.
    f. Calibration: NIST traceable factory calibration with certificate of calibration.

15. Resistance Temperature Detectors (RTD) Assemblies:

    a. Approved manufactures: Omega, JW Instruments (763.784.5708) or equal.
    b. RTD: Single Element, platinum, 3 wire, Tolerance Class A, 316 stainless steel sheath. Length to be at approximately 10% longer than radius of pipe.
    c. Temperature Ranges:
        1) Return brine/glycol: 0-50F
        2) Others: As required.
    d. Spring loaded.
    e. NPT stainless steel hex nipple.
    f. Aluminum screw cover head – NEMA 4X rated.
    g. Signal: 4 to 20 mA programmable temperature transmitter, upscale burnout, temperature range to match RTD.
    h. Thermowell: Shall be standard duty threaded (NPT), 304 stainless steel, NPT size as required to accommodate RTD.
    i. Shall coordinate type of RTD and transmitter with controls, VFD or other device that is being connected to RTD Assembly.

C. Valve Tags

1. Provide non-ferrous metal or plastic laminated tags on each valve with non-ferrous or corrosion proof fasteners. Numbering system shall be referenced in the Operation and Maintenance Manual.

2.03 PIPE HANGERS

A. Approved Manufacturers: Anvil International, Crane, Red Head, or equal.

B. Provide a complete pipe support system including hangers, supports, brackets, guides and anchors even if not specifically shown on the drawings. All supports shall conform to the latest requirements of ASME Code for Pressure Piping B31.1 and MSS Standard Practice SP-58, SP-69, SP-89 and SP-90.

C. Pipe hangers shall be capable of supporting the pipe in all conditions of operation without transferring excessive stress to the pipe.

D. Supports shall fit adequately over insulation. Provide 12 gage pipe saddles and inserts of high-density block insulation.

E. Exterior pipe supports shall be galvanized steel.

2.04 PIPE AND EQUIPMENT MARKERS

A. All exposed piping shall be marked with name of fluid be conveyed and direction of flow. Markers shall be clearly visible and shall conform to ANSI and OSHA requirements for marker size, marker color, legend size, and legend color. Install at least three (3) markers for each pipe in each room.

B. Label all pipe in ice equipment room over 1.5 inches in diameter.

C. Label all equipment on nearest pipe (e.g., Pump 1, Compressor 1, Chiller, , etc.)

2.05 EXPANSION TANK (FOR RINK FLOOR PIPING)

A. Approved Manufacturers: Aurora, Xylem Inc. Bell and Gossett, John Wood Company, H.A. Phillips, Armstrong, or equal.

B. Capacity: Horizontal compression tank. See capacity in Ice Equipment Schedule on drawings.

C. Materials: Pressure rating of 125 psig in accordance with Section VIII, Division 1, of the ASME Boiler Pressure Vessel Code, and registered with the National Board of Boiler Pressure Vessel Inspectors.

D. Accessories: Liquid level gauge assembly by Apollo Valve or equal and shall include gauge glass, drain valve, glass protector and shut off valves. Air control fitting equal to Xylem Inc. Bell and Gossett tank fitting and ATFL including brass vent tube plug and stainless-steel ball check.

E. Tank shall be painted with one coat of primer and one coat of enamel.

2.06 PRESSURE GAUGES

A. Approved Manufacturers: McDaniel, Ashcroft or equal.

B. Materials and Accessories: Shall have stainless steel case, minimum 4" diameter, bourdon tube type, liquid filled, 1% scale accuracy over entire range of gauge, 1/2" minimum diameter stainless steel sockets. Provide ball valve and snubber for each gauge. Provide 1/2” minimum diameter steel pipe extension to extend ball valve outside of pipe insulation. Steel pipe and ball valve specified elsewhere in the specifications.

C. Sizes: Scaled from 0 to 50 psi for snowmelt, sub-floor, and water systems. Scaled from 0 to 100 psi for all other systems

2.07 THERMOMETERS

A. Approved Manufacturers: Weksler, Trerice or equal.

B. Materials. Round, bimetal thermometer style using bimetallic sensing element, sensing element consisting of two dissimilar metals, stainless steel stem, highly polished type 300 stainless 4" diameter steel case, adjustable angle, silicone dampened coil, dial pointer, stainless steel stems, non-breakable double strength glass window, accuracy to +/- 1.0% full scale ASME B40.3 Grade A, external reset.

2.08 INSULATION

A. Pipe and equipment insulation system.

B. See Insulation Schedule on drawings for required thickness, type and location.

C. Insulation and Jacket Type:

1. Materials: Shall be composite insulation system including insulation, jacket (as specified for specific application), and all sealants and shall have a flame spread rating of 25 or less and a smoke development rating of 50 or less. Shall be puncture resistant based on ASTM D-781, moisture and mildew resistant and vermin proof. Insulation shall be suitable to receive jackets, adhesives and coatings as indicated.

2. Type 3 Insulation (exposed, interior of building) - Flexible Elastomeric Thermal Pipe Insulation by Armaflex or equal.

   a. Jacketing: None.

3. Type 5 Insulation (exposed, interior and exterior of building) – Dow XPS Styrofoam, Certainteed, Owens-Corning, Pittsburgh Corning, Extrol, Fibrex, H.B. Fuller, or equal.

   a. Insulation shall meet the following properties:

Properties	**Value**
Density, ASTM D1622, minimum	1.6 lbs/cf
Compressive Strength ASTM D1621, minimum	20 lb/sq. in
K-factor, ASTM C518	0.259 btu-in/hr-cf-F
Water Absorption, % by volume ASTM C272/D2842, max.	0.5/1.0 %
Water Vapor Permeability, ASTM E96, max.	1.5 perm-inch

   b. Jacketing (exposed, interior of building):
      1) PVC material with thickness of 20 mils, gloss finish on one side, semi-gloss on other side, FS LP-535D. Ultraviolet inhibited indoor/outdoor grade to be used where exposed to high humidity, ultraviolet radiation or installed outdoors. Jackets shall be rated for 0 F to 150 F with maximum flame spread rating of 25 meeting ASTM E-84 and maximum smoke development rating of 50 meeting ASTM E-84.
      2) Type: Composition A, Type II, Grade GU, jacketing shall meet above requirements. Type 3 jacketing shall meet ASTM D-1784, Grade 1, and high impact in addition to the above requirements.
   c. Jacketing (exposed, exterior of building and vertical pipe chase applications):
      1) Aluminum material alloy 3003, 1100, or 3105 meeting ASTM B-209 with H-14 temper, 20 mil, smooth finish, white painted aluminum. UV protected. Jacketing shall have no paper to retain moisture.
      2) Provide Polysurlyn moisture barrier with a minimum thickness of 2.5 mil. Dupont, Dow Saran or equal.
      3) Banding shall be 0.020" thick by ½" wide, 300 series, stainless steel.

4) Aluminum jacketing for fittings, tees, elbows, valves, caps, etc. shall be sectional, factory contoured, to fit closely around insulation.

4. Type 5A (direct bury interior and exterior applications) – FoamGlas by Owens Corning or equal.

   a. Insulation shall meet the following properties:

Properties	**Value**
Density, ASTM C303, minimum	7.18 lbs/cf
Compressive Strength C165/C240/C552, minimum	90 lb/sq. in
K-factor, ASTM C518, C177 at 0F	0.250 btu-in/hr-cf-F
Water Absorption, % by volume ASTM C240, max.	< 0.2% by Vol
Water Vapor Permeability, ASTM E 96 West Cup, max.	0.0 perm-inch

   b. Jacketing:
      1) Approved manufacturers: Pittwrap SS by Pittsburgh Corning or equal. Insulrap 50-SJ-NG is not considered an equal.
      2) Modified bituminous membrane
      3) Self-healing material
      4) Overlap shall be a minimum of 50%.
      5) Apply in temperatures above 50F.
      6) Properties:

Properties	**Value**
Thickness (mils), minimum	70
Permeability, ASTM E96 (perm-inches), max.	.002
Tensile Strength, ASTM D882 (at 78F), min.	>1150 lbs/in
Puncture Resistant, ASTM E154, min.	199 lbs

5. Type 5B (direct bury interior and exterior applications) Composite Piping System

   a. This **product is can only be used with composite piping systems with HDPE jacket** such as Tricon Piping Systems, Inc., Energy Task Force Pre-Insulated Pipe or equal. Piping material shall meet the pipe specifications for this project. Shall use HDPE jacket as specified below.
   b. Closed cell polyurethane foam insulation. Foamed in place.
   c. Insulation shall meet the following properties:

Properties	**Value**
Density, ASTM D1622, minimum	2.0 lbs/cf
Closed Cell, minimum	90-95%
K-factor, ASTM C177	0.147 btu-in/hr-sf-F

   d. Jacketing
      1) Direct Bury, Interior and Exterior of Building for Composite Piping Systems:
      2) Approved manufacturers: Tricon Piping Systems, Inc. or equal.
      3) HDPE materials.
      4) Must be applied with manufacturers recommended shrink sleeve material connecting pipe section for waterproof application. No substitutions.
      5) Properties:

Properties	**Value**
Resin, ASTM D3350	Type III, Grade P34
Tensile Strength, ASTM D638(at 78F), min.	3300 psi
Ultimate Elongation, ASTM D638 min.	850%
Tangent Flexural Modules, ASTM D790, min.	175,000 psi

D. Insulation Inserts and Pipe Shields

1. Approved Manufacturers: B-Line, Pipe Shields, Value Engineered Products or equal.
2. Construct inserts with calcium silicate, minimum 140 psi compressive strength. Piping 12" and larger, supplement with high density 600 psi structural calcium silicate insert. Provide galvanized steel shield. Insert and shield to be a minimum 180 degrees coverage on bottom supported piping and full 360 degrees coverage on clamped piping. On roller mounted piping and piping designed to slide on support, provide additional load distribution steel plate. On low temperature systems, extruded polystyrene may be substituted for calcium silicate provided insert and shield length and gauge are increased to compensate for lower insulation compressive strength.
3. Where contractor proposes shop/site fabricated inserts and shields, submit schedule of materials, thickness, gauges and lengths for each pipe size to demonstrate equivalency to pre-engineered/pre-manufactured product described above.
4. Precompressed 20 lb density molded fiberglass blocks, Hamfab or equal, of the same thickness as adjacent insulation may be substituted for calcium silicate inserts with a 1" x 6" block for piping through 2 ½" and three 1" x 6" blocks for piping through 4". Submit shield schedule to demonstrate equivalency to pre-engineered/pre-manufactured product described above.
5. Wood blocks will not be accepted.

E. Accessories:

1. Provide all adhesive, sealants, protective finishes, and other products as recommended by the manufacturer to provide a completely sealed system.
2. Provide vapor barrier that is non-flammable, fire resistant and polymeric resin, for all systems operating below 65 F.
3. Insulation bands shall be ¾ inches wide, constructed of aluminum or stainless steel. Minimum thickness to be 0.015 inches for aluminum and 0.010 inches for stainless steel.
4. Tack fasteners shall be stainless steel ring grooved shank tacks.
5. Staples shall be clinch style.
6. Insulating cement shall meet ANSI/ASTM C195, hydraulic setting mineral wool. Finishing cement shall meet ASTM C449.
7. Bedding compounds to be non-flammable, fire resistant, polymeric resin.

2.09 SEALANT AND FIRESTOPPING

A. Sealant and fire stopping of sleeves and openings between ductwork, piping, etc. and the sleeve, structural or partition opening shall be the responsibility of the contractor.

B. Fire and/or Smoke Rated Penetrations:

1. Approved Manufacturers: 3M, Hilti, Rectorseal, STI/SpecSeal, Tremco, or equal.
2. All fire stopping systems shall be provided by the same manufacturer.
3. Fire stop systems shall be UL listed or tested by and independent testing laboratory approved by the State.
4. Use a product that has a rating not less than the rating of the wall or floor being penetrated.

5. Contractor shall use firestop putty, caulk sealant, intumescent wrap strips, intumescent firestop collars, firestop blocks, firestop mortar or a combination of these products to provide a UL listed system for each application require for this project. Provide mineral wool backing where specified in manufacturer's application detail.

C. Non-rated Penetrations:

1. Pipe Penetrations Through Below Grade Walls. In exterior wall openings below grade, use a modular mechanical-type seal consisting of interlocking synthetic rubber links shaped to continuously fill the annular space between the uninsulated pipe and the cored opening or a water-stop type wall sleeve.

2. Pipe Penetrations. At pipe penetrations of non-rated interior partitions, floors and exterior walls above grade, use urethane caulk in annular space between pipe insulation and sleeve.

PART 3 - EXECUTION

3.01 EXCAVATION, INSTALLATION OF PIPE, AND BACKFILLING

A. The Contractor shall be responsible for verifying the location of all existing piping, electrical, and other utilities prior to excavation.

B. No changes to pipe alignment or elevation shall be made without approval from the Engineer.

C. All pipes shall be cleaned out prior to installation. Inspect pipe for defects and damage.

D. Decrease line size to pumps as required with long radius reducing elbows or concentric reducers/increasers in vertical piping. All valves and piping specialties must be full line size.

E. Excavate pipe trenches in accordance with OSHA regulations. All pipe trenches shall be backfilled as soon as possible. Backfill and compact materials in 12" lifts. Care shall be taken while backfilling to protect the pipe from damage. Backfill material for trenches within the building footprint or other structural areas shall be compacted to at least 100% standard moisture density relationship of soils to prevent settlement of the floor slabs.

F. Support all piping in such a manner as to prevent all vibration and vertical or horizontal movement. All pipe support systems shall be installed to meet local and state code requirements.

G. Provide all coring drilling required to install piping system through masonry or concrete walls, screen walls, roof structures and other structures as required to install piping systems. Keep holes to minimal size.

H. Provide all pipe sleeves required for core drilled penetrations.

I. Relief lines and devices shall be terminated outside of the building in accordance with all current State and Local codes including minimum distance from ground level, openings and exits unless a containment tank is specified.

J. All refrigerant piping shall be installed, tested and placed in operation per these specifications and the state and local mechanical codes.

K. All pipe joints erected on site shall be exposed for visual inspection prior to being covered.

3.02 TESTING OF PIPING SYSTEMS

A. All testing shall be witnessed by the Engineer. Provide advanced notification to the Engineer as specified in Section 13811 - Ice Rink General Requirements.

B. All piping shall be tested prior to backfilling. Isolate all equipment and any other devices that may be damaged by the pressure test. Testing procedures shall meet all code requirements.

C. Testing Requirements:

1. Polyethylene Pipe: Shall be tested as specified in Section 13813 -Ice Rink Floor.

2. Steel Glycol Pipe: Shall be hydrostatically tested at 75 psig for 24 hours with no pressure drop.

3. Steel Refrigerant Pipe (Refrigeration system):

a. Pressure Test: All refrigeration piping systems shall be pressure tested at the pressures stated in the table below with nitrogen gas for 24 hours with no pressure drop. The pressure shall then be lowered to 200 psig and maintained until system is ready to be charged. The test shall not begin until the Contractor is confident all water and contaminants are removed from the system. The Engineer shall witness the test.

Refrigerant	**Pressure (psig)**
R455A	450 psi (verify with manufacturer)

b. Vacuum Dehydration: After the piping has been tested, a vacuum pump of adequate size shall be connected to the rink field and associated piping and allowed or run continuously until a vacuum reading of at least 1000 microns (29.882 in. vacuum) or lower is obtained. This test must be maintained with the pump valved off for at least ten (10) minutes. Provide an absolute pressure gauge for monitoring and use per the manufacturer's recommendations. The Engineer shall witness the test.

4. Gauges used for pressure tests must be designed for pressures greater than the test pressure. For example, a 100-psi gauge cannot be used for a 100-psi test. The scale on the gauge must be the next increment up from 100 psi.

3.03 CHARGING OF SYSTEMS

A. Primary Refrigerant Systems: After all pressure tests and vacuum dehydration testing has passed, the system shall then be fully charged with the specified refrigerant.

B. Secondary Refrigerant Systems: After all pressure tests have passed the secondary refrigerant systems shall be fully charged with the specified solutions. Remove all air from the systems.

C. Waste Heat Recovery Systems: After all pressure tests have passed the waste heat recovery systems shall be fully charged with the specified solutions. Remove all air from the systems.

3.04 VALVES AND ACCESSORIES

A. Install valves at the locations shown on the drawings, described in the specifications as required for system operation and maintenance or as required by the manufacturer.

B. Install all valves so that they can be easily replaced in the future including installing unions and allowing adequate clearance.

C. Install all valves with adequate clearance around the valve for maintenance.

D. Install air release valves at all high points in the system whether or not shown on the drawings.

E. All pressure relief valves shall be located where ambient temperature is normally above 32 F. Pipe all pressure relief piping to within one foot of ice equipment room floor.

F. Install valves for system drainage at all exposed low points in the system whether or not shown on the drawings.

G. Provide all power and electrical systems as necessary for operation.

H. Expansion tank shall be supported from the ceiling or supported with a floor mounted frame system with adequate supports and gauge glass placed in highly visible arrangement. Location to be approved by the General Contractor.

I. Construction strainers in suction diffusers shall be removed after system start-up.

J. Install thermowells for all temperature gauges.

K. Resistance Temperature Detector (RTD) Assemblies

1. Piping system shall be drained and fluid stored for installation of threadolets to install wells and RTD probes. No hot taps allowed.

2. For new projects, installation shall be done prior to installation of insulation systems. For renovation projects, remove pipe insulation as necessary for installation of wells and sensors. Reinsulate piping system with like materials to provide a sealed insulation system.

3. Wire sensors directly to VFD's or other devices.

4. Refill piping systems. Provide additional fluid as necessary for full system charge. Remove air from system.

L. 30 days after start-up the following shall be performed on the system:

1. Replace filter dryer cores.

2. Clean screens on pumps, strainers and other equipment.

3.05 GAUGES AND THERMOMETERS

A. All gauges and thermometers shall be installed at eye level wherever possible unless specified otherwise and shall be positioned for ease of reading by operation and maintenance staff. All gauges and thermometers shall be calibrated per the manufacturer's recommendations prior to installation

3.06 HANGERS AND SUPPORTS

A. The Contractor is responsible for adequately supporting all piping systems and equipment with hangers, floor supports, framing systems and all other components required to adequately support the piping systems and equipment. If supported from the ceiling, the Contractor shall verify that the building structure can support the total weight of all piping and equipment systems where hangers and supports are installed unless otherwise noted on the drawings. If requested, the contractor shall provide calculations, by a registered engineer, to verify construction of hangers and supports is adequate including the building structure they are attached to.

B. Support all piping in such a manner as to prevent all vibration and vertical or horizontal movement.

C. Pipe hangers and supports shall be spaced no more than eight (8) feet on center. Provide additional supports by equipment for assistance with equipment maintenance and replacement. Provide sufficient supports near equipment so that temporary supports are not needed to remove and replace equipment or to service and maintain equipment.

3.07 INSULATION AND JACKETS

A. Furnish and install insulation and jacketing on equipment and piping as noted on the drawings and all other cold surfaces which are part of the system including, but not limited to, chilled water pump bodies, chilled water filter, chemical bypass feeder, etc.

B. Systems shall not be insulated until an inspection has been completed by the Engineer and pressure tests have been performed and accepted.

C. All valves, fittings, and accessories connected to pipe and equipment systems shall be insulated and jacketed. Provide handle extensions as required to allow full insulation of valves.

D. Provide vapor barrier for all systems operating below 65 F.

E. Install all insulation and jacketing per manufacturer's recommendations. Use full length materials. Install insulation continuous through pipe hangers and supports with hangers and supports on the exterior of insulation. Where a vapor barrier is not required, hangers or supports maybe attached directly to piping with insulation completely covering hanger or support and jacket sealed at support rod penetrations. Where riser clamps are required to be attached directly to piping requiring a vapor barrier, extend insulation and vapor barrier jacketing/coating around riser clamp.

F. Install all jacketing on exposed exterior piping systems with joints at 3’oclock and 9 o’clock position and jacketing secured with specified banding and seals. Banding shall be installed at a maximum of 9” on center. End joints shall be secured with bands and seals centered directly over joint. Jacketing shall be installed in a manner to shed water and in accordance with the Midwest insulation Contractors Association (M.I.C.A) National Commercial and Industrial Standards. Jacketing shall be caulked before closing and banding and positioned in an orientation to avoid water infiltration.

G. All insulation joints shall be staggered and tight. Provide 2” minimum lap on jackets and 2” tape on butt joints, firmly and continuously cemented with lap adhesive or welding solvent as recommended by the manufacturer. Additionally, secure with staples along seams and butt joints. Coat staples with vapor barrier mastic on systems requiring vapor barrier.

H. Provide inserts and pipe shields at all hanger and support locations. Inserts may be omitted on ¾” and smaller copper piping provided 12” long 22-gauge pipe shields are used.

I. Insulate entire piping system for a completely insulated system including all areas that will frost up during operation. This includes filling all gaps, spaces, voids, etc. completely to prevent frost or condensation build up. This also includes providing valve handle extensions and all other material to properly insulate valves and prevent condensation. Insulation shall be tightly butted and free of voids and gaps. Weather seal shall be continuous.

J. All fasteners and bands shall be neatly aligned, and overall work must be of high-quality appearance and workmanship.

K. Provide removable insulated covers for fill valves, equipment lifting hooks, access points to strainers, valves, nameplates, and all other areas that require periodic inspection, service or repair.

L. All site glasses and nameplates shall be insulated to prevent frost build-up.

M. Provide all adhesive, sealants and other products as required by the manufacturer to provide a completely sealed system. Seal all seams of the jacketing.

3.08 SEALING AND FIRESTOPPING

A. All pipes piercing interior and exterior walls, ceiling, and floor shall be tightly sealed to the walls, ceiling and floors through which they pass as specified herein.

1. Fire and/or Smoke Rated Penetrations. Install approved product in accordance with the manufacturer's instructions where pipes penetrate a fire/smoke rated surface. When pipe is insulated, use a product which maintains the integrity of the insulation and vapor barrier. Where firestop mortar is used to infill large fire-rated floor openings that could be required to support weight, provide permanent structural forming. Firestop mortar alone is not adequate to support any substantial weight.

2. Non-Rated Penetrations. At all interior partitions and exterior walls, pipe penetrations are required to be sealed. Apply sealant to both sides of the penetration in such a manner that the annular space between the pipe sleeve and cored opening and the pipe or insulation is completely blocked.

3.09 PAINTING

A. All interior steel piping, equipment, fittings, supports, and accessories that are exposed to view shall be painted with one coat of primer and one coat of enamel. All exterior exposed steel piping shall be painted with one coat of primer and two coats of enamel. Prepare steel as recommend by the paint manufacturer. Owner to select color of paint.

B. All exterior exposed steel piping shall be painted with one coat of primer and two coats of enamel. Prepare steel as recommend by the paint manufacturer. Owner to select color of paint.

C. Touch up paint on all equipment, vessels, supports and exposed pipes after project is complete.

D. Touch up damaged galvanized coatings and corrosion protection systems on condenser and remote sump.

END OF SECTION

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SECTION 13816

ICE RINK DASHER BOARD SYSTEM AND ACCESSORIES

PART 1 - GENERAL

1.01 SECTION INCLUDES

A. Quality assurance - prequalification criteria.

B. Approved manufacturers.

C. Dasher board system materials.

D. Floor anchors.

1.02 QUALITY ASSURANCE

A. Contractors wishing to bid/quote on this project must submit, with their bid, the following prequalification criteria.

1. Submit a list of five (5) ice rink construction projects the company has completed that are similar to this project and that were completed within the past five (5) years. Submittal shall be on company letterhead, signed by an authorized representative of the company and include project description, portion of project completed by the company, location, construction cost, completion date, owner's name, owner's representative, phone number and completion date of work.

2. Contractors/manufacturers listed as approved manufacturers in section 2.1 are not required to submit the prequalification material described in paragraph A.1 of this section.

3. Contractors/manufacturers seeking approval shall supply a sample panel section representative of all components to be used in the dasher board section if requested by the Owner.

B. Contractors wishing to bid on this project shall perform an on-site investigation prior to submitting a bid for the project. Contractor shall field verify all measurements that will affect the work of this project and report any concerns to the Engineer at least five (5) business day prior to the bid opening date. The contractor shall also perform a site visit to verify measurements prior to manufacturing the system.

1.03 RELATED SECTIONS

A. Section 007200 - General Conditions.

B. Section 007300 - Supplementary Conditions.

1.04 CODES AND STANDARDS

A. All parts of the project shall be performed in accordance with the most recent version of the following codes and standards and all amendments:

1. State Building Codes.

2. National Fire Protection Association Codes.

3. OSHA.

1.05 SUBMITTALS

A. Shop Drawings. All submittals shall conform to the requirements of the General Conditions. Shop Drawings shall include product information on all materials, color samples of all standard colors for top sill, facing, kick plate, backer panels, benches, and tables. Shop Drawings shall clearly highlight and note any materials, dimensions, etc. that do not match the contract documents. Samples shall be representative of thickness of material that will be supplied.

B. Structural Calculations: If requested, the manufacturer shall supply structural engineering calculations for the dasher board system.

C. Progress Schedule. Submit progress schedule before project begins.

D. Certifications. Submit four (4) copies of certifications to the Engineer when specified.

E. Project closeout documents:

1. Provide all documents required by the General Conditions and these specifications.

F. Payments for all submittals shall be incidental to the cost of the project.

1.06 WARRANTY/GUARANTY

A. In addition to the standard manufacturer's warranty on all equipment and materials, the contractor shall provide a standard two-year materials and labor warranty on all work performed for this project.

1.07 PRODUCT DELIVERY, STORAGE AND HANDLING REQUIREMENTS

A. Transport, handle, store and protect products in accordance with manufacturer's recommendations. Secure products at all times.

B. Store products with seals and labels intact and legible.

C. Store products in a secure environment at all times.

D. Provide adequate labor to handle products and prevent damage.

E. Protect top sill from becoming scratched or marked up during installation.

PART 2 - PRODUCTS

2.01 APPROVED MANUFACTURERS OF DASHER BOARD SYSTEM

A. Becker Arena Products/Sports Systems/Athletica/Cascadia, Rink Systems, Riley Manufacturing, or others by prior approval.

2.02 FRAME

A. All dasher panels whether straight, curved or gated shall have the same design and similar construction. Panels shall be all welded construction.

B. Standard Sizes:

Panel Section	**Height**	**Length**	**Width**
Straight	41”	96”	6”
Curved	41”	88”	6”

C. Materials:

1. Aluminum: Shall be structural alloy 6005A-T6. Architectural alloy is not acceptable. Shall meet ASTM B221 and Federal Specifications QQA200-9.
2. Systems shall be constructed with either aluminum or steel materials, not a combination of the two.
3. Height of systems shall be modified if ice retainers is used.

D. Components: See drawings.

E. Connections: Panels shall be fastened together through end plates at a minimum of three (3) locations with 1/2" diameter (minimum) bolts.

F. Other Supports: Provide additional supports where required and to accommodate systems such as quick release backer panels, gap closures, material, taller panels, etc.

G. All holes used in the framing system shall be pre-punched with slotted holes to allow for expansion and contraction in the polyethylene materials.

H. Systems that require external support posts on the back side of the dasher panel section are not acceptable unless specified or noted on the drawings.

2.03 POLYETHYLENE

A. Material: High impact, high density, UV stabilized, stress relieved, virgin polyethylene. Reprocessed polyethylene is not acceptable.

B. Dimensions: See drawings.

C. Colors:

1. As stated in material schedules on drawings. “Owner” means color shall be selected by Owner from the standard colors of white, black, royal blue, red, gold, yellow. It does not include the premium colors of light blue, green, navy blue, and some shades of grey or custom colors.
2. All like colors shall match.
3. White: Shall be Bright white in color. Natural white is not acceptable.

D. Fasteners: See Article 2.05 in this section.

E. Top Sill:

1. Dimensions – see drawing.

F. Thresholds:

1. Thresholds for equipment gates shall be constructed of a metal frame and a polyethylene top piece. Frame height shall be as required to provide an overall height shown in the table on the drawings. See drawings also for thickness of polyethylene. Frame material shall meet the requirements of Article 2.02 and polyethylene shall meet the material requirements of this article.
2. All equipment gate thresholds shall be easily removable for dry floor event access and for easy replacement.

2.04 FIBERGLASS

A. Material: High impact, UV stabilized, exterior grade fiberglass.

B. Dimensions: See drawings.

C. Colors:

1. As stated in material schedules on drawings. “Owner” means color shall be selected by Owner from the standard colors of white, black, royal blue, red, gold, yellow. It does not include the premium colors of light blue, green, navy blue, and some shades of grey or custom colors.

2. All like colors shall match.

3. White: Shall be Bright white in color. Natural white is not acceptable.

D. Fasteners: See Article 2.05 in this section.

E. Kick Plate:

1. Shall be fastened to facing of dasher board system.

F. Facing Panels:

1. Shall be one piece, cut to match dimension of frame.

G. Backer Panels:

1. Shall be one piece, cut to match dimensions of frame.

2. Provide polyethylene trim pieces between each section of back panel.

3. Quick Release System.

a. Install a quick release system on all backer panels.
b. System shall allow panels to be removed without removing fixed fasteners by using three spring latches at the top of the framing per panel.
c. Spring latches shall be accessed through a ¼” access hole in top sill.
d. A zinc plated bracket shall secure backer panel at the base of the framing system.
e. Provide an extra 1 ½” x 3” support welded to dasher frame at mid-point to support quick release backer panels.

2.05 FASTENERS FOR POLYETHYLENE OR FIBERGLASS MATERIAL

A. The fasteners specified in this article shall be used for securing the facing, backing, top sill and kick plate materials.

B. Material:

Framing Material	**Fastener Size and Type**
Aluminum	¼ “-20 Type F zinc – self tapping, color to match poly material
Steel	¼” Phillip flat head machine screw, flat washers, ¼” nylon insert lock nuts

C. Construction:

1. The heads of the screws shall be painted to match the facing color.

2. Fasteners for bottom row of kick plate shall be stainless steel. For outdoor rinks, all fasteners shall be stainless steel.

3. Spacing shall not exceed 10 inches on center.

4. Screw holes in poly material shall be large enough to allow for expansion and contraction.

5. Thresholds: All fasteners on thresholds shall be counter-sunk ½”.

2.06 ACCESS GATES

A. Provide access gates with openings as shown on the drawings.

B. Gates shall be integrated into the standard 8’ long panel sections and shall be Left or right swing as directed by the Owner.

C. Gate panel framing shall be similar construction as dasher framing.

D. Gate Latches: Shall be solid, steel welded construction, with a single 3/8” thick x 2” wide steel flat bar, easily opens with glove hand. Fastened to framing with 3/8” x 1 ¼” hex head bold and 3/8” nylon locking nut. Shall latch by gravity and latch on their own when gate is closed.

E. Gate Hinges: Shall be two lift off type hinges welded. All hinge assemblies shall have grease fittings for easy lubrication or use nylon bushings. Piano type hinges, 10 GA, non greasable, bolted to frame, are acceptable where shielding is not used. Hinges shall be adjustable.

F. Doorstop: All gates shall have a steel door stop welded to the frame with minimum dimensions of 3/8” x 3 ½” x 4 ½ long”.

G. Gate shall be constructed so top of threshold is located as follows:

Type of Gate	**Distance Above Finished Floor (in)**
Access	3
Equipment	2

H. Casters: For gates over 42” wide, provide 5” diameter, spring loaded, adjustable, zinc plated framing, polyurethane tires. Provide casters on each leaf.

2.07 EQUIPMENT GATES (STANDARD)

A. Shall be double leaf gates with opening sizes as shown on the drawings.

B. Materials: Framing materials to meet requirements of Article 2.02 of this specification and be of similar construction.

C. Latch: Shall be the sliding steel tube with minimum dimensions of 2 ¼” x 2 ¼” x 12 gauge or 2" diameter solid steel rod with large handle (push down). Zinc plated all components. Provide two (2) latches per gate.

D. Lock: Each leaf of gate shall lock into concrete perimeter slab with 3/4" diameter x 12” long solid steel, zinc plated cane bolts.

E. Hinges: Zinc plated, heavy duty, manufactured using 3/8” thick steel components and ¾” minimum diameter hinge pins, adjustable, lift off type welded to frame. Shall have grease fittings for easy lubrication. Two hinges per door.

F. Casters: 5” diameter, spring loaded, adjustable, zinc plated framing, polyurethane tires. Provide casters on each leaf.

G. Fasteners: Shall be zinc plated and color to match where necessary.

2.08 FLOOR ANCHORS AND INSERTS

A. Anchors components include bolts, inserts, washers, threaded rod, and hold down plate as shown on the drawings and as follows:

1. Where the dasher board system is located on the ice rink slab: Anchor assembly shall be as detailed on the drawings or equal and shall be cast in place into the concrete ice rink floor. If material type is not shown on the drawings, then insert material shall be:

a. For removable panels: Anchor inserts, and washers shall be 303 stainless steel, base plate may be 303 Stainless steel or carbon steel and bolts shall be zinc plated material.

B. Bolts shall be 5/8” diameter. Material shall be as stated herein.

C. Hold down plate shall be sized as shown on the drawings.

D. Plug Materials: Furnish and install threaded plugs for each insert. Brass for the dasher board inserts.

2.09 ACCESSORIES

A. Board Storage Cart.

1. Provide six (6) board storage cart(s), 60” wide x 60” high x 94” long.

2. Construction: 4,000 lb minimum, steel frame, heavy duty construction, end rails, plywood deck, two rigid and two swivel wheels. Shall have 5” diameter wheels rated for 2,000 lb load each. Carts shall be stackable. Assemble cart(s) for Owner.

3. Finish: One coat of primer and two coats of finish paint.

4. Accessories: Provide two (2) ratchet strap assemblies with each cart.

PART 3 - EXECUTION

3.01 INSTALLATION

A. Prior to delivering materials to the site and beginning installation, verify that the rink floor has been released for lift access and that the expansion joint has been installed and inspected.

B. The manufacturer shall provide all materials and labor for a complete dasher board system and installation. The dasher board system shall be shop fabricated as much as possible prior to delivering to job site.

C. Installation shall be completed under the direct supervision of an experienced representative from the manufacturer.

D. Installation shall be performed per the manufacturers recommended requirements and instructions. System shall be securely anchored in place. Provide all trim, shims and other accessories required for a complete, level and plumb, installation.

E. Any material that is scratched, marked up, chipped, dented or damaged in any way shall be replaced.

F. All parts of the system shall be thoroughly tested and adjusted, as necessary. Walk through the system with the Owner and make all adjustments necessary for the Owner's satisfaction.

3.02 ANCHORS AND INSERTS

A. The dasher board manufacturer shall be on-site prior to and during the concrete rink floor pour to install, protect and adjust the anchors and inserts when the dasher board system is being installed on the rink floor.

3.03 CLEANING

A. Clean all surfaces thoroughly prior to leaving the job site. The systems shall not be cleaned until all punch list items have been addressed.

3.04 START-UP SERVICES

A. After all systems have been tested and thoroughly cleaned provide the Owner's operating staff with a minimum of 4 hours of hands-on instructions on the operation and maintenance of the system.

3.05 COORDINATION OF WORK

A. The contractor shall be responsible for coordinating all work specified herein and shall work closely with other subcontractors on the project.

3.06 PERMITS

A. The contractor shall apply for and obtain all permits required to construct the project at no additional cost to the Owner unless specified otherwise.

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DIVISION 16

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SECTION 16551

SPECIAL PURPOSE LIGHTING, AUDIO AND CONTROL

PART 1 GENERAL

1.01 SECTION INCLUDES

A. The work of this Section consists of providing all labor, equipment, materials, incidental work, and construction methods necessary to perform a unified, complete, operational and accepted Audio/AV system and related items as indicated on the Drawings and as specified in this Section, and includes, but is not limited to, the following:

1. Control and operation all light fixtures within the project
2. Control and operation of audio and AV equipment
3. The delivery, unloading, setting in place, fastening to floors, poles, or other structures where required.
4. Provide low voltage cable as per A/V drawings or as required to deliver a fully functional system.
5. Final terminations, dressing, and testing of all AV Cabling inclusive of cables pulled by others.
6. Interconnecting wiring of the system components and equipment alignment and adjustment

B. These specifications and the drawings do not necessarily indicate every single component part of each system. It is the responsibility of the Contractor to engineer each system and its interconnection in order to provide, furnish, and install completely operational turnkey systems. No error or omission herein or on any related Construction Documents shall relieve the Contractor from this responsibility to do so.

1.02 REFERENCES

A. Work shall be done in accordance with the following:

1. NEC, NEMA and ANSI codes and standards.

B. All equipment and materials shall be manufactured and tested in accordance with the following:

1. Applicable portions of the latest editions of ANSI, NEC, NEMA, U/L, ASA, AIEE, and IPECA standards.

1.03 SUBMITTALS

A. Submit in accordance with Section 01300,

B. Product info for each piece of equipment shown on the drawings.

C. Close out Documents

1. At the completion of the installation, the Contractor shall provide the following items, and submit at least four sets of each. Two full sets shall be submitted to the owner, one to the

General Contractor and one to the consultant. The following list shall define “Close out Documents”.

a. Equipment manufacturer’s operation and maintenance manuals for each piece of equipment, bound in a three-ring binder. Include any “as modified” drawings pertaining to any equipment that has been modified by the contractor.

D. Contractor Qualifications

a. All personnel engaged in the installation of this Section shall have at least three (3) years direct experience with devices, equipment, and system installations of the type and scope specified herein

E. Quality of Materials and Equipment

1. All materials and equipment supplied by the Contractor shall be new and shall meet or exceed the latest published specification of the manufacturer in all respects.

2. The Contractor shall supply the latest model, available at the time of bidding, of each piece of equipment

3. The materials and completed Work of this Section shall conform to the applicable requirements of all current local and state codes, and of the following reference codes:

a. Occupational Safety and Health Act of 1970 and all amendments thereto
b. National Electrical Code, ANSI C1, as amended by all state and local codes
c. Uniform Building Code
d. All Authorities Having Jurisdiction (AHJ)

1.04 PRODUCT DELIVERY, STORAGE AND HANDLING

A. Electrical equipment shall always be adequately protected against mechanical injury or damage by water. Electrical equipment (excluding light poles) shall not be stored outside exposed to the elements. If any equipment or apparatus is damaged, such damage shall be repaired at no additional cost, or replaced at no additional cost as directed by the Engineer.

B. Ensure that the spaces where any electronic equipment is to be stored and/or installed is completely free from any foreign substances, such as concrete dust, or any other material that may otherwise be harmful to electronic equipment and connections. No allowances shall be made to the Contractor for equipment damage or delays due to environmental damage.

1.05 GUARANTEE AND MAINTENANCE

A. The Contractor shall guarantee all equipment and cabling, programming, and software furnished, in writing, against defects in workmanship and material for a period of **ONE YEAR** from the respective dates of final acceptance. All defects developing during that period shall be corrected in compliance with the "GUARANTEE" conditions under these specifications

B. Warranty Statement

1. To maintain certain manufacturers’ warranties, said equipment must be installed, aligned, and serviced by those installers authorized by said manufacturer to perform those duties.

If said manufacturer does not authorize the Contractor, it is the Contractors responsibility to make the appropriate arrangements and bear all cost and consequences thereof

PART 2 PRODUCTS

2.01 GENERAL

A. Materials and equipment furnished shall be designed for the intended use, shall meet all requirements of the latest edition of the National Electric Code (NEC), and all local codes. The materials used shall be new, unused, and of the best quality for the intended use. All equipment shall have the manufacturer's name, address, model or type designation, serial number and all applicable ratings clearly marked thereon in a location which can be readily observed after installation.

B. Materials shall be manufactured in accordance with the standards indicated in this Section, and typical industry standards and codes for the products specified. Materials and equipment shall be Underwriter's Laboratory (UL) listed.

C. Verify with all manufacturers and/or suppliers' availability and cost of all material and equipment proposed, including all material and equipment specified herein. No cost increases shall be allowed for manufacturers' cost increases, or for substitutions required because of unavailability of proposed equipment.

D. All products referenced herein to provide a baseline for standards of design, function and quality. Alternates will be reviewed at the Engineers discretion and at a minimum meet or exceed the performance standards.

1. The manufacturer specifications shall be considered as minimum performance levels of acceptance. Where a particular model is specified its performance, operating, and physical characteristics are part of these specifications. Further, these characteristics are part of a design as a whole and particularly the Engineer's designs are in full coordination with these characteristics.

E. The itemized parts lists below represents, to the best of our knowledge, all major components required for the construction of a complete and working systems as described herein. It shall be the responsibility of the contractor to verify that no item has been omitted that may be required for complete and working systems. Any additional items needed shall be provided at no additional costs.

2.02 LIGHTING AND AUDIO EQUIPMENT

A. Provide the equipment as shown on the drawings with appropriate hardware for mounting and as needed to complete the work.

An acceptable vendor for audio equipment:

Pro Acoustics.
Toll Free: 1-888-256-4112Phone: (254) 698-4042 Fax: (254) 698-2037
Email: sales@proacoustics.com
Address: 6612 Woodway Dr Bldg 2 Ste 1, Woodway, TX 76712

Hours of Operation: Monday - Friday 8:00am to 5:00pm CST.

An acceptable vendor for specialty lighting equipment:

Robert Somers, LC
Specification Sales: NH & Boston
bsomers@apexltg.com | c:978-954-1156
Apex Integrated Building Solutions

PART 3 EXECUTION

3.01 COORDINATION

A. The Contractor shall coordinate the finish required for all fixtures, panels, and enclosures supplied as part of this specification section with the Engineer and Owner.

3.02 WORKMANSHIP

A. The mechanical fabrication and workmanship shall incorporate neat and mechanically acceptable practices such as clean drilled and punched holes without flash; hand smooth finish for all sheared, machined, and cut edges; and proper fit of component and contiguous parts without irregularity where matching is intended. Welding shall meet qualifications of AWS D1, 1-81 and shall be without spatter and other evidence of poor practice. All bolts and rivets shall be sized and located in conformity with minimum acceptable standards as set forth in the Machinery's Handbook and all revisions to date.

B. All moving parts shall have acceptable tolerances, mountings, connections, and accessories coordinated into the system in a manner approved by the Engineer. No wood construction or equipment shall be incorporated into the system excepting as may be set forth in the specifications.

C. All electrical and electronic parts and components selected and installed shall be consistent with good practice and conservatively rated in their use in the circuit design. Each piece of equipment shall meet accepted basic engineering standards.

D. Adjust and balance all equipment as specified herein. Set all controls and software parameters to render a fully and optimally operating systems and subsystems. All computer-controlled functions shall require complete audio/computer/software setup, label-entry and documentation.

E. Install all equipment to industry safety and ergonomic standards and provide full engineering and technical support throughout the installation process.

3.03 FABRICATION & INSTALLATION

A. All installation practices shall be in accordance with, but not limited to, these specifications and drawings. Installation shall be performed in accordance with the applicable standards, requirements, and recommendations of authorities having jurisdiction.

B. Provide intelligible, permanent identification on or adjacent to all patching jacks, connectors, receptacles, terminal blocks, meters, indicators, switches, equalizers, mixers, amplifiers, etc. The identification shall clearly indicate the function, or circuit.

C. The Contractor must take such precautions as are necessary to guard against electromagnetic and electrostatic hum, to supply adequate ventilation, and to install the equipment so as to provide maximum safety to the operator.

D. All wire and cable shall be continuous and splice free for the entire length of run between designated connections or terminations.

E. When connecting stranded wire to compression screw terminals do not tin the wire ends. When inserting wires into a compression terminal take proper care to insert only the stripped portion of the cable.

3.04 EQUIPMENT LABELING

A. In addition to permanently labeling each cable and termination device, each piece of equipment, device, and panel shall have permanent label corresponding to its function as shown on system drawings.

3.05 GROUNDING

A. The Contractor shall follow all standard NEC and local codes for grounding practices on all of the audiovisual equipment and equipment racks.

B. It shall be the responsibility of the Contractor to follow good engineering practices. At no time shall there be a compromise in safety or any exception to the NEC and local codes.

C. Ground case of power strips/channels in equipment racks to the racks and insulate from power system ground.

D. Insulate all conductors in conduit, including shields, from the conduit, back boxes, and from each other for the entire conduit length.

E. Provide isolated ground receptacles typical for all power receptacles for all equipment.

F. The Contractor shall ensure that ONLY the audio-visual equipment is connected to the AUDIOVISUAL dedicated Ground system.

3.06 IDENTIFICATION

A. All installation shall bear the following identification plate, supplied by this contractor, mounted on the front of the main rack at the top:

1. SYSTEM FABRICATED & INSTALLED BY: Contractor Name Full Address

Telephone Number

B. Engraving shall be white filled Helvetica lettering on a black background or as appropriate to the identification plate material.

3.07 OFFSITE SYSTEM CHECKOUT

A. Before onsite installation, the Contractor shall be prepared to perform system checkout under the supervision of the Owner and Consultant at his shop. He shall furnish all required test equipment and shall perform all work necessary to determine and/or modify performance of the system to meet the requirements of this specification. This work shall include the following:

1. Test all audio systems for compliance with the Performance Standards.
2. Check all control functions, from all controlling devices to all controlled devices for proper operations.

3.08 SPEAKER AND LIGHTING INSTALLATION

A. The following general minimum standard requirements shall be applicable to the fabrication and installation of all speaker(s), and speaker assemblies in the Project:

B. Provide positioning and support elements for assemblies wherever required.

C. Coordinate installation of all assemblies to ensure proper projection of the respective elements, and access to them for maintenance and/or removal.

D. Verify that no assembly is subjected to stress, abrasion, or loading effects which could contribute to extraordinary failure.

E. Eliminate all conditions causing noise, rattle, or other extraneous sounds resulting from the operation of a assembly under any operating condition.

F. Verify that components are clear of any other obstructions.

G. Use tamper/vandal-proof screws for all items.

3.09 ADJUSTING

A. Aim and position adjustable luminaires and or speakers to achieve desired illumination/sound quality as indicated or as directed by Engineer. Secure locking fittings in place.

3.10 AC POWER

A. The Contractor shall ensure the Electrical Contractor has provided adequate power circuits and the grounding scheme is in accordance with the GROUNDING paragraph herein.

B. If a dedicated A/V power system is part of this design, the Contractor shall ensure that ONLY the audio-visual equipment is hooked up this dedicated ac power system.

3.11 PHYSICAL INSTALLATION

A. All equipment shall be firmly secured in place with a safety factor of at least five (5). All hardware shall be SAE Grade 5 minimum and all installation practices shall comply with standard rigging practice, OSHA standards, and all building codes.

B. All boxes, equipment, etc. shall be secured plumb and square.

C. In the installation of equipment and cable, consideration shall be given not only to operational efficiency, but also to overall aesthetic factors.

D. All power supplies shall be located, oriented, and connected electrically so as to minimize hum and RFI interference. Further, all plug-in type power supplies shall be firmly attached using mechanical fasteners to its associated power receptacle to insure accidental removal and/or connection loss.

3.12 CABLE LENGTH & SPLICES

A. All cables shall be cut to the length dictated by the run. No splices shall be permitted in any pull boxes. For equipment mounted, the interconnecting cables shall be provided with a service loop of appropriate length.

3.13 CABLE INSTALLATION

A. All cables, regardless of length, shall be marked with wrap-around number or letter cable markers at both ends. There shall be no unmarked cables at any place in the system. Marking codes used on cables shall correspond to codes shown on drawings and run sheets. Clear heat shrink (or equal) shall protect numbers.

B. All inter-rack cabling shall be neatly strapped, dressed, and adequately supported.

C. For all cables interfacing with racks, cabinets, consoles, or equipment modules requiring terminal blocks, boards, strips, or connectors these shall be either of the “barrier strip” type, screw down terminal strip or insulation displacement punch down type. No audio cables shall run directly to the audio patch panel jacks. Each audio patch panel shall be furnished with an audio terminal block, and all audio cables to and from the audio patch panel shall terminate on this block

D. All cables shall be grouped according to the signals being carried. In order to reduce signal contamination, separate groups shall be formed for the following cables:

1. Power cables
2. Control cables

3. Audio cables

E. All power cables, control cables, and high level cables shall be run vertically on one side of an equipment rack as viewed from the rear. All other cables shall be run vertically on the other side of an equipment rack, as viewed from the rear.

F. Cables and Connectors

1. Cables running in areas exposed to environmental factors such as, but not limited to, Exterior, UV, chemicals, direct burial, etc. shall be rated for such exposure and shall match the performance characteristics of its equivalent cable above.
2. All cables shall be cut to the length dictated by the run. No splices shall be permitted without prior permission of the Consultant. For equipment mounted in drawers or on slides, the interconnecting cables shall be provided with a service loop of appropriate length.
3. No cable shall be installed with a bend radius less than that recommended by the cable manufacturer.
4. Each DMX cable run shall be provided with appropriate 120 ohm resistors to prevent reflection. (DMX terminator)
5. Do not exceed the max. recommended cable lengths per type per run.
6. Limit fixture quantities per run per the drawings.
7. Provide isolation devices as required to prevent the control system from damage due to electrical shock.

3.14 PROGRAMMING

A. General: The Contractor shall be responsible for the control system programming. Further, the Contractor shall be responsible for the on-site programming, software de-bugging, and revising custom screens after initial use. Specific details are included in this document.

Including but not limited to:

a. Reinforcement of speech and music from wired microphone receptacle to listeners in the Park.
b. Built-in ability to connect rental equipment to Audio/AV system via Network.
c. Play background music and seasonal music via the Audio System,

B. Addressing of all DMX Fixtures within the park to create a unified control system. This shall include confirmation of fixture operation for all DMX controlled fixtures, including other LED/DMX fixtures furnished by the Electrical Contractor. Confirmation of system operation.

C. Programming of (5) Static Lighting Scenes

1. each static scene should include at a minimum:
2. dimming of site lighting to an acceptable safe level that does not compete with the light show.
3. A slow-moving repeating pattern of changing color or functions over a period for all the lights in an interesting layout with (2-3) holiday colors.

3.15 CLEANUP AND REPAIR

A. Upon completion of the work the Contractor shall remove all his refuse and rubbish from and about the premises and shall leave the relevant areas and equipment clean and in an operational state. The Contractor shall be responsible for repairing any damage caused to the premises by the Contractor's installation activities, at no cost to the Owner.

3.16 OPERATION INSTRUCTION

A. The Contractor shall provide on-the-job training by a suitably qualified instructor, to personnel designated by the Owner, to instruct them in the operation and maintenance of the systems. At no additional cost to the Owner, the Contractor shall provide a manufacturer’s representative for such instruction in the event the Contractor does not have qualified instructors on staff for certain sophisticated equipment. All training shall take place after the systems are operational, but before the acceptance tests. There shall be a total of up to (2) hours of training on the systems included in this specification, at the discretion of the owner.

B. The Contractor shall orally instruct and demonstrate, to personnel selected by the Owner, the Owner's Operating Manual and all final drawings as provided for in this Section.

C. This training session shall be performed independent of any acceptance testing procedures, and factory training at any manufacturer's facility. This training session shall be performed independent of any other clause in the Section.

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DIVISION 22

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SECTION 220000

PLUMBING TABLE OF CONTENTS

SECTION 220000

PLUMBING

PART 1 GENERAL

1.01 GENERAL REQUIREMENTS AND REFERENCES

A. Include “General Requirements” and applicable parts of Division 1 as part of this section.

B. Examine all other sections of the Specifications for requirements which affect work under this Section whether or not such work is specifically mentioned in this section. Where paragraphs of this section conflict with similar paragraphs of Division 1, requirements of this section shall prevail.

C. Coordinate work with that of all other trades affecting, or affected by work of this section. Cooperate with such trades to assure the steady progress of all work under the Contract.

D. The Plumbing Subcontractor shall be responsible for filing all documents, payment of all fees, and securing of all inspections and approvals necessary for the work of this section.

E. The Plumbing Subcontractor shall carry in the Bid Price all Utility Company and Municipal back charges for all materials furnished and work performed by them in conjunction with this Contract and pay same to the respective agency upon demand. The Plumbing Subcontractor shall not be entitled to additional compensation after the submittal of his bid price should he fail, for any reason, to obtain the total back charge costs to be incurred by the local utility companies or municipal agencies.

1.02 DEFINITIONS

A. As used in this section, “provide” means “furnish and install”, and “POS” means “Provided Under Other Sections”.

B. As used in the Contract Drawings and Specifications for Plumbing work, certain non-technical words shall be understood to have specific meanings as follows, regardless of indications to the contrary in the General Conditions of other documents governing the Plumbing work.

1. “Furnish” means: Purchase and deliver to the project site complete with every necessary appurtenance and support, all as part of the Plumbing work. Purchasing shall include payment of all sales taxes and other surcharges as may be required to assure that purchased item(s) are free of all liens, claims, or encumbrances.

2. “Install” means: Unload at the delivery point at the site and perform every operation necessary to establish secure mounting and correct operation at the proper location in the project, all as part of the Plumbing work.

3. “Provide” means: “Furnish” and “Install”.

4. “New” means: Manufactured within the past two (2) years and never before used.

C. Except where modified by a specific notation to the contrary, it shall be understood that the indication and/or description of any plumbing item in the Contract Drawings or Specifications for Plumbing work carries with it the instruction to furnish, install and connect the item as part of the Plumbing work, regardless of whether or not this instruction is explicitly stated.

D. It shall be understood that the Specifications and Drawings for Plumbing work are complimentary and are to be taken together for a complete interpretation of the Plumbing work except that indications on the Contract Drawings, which refer to an individual element of work, take precedence over the Specifications where they conflict.

1.03 SCOPE

A. Perform work and provide material and equipment as shown on Contract Drawings and as specified or indicated in this Section of the Specifications. Completely coordinate work of this Section with work of other trades and provide a complete and fully functional installation.

1. Domestic water piping system.
2. Exterior water service piping for domestic water beginning 5'-0" outside exterior wall of the building.
3. Pressure reducing station.
4. Non-potable water system including reduced pressure backflow preventer for HVAC.
5. Backflow preventers.
6. Domestic water heaters.
7. Interior sanitary waste and vent piping system.
8. Interior sanitary drainage system extended to a point 5'-0" outside the interior face of the foundation wall of the building.
9. Plumbing fixtures and trim.
10. Natural gas system.
11. Extend all gas train vents to atmosphere.
12. Final connection to all gas fired equipment including valves, regulators, drip and dirt pockets, unions and necessary appurtenances.
13. Floor drains.
14. Hose bibbs and wall hydrants.
15. Insulation.
16. Valves.
17. Water hammer arresters.
18. Fittings unions, flanges and couplings.
19. Flashing of floor drains.
20. Service water connections to equipment.
21. Roughing and final connections to equipment.
22. Hangers, plates and inserts.
23. Cleaning, testing and disinfection of piping systems.
24. All supplementary steel for piping and equipment support.
25. Guarantees.
26. Drilling for installation of inserts.
27. Vibration isolator and flexible connections.
28. Core drilling.
29. Fire seal off all penetrations in floors and walls to the rating of the barrier.
30. Gas fired equipment flue and combustion air piping.
31. Cutting, patching and pipe sleeves.

B. Drawings and Specifications form complimentary requirements; provide work specified and not

shown, and work shown and not specified as though explicitly required by both. Although work is not specifically shown or specified, provide supplementary or miscellaneous items, appurtenances, devices and materials obviously necessary for a sound, secure and complete installation.

C. Give notices, file plans, obtain permits and licenses, pay fees and back charges, and obtain necessary approvals from Authorities Having Jurisdiction as required to perform work in accordance with all legal requirements and with Specifications, Drawings, Addenda and Change Orders, all of which are part of Contract Documents.

D. Before submitting bid, visit and carefully examine site to identify existing conditions and difficulties that will affect work of this Section. No extra payment will be allowed for additional work caused by unfamiliarity with site conditions that are visible or readily construed by experienced observer. Site visit is particularly important because this is renovation work.

E. Before starting work in a particular area of the project, visit site and examine conditions under which work must be performed including preparatory work done under other Sections or Contracts or by Owner. Report conditions that might affect work adversely in writing through Contractor to Architect. Do not proceed with work until defects have been corrected and conditions are satisfactory. Commencement of work shall be construed as complete acceptance of existing and preparatory work.

1.04 RELATED WORK UNDER OTHER SECTIONS

A. The following items are not included in this section and will be performed under other sections.

1. Temporary Facilities.
2. Earthwork: Excavation and backfill.
3. Concrete:
    a. Equipment foundations.
    b. Housekeeping pads.
4. Masonry: All openings in masonry walls.
5. Waterproofing, Dampproofing and Caulking.
6. Roofing and Flashing.
7. Painting: All painting except as specified herein.
8. Finish Carpentry and Millwork.
9. Steel Doors and Frames.
10. Finish Hardware.
11. Electrical.
12. HVAC.
13. Foundation drains.
14. Site drainage.
15. Furnishing of toilet accessories such as toilet paper holders, mirrors and soap dispensers.
16. Utility structures.
17. Exterior grease interceptor.
18. Ice rink and associated equipment and accessories.

19. Kitchen equipment.

1.05 REGULATORY REQUIREMENTS

A. Comply with all applicable Federal and State laws, and all Local Codes, By-laws and Ordinances.

B. Where provisions of the Contract Documents conflict with any Codes, Rules or Regulations, the latter shall govern. Where the Contract requirements are in excess of applicable Codes, Rules or Regulations, the Contract provisions shall govern unless the Architect rules otherwise.

C. Request inspections from Authorities Having Jurisdiction, obtain all permits and pay for all fees and inspection certificates as applicable and/or required. All permits and certificates shall be turned over to the Owner at the completion of the work. Copies of permits shall be given to the Resident Engineer prior to the start of work.

D. Unless otherwise specified or indicated, materials and workmanship and equipment performance shall conform with the latest edition of the following standards, Codes, Specifications, Requirements and Regulations:

1. Local and State Building, Plumbing, Mechanical, Electrical, Fire and Health Department Codes.

2. American Gas Association (AGA).

3. National Fire Protection Association (NFPA).

4. American Insurance Association (AIA), formerly National Board of Fire Underwriters.

5. Occupational Safety and Health Act (OSHA).

6. Factory Mutual Association (FM).

7. Underwriter's Laboratories (UL).

8. Local Water and Sewer Authorities.

9. State Department of Environmental Protection Regulations.

E. All Plumbing work shall meet or exceed any other State and Local Codes and/or Authorities Having Jurisdiction including all other standards indicated herein.

1.06 SUBMITTALS

A. This paragraph shall supplement Division 1.

B. Definitions:

1. Shop Drawings: Information prepared by the Contractor to illustrate portions of the work in more detail than shown in the Contract Documents.

2. Coordination Drawings: Detailed, large-scale layout Shop Drawings showing HVAC, Electrical, Plumbing and Fire Protection work superimposed to identify conflicts and ensure inter-coordination of Mechanical, Electrical, Architectural, Structural and other work.

C. Submittals Procedures and Format:

1. Review submittal packages for compliance with Contract Documents and then submit to Architect for review. Submit transparency and two (2) blue or black-line reproductions of each Shop Drawing larger than 8-1/2" x 11". Submit eight (8) sets of each smaller shop drawing. After review, transparency original of each large Shop Drawing and six (6) sets of each small shop drawing will be returned with reviewer's marks. Electronically submitted shop drawings are acceptable.

2. Each Shop Drawing shall indicate in title block, and each Product Data package shall indicate

on cover sheet, the following information:

a. Title.

b. Name and location of project.

c. Names of Architect, Engineer, Contractor and Subcontractor(s).

d. Names of Manufacturer, Supplier, Vendor, etc.

e. Date of submittal.

f. Whether original submittal or resubmitted.

3. Shop Drawings showing Manufacturer's product data shall contain detailed dimensional Drawings, accurate and complete description of materials of construction, Manufacturer's published performance characteristics and capacity ratings (performance data alone is not acceptable), plumbing requirements and wiring diagrams. Drawings shall clearly indicate location (terminal block or wire number), voltage and function for all field terminations, and other information necessary to demonstrate compliance with all requirements of Contract Documents.

D. Acceptable Manufacturers:

1. The Architect's Plumbing design for each project is based on the single Manufacturer listed in the schedule or shown on the Contract Drawings. In Division 22 00 00 of these Specifications certain "Alternate Manufacturers" are listed as being acceptable. These are acceptable only if, as a minimum, they:

a. Accepted by Architect and Engineer.

b. Meet all performance criteria listed in the schedules and outlined in the Specifications.

c. Have equivalent operating characteristics to those called for in the Specifications.

d. Fit within the available space it was designed for, including space for maintenance and component removal, with no modifications to either the space or the product. Clearances to walls, ceilings and other equipment will be at least equal to those shown on the Contract Documents. The fact that a Manufacturer's name appears as acceptable shall not be taken to mean the Architect has determined that the Manufacturer's products will fit within the available space. This determination is solely the responsibility of the Contractor.

e. For equipment mounted in areas where structural matters are a consideration, the products must have a weight no greater than the product listed in the schedules or Specifications.

f. Products must adhere to all architectural considerations including, but not limited to, being the same size and of the same physical appearance as scheduled or specified products.

E. Substitutions: Substitution of products by Manufacturers other than those listed shall only be done in accordance with subparagraph "F" "Substitutions and Deviations".

F. Substitutions and Deviations:

1. Deviations from the Contract Documents and the substitution of materials or equipment relative to the "Acceptable Manufacturers" referred to above, shall be requested individually in writing whether deviations result from field conditions, standard shop practice, or other cause. Submit letter with transmittal of Shop Drawings which flags the substitution or deviation to the attention of the Architect. The letter shall describe changes in the system shown and physical characteristics (connections to adjacent materials, plumbing services,

service access requirements, and other characteristics), and differences in operating characteristics or cycles.

2. Without letters flagging the substitution or deviation to the Architect, it is possible that the Architect may not notice such substitution or deviation or may not realize its ramifications. Therefore, if such letters are not submitted to the Architect, the Contractor shall hold the Architect and his consultants harmless for any and all adverse consequences resulting from the deviations being implemented. Adverse consequences shall include, but not be limited to, excessive noise, excessive maintenance, shortened longevity, spatial coordination problems, and inadequate performance versus scheduled design. This shall apply regardless of whether the Architect has reviewed or approved Shop Drawings containing the deviation, and will be strictly enforced.

3. Do not request substitute materials or equipment unless identical material or equipment has been operated successfully for at least three (3) consecutive years. Such materials and equipment shall be a regular cataloged item shown in the current catalog of the Manufacturer. When deviation or substitution is permitted, coordinate fully with related changes to Architectural, Structural, Plumbing, Fire Protection, Mechanical, and other work. Ensure that related changes necessary for coordination of substituted items are made within the Contract Price. Assume full responsibility for safety, operation and performance of the altered system.

4. Substitutions of equipment, systems, etc. requiring approval of local Authorities must comply with such regulations and be filed by the Contractor (should filing be necessary).

5. Consideration will not be given to claims that the substituted item meets the performance requirements with lesser construction. Performance, as delineated in schedules and in the Specifications, shall be interpreted as minimum performance.

6. Approval of proposed deviations or substitutions, if any, will be made at discretion of Architect.

7. If equipment is proposed for substitution that is not tested and rated according to industry-wide standards, the Architect shall have the right to have performance tests completed, at the Contractor's expense, to confirm the Manufacturer's performance claims.

G. Submittal Notations: Submittals will be returned from the Architect marked as illustrated below:

□ NO EXCEPTION TAKEN	□ ACCEPTED AS NOTED
□ NOT ACCEPTED	□ REVISE AND RESUBMIT

1. Checking is only for general conformance with the design concept of the project and general compliance with the information given in the Contract Documents. Any action shown is subject to the requirements of the Contract Drawings and Specifications. Contractor is responsible for dimensions which shall be confirmed and correlated at the job site; fabrication process and techniques of construction; coordination of his work with that of all other trades; and the satisfactory performance of his work.

H. Schedule: Incorporated the Shop Drawing review period into the construction schedule so that work is not delayed. Contractor shall assume full responsibility for delays caused by not incorporating the following Shop Drawing review time requirements into his project schedule. Allow at least ten (10) working days, exclusive of transmittal time, for review each time a Shop Drawing is submitted or resubmitted with the exception that fifteen (15) working days, exclusive of transmittal time, are required for the following:

I. Schedule:

1. Copies of all backflow preventer permits.

2. Certification of domestic water system disinfection.
3. Coordination Drawings, if required by this Specification.
4. Adjustment and balancing certification.
5. If more than five (5) Shop Drawings of this trade are received in one (1) calendar week.

J. List of Proposed Equipment and Materials: Within four (4) weeks after Award of Contract and before ordering materials or equipment, submit a complete list of proposed materials and equipment and indicate Manufacturer's names and addresses. No consideration will be given to partial lists submitted out of sequence.

K. Responsibility:

1. The intent of submittal review is to check for capacity, rating, and certain construction features. Contractor shall ensure that work meets requirements of the Contract Documents regarding information that pertains to fabrication processes or means, methods, techniques, sequences and procedures of construction; and for coordination of work of this and other Sections. Work shall comply with submittals marked "REVIEWED" to extent that they agree with the Contract Documents. Submittal review shall not diminish responsibility under this Contract for dimensional coordination, quantities, installation, wiring, supports and access for service, nor the Shop Drawing errors or deviations from requirements of the Contract Documents. The Architect's noting of some errors while overlooking others will not excuse the Contractor for proceeding in error. Contract Documents requirements are not limited, waived, nor superseded in any way by review.
2. Inform Subcontractors, Manufacturers, Suppliers, etc. of scope and limited nature of review process and enforce compliance with the Contract Documents.

L. Material and equipment requiring Shop Drawing Submittals shall include but not be limited to:

1. Plumbing fixtures and trim.
2. Water heaters.
3. Floor drains.
4. Hose bibbs and wall hydrants.
5. Piping.
6. Fittings, unions, flanges and couplings.
7. Insulation.
8. Sleeve packing.
9. Valves
10. Water hammer arresters.
11. Flashing of floor drains.
12. Backflow preventers.
13. Hangers, plates and inserts.
14. Vibration isolation and flexible connections.
15. Pressure reducing station.
16. Receptors for condensate drainage.
17. Fire-rated penetration assembles (ASTM E814, UL 1479).
18. Access panels.

19. Shop Drawings shall be submitted as a single bound package, organized and titled.

1.07 SURVEYS AND MEASUREMENTS

A. Base all required measurements, both horizontal and vertical, on reference points established by the General Contractor and be responsible for the correct laying out of the Plumbing work. In the event of a discrepancy between actual measurements and those indicated, notify the General Contractor in writing. Do not proceed with the work required until written instructions have been issued by the General Contractor.

1.08 COORDINATION

A. HVAC, Plumbing and Electrical Drawings are diagrammatic. They indicate general arrangements of Mechanical and Electrical systems and other work. They do not show all offsets required for coordination nor do they show the exact routings and locations needed to coordinate with Structural and other trades and to meet Architectural requirements.

B. Work shall be performed in cooperation with other trades on the project and so scheduled as to allow speedy and efficient completion of the work.

C. Furnish to other trades advance information on locations and sizes of all frames, boxes, sleeves and openings needed for their work. Furnish information and Shop Drawings necessary to allow trades affected by the work to install their work properly and without delay.

D. In all spaces, prior to installation of visible material and equipment, including access panels, review Architectural Drawings for exact locations and where not definitely indicated, request information from Architect. Where the Plumbing work shall interfere with the work of other trades, assist in coordinating the space conditions to make satisfactory adjustments before installation. Without extra cost to the Owner, make reasonable modifications to the work as required by normal Structural interferences. Pay the General Contractor for additional openings, or relocating and/or enlarging existing openings through concrete floors, walls, beams and roof required for any work which was not properly coordinated. Maintain maximum headroom at all locations. All piping, duct, conduit, and associated components to be as tight to underside of structure as possible.

E. If any Plumbing work has been installed before coordination with other trades so as to cause interference with the work of such trades, all necessary adjustments and corrections shall be made by the plumbing trades involved without extra cost to the Owner.

F. Where conflicts or potential conflicts exist and engineering guidance is desired, submit sketch of proposed resolution to Architect for review and approval.

G. Protect all materials and work of other trades from damage which may be caused by the Plumbing work, and repair all damages without extra cost to the Owner.

1.09 MECHANICAL AND ELECTRICAL COORDINATION

A. Plumbing Subcontractor shall furnish and install various electrical items relating to the plumbing equipment and control apparatus. The Electrical Subcontractor shall be required to connect power wiring to this equipment unless noted otherwise.

B. The Plumbing and Electrical Subcontractors shall coordinate their respective portions of the work, as well as the electrical characteristics of the plumbing equipment.

C. All power wiring and local disconnect switches will be provided by the Electrical Subcontractor for the line voltage power. All control and interlocking wiring shall be the responsibility of the Plumbing Subcontractor.

D. 120V and above power wiring sources extended and connected to heating and ventilating control

panels, transformers and switches shall be the responsibility of the Electrical Subcontractor. All low voltage thermostats, zone valve and any switch wiring shall be the responsibility of the HVAC Subcontractor.

E. Temperature control and equipment wiring shall be installed by the Plumbing Subcontractor.

F. Pipe heat tracing shall be furnished and installed by the Plumbing Subcontractor. Power connections shall be by the Electrical Subcontractor.

G. The Electrical Subcontractor will provide all magnetic starters except those furnished as an integral part of packaged equipment.

1.10 COORDINATION DRAWINGS

A. Coordination Drawings:

1. The Sheetmetal Subcontractor shall prepare a complete set of 3D model electronic Drawings at a scale not less than 3/8" equals 1'-0", showing structure and other information as needed for coordination. He shall show sheetmetal layout thereon. These will be the Coordination Drawings.

2. The main paths of egress and for equipment removal, from main Mechanical, Electrical and Plumbing rooms must be clearly shown on the Coordination Drawings. All fire and smoke partitions must be highlighted on the Coordination Drawings for appropriate coordination.

3. Each of the below specialty trades shall add its work to these background Drawings with appropriate elevations and grid dimensions. Specialty trade information is required for fan rooms and mechanical rooms, horizontal exits from duct shafts, crossovers, and for spaces in and above ceilings where congestion of work may occur such as corridors, and even entire floors. Drawings shall indicate horizontal and vertical dimensions, to avoid interference with structural framing, ceilings, partitions, and other services.

   a. Specialty Trades:

      1) Plumbing System.

      2) HVAC Piping and Associated Control System.

      3) Electrical.

      4) Sheet Metal Work.

4. Each specialty trade shall sign and date each electronic Coordination Drawing. Return Drawings to the Sheetmetal Subcontractor, who shall route them sequentially to all specialty trades.

5. Where conflicts occur with placement of materials of various trades, the Sheetmetal Subcontractor will be responsible to coordinate the available space to accommodate all trades. Any resulting adjustments shall be initialed and dated by the specialty trade. The Sheetmetal Subcontractor shall then final date and sign each Coordination Drawing. If he cannot resolve conflicts, the decision of the General Contractor shall be final, subject to the approval of the Architect.

6. A Subcontractor who fails to promptly review and incorporate his work on the Coordination Drawings shall assume full responsibility of any installation conflicts affecting his work and of any schedule ramifications.

7. The Sheetmetal Subcontractor shall make electronic copies of all Coordination Drawings. Fabrication shall not start until such electronic Drawings are received by the Architect/Engineer and have been reviewed.

8. Review of Coordination Drawings shall not diminish responsibility under this Contract for

final coordination of installation and maintenance clearances of all systems and equipment with Architectural, Structural, Mechanical, Electrical, Plumbing and Fire Protection Contractors.

1.11 INSTALLATION REQUIREMENTS

A. The arrangement of all Plumbing work shown on the Contract Drawings is diagrammatic only and indicates the minimum requirements of the work. Conditions at the building including actual measurements shall determine the details of the installation. All work shall be laid out and installed so as to require the least amount of cutting and patching.

B. Review the Architectural Drawings and Specifications before ordering any material and equipment. Any discrepancies shall be brought to the attention of the Architect for his determination prior to proceeding with the work.

1.12 TYPICAL DETAILS

A. Typical details where shown on the Contract Drawings shall apply to each and every item of the project where such items are applicable. They are not repeated in full on the Contract Drawings, which in many cases are diagrammatic only, but with the intention that such details shall be incorporated in full. Any alternate method proposed for use by the Contractor shall have the prior approval of the Architect.

1.13 SLEEVES, INSERTS

A. Furnish and install all sleeves, inserts, anchor bolts and similar items to be set into masonry or concrete, as required for Plumbing work as indicated in Division 1. Internal diameter of sleeve ball shall be 1/2" larger than the outside diameter of the pipe or insulation covered line passing through it.

1.14 FIRESTOPPING, SMOKEPROOFING & WATERPROOFING

A. All cutting, patching, firestopping and waterproofing shall be performed by the Fire Suppression Subcontractor. Refer to Sections 01 73 29 – CUTTING AND PATCHING, 07 00 01 – WATERPROOFING, DAMPPROOFING & CAULKING, and 07 84 13 PENETRATION FIRESTOPPING for project requirements.

1.15 CORING, DRILLING

A. Core, cut and/or drill all holes in walls and floors required for the installation of sleeves and supports for the Plumbing work as indicated in Division 1.

1.16 ACCESSIBILITY

A. Install all work such that parts requiring periodic inspection, operation, maintenance and repair are readily accessible.

B. Furnish all access panels appropriate to particular conditions, to be installed by trades having responsibility for the construction of actual walls, floors or ceilings at required locations.

1.17 SUPPLEMENTARY SUPPORTING STEEL

A. Provide all supplementary (non-structural) steelwork required for mounting or supporting equipment and materials.

B. Steelwork shall be firmly connected to building construction as required. Locations and methods of attachment shall be approved by the Architect.

C. Steelwork shall be of sufficient strength to allow only minimum deflection in conformity with

Manufacturer's published requirements.

D. All supplementary steelwork shall be installed in a neat and workmanlike manner parallel to floor, wall and ceiling construction: all turns shall be made at forty-five and ninety degrees, and/or as dictated by construction and installation conditions.

E. All manufactured steel parts and fittings shall be galvanized.

1.18 TOOLS AND EQUIPMENT

A. Provide all tools and equipment required for the fabrication and installation of the plumbing equipment at the site.

1.19 PORTABLE AND DETACHABLE PARTS

A. Contractors shall retain in their possession all portable and/or detachable parts and portions of materials, devices, equipment, etc. necessary for the proper operation and maintenance of the Mechanical and Electrical systems until final completion of the work, at which time they shall be handed over to the Owner.

1.20 RECORD DRAWINGS, PROJECT CLOSEOUT

A. As work progresses and for the duration of Contract, maintain a complete and separate set of prints of Contract Drawings at job site at all times. Record work completed and all changes from original Contract Drawings clearly and accurately including work installed as a modification or addition to the original design. Work shall be updated on a weekly basis and shall be made available for review by Architect. Failure to perform this work shall be reason for withholding requisition payments. In addition, take photographs of all concealed equipment in gypsum board ceilings, shafts, and other concealed, inaccessible work. At completion of work, make copies of photographs with written explanation on back. These shall become part of Record Documents.

B. At the completion of work, prepare a complete set of electronic Record Drawings showing all systems as actually installed. The electronic copies will be made available for the Plumbing Contractor's copying, at his expense. The quantity of copies which are made available shall in no way be interpreted as setting a limit to the number of Drawings necessary to show the required information. The Plumbing Contractor's professional Draft Person shall transfer changes to electronic copies. Submit sets of prints to Architect for comments as indicated in Division 1 – 01 77 00 CONTRACT CLOSEOUT.

C. The Architect will not certify the accuracy of the Record Drawings. This is the sole responsibility of the Plumbing Contractor.

D. This trade shall submit the Record Drawings for approval by the Fire and Building Departments in a form acceptable to the departments, when required by the jurisdiction.

E. Record Drawings shall show record condition of details, sections, riser diagrams, control changes and corrections to schedules. Schedules shall show actual Manufacturer, Make and Model numbers of final equipment installation.

1.21 GUARANTEE/WARRANTY

A. Guarantee and 24 Hour Service:

1. Guarantee Work of this Section in writing for not less than one (1) year following the date of acceptance by the Owner. If the equipment is used for temporary power etc, prior to acceptance by the Owner, the bid price shall include an extended period of warranty covering the one (1) year of occupancy, starting from the date of acceptance by the Owner. The guarantee shall repair or replace defective materials, equipment, workmanship and installation that develop within this period, promptly and to the Architect's satisfaction and

correct damage caused in making necessary repairs and replacements under guarantee within Contract Price.

2. In addition to guarantee requirements of Division 1 and of Subparagraph A above, obtain written equipment and material warranties offered in Manufacturer's published data without exclusion or limitation, in Owner's name.
3. Upon receipt of notice from the Owner of failure of any part of the systems or equipment during the warranty period, the affected part or parts shall be replaced by this Contractor without any reimbursement.
4. Replace material and equipment that require excessive service during guarantee period as defined and as directed by Architect.
5. Provide 24 hour service beginning on the date the project is accepted by the Owner, whether or not fully occupied, and lasting until the termination of the guarantee period. Service shall be at no cost to the Owner. Service can be provided by this Contractor or a separate service organization. Choice of service organization shall be subject to Architect and Owner approval. Submit name and a phone number that will be answered on a 24 hour basis each day of the week, for the duration of the service.
6. Submit copies of equipment and material warranties to Architect before final payment.
7. At end of guarantee period, transfer Manufacturer's equipment and material warranties still in force to Owner.
8. This paragraph shall not be interpreted to limit Owner's rights under applicable Codes and Laws and under this Contract.
9. PART 2 paragraphs of this Specification may specify warranty requirements that exceed those of this paragraph. Those paragraphs shall govern.
10. Use of systems provided under this Section for temporary services and facilities shall not constitute Final Acceptance of Work by Owner, and shall not initiate the guarantee period.
11. Provide Manufacturer's Engineering and Technical Staff at site to analyze and rectify problems that develop during guarantee period immediately. If problems cannot be rectified immediately to Owner's satisfaction, advise the Architect in writing, describe efforts to rectify situation, and provide analysis of cause of problem. The Architect and/or Engineer will direct course of action.

1.22 OPERATING, INSTRUCTION AND MAINTENANCE MANUALS

A. Refer to Section 01 77 00 – CONTRACT CLOSEOUT and 01 78 23 – OPERATION AND MAINTENANCE DATA for submittal procedures pertaining to operating and maintenance manuals.

B. Each copy of the approved operating and maintenance manual shall contain copies of the approved Shop Drawings, equipment literature, cuts, bulletins, details, equipment and engineering data sheets and typewritten instructions relative to the care and maintenance for the operation of the equipment, all properly indexed. Each manual shall have the following minimum contents:

1. Table of Contents.
2. Introduction:
    a. Explanation of manual and its purpose and use.
    b. Description of the plumbing systems.
    c. Safety precautions necessary for equipment.

d. Illustrations, schematics and diagrams.

e. Installation drawing.

3. Maintenance:

a. Maintenance and lubricating instructions.

b. Replacement charts.

c. Trouble-shooting charts for equipment components.

d. Testing instructions for each typical component.

e. Two (2) typed sets of instructions for ordering spare parts. Each set shall include name, price, telephone number and address of where they may be obtained.

4. Manufacturer's Literature:

a. The equipment for which Shop Drawings have been submitted and approved.

1.23 QUALITY ASSURANCE

A. The requirements of the State Building Code and Local regulations establish the minimum acceptable quality of workmanship and materials, and all work shall conform thereto unless more stringent requirements are indicated or specified herein.

B. All work shall comply with the latest editions of the Codes as referenced herein.

C. Follow Manufacturer's directions for articles furnished, in addition to directions shown on the Contract Drawings or specified herein.

D. Protect all work, materials, and equipment from damage during process of work. Replace all damaged or defective work, materials and equipment without additional cost to the Owner.

E. All equipment and materials for permanent installation shall be the products of recognized Manufacturers and shall be new.

F. Equipment and materials shall:

1. Where normally subject to Underwriters Laboratory Inc. listing or labeling services, be so listed and labeled.

2. Be without blemish or defect.

3. Not be used for temporary purposes.

4. Be in accordance with the latest applicable ASME standards.

G. Products shall meet with the acceptance of all Authorities Having Jurisdiction over the work. Where such acceptance is contingent upon having the products examined, tested and certified by Underwriters or other recognized testing laboratory, the product shall be so examined, tested and certified.

H. All items of equipment or material of one (1) generic type shall be the product of one (1) Manufacturer throughout.

I. For items which are to be installed but not purchased as part of the Electrical work, the Electrical work shall include:

1. The coordination of their delivery.

2. Their unloading from delivery trucks driven into any point on the property line at grade level.

3. Their safe handling and field storage until the time of permanent placement in the project.

4. The correction of any damage, defacement or corrosion to which they may have been

subjected. Replacement, if necessary, shall be coordinated with the Contractor who originally purchased the item.

5. Field erection and internal wiring as necessary for their proper operation.
6. Mounting in place, including the purchase and installation of all dunnage, supporting members, and fastenings, necessary to adapt them to architectural and structural conditions.
7. Their connection to building wiring including the purchase and installation of all termination junction boxes necessary to adapt and connect them to this wiring. Included also shall be the purchase and installation of any substitute lugs or other wiring terminations as may be necessary to adapt their terminals to the building wiring as called for and to the connection methods set forth in these Specifications.

J. Items which are to be installed but not purchased as part of the Plumbing work shall be carefully examined upon delivery to the project. Claims that any of these items have been received in such condition that their installation will require procedures beyond the reasonable scope of the Plumbing work will be considered only if presented in writing within one (1) week of the date of delivery to the project of the items in question. The Plumbing work includes all procedures, regardless of how extensive, necessary to put into satisfactory operation, all items for which no claims have been submitted as outlined above.

1.24 DELIVERY, STORAGE AND HANDLING

A. All materials for the work of this section shall be delivered, stored and handled so as to preclude damage of any nature. Manufactured materials shall be delivered and stored in their original containers, plainly marked with the products' and manufacturer's name. Materials in broken containers or in packages showing watermarks or other evidence of damage shall not be used and shall be removed from the site.

PART 2 PRODUCTS

2.01 PIPE MATERIALS

A. The table below indicates pipe class for each service. Refer to the following pages for expanded Specifications for the respective class.

PIPE MATERIALS SPEC INDEX

Service	Code	Maximum Operating (psig)	Service Limits (Temperature °F)	Pipe Material
Domestic Cold Water	CW	150 below grade	250	Copper
Domestic Hot Water	HW	150 below grade	250	Copper
Non-Potable Water	NPW	100	250	Copper
Tempered Water	TW	100	250	Copper
Natural Gas	G	50	70	C. Steel
Sanitary Waste & Vent	S	Gravity	120	PVC

B. Each valve type shall be the product of a single Manufacturer. Each system shall be provided with valves as required by Code and shown on the Contract Drawings and shall be installed to facilitate operation, replacement and repair.

C. Provide access panels for concealed valves behind non-removable ceilings or walls.

D. Provide shut-off valves on supply piping to individual pieces of equipment.

E. Provide pipe dope, Teflon tape, wax rings, neoprene gaskets and other jointing compounds as required by best standard practice and only on service as recommended by Manufacturer.

F. Apply putties and jointing compounds for plumbing fixtures and trim as recommended by Manufacturers.

G. Valves on insulated piping system shall be equipped with extended handles to accommodate insulation thickness.

H. Provide one-piece chrome plated escutcheons for all wall, floor and ceiling pipe penetrations in finished rooms and areas.

2.02 COPPER PIPE (FOR CW, HW, TW SYSTEMS)

	1/2" to 3"	4" and Larger
Pipe	Seamless copper water tube, drawn temper, Type L. ASTM B-88. See Note 1.	Seamless copper water tube, drawn temper, Type L. ASTM B-8. See Notes 2 & 5.
Fittings	Wrought copper, solder-joint. ASTM B-16.22.	Ductile iron coupling with copper alkyd enamel paint coating, ASTM A-536. Grade "E" EPDM elastomer gasket. ASTM D-2000. Equal to Victaulic Style 606 coupling. ASTM B-75 copper alloy fittings. ASTM B-584 grooved end cast bronze fittings for 6" pipe size.
Joints	ASTM B-32 solder filled material, Alloy Sb5 "95/5." ASTM B-813 liquid or paste flux. Soldering procedures shall comply with ASTM B-828.	Rolled groove prepared and assembled in accordance with Manufacturer's instructions.
Mechanical Joints	Cast copper alloy unions, hexagonal stock with ball-and-socket joint, solder joint ends. ASME B-6.18.	ANSI Class 150 flange adapter equal to Victaulic Style 641 for connections to flanged equipment. ANSI B-16.1 flange dimensions. Watts G-4000-FDA series.
Valves Gate	Use ball valve.	Use ball valve.
Ball	All bronze, 3 piece, full port, PTFE seats, solder end connections. 600 psig WOG. Apollo 82-200, Milwaukee BA-350, Watts B-6801.	Class 125, cast iron body, epoxy coated. Full port, flanged ends, stainless steel ball and stem. ANSI B16.1 flange dimensions. Watts G-4000 FDA series.

Check	Bronze body and clapper, solder ends, 200 WOG. Jenkins 4093, WOG. Milwaukee 1509, Stockham B-309.	Iron body, bronze mounted, flanged ends, 200 Jenkins 625-C, Milwaukee F-2974-M, Stockham G-931.
Balancing	All bronze, 2 piece, RPTFE seats, solder end connections. 600 psig WOG. Apollo 70-100, Milwaukee BA-150, Watts B-6001. CamLock handle.	Cast iron lug body butterfly valve. Bronze disc, replaceable EPT liner and stainless steel stem, 200 psig CWP.

A. Notes:

1. Below grade water piping 3" and smaller be Type K copper with bituminous coating copper brazed joints, BcuP filler alloy. ANSI/AWS A5.8 procedures shall be per ANSI/AWS B2.2.
2. Below grade water piping 4" and larger shall be ductile iron with AWWA C104 cement lined Class AWWA C151 piping with push-on joints.
3. Contact between dissimilar metals shall be made with dielectric couplings or dielectric flanges. Contact between ferrous and stud bolts and bronze flanges shall be electrically insulated with non-metallic washers.
4. Provide mechanical joint connections to all equipment such as water heaters, pumps, compressors, etc.
5. Copper Pressure-Seal-Joint Fittings for copper piping and valves may be installed in lieu of solder-type fittings.
    a. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include the following: Apollo Press; NIBCO Inc.; Viega.
    b. NPS 2 and Smaller: Wrought-copper fitting with EPDM-rubber O-ring seal in each end.
    c. NPS 3 and NPS 4: Cast-bronze or wrought-copper fitting with EPDM-rubber O-ring seal in each end..

2.03 STEEL PIPE (FOR NATURAL GAS SYSTEMS)

	2" and Smaller	2-1/2" and Larger
Pipe	Schedule 40 carbon steel ASTM A53 Grade B, A106 Grade A or A120.	Schedule 40 Carbon Steel ASTM A-53, Grade B, A106 Grade A or A120.
Fittings	Screwed malleable iron 125 psi.	Butt weld carbon steel Schedule 40, A234.
Unions	Screw 150X malleable iron A105 Grade II.	Use flange.
Flanges	150# raised face, screwed, A105.	150# raised face weld neck A105 ASTM A181. Grade I. 150# flat face for cast iron valve.

Valves, Plugs, Gas Cock	Use ball valve.	Iron body, greaseable and lubricated tapered plug, flanged end, 175 working pressure Nordstrom 143, Serck Audco LSW-133-GG, Walworth.
Solenoid	Honeywell Skinner Value U121XXXXX/423/XXXXX with coils, printed circuit and other parts for intrinsic safe Specifications completely encapsulated within the enclosure using epoxy material. Operated at 24 VDC with an intrinsic safety barrier.	
Ball (Gas)	Bottom loaded pressure stem. Valve rated at 600 psi WOG. Watts B-6000-UL-MASS or equal.	
Emergency Gas Shut-Off	Zurn Accudoor custom valve box with brushed stainless finish. Flush door, glass pane, labeled "Safety Gas Shut-off Valve", T-handle locks. Furnish and install approved ball valve as specified above.	
Check (Gas)	150# Class, bronze swing check valve, aluminum disc, screwed cap and threaded ends. Approved equal to Eclipse, Inc. series 1000.	
Gaskets	1/16" red rubber, wire inserted. 150# raised face and 125 flat-face gasket.	

A. Notes:

1. Provide two wrenches for each gas cock size.
2. The Contractor, at his option, may weld piping down to 1-1/4" if permitted by local Codes.
3. All welders for gas piping must be certified per the requirements of Section 23 00 00.
4. All exterior black steel gas piping shall be painted with two (2) coats of epoxy-based paint. (Coordinate paint color with Architect.)
5. When steel comes in contact with dissimilar material, provide dielectric couplings or dielectric flanges. Contact between ferrous stud bolts and bronze flanges shall be electrically insulated with non-metallic washers. Provide union connections to all pneumatically operated equipment.

2.04 SANITARY WASTE AND VENT

	Above Grade	Below Grade
Piping	Schedule 40 solid core PVC DWV piping conforming to ASTM D2665 & NSF-14, with ends for solvent cemented joints.	Schedule 40 solid core PVC DWV piping conforming to ASTM D2321 & NSF-14, with ends for solvent cemented joints.
Fittings	PVC Socket Fittings: ASTM D 2665, made to ASTM D 3311, drain, waste, and vent patterns.	PVC Socket Fittings: ASTM D 2665, made to ASTM D 3311, drain, waste, and vent patterns.
Joints	Solvent Cement: ASTM D 2564. PVC solvent cement shall have a VOC content of 510 g/L or less when calculated according to 40 CFR 59, Subpart D (EPA Method 24). Primer: ASTM F 656. Primer shall have a VOC content of 550g/L or less when calculated according to 40 CFR 59, Subpart D (EPA Method 24).	Solvent Cement: ASTM D 2564. PVC solvent cement shall have a VOC content of 510 g/L or less when calculated according to 40 CFR 59, Subpart D (EPA Method 24). Primer: ASTM F 656. Primer shall have a VOC content of 550g/L or less when calculated according to 40 CFR 59, Subpart D (EPA Method 24).
Backwater Valve	Cast iron gravity flow type, bronze mounted, hub end. Exterior shall be mastic coated, bolted or extended cover in accordance with installation parameters. J.R. Smith Co. 7012-7022, JOSAM 67500, Zurn Industries Z-1095.	

A. Notes:

1. Copper tube and fittings shall not be used on urinal wastes.
2. Cellular (foam) core PVC piping is not approved for installation and shall not be installed.

2.05 PRESSURE, FLOW AND TEMPERATURE CONTROL DEVICES

A. Thermostatic Mixing Valves:

1. Pre-piped thermostatic mixing valve, inlet check valves, isolation valves, dial thermometer and mounting hardware.
2. Acceptable Manufacturers: Powers, Leonard or Symmons.

B. Pressure Reducing Valves on Water Services:

1. PRV 2-1/2” and 3” size shall be all bronze with separate strainer, inlet pressure up to 300 psi, adjustment range 25-75 psi: Watts N223B-S or equivalent by, Cash-Acme or Wilkens.
2. PRV 2” and smaller shall be pressure regulating, all-bronze construction with separate strainer, thread end, 200 psi inlet pressure, adjustment range 25-75 psi with built in bypass feature: Watts 45B, or equivalent by Cash-Acme or Wilkens.

3. Full flow range pressure reducing valves shall be equal to Watts control valve Model 115.
4. Supply a strainer upstream of all PRV valves.

C. Pressure and Temperature Relief Valves on Water Heaters:

1. Combination pressure and temperature (P&T) relief valves shall be automatic, ASME-rated, AGA and CGA-certified, ANSI standard, bronze body. Pressure relieving setting shall be 150% of the working pressure of the unit to a maximum of 150 psi; temperature relieving setting shall be 120° F. Temperature relieving capacity shall be selected on AGA-CGA rating.
2. Valves shall be by Watts Regulator Co. Approved equivalent valves by Robertshaw or Cash-Acme may be provided.

D. Vacuum Relief Valves on Cold Water Inlet to Water Heaters and Tanks:

1. Relief valves shall be bronze body composition disc with 200 psi working pressure and 250° F temperature rating.
2. Valves shall be by Watts Regulator Co. Approved equivalent valves by Taco or B&G may be provided.

E. Vacuum Breakers:

1. Atmospheric vacuum breakers shall be all-bronze, for temperature up to 210° F: Watts 800 or equivalent by Neptune or Febco.

F. Strainers: Strainers shall be wye strainers, bronze body, stainless steel screens, 400 psi working pressure, threaded end with blow-off valved and piped to drain by strainers shall be Watts 777 series or equivalent by Wilkins or Febco.

2.06 INSULATION

A. Insulation shall be by Owens-Corning, Certain-Teed or Manville.

B. Insulation shall be installed by insulation firm regularly specializing in this work and employing men particularly skilled therein. No covering applied by plumber's "helpers" will be acceptable.

C. Insulation installation shall meet Manufacturer's recommendations. No insulation shall be applied until piping has passed tests as required by Authorities Having Jurisdiction.

D. Insulation, jackets and adhesives shall be flame-retardant and shall have ASTM E-84 fire hazard ratings of 25 flame spread, 50 smoke developed and 50 fuel contributed.

1. Interior Applications – Jackets:

a. Type a – Vapor Barrier Jackets: Kraft reinforced foil vapor barrier with self-sealing adhesive joints. Jacket shall be heavy duty fire retardant material with glass fiber reinforcing and self-sealing lap. Jacket will be factory applied to the insulation. Jacket shall have neat, white Kraft finish or white vinyl suitable for painting, with bead puncture resistance of 50 units minimum. Vapor barrier shall be .001" aluminum foil adhered to the inner surface of the jacket. Permeance shall not exceed 0.02 perms. Jacket shall be Owens-Corning Fiberglass "ASJ-SSL" or Manville FlameSafe "AP-T".

b. Type b – PVC Jackets: One piece, pre-molded type.

E. Insulation and jacketing shall be in accordance with following:

1. Type A: Glass fiber insulation; ANSI/ASTM C547; "k" value of 0.22 – 0.28 at 100° F non-combustible.
2. Type B: Molded, flexible closed cell vinyl, ASTM D635; "k" value of 1.17 bacterial

resistant.

F. Schedule: The following piping systems require insulation:

Piping System	Type	Insulation Thickness Inch (mm)	Jacket Type
Domestic Hot Water Supply Less Than 1-1/2”	A	1”	a, b
Domestic Hot Water Supply 1-1/2” and Larger	A	1-1/2”	a, b
Tempered Domestic Water Supply Less than 1-1/2”	A	1”	a, b
Tempered Domestic Water Supply 1-1/2” and Larger	A	1-1/2”	a, b
Domestic Cold Water	A	1”	a, b
Non-Potable Water	A	1/2”	a, b
Piping Exposed to Freezing (Water)	A	2”	Note 2
Piping Exposed to Freezing (Sanitary)	A	1”	Note 2
Handicap Lav. Hot Water and Waste	B	1/8”	b

1. Notes:

   a. Two (2) layers of 1” with staggered joints. Provide galvanized ½” steel bands, 12” on center, apply 1’ hexagonal mesh over insulation and ½” thick coat of insulating cement troweled smooth. Apply glass cloth jacket and size with one brush coat of lagging adhesive.

   b. The Plumbing Contractor will furnish and install heat trace tape, prior to insulation installation. Raychem self-regulating winter guard plus (8) watts per foot with failure alarm.

   c. Unless noted otherwise, Section “F” pertains to all piping specified system. This note pertains to all piping scheduled above.

G. Insulation of exterior piping and fittings shall be covered with 0.016” thick smooth aluminum jacket with longitudinal zee closures. Jacket shall be secured at both joints with 2” wide aluminum straps centered over butt joint of jacket. Provide ½” wide aluminum bands on 12” centers. Fitting covers shall be manufactured for purpose intended and shall be of same material.

H. Pipe hangers shall be outside insulation and shall incorporate 12”, 26 gauge protection shields. Insulation on piping that passes through walls or partitions shall pass continuously through sleeves, except at firewalls, smoke partitions and floor penetrations where space between sleeves and piping shall be fire stopped with approved packing.

I. Insulate equipment as specified. Refer to following equipment Specifications for additional requirements:

   1. Water heaters.

2.07 PIPE SUPPORTS

A. Provide adjustable clevis hangers for hanger sizes 4” and larger and cast brass split-ring hinged

hangers or band type hangers for smaller. Support piping from building structure to maintain required grade and pitch of pipe lines, prevent vibration, secure piping in place and provide for expansion and contraction. Hangers on all insulated pipe shall be clevis type.

B. Provide vertical brackets and guides for horizontal piping where it is racked along walls. Trapeze hangers may be used where conditions permit. Provide all necessary pipe clips, anchors and sundries for proper alignment and support of piping. Hangers for copper piping shall be coated for dielectric isolation. Hangers for PVC, polypropylene and other plastic piping shall be extended V-shaped, with angle iron pipe supports as necessary.

C. Hangers for gas piping shall be steel hangers with cast rollers or pipe and roller supports.

D. Hanger rods shall have machine threads. Beam clamps, concrete inserts and expansion shields shall be provided as required. No ramset or shot shields will be allowed.

E. Hanger spacing shall meet requirements of State and Local Plumbing Codes. In no case shall horizontal piping be supported at intervals greater than 10’-0”.

F. Piping below basement or lowest level slab (that is, buried piping), need not be supported from structure if slab is not designed as structural slab. The Plumbing Contractor shall support all piping under structural slabs on grade.

G. Pipe supports shall not bear on sleeves.

H. Friction clamps shall be installed at base of plumbing risers and at each floor. Friction clamps shall not be supported from or rest on sleeves.

I. Horizontal piping shall be suspended from building structure by mild steel rod connecting pipe hanger to inserts, beam clamps, angle brackets and lag screws as required by Building Construction in accordance with the following:

Rod Size	Pipe Size
3/8”	1/2" to 2”
1/2"	2-1/2” to 4”
5/8”	5” to 12”
3/4"	15”

J. Hangers on insulated lines shall be sized to fit the outside diameter of pipe insulation. Provide hangers for insulated piping with 12” long, 18 gauge galvanized insulation shields.

K. Piping at equipment and control valves shall be supported to prevent strains or distortions in connected equipment and control valves. Piping at equipment shall be supported to allow for removal of equipment, valves and accessories with a minimum of dismantling and without requiring additional support after these items are removed.

L. Piping installed under this Section shall be independently supported from building structure by means of beam attachments and not from piping, ductwork or conduit of other trades. Supplementary steel, including factory-fabricated channels, required to meet the requirements specified herein, shall be provided by the Plumbing Contractor.

M. Maximum spacing of hangers on runs of steel, copper or brass pipe shall be as follows:

Schedule: Hanger Spacing in Feet/Pipe Material

Pipe Size (Inches)	Steel (Feet)	Copper or Brass (Feet)
1/2 to 1	7	5
1 to 1/4	10	6
1 to 1/2	10	8
2 to 8	10	10

N. Maximum spacing of hangers on no hub cast iron soil pipe shall be 5’ and hangers shall be provided at all changes in direction. Hanger rods to support piping from the structure or supplementary steel shall not exceed 4’ in total length. Where pipe support assemblies exceed 4’ in total length, Plumbing Contractor shall provide factory-fabricated channels and associated accessories.

O. All thermoplastic piping systems shall be hung in strict accordance with Manufacturer’s recommendations.

P. Hangers in areas exposed to weather or in unheated spaces shall be provided with a shop coat of rust inhibited paint. Hanger rods shall be hot dipped galvanized.

Q. Hangers and rods for under slab piping shall be hot dipped galvanized.

2.08 SLEEVES, INSERTS, FIRE STOPPING AND ESCUTCHEONS

A. All pipes passing through floors, walls or partitions shall be provided with sleeves having an internal diameter one inch larger than the outside diameter of pipe. Pipe Sleeve Materials:

1. Sleeves through floors and through exterior, structural and fire-rated construction, shall be hot dipped galvanized Schedule 40 steel pipe. Sleeves shall extend 1” above finished floor.

2. Sleeves through partitions and non-fire-rated construction shall be 26 gauge galvanized steel with lock longitudinal seams or approved plastic pipe.

3. Provide waterproofing membrane locking devices at floors. Provide 150 lb. Slip-on welding flanges at exterior wall penetrations.

4. Provide one-piece chrome plates escutcheons on all wall, floor and ceiling pipe penetrations in finished rooms and areas.

B. Fire stop penetration seals in fire-rated construction shall be products of STI SpecSeal, 3M, Proset Systems Firefill or Dow and shall be installed in accordance with the latest requirements of ASTM E814 (UL 1479). Fire stop penetration sealants for non-metallic and insulated piping shall be intumescent (STI SpecSeal Series 100 Sealant or SpecSeal Collar or approved equal). Provide mineral fiberboard, matting or putty for damming and forming. Finish seals flush to wall surface and fill gaps with silicone adhesive sealant caulking (Dow 96-081 RTV or approved equal). Provide 1” thick ceramic fiberboard on both sides of penetrations in 2 and 3 hour rated walls and floors less than 8” thick.

C. Packing for sleeves that do not require maintenance of fire rating shall be oakum, silicate foam, ceramic fiber or mineral fiber with approved sealant. Pack or foam to within one inch of both wall surfaces. Seal penetration packing with approved caulking and paintable waterproof mastic surface finish or silicone caulking.

D. Waterproof Pipe Penetrations:

1. Sleeves through outside walls shall be provided with pipe to wall penetration closures equal to Link-Seal Thunderline Corporation. Seals shall be mechanical type of interlocking rubber

links shaped to fill space between pipe and sleeve. Links shall be assembled with bolts to form a belt around the pipe with pressure plate under each bold head and nut. After seal assembly is positioned, tightening of bolts will provide watertight seal. This Contractor shall determine the required inside diameter of each individual sleeve before ordering, fabricating or installing. The inside diameter of each sleeve shall be sized as recommended by the Manufacturer to fit the pipe and Link-Seal to assure a watertight joint.

2. Prefabricated modular sleeves shall be Mason Industries (SWS) or approved equal stiffened galvanized steel sleeves with preformed closed-cell elastomeric seal (non-fire rated) or preformed mineral fiber or silicone foam seal (fire rated).

3. Provide waterproof 1" single ring set in silicone and bolted to floor or wall at chipped and drilled penetrations of existing slabs on grade and existing walls below grade.

E. Inserts shall be individual or strip type or pressed steel construction with accommodation for removable nuts and threaded rods up to 3/4" diameter, permitting lateral adjustment. Individual inserts shall have an opening at the top to allow reinforcing rods up to 1/2" diameter to be passed through the insert body. Strip inserts shall have attached rods with hooked ends to allow fastening to reinforcing rods.

F. Unless otherwise specified herein, escutcheons shall be cast brass chrome plated type and provided with a set screw to properly hold escutcheon in place.

2.09 CLEANOUTS, TRAPS AND STRAINERS

A. Provide cleanouts in soil, waste and storm drainage piping on straight runs at changes in directions and at foot of stacks and other points where required by inspecting Authorities. Cleanouts shall suit construction in which they are to be installed.

B. Maximum horizontal distance on straight runs between cleanouts shall be 50 feet.

C. Cleanouts shall be same size as pipe 4" and smaller. Cleanouts for piping larger than 4" shall be sized per local Code and in no circumstance shall they be less than 4" in diameter. No reduction in cleanout sizes for pipe 4" and smaller is permitted.

D. Traps not integral with fixtures and in accessible locations shall have brass trap screw protected by water seal and will be regarded as cleanout.

E. Bodies of cleanout ferrules in bell and spigot piping shall be standard pipe sizes conforming in thickness to that required for pipe and fittings and shall extend not less than 3/4" above hub of pipe.

1. Cleanout plug shall be cast brass with raised nut 3/4" high.

2. Cleanouts in copper waste piping shall be soldered brass cleanout fittings with extra heavy brass screw plugs of same size as line.

3. Cleanouts in threaded waste piping shall be cast iron, drainage T pattern, 90 branch fitting with extra heavy brass screw plugs of same size as pipe.

4. Floor cleanouts in finished areas shall be per schedules equivalent to J.R. Smith, Wade or Zurn.

5. Floor cleanouts in unfinished areas shall be per schedules equivalent to J.R. Smith, Wade or Zurn.

F. Provide test tees with cleanout plugs at foot vertical soil, waste, acid waste and roof conductor lines and at each floor. Cleanouts on vertical lines concealed behind finished walls shall extend to back of finish wall; provide wall plate. Obtain Architect's approval for wall plate locations and reroute piping if necessary.

G. Cleanouts shall open in direction of flow of drainage line served or at right angles thereto.

H. Keep cleanout plugs clean and unimpeded. Prevent covering with cement, plaster or other permanent finished materials.

I. All cleanouts shall be installed flush to wall and/or floor. Cut and patch walls and/or floor as required for proper installation.

2.10 THERMOMETERS AND PRESSURE GAUGES

A. Provide bronze Bourdon tube pressure gauges where shown on Contract Drawings and where specified, by U.S. Gauge, Trerice or Weksler, accurate to +1%.

1. Gauges shall have white faces with black-filled engraved lettering. Gauge bodies shall be set in phenolic cases. Provide pulsation dampers and gauge cocks to isolate each gauge.

2. Gauges shall be easily accessible and easily read. Gauges readable from floor at less than 5 feet shall be 4-1/2” dials. Other gauges shall have 6” dials. Gauges graduations shall meet limit requirements of normal operation. Gauges shall indicate at mid-scale.

3. Provide pressure gauges at the inlet and outlet of each pump.

4. Provide pressure gauges at each water entrance, downstream of the water meter and on each side of PRV stations.

B. Provide separable well V-case thermometers by U.S. Gauge, Trerice or Weksler where shown on Contract Drawings and where specified. Thermometers shall have 9” scale and white face with black-filled engraved letters. Thermometers shall be angular or straight stemmed, as conditions necessitate. Thermometer wells shall be bronze and shall be installed so as to ensure minimum restriction of water flow in pipe and shall be installed to be able to be viewed from the floor.

1. Provide thermometer at the inlet and outlet of each water heater and where shown on Contract Drawings. Thermometers shall have scale range of 30°-240° F with 2° scale division.

2. Provide thermometer in hot water return system at each hot water recirculation pump and where shown on Contract Drawings. Scale range shall be 30°-240° F with 2° scale division.

2.11 WALL HYDRANTS AND HOSE BIBBS

A. Provide wall hydrants as shown on the Contract Drawings. Provide hose bibbs in every toilet core where more than one (1) flushing fixture is shown.

B. Wall hydrant shall be recessed box anti-siphon, non-freeze, key-operated, 3/4". Hydrant shall be J.R. Smith or equivalent by Josam or Zurn. Coordinate cover and plate finish with Architect prior to ordering any units.

C. Hose bibb shall be chrome plated bronze or brass with replaceable hexagonal disc, hose thread spout and integral vacuum breaker in conformance to ANSI/ASSE 1011. Hose bibb shall be equal to Chicago No. 952 or equivalent, T&S Brass or WaterSaver.

2.12 WATER HAMMER ARRESTERS

A. Provide water hammer arresters at fixtures with automatic solenoid or cylinder operated valves, automatic flush valves quick-closing valves or solenoid valves and where indicated on Contract Drawings.

B. Fixtures and equipment in battery installation may use single water hammer arrester properly sized for connected load.

C. Provide proper access to water hammer arresters in chases, utilizing a minimum 12” x 12” access

panel furnished by this Contractor.

D. Water hammer arresters shall be installed in accordance with Manufacturer's recommendations and not less than one (1) installed per core piping hot system and core piping cold system. Arresters shall be equal to J.R. Smith, Zurn or PPP.

2.13 PLUMBING FIXTURES AND TRIM

A. Refer to Architectural and Plumbing Drawings for quantities, locations and mounting heights of fixtures provided under this Section.

1. Refer to fixture schedules on P0.1

B. Fixture trim, traps, faucets, escutcheons and waste pipes exposed to view in finished spaces shall be I.P.S. brass with polished chromium plating (CP) over nickel finish.

C. Vitreous china fixtures shall be regular selection fused and vitrified to produce homogeneous material with close grain without pores. Surfaces that contact walls, floors and other fixtures shall be set true.

D. Enameled surfaces on cast iron fixtures shall be of suitable thickness to provide the highest commercial grade. Exterior exposed surfaces not enameled shall be treated at factory with one (1) coat of filler.

E. Affix Manufacturer's guarantee label or trademark to fixture to indicate first quality. Acid-resisting enamel fixture shall bear Manufacturer's symbol signifying resistance to acid.

F. Set fixtures with wall outlet flanges at proper distance from floors and walls with closet setting compound or gasket.

G. Catalog designations and Manufacturer's names of vitreous china and enameled cast iron fixtures are specified to establish standards of quality for performance and materials. Equivalent fixtures by Toto, American Standard or Eljer may be submitted for consideration.

H. Vitreous china and enameled cast-iron fixtures shall be white throughout, unless specified otherwise. Closet seats shall match closet fixture color.

I. Fixture Types: As listed on Contract Drawings.

1. Notes:

a. Standards:

1) Floor Drains:

a) Cast Iron – ASME A112.21.1M

b) Plastic – ASTM A112.21.M

c) Cast Iron Trench Drains – ASME A112.21.1M

2) Cleanouts: Cast Iron – ASME A112.36.2M

3) Sleeve Systems: UL 1479

2.14 EQUIPMENT – GENERAL

A. The following mechanical equipment is to be supplied by a single Manufacturer as part of this package unless otherwise noted.

1. Refer to equipment schedules on P0.1

B. Equipment Tags:

1. All equipment shall be tagged using black phenol background with a 1/4" white engraved

lettering tag affixed to the piece. Tag shall be minimum of 2" high and 4" long for large equipment and shall include the tag number and the piece.

2. Equipment Tag Sequence (Example):
    a. G-CMP – 1XXX where:
    b. G – Indicates system (Natural Gas)
    c. CMP – Indicates equipment (Booster Pump)
    d. 1 – Indicates piece number (1, 2, 3…)
    e. XXX – Indicates building number (if applicable)

C. All equipment furnished in the following pages shall be furnished with seismic anchoring points. Equipment supplied shall be constructed with a seismic rating.

D. Each piece of gas fired equipment shall be direct vent, installed and vented as shown on the Contract Drawings and as specified below:

1. Listed Special Gas Vents: As products under this Section shall conform to the requirements of National Fuel Gas Code, ANSI Z223.1/NFPA-54 where applicable and shall comply with and be listed to UL 1738, the U.S. Standard for Venting Systems for Gas – Burning Appliances, Category II, III and IV and ULC-S636-95, the Canadian Standard for Type BH gas vent systems. Components coming in direct contact with products of combustion shall carry the appropriate UL or ULC. PVC, CPVC, PPS Polypropylene shall be ULC-S636 Certified for use as a flue gas vent system.
2. Approved Vent: Dura Vent Polypro.
3. Combustion-Air Intake: The air inlet pipe may be PVC, CPVC or ABS, as approved by Code and Manufacturer. The air inlet must terminate on the same sidewall or roof area with the Manufacturer's specified air inlet cap.

2.15 WATER HEATERS

A. Provide water heaters of sizes and types indicated on the schedule sheets. Heaters shall be tested at 200 psi and rated for working pressure of 150 psi and shall bare stamp certifying testing and rating. Tanks with capacity greater than 120 gallons or input rating greater than 200,000 Btu/hr. shall meet ASME Boiler and Pressure and Vessel Code requirements.

B. Provide pressure and temperature relief valve and vacuum relief valve.

1. Pressure and temperature relief valves shall be at least 3/4" and shall be rated and listed for heater input rating and as required by ANSI and ASME Standards. Temperature relief valves shall be installed within top 6" of tank.
2. Vacuum relief valves shall meet ANSI standards requirements and shall be rated and listed for heater input rating and as required by ANSI and ASME Standards. Temperature relief valves shall be installed within top 6" of tank.

C. Storage type heaters shall have minimum standby heat loss in accordance with requirements of State Energy Code. Tank and heaters which are not factory insulated and jacketed shall be field insulated.

D. Field insulation of tanks and heaters shall consist of minimum of 2" fiberglass insulation. Refer to insulation paragraph for additional requirements.

1. Insulation shall be cut or mitered where necessary to fit shape and contour of equipment. Insulation shall be banded or wired in place on 12" centers or impaled over pins on 18" centers. Point up open joints with insulating cement.

2. Apply 1” hexagonal mesh over insulation, lacing edges together. Apply 1/2" thick coat of insulating cement and trowel to smooth finish. Adhere glass cloth jacket over cement with approved lagging adhesive. Size jacket with one brush coat of lagging adhesive.

E. Heaters and tanks shall be of size and type as scheduled on Contract Drawings.

F. Furnish and install a condensate neutralizing box complete with limestone granules shipped loose for field installation, as required. A condensate trap assembly shall be furnished if a condensate collection tray is not provided by the water heater manufacturer. The trap allows condensate to drain from sump while retaining flue gases in the boiler. The trap has factory installed overflow switch, which shuts down the water heater in the event the drain line becomes obstructed, preventing proper condensate removal.

2.16 MISCELLANEOUS EQUIPMENT

A. Provide roughing and final connections for water, waste vent and gas systems, including traps, tailpiece and strainers, wheel handle stops, valves, cocks and appurtenances to fixtures and equipment requiring same. Each fixture and piece of equipment, including work in, under or through tables, cabinets and equipment chases, shall be valved and trapped.

B. Provide miscellaneous equipment connections and indirect drains from service units and similar equipment. Unions shall be installed at equipment and at other such places as may be necessary to disconnect piping so as to make repairs.

C. Roughing shall not be undertaken until Architect has approved equipment and fixture Shop Drawings, and template is furnished by pertinent Manufacturer so that connecting requirements may be verified and work installed in neat and workmanlike manner. Exact location of service connections shall be obtained prior to roughing.

D. Shock absorbers shall be installed in conjunction with quick closing valves including dishwasher and booster heater. Shut-off valve shall be installed beneath each absorber. Absorber shall be sized in accordance with Plumbing and Draining Institute Standard PDI-WH 201.

E. Provide 1/2" stop valves on all fixtures and equipment supplies.

F. Vacuum breakers shall be installed in conjunction with water lines where required to prevent back-siphonage.

PART 3 EXECUTION

3.01 COORDINATION

A. Cooperate and coordinate with work of other Sections in executing work of this Section.

3.02 EXPANSION PROVISIONS

A. Allow for expansion with offsets, loops, swing joints, expansion joints and other means, where necessary to protect piping systems as shown. Take-offs from mains to run outs shall not have less than a three (3) elbow swing.

B. Anchor mains and risers with loops or offsets to structure to impart expansion toward loops and offsets. Anchors shall be forged wrought iron, secured to pipe and structure. Provide vibration isolation as required and as specified.

C. Provide pipe alignment guides to guide expanding pipe to move freely from anchor points towards expansion joints, offsets and other expansion provisions.

3.03 VIBRATION ISOLATORS

A. Refer to Vibration Isolation (Seismic) and (Non-Seismic) sections in Specification Section 23 00 00. Adhere to all sections of said specification in addition to items B – E of this section.

B. Provide appropriate isolation bass, pads and vibration hangers for equipment. Vibration eliminators shall be selected for uniform static deflection according to distribution of weight and strong enough to ensure that springs will not compress totally under weight of equipment. Where rotational speed is disturbing frequency, use lowest rotational speed in system to size isolators, hangers and other isolating equipment.

C. Isolate units over 3 hp with steel springs on layer of ribbed neoprene. Spring static deflection shall be 1-1/2". Isolate units less than 3 hp with rubber-in-shear mounts with 1" static deflection or with ribbed neoprene or cork neoprene isolation pads over entire foot print.

D. Selection of correct isolators for each application shall be made by Manufacturer subject to Architect's approval. Installation of bases shall be done under direct supervision of Manufacturer's Representative.

E. Provide braided metal hose connections between piping and vibration eliminator-mounted equipment. Metal hose shall be same material as pipe or as required for proper operation. Flexible connections shall be insulated when connecting pipe is insulated.

3.04 PIPE IDENTIFICATION

A. Provide color-coded pipe identification markers on piping installed under this section. Pipe markers shall be snap-on laminated plastic protected by clean acrylic coating. Pipe markers shall be applied after Architectural painting where such is required.

B. Provide arrow marker with each pipe content marker to indicate direction of flow. If flow can be in either direction, use double-headed arrow marker.

C. Main shall be labeled at points of entrance and exit from mechanical room, adjacent to each valve, on each riser, at each tee fitting, at points of entrance and exit from building, at least once in each room and at intervals no longer than 20'.

D. In general, 2" high legend shall be used for pipe lines 4" in diameter and larger, and 3/4" high legend shall be used for pipe lines 3" in diameter and smaller.

E. Markers shall be Seton, MIS or approved equivalent.

F. Color banding shall meet ANSI latest and OSHA requirements.

G. Markers shall have legends and color coding with black letters:

1. Markers are to be applied to all piping, regardless of under jacket colors per the following schedule:

Service	Legend	Background Color
Cold Water	Cold Water	Green
Hot Water	Domestic Hot Water	Yellow
Non-Potable Water	Non-potable	Yellow
Exhaust Gas	Exhaust Gas	Yellow
Sanitary	Sanitary Sewer	Green
Vent	Vent	Yellow
Fuel Gas	Fuel Gas	Yellow

H. In Mechanical Rooms, Storage Rooms, Janitor's Closets and other areas without hung ceilings, colored PVC jackets shall be used per the schedule.

1. All insulated piping exposed in mechanical rooms shall be covered with a Ceel-Co plastic jacket. Color pattern and system identification legend shall be as in the schedule.
2. This plastic jacket shall include fitting covers and piping covers.
3. Piping to be covered with this plastic jacket shall be insulated and finished as herein specified and then the plastic jacket shall be applied.

3.05 TAGS, VALVES, EQUIPMENT AND INSTRUMENTS

A. Upon completion of work, attach engraved laminated plastic tags to all valves and instrumentation. Equipment shall bear a stamped stainless tag. Tags shall have black characters on white face, consecutively numbered and prefixed with letter "P" for general valves. Tags shall bear the number used in the P&IDs for those items so marked.

B. Embossed or engraved aluminum or brass tags may be substituted if desired. Tags shall be at least 1/8" thick.

C. Tags shall be at least 1" diameter with numerals at least 3/8" high and attached by "S" hooks and chains.

D. Nameplates, catalog numbers and rating identifications shall be securely attached to electrical and mechanical equipment with screws or rivets. Adhesives or cements will not be permitted.

E. Non-potable water outlets shall be identified with permanently attached yellow color-code or 4" high triangle tag reading "Water Unsafe".

F. Coordinate numbering system with existing piping tags as not to duplicate numbers.

3.06 FLASHING AND COUNTER FLASHING

A. Floor drains shall be flashed watertight with 20 ounce sheet copper flashing which shall extend 8" beyond drain flashing flange.

B. Provide counter flashing for roof penetrations required under this Section including vents and roof drains.

C. Flashing of vents, roof drains and other penetrations of roof required under this Section shall be done under other Sections.

3.07 JOINTS AND CONNECTIONS

A. Joints and connections shall be permanent and shall be gas and water-tight. Jointing shall be types specified for serviced indicated. Joints and connections shall meet requirements of Manufacturer's best recommended practice. All transitions between different piping materials shall be made using approved adapters. Adapters for transitions between two (2) types of piping materials shall be manufactured for purpose intended.

3.08 INTERIOR WATER SUPPLY SYSTEM

A. Provide a complete, new (domestic and/or protected) hot and cold water piping system as indicated on Contract Drawings and as specified, including supplies to fixtures and indicated equipment. Piping shall be pitched at least 1" in 40 feet so that it can be drained completely at low points with drain valves. Piping shall be pitched up toward fixtures for proper air relief. Provide automatic air vents with outlet piped to floor and gate valve ahead of air vents, where offsets cannot be vented by means of fixture connections.

1. Pipe used in piping assembly shall be clean and shall have ends square and reamed before

putting into fittings.

2. Cut tube to required length with hacksaw or tube cutter designed for copper work.
3. Remove burrs from inside and outside of cut edge and clean end of tube with steel wool or sand cloth until discoloration is removed and metal is smooth and bright.
4. Oxides shall be removed by sand cloth and brush.
5. Removal of oxides or discoloration of pipe and fittings by acids or self-cleaning flux is forbidden.
6. Apply a thin, uniform and complete coating of reliable brand of soldering flux (Nokorode or Crest) to cleaned surfaces of tube and fittings.
7. When joints are soldered, remove excess solder with a cloth or brush leaving a fillet of solder in chamber at end of the fitting.
8. Where quick closing valves such as solenoid or flush valves are being used, piping shall be protected from water hammer by shock absorbers. Shock absorbers shall be installed at all batteries of fixtures that are operated by flush valves. Shock absorbers shall be as manufactured by PPP, J.R. Smith, or Zurn, and shall conform to the Plumbing and Drainage Institute (PDI) published requirements.
9. Connections to tanks and equipment shall be made with unions.
10. Water services supplying the building shall flow through in-line strainers and shall have containment backflow protection as indicated.
11. Shut-off and control valves on main distribution and branch lines shall be located for easy access and operation. Branch piping shall be valved with access panels provided as required at locations shown on Contract Drawings and determined in field.
12. Specialty piping and fittings (copper pressure-seal-joint fittings, etc.) shall be installed in strict accordance with manufacturer's installation guidelines, requirements and recommendations. Join tubing and fittings with tools recommended by fitting manufacturer.

3.09 INTERIOR SANITARY WASTE, DRAINAGE AND VENT PIPING

A. Provide waste, drainage and vent lines shown in building as shown on Contract Drawings. Vents shall extend through roof and shall increase to at least 4”. Piping shall be assembled and installed without undue strains and stresses and provision shall be made for expansion, contraction and structural settlement.

B. Interior horizontal sanitary waste drainage piping shall be installed in practical alignment at uniform grade of at least 1/8” per foot, but 1/4" per foot where Code dictates and as shown on Contract Drawings.

C. Vents from fixtures or line of fixtures, when connected to vent line serving other fixtures, shall be extended at least 6” above flood level rim of highest of fixtures to prevent use of vent line as waste. No vent terminal shall be directly beneath door, window or other ventilating opening of building, nor shall any vent be within 12 feet horizontally of such opening.

D. Provide sleeves for pipe that pass through walls.

E. Provide 3” air gap on equipment and drains that discharge to floor drains.

F. Provide an air gap in which the vertical distance through the free atmosphere between the waste pipe and the floor rim of the receptacle into which it is discharging is a minimum of 2 pipe diameters greater.

G. Piping shall be run straight and plumb and offsets shall be made at an angle of not less than 45.

H. Carefully lay out work in advance so pipes pass through openings and permit proper pitch to stacks. Due to extensive ventilation and lighting systems all trades shall coordinate work with work of other trades.

I. Aboveground PVC piping shall be installed according to ASTM D2665. Underground PVC piping shall be installed according to ASTM D2321.

J. For PVC piping, solvent cement joints shall be used for joints. All surfaces shall be cleaned and dry prior to applying the primer and solvent cement. Installation practices shall comply with ASTM F402. The joint shall conform to ASTM D2855 and ASTM D2665 appendixes.

K. Cleanouts:

1. Provide cleanouts with brass caps and screws same size as pipe up to 4 inches and not less than 4 inches for larger piping at the ends of all branches on soil and waste piping and in such other portions of the piping where run is over 50 feet. Locate floor cleanouts as indicated on Contract Drawings.

2. All cleanouts shall be installed flush to wall and/or floor. Cut and patch walls and floor as required for proper installation.

3.10 WATER ENTRANCE

A. Run exterior water service piping for domestic water, beginning 5’-0” outside building wall, as shown on Contract Drawings.

B. When water pipe laying is not in progress, close ends of pipe with watertight plugs. If water enters pipe, flush and clean line.

C. Keep excavation for underground water main open until system has been tested, inspected and approved.

D. Piping shall be bedded as specified in Division 2.

3.11 EXTERIOR SANITARY SEWER

A. Sanitary line ending 5’-0” outside exterior building wall shall run by gravity as shown on Contract Drawings.

B. Check line and grade of piping with laser designed for purpose intended.

C. Plug open ends of piping when work is not in progress.

D. Piping shall be bedded as specified in Division 33.

3.12 WATER METER

A. Provide compound water meters that meet AWWA C701-70 requirements for cold water meters and the Municipal Water Authority.

B. Registers shall be straight reading, hermetically sealed calibrated in cubic feet and shall meet Section 9.3 of AWWA standard requirements. Provide center swept test hands.

C. Meter shall register at least 98% and no more than 102% of water actually passing through meter at any rate of flow, within range of 15 gpm to 800 gpm.

D. Main casing shall be bronze. Bolts shall be stainless steel.

E. Meter shall permit easy removal of interior parts without disturbing meter connections to pipeline.

F. Provide magnetic couplings to transmit motion from measuring chamber to register unit.

G. Provide remote register. Remote register plug/jack to conform to and be compatible with

Owner's standard building automated system.

H. Measuring chamber shall be removable from main line case for repair and re-calibration.

I. Meter shall be by Rockwell, Hersey or Neptune Products, and shall be approved by local Water Authority.

3.13 FIXTURE ROUGHINGS

A. Install rough plumbing including fixture carriers and supports, valves and water hammer arresters within chase tolerances. Supply roughing through finish walls and at hose bibbs and shower heads shall be secure and free of movement. Locate valves and water hammer arresters within 12 inches of approved access panel location.

B. Align exposed waste and supply pipe roughings with fixture connections within 1 inch tolerance. Provide flush valves in alignment with the fixture, without vertical or horizontal offsets. Obtain Fixture Manufacturer roughing data sheets for recommended roughing dimensions.

C. Provide fixture templates for Casework Contractor for counter mounted sinks and lavatories.

1. Rough handicapped use water closets to locate the flush valve handle on the wide side of the toilet stall.

D. Secure fixture supports to floor slab construction with lag bolts and metal expansion shields to support at least 250 pounds on the front rim of the fixture for 5 minutes.

E. Mounting heights shall be in accordance with all local and State Codes and latest ADA Standards.

F. Provide fixture rough-in piping connections, sizes in accordance with schedule on Contract Drawings.

3.14 EQUIPMENT ROUGHINGS AND CONNECTIONS

A. Provide roughing and final connections for water, waste, air and gas systems including indirect wastes, traps, tailpieces, stops and supplies, valves and unions for all equipment and fixtures including those supplied under other sections.

B. Provide complete plumbing roughings with capped and valved service with union of flange to suit Owner furnished equipment.

C. Refer to Architectural floor plans and Equipment schedules for all equipment provided under other sections or by Owner. Roughing for all equipment including floor drain locations shall be based on approved Shop Drawings. Install indirect waste discharge to spill into floor drain funnel. Floor drain grate and sediment bucket shall be removable.

3.15 INSTALLATION OF SPECIALTY ITEMS

A. Install vacuum relief valves located above the top of the heater on cold water supply lines to water heaters.

B. Gauges: Install gauges where indicated on the Contract Drawings and as specified. Install pressure gauges at water service entrance on inlet and outlet sides of strainers, filters, backflow preventers and pumps. Install temperature gauges on inlet and outlet side of water heaters and on recirculation line at least 10 feet upstream of circulation pumps. Gauges shall be legible from 4 feet to 6 feet above the floor.

C. Install trap seal gaskets at all floor, trench and hub drains. Gaskets shall be installed per all Code and manufacturer's installation requirements.

D. Water Hammer Arresters: Provide water hammer protection at all self-closing fixtures and equipment. Equip quick-closing valves such as flush valves and solenoids with water hammer arresters. Banks of plumbing fixtures may be protected with a single properly sized and located

PDI certified arrester. Obtain approval for access panel location prior to installation.

3.16 INSTALLATION OF FIXTURES

A. Mount fixtures level at the elevations shown on Architectural Drawings. Refer to toilet room elevations and casework details.

B. Install handicapped use fixtures in accordance with the requirements to the Architectural Access Board Code, latest ADA standards and ANSI A117.1. Insulate hot water supply and waste piping under lavatories.

1. Where urinals are provided, install one urinal with the rim mounted 17 inches above the finish floor in compliance with the Handicapped Code.

C. Grout walls and floor mounted fixtures watertight where the fixtures are in contact with walls and floors.

D. Caulk deck-mounted trim at the time of assembly, including fixture and casework mounted. Caulk self-rimming sinks installed in casework.

3.17 GAS SERVICE, METER, VENTS AND PIPING

A. Gas meter and piping to meter/regulator from gas main, will be provided by Gas Company. Pay charges associated with Gas Company installation. Gas piping provided under this Section shall begin at building side of gas meter/regulator.

B. Piping shall be done by licensed gas fitter (as required by Code).

C. Gas piping shall pitch to drain and shall have drip pockets at least 6” long with removable caps at low points. Branch connections shall be taken from top or side of horizontal running main. Provide gas cock or valve on connections to fixtures or equipment.

D. Provide union connection between shut-off cock and equipment to permit disconnection of equipment.

E. Provide pressure reducing valve between meter and building piping, as required by Gas Company, piped and vented to outside of building.

F. Provide individual vents from regulators, pressure switches and reliefs on factory packaged equipment gas trains at all equipment located on this system. It is this Contractor’s responsibility to extend all vents to atmosphere terminal at a safe location in conjunction with the Fuel Gas Code.

G. Gas piping and safety devices shall meet requirements of NFPA No. 54 and shall be subject to inspection and approval of State Gas Regulatory Board.

1. Special Note: Provide aluminum check valves on all gas pipes that enter rooms where compressed air is installed or when both compressed air and gas piping connect to the same piece of equipment. This is required in all areas where gas and air are present.

H. Provide a gas cock valve at each branch run out from main or riser serving gas outlets.

I. Piping shall be securely fastened, separately hung, and shall not support any other weight or piping. Piping dropped in concrete block walls shall be factory wrapped for corrosion protection.

J. Gas valves or cocks shall not be concealed and shall be readily accessible for inspection and repair.

K. Welded piping shall conform to the latest requirements of the (Rhode Island) Fuel Gas Code.

3.18 CROSS CONNECTION PROTECTION

A. All potable water piping outlets and connections to equipment or machinery shall be protected

against backflow by means of an air-gap or approved backflow preventer.

B. Backflow preventer type, application and installation shall comply with the local Water Authority and Rhode Island Department of Environmental Protection (DEP) Drinking Water Regulations.

C. Mount backflow preventers horizontally, unless device is approved for vertical installation, at heights and with clearances as required by local Water Authority and DEP regulations.

1. Reduced pressure backflow preventers shall be installed between 36” to 48” above the floor with a minimum of 6” clear space all around.

2. Double check valve assemblies shall be installed such that the top of the device is between 30” and 53” above the finished floor, with 12” clear space all around.

D. Submit plans to local Water Authority and DEP and obtain permit for each reduced pressure or double check valve backflow preventer installation and submit copies of Permit to Architect of Record.

E. Provide indirect waste piping with funnel to receive discharge from reduced pressure backflow preventer atmospheric vents and spill through air gap into floor drain.

3.19 CLEANING

A. Clean systems thoroughly before testing. Fixtures, equipment, pipe, valves and fittings shall be free of grease, metal cuttings, dirt and other foreign material. Remove protective covers. Fixtures (including lavatories, water closets and urinals) shall be cleaned and ready for use.

B. Repair stoppage, discoloration and damage to parts of building, finish and furnishings due to failure to properly clean piping system within Contract Price.

C. After completion of project, clean the exterior surface of equipment included in this section, including concrete residue.

D. After the completion of the work, all materials and equipment surfaces shall be thoroughly cleaned and polished in accordance with the finish of the material. All chromed surfaces shall be highly polished.

E. Before the systems are tested and balanced, pipes and equipment shall be thoroughly cleaned so that no dirt, dust, or other foreign matter will be deposited in or carried through the systems.

F. Water systems shall be thoroughly flushed and cleansed of any and all deleterious materials at least once before system is placed in operation. At this time, these systems will be carefully checked for leaking and defects as hereinafter specified. An approved cleansing agent will be used in flushing.

G. At all times, keep the premises clear of undue accumulation of rubbish.

H. On completion of the work, remove all rubbish and debris resulting from this Contract and dispose of same. At any time should the General Contractor be dissatisfied with the performance of clean-up responsibilities, he may elect, after proper notification, to undertake this operation and back charge this Subcontractor accordingly.

I. All equipment shall be thoroughly cleaned and left in a satisfactory condition for proper operation at project completion.

J. Before placing orders for pre-cleaned pipe, fittings, valves, etc., the Contractor shall submit the Manufacturer’s Cleaning Specifications to the Engineer for approval.

K. The supplying of pre-cleaned materials or the Engineer’s approval of the Manufacturer’s Cleaning Specifications, does not relieve the Contractor of the responsibility for meeting the requirements for cleanliness outline in this specification.

3.20 DISINFECTION OF WATER SYSTEMS - INTERIOR AND EXTERIOR

A. Water piping systems shall be thoroughly disinfected with a solution containing no less than 50 parts per million of available chlorine. Chlorinating materials shall be either liquid chlorine or sodium hypochlorite solution, and shall be introduced into the system and drawn to all points in the system. Disinfection solution shall be allowed to remain in system for 24 hours. During this time, valves and faucets shall be opened and closed several times. After disinfection, solution shall be flushed from the system with clear water until residual chlorine content is no greater than 0.2 parts per million.

1. Notify all parties 48 hours prior to cleaning system.
2. Bypass all building filters.
3. Perform chlorination prior to heating the domestic hot water system.
4. Provide advance notice to all trades prior to procedure. Post warning signs throughout the job site.
5. Collect samples randomly and at end user points.

B. Work shall be supervised by Owner and performed by approved chemical testing laboratory and results sent to the Architect or Architect's Representative for verification.

C. Testing laboratory shall submit a summary of test procedure for approval prior to any work performed. Subcontractor shall provide valves required to disinfect water supply system in part as required by phasing of construction and to provide isolating valves and draw-off valves for proper containment, phasing and flushing.

3.21 TESTING AND ADJUSTING – GENERAL

A. Scope:

1. Test and adjust plumbing systems as specified and as required by Code and Contract Documents.
2. Testing, balancing and adjusting shall in no way relieve guarantee requirements.
3. Provide services of qualified personnel, equipment and apparatus required to perform tests.
4. All systems shall be thoroughly adjusted for perfect intended operation. All mechanical equipment shall be adjusted for flow, temperature, etc. of fluid. The entire hot water circulation system shall be thoroughly balanced so hot water draw from fixtures shall be as quickly available as possible. Pumps, relief valves and pressure reducing valves shall be adjusted as required. Submit in writing to the Engineer upon completion of this work that it is complete and ready for use.

B. Before date of acceptance, furnish Architect with Certificates of Testing and Inspection indicating approval of Authorities Having Jurisdiction and conformance with requirements of Contract Documents.

C. General:

1. Submit proposed test procedures, recording forms and test equipment for review before testing.
2. Notify Architect and Authorities involved at least 48 hours before testing and inspection.
3. Do not paint, cover or conceal work before testing, inspecting and obtaining approval; this includes backfilling and application of insulation.
4. Costs of repairs and restoration of work of other trades and of existing building surfaces or material damaged during cleaning or testing shall be borne by trade performing cleaning or

testing.

D. No tests shall be started until systems have been cleaned as described under "Cleaning" paragraph. Provide temporary piping and connections for testing, flushing or draining systems to be tested.

1. Repair or replace leaks, damage and defects that result from tests to like-new condition. Remove and replace defective materials with acceptable materials.

2. Piping and joints shall be made tight without caulking. Continue tests until systems operate without adjustments and repair to equipment or piping.

3. Provide testing instruments, force pumps, gauges, equipment and labor necessary to conduct tests. Instruments used for testing and balancing shall have been calibrated within six months before balancing. Instrument calibration shall be certified.'

4. Submit six (6) copies of complete testing and balancing report to Architect for review.

E. Final test shall be made after vertical and horizontal pipes and roughing-in have been run and before sewer or fixture connection is made.

1. After soil, waste and storm lines, etc. have been installed outlets shall be temporarily plugged up.

2. Fill pipes with water to top of vertical lines and allow them to remain so filled for 24 hours.

3. Retesting after leaks are repaired shall be at no additional cost.

F. Pressurized Piping Systems:

1. Leak tests shall be conducted in accordance with ANSI applicable Codes and as specified herein.

2. Before piping of various systems has been covered or furred-in, piping systems shall be tested tight for 1 hour under hydrostatic pressure, 1-1/2 times systems working pressures, but not greater than test pressure of 150 psig.

3. Tests shall be witnessed by Architect and pronounced satisfactory before pressure is removed or any water drained off.

4. Equipment shall be valved off or removed during test if equipment pressure rating is less than test pressure.

5. Retest systems after leaks are repaired within Contract Price.

G. Gravity Systems: Test under water pressure at heads specified in Plumbing Codes. Fill pipe lines with water to top of 5 foot vertical section of pipe or to level of top of vent pipe; maintain head pressure for 30 minutes.

H. Potable Water System Test:

1. Certification of the potable water system integrity shall be required where separate systems of potable and non-potable water are provided to supply plumbing fixtures.

2. Fill potable water system to capacity with clean clear water. Introduce water at top of piping system (Hot and Cold). During filling, introduce green food coloring dye into piping system. A floor-by-floor survey shall be conducted. Operate each outlet (Hot and Cold) connected to potable water system until coloring has been observed. A method of maintaining the level of water and coloring shall be employed in order to make up the drawn off amounts. A survey sheet shall indicate each floor and the room number sequentially.

3. This survey is required to be performed after all pressure testing and flushing of the piping system, but before sterilization. Further, it is required that all fixtures connected to the potable water system be installed prior to the test.

I. Prove capacity and performance of each piece of equipment by field tests as specified herein various paragraphs. Equipment and instruments required for tests, as well as additional thermowells or gauge connections shall be installed at no additional cost to Owner.

1. Qualified Representative of Equipment Manufacturer shall be present. Architect may witness tests, if he so desires.

3.22 TESTING: PIPING SYSTEMS

A. General:

1. Piping systems shall be subjected to testing water or air as noted and shall hold tight at the pressure head stated for the time interval required without adding air or water. While any system is being tested, required head or pressure shall be maintained until joints are inspected.

2. Tests shall be witnessed by inspector having jurisdiction, and the Architect within 48 hour notice, given these Authorities.

3. Equipment, material, and labor required for testing of various systems, or part thereof, shall be provided by Plumbing Contractor.

B. Sanitary and Waste Conductor System:

1. Water test shall be applied to drainage system either in their entirety or in sections as required, after rough piping has been installed.

2. If applied to entire system, openings in piping system shall be tightly closed, except the highest opening and system filled with water to point of overflow.

3. If system is tested in sections, each opening shall be tightly closed except highest opening in the section under test and each section shall be filled with water but no section shall be tested with less than a 10’ head of water.

4. In testing successive sections, at least upper 10’ of next preceding section shall be tested so that no joint of piping in building, except the uppermost 10’ of the system shall be submitted to a test of less than a 10’ head of water.

5. Water shall be kept in system for at least 15 minutes before inspection starts; the system shall then be made tight at all points.

C. Points of drainage systems tested with air instead of water shall be tested by attaching an air compressor testing apparatus to suitable opening and, after closing all other inlets or outlets, forcing air into systems until a uniform gauge pressure of 5 psi or sufficient pressure to balance a column of mercury 10” high. Pressure shall be held without introduction of additional air for a period of at least 15 minutes.

D. All new sanitary, waste and vent piping installed under the floor slab, in the area of work, shall be video camera scoped and recorded upon completion and prior to final acceptance. Any debris found in underground piping shall be flushed and removed as part of this Contract. All video recordings and results shall be submitted to the Owner as part of the closeout documents.

E. Interior Water Piping System: Upon completion of water supply systems or section thereof, as required, system shall be tested and proved tight under a water pressure of 150 psi. Gauge shall be located on lowest new floor and pressure shall hold for a period of one (1) hours without introducing additional water. Water used for testing shall be from a potable source of supply.

F. Natural Gas Piping Systems – Domestic Gas:

1. Upon completion of gas piping system or section thereof, as required, test by attaching an air compressor testing apparatus to any suitable opening, and after closing all other inlets and

outlets, force air into the system until a uniform pressure of at least 6" mercury or 3 lb. gauge for a period of no less than 30 minutes for each 500 cubic feet of pipe volume without showing any drop in pressure. Pressure shall be measured with a mercury manometer, slope gauge, or an equivalent device calibrated to read in increments of no greater than 1/10 lbs.

G. Testing Summary:

1. W&V – with water to a 10 foot head for 30 minutes.
2. Water – with potable water to 150 psi for one hour.
3. Gas (Low Pressure) – with air to 6" mercury for ten minutes.

H. Defective Work: If inspection or tests show defects, such defective work or material shall be replaced and inspection and tests shall be repeated. Repairs to piping shall be made with new material. No caulking or screwed joints or holes shall be acceptable.

I. Additional Tests:

1. Provide additional tests such as smoke pressure tests as required by regulations or as directed by Authorities making the inspection.
2. Provide for any repeated test as directed by the Architect, to make all systems tight as required.
3. Visual inspections of joints and valves shall be made as directed by the Architect.

3.23 SEISMIC RESTRAINTS

A. All piping, equipment and devices shall be seismically supported as required by the Local and State Codes.

B. Refer to Vibration Isolation section in Specification Section 15600. Adhere to all sections of said specification in addition to items indicated in this specification.

END OF SECTION

DIVISION 23

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SECTION 230000

HVAC TABLE OF CONTENTS

SECTION 230000

HVAC

PART 1 GENERAL

1.01 GENERAL REQUIREMENTS AND REFERENCES

A. Include “General Requirements” and applicable parts of Division 1 as part of this section.

B. Examine all other sections of the Specifications for requirements which affect work under this Section whether or not such work is specifically mentioned in this section. Where paragraphs of this section conflict with similar paragraphs of Division 1, requirements of this section shall prevail.

C. Coordinate work with that of all other trades affecting, or affected by work of this section. Cooperate with such trades to assure the steady progress of all work under the Contract.

D. The HVAC Subcontractor shall be responsible for filing all documents, payment of all fees, and securing of all inspections and approvals necessary for the work of this section.

1.02 DEFINITIONS

A. As used in this section, “provide” means “furnish and install”, “POS” means “Provided Under Other Sections” and “HVAC” means “Heating, Ventilating and Air Conditioning”.

B. As used in the Drawings and Specifications for Mechanical Work, certain non-technical words shall be understood to have specific meanings as follows, regardless of indications to the contrary in the General Conditions of other documents governing the HVAC work.

1. “Furnish” means: Purchase and deliver to the project site complete with every necessary appurtenance and support, all as part of the HVAC work. Purchasing shall include payment of all sales taxes and other surcharges as may be required to assure that purchased item(s) are free of all liens, claims, or encumbrances.

2. “Install” means: Unload at the delivery point at the site and perform every operation necessary to establish secure mounting and correct operation at the proper location in the project, all as part of the HVAC work.

3. “Provide” means: “Furnish” and “Install”.

4. “New” means: Manufactured within the past two (2) years and never before used.

C. Except where modified by a specific notation to the contrary, it shall be understood that the indication and/or description of any HVAC item in the Drawings or Specifications for HVAC work carries with it the instruction to furnish, install and connect the item as part of the HVAC work, regardless of whether or not this instruction is explicitly stated.

D. It shall be understood that the Specifications and Drawings for HVAC work are complimentary and are to be taken together for a complete interpretation of the HVAC work except that indications on the Drawings, which refer to an individual element of work, take precedence over the Specifications where they conflict.

1.03 SCOPE

A. Perform work and provide material and equipment as shown on Drawings and as specified or indicated in this Section of the Specifications. Completely coordinate work of this Section with work of other trades and provide a complete and fully functional

installation.

B. Give notices, file plans, obtain permits and licenses, pay fees and back charges, and obtain necessary approvals from Authorities that have jurisdiction as required to perform work in accordance with all legal requirements and with Specifications, Drawings, Addenda and Change Orders, all of which are part of Contract Documents.

C. Work shall include, but shall not be limited to, the following:

1. Coordinate maintenance of existing services during construction with Owner.
2. Special coordination of chases and plenums as specified in Paragraph 3.02 (SPECIAL RESPONSIBILITIES).
3. Hoisting and rigging required to complete the work of this Section.
4. Sleeves, inserts and hangers.
5. Flexible connections for pumps and other vibrating and rotating equipment.
6. Equipment bases and supports.
7. Vibration isolation.
8. Motors.
9. Hot water boilers, trim and controls.
10. Boiler flue pipe and breeching.
11. Complete hot water system including pumps, expansion tanks, piping, valves, fittings and other hardware.
12. Pressure gauges and thermometers.
13. Water treatment equipment and chemicals, and testing.
14. Sheetmetal work.
15. Complete air distribution system including low and medium pressure ductwork, diffusers, registers, grilles, splitters, dampers, etc.
16. Insulation for piping.
17. Rooftop exhaust fans.
18. Electric heaters.
19. Gas-fired unit heaters.
20. Prime painting.
21. Pipe, duct, valve and equipment identification.
22. Instruction manuals and startup instructions.
23. Testing and balancing.
24. Cleaning.
25. Automatic temperature controls and other controls.

D. Work to be done under this section is shown on the following Drawings: M0.1, M1.0, M2.0, M3.0

E. Before submitting bid, visit and carefully examine site to identify existing conditions and difficulties that will affect work of this Section. No extra payment will be allowed for additional work caused by unfamiliarity with site conditions that are visible or readily

construed by experienced observer.

F. Before starting work in a particular area of the project, visit site and examine conditions under which work must be performed including preparatory work done under other Sections or Contracts or by Owner. Report conditions that might affect work adversely in writing through Contractor to Architect. Do not proceed with work until defects have been corrected and conditions are satisfactory. Commencement of work shall be construed as complete acceptance of existing and preparatory work.

1.04 RELATED WORK UNDER OTHER SECTIONS

A. The following items are not included in this section and will be performed under the designated sections.

1. Excavation and backfill.
2. Concrete work, including concrete housekeeping pads and other pads and blocks for vibrating and rotating equipment.
3. Cutting and patching of masonry, concrete, tile and other parts of structure, with the exception of drilling for hangers and providing holes and openings in metal decks.
4. Flashing of roof fans and of ductwork and all roof penetrations.
5. Installation of access panels in floor, wall, furred space, or above ceiling.
6. Painting, except as specified herein.
7. Electric power wiring for all equipment.
8. Structural supports necessary to distribute loading from equipment to roof or floor except as specified herein.
9. Temporary light, power, water, heat, gas and sanitary facilities for use during construction and testing.
10. Finish carpentry and millwork.
11. Fire protection.
12. Plumbing.
13. Electrical.

1.05 REGULATORY REQUIREMENTS

A. Perform work strictly as required by rules, regulations, standards, codes, ordinances and laws of Local, State and Federal governments, and all other Authorities that have legal jurisdiction over the site. Materials and equipment shall be manufacturer installed and tested as specified in latest editions of applicable publications, standards, rulings and determinations of:

1. Local and State Building, Plumbing, Mechanical, Electrical, Fire and Health Department Codes.
2. American Gas Association (AGA).
3. National Fire Protection Association (NFPA).
4. American Insurance Association (A.I.A.) (formerly National Board of Fire Underwriters).
5. Occupational Safety and Health Act (OSHA).

6. Factory Mutual Association (FM).

7. Underwriters' Laboratories (UL).

B. Material and equipment shall be listed by Underwriters' Laboratories (UL), and approved by ASME and AGA for intended service.

C. When requirements cited in this Specification conflict with each other or with Contract Documents the most stringent shall govern work. The Architect may relax this requirement when such relaxation does not violate the rulings of Authorities that have jurisdiction. Approval for such relaxation shall be obtained in writing.

D. Most recent editions of applicable Specifications and publications of the following organizations shall form part of the Contract Documents.

1. American National Standards Institute (ANSI).

2. American Society of Mechanical Engineers (ASME).

3. National Electric Manufacturers Association (NEMA).

4. American Society for Testing and Materials (ASTM).

5. American Water Works Association (AWWA).

6. American Society for Heating, Refrigerating and Air Conditioning Engineers (ASHRAE).

7. Air Moving and Conditioning Association (AMCA).

8. Sheetmetal and Air Conditioning Contractors National Association (SMACNA).

9. Air Conditioning and Refrigeration Institute (ARI).

10. Thermal Insulation Manufacturers Association (TIMA).

1.06 SUBMITTALS

A. This section shall supplement Division 1.

B. Definitions:

1. Shop Drawings: Information prepared by the Contractor to illustrate portions of the work in more detail than shown in the Contract Documents.

2. Coordination Drawings: Detailed, large-scale layout Shop Drawings showing HVAC, Electrical, Plumbing and Fire Protection work superimposed to identify conflicts and ensure inter-coordination of Mechanical, Electrical, Architectural, Structural and other work.

3. Manufacturer's Product Data: Information prepared by the manufacturer which depicts standard equipment.

C. Submittals Procedures and Format:

1. Review submittal packages for compliance with Contract Documents and then submit to Architect and Engineer for review. Submittal packages shall be sent electronically, either emailed or through utilization of a web based construction administration application such as Procore or Submittal Exchange. All reviews will be returned in kind, either by email or through the web based application with a cover sheet and applicable submittal notations per below.

2. Each Shop Drawing shall indicate in title block, and each Product Data package shall indicate on cover sheet, the following information:

a. Title.

b. Name and location of project.

c. Names of Architect, Engineer, Contractor and Subcontractor(s).

d. Names of Manufacturer, Supplier, Vendor, etc.

e. Date of submittal.

f. Whether original submittal or resubmitted.

3. Shop Drawings showing layouts of systems shall contain sufficient plans, elevations, sections, details and schematics to describe work clearly. They shall be ¼" = 1'-0" and shall indicate work of other Sections where physical clearances are critical and where interferences are possible. Provide larger scale details as necessary. Sheetmetal Drawings shall show elements of Architect's reflected ceiling plan, exposed ductwork, walls, partitions, diffusers, registers, grilles, fire dampers, sleeves and other aspects of construction as necessary for coordination.

D. Acceptable Manufacturers:

1. The Architect's Mechanical/Electrical design for each project is based on the single manufacturer listed in the schedule or shown on the Drawings. In Division 15 of these Specifications certain "Alternate Manufacturers" are listed as being acceptable. These are acceptable only if, as a minimum, they:

a. Meet all performance criteria listed in the schedules and outlined in the Specifications.

b. Have identical operating characteristics to those called for in the Specifications.

c. Fit within the available space it was designed for, including space for maintenance and component removal, with no modifications to either the space or the product. Clearances to walls, ceilings and other equipment will be at least equal to those shown on the Contract Documents. The fact that a manufacturer's name appears as acceptable shall not be taken to mean the Architect has determined that the manufacturer's products will fit within the available space. This determination is solely the responsibility of the Contractor.

d. For equipment mounted in areas where structural matters are a consideration, the products must have a weight no greater than the product listed in the schedules or Specifications.

e. Products must adhere to all architectural considerations including, but not limited to, being the same size and of the same physical appearance as scheduled or specified products.

E. Substitutions: Substitution of products by manufacturers other than those listed shall only be done in accordance with subparagraph "F" "Substitutions and Deviations".

F. Substitutions and Deviations:

1. Deviations from the Contract Documents and the substitution of materials or equipment relative to the "Acceptable Manufacturers" referred to above, shall be requested individually in writing whether deviations result from field conditions, standard shop practice, or other cause. Submit letter with transmittal of Shop Drawings which flags the substitution or deviation to the attention of the

Architect. The letter shall describe changes in the system shown and physical characteristics (connections to adjacent materials, electrical services, service access requirements, and other characteristics), and differences in operating characteristics or cycles.

2. Without letters flagging the substitution or deviation to the Architect, it is possible that the Architect may not notice such substitution or deviation or may not realize its ramifications. Therefore, if such letters are not submitted to the Architect, the Contractor shall hold the Architect and his consultants harmless for any and all adverse consequences resulting from the deviations being implemented. Adverse consequences shall include, but not be limited to, excessive noise, excessive maintenance, shortened longevity, spatial coordination problems, and inadequate performance versus scheduled design. This shall apply regardless of whether the Architect has reviewed or approved Shop Drawings containing the deviation, and will be strictly enforced.

3. Do not request substitute materials or equipment unless identical material or equipment has been operated successfully for at least three (3) consecutive years. Such materials and equipment shall be a regular cataloged item shown in the current catalog of the manufacturer. When deviation or substitution is permitted, coordinate fully with related changes to Architectural, Structural, Plumbing, Fire Protection, Mechanical, and other work. Ensure that related changes necessary for coordination of substituted items are made within the Contract Price. Assume full responsibility for safety, operation and performance of the altered system.

4. Substitutions of equipment, systems, etc. requiring approval of local Authorities must comply with such regulations and be filed by the Contractor (should filing be necessary).

5. Consideration will not be given to claims that the substituted item meets the performance requirements with lesser construction. Performance, as delineated in schedules and in the Specifications, shall be interpreted as minimum performance.

6. Approval of proposed deviations or substitutions, if any, will be made at discretion of Architect.

7. If equipment is proposed for substitution that is not tested and rated according to industry-wide standards, the Architect shall have the right to have performance tests completed, at the Contractor's expense, to confirm the manufacturer's performance claims.

G. Submittal Notations: will be returned from the Architect marked as illustrated below:

NO EXCEPTION TAKEN	ACCEPTED AS NOTED
NOT ACCEPTED	REVISE AND RESUBMIT

1. Checking is only for general conformance with the design concept of the project and general compliance with the information given in the Contract Documents. Any action shown is subject to the requirements of the Drawings and Specifications. Contractor is responsible for dimensions which shall be confirmed and correlated at the job site; fabrication process and techniques of construction; coordination of his work with that of all other trades; and the satisfactory performance of his work.

H. Schedule: Incorporate the Shop Drawing review period into the construction schedule so that work is not delayed. Contractor shall assume full responsibility for delays caused by not incorporating the following Shop Drawing review time requirements into his project schedule. Allow at least ten (10) working days, exclusive of transmittal time, for review each time a Shop Drawing is submitted or resubmitted with the exception that fifteen (15) working days, exclusive of transmittal time, are required for the following:

1. Automatic temperature controls.
2. Coordination Drawings, if required by this Specification.
3. If more than five (5) Shop Drawings of this trade are received in one (1) calendar week.

I. List of Proposed Equipment and Materials: Within four (4) weeks after Award of Contract and before ordering materials or equipment, submit a complete list of proposed materials and equipment and indicate manufacturer's names and addresses. No consideration will be given to partial lists submitted out of sequence.

J. Responsibility:

1. The intent of submittal review is to check for capacity, rating, and certain construction features. Contractor shall ensure that work meets requirements of the Contract Documents regarding information that pertains to fabrication processes or means, methods, techniques, sequences and procedures of construction; and for coordination of work of this and other Sections. Work shall comply with submittals marked "REVIEWED" to extent that they agree with the Contract Documents. Submittal review shall not diminish responsibility under this Contract for dimensional coordination, quantities, installation, wiring, supports and access for service, nor the Shop Drawing errors or deviations from requirements of the Contract Documents. The Architect's noting of some errors while overlooking others will not excuse the Contractor for proceeding in error. Contract Document requirements are not limited, waived, nor superseded in any way by review.
2. Inform Subcontractors, Manufacturers, Suppliers, etc. of scope and limited nature of review process and enforce compliance with the Contract Documents.

K. Material and equipment requiring Shop Drawing and/or Manufacturer's Data Submittals shall include but not be limited to:

1. Pumps.
2. Boiler.
3. Fittings, valves and strainers.
4. Expansion tanks, Air Separator and Glycol Feeder.
5. Diffusers, registers, grilles, splitters, dampers and accessories.
6. Exhaust fans.
7. Electric and Gas-fired unit heaters.
8. Automatic controls.
9. Pipe insulation.
10. Vibration isolation.
11. Pressure gauges and thermometers.
12. Water treatment equipment.

13. Pipes, pipe hangers, sleeves and inserts.

14. Equipment bases and supports.

15. Identification for pipe, duct, valves and equipment.

16. Complete ductwork Shop Drawings, construction details and duct construction standards.

17. Color selection charts and samples for equipment and systems in finished areas.

1.07 SURVEYS AND MEASUREMENTS

A. Base all required measurements, both horizontal and vertical, on reference points established by the General Contractor and be responsible for the correct laying out of the Mechanical work. In the event of a discrepancy between actual measurements and those indicated, notify the General Contractor in writing. Do not proceed with the work required until written instructions have been issued by the General Contractor.

1.08 COORDINATION

A. HVAC, Plumbing, Fire Protection, and Electrical Drawings are diagrammatic. They indicate general arrangements of Mechanical systems and other work. They do not show all offsets required for coordination nor do they show the exact routings and locations needed to coordinate with Structural and other trades and to meet Architectural requirements.

B. Work shall be performed in cooperation with other trades on the project and so scheduled as to allow speedy and efficient completion of the work.

C. Furnish to other trades advance information on locations and sizes of all frames, boxes, sleeves and openings needed for their work. Furnish information and Shop Drawings necessary to allow trades affected by the work to install their work properly and without delay.

D. In all spaces, prior to installation of visible material and equipment, including access panels, review Architectural Drawings for exact locations and where not definitely indicated, request information from Architect. Where the HVAC work shall interfere with the work of other trades, assist in coordinating the space conditions to make satisfactory adjustments before installation. Without extra cost to the Owner, make reasonable modifications to the work as required by normal Structural interferences. The Mechanical Contractor shall be liable for any additional openings, or relocating and/or enlarging existing openings through concrete floors, walls, beams and roof required for any work which was not properly coordinated. Maintain maximum headroom at all locations. All piping, duct, conduit, and associated components to be as tight to underside of structure as possible.

E. If any HVAC work has been installed before coordination with other trades so as to cause interference with the work of such trades, all necessary adjustments and corrections shall be made by the trades involved without extra cost to the Owner.

F. Where conflicts or potential conflicts exist and engineering guidance is desired, submit sketch of proposed resolution to Architect for review and approval.

G. Protect all materials and work of other trades from damage which may be caused by the Mechanical work, and repair all damages without extra cost to the Owners.

1.09 MECHANICAL AND ELECTRICAL COORDINATION

A. The HVAC Subcontractor shall furnish and install various electrical items relating to the

heating and ventilating equipment and control apparatus. The Electrical Subcontractor shall be required to connect power wiring to this equipment unless noted otherwise.

B. The HVAC and Electrical Subcontractors shall coordinate their respective portions of the work, as well as the electrical characteristics of the heating, ventilating and air conditioning equipment.

C. All power wiring and local disconnect switches will be provided by the Electrical Subcontractor for the line voltage power. All control and interlocking wiring shall be the responsibility of the HVAC Subcontractor.

D. 120V and above power wiring sources extended and connected to HVAC control panels, transformers and switches shall be the responsibility of the Electrical Subcontractor. All low voltage thermostats and any switch wiring shall be the responsibility of the HVAC Subcontractor.

E. Temperature control and equipment wiring shall be installed by the HVAC Subcontractor.

F. The Electrical Subcontractor will provide all magnetic starters except those furnished as an integral part of packaged equipment.

1.10 COORDINATION DRAWINGS

A. Coordination Drawings:

1. The Sheetmetal Subcontractor shall prepare a complete set of 3D model electronic Drawings at a scale not less than 3/8" equals 1'-0", showing structure and other information as needed for coordination. He shall show sheetmetal layout thereon. These will be the Coordination Drawings.

2. The main paths of egress and for equipment removal, from main Mechanical, Electrical, Plumbing and Fire Protection rooms must be clearly shown on the Coordination Drawings. All fire and smoke partitions must be highlighted on the Coordination Drawings for appropriate coordination.

3. Each of the below specialty trades shall add its work to these background Drawings with appropriate elevations and grid dimensions. Specialty trade information is required for fan rooms and mechanical rooms, horizontal exits from duct shafts, crossovers, and for spaces in and above ceilings where congestion of work may occur such as corridors, and even entire floors. Drawings shall indicate horizontal and vertical dimensions, to avoid interference with structural framing, ceilings, partitions, and other services.

   a. Specialty Trades:

      1) Plumbing System.

      2) HVAC Piping and Associated Control System.

      3) Electrical.

      4) Sheet Metal Work.

      5) Sprinkler System.

4. Each specialty trade shall sign and date each electronic Coordination Drawing. Return Drawings to the Sheetmetal Subcontractor, who shall route them sequentially to all specialty trades.

5. Where conflicts occur with placement of materials of various trades, the Sheetmetal Subcontractor will be responsible to coordinate the available space to

accommodate all trades. Any resulting adjustments shall be initialed and dated by the specialty trade. The Sheetmetal Subcontractor shall then final date and sign each Coordination Drawing. If he cannot resolve conflicts, the decision of the General Contractor shall be final, subject to the approval of the Architect.

6. A Subcontractor who fails to promptly review and incorporate his work on the Coordination Drawings shall assume full responsibility of any installation conflicts affecting his work and of any schedule ramifications.

7. The Sheetmetal Subcontractor shall make electronic copies of all Coordination Drawings. Fabrication shall not start until such electronic Drawings are received by the Architect/Engineer and have been reviewed.

8. Review of Coordination Drawings shall not diminish responsibility under this Contract for final coordination of installation and maintenance clearances of all systems and equipment with Architectural, Structural, Mechanical, Electrical, Plumbing and Fire Protection Contractors.

1.11 INSTALLATION REQUIREMENTS

A. The arrangement of all HVAC work shown on the Drawings is diagrammatic only and indicates the minimum requirements of the work. Conditions at the building including actual measurements shall determine the details of the installation. All work shall be laid out and installed so as to require the least amount of cutting and patching.

B. Review the Architectural Drawings and Specifications before ordering any material and equipment. Any discrepancies shall be brought to the attention of the Architect for his determination prior to proceeding with the work.

1.12 TYPICAL DETAILS

A. Typical details where shown on the Drawings shall apply to each and every item of the project where such items are applicable. They are not repeated in full on the Drawings, which in many cases are diagrammatic only, but with the intention that such details shall be incorporated in full. Any alternate method proposed for use by the Contractor shall have the prior approval of the Architect.

1.13 SLEEVES, INSERTS

A. Furnish and install all sleeves, inserts, anchor bolts and similar items to be set into masonry or concrete, as required for mechanical work. Internal diameter of sleeve ball shall be 1/2" larger than the outside diameter of the pipe or insulation covered line passing through it.

1.14 CORING, DRILLING

A. Core, cut and/or drill all small holes 4.5” diameter or less in walls and floors required for the installation of sleeves and supports for the Mechanical Electrical work.

1.15 ACCESSIBILITY

A. Install all work such that parts requiring periodic inspection, operation, maintenance and repair are readily accessible.

B. Furnish all access panels appropriate to particular conditions, to be installed by trades having responsibility for the construction of actual walls, floors or ceilings at required locations.

1.16 SUPPLEMENTARY SUPPORTING STEEL

A. Provide all supplementary (non-structural) steelwork required for mounting or supporting equipment and materials.

B. Steelwork shall be firmly connected to building construction as required. Locations and methods of attachment shall be approved by the Architect.

C. Steelwork shall be of sufficient strength to allow only minimum deflection in conformity with manufacturer's published requirements.

D. All supplementary steelwork shall be installed in a neat and workmanlike manner parallel to floor, wall and ceiling construction: all turns shall be made at forty-five and ninety degrees, and/or as dictated by construction and installation conditions.

E. All manufactured steel parts and fittings shall be galvanized.

1.17 TOOLS AND EQUIPMENT

A. Provide all tools and equipment required for the fabrication and installation of the mechanical equipment at the site.

1.18 PORTABLE AND DETACHABLE PARTS

A. Contractors shall retain in their possession all portable and/or detachable parts and portions of materials, devices, equipment, etc. necessary for the proper operation and maintenance of the Mechanical and Electrical systems until final completion of the work, at which time they shall be handed over to the Owners.

1.19 RIGGING REQUIREMENTS

A. The work to be done under this Section of the Specifications shall include all hoisting, scaffolding and planking including the furnishing, set-up and maintenance of all derricks, hoisting machinery, cranes, helicopters, scaffolds, staging and planking as required for the work.

B. Provide installation and erection information including; lifting requirements, and any special rigging or installation requirements for all equipment under the submittals.

1.20 RECORD DRAWINGS, PROJECT CLOSEOUT

A. As work progresses and for the duration of Contract, maintain a complete and separate set of prints of Contract Drawings at job site at all times. Record work completed and all changes from original Contract Drawings clearly and accurately including work installed as a modification or addition to the original design. Work shall be updated on a weekly basis and shall be made available for review by Architect. Failure to perform this work shall be reason for withholding requisition payments. In addition, take photographs of all concealed equipment in gypsum board ceilings, shafts, and other concealed, inaccessible work. At completion of work, make copies of photographs with written explanation on back. These shall become part of Record Documents.

B. At the completion of work, prepare a complete set of Record Drawings showing all systems as actually installed. The copies will be made available for the HVAC Contractor's copying, at his expense, to serve as backgrounds for the Record Drawings. The quantity of copies which are made available shall in no way be interpreted as setting a limit to the number of Drawings necessary to show the required information. The HVAC Contractor's professional Draft Person shall transfer changes to electronic CAD files. Submit three (3) sets of electronic copies to Architect for comments as to compliance with this section.

C. The Architect will not certify the accuracy of the Record Drawings. This is the sole

responsibility of the Mechanical Contractor.

D. This trade shall submit the Record Drawings for approval by the Fire and Building Departments in a form acceptable to the departments, when required by the jurisdiction.

E. Record Drawings shall show record condition of details, sections, riser diagrams, control changes and corrections to schedules. Schedules shall show actual manufacturer, make and model numbers of final equipment installation.

1.21 GUARANTEE/WARRANTY

A. Guarantee and 24 hour service.

1. Guarantee Work of this Section in writing for not less than one (1) year following the date of acceptance by the Owner. If the equipment is used for temporary heat, cooling, etc, prior to acceptance by the Owner, the bid price shall include an extended period of warranty covering the one (1) year of occupancy, starting from the date of acceptance by the Owner. The guarantee shall repair or replace defective materials, equipment, workmanship and installation that develop within this period, promptly and to the Architect's satisfaction and correct damage caused in making necessary repairs and replacements under guarantee within Contract Price.

2. In addition to guarantee requirements of Division 1 and of Subparagraph A above, obtain written equipment and material warranties offered in manufacturer's published data without exclusion or limitation, in Owner's name.

3. Upon receipt of notice from the Owner of failure of any part of the systems or equipment during the warranty period, the affected part or parts shall be replaced by this Contractor without any reimbursement.

4. Replace material and equipment that require excessive service during guarantee period as defined and as directed by Architect.

5. Provide 24 hour service beginning on the date the project is accepted by the Owner, whether or not fully occupied, and lasting until the termination of the guarantee period. Service shall be at no cost to the Owner. Service can be provided by this Contractor or a separate service organization. Choice of service organization shall be subject to Architect and Owner approval. Submit name and a phone number that will be answered on a 24 hour basis each day of the week, for the duration of the service.

6. Submit copies of equipment and material warranties to Architect before final payment.

7. At end of guarantee period, transfer manufacturer's equipment and material warranties still in force to Owner.

8. This paragraph shall not be interpreted to limit Owner's rights under applicable codes and laws and under this Contract.

9. PART 2 paragraphs of this Specification may specify warranty requirements that exceed those of this paragraph. Those paragraphs shall govern.

10. Use of systems provided under this Section for temporary services and facilities shall not constitute Final Acceptance of Work by Owner, and shall not initiate the guarantee period.

11. Provide manufacturer's engineering and technical staff at site to analyze and rectify problems that develop during guarantee period immediately. If problems

cannot be rectified immediately to Owner's satisfaction, advise the Architect in writing, describe efforts to rectify situation, and provide analysis of cause of problem. The Architect and/or Engineer will direct course of action.

1.22 OPERATING, INSTRUCTION AND MAINTENANCE MANUALS

A. Obtain at time of purchase of equipment, three copies of operation, lubrication and maintenance manuals for all items. Assemble literature in coordinated manuals with additional information describing combined operation of field-assembled units, including as-built wiring diagrams. The manual shall contain the names and addresses of manufacturers and local representatives who stock or furnish repair parts for items or equipment. Divide manuals into three sections or books as follows:

1. Directions for and sequence of operation of each item of HVAC system, e.g. air handling units and boilers. Sequence shall list valves, switches and other devices used to start, stop and control system. Detail procedure to be followed in case of malfunctions. Include detailed approved flow diagrams of temperature control, heating, condensate, chilled water, condenser water, etc. as appropriate for systems provided. Include approved valve directory showing each valve number, location of each valve and equipment or fixture controlled by valve.

2. Detailed maintenance and troubleshooting manuals containing data furnished by manufacturer for complete maintenance. Include copy of balancing report.

3. Lubrication instructions detailing type of lubricant, amount and intervals recommended by manufacturer for each item of equipment. Include additional instructions necessary for implementation of first class lubrication program. Include approved summary of lubrication instructions in chart form, where appropriate.

B. Furnish three copies of manuals to the Architect for approval and distribution to the Owner. Deliver manuals no less than 30 days prior to acceptance of equipment to permit the Owner's personnel to become familiar with equipment and operation prior to acceptance.

C. Provide framed and glazed charts as follows: mount as directed by the Architect.

1. Lubrication chart from third part of manual.

D. Operating Instructions: Upon completion of installation or when the Owner accepts portions of building and equipment for operational use, instruct the Owner's operating personnel in any or all parts of the various systems. Instructions shall be performed by factory authorized personnel. The Owner shall determine which systems require additional instructions. The duration of instructions shall take equipment through complete cycle of operation (at least five working days). Make adjustments under operating conditions.

E. Each contractor shall be responsible for his work and equipment until finally inspected, tested and accepted. Carefully store materials and equipment which are not immediately installed after delivery to site. Close open ends of work with temporary covers or plug during construction to prevent entry of obstructing material.

F. Each separate contractor shall protect the work and material of other trades that might be damaged by his work or workmen and make good all damage thus caused.

1.23 SERVICE CHARACTERISTICS

A. Secondary Building Voltage – High Level: 277/480.

B. Secondary Building Voltage – Low Level: 120/208.

C. All equipment and wiring shall be suitable for the applied voltage.

D. All motors rated 1/2 horsepower and above shall be 208V or 480V, 3-phase.

1.24 QUALITY ASSURANCE

A. The requirements of the State Building Code and Local regulations establish the minimum acceptable quality of workmanship and materials, and all work shall conform thereto unless more stringent requirements are indicated or specified herein.

B. All work shall comply with the latest editions of the codes as referenced herein.

C. Follow manufacturer's directions for articles furnished, in addition to directions shown on Drawings or specified herein.

D. Protect all work, materials, and equipment from damage during process of work. Replace all damaged or defective work, materials and equipment without additional cost to the Owner.

E. All equipment and materials for permanent installation shall be the products of recognized manufacturers and shall be new.

F. Equipment and materials shall:

1. Where normally subject to Underwriters Laboratory Inc. listing or labeling services, be so listed and labeled.

2. Be without blemish or defect.

3. Not be used for temporary purposes.

4. Be in accordance with the latest applicable ASHRAE standards.

G. Purchase products which will meet with the acceptance of all Authorities Having Jurisdiction over the work. Where such acceptance is contingent upon having the products examined, tested and certified by Underwriters or other recognized testing laboratory, the product shall be so examined, tested and certified.

H. Except for plans, all items of equipment or material of one generic type shall be the product of one manufacturer throughout.

I. For items which are to be installed but not purchased as part of the HVAC work, the Mechanical Contractor work shall include:

1. The coordination of their delivery.

2. Their unloading from delivery trucks driven into any point on the property line at grade level.

3. Their safe handling and field storage until the time of permanent placement in the project.

4. The correction of any damage, defacement or corrosion to which they may have been subjected. Replacement, if necessary, shall be coordinated with the Contractor who originally purchased the item.

5. Field erection and internal wiring as necessary for their proper operation.

6. Mounting in place, including the purchase and installation of all dunnage, supporting members, and fastenings, necessary to adapt them to architectural and structural conditions.

J. Items which are to be installed, but not purchased as part of the HVAC work shall be

carefully examined upon delivery to the project. Claims that any of these items have been received in such condition that their installation will require procedures beyond the reasonable scope of the HVAC work will be considered only if presented in writing within one (1) week of the date of delivery to the project of the items in question. The mechanical work includes all procedures, regardless of how extensive, necessary to put into satisfactory operation, all items for which no claims have been submitted as outlined above.

1.25 DELIVERY, STORAGE AND HANDLING

A. All materials for the work of this section shall be delivered, stored and handled so as to preclude damage of any nature. Manufactured materials shall be delivered and stored in their original containers, plainly marked with the products' and manufacturer's name. Materials in broken containers or in packages showing watermarks or other evidence of damage shall not be used and shall be removed from the site.

PART 2 PRODUCTS

2.01 DUCTWORK AND AIR DISTRIBUTION EQUIPMENT

A. Reference Standards:

1. Material, construction and installation shall meet requirements of most recent editions of the following standards and references, except for more stringent requirements specified or shown on the Drawings:

Standard	As Applicable To
SMACNA HVAC Duct Construction Standards Metal and Flexible	Sheetmetal Ductwork; Duct Liners; Adhesives; Fasteners; Flexible Ductwork
SMACNA HVAC Air Duct Leakage Test Manual	Duct Leakage Testing
SMACNA Fibrous Glass Duct Construction Standards	Fibrous Glass Ductwork; Tapes
SMACNA Ducted Electric Heat Guide for Air Handling Systems	Electric Duct Heaters
ADC and TIMA Flexible Duct Performance Standards	Flexible Ductwork
NFPA 90A	Fire Dampers; Fire Resistance Standards for Ducts and Liners
SMACNA Guidelines for Welding Sheetmetal	Welded Galvanized, Black Iron and Stainless Ductwork

B. General:

1. Provide supporting and hanging devices necessary to install the entire HVAC system including ductwork and equipment, and to prevent vibration.

2. Provide vertical and horizontal supports as required by code to meet minimum applicable earthquake resistance standards.

3. Ductwork shall be free from vibration under all conditions of operation. Dimensions shown on the Drawings for lined ductwork are net inside dimensions. Increase ductwork dimensions to accommodate lining requirements.

4. Pipe or conduit crossing duct: No pipe, conduit, hanger, Architectural element nor structural member shall pass through ductwork.

5. When making offsets and transformations necessary to accommodate structural

conditions, preserve full cross-sectional area of the ductwork as shown on the Drawings.

6. Ductwork shall have pressure-velocity classifications as follows:

Duct Construction Class	Static Pressure Rating	Pressure	SMACNA Seal Class	SMACNA Leakage Class	Velocity
2”	2”	Pos. or Neg.	B	12	2500 fpm or less
1”	1”	Pos. or Neg.	B	12	2500 fpm or less
1/2”	1/2”	Pos. or Neg.	B	12	2000 fpm or less

a. For negative pressures over 3” w.g., refer to SMACNA Round and Rectangular Industrial Duct Construction Standards for joint and intermediate reinforcement requirements

b. Unless otherwise specified or shown on the Drawings, the following pressure classifications shall be used for the types of ductwork listed below:

1) 2” Class: All other ductwork.

7. Sealing requirements for Class B, Leakage Class 12, galvanized, non-welded, aluminum or non-welded stainless steel ductwork:

a. Transverse Joints:

1) During assembly seal all flanged transverse joints with sealing tape of quality equal to Hardcast Inc. Model 1902-FR. Corners shall be sealed as described by SMACNA and when applicable per manufacturer’s published procedures.

2) Seal all non-flanged transverse joints with Hardcast Inc. Versa Grip Model 102 or approved equal.

b. Longitudinal Seams: Seal all longitudinal seams during ductwork fabrication with Hardcast Inc. Cold Seal Model 1001 or approved equal.

8. Support:

a. Space hangers as required by SMACNA (8 ft. max.) for horizontal duct on 8 ft. centers, unless concentrated loadings require closer spacing.

b. Support vertical duct on each floor or slab it penetrates.

c. Supports for ductwork and equipment shall be galvanized unless specified otherwise.

9. Connections:

a. Connect inlets and outlets of air handling units and fans to ductwork with flexible connections unless fan has vibration isolator mounts inside unit with flexible connections and no external vibration isolators. Exception: Do not use flex on life safety smoke exhaust fans.

b. Indoors, flexible connections shall be neoprene-coated fibrous glass fire retardant fabric, by Ventifabrics, or Durodyne. Outdoors, flexible connections shall be DuPont hyplon-coated fibrous glass fire, weather and UV-resistant by Ventifabrics or Durodyne.

c. Secure flexible connections tightly to air handlers with metal bands. Bands shall be same material as duct construction.

d. Connections from trunk to branch duct shall be as detailed on Drawings.

10. Construction:

a. No sharp metal edges shall extend into air streams.

b. Install drive slips on air-leaving side of duct with sheetmetal screws on 6" centers.

c. Spin in collars shall NOT be used for branch connections in 3" or higher pressure class ductwork.

11. Joints:

a. Longitudinal lock seams shall be double-locked and flattened to make tight joints.

b. Make transverse joints, field connections, collar attachments and flexible connections to ducts and equipment with sheetmetal screws or bolts and nuts. Do not use rivets or staples.

12. Prefabricated Transverse Duct Joints:

a. Transverse joints in galvanized sheetmetal ductwork may be made with galvanized gasketed frame and angle duct systems by Ductmate, TDF, TDC or approved equal. Angles shall be at least 20 gauge. Prefabricated transverse duct joints shall not be used for duct 16 ga. and heavier, nor for duct 23 ga. and lighter.

b. Secure angles to duct with screws (using clutched arbor) or spot-welds spaced as recommended by manufacturer for duct pressure class.

13. Elbows and Bends:

a. Elbows and bends for rectangular ducts shall have centerline radius of 1-1/2 times duct width wherever possible. Elbows for grease exhaust and fume hood exhaust shall be full radius. Vanes or mitered duct are not allowed.

b. Where centerline radius is less than 1-1/2 times duct width (on supply, return and exhaust ductwork), elbows shall be radius throat (square throat allowed when turning around column or other close objects) with radius heel. For elbows whose width is greater than 48 inches and/or where shown on plans, provide splitter vanes. Install vanes in accordance with SMACNA. Where multiple elbows are separated by less than ten duct diameters use splitter (full length) vanes.

c. For round ductwork provide stamped elbows, with centerline radii equal to 1-1/2 times duct diameter, or gored elbows as follows:

Elbow Angle	No. of Gores
0° - 36°	2
37° - 72°	3
73° - 90°	5

d. Elbows for flat oval ducts shall have centerline radii equal to 1-1/2 times duct diameter in plane of bend, or gored elbows with gores as specified for round ducts.

14. Access Panels/Doors:

a. Provide proper pressure and leakage rated, gasketed, duct mounted

access panels/doors for the following items with minimum sizes, as indicated. Access doors shall be of double wall construction. Access doors in insulated ducts shall be insulated. Gauges of door materials, number of hinges, number and type of door locks shall be as required by the SMACNA Duct Construction Standards. Hinged doors are not acceptable, screwed or bolted access panels are not acceptable. Doors shall be chained to frame with a minimum length of 6" to prevent loss of door. For seal Class A, access doors shall be leakage rated, neoprene gasketed UL 94 HF1 listed, DUCTMATE "sandwich" or approved equal. Door metal shall be the same gauge as the attached duct material. For grease and high temperature ducts, door assembly shall be rated for 2300° F. The minimum sizes shall be:

1) Fire dampers – 12" x 12", or larger.

2) Automatic control dampers – 6" x 6" minimum.

3) Manual volume dampers 2 sq. ft. and larger – 6" x 6" minimum.

4) At additional locations indicated on Drawings, or specified elsewhere – 12" x 12" minimum.

5) Generally access doors are not shown on the Drawings, but shall be provided in accordance with the above.

15. Extractors shall have adjusting rod and locknut on outside of duct.

16. Connections to roof fans:

a. Shall be at least 22 gauge galvanized steel soldered watertight.

b. Solder side seams at least 12" up from bottom.

c. Provide suitable dielectric gaskets to join dissimilar materials.

17. Plenums and Connections to Louvers:

a. Shall be 18 ga. minimum cross-broken and properly reinforced with galvanized angle irons to SMACNA requirements.

b. Shall have bottom and corner seams soldered watertight at least 12" up from bottom.

c. Shall have neoprene gaskets or other non-corrodible material to make connections to louvers watertight.

d. Shall pitch connection back towards the louver. Provide half-coupling drain connection at bottom of plenum unless noted otherwise. Pipe drain to nearest floor drain.

e. Shall have unused portions of louvers blocked-off with sheetmetal; sealed air and watertight; insulated with 2" thick 6 lb. Density rigid or board insulation.

18. Duct Pressure Tests:

a. Pressure test ducts after takeoffs and wall penetrations are in place and before applying exterior insulation. Correct any leaks.

b. Pressure and leak test 100% of medium and low-pressure ductwork at 100% of operating system pressure. Duct shall be constructed so there is no joint or structural failure at the test pressure.

19. Materials:

a. Sheetmetal ducts shall be constructed of hot-dipped galvanized sheetmetal with G90 Commercial coating according to ASTM 527 unless specified otherwise.

b. Flexible Ductwork:

1) Flexible ductwork, connecting to un-insulated or unlined duct, shall be polyester core with corrosion-resistant helical wire reinforcing. The polyester core shall be minimum two-ply and shall have a minimum thickness of 0.0017". Flex duct shall be UL rated for 6" WC positive pressure, 2" WC negative pressure with a maximum velocity of 4000 FPM. Flexduct must be listed as a Class 1 Connector according to UL 181 and shall meet the requirements of NFPA 90A. The maximum ASTM E-84 fire-hazard rating shall be 25 flame spread, 50 fuel contributed and 50 smoke developed. Un-insulated flexible duct shall be equivalent to Wiremold, Type WB, or Flexmaster Types 2 and 4 (not type 9).

2) Flexible duct connected to insulated or lined duct shall also be insulated and shall be equivalent to Wiremold Type WK or Flexmaster Types 2 or 4 (not type 9), with 1-1/2" 3/4 lb. density fiberglass insulation and an aluminized reinforced vapor barrier.

3) Submittals shall include data or number of polyester plies and minimum thickness of polyester core, in addition to other data listed above required to ensure that submitted product meets the requirements of these Specifications.

4) If flex duct other than the model numbers of the vendors listed above is submitted, a sample of the flex duct shall be submitted to the Architect. The Architect shall have sole discretion in determining whether the submitted flex duct is equivalent to that of the named vendors above.

5) Unless otherwise indicated, flexible duct shall not exceed 5'-0" long.

C. 2" and Lower Pressure Class Ductwork – Rectangular:

1. Ducts wider than 19" with more than 10 square feet of un-braced panel shall be beaded or cross-broken.

2. Internal stiffening struts shall only be used upon prior written approval of the Architect.

3. Make changes in duct size with tapered connections as required by SMACNA. Changes shall NOT exceed 30° from line of airflow. Take-off to the diffusers shall be 45° leading edge type or bellmouth type.

4. Transverse joints shall be TDF/TDC or slip joints; use flat or standing seam according to SMACNA. Where the duct size requires a standing seam but space restrictions dictate flat seam, notify Architect prior to fabrication.

D. 2" and Lower Pressure Class Ductwork – Round:

1. Joints:

a. Longitudinal joints shall be spiral seam, butt welded, lap and seam

welded, or ACME lock-grooved seam. Snap lock seams shall be used on 1/2" w.g. pressure class duct only.

b. Transverse joints shall be beaded sleeve joint or other approved joints listed in SMACNA. Use three (3) or more sheetmetal screws at 15" uniform intervals along circumference of joints.

2. Branch fittings shall be conical tee (Buckley or equal) or combination tee as shown in SMACNA.

E. Flexible Duct:

1. Flexible ductwork shall be Flexmaster Triple-Lock Buck Duct Flexible Air Duct (insulated or non-insulated) as manufactured by Buckley Associates, ATCO, or equal. Flexible duct, non-insulated, shall be Underwriters Laboratory Listed UL 181 Class 0 air duct and constructed in accordance with NFPA Standards 90A and 90B. It shall have a smoke/flame spread rating of 50/25.

2. The duct shall be made from a tape of dead soft aluminum sheet, spiral wound into a tube and spiral corrugated to provide strength and stability. The joint shall consist of a triple lock mechanically performed without the use of adhesives to make a durable airtight seam. A double lock is not acceptable.

3. Flexible duct connected to insulated or lined duct shall also be insulated. Flexmaster insulated flex shall have a gray Fire Retardant Polyethylene outer jacket with a 1/2 lb. density, 1-1/2" thick fiberglass insulation blanket, factory wrapped, providing a thermal performance of R-6 overall. Flexible Duct, insulated, shall be Underwriters Laboratory Listed and constructed in accordance with NFPA Standards 90A and 90B. It shall have a smoke/flame spread rating of 50/25.

4. The flexible duct shall be supported per manufacturer's instructions.

5. Flexible ductwork shall be rated at 12" positive pressure. Flexible ductwork from 3" to 16" in diameter shall have a negative pressure rating of 12". Flexible ductwork 18" to 20" in diameter shall have a negative pressure rating of 8".

6. All flexible ductwork shall be individually boxed and labeled for delivery to the jobsite for maximum protection.

7. Submittals shall include data on minimum thickness of aluminum core, in addition to other data listed above required to ensure that submitted product meets the requirements of these Specifications.

8. Provide sealing compound for installation. See further paragraphs in this Specification and details for other installation requirements.

9. Flexible duct shall be limited to 5' length.

F. Fire Dampers:

1. Provide fire dampers throughout the air distribution system(s) as required by applicable codes, standards and Authorities. Provide an access door for each fire damper of sufficient size to repair the internal fusible link (see access panel/door section). Fire dampers indicated on the Drawings may not fully represent the exact number required for this project. It is the Contractor's responsibility, at no additional cost to the Owner, to provide all required dampers.

2. Fire dampers shall be the fusible link spring loaded type. Where in ductwork served by fans which shut off during a fire alarm condition, dampers shall be the static type, similar to Greenheck Model FD series. Where in ductwork served by

fans which do not shut off during a fire alarm condition, dampers shall be the dynamic type, similar to Greenheck Model DFD series.

3. Fire damper frames shall be fitted with angle iron stop and stainless steel spring latch, and shall be securely fastened to building construction.

4. Seal spaces between damper frames and walls and between damper frames and floor with approved fire-retardant material.

5. The use of fire dampers shall NOT reduce net free area of duct below that shown on Drawings. Fire dampers shall be Type B with the blades of the fire dampers out of the air stream.

6. Samples of fire dampers shall be submitted to and approved by Local Authorities Having Jurisdiction.

7. Dampers shall bear 1-1/2 hour UL-rating fire damper label and shall be constructed and installed as required by UL-555.

8. Fire dampers shall be Buckley, Greenheck, Ruskin, Nailor Industries, Pottorff or Prefco for use in the proper duct pressure classification.

9. Dampers shall be installed per SMACNA with breakaway connections and nose pieces on duct liner (see SMACNA HVAC Duct Construction Standards).

G. Volume Dampers:

1. Provide manually adjustable rectangular parallel blade dampers for duct heights less than 12” with factory-installed locking hand quadrants extended 2” for all dampers installed in externally insulated duct:

   a. On each supply, return and general duct take-off.

   b. At each take-off to register, grille or diffuser (not all are shown on Drawings for clarity).

2. Volume dampers shall be manufactured approximately 5/16” smaller in width and 1/8” smaller in height than size of duct in which they are installed; e.g., nominal damper size is 24” x 10”; actual size is approximately 23-11/16” x 9-7/8”.

3. Volume damper frames shall be constructed of #6063 extruded aluminum reinforced channel with minimum thickness of 0.050”. Opposed damper blades shall be #6063 extruded aluminum with minimum thickness of 0.050” and shall include reinforcing ribs. Each blade shall be supported in the damper frame by individual Teflon axle bearings, and shall be driven by stainless steel connecting slide linkage controlled by 3/8” square steel control shaft.

4. All required volume dampers may not be indicated on Drawings, but volume dampers shall be provided as necessary for systems balancing.

5. Dampers 12” and larger in height shall be opposed multi-blade type.

6. Where volume dampers are inaccessible, use locking type ceiling regulators and miter gear or worm gear for all horizontal dampers. Bearing coupling for bottom duct control may be used for shaft on vertical blade dampers. The 3/8” rod between ceiling regulator and damper shall be provided by Contractor.

7. Damper blades shall be two gauges heavier than adjoining ductwork, and shall be riveted to supporting rods. Hem over edges parallel to rods.

8. Brackets shall be galvanized metal, secured to ductwork with sheetmetal screw

with locking quadrant arms (see Seal Class Section for additional requirements). Provide 2" handle extension for all dampers on externally insulated ductwork.

9. Note: All required volume dampers may not be indicated on Drawings but dampers shall be provided as necessary for system balancing.

H. Automatic Dampers: Install automatic dampers furnished under Automatic Temperature Control Paragraph of this Section, as shown on Drawings, and as specified. Provide sealed wall penetrations for Seal Class A ductwork.

I. Diffusers, Registers and Grilles:

1. Provide diffusers, registers and grilles for supply, return and exhaust outlets, of size, type and design shown on Drawings. Acceptable manufacturers shall be Anemostat, Krueger, Metal*Aire, Price, or Titus.

2. Equipment shall be tested and rated per ASHRAE 91-70.

3. Equipment shall handle air quantities at operating velocities:

a. With maximum diffusion within space supplied or exhausted.

b. Without objectionable air movement as determined by Architect.

c. With sound pressure level not to exceed NC 30.

4. Diffusers within same room or area shall be of same type and style to provide Architectural uniformity.

5. Diffusers, registers and grilles shall be furnished with gaskets and installed with faces set level and plumb, tightly against mounting surface.

6. Finish shall be as directed by the Architect.

7. Coordinate diffusers, registers and grilles with ceiling and wall construction. Refer to Architectural Drawings for exact lengths and for framing and mitering arrangements that may differ from those shown on HVAC Drawings.

J. Branch Duct Take-off Fittings:

1. Contractor shall provide bellmouth take-offs at all branch duct locations.

2. Bellmouth fitting shall be provided with damper.

3. Bellmouths shall be constructed of heavy-duty galvanized steel. Bellmouths shall include an airtight neoprene gasket to ensure a tight fitting with minimal leakage. Pre-drilled holes shall be provided for quick mounting.

4. Standard damper hardware to be constructed of 26-gauge galvanized material with a quadrant damper and tight-fitting gasket to ensure minimal leakage at damper pivot points.

5. Optional heavy-duty hardware shall be provided at locations of higher static pressure where shown on the Drawings.

6. Ninety-degree (90°) take-offs are not permitted on this project.

2.02 SLEEVES AND PENETRATIONS

A. Pipe Sleeves:

1. Sleeves through floors and through exterior, structural and fire-rated construction shall be hot-dipped galvanized Schedule 40 steel pipe.

2. Sleeves through partitions and non-rated construction shall be 26-gauge

galvanized steel with lock longitudinal seams, or approved plastic pipe.

3. Provide waterproofing membrane locking devices at floors. Provide 150 lb. slip-on welding flanges at exterior wall penetrations.

B. Duct Sleeves and Openings:

1. Sleeves through floors, through exterior structure, through fire-rated construction and through smoke partitions that require smoke dampers shall be Schedule 40 galvanized steel pipe for round duct and shall meet the SMACNA Fire Damper and Heat Stop Guide for rectangular ducts. Fireproof packing shall be applied to seal any openings between sleeve and wall. Materials shall maintain the fire rating of the wall, and shall be installed in accordance with the SMACNA Fire Damper and Heat Stop Guide.

2. Openings in walls, partitions and other fire-rated construction that do not require smoke dampers shall meet NFPA 90A, Section 3-3.8.

3. Materials for prepared openings in partitions shall match construction penetrated.

C. Pipe Sleeve Packing:

1. Packing between the pipe and the sleeve (or wall or slab opening) in fire-rated walls or slabs shall be a combination of fireproof insulation and fireproof caulk. The combination of materials shall have the same fire rating, in hours, as the wall or slab, as tested in accordance with the latest edition of ASTME-814 (UL 1479). The combination of materials shall be classified by UL, (fill, void or cavity materials) for the fire rating required and shall be listed as a numbered system in the UL Fire Resistance Director. Fiberglass shall not be used as the insulation material.

2. Acceptable fireproof insulation materials shall be: Kaolin (Kaowool by Babcock and Wilcox); ceramic fiber blanket (Fiberfrax by Standard Oil) or fire-rated material wool (Thermafiber by USG). Acceptable fireproof caulks shall be: Silicone (Firestop by Dow Corning, Hilti CS240); ceramic fiber (Fyreputty by Standard Oil) or intumescent synthetic elastomer (Fire Barrier Caulk by 3M, Hilti CS2420).

3. Packing for sleeves that do not require maintenance of fire rating shall be oakum, silicate foam, ceramic fiber or mineral fiber with approved sealant. Pack or foam to within 1" of both wall surfaces. Seal penetration packing with approved caulking and paintable waterproof mastic surface finish or silicone caulking.

4. All materials must be installed in accordance with manufacturer's instructions; all gaps must be sealed. Finish caulk flush with wall or slab surface if piping runs exposed.

D. Other Waterproof Pipe Penetrations:

1. Modular mechanical penetration seals shall be interlocking synthetic rubber links shaped to fill annular space continuously, with galvanized carbon steel bolts, nuts and pressure plates to expand rubber seal between pipe and sleeve. Sleeve seal shall be watertight.

2. Prefabricated modular sleeves shall be Mason Industries (SWS) or approved equal stiffened galvanized steel sleeves with preformed closed-cell elastomeric seal (non-fire-rated) or preformed mineral fiber or silicone seal (fire-rated).

3. Provide waterproof 1" single ring set in silicone and bolted to floor or wall at chipped and drilled penetrations of existing slabs-on-grade and existing walls-

below-grade.

2.03 ESCUTCHEONS AND DUCT COLLARS

A. Provide adjustable escutcheons on exposed piping that passes through finished floors, walls and ceilings. Escutcheons shall be chromium-plated cast brass, sized to cover sleeve opening and to accommodate pipe and insulation.

B. Provide 4" wide, 20 gauge galvanized sheetmetal collars at sleeves and prepare openings, sized to cover entire duct penetration including sleeve and seal, and to accommodate duct and insulation as necessary. Edges shall have milled lips ground smooth. Paint to match finish of duct or as directed by the Architect.

C. Provide #316 stainless steel/No. 4 finish collar for emergency generator exhaust piping which passes through exterior wall.

2.04 PIPING AND FITTINGS

A. General: Pipe materials and fitting materials shall be as indicated in Schedule of Pipe and Fitting Materials.

B. Schedule of Pipe and Pipe Fitting Materials:

Service	Systems Description	Pipe Size	Pipe Material	Joints	Fitting Material	Fitting Rating PSI/Class/ Weight
Hot Water	HWS/R	2" and under	Copper, B88, Type L or	Soldered 95/5 Tin/Antimony or Press	Wrought copper, B16.22	Class 150

1. Note 1: Grooved piping systems may be used in lieu of welded piping for CHWS/R and CWS/R, HWS/R systems for sizes 2-1/2" and over subject to the requirements listed in the Grooved Piping Section and in PART 4 of the Specification.

C. Connections:

1. Provide dielectric fittings at connections of dissimilar materials.

2. Provide eccentric reducing couplings to bring pipes flush on top for water service and flush on bottom for steam service.

3. Branch lines in welded piping shall be made with welding tees except that branch lines less than one half diameter of main may be made with Weld-O-Lets or Sock-O-Lets.

4. Nipples shall be same material, make and thickness as pipe with which they are used. Close nipples shall not be used.

5. Make piping connections 2-1/2" diameter and larger to valves and equipment with welding neck flanges, ANSI B16.5, pressure rating to match system, flat or raised face as required.

6. Make piping connections 2" diameter and smaller to valves and equipment with steel body, 300 psi brass seat unions on steel piping and with heavy semi-finished brass unions on copper tubing.

7. Fit flanged joints with Johns-Manville or approved equal full-face gaskets.

Flanges shall be faced and drilled to ASA standards and fitted with semi-finished hexagon machine bolts and nuts of proper number and size.

8. Make screw joints tight with Teflon (polytetrafluoroethylene) tape or litharge-glycerin mixture applied to male threads. Use tapered threads.

9. Make fusion welded joints as required by ANSI B31.1. Make changes in direction of pipe with welded fittings only. Bevel connections before welding, mechanically or by flame cutting.

2.05 CHEMICAL TREATMENT – WATER SYSTEMS

A. Provide treatment systems and service for primary water systems. Do not operate systems without water treatment. Water treatment chemicals shall be by Barclay, Dearborn, Olin or Mogul. Pump and chemical drums shall be by the manufacturers of the chemicals or Liquid Metronics. Dearborn and Liquid Metronics model numbers are used to establish standards of quality.

B. Provide piping necessary for complete systems.

C. Water treatment shall include feeding devices necessary to feed chemical solution into piping system and bring chemical properties of water to within manufacturer's recommended operating limits, in order to minimize corrosion and reduce buildup of slime or other contaminants.

D. Furnish and install a coupon rack capable of accepting six (6) coupons in each chemically treated system. The Chemical Treatment Contractor shall make recommendations as to the use of coupons and shall include the furnishing and analysis of the coupons/system (steel and copper) each month.

E. The closed loop systems (chilled water and heating hot water) shall have water treatment consisting of Dearborn Model Type AV By-Pass Shot Feeder, to feed chemical solution into each piping system. Chemicals shall be Dearborn B-524 (Nitride Corrosion Inhibitor) to maintain control limits at 800-1,000 parts per million of sodium nitrite). Below 1,000 gpm of system flow, a 5 gallon shot-feeder shall be provided. From 1,001 to 2,500 gpm, provide a 50 gallon tank, pump set and agitator.

F. Water treatment for open condenser water system shall consist of:

1. Equipment:

a. Provide one (1) Hydac Modu-Max Control System, or equal by Uniloc, Lakewood or Great Lakes consisting of:

1) Control box enclosure, NEMA 12 cabinet, 20 amperes 115V with internal circuit breakers.

2) PH-TDS Conductivity Monitor and Control Module.

3) Flow-through type probe assembly with flow control shutoff; pressurized, pre-piped and mounted.

4) Digital display and readout for conductivity and PH controller.

5) Electric contacting water meter.

6) Water meter totalizer.

7) Solenoid bleed valve, suitable for outdoor environment.

8) Counter timer control module for inhibitor feed.

9) Biocide programmable module – dual pumps.

b. Water meter and solenoid bleed valve shall be sizes as follows:

System Capacity	Solenoid Bleed Valve Size	Water Meter Size	Water Meter Gallons Per Contact
Less than 400 tons	3/4"	3/4"	10
401 – 900 tons	3/4"	1”	50
901- 1,500 tons	1”	1-1/2”	100
1,501 – 3,000 tons	1-1/2”	2”	100

c. Provide three (3) chemical metering pumps as follows:

1) System size under 900 tons: Liquid Metronics AISI-191S, 24 gpd, 110 psi.

2) System size above 900 tons: Liquid Metronics B111-95S, 30 gpd, 150 psi.

3) If local water conditions warrant, provide an additional caustic or acid pump, of capacities listed above.

2. Chemical:

a. Provide Dearborn C-381 cooling water inhibitor maintaining control limits of 100-125 parts per million and pH of 8.0 to 8.5.

b. Provide Dearborn A-100 and A-111 algaecides or provided equal.

G. Flush and clean all systems with Dearborn BC-45 cleaner after completion of installation. After cleaning, add Dearborn B-524 nitrite inhibitor to closed loop systems, control nitrite strength to 800-1,800 ppm maximum. Submit written report indicating that systems have been thoroughly cleaned and charged with corrosion inhibitor.

H. Effluent from HVAC system discharged to sewer shall meet requirements of applicable Local, State, and National Water Quality Standards.

I. One (1) year service shall include, but not be limited to, the following:

1. Delivery and maintenance of water treatment chemicals for one (1) year.

2. Collection and analysis of samples of circulating water every 30 days for one (1) year, and adjustments to the rate of chemical feed to suit each system.

3. Inspection and maintenance of chemical feeding devices for one (1) year. Inspection and maintenance should be performed at minimum intervals of every 30 days.

4. Water tests according to project requirements.

J. The Mechanical Contractor shall provide the steel support shelf for the chemical feed pumps.

K. Electrical Wiring and Controls Interlocking: Provide all necessary interlocking between solenoid bleed valve and respective conductivity controller. Provide power wiring for solenoid valves, pumps and controller.

L. Closed loop systems with glycol shall be filled to a 35% concentration of propylene glycol/water solution. An extra 55 gallon drum shall be provided to the Owner.

2.06 VALVES AND STRAINERS

A. Valves on hot water shall be 125 psi unless noted otherwise. Provide balancing valves where shown on Drawings.

B. Valves shall have name of manufacturer and guaranteed working pressure cast or stamped on bodies. Valves of similar type shall be by single manufacturer. Provide chain operators for valves 7 feet and higher above floor.

C. Provide butterfly valves for shutoff on hot water services 2-1/2" and larger. Do not use butterfly valves for balancing service.

1. Valves shall be rated 175 psi maximum working pressure, iron body, threaded-lug with resilient EPDM seats, bronze disc and 416 stainless stem by Centerline, DeZurik, Keystone or Bray.

2. Test valves at 110% of rated pressure.

D. Provide bronze-body ball valves with reinforced Teflon seats, seals, bearings and packing. Ball valves shall be used for hot water services in sizes 2" and smaller. Do not use ball valves for balancing service. Valves on insulated piping shall have 2" extended stems. Valves shall be as manufactured by Apollo, Cannon, Nibco, Milwaukee or Watts. Valves shall be rated 600 psi W.O.G.

E. Check valves sized 2-1/2" and larger shall be iron body, flanged ends, bronze mounted, swing pattern. Check valves 2" and smaller shall be bronze, screwed ends, swing pattern. Check valves for hot water, chilled water, and condenser water pump discharge shall be spring loaded, silent check, as manufactured by APCO, Milwaukee, Mueller or Stockham.

F. Relief valves shall be brass with external lever, ASME-approved. Pipe discharge to floor drain with open connection at floor. Pipe chiller refrigerant relief devices through roof to atmosphere.

G. Strainers:

1. Strainers 2" and smaller shall be 250 lb. bronze body, stainless steel, screen with 20 mesh screen opening, Y-pattern, screwed ends, as manufactured by Sarco Type BT, Mueller, Watts or Armstrong.

2. Strainers 2-1/2" and larger shall be 125 lb., cast iron body, stainless steel screen with manufacturer's recommended screen openings, Y-pattern, flanged, as manufactured by Sarco Type AF-125 or equivalent as manufactured by Mueller, Watts or Armstrong.

3. Provide blow-off valve on each strainer.

4. Pump suction strainers 2" and smaller shall have a 0.062 screen opening. Pump suction strainers 2-1/2" and larger shall have a 0.125 screen opening.

5. Strainer gaskets shall not contain asbestos.

H. Provide threaded vacuum breakers with ball, spring, O-ring flexible seat and screen. Ball shall be 440 stainless steel; seat shall be EPR. Spring shall be 316 stainless steel, screen and cap shall be 304 stainless steel and threaded collar shall be 416 stainless steel. Body shall be brass. Vacuum breakers shall be as manufactured by Johnson Series VB8 size 1-1/4 IPS, or equivalent by Watts or ITT Hoffman.

I. Provide unions for threaded end valves to facilitate removal from pipe.

J. Automatic Flow Control Valves:

1. Provide automatic pressure compensating flow control valves by Griswold, or Auto-flow where indicated on the Drawings. Valves shall have the capacities and pressure differential characteristics, as indicated, and conform to the following Specifications. Valves 2" and smaller shall be threaded bronze; valves

2-1/2” and larger shall be flanged iron or steel body.

2. Valves shall be factory set and shall automatically limit the rate of flow to required engineered capacity within + 5% accuracy over an operating pressure differential of at least 14 times the minimum required for control.

3. The control mechanism of the valve shall consist of self-contained, open-chamber cartridge assembly with unobstructed flow passages that eliminate accumulation of particles and debris. All internal working parts shall be stainless steel or nickel-plated brass. Body shall be ductile iron, cast iron, or bronze.

4. The cartridge assembly shall consist of a spring-loaded cup. The cup shall utilize the full available differential pressure across the valve to actuate the cup and, thereby, reduce friction and hysteresis and eliminate binding.

5. Valves shall be available in minimum of three (3) pressure differential ranges, with the minimum range requiring less than 2 psig to control flow. Valve bodies shall be provided with inlet and outlet tapings suitable for connection of instruments for verification of flow rates and temperature and shall be marked to show direction of flow. Valve bodies shall be rated for use at not less than 150% of system designed operating pressures.

6. Certified performance data for the flow control valve, based on independent laboratory tests, supervised and witnessed by a registered Professional Engineer, shall be available.

7. All flow control valves shall be supplied by a single source responsibility.

8. Each automatic flow control valve shall be furnished with a valve kit consisting of 1/4" x 2” minimum size nipples, quick-disconnect valves (to be located outside of insulation), and fittings suitable for use with the measuring instruments specified, as well as temperature.

9. Provide a metal identification tag, with chain, for each installed valve. The tag to be marked with zone identification, valve model number and rated flow in GPM.

10. Flow control valve shall be warranted for period of five (5) years from date of startup.

11. Provide Owner with dual hose meter kit including pressure gauge with 4-1/2” dial, 3-way push button operated valve, 5 foot long dual connection hoses, dual shutoff and vent valves, dual special valves for connection to standard valve kit, flow conversion chart and carrying case.

K. Suction Diffusers:

1. Suction diffusers/strainers shall have 200 psi cast iron body and stainless steel strainer with 5/32” perforations. Units shall include flanged connections, removable gasketed cover and straightening vanes. Diffusers shall be as manufactured by Taco, B&G or Mueller.

2. Provide 16 mesh startup strainer.

3. Provide blow-off tapping on bottom of unit.

4. Provide full size inlet and outlet.

L. Combination Balancing/Flow Measurement/Shut-off Valves:

1. Valves shall be Y-pattern style with multi-turn hand-wheel.

2. Valves shall be capable of being installed in any direction without affecting flow

measurement and shall provide the following functions:

a. Precise flow measurement.

b. Precision flow balancing.

c. Positive shut-off with no drip seat.

d. 3/4" drain port suitable for hose bib fitting. (Sizes 2” and below.)

3. Valves shall have four (4) 360° adjustment turns (2” and below) and eight (8) 360° adjustment turns (2-1/2” – 6”), twelve (12) 360° adjustment turns (8”, 10”), and sixteen (16) 360° adjustment turns (12”). Hand-wheels shall have digital indicators with hidden memory and tamper-proof setting features.

4. Valves 2” and below shall be non-ferrous, pressure die-cast, non-porous Ametal copper alloy, with soldered ends.

5. Valves 2-1/2” and over shall be ductile iron body with all other metal parts of non-ferrous copper alloy. End connections shall be flanged or grooved.

6. Pressure ratings shall be 300 psi for 2” and below, 250 psi for flanged and 300 psi for grooves ends.

7. Each valve shall have pressure/temperature readout ports with EPDM seals and attached shut-off valves.

8. One (1) computerized hand-held balancing meter shall be furnished to the Owner. The Testing and Balancing Contractor shall utilize this instrument for his work. The meter shall include the following:

a. Flow measurement direct in GPM.

b. Differential pressure measurement.

c. Temperature measurement.

d. Automatic calibration.

e. Automatic air pursing.

f. Extended data logging functions.

9. Balance valves 2” and under shall be Tour and Anderson Model STAS. Valves 2-1/2” and over shall be Tour and Anderson Models STAF-SG or STAG. The hand-held meter shall be Tour and Anderson Model CBI with PCB data logging features. Balance valves manufactured by Armstrong or Victaulic shall be considered equivalent.

2.07 PIPE INSULATION

A. Insulation shall be fibrous glass insulation with factory-applied fire retardant vapor barrier jacket by Owens Corning, Certain-Teed, Manville or Knauf, installed as required by manufacturer. ASTM E-84 fire hazard ratings shall be 25 flame spread, 50 smoke developed and 50 fuel contributed.

B. Apply insulation after systems have been tested, proved tight and approved by the Architect. Remove dirt, scale, oil, rust and foreign matter prior to installation of insulation.

C. Provide fibrous dual temperature insulation with factory applied vapor barrier jacket on condensate drain piping, unless noted otherwise.

D. Drain piping shall have 1/2" thick insulation.

E. Insulation Table:

TABLE C403.2.8
Minimum Pipe Insulation Thickness (thickness in inches)[a]

Fluid Operating Temperature Range and Usage (°F)	Insulation Conductivity		Nominal Pipe or Tube Size (Inches)				
	Conductivity Btu – In./(h . ft^2 . °F)[b]	Mean Rating Temperature, °F	<1	1 to <1½	1½ to < 4	4 to < 8	< 8
141 – 200	0.25 – 0.29	125	1.5	1.5	2.0	2.0	2.0
105 - 140	0.21 – 0.28	100	1.0	1.0	1.5	1.5	1.5
40 – 60	0.21 – 0.27	75	0.5	0.5	1.0	1.0	1.0
<40	0.20 – 0.26	75	0.5	1.0	1.0	1.0	1.5

1. For piping smaller than 1½ inch (38 mm) and located in partitions within conditioned spaces, reduction of these thicknesses by 1 inch (25 mm) shall be permitted (before thickness adjustment required in footnote b) but not to a thickness less than 1 inch (25 mm).

2. For insulation outside the stated conductivity range, the minimum thickness (T) shall be determined as follows:

   a. $T = r (1 + t/r)K/k – 1)$ where:

      1) T = minimum insulation thickness,

      2) r = actual outside radius of pipe,

      3) t = insulation thickness listed in the table for applicable fluid temperature and pipe size,

      4) K = conductivity of alternate material at mean rating temperature indicated for the applicable fluid temperature (Btu x in/h x ft 2 x °F) and

      5) k = the upper value of the conductivity range listed in the table for the applicable fluid temperature.

F. Provide longitudinal lap and 6” wide vapor barrier joint seal strips secured with approved adhesive.

G. Seal ends of pipe insulation and seal insulation to pipe with approved fire retardant vapor barrier, at flanges, valves and fittings and at intervals of no more than 21 feet on continuous runs of piping.

H. Secure covers on concealed pipe with metal bands at least 3/4" wide and no more than 18” apart, spaced to hold ends and center of each section.

I. Insulation on Fittings, Valves and Flanges:

1. Fittings, valves and flanges shall be insulated with pre-cut, factory-supplied fibrous glass, by Certain-Teed, Knauf, Owens Corning or Manville.

2. Fittings, valves and flanges shall be insulated with same material and to same thickness as adjoining pipe insulation.

3. Pipe fittings shall be pre-tested, clean and dry before insulation.

4. Installation of insulation on fittings shall be as follows, in order:

   a. Wrap insulation around fitting and tuck ends into fitting throat.

   b. Edges of adjacent insulation shall be tufted and tucked in, to fully insulate fitting to thickness of adjacent pipe insulation. Use two or more thicknesses if necessary.

   c. If two layers of insulation are used on fittings, wrap and secure first layer with twine before applying second layer.

   d. Top layer of insulation shall be covered with one (1) piece PVC, Zeston molded fitting cover. Secure cover with stainless steel tack fasteners inserted into jacket thread overlap seam.

   e. Tape joints with pressure-sensitive vapor barrier tape; tape shall extend 2" on either side of joint.

5. Prior to taping of joints on chilled water lines, apply vapor barrier mastic (brushed on) to fitting cover, throat overlap and edges. Also apply vapor barrier mastic to pipe insulation jacket ends.

6. For strainers and other valves or fittings which need maintenance, provide preformed removable insulation section.

2.08 CONDENSING HOT WATER BOILER

Elite XL Commercial Boiler Specification Sheet
Model: ELX-400FBN / 500 / 650 / 800 / 1000 / 2000

A. The boiler shall be an HTP, Inc. model_____ , having a modulation input range of Btu/Hr, and shall operate on either Natural Gas (NG) or Liquid Propane (LP) (2000 Models operate on Natural Gas (NG) ONLY). The boiler shall be capable of full modulation with a turndown ratio of up to 10:1.

B. The boiler heat exchanger shall be certified and stamped for 160PSI, and shall be National Board Listed. There shall be no banding material, bolts, gaskets, or "O" rings in the header configuration. The heat exchanger is removable from the cabinet for replacement without removing the entire boiler assembly from the site. The stainless steel combustion chamber shall be designed to direct condensate to the rear of the chamber to ensure that condensation does not collect in the boiler. The complete heat exchanger assembly shall have a ten (10) year limited warranty.

C. The boiler shall be certified and listed by ETL under the latest edition of the harmonized ANSI Z21.13 test standard for the US and Canada. The boiler shall comply with the energy efficiency requirements of the latest edition of the ASHRAE 90.1 Standard and the minimum efficiency requirements of the latest edition of the ASHRAE 103 Standard. The boiler shall operate at up to 97% thermal efficiency. The boiler shall be certified for indoor/outdoor installation. The boiler shall be constructed with a heavy gauge steel jacket assembly, primed and pre-painted on both sides. The boiler jacket shall afford easy access to all components through easily removable access doors to facilitate service of all components. The combustion chamber shall be sealed and completely enclosed, independent of the outer jacket assembly, so that integrity of the outer jacket does not affect a proper seal. A burner/flame observation port shall be provided. The burner shall be a premix design and constructed of high grade stainless steel with modulating firing rates. The boiler shall be supplied with a gas valve designed with negative pressure regulation and be equipped with a variable speed blower system to precisely control the fuel/air mixture to provide modulating boiler firing rates for maximum efficiency. The boiler shall operate in a safe condition at a derated output with gas supply pressures as

low as 3 ½ inches of water column.

D. The control customer connection board shall be equipped with two screw type terminal strips. One of the terminal strips is designated for low voltage connection inputs including thermostat, DHW sensor, system sensor, outdoor sensor, 0-10VDC, external low water cut off input signals. There are also two sets of Low Voltage Output 0-10 volt - A (Modulating Pump Output) and Low Voltage B (see the status of various parameters through 0-10VDC output for the Fan Speed - Boiler Power - Cascade Power Alarm Status or Target temperature). The other terminal strip is designated for 120-volt connections for incoming power, central heat pump (CH), DHW pump (indirect water heater), and system pump operation with additional double pole relay rated at 5 amp for Alarm Output. All three pump outputs are 2-amp fuse protected. The control cabinet will also include two RJ-45 style jacks for cascade communication bus wiring using CAT 5 or CAT 3 cables. All of these connections and fuses are accessed from the outside of the boiler by removing an access door. The electrical supply shall be 120 volt / 60 hertz / single phase on all models. Two additional electrical connections are provided internal to the boiler cabinet for the connection of optional high and low gas pressure switches. The boiler comes equipped with a certified UL-353 low water cut off (LWCO) safety with manual reset.

E. The boiler shall utilize a 120 VAC control circuit and components. The control system shall have a five inch (5”) color touch screen display for boiler setup, status, and diagnostics. All components shall be easily accessed and serviceable from the front, right, and left sides of the jacket. The boiler shall be supplied with a temperature/pressure gauge, optional high limit temperature control with manual reset, ASME certified pressure relief valve, outlet water temperature sensor, return water temperature sensor, blocked vent pressure switch, flue temperature sensor, built-in freeze protection, and a UL 353 LWCO. The boiler shall also be equipped with an outdoor temperature reset function.

F. The boiler shall feature the HTP Link system as standard equipment. HTP Link offers a WiFi web connection to remotely monitor boiler operation. HTP Link will also allow the user to change system parameters to maximize boiler efficiency and alert the user of system issues to aid in troubleshooting. The boiler shall include an ON/OFF power switch and feature the 928 intelligent control system with color touch screen display with graphic indicators for System Pump, DHW Pump, Boiler Pump, Pump Service Mode, Flame On, and Fault Indication. Pump operation and the combustion system can be manually operated to assist the installer in system commissioning. The control will have password protection for the installer to set limits and configure outdoor reset. The control will have freeze protection (which can be disabled for snowmelt applications), outdoor reset, indirect priority with operation time limits, and a 0-10V DC input for building management system (i.e. programmable to control either boiler temperature or firing). The boiler control shall have an optional gateway device which will allow integration of Modbus or BACnet Protocols. The boiler control is equipped for cascading up to eight boilers for greater system turndown and system backup.

G. The boiler shall be equipped with a condensate collection system equipped with an internal float switch which will protect the boiler from condensation backing up into the combustion chamber. The condensate collection system will be equipped with a 2” NPT threaded cleanout port to allow for easy cleaning and sediment removal.

H. The boiler will have a sealed combustion system, taking outside air for combustion and exhausting the flue gas with a stainless steel adapter for 4" Category IV Stainless Steel, PVC, CPVC, or Polypropylene (400 / 500 models) or 6” Category IV Stainless Steel, PVC CPVC, or Polypropylene (650, 800 and 1000 models). The boiler's total combined equivalent vent length, including fitting allowances for both intake and exhaust, shall not

exceed 125 feet. The vent connections shall be located on the top of the boiler to allow for optional wall mounted installations.

I. The boiler can be vented in many methods, including:

1. **Horizontal Venting** shall be done as a balanced system only. Both intake and exhaust must terminate on the same side of the building.

2. **Vertical Venting** shall be done either as a balanced or unbalanced system. An unbalanced system shall ONLY be allowed when the exhaust is installed vertically and the intake horizontally. Both exhaust and intake must remain within the boiler's combined equivalent length.

3. **Indoor Combustion Venting from a Confined or Unconfined Space** – Where the exhaust runs vertically and combustion air is drawn either from the mechanical room or from outdoors.

4. Adequate combustion air must be supplied when drawing air from the mechanical room. Avoid the room contaminants listed in the installation manual. (Refer to appliance installation manual venting section for additional venting requirements.)

J. CAUTION: Foam core pipe is NOT an approved material for either intake or exhaust piping.

K. The boiler shall be in compliance with the NOx emissions limit set forth in SCAQMD Rule 1146.2. The manufacturer shall verify proper operation of the burner, the combustion and control systems, as well as all related safety functions, to ensure the boiler will operate based on its designed parameters before shipping. Complete operating and installation instructions shall be furnished with every boiler as packaged by the manufacturer for shipping.

L. The appliance shall operate at high elevations without additional parts. However, adjustments to the combustion system may be required at any elevation. See installation manual for combustion system setting details.

M. Maximum unit dimensions shall be length____inches, width____inches, and height inches. Maximum unit weight shall be____pounds.

N. **NOTE: Due to variations in CSD-1 requirements from state to state, please consult with the factory for all controls required in your jurisdiction.**

2.09 VARIABLE SPEED PUMPS

A. Summary

1. Section Includes:

a. Wet-rotor pumps.

B. Definitions

1. ECM: Electronically commutated motor.

2. EPDM: Ethylene propylene diene monomer.

3. EPR: Ethylene propylene rubber.

4. EPT: Ethylene propylene terpolymer.

5. FKM: Fluoroelastomer polymer.

6. HI: Hydraulic Institute.

7. NBR: Nitrile rubber or Buna-N.
8. ODP: Open, drip proof.
9. TEFC: Totally enclosed, fan-cooled.
10. TENV: Totally enclosed, non-ventilated.
11. VFD: Variable-frequency controller.

C. Action Submittals

1. Product Data: For each type of pump.
    a. Include published performance curves and rated capacities, operating characteristics, furnished specialties, final impeller dimensions, and accessories for each type of product indicated.
    b. Indicate pump's operating point on curves.
2. Shop Drawings: For each pump.
    a. Show pump layout and connections.
    b. Include setting drawings with templates for installing foundation and anchor bolts and other anchorages.
    c. Include diagrams for power, signal, and control wiring.
3. Delegated Design Submittal: For each pump.
    a. Design calculations and vibration isolation base details, signed and sealed by a qualified professional engineer.
        1) Design Calculations: Calculate requirements for selecting vibration isolators and for designing vibration isolation bases.
        2) Vibration Isolation Base Details: Detail fabrication, including anchorages and attachments to structure and to supported equipment. Include adjustable motor bases, rails, and frames for equipment mounting.

D. Informational Submittals

1. Coordination Drawings: Plans, or BIM model, drawn to scale, showing the items described in this Section, and coordinated with all building trades.
2. Seismic Qualification Data: Certificates for pumps, accessories, and components.
    a. Basis for Certification: Indicate whether withstand certification is based on actual test of assembled components or on calculation.
    b. Dimensioned Outline Drawings of Equipment Unit: Identify center of gravity and locate and describe mounting and anchorage provisions.
    c. Detailed description of equipment anchorage devices on which the certification is based and their installation requirements.
3. Field quality-control reports.

E. Closeout Submittals

1. Operation and Maintenance Data: For pumps to include in operation, and maintenance manuals.

F. Maintenance Material Submittals

1. Furnish spare parts that match products installed and that are packaged with protective covering for storage and identified with labels describing contents.
    a. Seal Kit: mechanical seal kit(s) for each pump.
    b. Bearings.
    c. Gaskets.

G. Performance Requirements

1. Provide pumps and associated equipment that are in compliance with energy conservation guidelines published in 2020 by the U.S. Department of Energy Rulemaking Committee for commercial and industrial pumps.
2. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70, by a qualified testing agency, and marked for intended location and application.
3. Delegated Design: Engage a qualified professional engineer, as defined in Section 014000 "Quality Requirements," to design vibration isolation.
4. Seismic Performance: Pumps to withstand the effects of earthquake motions determined in accordance with **ASCE/SEI 7**.
    a. The term "withstand" means "the unit will remain in place without separation of any parts from the device when subjected to the seismic forces specified[**and the unit will be fully operational after the seismic event**]."
    b. Component Importance Factor: [**1.5**] [**1.0**].
    c. <Insert requirements for Component Amplification Factor and Component Response Modification Factor>.F
5. Wet Rotor Pumps
    a. Basis-of-Design Product: Subject to compliance with requirements, provide Taco Comfort Solutions, Inc.; VR15 Series or comparable product by one of the following:
        1) Bell & Gossett.
        2) Thrush Co. Inc.
        3) <Insert manufacturer's name>.
    b. Source Limitations: Obtain pumps from single source from single manufacturer.
    c. Description: Factory-assembled and -tested, wet-rotor pump. Pump and motor to form an integral unit with bearings lubricated by the pumped liquid.
    d. Pump Construction:
        1) Body: Cast iron.
        2) Impeller: Type 304 stainless steel.
        3) Pump Shaft: Stainless steel.
        4) Bearings. Metal-impregnated carbon.
    e. Motor: Single speed.

1) Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70, by an NRTL, and marked for intended location and use.

2) Comply with NEMA designation, temperature rating, service factor, and efficiency requirements for motors specified in Section 230513 "Common Motor Requirements for HVAC Equipment."

3) ECM type.

f. Capacities and Characteristics:

1) Capacity: <Insert **gpm (L/s)**>.

2) Total Dynamic Head: <**Insert feet (kPa)**>.

3) Maximum Operating Pressure: **150 psig**.

4) Maximum Continuous Operating Temperature: [**225 deg F (107 deg C)**] [**230 deg F (111 deg C)**] <Insert temperature>.

5) Inlet and Outlet Size: <**Insert NPS (DN)**>.

6) Impeller Size: <**Insert inches (mm)**>.

7) Motor Speed: <**Insert rpm**>.

8) Motor Horsepower: <**Insert value**>.

9) Electrical Characteristics:

a) Volts: 120 V.

b) Phase: Single.

c) Hertz: 60 Hz.

H. Examination

1. Examine equipment foundations and anchor-bolt locations for compliance with requirements for installation tolerances and other conditions affecting performance of the Work.

2. Examine roughing-in for piping systems to verify actual locations of piping connections before pump installation.

3. Proceed with installation only after unsatisfactory conditions have been corrected.

I. Pump Installation

1. Comply with HI 14.4 and HI 2.4.

2. Install pumps to provide access for periodic maintenance including removing motors, impellers, couplings, and accessories.

3. Where required, independently support pumps and piping so weight of piping is not supported by pumps and weight of pumps is not supported by piping.

4. Equipment Mounting:

a. Comply with requirements for vibration isolation and seismic-control devices specified in Section 230548 "Vibration and Seismic Controls for HVAC."

b. Comply with requirements for vibration isolation devices specified in

Section 230548.13 "Vibration Controls for HVAC."

5. Equipment Mounting: Install in-line pumps with continuous-thread hanger rods and spring hangers of size required to support weight of in-line pumps.
    a. Comply with requirements for seismic-restraint devices specified in Section 230548 "Vibration and Seismic Controls for HVAC."
    b. Comply with requirements for hangers and supports specified in Section 230529 "Hangers and Supports for HVAC Piping and Equipment."

J. Alignment

1. Engage a service representative to perform alignment service.
2. Perform alignment service. When required by manufacturer to maintain warranty coverage, engage a factory-authorized service representative to perform it.
3. Comply with pump and coupling manufacturers' written instructions.
4. After alignment is correct, tighten foundation bolts evenly but not too firmly. Completely fill baseplate with nonshrink, nonmetallic grout while metal blocks and shims or wedges are in place. After grout has cured, fully tighten foundation bolts.

K. Piping Connections

1. Where installing piping adjacent to pump, allow space for service and maintenance.
2. Connect piping to pumps. Install valves that are same size as piping connected to pumps.
3. Install suction and discharge pipe sizes equal to or greater than diameter of pump nozzles.
4. Install check, shutoff, and throttling valves check valve and throttling valve with memory stop triple-duty valve on discharge side of pumps.
5. Install Y-type strainer and shutoff valve on suction side of pumps.
6. Use startup strainer for initial system startup. Install permanent strainer element before turnover of system to Owner.
7. Install pressure gauges on pump suction and discharge or at integral pressure-gauge tapping, or install single gauge with multiple-input selector valve.
8. Install check valve on each condensate pump unit discharge unless unit has a factory-installed check valve.

L. Electrical Connections

1. Connect wiring in accordance with Section 260519 "Low-Voltage Electrical Power Conductors and Cables."
2. Ground equipment in accordance with Section 260526 "Grounding and Bonding for Electrical Systems."
3. Install electrical devices furnished by manufacturer, but not factory mounted, in accordance with NFPA 70 and NECA 1.
4. Install nameplate for each electrical connection, indicating electrical equipment designation and circuit number feeding connection.

a. Nameplate to be laminated acrylic or melamine plastic signs, as specified in Section 260553 "Identification for Electrical Systems."

b. Nameplate to be laminated acrylic or melamine plastic signs with a black background and engraved white letters at least 1/2 inch (13 mm) high.

M. Control Connections

1. Install control and electrical power wiring to field-mounted control devices.

2. Connect control wiring in accordance with Section 260523 "Control-Voltage Electrical Power Cables."

N. Startup Service

1. [Engage a factory-authorized service representative to perform] [Perform] startup service.

a. Complete installation and startup checks in accordance with manufacturer's written instructions.

b. Check piping connections for tightness.

c. Clean strainers on suction piping. Use startup strainer for initial startup.

d. Perform the following startup checks for each pump before starting:

1) Verify bearing lubrication.

2) Verify that pump is free to rotate by hand and that pump for handling hot liquid is free to rotate with pump hot and cold. If pump is bound or drags, do not operate until cause of trouble is determined and corrected.

3) Verify that pump is rotating in correct direction.

e. Prime pump by opening suction valves and closing drains, and prepare pump for operation.

f. Start motor.

g. Open discharge valve slowly.

O. Field Quality Control

1. Testing Agency: Engage qualified testing agency to perform tests and inspections.

2. Manufacturer's Field Service: Engage a factory-authorized service representative to test and inspect components, assemblies, and equipment installations, including connections.

3. Perform tests and inspections with the assistance of a factory-authorized service representative.

4. Hydronic pumps will be considered defective if they do not pass tests and inspections.

5. Prepare test and inspection reports.

P. DEMONSTRATION

1. Train Owner's maintenance personnel to adjust, operate, and maintain hydronic pumps.

2.10 PIPE HANGERS AND SUPPORTS

A. Provide pipe stands, supports, hangers and other supporting devices in accordance with ANSI B31.9 and MSS-69, as necessary to support work required by Contract Documents.

B. Secure vertical piping to building construction to prevent sagging or swinging.

C. Space hangers for horizontal piping as follows:

Pipe Size	Rod Diameter	Maximum Spacing
Up to 1-1/4”	3/8”	6 ft.-0”
1-1/2” and 2”	3/8”	8 ft.-0”
2-1/2” and 3”	1/2"	9 ft.-0”
4” and 5”	5/8”	12 ft.-0”
6”	3/4"	12 ft.-0”
8” and over	7/8”	12 ft.-0”

D. Horizontal copper tubing shall have maximum hanger spacing of 5 ft. for tubing 1-1/4” diameter and smaller and 10’ for tubing 1-1/2” and larger. Maximum spacing for PVC pipe hanger shall be 4”.

E. Reduce spacing to a maximum of 10’-0” apart, regardless of pipe size, as necessary for fittings, valves and other concentrated loads.

F. Support piping 4” diameter and larger from structure with pipe roll hangers with adjustable steel rod hangers, sized to accommodate insulation.

G. Support piping 3” diameter and under from structure with Carpenter and Patterson Fig. 100 clevis hangers or approved equal.

H. Hangers shall be as manufactured by Carpenter and Patterson, F&S or Grinnell Co. Figure numbers of Carpenter and Patterson are specified to establish standards of quality for performance and materials.

I. Provide spring hangers with travel stops as specified in Vibration Isolation Paragraph, where necessary and where shown on Drawings.

J. Pipe supports for 4” and larger pipe and insulated high-temperature piping shall have welded inserts of equal thickness to insulation to prevent compression of insulation. Other insulated pipe shall have 12”, 14 ga. shields at hangers, composed of 180° coverage of galvanized sheetmetal and high density, preformed rigid insulation. Where rollers are required, shield shall be steel pipe.

K. Hangers for horizontal lines shall be vertically adjustable to obtain pitch requirements of Piping Paragraph.

2.11 CABINET UNIT HEATER (ELECTRIC)

A. Furnish and install electric cabinet unit heaters as shown and scheduled on the drawings. Units shall be as manufactured by Qmark, Berko, King or an approved equal. Unit heater power ratings and voltages shall match the schedules and be coordinated with the electrical plans.

B. Construction:

1. Heater assembly shall fit into a backbox and consist of all operational parts mounted to a fan panel.

2. Heating elements shall be of the non-glowing design consisting of an 80/20 nickel-chromium resistance wire enclosed in a steel sheath with copper brazed plat fins.

3. Fan shall be five-bladed aluminum.

4. Fan motor shall be totally enclosed.

5. Backbox shall be designed as a recessed rough-in type for masonry or frame installations or to be surface mounted with option frame. Box shall be 20 gauge galvanized steel and contain knockouts through which power leads are brought.

6. Front panel shall be a bar grille type constructed of 10 gauge cold-rolled steel, welded into a uniform grille and finished in a baked enamel paint.

C. Features:

1. Thermal Cutout: built into the system to shut down heater in the event of over-heating.

2. Disconnect Switch: double pole single throw type mounted on the back box for positive disconnect of unit power supply (completely concealed behind front cover).

3. Heater shall be 3-Piece Design: Backbox, heater assembly, and front panel.

4. Fan Delay Switch: shall be of bi-metallic, snap-action type and shall activate fan after heating element reaches operating temperature. Fan shall operate after thermostat is satisfied and until the heating element is cool.

5. Thermostat: tamper-proof and completely concealed behind the front cover, shall be bi-metallic, snap-action type with enclosed contacts.

D. Options (provide as scheduled):

1. Pneumatic/Electric Switch: Available for use with energy management systems employing pressure devices.

2. Low voltage relays: Normally open 24 volt and 120 low voltage holding coil relays for use on higher voltage units for temperature control integration.

3. 1 inch or 2 inch deep surface mounting frames (for surface mounted heater applications).

4. 14 gauge security front cover.

2.12 ELECTRIC UNIT HEATERS

A. Provide electric unit heaters of horizontal discharge type, by Q Mark, Markel, or King, as shown on Drawings and on Schedules.

B. Casings shall be heavy gauge steel with mounting bracket.

C. Horizontal heaters shall have adjustable steel discharge louvers.

D. Electric motor shall have integral overload protection and shall be equipped with combination fan guard/motor support resiliently mounted to absorb motor vibration.

E. Fan blades shall be aluminum directly connected to fan motor and shall be dynamically balanced.

F. Fan switching shall be available to operate fan independently for summer circulation.

G. Automatic reset thermal overheat protection shall be wired for instantaneous pilot operation of built-n control contractor holding coil.

2.13 GAS UNIT HEATERS

A. Provide AGA certified gas unit heaters with gravity venting, of capacities and in

locations shown on Drawings, by Modine, Reznor or Trane.

B. Provide the following:

1. Aluminized steel heat exchanger and burner.
2. Connection to 24 volt thermostat, including transformer, automatic gas valve, pilot line filter, pressure regulator, pilot shutoff and manual shutoff.
3. Baked-on enamel finish.
4. Horizontal and vertical directional louvers.
5. Totally enclosed fan motor.
6. Safety fan guard.
7. Draft diverter.
8. Fan delay switch.
9. Burner air shutters.
10. Electric ignition intermittent gas pilot system.

2.14 GAS DETECTION SYSTEM

A. General: The Gas detection system shall be by Intec, Toxalert, ACME, Honeywell, or equal.

B. The Digital Control Panel shall provide continuous monitoring and display of the gas levels and control the ventilation system via digital and analog outputs in accordance with all applicable codes and standards.

1. The Digital Control Panel shall provide optional upward communication via BACnet communication protocol to any compatible electronic control, DDC/PLC control or automation system. Connection shall be capable at any point on the trunk.
2. The Digital Control Panel shall be capable of having 1 to 8 communication trunks, each with full trunk protection for the RS-485 and DC power. The trunks shall be capable of any distance with the appropriate number repeaters/power boosters.
3. The Digital Control Panel shall have the capability to accept at least 48 CO/NO2 sensor/transmitter pairs.
4. The Digital Control Panel shall provide for 5-stage thresholds for each sensor. To create zones of control, any of the (5) stages for any sensor can be assigned to any one or multiples of up to (30) local (at the controller panel) or remote relay outputs. Each remote relay module shall be able to perform on/off control and/or to control VFDs via analog outputs. The input to output connections shall be programmable in the field. Each sensor shall have a user-defined hysteresis value to prevent rapid cycling into and out of alarm stages.
5. The Digital Control Panel must provide user-defined start and stop delays and user-defined minimum on and off times. Start and stop delays shall be used to prevent fan starts upon detection of brief spikes in gas concentration. Minimum on and minimum off times shall be used to prevent short cycling of the fans.
6. The Digital Control Panel must provide fail-safe control whereby any sensor failure shall cause a pre-defined fan or fans to run.
7. The Digital Control Panel shall have (4) digital inputs that can be assigned for

override or remote reset of the relays.

8. The operator shall be able to connect to the controller or to any digital sensor on the system via laptop to enable programming of all controller parameters and also allow display of all sensor values including alarm levels. This data can also be saved in historical csv files with time and date.

9. To facilitate system startup and lifecycle maintenance, the system shall be capable of recording sensor values, alarms and system events.

    a. Sensor values shall be recorded for all active channels at a user defined interval between once every 10 seconds and once every two (2) hours. The sensor value file must record the readings in scaled engineering units (i.e.: PPM, %LEL, etc.) and indicate with error codes in appropriate cells if the sensor is locked (alarms inhibited), if data is unavailable due to a communication error, or if the reading of an analog channel is below 3mA.

    b. The alarm data file shall contain a time and date stamped entry each time any sensor crosses an alarm threshold both in the direction of the alarm or in the direction of return-to-normal (including hysteresis). Each alarm entry shall identify the sensor address, the gas type, the sensor reading, all currently exceeded threshold values for the channel and the relay number that is associated with each threshold alarm.

    c. The system event log file shall record communication errors and system power resets.

        1) Data files shall be stored on commercially available, non-volatile, removable media such as a USB flash drive, in CSV or other non-proprietary text file format. For security purposes, the memory device shall not be visible when the controller is in its normal operating state. To ensure that file sizes do not exceed the limits of any analytic software, all files shall contain data for no more than one calendar day and sufficient storage shall be provided to log all channels at 1 minute intervals for one calendar year. Controllers or auxiliary data logging devices that record data in a proprietary format or which require proprietary software for viewing or analysis shall not be accepted.

10. Periodic sensor/transmitter calibration and system recommissioning is required to keep the Gas Detection and Control System in its optimum working condition. The System must be capable of generating calibration reports documenting the “as found” and “as left” zero and span readings for each sensor/transmitter as well as diagnostic information indicating the sensor element’s remaining effective life. Systems requiring replacement of sensors or sensor modules at fixed intervals are not acceptable due to their high lifecycle maintenance cost. The Gas Detection and Control System supplier must provide a system test certificate which the installation and/or service contractor will issue to the System Owner at the time of initial commissioning and lifecycle recommissioning to document the condition and functionality of the System.

11. The Digital Control Panel shall have a 90db audible alarm assignable to stage level S1, S2, S3, S4, or S5. An external manual reset switch via the digital input or through the control panel menu shall acknowledge the alarm.

12. The Digital Control Panel shall have status indicator LEDs located on the front; Green = Power On, Flashing Red = Alarm, Flashing Yellow = Fault/Sensor

Failure.

13. The Digital Control Panel shall have a supply output of 24VDC available for remote horn/strobes.

14. The Digital Control Panel parameters shall be password protected. There shall be four password levels to allow operation without modifying critical parameters.

15. The Digital Control Panel shall include an LCD display. The controller shall sequentially display the current measured gas level for each activated sensor/transmitter with a visual indication of whether the reading is "normal" or "alarm". Via menu/pushbutton commands, the Controller must be able to identify all sensors currently in alarm.

16. The Digital Control Panel must monitor all communications and health of the system. Up to 20 system errors must be stored for review by the operator and also stored in history for review by the service technician.

17. The Digital Control Panel shall be NRTL performance tested and certified to ANSI/UL 2017.

18. The contractor shall supply the PolyGard® Series DGC5 Digital Control Panel, by INTEC Controls (a Relevant Solutions brand).

C. Carbon Monoxide (CO) Sensor/Transmitter:

1. The carbon monoxide (CO) gas sensor/transmitter shall provide monitoring of the carbon monoxide levels in the parking garage and control the ventilation system via the Digital Gas Controller (DGC5) and BAS in accordance with all applicable codes and standards.

2. The sensors shall be electrochemical type. The sensor/transmitter shall have plug-in technology for ease of troubleshooting and replacement of both the element and the printed circuit board. Solid-state sensors or air sampling devices shall not be acceptable.

3. The sensor range shall be 0-250 ppm carbon monoxide. A microprocessor-based transmitter shall communicate over serial bus. The wiring between the transmitter and the controller (DGC5) shall be a 4-wire, polarity protected daisy-chained networked configuration. Communication circuitry shall be protected from accidental application to maximum of 30V power and also short circuit and surge protection to the serial bus.

4. Each carbon monoxide sensor/transmitter shall cover between 5,000 and 10,000 square feet of the garage floor and placement shall be applied strategically and appropriately per floor plan requirements.

5. The sensor shall have stability and resolution of 3.0 ppm of reading; repeatability ±3.0% of reading; long term output drift < 0.4% signal loss/month; response time t90 < 50 sec.; and sensor life expectancy of at least 5 years in normal operating conditions, the permissible ambient working temperature shall be 14°F to 104°F and permissible ambient humidity shall be 15 to 95% RH, non-condensing. The sensor shall require no routine maintenance other than periodic calibration. The manufacturer shall provide a two-year warranty for materials and workmanship.

6. Each digital sensor/transmitter printed shall have the capability of adding one (1) 4-20 mA transmitter input to monitor temperature, humidity or any other gas.

7. The sensor/transmitter shall be contained in a NEMA4X enclosure for protection from dirt and water and to prevent vandalism. The enclosure for the sensor

/transmitter shall be installed on walls or columns approximately 5 feet AFF.

8. The sensor/transmitter shall be NRTL performance tested and certified to ANSI/UL 2075.

9. The sensor shall be able to be addressed and calibrated with a digital programming tool (DPT). The DPT shall be capable of determining the remaining life of the sensor element. Potentiometer calibration is not acceptable. While performing calibration at the sensor it shall be possible to communicate with the controller to change any parameters and to visually see the status of all other sensors.

10. If the level of Carbon Monoxide reaches 25 PPM in the area of detection, the low alarm shall activate and the exhaust fans will be started. If the level of CO increases to 100 PPM, the high alarm shall activate.

11. The contractor shall supply the PolyGard® Series DT5-1112 CO sensor/transmitter, by INTEC Controls (a Relevant Solutions brand).

D. Nitrogen Dioxide (NO2) Sensor/Transmitter:

1. The nitrogen dioxide (NO2) gas sensor/transmitter shall provide monitoring of the nitrogen dioxide levels in the parking garage and control the ventilation system via the Digital Gas Controller (DGC5) and BAS in accordance with all applicable codes and standards.

2. The sensors shall be electrochemical type. The sensor/transmitter shall have plug-in technology for ease of troubleshooting and replacement of both the element and the printed circuit board. Solid-state sensors or air sampling devices shall not be acceptable.

3. The sensor range shall be 0-10 ppm nitrogen dioxide. The microprocessor-based transmitter shall communicate with the nearest carbon monoxide transmitter via an analog 4-20mA signal.

4. Each nitrogen dioxide sensor/transmitter shall cover between 4,000 and 6,000 square feet of the garage floor and placement shall be applied strategically and appropriately per floor plan requirements.

5. The sensor shall have stability and resolution of ±0.1 ppm; repeatability ± 2.0% of reading; long term output drift < 2.0% signal loss/month; response time t90 < 60 sec; sensor life expectancy ≥ 2 years; permissible ambient working temperature shall be 14°F to 104°F and permissible ambient humidity shall be 15 to 95% RH, non-condensing. The sensor shall require no routine maintenance other than periodic calibration. The manufacturer shall provide a two-year warranty for materials and workmanship.

6. The sensor/transmitter shall be contained in a NEMA4X enclosure for protection from dirt and water and to prevent vandalism. The enclosure for the sensor /transmitter shall be installed on walls or columns approximately 2 feet AFF.

7. If the level of nitrogen dioxide reaches 2 PPM in the area of detection, the low alarm shall activate and the exhaust fans will be started. If the level of NO2 increases to 4 PPM, the high alarm shall activate. Where VFD's are used analog output must be provided locally to ramp up the VFD based on concentration level.

8. The contractor shall supply the PolyGard® Series AT-1130 NO2 sensor/transmitter, by INTEC Controls (a Relevant Solutions brand).

E. Supplier: The contractor shall provide the controller all sensors by one manufacturer. The PolyGard® Series DGC5 digital controller and remote sensor by INTEC Controls (a Relevant Solutions brand) shall be the basis of design.

F. Warranty: The manufacturer shall provide a 1-year warranty for materials and workmanship.

G. Inspection:

1. General: Examine areas and conditions under which the gas monitoring and control system shall be installed. Related items shall be examined as well.

H. Control Sequence:

1. The controller shall operate according to the Specifications recommended by the manufacturer. The operation shall be as follows:

a. The controller shall be factory set to 25 PPM for CO and 2PPM for NO2 for the low alarm and 100 PPM for CO and 5 PPM for NO2 for the high alarm.

b. The controller shall continuously detect the surrounding air for any traces of carbon monoxide gas.

c. When 25 PPM CO and or 2 PPM NO2 is reached, the sensor shall activate the low alarm relay and the corresponding devices, such as the exhaust fans, dampers, etc.

d. If the gas level continues to increase to 100 PPM CO and or 5 PPM NO2 after 10 minutes (field adjustable), the high alarm shall activate the associated remote devices, such as the horn/strobe and any other audio/visual alarms, etc.

e. The sensor shall continue to monitor the specified gas and it shall not be possible to reset the alarm until the gas level has dropped either 4 or 10% below the alarm set points, as selected.

f. Where VFD's are used the analog output will be used to proportionally speed up the exhaust fan.

I. Operation and Maintenance Manuals:

1. The operation and maintenance manuals shall contain all information necessary for the operation, maintenance, replacement, installation, and parts procurement for the entire gas detection system. This documentation shall include specific part numbers.

J. Calibration/Verification:

1. Calibration shall not be necessary to verify system operation. The user shall verify operation by applying the appropriate test gas to the corresponding sensor. The calibration kit can be used for system verification or sensor calibration when required. The contractor shall provide one calibration kit per gas to be monitored and turn them over as part of their close out documentation.

2.15 LOUVERS

A. General: Provide stationary drainable blade style architectural louvers as shown on the drawings and based on the drawing schedules as manufactured by Greenheck, Ruskin, or an approved equal. All louvers shall be designed to protect air intake and exhaust openings in building exterior walls. Design shall incorporate a drainable head member

and stationary horizontal blades to channel water to the jambs and guide water through vertical downspouts to escape at the sill. All louver finishes shall be coordinated with the Project Architect or Building Owner prior to final submittal to the Engineer.

B. Construction:

1. Frame: Heavy gauge extruded 6063-T5 aluminum, 4 inch nominal wall thickness.
2. Blades: Drainable design, heavy gauge extruded 6063-T5 aluminum, 0.081 inch nominal wall thickness, positioned at 37 degree and 45 degree angles on approximately 4 inch centers.
3. All components mechanically fastened.
4. Birdscreen: 3/4 inch by 0.051 inch flattened expanded aluminum in removable frame, inside mount.

C. Performance: Based on testing in standard air conditions – 0.075 lb./cubic foot, beginning point of water penetration shall be no less than 1007 feet/minute free air velocity. Individual louver panels shall be capable of withstanding a 25 pound/square foot wind load.

D. Certifications: All louvers shall be AMCA certified and may bear the AMCA Seal for air performance and water penetration ratings in accordance with AMCA publication 511.

E. Options: Where shown or scheduled, provide the following options or accessories.

1. Insect screens.
2. Blank-off panels.
3. Extended sills.
4. Filter racks.
5. Flanged frames.
6. Hinged frames.
7. Security bars.
8. Welded construction.
9. 0.125 inch nominal thick louver walls.
10. Architectural Finishes:
    a. Clear anodized.
    b. Integral color anodized.
    c. Baked enamel paint.
    d. Kynar paint.

2.16 CENTRIFUGAL FANS

A. Provide centrifugal fans by Chicago, Cook, Trane, ILG, Barry, Greenheck, New York Blower with welded steel housing and wheel, balanced dynamically and statically. Fans shall be AMCA-certified and sealed.

B. Backdraft dampers shall not be provided when fans are specified or scheduled to be equipped with automatic control dampers in or immediately below curb.

C. Provide V-belt, variable-pitch drives for + 10% speed variation and with spring loaded

belt tensioner.

D. Fans shall have centrifugal with backward-curved blades fan connected to electric motor so selected that in no instance can fan motor be overloaded at capacities shown on schedule on Drawings. Provide open drip-proof motor on adjustable base. Motors shall be high or premium efficiency type. See "Motors and Starters" paragraph of this Specification for required efficiencies and other requirements.

E. Provide V-belt (direct) drives sized as recommended by manufacturer. Belt construction shall be rubber and cord. Belt sets shall be matched for length. Belt capacity shall be 150% of motor horsepower rating. Sheaves shall be cast and machined iron or steel larger than minimum diameters recommended for particular belt. Sheaves shall be balanced dynamically and statically.

F. Provide belt guards of 18 gauge steel mesh or perforated or expended steel sheets with angle frames and galvanized steel or iron trim, rigidly-braced. Provide ports for tachometer speed measurements at fan shafts.

G. Provide spring vibration isolation bases as shown on Drawings and specified in Vibration Isolation Paragraph.

H. Provide variable inlet vanes.

2.17 PROPELLER FANS

A. Provide where shown on Drawings propeller fans of sizes and capacities listed in schedule.

B. Fans shall be tested and performance-rated as required by AMCA and shall bear AMCA seal.

C. Propellers shall be statically and dynamically balanced and set in deep spun Venturi orifice.

D. Fans shall be provided with following:

1. Cast aluminum blades, designed for intended duty and factory-adjusted for pitch, non-overloading.

2. Phosphatized panels with high gloss enamel coating.

3. Matching self-acting back draft damper, unless otherwise shown on Drawings.

4. Expanded metal OSHA fan guard.

E. Provide pre-lubricated, self-aligning pillow block ball bearings and belt-tensioning variable pitch pulleys for belt-driven fans.

F. Fans shall be by Penn, New York Blower, Peerless, Jenn-Air, Greenheck, ILG, Cook, ACME, Hartzell, or Aerovent.

2.18 AUTOMATIC TEMPERATURE CONTROL

A. General: Furnish and install control components for a complete control system as specified herein and as shown on the plans. The system shall include all thermostats, sensors, controllers, dampers and damper actuators, and other accessories required for a complete installation, and electrical work incidental to the operation of the control system. Power sources shall be provided by the electrical subcontractor as specified herein.

B. Wiring: Furnish and install all electrical work including interlock and control wiring necessary for the control system interface wiring with the unit operation. Any step down

voltage transformers shall be furnished. All interlock wiring shall be provided by this contractor. The wiring and raceway system shall comply to the requirements of "NEC" and electrical specifications.

C. Power sources by electrical contractor: For use by the control manufacturer, the electrical subcontractor will furnish and install power sources as follows: 120/1/60 phase power with 24 volt transformer at each unit control panel location. Mechanical contractor shall coordinate power requirement with the electrical contractor.

D. Refer to sequence of operations for equipment noted in the mechanical schedules.

2.19 SEQUENCE OF OPERATIONS

A. Boilers/Pumps: On a drop in pit water temperature below 85°F, the controller will start the hot water pump and the boiler to maintain the pit water temperature setpoint of 85°F (user adjustable).

B. Exhaust Fans (EF-1, EF-3, EF-4): Exhaust fans are started and stopped based on a time - of - day schedule set at the time clock. Fans shall run continuously.

C. Infrared Heaters (IRH): Infrared heaters (IRH 1-5) shall be controlled via a on/off zone control switch located in Storage Room 103. Infrared heaters shall be controlled via a thermostat to maintain space temperature setpoint (70°F Adj.).

D. Electric Unit Heaters (EUH): A local wall mounted thermostat will cycle the fan and energize heating coil to maintain space temperature setpoint (70°F Adj.).

E. Gas Fired Unit Heaters (GUH): A local wall mounted thermostat will cycle the fan and energize heating coil to maintain space temperature setpoint (60°F Adj.). GUH-2 shall be wired to the dry contacts at refrigerant detection system control panel and the emergency mechanical equipment shut-off switch. In the event of an alarm at the refrigerant detection system, GUH-2 shall be shut down.

F. CO/NO Gas Detection System: EF-2 shall be interlocked with gas detection system (GD-1). Upon alarm from the gas detection system, the motorized dampers MD-1 & MD-2 shall open and EF-2 shall energize and run until manual reset of the gas detection system. The fan speed switch shall be used for balancing purposes only.

G. Refrigerant leak Detection System: EF-5 shall be interlocked with refrigerant leak detection system (provided by others). Upon alarm from the refrigerant leak detection system or manual activation from any of the emergency break switches, the motorized dampers MD-3 & MD-4 shall open and EF-5 shall energize and run until manual reset of the refrigerant leak detection system. The fan speed switch shall be used for balancing purposes only.

PART 3 EXECUTION

3.01 SPECIAL RESPONSIBILITIES

A. Coordination: Cooperate and coordinate with work of other Sections in executing work of this Section.

1. Perform work such that progress of entire project including work of other Sections shall not be interfered with or delayed.

2. Provide information as requested on items furnished under this Section which shall be installed under other Sections.

3. Obtain detailed installation information from manufacturers of equipment provided under this Section.

4. Obtain final roughing dimensions or other information as needed for complete installation of items furnished under other Sections or by Owner.

5. Keep fully informed as to shape, size and position of openings required for material or equipment to be provided under this and other Sections. Give full information so that openings required by work of this Section may be coordinated with other work and other openings and may be provided for in advance. In case of failure to provide sufficient information in proper time, provide cutting and patching or have same done, at own expense and to full satisfaction of Architect.

6. Provide information as requested as to sizes, number and locations of concrete housekeeping pads necessary for floor-mounted vibrating and rotating equipment provided under this Section.

B. Installation Only Items:

1. Where this Contractor is required to install items which it does not purchase, it shall coordinate their delivery and be responsible for this unloading from delivery vehicles and for their safe handling and field storage up to the time of installation. This trade shall be responsible for:

a. Any necessary field assembly and internal connections, as well as mounting in place of the items, including the purchase and installation of all dunnage supporting members and fastenings necessary to adapt them to architectural and structural conditions.

b. Their connection to building systems including the purchase and installation of all terminating fittings necessary to adapt and connect them to the building system.

2. This Contractor shall carefully examine such items upon delivery. Claims that any of these items have been received in such condition that their installation will require procedures beyond the reasonable scope of work of this Contractor will be considered only if presented in writing within one (1) week of their date of delivery. Unless such claims have been submitted this Contractor shall be fully responsible for the complete reconditioning or replacement of the damaged items.

C. Maintenance of equipment and Systems: Maintain HVAC equipment and systems until Final Acceptance. Ensure adequate protection of equipment and material during delivery, storage, installation and shutdown delays pending final test of systems and equipment because of seasonal conditions. Do not use boilers before providing water treatment where required; this includes use of boilers for temporary heat or for testing.

D. Use of Premises: Use of premises shall be restricted as directed by Architect and as required below:

1. Remove and dispose of dirt and debris, and keep premises reasonably clean. Upon completion of work, remove equipment and unused material. Put building and premises in neat and clean condition and do cleaning and washing required to provide acceptable appearance and operation of equipment, to satisfaction of Architect and as specified under CLEANING paragraph.

2. It shall be this trade’s responsibility to store his material in a manner that will maintain an orderly clean appearance. If stored on-site in open or unprotected areas, all equipment and material shall be kept off the ground by means of pallets or racks, and covered with tarpaulins.

3. Do not interfere with functions of existing sewers and gas mains. Extreme care shall be observed to prevent debris from entering ductwork. Confer with Architect as to disruption of heating services or other utilities due to testing or connection of new work to existing. Interruption of heating services shall be performed at time of day or night deemed by Architect to provide minimum interference with normal operation. Obtain Architect's approval of the method proposed for minimizing service interruption.

E. Surveys and Measurements:

1. Base measurements, both horizontal and vertical, on reference points established by Contractor and be responsible for correct laying out of work.

2. In event of discrepancy between actual measurements and those indicated, notify Architect in writing and do not proceed with work until written instructions have been issued by Architect.

F. Fireproofing:

1. Clips, hangers, clamps, supports and other attachments to surfaces to be fireproofed shall be installed, insofar as possible prior to start of spray fiber work.

2. Ducts, piping and other items, which would interfere with proper application of fireproofing, shall be installed after completion of spray fiber work.

3. Patching and repairing of spray fireproofing due to cutting or damaging to fireproofing during course of work specified under this Section shall be performed by installer of fireproofing and paid for by trade responsible for damage and shall not constitute grounds for an extra to Owner.

3.02 MATERIALS AND WORKMANSHIP

A. Work shall be neat and rectilinear. Ductwork and piping shall run concealed except in mechanical rooms and areas where no hung ceiling exists. Install material and equipment as required by manufacturers. Installation shall operate safely and without leakage, undue wear, noise, vibration, corrosion or water hammer. Work shall be properly and effectively protected, and pipe and duct openings shall be temporarily closed to prevent obstruction and damage before completion.

1. Except as specified otherwise, material and equipment shall be new. Provide supplies, appliances and connections necessary for complete and operational installation. Provide components required or recommended by OSHA and applicable NFPA documents.

2. References to manufacturers and to catalog designation are intended to establish standards of quality for materials and performance but imply no further limitation of competitive bidding.

3. Finish of materials, components and equipment shall be as approved by Architect and shall be resistant to corrosion and weather as necessary.

4. Owner will not be responsible for material and equipment before testing and acceptance.

3.03 CONTINUITY OF SERVICES

A. Do not interrupt existing service without Owner's approval.

B. Schedule interruptions in advance, according to Owner's instructions. Submit, in writing,

with request for interruption, methods proposed to minimize length of interruption.

C. Interruptions shall be scheduled at such times of day and work so that they have minimal impact on Owner's operations.

3.04 TAGS

A. Upon completion of work, attach engraved laminated tags to all valves (listed in the valve directory called for in the "Bulletins, Manuals and Instructions" paragraph of these Specifications) and all pieces of HVAC equipment (including but not limited to pumps, fans, air handlers, coils and all other equipment listed in the HVAC Schedules). Valve tags shall have black characters on white face, consecutively numbered and prefixed by letter "V". Equipment tags shall have black characters on white face with labels corresponding to drawing schedule numbers.

B. Embossed or engraved aluminum or brass tags may be substituted if desired. Tags shall be at least 1/8" thick.

C. Valve tags shall be at least 1" in diameter with numerals at least 3/8" high and attached by "S" hooks or chains. Equipment tags shall be at least 2" diameter securely attached to apparatus.

D. Provide manufacturers equipment nameplates, catalog numbers and rating identification securely attached to electrical and mechanical equipment with screws or rivets. Adhesives or cements will not be permitted.

3.05 PIPE AND DUCT IDENTIFICATION

A. Ductwork shall be stenciled at each junction or branch takeoff, at least once in each room, and at intervals not longer than 20 feet. Stencil shall clearly identify duct service ("S" for supply; "R" for return' "X" for exhaust), area served by branch, and arrow indicating direction of flow.

B. Provide color-coded pipe identification markers on piping installed under this Section. Pipe markers shall be snap-on laminated plastic protected by clear acrylic coating. Pipe markers shall be applied after architectural painting where such is required.

C. Provide arrow marker with each pipe content marker to indicate direction of flow. If flow can be in either direction, use double-headed arrow marker.

D. Mains shall be labeled at points of entrance and exit from mechanical room, adjacent to each valve, on each riser, at each tee fitting, at points of entrance and exit from building, at least once in each room and at intervals no longer than 20 feet.

E. Size of legend letters on markers and length of color field shall be per the latest edition of ANSI A13.1.

F. Markers shall be "Setmark" by Seton Name Plate Corp., or approved equal.

G. Following color-coding shall be used with names in black letters on background and while letters on green background:

Service	Legend	Background Color
Hot Water Supply	HWS	Yellow
Hot Water Return	HWR	Yellow

H. Color banding shall meet latest edition of ANSI A13.1 and OSHA.

3.06 ACCESS AND ACCESS PANELS

A. Provide proper access to materials and equipment that require inspection, replacement, repair or service and coordinate their delivery with the installing Trade. If proper access cannot be provided, confer with Architect as to best method of approach for minimizing effect of reduced access which may result.

B. Coordinate and prepare a location, size and function schedule of access panels required to fully service equipment and deliver to a representative of the installing Trade. Furnish and install distinctively colored buttons (color as selected by Architect) in finished ceiling to identify all access panels.

C. Furnish access panels for installation under other Sections where fire dampers, volume dampers, controls, shut-off valves, control valves, check valves or other items installed under this Section require access and are concealed in floor, wall, furred space or above ceiling. Access panels shall be by Milcor, Knapp, Nystrom or Inland Steel; coordinate selection with other Sections supplying similar access panels.

D. Ceilings consisting of lay-in or removable splined tiles do not require access panels and dampers, splitters or test hole openings above ceiling shall have location marked with thumb tack on finished ceiling panel. Location shall be noted on record Drawings.

E. Access panels shall have same fire-rating classification as surface penetrated.

F. Panels shall be at least 12” x 12”; access panels at equipment (VAV boxes, fan boxes and others) shall be 18” x 18”.

3.07 PENETRATIONS AND SLEEVES

A. General:

1. Provide pipe and duct sleeves and packing materials as specified and as shown on Drawings at penetrations of foundations, walls, slabs (except on-grade), partitions and floors. Sleeves shall meet NFPA-101 requirements and materials requirements of PART 2 or this Section.

2. Coordinate work carefully with architectural and structural work. Set sleeves in forms before concrete is poured. Provide core drilling as necessary if walls are poured, or otherwise constructed, without sleeves and a wall penetration is required. Provide core drilling as required for penetrations of existing construction. Do not penetrate structural members without Architect’s approval.

3. Sleeves for insulated pipe and duct in non-fire rated construction shall accommodate continuous insulation without compression. Sleeves and/or penetrations in fire-rated construction shall be packed with fire-rated material which shall maintain the fire rating of the wall. Seal ends of penetrations to provide continuous vapor barrier where insulation is interrupted. See “PART 2” of these Specifications for requirements for packing materials.

4. Sleeves through floor shall be water-tight and shall extend 2” above floor surface.

B. Pipe Sleeves:

1. Annular space between pipe and sleeve shall be at least 1/4".

2. Sleeves are not required for slabs-on-grade unless specified otherwise.

3. Sleeves and packing materials, through rated fire walls and smoke partitions shall maintain fire rating of construction penetrated.

4. Do not support piping risers on sleeves.

C. Duct Sleeves and Prepared Openings:

1. Provide duct sleeves for round ducts 15” and smaller; provide prepared, framed openings for round ducts larger than 15” and for square, rectangular and flat oval ducts, except as specified otherwise. Sleeves shall met SMACNA requirements.

2. Provide sleeves for ducts through 1, 2, or 3-hour fire-rated construction and smoke partitions, regardless of size and shape of ducts. Sleeves shall maintain fire rating of construction penetrated. Sleeve and seal materials, construction and clearances shall meet requirements of SMACNA Fire Damper and Heat Stop Guide for Air Handling Systems.

3. Prepared openings shall be framed to provide 1” clearance between framing and duct or duct insulation.

D. Installation Testing, Listings and Approvals:

1. Installation shall meet material manufacturer’s recommendations exactly, particularly as regarding safety, ventilation, removal of foreign materials and other details of installation. Dam openings as recommended. Remove flammable materials used for damming and forming seals in fire-rated construction.

2. Sleeve penetration methods shall be water and gas-tight and shall meet requirements of ASTM E-119 Standard Methods of Fire Tests of Building Construction and Materials.

3. Fire-stop penetration seal methods and materials shall be FM-approved and UL-listed as applicable.

4. Inspect foamed sealants to ensure manufacturer’s optimum cell structure and color ranges.

3.08 ANCHORS AND INSERTS

A. Inserts shall be iron or steel of type to receive machine bolt head or nut after installation. Inserts shall permit adjustment of bolt in one (1) horizontal direction and shall develop strength of bolt when installed in properly cured concrete.

B. Provide anchors as necessary for attachment of equipment supports and hangers.

3.09 INSTALLATION OF EQUIPMENT

A. Avoid interference with structure and with work of other trades, preserving adequate headroom and clearing doors and passageways to satisfaction of Architect and in accordance with code requirements. Installation shall permit clearance for access to equipment for repair, servicing and replacement.

B. Install equipment so as to properly distribute equipment loads on building structural members provided for equipment support under other Sections. Roof-mounted equipment shall be installed and supported on structural steel provided under other Sections.

C. Provide suspended platforms, strap hangers, brackets, shelves, stands or legs as necessary for floor, wall or ceiling mounting of equipment provided under this Section (e.g. heating and ventilating units, fans, ducts and piping) as indicated on Drawings and in Specifications.

D. Provide steel supports and hardware for proper installation of hangers, anchors, guides, etc.

E. Provide cuts, weight and other pertinent data required for proper coordination of equipment support provisions and installation.

F. Structural steel and hardware shall conform to Standard Specifications of ASTM; use of steel and hardware shall conform to requirements of Section 5 of Code of Practice of American Institute of Steel Construction.

G. Verify site conditions and dimensions of equipment to ensure access for proper installation of equipment without disassembly which will void warrantee. Report in writing to Architect, prior to purchase or shipment of equipment involved, on conditions which may prevent proper installation.

3.10 CLEANING

A. Ductwork:

1. New ductwork shall be shipped from the shop to the job site with the ends of the ducts sealed tight with heavy duty plastic to prevent dirt, water or other elements from entering the ducts while in transport to the job site.

2. At the end of each working day all open ends of ducts that have been hung in place shall be re-covered with the plastic material to prevent the entry of foreign objects, dirt or debris into the ducts.

3. All ducts shall be cleaned of dirt and any other foreign matter if it should accumulate on or in the ducts prior to start-up and testing of the new HVAC systems. If the ducts do need to be blown clean, cheesecloth shall be placed over the outlet air openings, and the rooftop unit(s) serving the ducts shall be provided with temporary filters.

B. Piping:

1. Furnish pipe cleaning chemicals, chemical feed equipment, materials and labor necessary to clean piping.

2. Permanently install necessary chemical injection fittings complete with stop valves.

3. After heating hot water have been pressure tested and approved for tightness, clean and flush piping specified under WATER TREATMENT paragraph.

4. Maintain continuous blow-down and make-up, as required during flushing operation.

5. Equipment: After completion of project, clean the exterior surface of equipment included in this section, including concrete residue.

3.11 STARTUP, TESTING, ADJUSTING AND BALANCING FOR HVAC

A. General:

1. References:

a. AABC – National Standards for Total System Balance.

b. ADC – Test Code for Grilles, Registers, and Diffusers.

c. ASHRAE 111 – Practices for Measurement, Testing, Adjusting, and Balancing of Building Heating, Ventilating, Air Conditioning and Refrigeration Systems.

d. NEBB – Procedural Standards for Testing, Adjusting, and Balancing of Environmental Systems.

e. SMACNA – HVAC Systems Testing, Adjusting, and Balancing.

2. Qualifications:

a. Agency: Company specializing in the testing, adjusting, and balancing of systems specified in this section with minimum three years documented experience certified by AABC.

b. Perform work under supervision of AABC Certified Test and Balance Engineer or NEBB Certified Testing, Balancing and Adjusting Supervisor.

B. Examination:

1. Verify that systems are complete and operable before commencing work. Ensure the following conditions:

a. Systems are started and operating in a safe and normal condition.

b. Control systems are installed complete and operable.

c. Proper thermal overload protection is in place for electrical equipment.

d. Ductwork systems:

1) Final filters are clean and in place. If required, install temporary media in addition to final filters.

2) Duct systems are clean of debris.

3) Fans are rotating correctly.

4) Dampers are in place and open.

5) Air coil fins are cleaned and combed.

6) Access doors are closed and duct end caps are in place.

7) Air inlets and outlets are installed and connected.

8) Duct system leakage is minimized.

e. Piping systems:

1) Hydronic systems are flushed, filled, tested and vented.

2) Pumps are rotating correctly.

3) Proper strainer baskets are clean and in place.

4) Service and balance valves are open.

2. Submit field reports. Report defects and deficiencies noted during performance of services which prevent system balance.

3. Beginning of work means acceptance of existing conditions.

C. Preparation:

1. Provide instruments required for testing, adjusting, and balancing operations. Make instruments available to Owner to facilitate spot checks during testing.

2. Provide additional balancing devices as required.

D. Installation Tolerances:

1. HVAC Systems: Adjust to within plus or minus 10 percent of design for exhaust systems.

2. Air Outlets and Inlets: Adjust outlets and inlets in space to within plus or minus 10 percent of design.

3. Hydronic Systems: Adjust to within plus or minus 10 percent of design.

E. Adjusting:

1. Ensure recorded data represents actual measured or observed conditions.

2. Permanently mark settings of balancing devices allowing settings to be restored. Set and lock memory stops.

3. After adjustment, take measurements to verify balance has not been disrupted or that such disruption has been rectified.

4. Leave systems in proper working order, replacing belt guards, closing access doors, closing doors to electrical switch boxes, and restoring thermostats to specified settings.

F. Sequencing:

1. All systems providing both heating and cooling shall be balanced in both modes of operation.

2. For all systems provide initial balancing to tolerances indicated in this section. After initial balancing readjust systems as directed by Engineer and Owner as necessary to achieve uniform space temperatures free from objectionable drafts and noises.

G. Air System Procedure:

1. Adjust equipment and distribution systems to provide required or design air quantities.

2. Make air quantity measurements in ducts by Pitot tube traverse of entire cross sectional area of duct.

3. Measure and record air quantities at air inlets and outlets.

4. Use volume control devices to regulate air quantities only to extent that adjustments do not create objectionable air motion or sound levels. Adjust air volume by adjusting duct internal devices such as dampers and splatters. Do not utilized opposed blade dampers at air inlets and outlets.

5. Vary total system air quantities by adjusting sheave position or replacing fixed sheaves with larger or smaller diameter sheaves at each fan. Provide replacement fixed ratio sheaves and belts after final balancing selected to achieve design airflows. Vary branch air quantities by damper regulation.

6. Measure and record static air pressure conditions at air supply and exhaust units, including filter and coil pressure drops, and total pressure across the fan. Make allowances for 50 percent loading of filters.

7. Adjust settings and minimum setpoints for motorized and backdraft dampers to design conditions.

8. Measure and record temperature conditions across dampers to check leakage.

9. Where modulating dampers are provided, take measurements and balance at extreme conditions.

10. Measure and record building static pressure and adjust supply, return, and exhaust air systems to provide required relationship between each to maintain approximately 0.05 inches (12.5 Pa) positive static pressure near the building

entries.

11. [For variable air volume system powered units set volume controller to air flow setting indicated. Confirm connections properly made and confirm proper operation for automatic variable air volume temperature control.]

12. Measure and record inlet and outlet temperatures at each air supply unit at full cooling and heating capacity.

13. Prepare system pressure profiles: On schematic fan system diagrams, show STATIC pressure readings taken at following points.

    a. Fan discharge

    b. Fan discharge plenum or main duct in fan room

    c. Fan inlet plenum

    d. Inlet and outlet plenum space on each side of each heating coil, cooling coil and filter

    e. Return air/outside air mixing plenum

    f. Duct or plenum immediately behind outside air louver

    g. Return/exhaust fan inlet

    h. Return/exhaust fan outlet

    i. Each main branch duct takeoff at each floor

    j. Within 3 feet of last supply air outlet connection in most remote duct.

H. Water System Procedure:

1. Adjust water systems to provide required or design quantities.

2. Use calibrated Venturi tubes, orifices, or other metered fittings and pressure gages to determine flow rates for system balance. Where flow metering devices are not installed, base flow balance on temperature difference across various heat transfer elements in the system.

3. Adjust systems to provide specified pressure drops and flows through heat transfer elements prior to thermal testing. Perform balancing by measurement of temperature differential in conjunction with air balancing.

4. Balance systems with automatic control valves fully open to heat transfer elements.

5. Balance water distribution systems by means of balancing cocks, valves, and fittings. Do not use service or shut-off valves for balancing unless indexed for balance point. Measure and record flows at each balancing device.

6. Measure and record inlet and outlet temperatures at heat transfer elements and at cooling and heating plants at full cooling and heating capacity.

7. Where available pump capacity is less than total flow requirements or individual system parts, full flow in one part may be simulated by temporary restriction of flow to other parts.

I. Schedules:

1. Equipment requiring Testing, Adjusting, and Balancing including but not limited to:

    a. Pumps

b. Boilers

c. Exhaust Fans

d. Gas Detection System

J. Report Forms:

1. Forms shall include the following:

a. Title Page:

1) Name of Testing, Adjusting, and Balancing Agency

2) Address of Testing, Adjusting, and Balancing Agency

3) Telephone number of Testing, Adjusting, and Balancing Agency

4) Project name

5) Project location

6) Project Architect

7) Project Engineer

8) Project Contractor

9) Project altitude

10) Report date

b. All equipment shall include:

1) Manufacturer

2) Model/Size

3) Identification/Number

4) Serial Number

c. Summary Comments:

1) Design versus final performance

2) Notable characteristics of system

3) Description of systems operation sequence

4) Summary of outdoor and exhaust flows to indicated amount of building pressurization

5) Nomenclature used throughout report

6) Test conditions

d. Instrument List:

1) Instrument

2) Manufacturer

3) Model number

4) Serial number

5) Range

6) Calibration date

e. Electric Motors: (data for single and multispeed motors)

1) Manufacturer
2) Model/Frame
3) HP/BHP/efficiency
4) Phase, voltage, amperage; nameplate, actual, no load
5) RPM
6) Service factor
7) Starter size, rating, heater elements
8) Sheave Make/Size/Bore

f. Pump Data:

1) Impeller
2) Service
3) Design flow rate, pressure drop, BHP
4) Actual flow rate, pressure drop, BHP
5) Discharge pressure
6) Suction pressure
7) Total operating head pressure
8) Shut off, discharge and suction pressures
9) Shut off, total head pressure

g. Combustion Test:

1) Manufacturer
2) Model number
3) Firing rate
4) Over-fire draft
5) Gas meter timing dial size
6) Gas meter time per revolution
7) Gas pressure at meter outlet
8) Gas flow rate
9) Heat input
10) Oil flow rate
11) Burner manifold gas pressure
12) Percent carbon monoxide (CO)
13) Percent carbon dioxide (CO2)
14) Percent oxygen (O2)
15) Percent excess air
16) Flue gas temperature at outlet

17) Ambient temperature
18) Net stack temperature
19) Percent stack loss
20) Percent combustion efficiency
21) Heat output

h. Electric Duct Heater:
1) Location
2) Number of stages
3) Wattage, phase, voltage, amperage
4) Test voltage (each phase)
5) Test amperage (each phase)
6) Air flow, specified and actual
7) Temperature rise, specified and actual

i. Exhaust Fan Data:
1) Location
2) Air flow, specified and actual
3) External static pressure, specified and actual
4) Inlet pressure
5) Discharge pressure
6) Fan RPM

j. Duct Traverse:
1) System zone/branch
2) Duct size
3) Area
4) Design velocity
5) Design air flow
6) Test velocity
7) Test air flow
8) Duct static pressure
9) Air temperature
10) Air correction factor

k. Duct Leak Test:
1) Description of ductwork under test
2) Duct design operating pressure
3) Duct design test static pressure
4) Duct capacity, air flow

5) Maximum allowable leakage duct capacity times leak factor

6) Test apparatus

a) Blower

b) Orifice, tube size

c) Orifice size

d) Calibrated

7) Test static pressure

8) Test orifice differential pressure

9) Leakage

l. Water Distribution Test Sheet:

1) Heat transfer terminal number.

2) Room number/location.

3) Terminal type.

4) Terminal size.

5) Design flow.

6) Test (final) flow.

7) Percent of design flow.

3.12 WELDING

A. Weld only by approved acetylene or electric welding processed and welders shall hold certificate from approved insurance company.

B. Conduct test to demonstrate suitability of procedures to be used in making welds which conform to specified requirements.

C. Specification for welding procedure shall meet requirements of Welding Qualifications, Section IX, ASME Boiler and Pressure Vessel Code and ANSI B31.1.

D. Align components. No strain shall be placed on weld during welding. No part of pipe shall be offset more than 20% of thickness. Set flanges and branches properly.

E. Welder Qualification:

1. Test welders to demonstrate ability to make acceptable welds. Tests conducted for qualification of welder for work under one division or section shall not qualify welder for work under another division or section.

2. Tests shall be as prescribed for welder qualification in Section IX of the ASME Code.

3. Records of such tests shall be as follows: Each welder shall be assigned an identifying number, letter or symbol. Identifying mark shall be stamped adjacent to welds made by this welder. Identification shall be at top of horizontal piping and at front of vertical piping.

4. Maintain record of welders employed, showing dates and results of tests and identifying mark assigned to each welder. Certify records and make them accessible to Owner's Project Representative and/or the Project Manager. Before completion of project, one (1) copy of records shall be turned over to the Owner.

5. No qualification shall be older than three (3) years when welder commences work on this project. If welder has not welded in required welding process for a period of 6 months, he shall be recertified.

F. Welding Tests:

1. As designated by Architect, remove welds for destructive testing or for testing by non-destructive means. Tests shall be as determined by Architect.

2. If, in Architect's opinion, welds so tested do not meet requirements of Sections VIII and IX of ASME, remove welds welded by that welder, at no cost to the Owner. Re-welding shall be performed by qualified welder other than welder whose welds did not pass test. Welders whose welds were defective shall not be employed on-site for remainder of project.

3. Welding of stanchions, brackets, anchors and other welding not performed on pipe joints shall be in accordance with requirements of AWS Specifications and requirements.

END OF SECTION

DIVISION 26

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SECTION 260000

ELECTRICAL TABLE OF CONTENTS

SECTION 260000

ELECTRICAL

PART 1 GENERAL

1.01 GENERAL REQUIREMENTS AND REFERENCES

A. Include “General Requirements” and applicable parts of Division 1 as part of this section.

B. Examine all other sections of the Specifications for requirements which affect work under this Section whether or not such work is specifically mentioned in this section. Where paragraphs of this section conflict with similar paragraphs of Division 1, requirements of this section shall prevail.

C. Coordinate work with that of all other trades affecting, or affected by work of this section. Cooperate with such trades to assure the steady progress of all work under the Contract.

D. The Subcontractor shall be responsible for filing all documents, payment of all fees, and securing of all inspections and approvals necessary for the work of this section.

E. The Electrical Subcontractor shall carry in the Bid Price all Utility Company and Municipal back charges for all materials furnished and work performed by them in conjunction with this Contract and pay same to the respective agency upon demand. The Electrical Subcontractor shall not be entitled to additional compensation after the submittal of his bid price should he fail, for any reason, to obtain the total back charge costs to be incurred by the Local Utility Companies or Municipal Agencies.

1.02 DEFINITIONS

A. As used in this section, “provide” means “furnish and install”, and “POS” means “Provided Under Other Sections”.

B. As used in the Contract Drawings and Specifications for Electrical work, certain non-technical words shall be understood to have specific meanings as follows, regardless of indications to the contrary in the General Conditions of other documents governing the Electrical work.

1. “Furnish” means: Purchase and deliver to the project site complete with every necessary appurtenance and support, all as part of the Electrical work. Purchasing shall include payment of all sales taxes and other surcharges as may be required to assure that purchased item(s) are free of all liens, claims, or encumbrances.

2. “Install” means: Unload at the delivery point at the site and perform every operation necessary to establish secure mounting and correct operation at the proper location in the project, all as part of the Electrical work.

3. “Provide” means: “Furnish” and “Install”.

4. “New” means: Manufactured within the past two (2) years and never before used.

C. Except where modified by a specific notation to the contrary, it shall be understood that the indication and/or description of any electrical item in the Contract Drawings or Specifications for Electrical work carries with it the instruction to furnish, install and connect the item as part of the Electrical work, regardless of whether or not this instruction is explicitly stated.

D. It shall be understood that the Specifications and Drawings for Electrical work are complimentary and are to be taken together for a complete interpretation of the Electrical work except that indications on the Contract Drawings, which refer to an individual element of work, take precedence over the Specifications where they conflict.

1.03 SCOPE

A. Perform work and provide material and equipment as shown on Drawings and as specified or indicated in this Section of the Specifications. Completely coordinate work of this Section with work of other trades and provide a complete and fully functional installation.

1. Primary electric service duct bank.

2. Secondary electric service including underground conduit bank and secondary service entrance feeders, from the utility company pad mounted transformer, building grounding electrode and main service disconnect.

3. Interior secondary distribution systems including main switchboard, dry type indoor transformers, all distribution panelboards, motor controls, motor control centers, magnetic starters, overcurrent and switching devices, panelboards, raceways, cables, wiring, junction and pull boxes, wireways, and all other components required for complete electrical distribution system.

4. All lighting systems (indoor and outdoor, normal, night, emergency and exit) including all fixtures, lamps, mounting accessories, switches, controls, outlets, wiring, raceways, and all other components and fittings required for a complete lighting system.

5. Grounding and bonding of all electrical systems and equipment.

6. Fire alarm system complete with all devices and wiring including municipal connections.

7. Wiring devices (switches and receptacles) complete with associated wallplates.

8. Power wiring to HVAC, plumbing and fire protection equipment.

9. Testing of all electrical systems.

10. Coordination between electrical and other trades.

11. All other systems hereinafter specified or indicated on the Contract Drawings, complete, leaving ready an electrical system in perfect operating condition.

12. All required staging and scaffolding of any height.

B. Drawings and Specifications form complimentary requirements; provide work specified and not shown, and work shown and not specified as though explicitly required by both. Although work is not specifically shown or specified, provide supplementary or miscellaneous items, appurtenances, devices and materials obviously necessary for a sound, secure and complete installation.

C. Give notices, file plans, obtain permits and licenses, pay fees and back charges, and obtain necessary approvals from Authorities Having Jurisdiction as required to perform work in accordance with all legal requirements and with Specifications, Drawings, Addenda and Change Orders, all of which are part of Contract Documents.

1.04 RELATED WORK UNDER OTHER SECTIONS

A. The following items are not included in this section and will be performed under the designated sections.

1. Temporary Facilities.

2. Earthwork: Excavation and backfill.

3. Concrete:

a. Equipment foundations.

b. Housekeeping pads.

c. Concrete encasement for conduit banks.

d. Light pole bases.

e. Rebar for items “a, b, c & d” above.

4. Masonry: All openings in masonry walls.

5. Waterproofing, Dampproofing and Caulking.

6. Roofing and Flashing.

7. Painting: All painting except as specified herein.

8. Finish Carpentry and Millwork.

9. Steel Doors and Frames.

10. Finish Hardware.

11. Plumbing.

12. HVAC.

1.05 REGULATORY REQUIREMENTS

A. Comply with all applicable Federal and State laws, and all Local Codes, By-laws and Ordinances.

B. Where provisions of the Contract Documents conflict with any codes, rules or regulations, the latter shall govern. Where the contract requirements are in excess of applicable codes, rules or regulations, the contract provisions shall govern unless the Architect rules otherwise.

C. Request inspections from Authorities Having Jurisdiction, obtain all permits and pay for all fees and inspection certificates as applicable and/or required. All permits and certificates shall be turned over to the Owners at the completion of the work. Copies of permits shall be given to the resident engineer prior to the start of work.

D. Unless otherwise specified or indicated, materials and workmanship and equipment performance shall conform with the latest edition of the following standards, codes, Specifications, requirements and regulations:

1. State Building Code.

2. State Electrical Code.

3. National Fire Protection Association (NFPA).

4. Local Town Regulations and By-Laws.

5. Underwriter's Laboratories, Inc. (UL).

6. National Electrical Manufacturer's Association (NEMA).

7. American National Standards Institute (ANSI).

E. All Electrical work shall meet or exceed any other state and local codes and/or Authorities Having Jurisdiction including all other standards indicated herein.

1.06 SUBMITTALS

A. This paragraph shall supplement Division 1.

B. Definitions:

1. Shop Drawings: Information prepared by the Contractor to illustrate portions of the work in more detail than shown in the Contract Documents.

2. Coordination Drawings: Detailed, large-scale layout Shop Drawings showing HVAC, Electrical, Plumbing and Fire Protection work superimposed to identify conflicts and ensure inter-coordination of Mechanical, Electrical, Architectural, Structural and other work.

3. Manufacturer's Product Data: Information prepared by the manufacturer which depicts standard equipment.

C. Submittals, Procedures and Format:

1. Review submittal packages for compliance with Contract Documents and then submit to Architect for review. Submit transparency and two (2) blue or black-line reproductions of each Shop Drawing larger than 8-1/2" x 11". Submit eight (8) sets of each smaller shop drawing. After review, transparency original of each large Shop Drawing and six (6) sets of each small shop drawing will be returned with reviewer's marks. Electronically submitted shop drawings are acceptable.

2. Each Shop Drawing shall indicate in title block, and each Product Data package shall indicate on cover sheet, the following information:

a. Title.

b. Name and location of project.

c. Names of Architect, Engineer, Contractor and Subcontractor(s).

d. Names of Manufacturer, Supplier, Vendor, etc.

e. Date of submittal.

f. Whether original submittal or resubmitted.

3. Shop Drawings and/or Manufacturer's Product Data shall contain detailed dimensional Drawings, accurate and complete description of materials of construction, manufacturer's

published performance characteristics and capacity ratings (performance data alone is not acceptable), electrical requirements and wiring diagrams. Drawings shall clearly indicate location (terminal block or wire number), voltage and function for all field terminations, and other information necessary to demonstrate compliance with all requirements of Contract Documents.

D. Acceptable Manufacturers:

1. The Architect's Mechanical/Electrical design for each project is based on the single manufacturer listed in the schedule or shown on the Contract Drawings. In Division 26 of these Specifications certain "Alternate Manufacturers" are listed as being acceptable. These are acceptable only if, as a minimum, they:

   a. Meet all performance criteria listed in the schedules and outlined in the Specifications.

   b. Have identical operating characteristics to those called for in the Specifications.

   c. Fit within the available space it was designed for, including space for maintenance and component removal, with no modifications to either the space or the product. Clearances to walls, ceilings and other equipment will be at least equal to those shown on the Contract Documents. The fact that a manufacturer's name appears as acceptable shall not be taken to mean the Architect has determined that the Manufacturer's products will fit within the available space. This determination is solely the responsibility of the Contractor.

   d. For equipment mounted in areas where structural matters are a consideration, the products must have a weight no greater than the product listed in the schedules or Specifications.

   e. Products must adhere to all architectural considerations including, but not limited to, being the same size and of the same physical appearance as scheduled or specified products.

E. Substitutions: Substitution of products by manufacturers other than those listed shall only be done in accordance with subparagraph "F" "Substitutions and Deviations".

F. Substitutions and Deviations:

1. Deviations from the Contract Documents and the substitution of materials or equipment relative to the "Acceptable Manufacturers" referred to above shall be requested individually in writing whether deviations result from field conditions, standard shop practice, or other cause. Submit letter with transmittal of Shop Drawings which flags the substitution or deviation to the attention of the Architect. The letter shall describe changes in the system shown and physical characteristics (connections to adjacent materials, electrical services, service access requirements, and other characteristics), and differences in operating characteristics or cycles.

2. Without letters flagging the substitution or deviation to the Architect, it is possible that the Architect may not notice such substitution or deviation or may not realize its ramifications. Therefore, if such letters are not submitted to the Architect, the Contractor shall hold the Architect and his consultants harmless for any and all adverse consequences resulting from the deviations being implemented. Adverse consequences shall include, but not be limited to, excessive noise, excessive maintenance, shortened longevity, spatial coordination problems, and inadequate performance versus scheduled design. This shall apply regardless of whether the Architect has reviewed or approved Shop Drawings containing the deviation, and will be strictly enforced.

3. Do not request substitute materials or equipment unless identical material or equipment has been operated successfully for at least three (3) consecutive years. Such materials and equipment shall be a regular cataloged item shown in the current catalog of the manufacturer. When deviation or substitution is permitted, coordinate fully with related changes to Architectural, Structural, Plumbing, Fire Protection, Mechanical, and other work. Ensure that related changes necessary for coordination of substituted items are made within the Contract Price. Assume full responsibility for safety, operation and performance of the altered system. Any extra costs incurred to the project based on the use of alternate manufacturers shall be borne by the Contractor who has requested the substitution.

4. Substitutions of equipment, systems, etc. requiring approval of local Authorities must comply with such regulations and be filed by the Contractor (should filing be necessary).

5. Consideration will not be given to claims that the substituted item meets the performance requirements with lesser construction. Performance, as delineated in schedules and in the Specifications, shall be interpreted as minimum performance.

6. Approval of proposed deviations or substitutions, if any, will be made at discretion of Architect.

7. If equipment is proposed for substitution that is not tested and rated according to industry-wide standards, the Architect shall have the right to have performance tests completed, at the Contractor's expense, to confirm the manufacturer's performance claims.

G. Submittal Notations: Submittals will be returned from the Architect marked as illustrated below:

NO EXCEPTION TAKEN	ACCEPTED AS NOTED
NOT ACCEPTED	REVISE AND RESUBMIT

1. Checking is only for general conformance with the design concept of the project and general compliance with the information given in the Contract Documents. Any action shown is subject to the requirements of the Contract Drawings and Specifications. Contractor is responsible for dimensions which shall be confirmed and correlated at the job site; fabrication process and techniques of construction; coordination of his work with that of all other trades; and the satisfactory performance of his work.

H. Schedule: Incorporate the Shop Drawing review period into the construction schedule so that work is not delayed. Contractor shall assume full responsibility for delays caused by not incorporating the following Shop Drawing review time requirements into his project schedule. Allow at least ten (10) working days, exclusive of transmittal time, for review each time Shop Drawing is submitted or resubmitted.

I. List of Proposed Equipment and Materials: Within four (4) weeks after Award of Contract and before ordering materials or equipment, submit a complete list of proposed materials and equipment and indicate manufacturer's names and addresses. No consideration will be given to partial lists submitted out of sequence.

J. Responsibility:

1. The intent of submittal review is to check for capacity, rating, and certain construction features. Contractor shall ensure that work meets requirements of the Contract Documents

regarding information that pertains to fabrication processes or means, methods, techniques, sequences and procedures of construction; and for coordination of work of this and other Sections. Work shall comply with submittals marked "REVIEWED" to extent that they agree with the Contract Documents. Submittal review shall not diminish responsibility under this Contract for dimensional coordination, quantities, installation, wiring, supports and access for service, nor the shop drawing errors or deviations from requirements of the Contract Documents. The Architect's noting of some errors while overlooking others will not excuse the Contractor for proceeding in error. Contract Document requirements are not limited, waived, nor superseded in any way by review.

2. Inform Subcontractors, Manufacturers, Suppliers, etc., of scope and limited nature of review process and enforce compliance with the Contract Documents.

K. Material and equipment requiring Shop Drawing and/or Manufacturer's Data Submittals shall include but not be limited to:

1. Light fixtures.

2. Switchboard.

3. Panelboards.

4. Overcurrent and switching devices.

5. Wiring devices and wall plates.

6. Fire alarm system with wiring diagram and schedule.

7. Indoor dry type transformer.

8. Wiring and cables.

9. Conduit.

10. Boxes and fittings.

11. Safety switches.

1.07 SURVEYS AND MEASUREMENTS

A. Base all required measurements, both horizontal and vertical, on reference points established by the General Contractor and be responsible for the correct laying out of the Electrical work. In the event of a discrepancy between actual measurements and those indicated, notify the General Contractor in writing. Do not proceed with the work required until written instructions have been issued by the General Contractor.

1.08 COORDINATION

A. HVAC, Plumbing, Fire Protection, and Electrical Drawings are diagrammatic. They indicate general arrangements of Mechanical and Electrical systems and other work. They do not show all offsets required for coordination nor do they show the exact routings and locations needed to coordinate with Structural and other trades and to meet Architectural requirements.

B. Work shall be performed in cooperation with other trades on the project and so scheduled as to

allow speedy and efficient completion of the work.

C. Furnish to other trades advance information on locations and sizes of all frames, boxes, sleeves and openings needed for their work. Furnish information and Shop Drawings necessary to allow trades affected by the work to install their work properly and without delay.

D. In all spaces, prior to installation of visible material and equipment, including access panels, review Architectural Drawings for exact locations and where not definitely indicated, request information from Architect. Where the Electrical work shall interfere with the work of other trades, assist in coordinating the space conditions to make satisfactory adjustments before installation. Without extra cost to the Owners, make reasonable modifications to the work as required by normal Structural interferences. Pay the General Contractor for additional openings, or relocating and/or enlarging existing openings through concrete floors, walls, beams and roof required for any work which was not properly coordinated. Maintain maximum headroom at all locations. All piping, duct, conduit, and associated components to be as tight to underside of structure as possible.

E. If any Electrical work has been installed before coordination with other trades so as to cause interference with the work of such trades, all necessary adjustments and corrections shall be made by the trades involved without extra cost to the Owners.

F. Where conflicts or potential conflicts exist and engineering guidance is desired, submit sketch of proposed resolution to Architect for review and approval.

G. Protect all materials and work of other trades from damage which may be caused by the Electrical work, and repair all damages without extra cost to the Owners.

1.09 MECHANICAL AND ELECTRICAL COORDINATION

A. The HVAC Subcontractor shall furnish and install various electrical items relating to the heating and ventilating equipment and control apparatus. The Electrical Subcontractor shall be required to connect power wiring to this equipment unless noted otherwise.

B. The HVAC and Electrical Subcontractors shall coordinate their respective portions of the work, as well as the electrical characteristics of the heating, ventilating and air conditioning equipment.

C. All power wiring and local disconnect switches will be provided by the Electrical Subcontractor for the line voltage power. All control and interlocking wiring shall be the responsibility of the HVAC Subcontractor.

D. 120V and above power wiring sources extended and connected to HVAC control panels, transformers and switches shall be the responsibility of the Electrical Subcontractor. All low voltage thermostat, and any switch wiring shall be the responsibility of the HVAC Subcontractor.

E. Temperature control and equipment wiring shall be installed by the Heating and Ventilating Subcontractor.

F. Pipe heat tracing shall be furnished and installed by the Plumbing Subcontractor. Power connections shall be by the Electrical Subcontractor.

G. The Electrical Subcontractor will provide all magnetic starters except those furnished as an integral part of packaged equipment.

1.10 INSTALLATION REQUIREMENTS

A. The arrangement of all Electrical work shown on the Contract Drawings is diagrammatic only and indicates the minimum requirements of the work. Conditions at the building including actual measurements shall determine the details of the installation. All work shall be laid out and installed so as to require the least amount of cutting and patching.

B. Review the Architectural Drawings and Specifications before ordering any material and equipment. Any discrepancies shall be brought to the attention of the Architect for his determination prior to proceeding with the work.

1.11 TYPICAL DETAILS

A. Typical details where shown on the Contract Drawings shall apply to each and every item of the project where such items are applicable. They are not repeated in full on the Contract Drawings, which in many cases are diagrammatic only, but with the intention that such details shall be incorporated in full. Any alternate method proposed for use by the Contractor shall have the prior approval of the Architect.

1.12 SLEEVES, INSERTS

A. Furnish and install all sleeves, inserts, anchor bolts and similar items to be set into masonry or concrete, as required for Mechanical and Electrical work. Internal diameter of sleeve ball shall be 1/2" larger than the outside diameter of the pipe or insulation covered line passing through it.

1.13 CORING, DRILLING

A. Core, cut and/or drill all small holes 4.5” diameter or less in walls, floors and ceiling required for the installation of sleeves, supports, and conduit for the Electrical work.

1.14 FIRESTOPPING, SMOKEPROOFING AND WATERPROOFING

A. All penetrations made through fire rated assemblies (structures or partitions) shall be completely and properly fire sealed with the appropriate firestop systems installed in accordance with the Manufacturer’s recommendations. The firestop material UL listed fire rating shall match or exceed the fire rated assemblies. Verify with Architect if project is utilizing a specified product. If not, provide product manufactured by Hilti, Nelson or STI.

B. Provide waterproofing of all materials which penetrate a floor, exterior wall, slab or roof. All sleeves shall extend a minimum of 3 inches above floor or roof. All penetrations thru building foundation walls shall utilize Link-Seal products or approved equal.

C. All device, outlet and junction boxes installed within fire rated walls or ceilings shall be provided with a fire rated moldable putty pad. The putty pad shall be a one component, ready to use, intumescent elastomer capable of expanding a minimum of 3 times a 1000°F and the material shall be suitable for overhead, vertical and horizontal fire steps. The putty shall be listed by an independent testing agency such as U.L. or FM and shall meet or exceed the requirements of the applicable sections of the IBC, NFPA 5000, NEC & NFPA 101. Provide 3M fire barrier moldable putty pads MPP+ approved equal.

1.15 ACCESSIBILITY

A. Install all work such that parts requiring periodic inspection, operation, maintenance and repair are readily accessible.

B. Furnish all access panels appropriate to particular conditions, to be installed by trades having

responsibility for the construction of actual walls, floors or ceilings at required locations.

1.16 SUPPLEMENTARY SUPPORTING STEEL

A. Provide all supplementary (non-structural) steelwork required for mounting or supporting equipment and materials.

B. Steelwork shall be firmly connected to building construction as required. Locations and methods of attachment shall be approved by the Architect.

C. Steelwork shall be of sufficient strength to allow only minimum deflection in conformity with manufacturer's published requirements.

D. All supplementary steelwork shall be installed in a neat and workmanlike manner parallel to floor, wall and ceiling construction: all turns shall be made at forty-five and ninety degrees, and/or as dictated by construction and installation conditions.

E. All manufactured steel parts and fittings shall be galvanized.

1.17 TOOLS AND EQUIPMENT

A. Provide all tools and equipment required for the fabrication and installation of the Mechanical and Electrical equipment at the site.

1.18 PORTABLE AND DETACHABLE PARTS

A. Contractors shall retain in their possession all portable and/or detachable parts and portions of materials, devices, equipment, etc. necessary for the proper operation and maintenance of the Mechanical and Electrical systems until final completion of the work, at which time they shall be handed over to the Owners.

1.19 RECORD DRAWINGS, PROJECT CLOSEOUT

A. As work progresses and for the duration of Contract, maintain a complete and separate set of prints of Contract Drawings at job site at all times. Record work completed and all changes from original Contract Drawings clearly and accurately including work installed as a modification or addition to the original design. Work shall be updated on a weekly basis and shall be made available for review by Architect. Failure to perform this work shall be reason for withholding requisition payments. In addition, take photographs of all concealed equipment in gypsum board ceilings, shafts, and other concealed, inaccessible work. At completion of work, make copies of photographs with written explanation on back. These shall become part of Record Documents.

B. At completion of work prepare a complete set of Record Drawings utilizing AutoCAD produced drawings showing all systems as actually installed, including all fire alarm and electrical circuitry. Submit three (3) sets of prints to Architect for comments as to compliance with this section.

C. The Architect will not certify the accuracy of the Record Drawings. This is the sole responsibility of the Electrical Contractor.

D. This trade shall submit the Record Drawings for approval by the Fire and Building Departments in a form acceptable to the departments, when required by the jurisdiction.

E. Record Drawings shall show record condition of details, sections, riser diagrams, control changes

and corrections to schedules. Schedules shall show actual manufacturer, make and model numbers of final equipment installation.

1.20 GUARANTEE/WARRANTY

A. Guarantee and 24 Hour Service:

1. Guarantee Work of this Section in writing for not less than one (1) year following the date of acceptance by the Owner. If the equipment is used for temporary power etc, prior to acceptance by the Owner, the bid price shall include an extended period of warranty covering the one (1) year of occupancy, starting from the date of acceptance by the Owner. The guarantee shall repair or replace defective materials, equipment, workmanship and installation that develop within this period, promptly and to the Architect's satisfaction and correct damage caused in making necessary repairs and replacements under guarantee within Contract Price.

2. In addition to guarantee requirements of Division 1 and of Subparagraph A above, obtain written equipment and material warranties offered in manufacturer's published data without exclusion or limitation, in Owner's name.

3. Upon receipt of notice from the Owner of failure of any part of the systems or equipment during the warranty period, the affected part or parts shall be replaced by this Contractor without any reimbursement.

4. Replace material and equipment that require excessive service during guarantee period as defined and as directed by Architect.

5. Provide 24 hour service beginning on the date the project is accepted by the Owner, whether or not fully occupied, and lasting until the termination of the guarantee period. Service shall be at no cost to the Owner. Service can be provided by this Contractor or a separate service organization. Choice of service organization shall be subject to Architect and Owner approval. Submit name and a phone number that will be answered on a 24 hour basis each day of the week, for the duration of the service.

6. Submit copies of equipment and material warranties to Architect before final payment.

7. At end of guarantee period, transfer manufacturer's equipment and material warranties still in force to Owner.

8. This paragraph shall not be interpreted to limit Owner's rights under applicable codes and laws and under this Contract.

9. PART 2 paragraphs of this Specification may specify warranty requirements that exceed those of this paragraph. Those paragraphs shall govern.

10. Use of systems provided under this Section for temporary services and facilities shall not constitute Final Acceptance of Work by Owner, and shall not initiate the guarantee period.

11. Provide manufacturer's engineering and technical staff at site to analyze and rectify problems that develop during guarantee period immediately. If problems cannot be rectified immediately to Owner's satisfaction, advise the Architect in writing, describe efforts to rectify situation, and provide analysis of cause of problem. The Architect and/or Engineer will direct course of action.

1.21 OPERATING, INSTRUCTION AND MAINTENANCE MANUALS

A. Refer to Section 017000 – CONTRACT CLOSEOUT for submittal procedures pertaining to operating and maintenance manuals.

B. Each copy of the approved operating and maintenance manual shall contain copies of approved Shop Drawings, equipment literature, cuts, bulletins, details, equipment and engineering data sheets and typewritten instructions relative to the care and maintenance for the operation of the equipment, all properly indexed. Each manual shall have the following minimum contents:

1. Table of Contents.

2. Introduction:
   a. Explanation of manual and its purpose and use.
   b. Description of the electrical systems.
   c. Safety precautions necessary for equipment.
   d. Illustrations, schematics and diagrams.
   e. Installation drawing.

3. Maintenance:
   a. Maintenance and lubricating instructions.
   b. Replacement charts.
   c. Trouble-shooting charts for equipment components.
   d. Testing instructions for each typical component.
   e. Two (2) typed sets of instructions for ordering spare parts. Each set shall include name, price, telephone number and address of where they may be obtained.

4. Manufacturer's Literature:
   a. The equipment for which Shop Drawings have been submitted and approved.

1.22 SERVICE CHARACTERISTICS

A. Secondary Building Voltage – High Level: 277/480.

B. All equipment and wiring shall be suitable for the applied voltage.

1.23 QUALITY ASSURANCE

A. The requirements of the State Building Code and Local regulations establish the minimum acceptable quality of workmanship and materials, and all work shall conform thereto unless more stringent requirements are indicated or specified herein.

B. All work shall comply with the latest editions of the codes as referenced herein.

C. Follow manufacturer's directions for articles furnished, in addition to directions shown on Drawings or specified herein.

D. Protect all work, materials, and equipment from damage during process of work. Replace all damaged or defective work, materials and equipment without additional cost to the Owner.

E. All equipment and materials for permanent installation shall be the products of recognized manufacturers and shall be new.

F. Equipment and materials shall:

1. Where normally subject to Underwriters Laboratory Inc. listing or labeling services, be so listed and labeled.

2. Be without blemish or defect.

3. Not be used for temporary light and power purposes.

4. Be in accordance with the latest applicable NEMA standards.

5. Buy products which will meet with the acceptance of all Authorities Having Jurisdiction over the work. Where such acceptance is contingent upon having the products examined, tested and certified by Underwriters or other recognized testing laboratory, the product shall be so examined, tested and certified.

G. Except for conduit, conduit fittings, outlet boxes, wire and cable, all items of equipment or material of one generic type shall be the product of one manufacturer throughout.

H. For items which are to be installed but not purchased as part of the Electrical work, the Electrical work shall include:

1. The coordination of their delivery.

2. Their unloading from delivery trucks driven into any point on the property line at grade level.

3. Their safe handling and field storage until the time of permanent placement in the project.

4. The correction of any damage, defacement or corrosion to which they may have been subjected. Replacement, if necessary, shall be coordinated with the Contractor who originally purchased the item.

5. Field erection and internal wiring as necessary for their proper operation.

6. Mounting in place, including the purchase and installation of all dunnage, supporting members, and fastenings, necessary to adapt them to architectural and structural conditions.

I. Items which are to be installed but not purchased as part of the electric work shall be carefully examined upon delivery to the project. Claims that any of these items have been received in such condition that their installation will require procedures beyond the reasonable scope of the electric work will be considered only if presented in writing within one (1) week of the date of delivery to the project of the items in question. The electric work includes all procedures, regardless of how extensive, necessary to put into satisfactory operation, all items for which no claims have been submitted as outlined above.

1.24 DELIVERY, STORAGE AND HANDLING

A. All materials for the work of this section shall be delivered, stored and handled so as to preclude damage of any nature. Manufactured materials shall be delivered and stored in their original containers, plainly marked with the products' and manufacturer's name. Materials in broken containers or in packages showing watermarks or other evidence of damage, shall not be used and

shall be removed from the site.

1.25 TEMPORARY POWER AND LIGHTING

A. The Electrical Subcontractor shall furnish and install feeders of sufficient size from the Utility Company's power lines for the electric light and power requirements for the building while under construction and until the permanent feeders and related equipment have been installed and are in operation.

B. All necessary transformers, meters, cables, panelboards, switches, temporary lamp replacements and accessories required for the temporary light and power installation shall be provided by the Electrical Subcontractor.

C. The Electrical Subcontractor shall install and maintain the wiring and accessories for the offices of the General Contractor and the Clerk of the Works as specified in the contract form.

D. All temporary Electrical work shall meet the requirements of the National Electrical Code Article 590 Temporary Wiring, the Local Utility Company, and all Federal Standards and Laws.

E. All temporary wiring and accessories thereto installed by the Electrical Subcontractor shall be removed after their purposes have been served.

F. The General Contractor will pay for the cost of electric energy consumed by himself and by all of his Subcontractors, unless otherwise indicated.

1.26 STAGING AND SCAFFOLDING

A. Provide staging and scaffolding for all the work of this section complying with Division 1 requirements.

1.27 SEISMIC REQUIREMENTS

A. Equipment and work shall meet the restraint requirements for the designated Seismic Design category. This shall include all installation and connections of material and equipment to the building structure. Refer to Structural Drawings for Seismic Design category and ASCE7 for electrical requirements.

PART 2 PRODUCTS

2.01 GENERAL

A. Product Specifications are written in such a manner so as to specify what materials may be used in a particular location or application and therefore do not indicate what is not acceptable or suitable for a particular location or application. As an example: Non-metallic sheathed cable is not specified; therefore it is not acceptable.

B. For purpose of establishing a standard of quality and not for purposes of limiting completion, the basis of this Specification is upon specified models and types of equipment and materials, as manufactured by specified manufacturers.

C. In all cases, standard cataloged materials and systems have been selected. Materials such as lighting fixtures specially manufactured for this particular project, and not part of a

manufacturer's standard product line, will not be acceptable. In the case of systems, the system components shall be from a single source regularly engaged in supplying such systems. A proposed system made up of a collection of various manufacturers products will be unacceptable.

D. Where Specifications list manufacturers names and/or "as approved" or "equal approved by Designer", other manufacturers equipment will be considered if equipment meets Specification requirements and has all features of the specified items as are considered essential by the Architect.

E. All materials shall be new and shall be UL listed.

2.02 ARC-FLASH HAZARD WARNING

A. In accordance with NFPA 110.16, all electrical equipment shall be provided with factory or field marking which will warn personnel of potential electric arc flash hazards.

2.03 RACEWAYS AND FITTINGS

A. Raceways – General:

1. No raceway shall be used smaller than 3/4" diameter. No conduit shall have more than three (3) 90° bends in any one run, and where necessary, pull boxes shall be provided.

2. Rigid metal conduit (RMC) conforming to, and installed in accordance with, Article 344 of NFPA 70 shall be heavy wall zinc coated steel conforming to American Standard Specifications C80-1 and may be used for service work, exterior work, slab work, and below grade level slab, wet locations, and in mechanical rooms and where raceway may be subjected to mechanical damage, i.e., loading docks, workshops, etc.

3. Intermediate metal conduit (IMC) conforming to, and installed in accordance with Article 342 of NFPA 70 shall be zinc coated steel and may be used in all areas similar to RMC.

4. Thin wall conduit (EMT), conforming to, and installed in accordance with, Article 358 of NFPA 70 shall be zinc coated steel, conforming to industry standards, may be used in masonry block walls, stud partitions, above furred ceilings where exposed but not subject to mechanical damage, and shall be used for fire alarm work.

5. Flexible metal conduit (FMC) conforming to, and installed in accordance with Article 348 of NFPA 70 shall be used for connections to recessed light fixtures, vibrating equipment and motors. All FMC shall be secured and supported in accordance with Article 348 of NFPA 70.

6. Liquidtight flexible metal conduit (LFMC) conforming to, and installed in accordance with Article 350 of NFPA 70 shall be used for connections to light fixtures, vibrating equipment and motors. All LFMC shall be secured and supported in accordance with Article 350 of NFPA 70. If used on roof applications, all LFMC shall be supported by sleepers approved by the Architect prior to installation.

7. Rigid non-metallic conduit may be used at the Contractor's option for underground electric and telephone services outside the foundation wall and shall be polyvinyl chloride (PVC) schedule 40 or 80, 90° C. If option of rigid non-metallic conduit is exercised, underground runs outside the foundation wall shall be concrete encased at Contractor's expense. Schedule 40/80 conduit shall be installed in conformance with Article 352 of NFPA 70. Use of type EB or A PVC conduit is not allowed.

8. PVC Schedule 40 may also be used for below grade slab circuits within building confines. Below slab rigid non-metallic conduits do not require concrete encasement. Rigid non-metallic conduits shall not be used in slabs. Rigid steel elbows or stubs shall be used for penetrations from below slab or through exterior walls into building. PVC shall not be installed within building. Raceways and fittings shall be produced by same manufacturer. All PVC conduit shall comply with ANSI/UL 651.

9. PVC coated rigid metal conduit shall be used where indicated and conform to the following:
    a. Prior to application of the PVC coatings, all conduits shall conform to Federal Specification WW-C-581 E, ANSI Standard C80.1, UL Standard #6 and shall be hot dip galvanized.
    b. The PVC exterior coating shall have a nominal thickness of 40 mils and shall be applied using a fluidized bed process.
    c. Interior conduit, interior fitting surfaces and all threads shall all be protected by a two-part 2 mil urethane coating.
    d. Interior and exterior coatings on conduit shall have sufficient flexibility to permit field bending without damage.

10. Acceptable Manufacturers:
    a. Wheatland Tube Company
    b. Allied Tube
    c. Western Tube & Conduit
    d. Carlon
    e. Perma-Cote Supreme
    f. Cantex

11. Fittings:
    a. Provide insulated bushings on all raceways that house conductors #4 AWG or larger at all threaded fittings no matter what the size of the conductor.
    b. Manufacturer’s standard fittings shall be used for raceway supports.
    c. Expansion Fittings: Expansion fittings shall be used where structural and concrete expansion joints occur and shall include a ground strap.
    d. Couplings for rigid metal conduit and IMC shall be threaded type. Provide insulated bushings.
    e. All fittings for EMT conduit shall be steel. No die-cast fittings are allowed. Set screw and compression connectors are allowed.
    f. Threadless fittings for EMT shall be watertight compression type. All fittings shall be concrete tight.
    g. Cable supports in vertical raceways shall be of the split wedge type. Armored cable supports for vertical runs to be of wire mesh basket design.
    h. Wall entrance seals shall be equal to O.Z. Gedney type “WSK” or Link-Seal.
    i. Couplings, elbows and other fittings used with rigid nonmetallic raceways shall be of the solvent cemented type to secure a waterproof installation.
    j. Acceptable manufacturers:

1) O.Z. Gedney
2) Crouse Hinds
3) American Fittings
4) Hubbell
5) Thomas & Betts

2.04 WIRING MATERIALS

A. Building Wire and Cable shall be copper with 600V insulation, THWN for branch circuitry and XHHW for feeders.

B. Conductors shall be of soft drawn 98% minimum conductivity properly refined copper, solid construction where No. 10 AWG and smaller, stranded construction where No. 8 AWG and larger.

C. Exterior of wires shall bear repetitive markings along their entire length indicating conductor size, insulation type and voltage rating.

D. Exterior of wires shall be color coded, so as to indicate a clear differentiation between each phase and between each phase and neutral. In all cases, grounded neutral wires and cables shall be identified by the colors “white” or “gray”. In sizes and insulation types where factory applied colors are not available, wires and cables shall be color coded by the application of colored plastic tapes in overlapping turns at all terminal points, and in all boxes in which splices are made. Colored tape shall be applied for a distance of 6 inches along the wires and cables, or along their entire extensions beyond raceway ends, whichever is less.

E. Final connections to motors shall be made with 18” of neoprene sheathed flexible conduit.

F. Minimum branch circuit conductor size shall be No. 12 AWG installed in conduit. Motor control circuit wiring shall be minimum No. 14 AWG installed in conduit.

G. Fire alarm wiring shall be per manufacturer’s recommendations.

H. Other wires and cables required for the various systems described elsewhere in this section of the Specifications shall be as specified herein, as shown on the Contract Drawings, or as recommended by the manufacturer of the specific equipment for which they are used, all installed in conduit.

I. Metal clad sheathed cable NFPA 70, type MC may be used for branch circuitry where run concealed, and not subject to physical damage. All type MC cable used shall contain a full size insulated ground conductor. All conductors shall be copper. All type MC cable insulation used shall have voltage rating of 600 volts, shall have a temperature rating of 75° C, and shall be thermoplastic material. Armor material shall be steel and armor design shall be interlocked metal tape. Fire alarm rated MC cable may be used for fire alarm work where concealed and acceptable to the Local Authorities Having Jurisdiction.

J. Wiring materials shall be manufactured by Southwire, Prysmian, General Cable, or equal.

2.05 OUTLET, JUNCTION, PULL BOXES AND WIRING TROUGHS FOR ALL SYSTEMS

A. Outlets:

1. Each outlet in wiring or raceway systems shall be provided with an outlet box to suit conditions encountered. Boxes installed in normally wet locations shall be of cast-metal type having hubs. Concealed boxes shall be cadmium plated or zinc coated sheet metal type. Old work boxes with Madison clamps are not allowed in new construction.

2. Each box shall have sufficient volume to accommodate number of conductors in accordance with requirements of NFPA 70. Boxes shall not be less than 1-1/2" deep unless shallower boxes are required by structural conditions and are specifically approved by Architect. Ceiling and bracket outlet boxes shall not be less than 4" octagonal except that smaller boxes may be used where required by particular fixture to be installed. Flush or recessed fixtures shall be provided with separate junction boxes when required by fixture terminal temperature requirements. Switch and receptacle boxes shall be 4" square or of comparable volume.

3. Acceptable Manufacturers:
   a. Appleton
   b. Crouse Hinds
   c. Steel City
   d. RACO

B. Pull and Junction Boxes: Where necessary to terminate, tap off, or redirect multiple raceway runs or to facilitate conductor installation, furnish and install appropriately designed boxes. Boxes shall be fabricated from code gauge steel assembled with corrosion resistant machine screws. Box size shall be as required by Code. Where intermediate cable supports are necessary because of box dimensions, provide insulated removable core brackets to support conductors. Junction boxes are to be equipped with barriers to separate circuits. Where splices are to be made, boxes shall be large enough to provide ample work space. All conductors in boxes are to be clearly tagged to indicate characteristics. Boxes shall be supported independently of raceways. Junction boxes in moist or wet areas shall be galvanized type. Boxes larger than 4 inches square shall have hinged covers. Boxes larger than 12 inches in one dimension will be allowed to have screw fastened covers, if a hinged cover would not be capable of being opened a full 90 degrees due to installation location.

2.06 WIRING DEVICES

A. Provide wiring device type plates for all wall-mounted devices. All wall plates shall be smooth high impact nylon for all areas, color as directed by the Architect. Provide galvanized steel for all Utility, Electric and Mechanical Rooms.

B. Wiring devices standard for the project (i.e., with no specific type indicated) shall conform to the following:

1. Visible part colors of wiring devices shall be as directed by the Architect for all areas. Provide brown devices for all Utility, Electrical and Mechanical rooms.

2. Exclude compact or "despard" type devices.

C. Wiring device switches shall be toggle type, A.C. quiet design, specification grade, 20 amps on 120 volt circuits. Switches shall be mounted 48" to center line above finished floor unless noted otherwise.

1. Single pole switch shall be equal to Hubbell No. 1221.

2. Double pole switch shall be equal to Hubbell No. 1222.

3. Three-way switch shall be equal to Hubbell No. 1223.

4. Four-way switch shall be equal to Hubbell No. 1224.

5. Single pole pilot light switch shall be equal to Hubbell No. HBL 1221PL.

6. Equivalent 277 volt 20 amp switches shall be used where required.

D. Standard duplex convenience receptacles shall be 125 volt, 20 amps, three wire (two circuit wires plus ground), "U-bar" ground NEMA slot configuration 5-20R specification grade. Receptacles shall be mounted 18" to center line above finished floor unless noted otherwise.

1. Equal to Hubbell No. 5362.

2. Where indicated on plans provide receptacles with ground fault current interrupters, UL Class A; 20A, 125V to be equal to Hubbell No. GF5362. All GFI receptacles shall be self-testing type in compliance with UL 943.

3. Where indicated on plans, provide receptacles with integral USB charging ports; compliant with USB BC 1.2 rated 3A, 5VCD, 20A, 125V tamper resistant equal to Hubbell No. USB20X2W.

E. Non-standard convenience receptacles and special purpose power supply receptacles shall be as listed on plans.

F. Devices and device plates for flush wall devices which are not integrally equipped with same, shall be as directed by the Architect.

G. For unfinished spaces, plates for surface-mounted wall devices which are not integrally equipped with same, shall be galvanized sheet steel, formed raised type which does not overlap box. Where for switches, such plates shall have toggle guards.

H. Where more than one wiring device is indicated in the same location, the devices shall be mounted in gang under a common wall plate.

I. Mount duplex convenience and power receptacles vertically with grounding posts at top of device unless otherwise indicated. Locate grounding post to left when horizontal mounting is indicated.

J. Wiring devices and associated hardware shall be manufactured by Leviton, Hubbell or Pass and Seymour.

2.07 GROUNDING REQUIREMENTS

A. Ground all systems and equipment in accordance with best industry practice, the requirements of NFPA 70, Article 250 and the following:

1. The ground bus of the main switchboard shall be connected to the main grounding electrode specified below by means of insulated conductors run in conduit.

a. Metal underground water pipes.

b. Metal frame of building.

c. Concrete encased electrode.

d. Rod and pipe electrodes.

e. Ground ring.

2. Provide grounding bonds between all metallic conduits of the light and power system which enter and leave cable chambers or other non-metallic cable pulling and splicing boxes. Accomplish this by equipping the conduits with bushings of the grounding type individually cross connected.

3. Bond metallic conduits containing grounding electrode conductors and main bonding conductors to the ground bus service enclosure and/or grounding electrode at both ends of each run utilizing grounding bushings and jumpers.

4. Provide grounding bonds for all metallic conduits of the light and power system which terminate in pits below equipment for which a ground bus is specified. Accomplish this by equipping the conduits with bushings of the grounding type connected individually to the ground bus.

5. Provide supplementary ground bonding where metallic conduits terminate at metal clad equipment (or at the metal pull box of equipment) for which a ground bus is specified. Accomplish this be equipping the conduits with bushings of the grounding type connected individually by means of jumpers to the ground bus. Exclude the jumpers where directed. This exclusion will be required where an isolated ground for electronic equipment is to be maintained.

6. Each grounding type bushing shall have the maximum ground wire accommodation available in standard manufacture for the particular conduit size. Connection to bushing shall be with wire of this maximum size.

7. Bonding conductors on the load side of the service device and equipment grounding conductors shall be sized in relation to the fuses or trip size of the overcurrent device supplying the circuit.

8. The central equipment for the fire protective alarm system and telephone system shall have its grounding terminal connected to the grounding electrode by means of a No. 6 green coded insulated conductor, run in 3/4" conduit. Utilize a ground clamp of a type specifically manufactured for the purpose.

2.08 PHASING AND COLOR CODING

A. The insulation or covering of each wire or cable shall be color coded so as to provide for circuit identification as specified below:

120/208 V Circuits	277/480V	Phase Circuits
Black	Brown	A
Red	Orange	B
Blue	Yellow	C
White	Grey	Neutral
Green	Green with Yellow Tracer	Equipment Ground

B. Color coding shall be achieved by one of the following methods:

1. The insulation or covering shall be coded during manufacture by use of one of the following methods:

    a. Colored compounds.

    b. Colored coatings.

2. In sizes and insulation types where factory applied colors are not available, wires and cables shall be color coded by the application of colored plastic tapes in overlapping turns at all terminal points, and in all boxes in which splices are made.

C. The same colored cable shall be connected to the same phase throughout the project.

D. In general, panelboards shall be phased “A”, “B”, “C”, left to right. The neutral, although it may be in different locations for different equipment, shall be identified.

2.09 SWITCHBOARD

A. The switchboard shall be of the free-standing deadfront, front accessible only, totally metal enclosed externally operable type, and shall consist of an assembly of standardized vertical sections, each having rigid frame construction of heavy gauge formed steel. Each section shall be thoroughly rustproof, primed and painted to provide an overall even appearance. Adjacent vertical sections shall be arranged for bolting together. Welded construction will be permitted only for individual vertical sections. Switchboards shall include all protective devices and equipment as listed on the Contract Drawings with the necessary interconnections, instrumentation and control wiring. All switchboard sections shall align on front and rear.

B. Its arrangement shall be such that their lowest current carrying parts are at least 12 inches above finished floor, and its height is no more than 90 inches.

C. It shall comply with all the latest applicable standards of NEC, NEMA, ANSI and UL, having all main overcurrent and switching devices individually mounted and front accessible only. All branch overcurrent and switching devices shall be panel mounted, and shall be front accessible only.

D. Molded Case Circuit Breakers:

1. Main and distribution feeder protective devices as shown shall be molded case air circuit breakers, built, tested and UL labeled per UL 489. Main and distribution feeder breakers shall have long time, short time, instantaneous, (LSI) trip functions. Main circuit breaker shall also have a ground fault (G) trip function.

2. Breaker trip unit shall be solid-state trip complete with built in current transformers, solid-state trip unit and flux transfer shunt trip. Breakers shall have interchangeable trip rating plugs with trip ratings as indicated on the Contract Drawings. Rating plugs shall be interlocked so they are not interchangeable between frames and interlocked such that breaker cannot be latched with rating plug removed. Provide test kit that is fully compatible with built-in test points for testing long delay and instantaneous functions of the breaker by means of a 120-volt operated test kit.

    a. Solid-state instantaneous element shall be continuously adjustable from approximately 4 to 8 times the trip rating, with short time adjustment from instantaneous to 10 cycle delay for coordination purposes. Provide short delays over-ride feature providing for instantaneous tripping on high magnitude faults.

3. Molded case breakers shall have available interrupting current (AIC) rating shall meet or exceed the switchboard assembly UL listed integrated short circuit rating but shall have a minimum 65,000 symmetrical RMS interrupting capacity at 240 volts.

E. It shall have ample gutter space for outgoing cables.

F. It shall have complete bussing suitable for main service supply characteristics.

G. It shall have a neutral bus.

H. It shall have a ground bar sized per NEC but shall be minimum 2" x 1/4" copper bar run along the switchboard for its entire length. The ground bar shall be fastened and bonded to each vertical framing member of the switchboard.

I. Rear or side access to each vertical section shall not be required.

J. Switchboard bussing shall be of hard drawn 98% minimum conductivity copper and shall conform to the following:

1. No individual bar shall be of a thickness of more than 1/4 inch. Where necessary for current capacity, multiple parallel bars shall be used. Parallel bars shall be separated by copper spacers or washers maintaining a spacing equal to bar thickness.

2. Exclude divergent routing of electrically paralleled bars.

3. Connections shall be made up with cadmium plated steel bolts and nuts utilizing "Belleville" type washers or split locknuts plus flat washers.

4. The current density across bolted contact surfaces of bars shall not exceed 200 amps per square inch. Bolted contact surfaces of bars shall be silver or tin-plated.

5. Bracing and protective devices shall be such as to withstand and interrupt short circuit stresses of 65,000 amps symmetrical at 480 VAC minimum or available short circuit whichever is larger.

6. Bussing designated as mains shall be run for the full extend indicated without reduction in size.

7. Neutral bussing shall be full size.

8. Neutral bussing shall extend the same length as the main phase bussing with which it is associated.

9. The neutral bus shall be bonded to the ground bus by means of insulated copper cables.

10. Each neutral bus shall be properly drilled and tapped for each outgoing feeder requiring a neutral connection.

11. "Spaces only" for overcurrent protection and switching devices shall be bussed for the maximum device that can be fitted into them including all necessary hardware except the device itself.

12. Bussing and arrangement of overcurrent and switching devices shall be bussed for the maximum trip setting of the device that can be fitted into them.

K. Submit certification that the switchboard has withstood, without breakdown, a factory dielectric "Hi-Pot" test consisting of a one minute application of a 60 cycle AC test voltage applied between phase legs and from each phase leg to enclosure. The applied test voltage shall have an RMS valve of at least twice the line-to-line system voltage to which the switchboard is to be applied.

L. The main switchboard shall be listed with an Underwriters label attesting to its suitability as service entrance equipment.

M. Provide adequate means for rigging, skidding and rolling.

N. Switchboard shall be manufactured by Square D, Siemens, Eaton, or General Electric.

2.10 ENCLOSURES FOR INDIVIDUALLY MOUNTED OVERCURRENT AND SWITCHING DEVICES

A. Construction shall be NEMA Class I, where installed indoors.

B. Construction shall be NEMA Class IIIR, where installed outdoors, in mechanical rooms, in locations defined as damp or wet by NFPA 70 or where indicated as weatherproof.

C. Operating handles shall be front or side type to accommodate hand access space and flush or surface mounting requirements.

D. Each shall be equipped with padlock for locking operating handle in the open position.

2.11 INDIVIDUALLY MOUNTED DRY TYPE THREE PHASE TRANSFORMERS

A. Provide individually mounted dry type 3-phase transformers in accordance with the following:

1. They shall be of the indoor ventilated type.

2. They shall be of energy efficient design and meet the requirements of the Department of Energy standard DOE 2016.

3. They shall be for 60 Hertz operation.

4. They shall have a delta connected high side rated for 480 volts and a wye connected low side rated for 120/208 volts, 3-phase, 4-wire, grounded neutral or as indicated.

5. They shall have full capacity taps above and below normal as follows:

Transformer Rating	Taps
15 kVA and less	Two 5% FCBN
30 kVA and above	Two 2-1/2% FCAN and Four 2-1/2% FCBN

6. Up to and including 15 kVA they shall be suitable for wall mounting. Larger than 15 kVA, shall be floor mounted.

7. They shall have sheet metal casings which are coated inside and out with a rust inhibiting primer and finished with a factory coat of enamel.

8. Floor or wall supported transformers shall be resiliently isolated from the building structure by means of neoprene vibration isolators.

9. All supports for ceiling mounted transformers shall be designed by a licensed Structural Engineer.

10. Submit manufacturer's certification that 75°C operating temperature wires connecting to their terminals will not be damaged under full load conditions if the ambient temperature is maintained at 40°C. Provide 90°C wire where required.

11. Submit manufacturer's certification that the sound outputs of transformers do not exceed the following levels based on NEMA standard testing procedures:

Transformer Rating	Decibel Sound Output
9	40
15	45
30	45
45	45
75	50
112-1/2	50
150	50
300	55

B. The center tap or neutral of the load side transformer windings shall be bonded to a lug and bolt inside the transformer casing. The bolt shall extend outside to serve as a system grounding stud. The bond to the bolt shall have an ampere capacity of no less than 20% of the capacity of a load side phase winding.

C. All dry-type transformers where indicated on the Contract Drawings or herein specified shall be electro-statically shielded type, UL listed K factor transformers, rated K13 minimum with 200% neutral bars, lugs and connections.

D. All transformers shall be provided with Class 220 insulation.

E. All transformers shall be provided with 115°C temperature rise.

F. Dry type transformers shall be manufactured by Square D, Siemens, Eaton, or General Electric.

2.12 PANELBOARDS

A. Panelboards shall consist of factory completed dead front assemblies of back pans, main busses, overcurrent and switching units, sheet metal cabinets and trims. They shall be so designed that switching and overcurrent devices can be replaced without disturbing adjacent units and without removing the main bus connectors, so that circuits may be changed without machine drilling or tapping.

B. Where indicated as power or distribution panels, they shall be as manufactured by Square D, Siemens, Eaton, or General Electric.

C. Bus bars for their mains shall be of copper having current capacities as indicated and sized for such capacities in accordance with Underwriter Laboratory standards. Provide double size neutral bus bars and lugs for all 120/208 volt panelboards where fed from "K" rated transformers. Bus bar taps for panels with single pole branches shall be arranged for sequence phasing of the

branch circuit devices. Bussing shall be braced throughout to conform to industry standard practice governing short circuit stresses in panelboards. Phase bussing shall be full height without reduction.

D. A ground bus shall be provided for each panel. Each ground bus shall be of the same material as the phase and neutral buses.

E. Cabinets shall be fabricated from industry standard gauge galvanized sheet steel with corners lapped and riveted, or fastened by approved methods.

F. The inside and outside of the trims shall be factory painted with one (1) rust proofing primer coat and one (1) finish coat. The finish paint shall be of a type to which field applied paint will bond. All trims shall be hinged.

G. Cabinets and trims shall be suitable for the required mounting. Trims shall be fastened to cabinets and shall be of a type that is self-supporting on cabinets. Trims for flush panels shall overlap cabinets by at least 3/4" all around. Where two section panels are required, cabinets shall be of equal height including those cases where there is one main for both sections.

H. Cabinets and trims for lighting and appliance panels shall accommodate and conform to the following limited dimensions:

1. Minimum wiring gutter width on each side: 5-3/4".

2. Maximum overall width: 24".

3. Maximum overall depth: 6".

I. Where wires or cables are used within panelboards to make up internal connections (factory installed or otherwise) such wire or cable shall have copper conductors only.

J. Any cabinet for a power or distribution panel shall (regardless of the actual devices required to be in it) have a width, depth and bussing adequate for a 3-pole branch device equal in rating to the panel mains. In no case shall the cabinet be wider than 42" or deeper than 18".

K. Hinged doors covering all switching device handles shall be included in all panel trims.

L. Doors in panelboard trims shall conform to the following:

1. In making switching device handles accessible, doors shall not uncover any live parts.

2. Doors shall have flush type paracentric cylinder locks and catches. Two (2) keys shall be supplied for each lock and each key shall open all panelboards. Locks and keys shall conform to a "standard keying policy" as directed.

M. Where "spaces only" for overcurrent protection and switching devices are called for in a panel, its main bus, and backpan, as well as its cabinet and trim, shall be extended to accommodate these spaces and shall include all necessary hardware including bus connectors to add future devices.

N. Panelboards shall comply with the following industry standards:

1. UL Standards:

a. Panelboards – UL67.

b. Cabinet & Boxes – UL50.

2. NEMA Standard – PB1.

O. Panelboards shall be labeled with UL short-circuit rating adequate for the available short-circuit and based on the lowest panel mounted circuit breaker available UL listed interrupting current rating, but in no case less than 65 ka for 480 volt and 22 ka for 240 volt panelboards.

P. Provide “lock on” clips for the toggle handles of certain branches serving the Fire Alarm System, security, etc.

Q. Panelboards shall be manufactured by Eaton, Siemens, Square D, or General Electric.

2.13 MOLDED CASE CIRCUIT BREAKERS

A. Molded case type circuit breakers shall consist of manually operated quick-make quick-break mechanically trip free operating mechanisms for simultaneous operation of all poles, with contacts, arc interrupters and trip elements for each pole, all enclosed in molded phenolic plastic cases.

1. Their tripping units shall be of the “thermal magnetic” type having bimetallic elements for time delay overload protection and magnetic elements for short-circuit protection.

2. They shall be manually operable by means of toggle type operating handles having “tripped” position midway between the “on-off” positions.

3. They shall each be contained in an individual case enclosing only the number of poles required for the particular breaker.

4. All panels and individually mounted circuit breakers shall have short circuit ratings exceeding the available short-circuit of the values indicated in the “Power System Studies” in this section by a factor of 1.2 with a minimum as follows:

a. 240V class panels/breakers: 10 kAIC where shown fed by a 150 kVA or less transformer

1) 10 kAIC where shown

2) 22 kAIC where shown fed by a 300 kVA or less transformer.

b. 480V Class Panels/Breakers shall be 65 kAIC.

5. They shall be of the “bolted-in” type.

a. Where necessary, to accommodate other requirements, their frame sizes shall be increased to conform to such requirements, frame sizes being indicated only as a reference to the minimum acceptable interrupting ratings noted above.

b. Where single pole in trip sizes 20 amps or less, they shall be rated for switching duty.

c. They shall be equipped with 5 milliamp sensitivity ground fault interrupting features where so indicated.

d. All circuit breakers connected to lighting branch circuits shall be high magnetic type breakers.

6. They shall be manufactured by Square D, Siemens, Eaton, or General Electric.

2.14 CARTRIDGE FUSES

A. Cartridge fuses shall be as follows:

1. Provide a complete set of fuses for each item of fusible type equipment. Fusible equipment furnished by other Contractors will be complete with fuses.

2. Secondary system fuses, rated at 600 volts or less, shall be UL listed and constructed in conformance with the applicable standards set forth by NEMA and ANSI. All fuses of a particular class shall be of same manufacturer.

3. Regardless of actual fault current, they shall, at full recovery voltage, be capable of safely interrupting fault currents of 200,000 amperes RMS symmetrical or 340,000 amperes RMS asymmetrical, deliverable at the line side of the fuse.

4. Circuits 0-600 amperes shall be protected by the equal of Bussman "Low Peak" current limiting fuses, LPN-RK (250 volts), LPS-RK (600 volts), UL class RK-1.

5. Fuses shall be suitable for application to fuse gaps which reject other types of fusing.

6. Supply 10% spare fuses of each size and type 60 amps and less. Supply three (3) spare fuses for each size and type over 60 amps.

B. Cartridge fuses shall be manufactured by Bussman, Gould or EFCO.

2.15 MOTOR CONTROLS

A. Motor Controls – Manual and Magnetic:

1. Individually-mounted magnetic starters shall be across-the-line type with thermal overload on each phase, single-speed, two-speed, or reduced voltage start as indicated. Check exact type of two-speed or part-winding motors to be furnished by other Contractors, and provide proper starter.

2. Starters shall be of the replaceable contact double break type, of size and type required for particular motor horsepower and voltage. Minimum size starter to be size 1.
   a. Starters shall have OL reset button, green pilot light to indicate "ON", and "HAND-OFF-AUTO" switch in cover. Pilot lights shall be push-to-test type.
   b. Starters to have 120 volt control transformers with fused output being provided for those units operating on 277/480 volt system.
   c. Provide proper rating of thermal overloads. Replace any overloads found to be of an incorrect rating. Provide a spare set of three (3) thermal overloads for each starter.
   d. Provide four (4) sets of auxiliary contacts of convertible type N.O. to N.C. for each starter.
   e. Motor starters installed in dry locations shall have NEMA I enclosures. Those in wet locations shall have NEMA IV enclosures.
   f. Acceptable Manufacturers:
      1) Siemens
      2) Eaton
      3) Square D
      4) General Electric

3. Manual motor starters shall have pilot lights and shall be furnished with thermal overloads on each phase.

B. Motors: Each motor shall have disconnect switch and starter provided under this section. Starters which are a part of "factory assembled" control panel will be provided under section supplying equipment to be controlled but connected under this section.

C. Disconnect Switches:

1. Disconnect (safety) switches shall conform to industrial standards of NEMA, be UL listed and shall be heavy-duty type, quick-make, quick-break type with interlocking cover mechanism and provisions for padlocking switch handle in "OFF" position. Three (3) pole toggle switches are not acceptable as substitute for disconnect switches.

2. Disconnect switches shall be of fused or un-fused type as indicated with number of disconnecting poles indicated. The grounded conductor shall not be switched. Switches shall be for use with current limiting fuses with rejection type fuse clips and those shall be horsepower rated.

3. Enclosures shall be of proper NEMA type for the intended location and shall be phosphate coated or equivalent code gauge galvanized sheet steel with gray baked enamel finish.

4. Acceptable Manufacturers:

a. Eaton

b. Siemens

c. Square D

d. General Electric

D. Combination Starter: Provide combination starters where indicated on the plans.

E. Motor Control Circuitry:

1. Except as noted below, select materials exactly as specified for feeders. Utilize No. 12 A.W.G. THWN conductors throughout minimum.

2. Motor control circuit wires may be run in the same conduit as the wires of motor power circuits; however, exclude motor control wires from enclosures (other than motor starter enclosures) which contain power circuit overcurrent protection and switching devices; also from pull boxes and junction boxes containing the wires of main and sub main feeders. Utilize auxiliary pull boxes to separate motor control wires from motor power circuit wires before the power circuit wires enter the items from which motor control wires are excluded.

3. Prior to installing any motor control circuitry for a particular motor, notify the Architect of any deviations between the control circuitry requirements of the trade supplying the motor and the indicated electric work.

2.16 LIGHTING FIXTURES

A. All lighting fixtures shall be in accordance with identifications on the Contract Drawings and the following:

1. Finishes shall be as selected by the Architect or as indicated on the plans.

2. Any additional appurtenances required for installation and operation, where same are not covered by the identification used on the Contract Drawings, shall be included.

3. Recessed fixtures shall be coordinated with ceiling construction.

4. Exact location of all fixtures shall be confirmed with Architect prior to rough-in.

5. Recessed fixtures throughout shall have their components, wiring and external connections coordinated for use in ceilings utilized as air handling plenums.

6. Fixtures for use outdoors or in areas designated as damp locations, shall be suitably gasketed and UL listed for such applications.

7. All fixtures shall be UL approved with labels attesting thereto.

8. The Contractor shall obtain all information relative to the exact type of hung ceilings and suspension systems to be installed before ordering any recessed fixtures. This Contractor shall furnish the proper type fixtures applicable to the ceiling framing system. If, other than the type of fixtures specified are required for installation, due to the type of ceiling construction, this Contractor shall furnish and install the proper type fixtures and mounting appurtenances required at no extra charge.

9. The Contractor shall coordinate the exact locations of all lighting fixtures with the ceiling pattern during the construction period and before installation of the fixtures. Interferences between lighting fixtures, and other equipment, shall be brought to the attention of the General Contractor.

10. Include the aiming and/or adjustments of all lighting fixtures requiring same in accordance with instructions issued by the Architect in the field.

11. All lamp sockets in lighting fixtures shall be suitable for the indicated lamps and shall be set so that the lamps are positioned in optically correct relation to all lighting fixture components.

12. Lighting fixtures shall be supported from building structure only, not from hung or suspended ceiling, by means of chains, threaded rods or #14 gauge tie wire.

13. All fixtures shall include seismic clips and shall be supported to comply with seismic regulations.

B. LED Lamps and Luminaires:

1. Solid State Lighting/Light Emitting Diode (LED) Lamps and Luminaries:

   a. Luminaire manufacturer shall have a minimum of five (5) years' experience in the manufacture and design of LED products and systems and no less than one hundred (100) North American installations.

   b. Unless otherwise specified, all LED luminaires and power/data supplies shall be provided by a single manufacturer to ensure compatibility.

   c. All components, peripheral devices and control software are to be provided by and shall be the responsibility of a single entity. All components shall perform successfully as a complete system.

   d. Include all components necessary for a complete installation. Provide all power supplies, synchronizers, data cables, and data terminators for a complete working system.

e. All LED sources used in the LED luminaire shall be of proven quality from established and reputable LED manufacturers and shall have been fabricated after 2007.

2. Replacement and Spares:

   a. Manufacturer will keep record of original bin for each LED module and have replacement modules from the same bin available for three (3) years after date of installation.

   b. Manufacturer will keep an inventory of replacement parts (source assembly, power and control components).

   c. Manufacturer's LED system will not become obsolete for ten (10) years.

   d. Manufacturer will provide exact replacement parts, or provide upgraded parts that are designed to fit into the original luminaire and provide equivalent distribution and lumen output to the original, without any negative consequences.

   e. Manufacturer has in place a written recycling and re-use program, and will accept returned product and/or components for recycling or re-use.

   f. Manufacturer will properly dispose of non-recyclable components that are deemed harmful to the environment.

   g. System shall carry a full warranty for five (5) years. Manufacturer shall be responsible for cost of labor not to exceed $50 per individual part, and cost of shipping, to replace any component of the system that fails within two (2) years of installation.

3. Products and Components – Performance:

   a. LED luminaires and components shall be UL listed or UL classified.

   b. LED luminaires and components shall be CE certified.

   c. LED luminaires and components shall be PSE marked.

   d. All LED luminaires shall be subjected to the following JEDEC Reliability Tests for Lead-free Semiconductors: HTOL, RTOL, LTOL, PTMCL, TMSK, Mechanical Shock, Variable Vibration Frequency, SHR, Autoclave.

   e. To ensure luminaire quality, luminaire shall have been tested under accelerated life test conditions including an operating temperature span of 360 degrees F, and cyclic loading up to 60G.

   f. All products included in system shall use Mil-Std 810F, Random Vibration 7.698g as a minimum standard. In installations subject to vibration, luminaire shall be installed with vibration isolation hardware to sufficiently dampen vibrations.

   g. All LED components shall be mercury and lead-free.

   h. All manufacturing processes and materials shall conform to the requirements of the European Union's Restriction on the Use of Hazardous Substances in Electrical and Electronics Equipment (RoHS) Directive, 2002/95/EC.

   i. LEDs shall comply with ANSI/NEMA/ANSLG C78.377-2008 – Specifications for the Chromaticity of Solid State Lighting Products. Color shall remain stable throughout the life of the lamp. Color shall match approved sample.

   j. LEDs shall comply with IESNA LM-80 – Standards for Lumen Maintenance of LED Lighting Products.

   k. White LEDs shall have a rated source life of 50,000 hours under normal operation conditions. RGB LEDs shall have a rated source life of 100,000 hours. LED "rated

source life" is defined as the time when a minimum of 70% of initial lumen output remains.

l. Luminaire assembly shall include a method of dissipating heating so as to not degrade life of source, electronic equipment, or lenses. LED luminaire housing shall be designed to transfer head from the LED board to the outside environment. Luminaire housing shall have no negative impact on life of components.

m. Manufacturer shall supply in writing a range of permissible operating temperatures in which system will perform optimally.

n. High power LED luminaires shall be thermally protected using one or more of the following thermal management techniques: metal core board, gap pad, and/or internal monitoring firmware.

o. LEDs shall be adequately protected from moisture or dust in interior applications.

p. For wet and damp use, LED-based luminaires itself shall be sealed, rated, and tested for appropriate environmental conditions, not accomplished by using an additional housing or enclosure. Such protection shall have no negative impact on rated life of source or components, or if so, such reductions shall be explicitly brought to the attention of the Designer.

q. All hardwired connections to LED luminaires shall be reverse polarity protected and provide high voltage protection in the event connections are reversed or shorted during the installation process.

r. The LED luminaire shall be operated at constant and carefully regulated current levels. LEDs shall not be overdriven beyond their specified nominal voltage and current.

s. RGB LED luminaries shall utilize an equal combination of high brightness red, blue and green LEDs, unless otherwise noted, to provide up to 16.78 million additive RGB colors and shall be capable of at least 8-bit control.

t. Manufacturer shall be able to provide supporting documentation of the product meeting third party regulatory compliance.

u. Manufacturer shall ensure that products undergo and successfully meet appropriate design and manufacturability testing including Design FMEA, Process FMEA, Environmental Engineering Considerations and Laboratory Tests, IEC standards and UL/CE testing.

v. All LED luminaires (100% of each lot) shall undergo a minimum twenty-four (24) hour burn-in during manufacturing, prior to shipping.

w. Manufacturer shall provide Luminaire Efficacy (Im/W), total luminous flux (lumens), luminous intensity (candelas) chromaticity coordinates, CCT and CRI optical performance, polar diagrams, and relevant luminance and illuminance photometric data. Provide data in IES file format in accordance with IES LM-79-2008, based on test results from an independent Nationally Recognized Testing Laboratory.

x. Power/Data supply shall have the following:

1) Supply outputs shall have current limiting protection.

2) Supply shall provide miswiring protection.

3) Supply shall have power factor correction.

4) Supply shall provide connections that are conduit-ready or clamp-style connections in the case of low-voltage wiring.

5) Supply shall come with a housing that meets a minimum IP20 rating for dry location

installation unless located in a damp or wet location.

6) Supply shall be UL listed for Class 1 or Class 2 wiring.

2.17 SERVICE ENTRANCE SPD PROTECTION

A. Summary: Section Includes: Provide surge protective device (SPD) external to main switchboard for the protection of building electrical system.

B. References:

1. ANSI/IEEE C.62.41 and C62.45.
2. UL 1449 – 3rd Edition.
3. UL 1283.
4. NEC – NFPA 70.
5. NEMA LS1.
6. NFPA.
7. OSHA.
8. IEEE Std. 1100.

C. Submittals:

1. Shop Drawings: Provide Shop Drawings with wiring diagrams, installation information, testing and maintenance procedures, and operational information for the transient protection system. Shop Drawings shall be submitted to Engineer for approval before starting actual fabrication.

2. Submittal for Approval: Provide the following transient protection submittals:
   a. Dimensional Drawing of each SPD type, indicating proposed mounting arrangements.
   b. Written functional description of the transient protection circuit in terms of components, configuration, design approach, and performance capability per latest NEMA LS1.
   c. The means of connection of the SPD to the electrical distribution system per latest NEMA LS1.
   d. Manufacturer will provide UL-1449, Third Edition data card showing the Suppressed Voltage Rating (SVR) for the specific catalog number submitted. “Typical” UL 1449, Second Edition data is not acceptable.
   e. Per the requirements of NEC Article 285.6, the devices shall be marked with the short circuit current rating. This rating shall meet or exceed the available fault current. Test data from an independent testing laboratory shall be provided to demonstrate the short circuit current rating has been tested on a complete device.
   f. Submit test report data clearly demonstrating the maximum surge current rating has been tested on a COMPLETE SPD unit including all necessary fusing/overcurrent protection, thermal disconnects, integral disconnects and monitoring systems. Manufacturers who cannot provide this data will not be considered.

g. Submit data demonstrating the SPD unit, including all overcurrent protection, is fully capable of a minimum repetitive surge current rating of 10,000 ANSI/IEEE C62.41, Category C3 (10kA) impulses without failure or a change in performance characteristics of more than 10%.

h. Written detailed response to each paragraph of the specification indicating that the proposed product meets or exceeds this specification. If specific paragraphs are not met, provide written explanations as to why not.

D. Warranty: Description: Manufacturer shall provide a product warranty for a period of not less than 5 years from data of installation.

E. Manufacturers:

1. Acceptable Manufacturers: Subject to compliance with requirements of the Contract Documents, acceptable manufactures are as follows:

a. Liebert

b. Current Technology

2. Quality: The Manufacturer shall be ISO 9001 certified, demonstrating world-class quality systems for the design and manufacture of the SPD units.

F. Environmental:

1. General Requirements:

a. No audible noise shall be generated.

b. No appreciable magnetic fields shall be generated. System shall be capable of use directly in computer rooms in any location without danger to disc units, disk packs, or tapes.

c. Operating Conditions:

1) 30 – 130 Degrees F.

2) 15 – 85 Percent Humidity Non-Condensing.

d. Enclosure: The unit shall have a heavy duty NEMA 12 dust-tight, drip-tight enclosure.

G. Surge Suppressors:

1. General Requirements:

a. Rated for a (480Y/277) (208Y/120) volt, 60 Hertz, 3-phase, 4-wire switchboard.

b. Surge suppressors shall be in accordance with the following requirements:

1) Unit shall be parallel in design and connect in parallel to main switchboard. Each surge suppression element (MOV) shall be individually fused so that a failure of one element and/or fuse shall not affect other surge suppression elements.

2) Unit shall be UL 1449, 3rd Edition Listed.

3) Unit shall provide maximum UL 1449 2nd Edition Suppressed Voltage Rating (SVR) for 120, 120/208, or 120/240 volt system as follows:

a) L-N = 400V.

b) L-G = 400V.

c) N-G = 400V.

d) L-L = 700V.

4) Unit shall provide maximum UL 1449 3rd Edition Suppressed Voltage Rating (SVR) for 240, 277 or 277/480 volt system as follows:

a) L-N = 700V.

b) L-G = 700V.

c) N-G = 700V.

d) L-L = 1500V.

5) Unit shall provide maximum surge current rating of 100,000 amperes based on ANSI/IEEE C62.41 standard 8 by 20 microsecond current waveform.

6) Unit shall have a short circuit current rating, which equals or exceeds that of the Main Switchboard.

7) Unit shall be UL 1283 listed as an electromagnetic interference filter and provide 50 Ohm noise attenuation of at least 30 dB at 100 kHz, 50 dB at 1 MHz, 50 dB at 10 MHz, and 45 dB at 100 MHz.

8) Unit shall include solid-state, long-life externally mounted LED visual status indicators that indicate the on-line status and operational integrity of each phase of the unit.

9) Unit shall have a Form C summary alarm output contact rated for at least 1 amp at 120VAC for remote annunciation of SPD status.

H. Installation:

1. General Requirements:

a. Contractor shall install suppression system immediately next to or on top of service equipment where so approved by the Engineer.

b. Conductors between suppressor and point of attachment to service equipment shall be sized in accordance with Manufacturer's Shop Drawings and conductor lengths shall be as short as possible, preferably not to exceed 24". Manufacturers who offer an integrated SPD in the main service entrance equipment will provide information that clearly shows lead lengths, including the neutral and ground connections

c. Grounding: Suppressor ground shall be bonded to the equipment grounding conductor and service entrance ground.

2.18 UNDERGROUND ENCLOSURES

A. Underground enclosures and covers are for use in residential sidewalks and/or driveways subject to occasional non-deliberate heavy traffic. The enclosures shall be suitable for direct buried applications in soil, concrete embedment, or asphalt embedment.

B. The enclosures shall be concrete/cement gray in color, unless otherwise specified.

C. Box Description:

1. The box shall have an open bottom.

D. Cover:

1. The cover shall have a logo that reads “ELECTRIC”.

2. The cover shall have two lifting eyes/pull slots with the following dimensions – 1/2” x 4” with a 1/4” center pin.

3. The cover’s surface shall be skid resistant and have a minimum coefficient of friction of 0.50, as specified in current ANSI/SCTE 77.

4. The cover shall have two locking bolt slots, and two 3/8” – 16 UNC hex head bolts to secure the cover into the box.

E. Knockouts shall be notched to allow for a smooth edge upon removal.

F. The enclosures (Box and Cover) shall comply with all of the environmental tests as per current ANSI/SCTE 77.

G. Structural Requirements:

1. The enclosures (Box and Cover) shall be current ANSI/SCTE 77 Tier 22 and shall be UL Listed to 66WF and tested to the full ANSI standard.

2. The enclosures (Box and Cover) shall comply with all structural load tests as per current ANSI/SCTE 77 and shall be UL Listed to full ANSI standard - 66WF.

H. Approved Manufacturers:

1. Quazite

2. CDR

3. Hubbell Enclosures

4. Strongwell

5. PenCell Plastics, Inc.

I. Provide box collar around each underground enclosure. Box collars shall be tested to withstand a Tier 22 test load. Each collar shall meet or exceed the following requirements:

1. ANSI/SCTE77 Section 6.0

2. ASTM D2444

3. ASTM 1028-06 Section 8.

PART 3 EXECUTION

3.01 BASIC REQUIREMENTS

A. Adhere to best industry practice and the following:

1. All work shall be concealed.

2. Route circuitry runs embedded in concrete to coordinate with structural requirements.

3. Provide all outlet boxes, junction boxes, and pull boxes for proper wire pulling and device installation. Include those omitted from the Contract Drawings due to symbolic methods of notation.

4. Utilize lugs of the limited type to make connections at both ends of cables installed on the line side of main service overcurrent and switching devices. Provide cable limiters for each end of each service entrance cable.

5. Beyond the termination of raceways, fireproof the following:

   a. All wires and cables within pad-mounted transformer enclosure.

   b. All service feeder cables ahead of main service overcurrent protection devices, and elsewhere where not in raceways.

   c. Fireproofing of wires and cables shall be by means of a half-lapped layer of arc proof or by means of sleeving of a type specifically manufactured for the purpose. Ends of tape or sleeving shall be severed with twine. Fireproofing shall be extended up into raceways. After conductors have been finally shaped into their permanent configuration, fireproofing tape or sleeving shall be coated with silicate of soda (water glass). Fireproofing shall be applied in an overall manner to raceway groupings of conductors.

6. Provide all sleeves through fireproof and waterproof slabs, walls, etc., required for electric work.

   a. Provide waterproof sealing for the sleeves through waterproof slabs, walls, etc.

   b. Provide fireproof sealing for the sleeves through fireproof walls, slabs, etc.

   c. Provide fireproof sealing for the openings in fireproof walls, slabs, etc., resulting from removal of existing electrical sleeves, conduits, poke-thru's etc.

7. No splicing of wires will be permitted in Fire Alarm System.

8. Bundle wiring passing through pull boxes and panelboards in a neat and orderly manner.

9. Turn branch circuits and auxiliary system wiring out of wiring gutters at 90 degrees to circuit breakers and terminal lugs.

10. All panelboards shall be labeled in accordance with NFPA 70 Article 408.

3.02 TESTING REQUIREMENTS & INSTRUCTIONS

A. The Electrical Subcontractor shall provide supervision, labor, materials, tools, test instruments and all other equipment or services and expenses required to test, adjust, set, calibrate, and operationally check work and components of the electrical systems and circuitry throughout Division 26 work.

B. The Electrical Subcontractor shall pay for all tests specified in Division 26, including expenses incident to retests occasioned by defects and failures of equipment to meet Specifications, at no additional cost to the Owner. Any defects or deficiencies discovered in any of the Electrical work shall be corrected.

   1. The Electrical Subcontractor shall:

a. Replace wiring and equipment found defective (defined as failing to meet specified requirements) at no additional cost to the Owner.

b. Submit three (3) copies of test results to the Engineer.

2. Do not void equipment warranties or guarantees by testing and checkout work. Checks and tests shall be supplemental to and compatible with the Manufacturer's installation instructions. Where deviations are apparent, obtain the Manufacturer's approved review of procedures prior to testing. Where any repairs, modifications, adjustments, tests or checks are to be made, the Contractor shall contact the Engineer to determine if the work should be performed by or with the Manufacturer's Representative.

3. Tests are to:

   a. Provide initial equipment/system acceptance.

   b. Provide recorded data for future routine maintenance and trouble-shooting.

   c. Provide assurance that each system component is installed satisfactorily and can be expected to perform, and continue to perform its specified function with reasonable reliability throughout the life of the facility.

      1) At any stage of construction and when observed, any electrical equipment or system determined to be damaged, or faulty, is to be reported to the Engineer. Corrective action by the Contractor requires prior Engineer approval, retesting, and inspection.

      2) Prior to testing and start-up, equipment and wiring shall be properly and permanently identified with nameplates, and other identification as specified in Section 3.7. Check and tighten terminals and connection points, remove shipping blocks and thoroughly clean equipment, repair damaged or scratched finishes, inspect for broken and missing parts and review and collect Manufacturer's Drawings and instructions for delivery to the Engineer. Make routine checks and tests as the job progresses to ensure that wiring and equipment is properly installed.

      3) Testing and checkout work is to be performed with fully qualified personnel skilled in the particular tests being conducted. Personnel are to have at least five (5) years of experience with tests of same type and size as specified.

      4) Inspections and tests shall be in accordance with the following applicable codes and standards as amended to date, unless otherwise specified.

         a) National Electrical Manufacturer's Association – NEMA.

         b) American Society for Testing and Materials _ ASTM.

         c) Institute of Electrical and Electronic Engineers – IEEE.

         d) National Electrical Testing Association – NETA.

         e) American National Standards Institute – ANSI.

         f) C2: National Electrical Safety Code.

         g) Z244-1: American National Standard for Personnel Protection.

         h) Insulated Cable Engineers Association – ICEA.

         i) Association of Edison Illuminating Companies – AEIC.

         j) Occupational Safety and Health Administration – OSHA.

         k) OSHA Part 1910; Subpart S, 1910.308.

         l) OSHA Part 1926; Subpart V, 1926.950 through 1926.960.

m) National Fire Protection Association – NFPA.

n) 70B: Electrical Equipment Maintenance.

o) 70E: Electrical Safety Requirements for Employer Workplaces.

p) 70: National Electrical Code.

q) 101: Life Safety Code.

r) Inspections and tests shall utilize the following references:

s) Contract Drawings and Specifications.

t) Manufacturer's printed test procedures for respective equipment.

4. Test Equipment:

   a. Test equipment used by the Contractor is to be inspected and calibrated.

   b. Perform calibration and setting checks with calibrated test instruments of at least twice that of the accuracy of the equipment, device, relay or meter under test. Dated calibration labels shall be visible on test equipment. Calibrations over six (6) months old are not acceptable on field test instruments. Inspect test instruments for proper operation prior to proceeding with the tests. Record serial and model numbers of the instruments used on the test forms.

5. Test Procedures:

   a. The Electrical Subcontractor is responsible for the preparation of the procedures and schedules for the work specified herein. This work is to be coordinated and compatible with both the work and schedule of the other crafts. Sequence the tests and checks so that the equipment can be energized immediately after the completion of the application tests.

   b. Submit proposed testing and checkout forms. The procedures shall provide specific instructions for the checking and testing of each electrical component of each system. Schedule tests and inspections as the job progresses. Test procedures submitted shall include job safety rules.

   c. After each electrical system installation is complete, perform the tests to determine that the entire system is in proper working order and in accordance with applicable codes, Manufacturer's instructions, Drawings, and Specifications. Tests are in addition to shop tests of individual items at the Manufacturer's plant. Perform insulation and ground resistance tests before operating tests.

   d. Perform insulation tests on electrical equipment, apparatus, cables, motors, generators, transformers, circuit breakers and switches, switchgear, motor control centers, and similar electrical equipment, at the following items and conditions:

   e. Prior to energization and/or placing into service.

   f. When damage to the insulation is suspected or known to exist.

   g. After repairs or modifications to the equipment affecting the insulation.

   h. Where lightning or other surge conditions are known to have existed on the circuit.

   i. Make openings in circuits for test instruments and place and connect instruments, equipment, and devices, required for the tests. Upon completion of tests, remove instruments and instrument connections and restore circuits to permanent condition.

   j. List each circuit and measured resistance as test data. Maintain record of insulation resistance values. Identify conductor, or equipment, date that value was taken and

resistance value. Arrange information in tabular form and submit to Engineer.

k. Report inspections, tests, and calibrations in writing on Engineer approved reports/forms. The recorded data form shall have the signatures of the persons conducting the tests, authorized Witnesses and the Engineer. The forms shall serve as the test and inspection checklist.

l. When the electrical tests and inspections specified or required within Division 26 are completed and results reported, reviewed, and approved by the Engineer, the Contractor may consider that portion of the electrical equipment system or installation electrically complete. The Contractor will then affix appropriate, approved, and dated completion or calibration labels to the tested equipment and notify the Engineer of electrical completion. If the Engineer finds completed work unacceptable, he will notify the Contractor in writing of the unfinished or deficient work, with the reason for his rejection, to be corrected by the Contractor. The Contractor will notify the Engineer in writing when exceptions have been corrected. The Contractor will prepare a "Notification or Substantial Electrical Completion" for approval by the Engineer following Engineer's acceptance of electrical completion. If later in-service operation or further testing identified problems attributable to the Contractor, these will be corrected by the Contractor, at no additional cost to the Authority.

C. Specific Tests: Perform the following specified tests. De-energize and isolate equipment and cable prior to performing the tests.

D. Motors:

1. Before energizing any machine, visually inspect for serviceability. Check Manufacturer's instruction manual for correct lubrication and ventilation. Align motor with driven equipment. Check nameplate for electrical power requirements.

2. Test run motors uncoupled or unloaded, before placing into operation. Check the motor for rotation, speed, current and temperature rise under normal load and record the results. Maintain the proper color codes for phase identifications. This may require swaps at the motor for proper rotation. Use motor phase rotation meter prior to lead connection at motor in order to minimize later swaps.

E. Grounding Systems:

1. Test main building loops and major equipment grounds to remote earth, directly referenced to an extremely low resistance (approximately 1 ohm) reference ground benchmark. Perform a visual inspection of the systems, raceway and equipment grounds to determine the adequacy and integrity of the grounding. Ground testing results shall be recorded, witnesses, and submitted to the Engineer.

2. Perform ground tests using a low resistance, null-balance type ground testing ohmmeter, with test lead resistance compensated for. Use the type of test instrument which compensates for potential and current rod resistances.

3. Test each ground rod and measure ground resistance. If resistance is not 25 ohms or less, drive additional rods to obtain a resistance of 25 ohms or less. Submit tabulation of results to Engineer. Include identification of electrode, date of reading and ground resistance valve in the test reports.

4. Test each building and major equipment grounding system for continuity of connections and for resistance. Ground resistance of conduits, equipment cases, and supporting frames, shall

not exceed 5 ohms to ground. Submit all readings to the Engineer.

5. Where ground test results identify the need for additional grounding conductors or rods that are not indicated or specified, design changes will be initiated to obtain the acceptable values. The Contractor is responsible for the proper installation of the grounding indicated and specified.

6. Wire and Cable: (All conductors originating from main switchboard and distribution panels).

   a. Before energizing any cable or wire, megger the insulation resistance of every external circuit wire to each other and to ground. Tests shall be conducted at voltages of 500 volts or lower. Continuity test each wire and cable to verify the field-applied tag per conductor. Continuity test each wire and cable to verify the field-applied tag per conductor. Minimum insulation resistance valves shall not be less than two (2) megohms.

   b. Take insulation resistance measurements for motor feeders. With motors disconnected, measure insulation resistance from load side of contactors or circuit breakers.

   c. Check cables and wires for the proper identification numbering and/or color coding.

   d. Inspect cables for physical damage and proper connection in accordance with single line diagram.

3.03 BRANCH CIRCUITRY

A. For all lighting and appliance branch circuitry, raceway sizes shall conform to industry standard maximum permissible occupancy requirements except where these are exceeded by other requirements specified elsewhere.

B. Circuits shall be balanced on phases at their supply as evenly as possible.

C. Feeder connections shall be in the phase rotation which establishes proper operation for all equipment supplied.

D. Reduced size conductors indicated for any feeders shall be taken as their grounding conductors.

E. Feeders consisting of multiple cables and raceways shall be arranged such that each raceway of the feeder contains one (1) cable for each leg and one (1) neutral cable, if any.

F. For circuitry indicated as being protected at 20 Amps or less, abide by the following:

   1. All 20 amp, 120/208 volt, 3-phase, 4-wire combined branch circuit homeruns shall be provided with a #8 AWG neutral conductor.

   2. Minimum conductor size shall be No. 12 AWG copper.

   3. Conductors operating at 120 volts extending in excess of 100 ft. or at 277 volts extending in excess of 200 ft., or the last outlet or fixture tap shall be No. 10 AWG copper throughout.

   4. Lighting fixtures and receptacles shall not be connected to the same circuit.

   5. Circuits shall be balanced on phases at their supply point as evenly as possible.

G. Type MC Cable Installation:

1. Where cable is permitted under the products section, the installation of same shall be done in accordance with code and the following:

    a. Cable shall be supported in accordance with code. Tie wire is not an acceptable means of support. Cable supports such as Caddy WMX-6, MX-3, and clamps such as Caddy 449 shall be used. Where cables are supported by the structure and only need securing in place, then ty-raps will be acceptable. Ty-raps are not acceptable as a means of support. All fittings, hangers, and clamps for support and termination of cables shall be of type specifically designed for use with cable, i.e., romex connectors not acceptable.

    b. Armor of cable shall be removed with rotary cutter device equal to roto-split by Seatek Co.; not with a hacksaw.

    c. Use split "Insuliner" sleeves at terminations.

3.04 REQUIREMENTS GOVERNING ELECTRICAL WORK IN DAMP OR WET LOCATIONS

A. Outlets and outlet size boxes shall be of galvanized cast ferrous metal only.

B. The finish of threaded steel conduit shall be galvanized only.

C. Wires for pulling into raceways for lighting and appliance branch circuitry shall be limited to "THWN".

D. Wires for pulling into raceways for feeders shall be limited to "XHHW".

E. Plates for toggle switches and receptacles shall have gasketed snap shut covers suitable for wet locations while in use.

F. Final connections of flexible conduit shall be neoprene sheathed.

G. Apply one (1) layer of half looped plastic electric insulating tape over wire nuts used for joining the conductors of wires.

H. Enclosures, junction boxes, pull boxes, cabinets, cabinet trims, wiring troughs and the like, shall be fabricated of galvanized sheet metal, shall conform to the following:

    1. They shall be constructed with continuously welded joints and seams.

    2. Their edges and weld spots shall be factory treated with cold galvanizing compound.

    3. Their connection to circuitry shall be by means of watertight hub connectors with sealing rings.

I. Enclosures for individually mounted switching and overcurrent devices shall be NEMA Class IV weatherproof construction.

J. The covers, doors and plates and trims used in conjunction with all enclosures, pull boxes, outlet boxes, junction boxes, cabinets and the like shall be equipped with gaskets.

K. Panels shall be equipped with doors without exception.

L. The following shall be interpreted as damp or wet locations within building confines:

    1. Spaces where any designations indicating weatherproof (WP) or vapor proof appear on the

Contract Drawings.

2. Below waterproofing in slabs applied directly on grade.

3. Spaces defined as wet or damp locations by Article 100 of the National Electric Code.

3.05 UNDERGROUND CONDUIT BANKS

A. The Electrical work required in conjunction with underground conduit banks shall include providing all conduits.

B. Conduits for underground banks shall be:

1. Trade diameter size as indicated but in no case less than one inch.

2. Polyvinyl chloride Schedule 40 (approved for encased burial) duct, rigid steel conduit for vertical elbows and straight sections used to penetrate equipment pads, building foundation walls and concrete slabs.

C. All conduits indicated as being incorporated into conduit banks unless specifically noted as rigid steel conduits shall be encased in a concrete envelope which accommodates the indicated configuration of conduits and which encompasses dimensions as follows:

1. Outside surfaces of conduits to outside surface of envelope where reinforcement of encasement is required – 6” minimum.

2. Outside surfaces of conduits to outside surface of envelope where no reinforcement of encasement is required – 3” minimum.

3. Spacing between centerlines of conduits assigned to different categories of use primary feeders, secondary feeders, communications and signaling – 10-1/2” minimum.

4. Spacing between centerlines of conduits assigned to the same category of use – 7-1/2” minimum.

D. Reinforcement of the concrete encasement for conduit banks where required shall consist of No. 4 longitudinal reinforcing bars located 3” from the outside surface of the envelope and spaced 6” on centers all around. No. 8 wire reinforcing hoops set 8” apart shall be used to tie the longitudinal bars together.

E. Install conduit in such a manner as to provide a minimum cover of 30 inches after final grading except the cover may be reduced to a minimum of 18 inches to:

1. Tie into existing work.

2. Pass over other underground utilities.

3. Pass over underground obstructions.

4. Assist in the avoidance of low points.

F. Increase the minimum cover where required by field conditions.

G. Lay conduit to avoid low points during run. Pitch at a minimum of 3 inches per 100 feet away

from building.

H. Provide reinforcement for the concrete encasement of a conduit bank where:

1. It passes under or over underground utilities.

2. It passes under or over underground obstructions.

3. Its cover is reduced to less than 30 inches.

4. It runs through foundation walls and other building construction.

I. Concrete encasement reinforcing shall extend in each case 5 feet beyond the points at which the determining conditions terminate.

J. Bends in conduit shall have minimum radii as follows:

1. For primary feeder 15’-0” except where specifically indicated otherwise or where turning up at termination point.

2. For primary feeder turning up at termination point – 4’-0”.

K. Install conduit so that adjacent joints are staggered at least 6 inches from one another.

L. Offsets to accommodate field conditions shall be accomplished with two (2) bends of not more than ten (10) degrees each.

M. Plug both ends of all conduit stubs.

N. Seal the end of each conduit run terminating inside a building utilizing a water and gas-tight sealant manufactured specifically for the purpose.

O. After conduit has been installed with concrete encasement completed, clear each conduit of all obstructions and foreign matter by pulling a flexible mandrel (12” minimum length and a diameter 1/4" less than that of the conduit) and brush through it. In the event that obstructions are encountered in any conduit which will not permit the mandrel to pass, remove and replace the blocked section. Include in the electric work all excavation, backfilling, repair of concrete encasement and restoration of surface at grade involved in the conduit replacement.

P. Provide a nylon cord for the pulling of cable in each conduit in which no cable is to be installed as part of the electric work.

Q. The Electrical Subcontractor shall provide all insulated racks as required for proper support of all cables and wires.

R. Provide magnetic warning tape above each full length of duct bank 12 inches below grade.

3.06 IDENTIFICATION AND TAGGING

A. Identify individually:

1. Each transformer.

2. Each panelboard.

3. Each switch and circuit breaker.

4. Each feeder, wire or cable of all systems.

5. Each switchboard.

6. Each end of nylon pullwire in empty conduit.

B. Each wire or cable in a feeder shall be identified at its terminal points of connection and in each pullbox, junction box and panel gutter through which it passes.

C. The nomenclature used to identify panelboards or load center shall designate the numbers assigned to them.

D. The nomenclature used to identify switches or circuit breakers shall:

1. Where they disconnect mains or services designate this fact.

2. Where they control feeders, designate the feeder number and the name of the load supplied.

3. Where they control lighting and appliance branch circuitry, designate the name of the space and the load supplied.

E. The nomenclature used to identify feeder wires and cables shall designate the feeder number.

F. Identification for panelboards or load centers shall be by means of engraved Lamacoid nameplates showing 1/4" high white lettering on a black background fastened to the outside face of the front.

G. Identification for switches or circuit breakers shall be by means of the following:

1. Where individually enclosed – engraved Lamacoid nameplates showing 1/8” high white lettering on a black background fastened on the outside front face of the enclosure.

2. Where in panelboards or load centers without doors – same as for individually enclosed.

3. Where in panelboards or load centers with doors – typewritten directories mounted behind transparent plastic covers, in metal frames fastened on the inside face of the doors.

H. Identification for wires and cables shall be by means of wrap around “brady” type labels.

I. Device plates for local toggle switches, toggle switch type motor starters, pilot lights and the like, whose function is not readily apparent shall be engraved with 1/8” high letters suitably describing the equipment controlled or indicated.

J. Phase identification letters shall be stamped into the metal of the bus bars of each phase of the main busses of each switchboard and each panelboard. The letters shall be visible from at least one (1) “normal posture” location without having to demount any current carrying or supporting elements.

K. Equip the front face of all switchboard pull boxes junction boxes and the like containing cables, busing or devices operating in excess of 600 volts with enameled sheetmetal “red on white” signs reading “DANGER-HIGH VOLTAGE.”

L. Identify each outlet box, junction box, and cabinet used in conjunction with empty raceway for wires of a future system by means of indelible markings on the inside denoting the system.

M. Prior to installing identifying tags and nameplates, submit their nomenclature for approval. Conform to all revisions issued by the Architect.

3.07 SUPPORTS AND FASTENINGS

A. Support work in accordance with best industry standards, Local Electric Code and the following:

1. Include supporting frames or racks for equipment, intended for vertical surface mounting, which is required in a freestanding position.

2. Supporting frames or racks shall be of standard angle, standard channel or specialty support system steel members. They shall be rigidly bolted or welded together and adequately braces to form a substantial structure. Racks shall be of ample size to assure a workmanlike arrangement of all equipment mounted on them.

3. No work intended for exposed installation shall be mounted directly on any building surface. In such locations, flat bar members or spaces shall be used to create a minimum of ¼" air space between the building surfaces and the work. Provide ¾" thick exterior grade plywood painted with two (2) coats of fire-retardant gray paint for mounting of panelboards.

4. Nothing (including outlet, pull and junction boxes and fittings) shall depend on electric conduits, raceways or cables for support.

5. Nothing shall rest on, or depend for support on, suspended ceiling media.

6. Support less than 2" trade size, vertically run, conduits at intervals no greater than 8'. Support such conduits, 2-1/2" trade size or larger, at intervals no greater than they story height, or 15', whichever is smaller.

7. Where they are not embedded in concrete, support less than 1" trade size, horizontally run, conduits at intervals no greater than 7'. Support such conduits, 1" trade size or larger, at intervals no greater than 10'.

8. Support all lighting fixtures directly from structural slab, intermediate decking or framing member as directed by the Architect. No light fixtures shall be supported directly from the roof deck.

9. Where fixtures and ceilings are such as to require fixture support from ceiling openings frames, include in the electric work the members necessary to tie back the ceiling opening frames to ceiling suspension members or slabs so as to provide actual support for the fixtures noted above.

10. Support all runs of conduit and/or circuitry directly from structural slabs, intermediate decking or framing members.

11. Fasten electric work to building structure in accordance with the best industry practice.

12. Floor mounted equipment shall not be held in place solely by its own dead weight. Include floor anchor fastenings in all cases.

13. For items which are shown as being ceiling mounted at locations where fastenings to the

building construction element above is not possible, provide suitably auxiliary channel or angle iron bridging tying to building structural elements.

14. As a minimum procedure, where weight applied to the attachment points is 100 lbs. or less, fasten to concrete and solid masonry with bolts and expansion shields.

15. As a minimum procedure, where weight applied to building attachment points exceed 100 lbs., but is 300 lbs. or less, conform to the following:

    a. At field poured concrete slabs, utilize inserts with 20' minimum length slip-through steel rods, set transverse to reinforcing steel.

3.08 SPLICING AND TERMINATING WIRES AND CABLES

A. Maintain all splices and joints in removable cover boxes or cabinets where they may be easily inspected.

B. Locate each completed conductor splice or joint in the outlet box, junction box, or pull box containing it, so that it is accessible from the removal cover side of the box.

C. Join solid conductors No. 8 AWG and smaller by securely twisting them together and soldering, or by using insulated coiled steel spring "wire nut" type connectors. Exclude "wire nuts" employing non-expandable springs. Terminate conductors No. 8 AWG and smaller by means of a neat and fast holding application of the conductors directly to the binding screws or terminals of the equipment or devices to be connected.

D. Join, tap and terminate standard conductors No. 6 AWG and larger by means of solder sleeves, taps, and lugs with applied solder or by means of bolted saddle type or pressure indent type connectors, taps and lugs. Exclude connectors and lugs of the types which apply set screws directly to conductors. Where equipment or devices are equipped with set screw type terminals which are impossible to change, replace the factory supplied set screws with a type having a ball bearing tip. Apply pressure indent type connectors, taps and lugs utilizing tools manufactured specifically for the purpose and having features preventing their release until the full pressure has been exerted on the lug or connector.

E. Except where wire nuts are used, build up insulation over conductor joints to a value, equal both in thickness and dielectric strength, to that of the factory applied conductor insulation. Insulation of conductor taps and joints shall be by means of half-lapped layers of rubber tape, with an outer layer of friction tape; by means of half-lapped layers of approved plastic electric insulating tape; or by a means of split insulating casings manufactured specifically to insulate the particular connector and conductor, and fastened with stainless steel or non-metallic snaps or clips.

F. Exclude splicing procedures for neutral conductors in lighting and appliance branch circuitry which utilize device terminals as the splicing points.

G. Exclude joints or terminations utilizing solder in any conductors used for grounding or bonding purposes.

H. Exclude all but solder or pressure indent type joints in conductors used for signaling or communication purposes.

I. Lugs for conductors used to make phase leg connections on the line side of the main service overcurrent and switching device shall be of the limiter type.

3.09 PULLING WIRES INTO CONDUITS AND RACEWAYS

A. Delay pulling wires or cables in until the project has progressed to a point when general construction procedures are not liable to injure wires and cables, and when moisture is excluded from raceways.

B. Utilize nylon snakes or metallic fish tapes with ball type heads to set up for pulling. In raceways 2" trade size and larger, utilize a pulling assembly ahead of wires consisting of a suitable brush followed by a 3-1/2" diameter ball mandrel.

C. Leave sufficient slack on all runs of wire and cable to permit the secure connection of devices and equipment.

D. Include circular wedge-type cable supports for wires and cables at the top of any vertical raceway longer than 20 feet. Also include additional supports spaced at intervals which are no greater than 10'. Supports shall be located in accessible pull boxes. Supports shall be of a non-deteriorating insulating material manufactured specifically for the purpose.

E. Pulling lubricants shall be used. They shall be products manufactured specifically for the purpose.

F. Slack on wires and cables located in cabinets and pull boxes shall be formed and set in place in groupings corresponding to their occupancy of raceways. They shall also be arranged, with insulators and supports provided where necessary, such that cable shims or other such temporary expedients do not have to be left permanently in place to prevent the wires and cables from shifting when covers or trims are removed.

3.10 REQUIREMENTS FOR THE INSTALLATION OF JUNCTION BOXES, OUTLET BOXES AND PULL BOXES

A. Flush wall-mounted outlet boxes shall not be set back to back but shall be offset at least 12" horizontally regardless of any indication on the Contract Drawings.

B. Locate all boxes so that their removable covers are accessible without necessitating the removal of parts of permanent building structure, including piping, ductwork, and other permanent mechanical elements.

C. In conjunction with concealed circuitry, abide by one of the following instructions (as may be applicable to the conditions) in order to assure the aforementioned accessibility. (Not required for circuitry concealed by removable suspended ceiling tiles.)

1. For a small (outlet size) box on circuitry concealed in a partition or wall, locate box or fitting so that its removable cover side, (or the face of any applied raised cover) penetrates through to within 1/8" of the exposed surface of the building materials concealing the circuitry and apply a blank or device plate to suit the functional requirements.

2. For a large box on circuitry concealed in a partition, suspended ceiling, or wall, locate box totally hidden but with its removable cover directly behind an architectural access door or panel (included for the purpose, separate from the electric work) in the building construction which conceals the circuitry.

3. For a small (outlet size) box on circuitry concealed above and intended as an outlet for a surface mounted lighting fixture or other such electrical item, locate box so that its removable cover side penetrates through to the exposed surface of the building materials concealing the

circuitry. Arrange the mounting of the lighting fixture or other item so that it completely covers the opening in the building construction caused by the box.

4. For a small (outlet size) box on circuitry concealed in a suspended ceiling, and intended as an outlet for a non-demountable type of recessed lighting fixtures or other such electrical items, locate box totally hidden but with its removable cover not more than 1' away from the building construction opening occupied by the demountable items.

D. Apply junction and pull boxes in accordance with the following:

1. Include all pull boxes in long straight runs of raceway to assure that cables are not damaged when they are pulled in.

2. Include junction and pull boxes to assure a neat and workmanlike installation of raceways.

3. Include junction and pull boxes to fulfill requirements pertaining to the limitations to the number of bends permitted in raceway between cable access points, the accessibility of cable joints and splices, and the application of cable supports.

4. Include all required junction and pull boxes regardless of indications on the Contract Drawings (which, due to symbolic methods of notation, may omit to show some of them).

E. Apply outlet boxes in accordance with the following:

1. Unless noted below or otherwise specifically indicated, include a separate outlet box for each individual wiring device, lighting fixture and signal or communication system outlet component. Outlet boxes supplied attached to lighting fixtures shall not be used as replacements for the boxes specified herein.

2. A continuous row of fixtures of the end-to-end channel type, designed for "through wiring", and wired in accordance with the specification hereinafter pertaining to circuitry through a series of lighting fixtures, may be supplied through a single outlet box.

3. A series of separate fixtures, designed for "through wiring", spaced not more than 4' apart, and inter-connected with conduit or raceway and circuitry which is in accordance with the Specifications hereinafter pertaining to circuitry through a series of lighting fixtures, may be supplied through a single outlet box.

4. Connection to recessed ceiling fixtures supplied with pigtails may be arranged so that more than one (1), but not more than four (4) such fixtures are connected into a single outlet box. When adopting this procedure:

   a. Utilize an outlet box no smaller than 5" square by 2-1/2" deep.

   b. Allow no fixture to be supplied from an outlet box in another room.

5. Multiple local switches indicated at a single location shall be gang-mounted in a single outlet box.

6. Include all required outlet boxes regardless of indications on the Contract Drawings (which due to symbolic methods of notation, may omit to show some of them).

F. Install junction boxes, pull boxes and outlet boxes in conjunction with concealed circuitry.

1. Exclude surface-mounted outlet boxes in conjunction with concealed circuitry.

2. Exclude unused circuitry openings in junction and pull boxes. In larger boxes each such opening shall be closed with a galvanized sheet steel plate fastened with a continuous weld all around. In small outlet type boxes, utilize plugs as specified for such boxes.

3. Close up all unused circuitry openings in outlet boxes. Unused openings in cast boxes shall be closed with approved cast metal threaded plugs. Unused openings in sheet metal boxes shall be closed with sheet metal knock-out plugs.

4. Outlet boxes for switches shall be located at the strike side of doors. Indicate door swings are subject to field change. Outlet boxes shall be located on the basis of final door swing arrangements.

5. Boxes and plaster covers for duplex receptacles shall be arranged for vertical mounting of the receptacle.

6. Equip outlet boxes used for devices which are connected to wires of systems supplied by more than one set of voltage characteristics with barriers to separate the different systems.

G. Barriers in junction and pull boxes of outlet size shall be of the same metal as the box.

1. Barriers in junction and pull boxes which are larger than outlet size shall be of the polyester resin fiberglass of adequate thickness for mechanical strength, but in no case less than 1/4" thick. Each barrier shall be mounted, without fastenings, between angle iron guides so that they may be readily removed.

3.11 LOCATING AND ROUTING OF CIRCUITRY

A. In general, all circuitry shall be run concealed except that it shall be run exposed where the following conditions occur:

1. Horizontally at the ceiling of permanently unfinished spaces which are not assigned to mechanical or electrical equipment.

2. Horizontally and vertically in mechanical equipment spaces.

3. Horizontally and vertically in electric equipment rooms.

B. Concealed circuitry shall be so located that building construction materials can be applied over its thickest elements without being subject to spalling or cracking.

C. All circuitry and raceways shall not be run within slabs. If field conditions requires raceways to be embedded in field-poured structural building construction concrete fill or slab shall conform to the following:

1. All proposed embedded raceways shall be indicated on plan and elevation and submitted to the Architect and Structural Engineer for review and written approval prior to installation. Any costs associated with the review and approval shall be borne by the Electrical Subcontractor.

2. They shall be run “single layer” with their outside surface no closer than 1” to any surface of the structural concrete.

3. They shall not be located in any configuration which places the outside surface of one closer than 3” to outside surface of another, except at tees, crosses or other single level wide angle

junction points.

4. Where crossovers or close grouping are unavoidable, circuitry shall be carefully field coordinated so as not to cause structural weakness.

5. Where turned up or down into a wall or partition they shall, before entering same, be routed parallel for a long enough distance to assure that no relocation of the wall or partition will be necessary to conceal the required bend.

6. They shall be routed in such a manner as to coordinate with the structural requirements of the building.

7. They shall be routed in accordance with field instructions issued by the Architect where such instructions differ from Specifications set forth herein.

D. Circuitry run exposed shall be routed parallel to building walls and column lines.

E. Exposed circuitry located overhead shall be run in a completely accessible manner on the underside of all piping and ductwork.

F. Circuitry run in suspended ceilings shall be routed parallel to building walls, column lines, etc.

G. Circuitry shall be routed so as to prevent electric conductors from being subject to high ambient temperature. Minimum clearances from heated lines or surfaces shall be maintained as follows:

1. Crossing where uninsulated: 3".

2. Crossing where insulated: 1"

3. Running parallel where uninsulated: 36".

4. Running parallel where insulated: 6".

H. Circuitry shall not be run in elevator shafts, hoistways, and the like. Where outlets for trail cables, pit lights, run be level lights, and the like, are involved, only the "final connection" outlet boxes themselves shall be located within or open into, the confines of the shaft.

I. Circuitry for miscellaneous systems indicated without notation as to location and routing shall be run as per the requirements and notations governing the adjacent light and power circuitry.

3.12 INSTALLING CIRCUITRY

A. The outside surface of circuitry, which is to be embedded in cinder concrete, shall be coated with asphaltum paint.

B. In runs of conduit or raceway including flexible limit the number of bends between cable access points to a total which does not exceed the maximum specified for the particular system. Where no such maximum is specified, limit the number to four (4) right angle bends or the equivalent thereof.

C. In each conduit or raceway assigned for the future pulling in of wires, include a nylon drag cord. In raceways 2" trade size and larger, the cord shall be pulled in utilizing a suitable brush, followed by an 85% diameter ball mandrel ahead of the cord in the pulling assembly. In the event that obstructions are encountered, which will not permit the drag cord to be installed, the

blocked section of raceway shall be replaced and any cutting and patching of the structure involved in such replacement shall be included as part of the electric work.

D. Circuitry shall be arranged such that conductors of one feeder or circuitry carrying "going" current are not separated from conductors of the same feeder or circuitry carrying "return" current by any ferrous or other metal. Where not within raceways, all "going" and "return" current conductors of one feeder or circuit shall be laced together so as to minimize induction heating of adjacent metal components.

E. Sleeves used where circuitry is to penetrate waterproof slabs, decks and walls, shall be of a type selected to suit the water condition encountered in the field.

3.13 EXCAVATION AND BACKFILLING FOR UNDERGROUND ENCLOSURES

A. Provide excavation and backfilling include minimum 6" gravel Base under the handhole assembly with the gravel 3" to 4" wider than the sides of the hand hole. (Internal Bracing may be warranted for any manufacturer's underground enclosure if 95% compaction is required or if heavy vehicles are going to be present during construction and/or throughout the life of the enclosure. See manufacturer recommended practices and instruction including applicable sizes that would require internal bracing).

3.14 SEALING OF PENETRATIONS AND OPENINGS

A. Environmental Seals:

1. Provide seals on raceways exposed to widely different temperatures, as in refrigerated or cold storage areas. Install seal to prevent circulation of air from warmer to colder sections through the raceway.

2. Provide seals under device plates for outlets on walls between conditioned and non-conditioned spaces.

3. Provide outlet plate gasket seals at all work area outlets on interior and exterior walls.

B. Smoke and Fire Stopping Seals:

1. Provide a seal around raceways or cables penetrating full height walls (slab to slab), floors or ventilation or air handling ducts so that the spread of fire or products of combustion shall not be substantially increased.

2. Penetrations through fire-resistant-rated walls, partitions, floors or ceilings shall be fire stopped using approved methods and NRTL listed products to maintain the fire resistance rating.

3. Installation restrictions of the listing agencies shall be strictly adhered to (e.g. 24 inch (610 mm) minimum horizontal separation between boxes on opposite sides of the wall, maximum square inch opening in wall).

4. Fire stopping in sleeves or in areas having small openings that may require the addition or modification of installed cables or raceways shall be a soft, pliable, non-hardening fire stop putty. Putty shall be water resistant and intumescent.

5. Fire stopping in locations not likely to require frequent modification shall be a NRTL listed putty or caulk to meet the required fire resistance rating.

6. Box penetrations into a fire rated wall or shaft shall have a fire stopping pad installed on the back of the box.

7. Fire stopping of cable trays and snake trays through walls shall be with NRTL listed bags to meet the required fire resistive rating and that will not allow products of combustion to pass through the protected opening. The NRTL listed bags shall be installed inside and on both sides of the opening as required to meet the required resistive fire rating of the wall.

8. Fire stopping materials shall be NRTL listed to UL 1479 (ASTM E814). Installation methods shall conform to a UL fire stopping system. Submit specifications and installation drawings for the type of material to be used. Fire stopping materials shall be as manufactured by 3M, International Protective Coatings Corp., Specified Technologies, Inc., Carborundum Company, RayChem, Nelson Fire Stop or approved equal.

3.15 SEISMIC SUPPORTS, SUPPLEMENTARY STEEL AND CHANNELS

A. Provide all supports, supplementary steel and channels required for the proper Seismic installation, mounting and support of all work installed under this Section.

B. All supports, supplementary steel and channels shall be furnished, installed and secured with all fittings, support rods and appurtenances required for a complete support or mounting system.

C. Supplementary steel and channels shall be firmly connected to the building construction in a manner approved by the Architect prior to the installation of same. Submit to the Architect, via the General Contractor, the locations proposed for using supplementary steel and channels for the support of equipment, fixtures and raceways. The submittal shall indicate the mounting methods, size and details of the supports, channels and steel; it shall indicate also that weight which the supports, channels and supplementary steel is to carry.

D. The type and size of the supporting channels and supplementary steel shall be of sufficient strength and size for seismic restraint and to allow only a minimum deflection in conformance with the channel and supplementary steel manufacturer's requirements for loading.

E. All supplementary steel and channels shall be installed in a neat and workmanlike manner parallel to the walls, floor and ceiling construction. All turns shall be made with 90 degrees and 45 degrees fittings, as required to suit the construction and installation conditions.

F. All supplementary steel, channels, supports, and fittings, shall be Underwriters' Laboratories, Incorporated, approved, be galvanized steel and be manufactured by Steel City, Unistrut, Power-Strut, T. J. Cope, Chalfant or approved equal.

G. Provide supports to meet the required Seismic rating as indicated under "Part One" of this Specification.

H. Provide beam clamps with set screws (C-clamp type).

I. Work under this Section shall be held in place by Seismic rated methods.

J. Supporting from the roof decking will not be acceptable.

K. Provide expansion anchors on masonry units or brick work. Power actuated supports will not be accepted.

L. Provide stainless steel or corrosion resistant supports in corrosive areas on wet or damp areas.

M. Support work from the building structure, independent of suspended ceilings, roof deck or other trades work. Where duct work, pipes, pipe racks, type of building construction materials or structural framing members provide obstruction or difficult support means, hanger rods shall be used in association with horizontal sections of steel support channels, in an approved manner.

N. All work shall be installed in a rigid and satisfactory manner and shall be supported by bar hangers in frame construction or shall be fastened directly with wood screws on wood, bolts with expansion shields on concrete or brick toggle bolts on hollow masonry units, and machine screws or welded threaded studs on metal. Threaded studs of the proper type and holding capacity driven in by a power charge and provided with lock washers and nuts are acceptable for mounting of equipment on solid concrete walls or slabs.

O. Obtain written permission from the General Contractor allowing use of power activated charges. Use only properly trained and licensed operators.

P. Do not use power charge driven supports for any work that is to be hung from a horizontal surface without written permission from the Architect.

Q. Preset inserts of the proper type and holding capacity shall be used in overhead slab construction wherever possible.

R. Provide lateral supports for work to prevent excessive movement during a seismic event using rods, braces or galvanized or stainless steel cables.

S. Pendants, supports or hanging rods longer than 12 inches (300mm) shall be laterally braced.

T. Where installed in damp, wet and areas requiring wash down, all surface mounted panels, boxes, junction boxes, conduit, etc., shall be supported by spacers to provide a clearance between wall and equipment.

3.16 PROJECT OWNER COORDINATION

A. Prior to Substantial Completion of the project and in ample time to address and resolve any coordination issues, request and arrange meetings between the Owner, Owner's Vendors and Consultants, Architect and General Contractor to discuss the Scope of Work for each system being provided and the interface required for a fully functional and operational system upon project completion. Initial meetings shall be scheduled three months prior to the scheduled Substantial Completion date or as soon as Submittals are submitted and reviewed for projects with shorter schedules.

B. At these meetings the required interface with the Owner shall be reviewed, requests for information required to complete programming or for coordination shall be presented and system operation and philosophy shall be discussed.

C. Additional meetings shall be held as requested by any party so that all issues are resolved and with the goal and intent being that all systems are fully operational and functional upon project Substantial Completion and that the responsibility for all components required is clearly established.

3.17 CLEANING UP

A. Upon completion of all work, and testing, thoroughly inspect all exposed portions of the installation and completely remove all exposed labels, markings, and foreign material.

B. The interior of all boxes and cabinets shall be left clean; exposed surfaces shall be cleaned and plated surfaces polished.

C. Repair damage to finish surfaces resulting from work under this Section.

D. Remove material and equipment from areas of work and storage areas.

E. All equipment shall be clean from dirt, dust, and fingerprints prior to final acceptance.

F. Touch up all damaged pre-finished equipment using materials and methods recommended by the Manufacturer.

3.18 PROJECT CLOSEOUT

A. Provide close out submittals as required herein and in SECTION 01700 - PROJECT CLOSEOUT including the following close out submittals.

1. Operation and Maintenance Manuals:

2. Record Drawings.

3. Test Reports.

4. Extra Materials.

B. Obtain written receipts of acceptance close out submittals submitted. Receipts shall specifically detail what is being delivered (description, quantity and specification section) and shall be dated and signed by firm delivering materials and by the Owner's Representative.

C. All sketches, drawings, and charts herein are for the purpose of providing for specifications in a simplified format. Errors and omissions in such does not relieve the Contractor of the responsibility for providing a fully complete, secure and properly operating integrated instructional technology network system suitable for the intended use. Bidders must obtain a complete set of Project Drawings and Specifications to determine the full scope of work. In case of conflict the Project Drawings and Specifications shall prevail.

END OF SECTION

APPENDIX A

Geotechnical Report

REPORT

23-0305 S

March 20, 2023

Explorations and Geotechnical Engineering Services

Proposed Ice Rink, Canopy, and Recreational Building
100 Veterans Memorial Drive
Warwick, Rhode Island

Prepared For:
BETA Group, Inc.
Attention: Nathan Socha
701 George Washington Highway
Lincoln, RI 02865

Prepared By:
S. W. Cole Engineering, Inc.
227 Wampanoag Trail
Riverside, Rhode Island 02905
T: 401-438-7711

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23-0305 S

March 20, 2023

BETA Group, Inc.
Attention: Nathan Socha
701 George Washington Highway
Lincoln, RI 02865

Subject: Explorations and Geotechnical Engineering Services
Proposed Ice Rink, Steel Canopy, and Recreational Building
100 Veterans Memorial Drive
Warwick, Rhode Island

Dear Nathan:

In accordance with our Subconsultant Agreement, dated February 23, 2023, and Contract Addendum, dated March 16, 2023, we have performed subsurface explorations for the subject project. This report summarizes our findings and geotechnical recommendations, and its contents are subject to the limitations set forth in Appendix A.

1.0 INTRODUCTION

1.1 Scope and Purpose

The purpose of our services was to obtain subsurface information at the site in order to develop geotechnical recommendations relative to foundations and earthwork associated with the proposed construction. Our scope of services included subsurface explorations, pavement cores, soils laboratory testing, a geotechnical analysis of the subsurface findings and preparation of this report.

1.2 Site and Proposed Construction

The site is located at City Hall Plaza on Veterans Memorial Drive in Warwick, Rhode Island. The site was previously occupied by a town building which has since been demolished. An ice rink is being proposed covered by a 3-sided, 75-foot by 120-foot steel canopy structure. A single-story recreational building approximately 3,000 square feet in plan area is proposed to the north of the ice rink which will house equipment, a

concession stand, locker rooms, and restrooms. It is anticipated that the existing paved parking to the east and north of the project site are to remain and will undergo reconstruction or overlay. The parking lot is also expected to be expanded. The project area is relatively flat with existing grades across the proposed ice rink and building ranging from about elevation 27 to 29 feet (project datum).

Proposed and existing site features are shown on the "Exploration Location Plan" attached in Appendix B.

2.0 EXPLORATION AND TESTING

2.1 Explorations

Six test borings (B-1 through B-6) were performed within the proposed building and canopy footprint. One shallow test boring (B-101) and three shallow borings with pavement cores (PC-1 through PC-4 were made in the area in the existing and proposed expanded parking lot. The explorations were performed at the site on February 24, 2023 and February 27, 2023 by S. W. Cole Explorations, LLC. The exploration locations were selected by S. W. Cole Engineering, Inc. (S.W.COLE) and the CLIENT and established in the field by S.W.COLE using measurements from existing site features. The approximate exploration locations are shown on the "Exploration Location Plan" attached in Appendix B. Logs of the explorations and a key to the notes and symbols used on the logs are attached in Appendix C.

2.2 Field Testing

The test borings were drilled using a combination of hollow stem auger and cased wash-boring techniques. The soils were sampled at 2 to 5 foot intervals using a split spoon sampler and Standard Penetration Testing (SPT) methods. SPT blow counts are noted on the logs.

2.3 Laboratory Testing

Soil samples obtained from the explorations were returned to our laboratory for further classification and testing. A total of 8 gradations and moisture contents were performed on select soil samples. Results of gradations are included in Appendix D. Moisture content results are noted on the logs.

3.0 SUBSURFACE CONDITIONS

3.1 Soil and Bedrock

Test borings B-1 through B-6 performed within the footprint of the proposed building and ice rink canopy encountered a soil profile generally consisting of 5 to 13 feet of very loose to medium dense granular fill overlying native deposits of very loose to dense sand. A layer of silt fill was encountered in B-4 between at a depth of 5 to 7 feet below ground surface (bgs). Below the native sands, these borings, with the exception of B-5, encountered a medium dense to very dense silty sand and gravel depths varying from about 23 and 28 feet bgs. Borings B-1, B-3, B-5 and B-6 were terminated in the native sand and gravel at depths ranging from 22 to 32 feet bgs. Borings B-2 and B-4 encountered refusal surfaces (probable bedrock) at depths ranging from about 26 to 32 feet bgs.

Pavement explorations, PC-1 through PC-3, encountered asphalt pavement overlying granular fill f to termination depths of about 2.4 feet bgs. Boring B-101 encountered granular fill from the surface to a termination depth of 4 feet bgs. Pavement thicknesses encountered in PC-1 through PC-3 are summarized in the table below.

Pavement Core	Asphalt Thickness (Inches)
PC-1	4
PC-2	4.9
PC-3	5.2

AASHTO classifications of the granular fill encountered within PC-1 through PC-3 and B-101 are included on the boring logs attached in Appendix C. Photographs of the pavement cores are included in Appendix E.

Not all the strata were encountered at each exploration; refer to the attached logs for more detailed subsurface information.

3.2 Groundwater

Saturated soils were encountered within the borings at a depth of about 20 feet bgs. Long term groundwater information is not available. It should be anticipated that groundwater

levels will fluctuate, particularly in response to periods of snowmelt and precipitation, as well as changes in site use.

4.0 EVALUATION AND RECOMMENDATIONS

4.1 General Findings

Based on the subsurface findings, the proposed construction appears feasible from a geotechnical standpoint. The principle geotechnical considerations include:

- Spread footing foundations and slab-on-grade floors bearing on ground improved with Rapid Impact Compaction appear suitable for the proposed recreational building, ice rink and canopy. Footings should bear on at least 6-inches of compacted Crushed Stone overlying ground improved with Rapid Impact Compaction. On-grade floor slabs should bear on at least 12-inches of properly compacted Structural Fill overlying ground improved with Rapid Impact Compaction.

- All remnant structures, foundations and debris encountered must be removed from beneath the proposed building and ice rink as encountered during construction. Overexcavations to remove structures, foundations and debris should be replaced with compacted Granular Borrow or Structural Fill.

4.2 Site and Subgrade Preparation

We recommend that site preparation begin with the construction of an erosion control system to protect adjacent drainage ways and areas outside the construction limits. Surficial organics, roots and topsoil should be completely removed from areas of proposed fill and construction. As much vegetation as possible should remain outside the construction areas to lessen the potential for erosion and site disturbance.

As discussed, the site was previously developed. Foundation remnants and construction debris may be present beneath the ground surface at the site. All relic structures, foundations and debris must be removed from beneath the proposed building and on-grade slabs, as encountered during construction. We recommend the existing granular fills beneath the proposed building, ice rink and canopy be improved by Rapid Impact Compaction (RIC) beneath foundation and on-grade slab bearing surfaces. Alternatively,

areas within the proposed ice rink footprint should be densified with at least 3 passes of a 10 ton vibratory roller compactor; areas that become soft or yielding after densification should be removed and replaced with compacted Structural Fill.

We recommend that footings be excavated using a smooth-edged bucket and that footings be underlain by at least 6 inches of compacted Crushed Stone overlying ground improved by RIC. Floor slabs should be underlain by at least 12 inches of compacted Structural Fill overlying ground improved by RIC.

4.3 Excavation and Dewatering

Excavation work will generally encounter granular fills with potential rubble, overlying native sand. Earthwork and grading activities should occur during drier, non-freezing weather of Spring, Summer and Fall. Final cuts to subgrade should be performed with a smooth-edged bucket to help reduce strength loss from soil disturbance.

Sumping and pumping dewatering techniques should be adequate to control groundwater in excavations as needed. Controlling the water levels to at least one foot below planned excavation depths will help stabilize subgrades during construction.

Excavations must be properly shored or sloped in accordance with OSHA Regulations to prevent sloughing and caving of the sidewalls during construction. Care must be taken to preclude undermining adjacent structures, utilities and roadways. The design and planning of excavations, excavation support systems, and dewatering is the responsibility of the contractor.

4.4 Foundations

Considering the subsurface findings and our understanding of the proposed construction, we recommend the proposed recreational building and the steel canopy structure be supported with spread footings bearing on ground improved by Rapid Impact Compaction (RIC).

For foundations bearing on properly prepared subgrades, as recommended herein, we offer the following geotechnical parameters for design consideration:

Geotechnical Parameters for Spread Footings and Foundation Walls	
Design Frost Depth (RI Building Code)	3.5 feet
Net Allowable Soil Bearing Pressure	3.0 ksf (RIC Improved Ground)
Base Friction Factor	0.35
Total Unit Weight of Backfill	125 pcf
At-Rest Lateral Earth Pressure Coefficient	0.5
Internal Friction Angle of Backfill	30°
Seismic Soil Site Class	D (IBC 2015)
Estimated Total Settlement	1-inch (RIC Improved Ground)
Differential Settlement	½-inch (RIC Improved Ground)

We recommend the contract documents require an engineered submittal for Rapid Impact Compaction (RIC) to improve ground conditions to meet or exceed the geotechnical parameters for bearing capacity and settlement as recommended herein. The RIC design submittal must be prepared and sealed by a licensed Professional Engineer and endorsed by the RIC geotechnical specialty contractor.

4.5 Foundation Drainage

We recommend an underdrain system be installed on the outside edge of perimeter footings. The underdrain pipe should consist of 4-inch diameter, perforated SDR-35 foundation drain pipe bedded in Crushed Stone and wrapped in non-woven geotextile fabric. The underdrain pipe must have a positive gravity outlet protected from freezing, clogging and backflow. Surface grades should be sloped away from the building for positive surface water drainage. General underdrain details are illustrated on the "Foundation Detail Sketch" attached in Appendix B.

4.6 Slab-On-Grade Floors

On-grade floor slabs in heated areas may be designed using a subgrade reaction modulus of 100 pci (pounds per cubic inch) provided the slab is underlain by at least 12-inches of compacted Structural Fill placed over ground improved with RIC. On-grade slabs for the ice rink should be designed considering engineering properties of insulation and bedding sands specified by the rink designer. The structural engineer or concrete consultant must design steel reinforcing and joint spacing appropriate to slab thickness and function, as well as prevention of slab cracking and curling.

We recommend a sub-slab vapor retarder particularly in areas of the building where the concrete slab will be covered with an impermeable surface treatment or floor covering

that may be sensitive to moisture vapors. The vapor retarder must have a permeance that is less than the floor cover or surface treatment that is applied to the slab. The vapor retarder must have sufficient durability to withstand direct contact with the sub-slab base material and construction activity. The vapor retarder material should be placed according to the manufacturer's recommended method, including the taping and lapping of all joints and wall connections. The architect and/or flooring consultant should select the vapor retarder products compatible with flooring and adhesive materials.

The floor slab should be appropriately cured using moisture retention methods after casting. Typical floor slab curing methods should be used for at least 7 days. The architect or flooring consultant should assign curing methods consistent with current applicable American Concrete Institute (ACI) procedures with consideration of curing method compatibility to proposed surface treatments, flooring and adhesive materials.

4.7 Entrance Slabs and Sidewalks

Entrance slabs and sidewalks adjacent to the building must be designed to reduce the effects of differential frost action between adjacent pavement, doorways, and entrances. We recommend that non-frost susceptible Structural Fill be provided to a depth of at least 3.5 feet below the top of entrance slabs. This thickness of Structural Fill should extend the full width of the entrance slab and outward at least 3.5 feet, thereafter transitioning up to the bottom of the adjacent sidewalk or pavement gravels at a 3H:1V or flatter slope. General details of this frost transition zone are shown on the "Foundation Detail Sketch" attached in Appendix B.

4.8 Fill, Backfill and Compaction

We recommend the following fill and backfill materials: recycled products must also be tested in accordance with applicable environmental regulations and approved by a qualified environmental consultant.

Structural Fill: Foundation backfill and material below entrance slabs, and fill to raise grades in building and ice rink areas should be clean, non-frost susceptible sand and gravel meeting the gradation requirements for Structural Fill as given below:

Structural Fill	
Sieve Size	**Percent Finer by Weight**
4 inch	100
3 inch	90 to 100
¼ inch	25 to 90
#40	0 to 30
#200	0 to 6

In our opinion, RIDOT M.01.09 Gravel Borrow, Column 1a, modified to 3-inch minus, meets the intent of Structural Fill, as recommended herein.

Granular Borrow: Fill to raise grades in paved areas should be sand or silty sand meeting the requirements of RIDOT M.01.01 Common Borrow with no more than 17 percent passing No. 200 sieve by weight.

Crushed Stone: Crushed Stone, used beneath footing foundations should be clean, washed crushed stone meeting the requirements of ASTM D-448, No. 57 stone.

Re-Use of On-Site Soils: Excavated soils are expected to consist of granular fills and silty gravelly sand. These materials are unsuitable for re-use as Structural Fill, but may be suitable for re-use as Granular Borrow, provided they are free of deleterious materials and at a compactable moisture content at the time of construction.

Placement and Compaction: Foundation backfill should be placed in horizontal lifts and compacted such that the desired density is achieved throughout the lift thickness with 3 to 5 passes of the compaction equipment. Loose lift thicknesses for grading, fill and backfill activities should not exceed 12 inches. We recommend that foundation backfill be compacted to at least 92 percent of its maximum dry density as determined by ASTM D-1557. Crushed Stone should be compacted with 3 to 5 passes of a vibratory plate compactor having a static weight of at least 500 pounds.

4.9 Weather Considerations

Construction activity should be limited during wet and freezing weather and the site soils may require drying or thawing before construction activities may continue. The contractor should anticipate the need for water to temper fills in order to facilitate compaction during dry weather. If construction takes place during cold weather, subgrades, foundations and floor slabs must be protected during freezing conditions. Concrete and fill must not be

placed on frozen soil; and once placed, the concrete and soil beneath the structure must be protected from freezing.

4.10 Design Review and Construction Testing

S.W.COLE should be retained to review the construction documents prior to bidding to determine that our earthwork and foundation recommendations have been properly interpreted and implemented.

S.W.COLE should be engaged to review the Rapid Impact Compaction (RIC) design submittal prior to mobilization for construction.

A construction materials testing and quality assurance program should be implemented during construction to observe compliance with the design concepts, plans, and specifications. S.W.COLE is available to observe earthwork activities, the preparation of foundation bearing surfaces and pavement subgrades, as well as to provide testing and IBC Special Inspection services for soils, concrete, steel, spray-applied fireproofing, fire-stopping, structural masonry and asphalt construction materials.

5.0 CLOSURE

It has been a pleasure to be of assistance to you with this phase of your project. We look forward to working with you during the construction phase of the project.

Sincerely,

S. W. Cole Engineering, Inc.

Ryan Larmouth
Project Geotechnical Engineer

TIMOTHY J. BOYCE
STATE OF RHODE ISLAND
No. 13843
HOPE
REGISTERED
PROFESSIONAL ENGINEER

Timothy J. Boyce, P.E.
Vice President

RSL: tjb

APPENDIX A

Limitations

This report has been prepared for the exclusive use of BETA Group, Inc. for specific application to the proposed Ice Rink, Canopy, and Recreational Building on 100 Veterans Memorial Drive in Warwick, Rhode Island. S. W. Cole Engineering, Inc. (S.W.COLE) has endeavored to conduct our services in accordance with generally accepted soil and foundation engineering practices. No warranty, expressed or implied, is made.

The soil profiles described in the report are intended to convey general trends in subsurface conditions. The boundaries between strata are approximate and are based upon interpretation of exploration data and samples.

The analyses performed during this investigation and recommendations presented in this report are based in part upon the data obtained from subsurface explorations made at the site. Variations in subsurface conditions may occur between explorations and may not become evident until construction. If variations in subsurface conditions become evident after submission of this report, it will be necessary to evaluate their nature and to review the recommendations of this report.

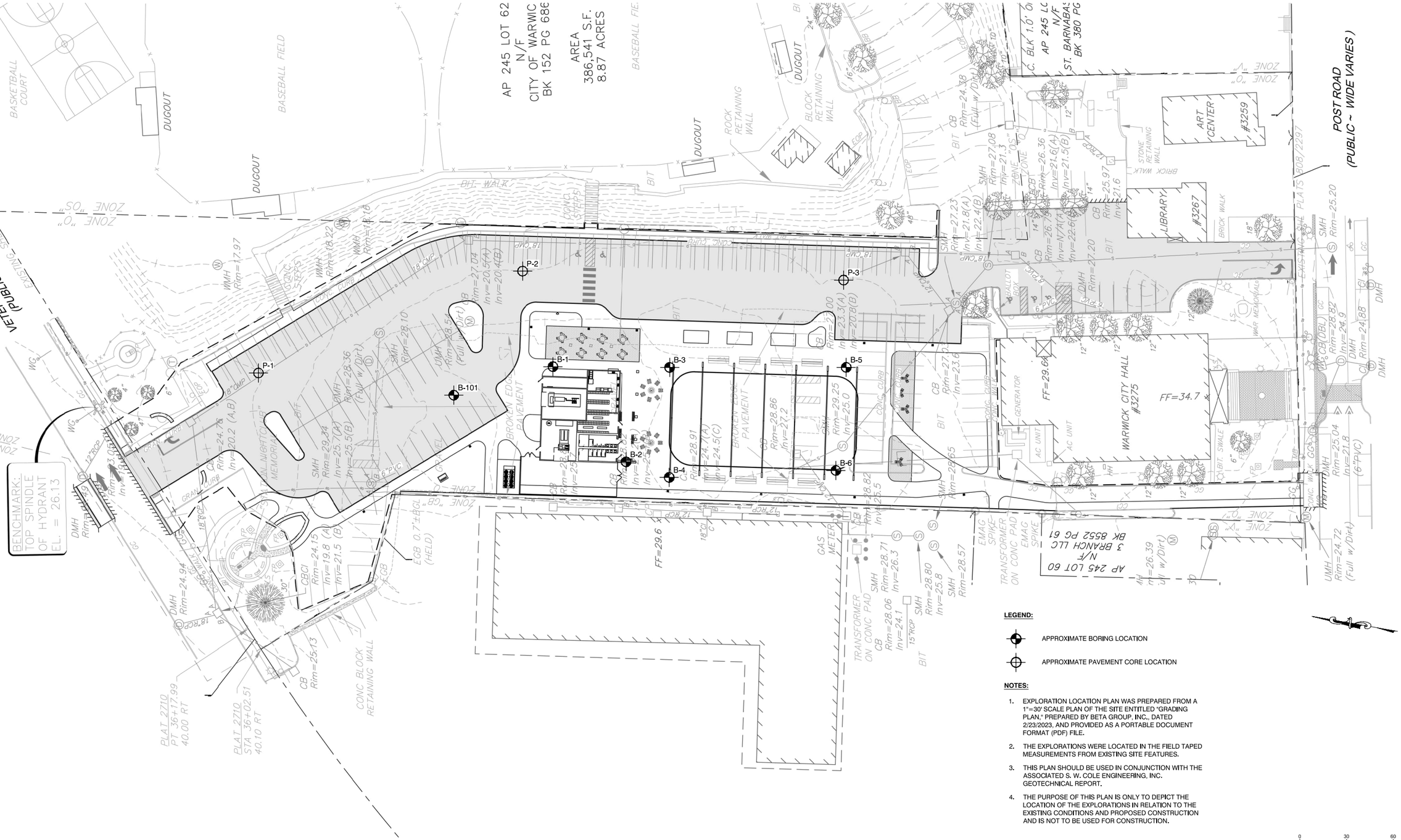
Observations have been made during exploration work to assess site groundwater levels. Fluctuations in water levels will occur due to variations in rainfall, temperature, and other factors.

S.W.COLE's scope of services has not included the investigation, detection, or prevention of any Biological Pollutants at the project site or in any existing or proposed structure at the site. The term "Biological Pollutants" includes, but is not limited to, molds, fungi, spores, bacteria, and viruses, and the byproducts of any such biological organisms.

Recommendations contained in this report are based substantially upon information provided by others regarding the proposed project. In the event that any changes are made in the design, nature, or location of the proposed project, S.W.COLE should review such changes as they relate to analyses associated with this report. Recommendations contained in this report shall not be considered valid unless the changes are reviewed by S.W.COLE.

APPENDIX B

Figures



LEGEND:

- APPROXIMATE BORING LOCATION
- APPROXIMATE PAVEMENT CORE LOCATION

NOTES:

1. EXPLORATION LOCATION PLAN WAS PREPARED FROM A 1"=30' SCALE PLAN OF THE SITE ENTITLED "GRADING PLAN," PREPARED BY BETA GROUP, INC., DATED 2/23/2023, AND PROVIDED AS A PORTABLE DOCUMENT FORMAT (PDF) FILE.
2. THE EXPLORATIONS WERE LOCATED IN THE FIELD TAPED MEASUREMENTS FROM EXISTING SITE FEATURES.
3. THIS PLAN SHOULD BE USED IN CONJUNCTION WITH THE ASSOCIATED S. W. COLE ENGINEERING, INC. GEOTECHNICAL REPORT.
4. THE PURPOSE OF THIS PLAN IS ONLY TO DEPICT THE LOCATION OF THE EXPLORATIONS IN RELATION TO THE EXISTING CONDITIONS AND PROPOSED CONSTRUCTION AND IS NOT TO BE USED FOR CONSTRUCTION.

0 30 60 Feet

S.W.COLE ENGINEERING, INC.

BETA GROUP, INC.

EXPLORATION LOCATION PLAN

PROPOSED ICE RINK, STEEL CANOPY, AND RECREATIONAL BUILDING
100 VETERANS MEMORIAL DRIVE, WARWICK, RHODE ISLAND

Job No.:	23-0305	Scale:	1" = 30'
Date :	03/17/2023	Sheet:	1

APPENDIX C

Exploration Logs and Key

BORING LOG

BORING NO.:	**B-01**
SHEET:	1 of 2
PROJECT NO.	23-0305
DATE START:	2/24/2023
DATE FINISH:	2/24/2023

CLIENT: BETA Group, Inc.
PROJECT: Proposed Ice Rink, Steel Canopy, and Recreational Building
LOCATION: 100 Veterans Memorial Drive, Warwick, Rhode Island

Drilling Information

LOCATION: See Exploration Location Plan | **ELEVATION (FT):** 29' Estimated | **TOTAL DEPTH (FT):** 32.0 | **LOGGED BY:** M. Socci
DRILLING CO.: S. W. Cole Explorations, LLC | **DRILLER:** W. Williams | **DRILLING METHOD:** Hollow Stem Auger
RIG TYPE: Track Mounted Diedrich D-50 | **AUGER ID/OD:** 2 1/4 in / 5 5/8 in | **SAMPLER:** Standard Split-Spoon
HAMMER TYPE: Automatic | **HAMMER WEIGHT (lbs):** 140 / 300 | **CASING ID/OD:** N/A /N/A | **CORE BARREL:** N/A
HAMMER CORRECTION FACTOR: | **HAMMER DROP (inch):** 30 / 16
WATER LEVEL DEPTHS (ft): ▽ 20 ft Soils Saturated Below 20'
GENERAL NOTES:

KEY TO NOTES AND SYMBOLS:
Water Level: ▽ At time of Drilling; ▼ At Completion of Drilling; ▼ After Drilling
D = Split Spoon Sample; U = Thin Walled Tube Sample; R = Rock Core Sample; V = Field Vane Shear
Pen. = Penetration Length; Rec. = Recovery Length; bpf = Blows per Foot; mpf = Minute per Foot
WOR = Weight of Rods; WOH = Weight of Hammer; RQD = Rock Quality Designation; PID = Photoionization Detector
S_v = Field Vane Shear Strength, kips/sq.ft.; q_u = Unconfined Compressive Strength, kips/sq.ft.; Ø = Friction Angle (Estimated); N/A = Not Applicable

Elev. (ft)	Depth (ft)	Casing Pen. (bpf)	SAMPLE INFORMATION: Sample No.	Type	Depth (ft)	Pen./ Rec. (in)	Blow Count or RQD	Field / Lab Test Data	Graphic Log	Sample Description & Classification	H_20 Depth	Remarks
			1D		0-2	24/14	6-7-6-6			Medium dense, moist, gray, fine to coarse SAND, trace silt, varying amount of gravel (FILL)		
			2D		2-4	24/13	6-5-14-14					
25												
	5		3D		5-7	24/4	12-10-19-16			5.0 Medium dense, moist, brown, silty, fine to coarse SAND and GRAVEL (FILL)		
			4D		7-9	24/12	12-16-15-8					
20												
	10		5D		10-12	24/10	3-3-4-5			10.0 Loose to medium dense, moist to wet, gray, fine to coarse SAND, some silt, varying amount of gravel		
15												

Stratification lines represent approximate boundary between soil types, transitions may be gradual. Water level readings have been made at times and under conditions stated. Fluctuations of groundwater may occur due to other factors than those present at the time measurements were made.

(Continued Next Page)

BORING LOG

CLIENT: BETA Group, Inc.
PROJECT: Proposed Ice Rink, Steel Canopy, and Recreational Building
LOCATION: 100 Veterans Memorial Drive, Warwick, Rhode Island

BORING NO.: B-01
SHEET: 2 of 2
PROJECT NO. 23-0305
DATE START: 2/24/2023
DATE FINISH: 2/24/2023

Elev. (ft)	Depth (ft)	Casing Pen. (bpf)	SAMPLE INFORMATION: Sample No.	Type	Depth (ft)	Pen./ Rec. (in)	Blow Count or RQD	Field / Lab Test Data	Graphic Log	Sample Description & Classification	H_20 Depth	Remarks
			6D		15-17	24/17	4-5-7-8			Loose to medium dense, moist to wet, gray, fine to coarse SAND, some silt, varying amount of gravel		
10	20		7D		20-22	24/16	4-3-4-6				▽	
5	25		8D		25-27	24/24	15-9-6-8					
										28.0 Medium dense, wet, dark gray, silty, fine to coarse SAND and GRAVEL		
0	30		9D		30-32	24/4	19-7-7-10					

Bottom of Exploration at 32.0 feet

Stratification lines represent approximate boundary between soil types, transitions may be gradual. Water level readings have been made at times and under conditions stated. Fluctuations of groundwater may occur due to other factors than those present at the time measurements were made.

BORING LOG

BORING NO.:	**B-02**
SHEET:	1 of 2
PROJECT NO.	23-0305
DATE START:	2/24/2023
DATE FINISH:	2/24/2023

CLIENT: BETA Group, Inc.
PROJECT: Proposed Ice Rink, Steel Canopy, and Recreational Building
LOCATION: 100 Veterans Memorial Drive, Warwick, Rhode Island

Drilling Information

LOCATION: See Exploration Location Plan | **ELEVATION (FT):** 29' Estimated | **TOTAL DEPTH (FT):** 26.2 | **LOGGED BY:** M. Socci
DRILLING CO.: S. W. Cole Explorations, LLC | **DRILLER:** W. Williams | **DRILLING METHOD:** Hollow Stem Auger
RIG TYPE: Track Mounted Diedrich D-50 | **AUGER ID/OD:** 2 1/4 in / 5 5/8 in | **SAMPLER:** Standard Split-Spoon
HAMMER TYPE: Automatic | **HAMMER WEIGHT (lbs):** 140 / 300 | **CASING ID/OD:** N/A /N/A | **CORE BARREL:** N/A
HAMMER CORRECTION FACTOR: | **HAMMER DROP (inch):** 30 / 16
WATER LEVEL DEPTHS (ft): ▽ 20 ft Soils Saturated Below 20'
GENERAL NOTES:

KEY TO NOTES AND SYMBOLS:
Water Level: ▽ At time of Drilling; ▼ At Completion of Drilling; ▼ After Drilling
D = Split Spoon Sample; U = Thin Walled Tube Sample; R = Rock Core Sample; V = Field Vane Shear
Pen. = Penetration Length; Rec. = Recovery Length; bpf = Blows per Foot; mpf = Minute per Foot
WOR = Weight of Rods; WOH = Weight of Hammer; RQD = Rock Quality Designation; PID = Photoionization Detector
S_v = Field Vane Shear Strength, kips/sq.ft.; q_u = Unconfined Compressive Strength, kips/sq.ft.; Ø = Friction Angle (Estimated); N/A = Not Applicable

Elev. (ft)	Depth (ft)	Casing Pen. (bpf)	SAMPLE INFORMATION: Sample No.	Type	Depth (ft)	Pen./ Rec. (in)	Blow Count or RQD	Field / Lab Test Data	Graphic Log	Sample Description & Classification	H_20 Depth	Remarks
			1D		0-2	24/6	3-3-4-4			Loose, moist, brown, silty, fine to coarse SAND, trace gravel (FILL)		
			2D		2-4	24/4	7-11-13-7			2.0 Medium dense, brown, silty, GRAVEL and fine to coarse SAND (FILL)		
25												
	5		3D		5-7	24/10	3-6-3-4	w =3.5 %		5.0 Loose to medium dense, moist to wet, gray, fine to coarse SAND, some silt, varying amount of gravel		
			4D		7-9	24/12	5-4-4-4					
20												
	10		5D		10-12	24/18	3-4-4-5					
15												

Stratification lines represent approximate boundary between soil types, transitions may be gradual. Water level readings have been made at times and under conditions stated. Fluctuations of groundwater may occur due to other factors than those present at the time measurements were made.

(Continued Next Page)

BORING LOG

CLIENT: BETA Group, Inc.
PROJECT: Proposed Ice Rink, Steel Canopy, and Recreational Building
LOCATION: 100 Veterans Memorial Drive, Warwick, Rhode Island

BORING NO.: B-02
SHEET: 2 of 2
PROJECT NO. 23-0305
DATE START: 2/24/2023
DATE FINISH: 2/24/2023

Elev. (ft)	Depth (ft)	Casing Pen. (bpf)	SAMPLE INFORMATION: Sample No.	Type	Depth (ft)	Pen./ Rec. (in)	Blow Count or RQD	Field / Lab Test Data	Graphic Log	Sample Description & Classification	H_20 Depth	Remarks
			6D		15-17	24/16	2-3-5-7			Loose to medium dense, moist to wet, gray, fine to coarse SAND, some silt, varying amount of gravel		
10	20		7D		20-22	24/20	5-5-8-11				▽	
										23.0 Very dense, wet, dark gray, silty, sandy, GRAVEL		
5	25		8D		25-26.2	14/6	5-22-50/2"					
										26.2 Refusal at 26.2 feet Probable Bedrock		

Stratification lines represent approximate boundary between soil types, transitions may be gradual. Water level readings have been made at times and under conditions stated. Fluctuations of groundwater may occur due to other factors than those present at the time measurements were made.

BORING LOG

BORING NO.:	**B-03**
SHEET:	1 of 2
PROJECT NO.	23-0305
DATE START:	2/24/2023
DATE FINISH:	2/24/2023

CLIENT: BETA Group, Inc.
PROJECT: Proposed Ice Rink, Steel Canopy, and Recreational Building
LOCATION: 100 Veterans Memorial Drive, Warwick, Rhode Island

Drilling Information

LOCATION: See Exploration Location Plan | **ELEVATION (FT):** 29' Estimated | **TOTAL DEPTH (FT):** 32.0 | **LOGGED BY:** M. Socci
DRILLING CO.: S. W. Cole Explorations, LLC | **DRILLER:** W. Williams | **DRILLING METHOD:** Cased Boring
RIG TYPE: Track Mounted Diedrich D-50 | **AUGER ID/OD:** N/A / N/A | **SAMPLER:** Standard Split-Spoon
HAMMER TYPE: Automatic | **HAMMER WEIGHT (lbs):** 140 / 300 | **CASING ID/OD:** 3 in / 3 1/2 in | **CORE BARREL:** N/A
HAMMER CORRECTION FACTOR: | **HAMMER DROP (inch):** 30 / 16
WATER LEVEL DEPTHS (ft): ▽ 20 ft Soils Saturated Below 20'
GENERAL NOTES:

KEY TO NOTES AND SYMBOLS:
Water Level: ▽ At time of Drilling; ▼ At Completion of Drilling; ▼ After Drilling
D = Split Spoon Sample; U = Thin Walled Tube Sample; R = Rock Core Sample; V = Field Vane Shear
Pen. = Penetration Length; Rec. = Recovery Length; bpf = Blows per Foot; mpf = Minute per Foot
WOR = Weight of Rods; WOH = Weight of Hammer; RQD = Rock Quality Designation; PID = Photoionization Detector
S_v = Field Vane Shear Strength, kips/sq.ft.; q_u = Unconfined Compressive Strength, kips/sq.ft.; Ø = Friction Angle (Estimated); N/A = Not Applicable

Elev. (ft)	Depth (ft)	Casing Pen. (bpf)	SAMPLE INFORMATION: Sample No.	Type	Depth (ft)	Pen./ Rec. (in)	Blow Count or RQD	Field / Lab Test Data	Graphic Log	Sample Description & Classification	H_20 Depth	Remarks
			1D		0-2	24/18	3-3-4-5			Loose, moist, tan, fine to medium SAND, trace silt (FILL)		
			2D		2-4	24/15	5-5-5-6					
25												
	5		3D		5-7	24/10	12-12-10-14			5.0 Medium dense, moist, brown, silty, fine to coarse SAND and GRAVEL (FILL)		
			4D		7-9	24/12	11-9-8-11			7.0 Medium dense, moist, gray, silty, fine to coarse SAND		
20												
	10		5D		10-12	24/14	15-5-6-6			10.0 Loose to medium dense, moist to wet, gray, fine to coarse SAND, some silt, varying amount of gravel		
15												

Stratification lines represent approximate boundary between soil types, transitions may be gradual. Water level readings have been made at times and under conditions stated. Fluctuations of groundwater may occur due to other factors than those present at the time measurements were made.

(Continued Next Page)

BORING LOG

CLIENT: BETA Group, Inc.
PROJECT: Proposed Ice Rink, Steel Canopy, and Recreational Building
LOCATION: 100 Veterans Memorial Drive, Warwick, Rhode Island

BORING NO.: B-03
SHEET: 2 of 2
PROJECT NO. 23-0305
DATE START: 2/24/2023
DATE FINISH: 2/24/2023

Elev. (ft)	Depth (ft)	Casing Pen. (bpf)	SAMPLE INFORMATION: Sample No.	Type	Depth (ft)	Pen./ Rec. (in)	Blow Count or RQD	Field / Lab Test Data	Graphic Log	Sample Description & Classification	H_20 Depth	Remarks
			6D		15-17	24/12	6-6-7-10			Loose to medium dense, moist to wet, gray, fine to coarse SAND, some silt, varying amount of gravel		
10	20		7D		20-22	24/18	3-4-5-7				▽	
5	25		8D		25-27	24/20	3-5-4-6					
										28.0 Dense, wet, dark gray, silty, gravelly, fine to coarse SAND		
0	30		9D		30-32	24/5	24-14-33-19					

Bottom of Exploration at 32.0 feet

Stratification lines represent approximate boundary between soil types, transitions may be gradual. Water level readings have been made at times and under conditions stated. Fluctuations of groundwater may occur due to other factors than those present at the time measurements were made.

BORING LOG

BORING NO.: B-04
SHEET: 1 of 2
PROJECT NO. 23-0305
DATE START: 2/24/2023
DATE FINISH: 2/24/2023

CLIENT: BETA Group, Inc.
PROJECT: Proposed Ice Rink, Steel Canopy, and Recreational Building
LOCATION: 100 Veterans Memorial Drive, Warwick, Rhode Island

Drilling Information

LOCATION: See Exploration Location Plan | **ELEVATION (FT):** 29' Estimated | **TOTAL DEPTH (FT):** 31.7 | **LOGGED BY:** M. Socci
DRILLING CO.: S. W. Cole Explorations, LLC | **DRILLER:** W. Williams | **DRILLING METHOD:** Cased Boring
RIG TYPE: Track Mounted Diedrich D-50 | **AUGER ID/OD:** N/A / N/A | **SAMPLER:** Standard Split-Spoon
HAMMER TYPE: Automatic | **HAMMER WEIGHT (lbs):** 140 / 300 | **CASING ID/OD:** 3 in / 3 1/2 in | **CORE BARREL:** N/A
HAMMER CORRECTION FACTOR: | **HAMMER DROP (inch):** 30 / 16
WATER LEVEL DEPTHS (ft): ▽ 20 ft Soils Saturated Below 20'
GENERAL NOTES:

KEY TO NOTES AND SYMBOLS:
Water Level: ▽ At time of Drilling; ▼ At Completion of Drilling; ▼ After Drilling
D = Split Spoon Sample; U = Thin Walled Tube Sample; R = Rock Core Sample; V = Field Vane Shear
Pen. = Penetration Length; Rec. = Recovery Length; bpf = Blows per Foot; mpf = Minute per Foot
WOR = Weight of Rods; WOH = Weight of Hammer; RQD = Rock Quality Designation; PID = Photoionization Detector
S_v = Field Vane Shear Strength, kips/sq.ft.; q_u = Unconfined Compressive Strength, kips/sq.ft.; Ø = Friction Angle (Estimated); N/A = Not Applicable

Elev. (ft)	Depth (ft)	Casing Pen. (bpf)	SAMPLE INFORMATION: Sample No.	Type	Depth (ft)	Pen./ Rec. (in)	Blow Count or RQD	Field / Lab Test Data	Graphic Log	Sample Description & Classification	H_20 Depth	Remarks
			1D		0-2	24/14	WOH/18-1			Very loose, moist, tan, fine to medium SAND, trace silt (FILL)		
			2D		2-4	24/19	1-2-2-7					
25												
	5		3D		5-7	24/20	6-6-6-8	w =25 %		5.0 Medium dense, wet, tan, sandy, SILT (FILL)		Perched Water Encountered at 5'
			4D		7-9	24/12	5-6-8-10			7.0 Medium dense, wet, gray, silty, fine to coarse SAND (FILL)		
20										9.0 Dense, moist, brown, silty, gravelly, fine to coarse SAND (FILL)		
	10		5D		10-12	24/5	27-20-20-22					
										13.0 Loose to medium dense, moist to wet, gray, fine to coarse SAND, some silt, varying amount of gravel		
15												

Stratification lines represent approximate boundary between soil types, transitions may be gradual. Water level readings have been made at times and under conditions stated. Fluctuations of groundwater may occur due to other factors than those present at the time measurements were made.

(Continued Next Page)

BORING LOG

CLIENT: BETA Group, Inc.
PROJECT: Proposed Ice Rink, Steel Canopy, and Recreational Building
LOCATION: 100 Veterans Memorial Drive, Warwick, Rhode Island

BORING NO.: B-04
SHEET: 2 of 2
PROJECT NO. 23-0305
DATE START: 2/24/2023
DATE FINISH: 2/24/2023

Elev. (ft)	Depth (ft)	Casing Pen. (bpf)	SAMPLE INFORMATION: Sample No.	Type	Depth (ft)	Pen./ Rec. (in)	Blow Count or RQD	Field / Lab Test Data	Graphic Log	Sample Description & Classification	H_20 Depth	Remarks
			6D		15-17	24/15	4-3-4-6			Loose to medium dense, moist to wet, gray, fine to coarse SAND, some silt, varying amount of gravel		
10	20		7D		20-22	24/17	4-5-5-6				▽	
5	25		8D		25-27	24/24	10-6-8-11					
										28.0 Medium dense, wet, dark gray, silty, gravelly, fine to coarse SAND		
0	30		9D		30-31.7	20/12	9-8-20-50/2"					
										31.7 Refusal at 31.7 feet Probable Bedrock		

Stratification lines represent approximate boundary between soil types, transitions may be gradual. Water level readings have been made at times and under conditions stated. Fluctuations of groundwater may occur due to other factors than those present at the time measurements were made.

BORING LOG

BORING NO.:	**B-05**
SHEET:	1 of 2
PROJECT NO.	23-0305
DATE START:	2/27/2023
DATE FINISH:	2/27/2023

CLIENT: BETA Group, Inc.
PROJECT: Proposed Ice Rink, Steel Canopy, and Recreational Building
LOCATION: 100 Veterans Memorial Drive, Warwick, Rhode Island

Drilling Information

LOCATION: See Exploration Location Plan | **ELEVATION (FT):** 29' Estimated | **TOTAL DEPTH (FT):** 22.0 | **LOGGED BY:** M. Socci
DRILLING CO.: S. W. Cole Explorations, LLC | **DRILLER:** W. Williams | **DRILLING METHOD:** Cased Boring
RIG TYPE: Track Mounted Diedrich D-50 | **AUGER ID/OD:** N/A / N/A | **SAMPLER:** Standard Split-Spoon
HAMMER TYPE: Automatic | **HAMMER WEIGHT (lbs):** 140 / 300 | **CASING ID/OD:** 3 in / 3 1/2 in | **CORE BARREL:** N/A
HAMMER CORRECTION FACTOR: | **HAMMER DROP (inch):** 30 / 16
WATER LEVEL DEPTHS (ft): ▽ 20 ft Soils Saturated Below 20'
GENERAL NOTES:

KEY TO NOTES AND SYMBOLS:
Water Level: ▽ At time of Drilling; ▼ At Completion of Drilling; ▼ After Drilling
D = Split Spoon Sample; U = Thin Walled Tube Sample; R = Rock Core Sample; V = Field Vane Shear
Pen. = Penetration Length; Rec. = Recovery Length; bpf = Blows per Foot; mpf = Minute per Foot
WOR = Weight of Rods; WOH = Weight of Hammer; RQD = Rock Quality Designation; PID = Photoionization Detector
S_v = Field Vane Shear Strength, kips/sq.ft.; q_u = Unconfined Compressive Strength, kips/sq.ft.; Ø = Friction Angle (Estimated); N/A = Not Applicable

Elev. (ft)	Depth (ft)	Casing Pen. (bpf)	SAMPLE INFORMATION: Sample No.	Type	Depth (ft)	Pen./ Rec. (in)	Blow Count or RQD	Field / Lab Test Data	Graphic Log	Sample Description & Classification	H_20 Depth	Remarks
										6" ASPHALT		
			1D		0.5-2.5	24/0	12-13-13-14			0.5 Probable FILL		
			2D		2.5-4.5	24/0	13-7-7-4					
25												
	5		3D		5-7	24/10	1-2-2-4			5.0 Very loose to dense, moist to wet, gray to brown, fine to coarse SAND, some silt, varying amount of gravel		
			4D		7-9	24/14	4-4-5-4					
20												
	10		5D		10-12	24/10	3-2-3-4	w =14.3 %				
15												

Stratification lines represent approximate boundary between soil types, transitions may be gradual. Water level readings have been made at times and under conditions stated. Fluctuations of groundwater may occur due to other factors than those present at the time measurements were made.

(Continued Next Page)

BORING LOG

CLIENT: BETA Group, Inc.
PROJECT: Proposed Ice Rink, Steel Canopy, and Recreational Building
LOCATION: 100 Veterans Memorial Drive, Warwick, Rhode Island

BORING NO.: B-05
SHEET: 2 of 2
PROJECT NO. 23-0305
DATE START: 2/27/2023
DATE FINISH: 2/27/2023

Elev. (ft)	Depth (ft)	Casing Pen. (bpf)	SAMPLE INFORMATION: Sample No.	Type	Depth (ft)	Pen./ Rec. (in)	Blow Count or RQD	Field / Lab Test Data	Graphic Log	Sample Description & Classification	H_20 Depth	Remarks
			6D		15-17	24/10	6-8-13-19			Very loose to dense, moist to wet, gray to brown, fine to coarse SAND, some silt, varying amount of gravel		
10												
	20		7D		20-22	24/12	12-15-20-21				▽	

Bottom of Exploration at 22.0 feet

Stratification lines represent approximate boundary between soil types, transitions may be gradual. Water level readings have been made at times and under conditions stated. Fluctuations of groundwater may occur due to other factors than those present at the time measurements were made.

BORING LOG

BORING NO.:	**B-06**
SHEET:	1 of 2
PROJECT NO.	23-0305
DATE START:	2/27/2023
DATE FINISH:	2/27/2023

CLIENT: BETA Group, Inc.
PROJECT: Proposed Ice Rink, Steel Canopy, and Recreational Building
LOCATION: 100 Veterans Memorial Drive, Warwick, Rhode Island

Drilling Information

LOCATION: See Exploration Location Plan | **ELEVATION (FT):** 29' Estimated | **TOTAL DEPTH (FT):** 32.0 | **LOGGED BY:** M. Socci
DRILLING CO.: S. W. Cole Explorations, LLC | **DRILLER:** W. Williams | **DRILLING METHOD:** Cased Boring
RIG TYPE: Track Mounted Diedrich D-50 | **AUGER ID/OD:** N/A / N/A | **SAMPLER:** Standard Split-Spoon
HAMMER TYPE: Automatic | **HAMMER WEIGHT (lbs):** 140 / 300 | **CASING ID/OD:** 3 in / 3 1/2 in | **CORE BARREL:** N/A
HAMMER CORRECTION FACTOR: | **HAMMER DROP (inch):** 30 / 16
WATER LEVEL DEPTHS (ft): ▽ 20 ft Soils Saturated Below 20'
GENERAL NOTES:

KEY TO NOTES AND SYMBOLS:
Water Level: ▽ At time of Drilling; ▼ At Completion of Drilling; ▼ After Drilling
D = Split Spoon Sample; U = Thin Walled Tube Sample; R = Rock Core Sample; V = Field Vane Shear
Pen. = Penetration Length; Rec. = Recovery Length; bpf = Blows per Foot; mpf = Minute per Foot
WOR = Weight of Rods; WOH = Weight of Hammer; RQD = Rock Quality Designation; PID = Photoionization Detector
S_v = Field Vane Shear Strength, kips/sq.ft.; q_u = Unconfined Compressive Strength, kips/sq.ft.; Ø = Friction Angle (Estimated); N/A = Not Applicable

Elev. (ft)	Depth (ft)	Casing Pen. (bpf)	SAMPLE INFORMATION: Sample No.	Type	Depth (ft)	Pen./ Rec. (in)	Blow Count or RQD	Field / Lab Test Data	Graphic Log	Sample Description & Classification	H_20 Depth	Remarks
										7" ASPHALT		
			1D		0.6-2.6	24/16	12-7-5-6			0.6 Loose to medium dense, moist, brown, silty, gravelly, fine to coarse SAND		
			2D		2.6-4.6	24/14	4-2-3-2					
25												
	5		3D		5-7	24/18	2-2-2-2	w =5.6 %		5.0 Very loose to medium dense, moist to wet, gray, fine to coarse SAND, some silt, varying amount of gravel		
			4D		7-9	24/18	3-3-3-5					
20												
	10		5D		10-12	24/20	6-5-6-7					
15												

Stratification lines represent approximate boundary between soil types, transitions may be gradual. Water level readings have been made at times and under conditions stated. Fluctuations of groundwater may occur due to other factors than those present at the time measurements were made.

(Continued Next Page)

BORING LOG

CLIENT: BETA Group, Inc.
PROJECT: Proposed Ice Rink, Steel Canopy, and Recreational Building
LOCATION: 100 Veterans Memorial Drive, Warwick, Rhode Island

BORING NO.: B-06
SHEET: 2 of 2
PROJECT NO. 23-0305
DATE START: 2/27/2023
DATE FINISH: 2/27/2023

Elev. (ft)	Depth (ft)	Casing Pen. (bpf)	SAMPLE INFORMATION: Sample No.	Type	Depth (ft)	Pen./ Rec. (in)	Blow Count or RQD	Field / Lab Test Data	Graphic Log	Sample Description & Classification	H_20 Depth	Remarks
			6D		15-17	24/8	5-6-7-8			Very loose to medium dense, moist to wet, gray, fine to coarse SAND, some silt, varying amount of gravel		
10	20		7D		20-22	24/7	9-9-11-9				▽	
5	25		8D		25-27	24/10	9-10-10-11					
										28.0 Medium dense, wet, dark gray, silty, gravelly, fine to coarse SAND		
0	30		9D		30-32	24/6	19-9-7-14					

Bottom of Exploration at 32.0 feet

Stratification lines represent approximate boundary between soil types, transitions may be gradual. Water level readings have been made at times and under conditions stated. Fluctuations of groundwater may occur due to other factors than those present at the time measurements were made.

BORING LOG

BORING NO.: B-101
SHEET: 1 of 1
PROJECT NO. 23-0305
DATE START: 2/27/2023
DATE FINISH: 2/27/2023

CLIENT: BETA Group, Inc.
PROJECT: Proposed Ice Rink, Steel Canopy, and Recreational Building
LOCATION: 100 Veterans Memorial Drive, Warwick, Rhode Island

Drilling Information

LOCATION: See Exploration Location Plan
ELEVATION (FT): 29' Estimated
TOTAL DEPTH (FT): 4.0
LOGGED BY: M. Socci
DRILLING CO.: S. W. Cole Explorations, LLC
DRILLER: W. Williams
DRILLING METHOD: Testpit
RIG TYPE: Track Mounted Diedrich D-50
AUGER ID/OD: N/A / N/A
SAMPLER: Standard Split-Spoon
HAMMER TYPE: Automatic
HAMMER WEIGHT (lbs): 140 / 300
CASING ID/OD: N/A /N/A
CORE BARREL: N/A
HAMMER CORRECTION FACTOR:
HAMMER DROP (inch): 30 / 16
WATER LEVEL DEPTHS (ft): Not Encountered
GENERAL NOTES:

KEY TO NOTES AND SYMBOLS:
Water Level
▽ At time of Drilling
▼ At Completion of Drilling
▼ After Drilling
D = Split Spoon Sample
U = Thin Walled Tube Sample
R = Rock Core Sample
V = Field Vane Shear
Pen. = Penetration Length
Rec. = Recovery Length
bpf = Blows per Foot
mpf = Minute per Foot
WOR = Weight of Rods
WOH = Weight of Hammer
RQD = Rock Quality Designation
PID = Photoionization Detector
S_v = Field Vane Shear Strength, kips/sq.ft.
q_u = Unconfined Compressive Strength, kips/sq.ft.
Ø = Friction Angle (Estimated)
N/A = Not Applicable

Elev. (ft)	Depth (ft)	Casing Pen. (bpf)	SAMPLE INFORMATION: Sample No.	Type	Depth (ft)	Pen./ Rec. (in)	Blow Count or RQD	Field / Lab Test Data	Graphic Log	Sample Description & Classification	H_20 Depth	Remarks
			1D		0-2	24/10	6-7-5-13			Medium dense, moist, tan, fine to coarse SAND, some gravel, trace silt (FILL)		
			2D		2-4	24/10	3-6-6-7	w =20.6 %		Medium dense, moist, brown, fine to coarse SAND and GRAVEL, some silt (FILL)		AASHTO Classification- A-1-b
25										2.0 Bottom of Exploration at 4.0 feet		

Stratification lines represent approximate boundary between soil types, transitions may be gradual. Water level readings have been made at times and under conditions stated. Fluctuations of groundwater may occur due to other factors than those present at the time measurements were made.

BORING LOG

BORING NO.: PC-1
SHEET: 1 of 1
PROJECT NO. 23-0305
DATE START: 2/27/2023
DATE FINISH: 2/27/2023

CLIENT: BETA Group, Inc.
PROJECT: Proposed Ice Rink, Steel Canopy, and Recreational Building
LOCATION: 100 Veterans Memorial Drive, Warwick, Rhode Island

Drilling Information

LOCATION: See Exploration Location Plan
ELEVATION (FT): 29' Estimated
TOTAL DEPTH (FT): 2.3
LOGGED BY: M. Socci
DRILLING CO.: S. W. Cole Explorations, LLC
DRILLER: W. Williams
DRILLING METHOD:
RIG TYPE: Track Mounted Diedrich D-50
AUGER ID/OD: N/A / N/A
SAMPLER: 3" Split Spoon
HAMMER TYPE: Automatic
HAMMER WEIGHT (lbs): 140 / 300
CASING ID/OD: N/A /N/A
CORE BARREL: N/A
HAMMER CORRECTION FACTOR:
HAMMER DROP (inch): 30 / 16
WATER LEVEL DEPTHS (ft):
GENERAL NOTES:

KEY TO NOTES AND SYMBOLS:
Water Level
▽ At time of Drilling
▼ At Completion of Drilling
▼ After Drilling
D = Split Spoon Sample
U = Thin Walled Tube Sample
R = Rock Core Sample
V = Field Vane Shear
Pen. = Penetration Length
Rec. = Recovery Length
bpf = Blows per Foot
mpf = Minute per Foot
WOR = Weight of Rods
WOH = Weight of Hammer
RQD = Rock Quality Designation
PID = Photoionization Detector
S_v = Field Vane Shear Strength, kips/sq.ft.
q_u = Unconfined Compressive Strength, kips/sq.ft.
Ø = Friction Angle (Estimated)
N/A = Not Applicable

Elev. (ft)	Depth (ft)	Casing Pen. (bpf)	SAMPLE INFORMATION: Sample No.	Type	Depth (ft)	Pen./ Rec. (in)	Blow Count or RQD	Field / Lab Test Data	Graphic Log	Sample Description & Classification	H_20 Depth	Remarks
			1D		0.3-2.3	24/19				4" ASPHALT 0.3 Brown, moist, gravelly, fine to coarse SAND, some silt (FILL) 2.3 Bottom of Exploration at 2.33 feet		AASHTO Classification- A-1-b

Stratification lines represent approximate boundary between soil types, transitions may be gradual. Water level readings have been made at times and under conditions stated. Fluctuations of groundwater may occur due to other factors than those present at the time measurements were made.

BORING LOG

BORING NO.: PC-2
SHEET: 1 of 1
PROJECT NO. 23-0305
DATE START: 2/27/2023
DATE FINISH: 2/27/2023

CLIENT: BETA Group, Inc.
PROJECT: Proposed Ice Rink, Steel Canopy, and Recreational Building
LOCATION: 100 Veterans Memorial Drive, Warwick, Rhode Island

Drilling Information

LOCATION: See Exploration Location Plan
ELEVATION (FT): 29' Estimated
TOTAL DEPTH (FT): 2.4
LOGGED BY: M. Socci
DRILLING CO.: S. W. Cole Explorations, LLC
DRILLER: W. Williams
DRILLING METHOD:
RIG TYPE: Track Mounted Diedrich D-50
AUGER ID/OD: N/A / N/A
SAMPLER: 3" Split Spoon
HAMMER TYPE: Automatic
HAMMER WEIGHT (lbs): 140 / 300
CASING ID/OD: N/A /N/A
CORE BARREL: N/A
HAMMER CORRECTION FACTOR:
HAMMER DROP (inch): 30 / 16
WATER LEVEL DEPTHS (ft):
GENERAL NOTES:

KEY TO NOTES AND SYMBOLS:
Water Level
▽ At time of Drilling
▼ At Completion of Drilling
▼ After Drilling
D = Split Spoon Sample
U = Thin Walled Tube Sample
R = Rock Core Sample
V = Field Vane Shear
Pen. = Penetration Length
Rec. = Recovery Length
bpf = Blows per Foot
mpf = Minute per Foot
WOR = Weight of Rods
WOH = Weight of Hammer
RQD = Rock Quality Designation
PID = Photoionization Detector
S_v = Field Vane Shear Strength, kips/sq.ft.
q_u = Unconfined Compressive Strength, kips/sq.ft.
Ø = Friction Angle (Estimated)
N/A = Not Applicable

Elev. (ft)	Depth (ft)	Casing Pen. (bpf)	SAMPLE INFORMATION: Sample No.	Type	Depth (ft)	Pen./ Rec. (in)	Blow Count or RQD	Field / Lab Test Data	Graphic Log	Sample Description & Classification	H_20 Depth	Remarks
			1D		0.4-2.4	24/16				4.9" ASPHALT 0.4 Brown, moist, gravelly, fine to coarse SAND, some silt (FILL)		AASHTO Classification- A-1-b

Bottom of Exploration at 2.4 feet

Stratification lines represent approximate boundary between soil types, transitions may be gradual. Water level readings have been made at times and under conditions stated. Fluctuations of groundwater may occur due to other factors than those present at the time measurements were made.

BORING NO.: PC-2

BORING LOG

BORING NO.: PC-3
SHEET: 1 of 1
PROJECT NO. 23-0305
DATE START: 2/27/2023
DATE FINISH: 2/27/2023

CLIENT: BETA Group, Inc.
PROJECT: Proposed Ice Rink, Steel Canopy, and Recreational Building
LOCATION: 100 Veterans Memorial Drive, Warwick, Rhode Island

Drilling Information

LOCATION: See Exploration Location Plan
ELEVATION (FT): 29' Estimated
TOTAL DEPTH (FT): 2.4
LOGGED BY: M. Socci
DRILLING CO.: S. W. Cole Explorations, LLC
DRILLER: W. Williams
DRILLING METHOD:
RIG TYPE: Track Mounted Diedrich D-50
AUGER ID/OD: N/A / N/A
SAMPLER: 3" Split Spoon
HAMMER TYPE: Automatic
HAMMER WEIGHT (lbs): 140 / 300
CASING ID/OD: N/A /N/A
CORE BARREL: N/A
HAMMER CORRECTION FACTOR:
HAMMER DROP (inch): 30 / 16
WATER LEVEL DEPTHS (ft):
GENERAL NOTES:

KEY TO NOTES AND SYMBOLS:
Water Level
▽ At time of Drilling
▼ At Completion of Drilling
▼ After Drilling
D = Split Spoon Sample
U = Thin Walled Tube Sample
R = Rock Core Sample
V = Field Vane Shear
Pen. = Penetration Length
Rec. = Recovery Length
bpf = Blows per Foot
mpf = Minute per Foot
WOR = Weight of Rods
WOH = Weight of Hammer
RQD = Rock Quality Designation
PID = Photoionization Detector
S_v = Field Vane Shear Strength, kips/sq.ft.
q_u = Unconfined Compressive Strength, kips/sq.ft.
Ø = Friction Angle (Estimated)
N/A = Not Applicable

Elev. (ft)	Depth (ft)	Casing Pen. (bpf)	SAMPLE INFORMATION: Sample No.	Type	Depth (ft)	Pen./ Rec. (in)	Blow Count or RQD	Field / Lab Test Data	Graphic Log	Sample Description & Classification	H_20 Depth	Remarks
			1D		0.43-2.4	24/15				5.2" ASPHALT 0.4 Brown, moist, gravelly, fine to coarse SAND, some silt (FILL) 2.4 Bottom of Exploration at 2.43 feet		AASHTO Classification- A-1-b

Stratification lines represent approximate boundary between soil types, transitions may be gradual. Water level readings have been made at times and under conditions stated. Fluctuations of groundwater may occur due to other factors than those present at the time measurements were made.

KEY TO NOTES & SYMBOLS

Test Boring and Test Pit Explorations

Stratification lines represent the approximate boundary between soil types and the transition may be gradual.

Key to Symbols Used:

w	-	water content, percent (dry weight basis)
q_u	-	unconfined compressive strength, kips/sq. ft. - laboratory test
S_v	-	field vane shear strength, kips/sq. ft.
L_v	-	lab vane shear strength, kips/sq. ft.
q_p	-	unconfined compressive strength, kips/sq. ft. – pocket penetrometer test
O	-	organic content, percent (dry weight basis)
W_L	-	liquid limit - Atterberg test
W_P	-	plastic limit - Atterberg test
WOH	-	advance by weight of hammer
WOM	-	advance by weight of man
WOR	-	advance by weight of rods
HYD	-	advance by force of hydraulic piston on drill
RQD	-	Rock Quality Designator - an index of the quality of a rock mass.
γ_T	-	total soil weight
γ_B	-	buoyant soil weight

Description of Proportions:

Trace:	0 to 5%
Some:	5 to 12%
"Y"	12 to 35%
And	35+%
With	Undifferentiated

Description of Stratified Soils

Parting:	0 to 1/16" thickness
Seam:	1/16" to 1/2" thickness
Layer:	½" to 12" thickness
Varved:	Alternating seams or layers
Occasional:	one or less per foot of thickness
Frequent:	more than one per foot of thickness

REFUSAL: **Test Boring Explorations** - Refusal depth indicates that depth at which, in the drill foreman's opinion, sufficient resistance to the advance of the casing, auger, probe rod or sampler was encountered to render further advance impossible or impracticable by the procedures and equipment being used.

REFUSAL: **Test Pit Explorations** - Refusal depth indicates that depth at which sufficient resistance to the advance of the backhoe bucket was encountered to render further advance impossible or impracticable by the procedures and equipment being used.

Although refusal may indicate the encountering of the bedrock surface, it may indicate the striking of large cobbles, boulders, very dense or cemented soil, or other buried natural or man-made objects or it may indicate the encountering of a harder zone after penetrating a considerable depth through a weathered or disintegrated zone of the bedrock.

APPENDIX D

Laboratory Test Results

S.W.COLE ENGINEERING, INC.

Report of Gradation

ASTM C-117 & C-136

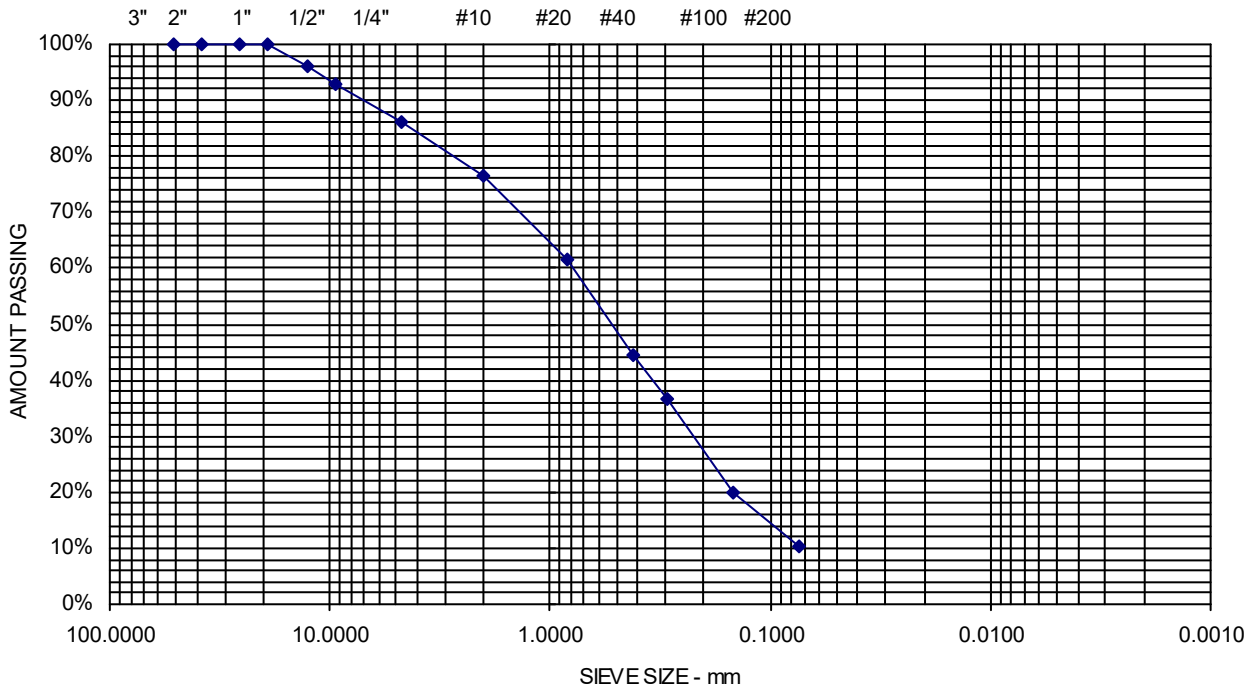
Project Name: WARWICK RI - PROPOSED SKATING RINK FACILITY - GEOTECHNICAL ENGINEERING SERVICES

Client: BETA GROUP, INC.

Material Source: **PC-1 0-24"**

Project Number: 23-0305
Lab ID: 5933T
Date Received: 3/6/2023
Date Completed: 3/7/2023
Tested By: JORDAN PAINE

STANDARD DESIGNATION (mm/µm)	SIEVE SIZE	AMOUNT PASSING (%)	
50 mm	**2"**	**100**	
38.1 mm	**1-1/2"**	**100**	
25.0 mm	**1"**	**100**	
19.0 mm	**3/4"**	**100**	
12.5 mm	**1/2"**	**96**	
9.5 mm	**3/8"**	**93**	
4.75 mm	**No. 4**	**86**	13.8% Gravel
2.00 mm	**No. 10**	**76**	
850 um	**No. 20**	**62**	
425 um	**No. 40**	**44**	75.9% Sand
300 um	**No. 50**	**37**	
150 um	**No. 100**	**20**	
75 um	**No. 200**	**10.3**	10.3% Fines



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S.W.COLE ENGINEERING, INC.

Report of Gradation

ASTM C-117 & C-136

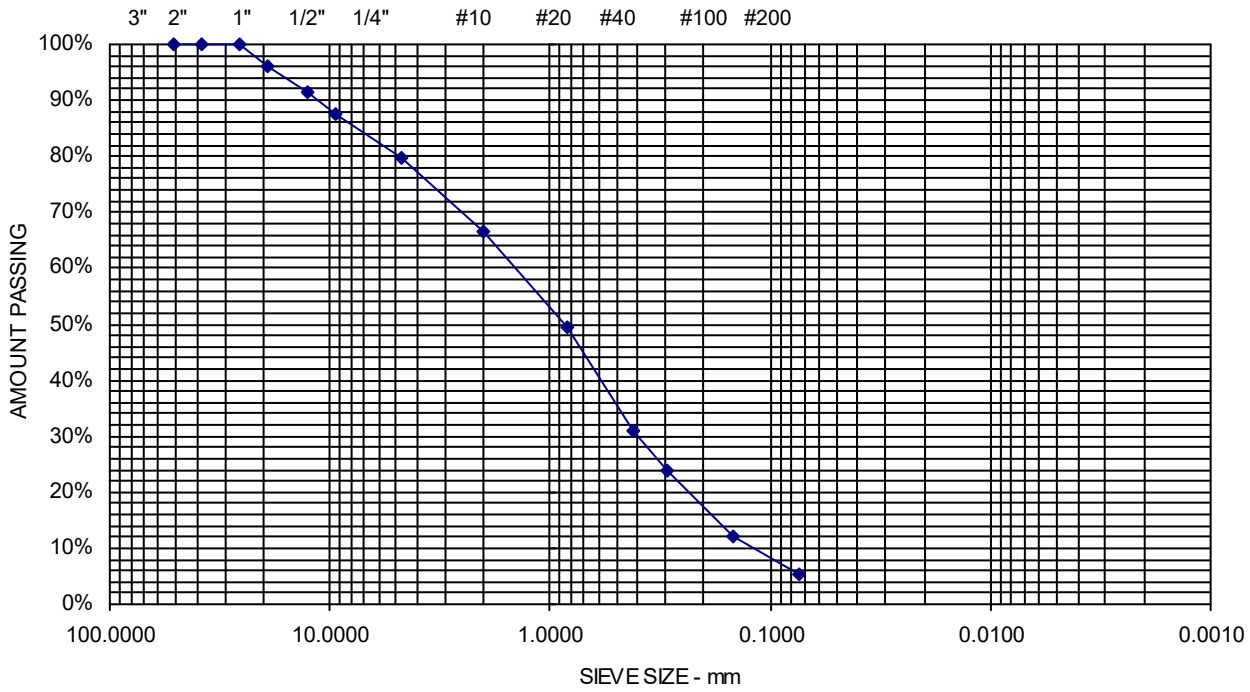
Project Name: WARWICK RI - PROPOSED SKATING RINK FACILITY - GEOTECHNICAL ENGINEERING SERVICES

Client: BETA GROUP, INC.

Material Source: **PC-2 0-24"**

Project Number: 23-0305
Lab ID: 5934T
Date Received: 3/6/2023
Date Completed: 3/8/2023
Tested By: JORDAN PAINE

STANDARD DESIGNATION (mm/µm)	SIEVE SIZE	AMOUNT PASSING (%)	
50 mm	**2"**	**100**	
38.1 mm	**1-1/2"**	**100**	
25.0 mm	**1"**	**100**	
19.0 mm	**3/4"**	**96**	
12.5 mm	**1/2"**	**91**	
9.5 mm	**3/8"**	**88**	
4.75 mm	**No. 4**	**80**	20.4% Gravel
2.00 mm	**No. 10**	**67**	
850 um	**No. 20**	**49**	
425 um	**No. 40**	**31**	74.3% Sand
300 um	**No. 50**	**24**	
150 um	**No. 100**	**12**	
75 um	**No. 200**	**5.3**	5.3% Fines



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S.W.COLE ENGINEERING, INC.

Report of Gradation

ASTM C-117 & C-136

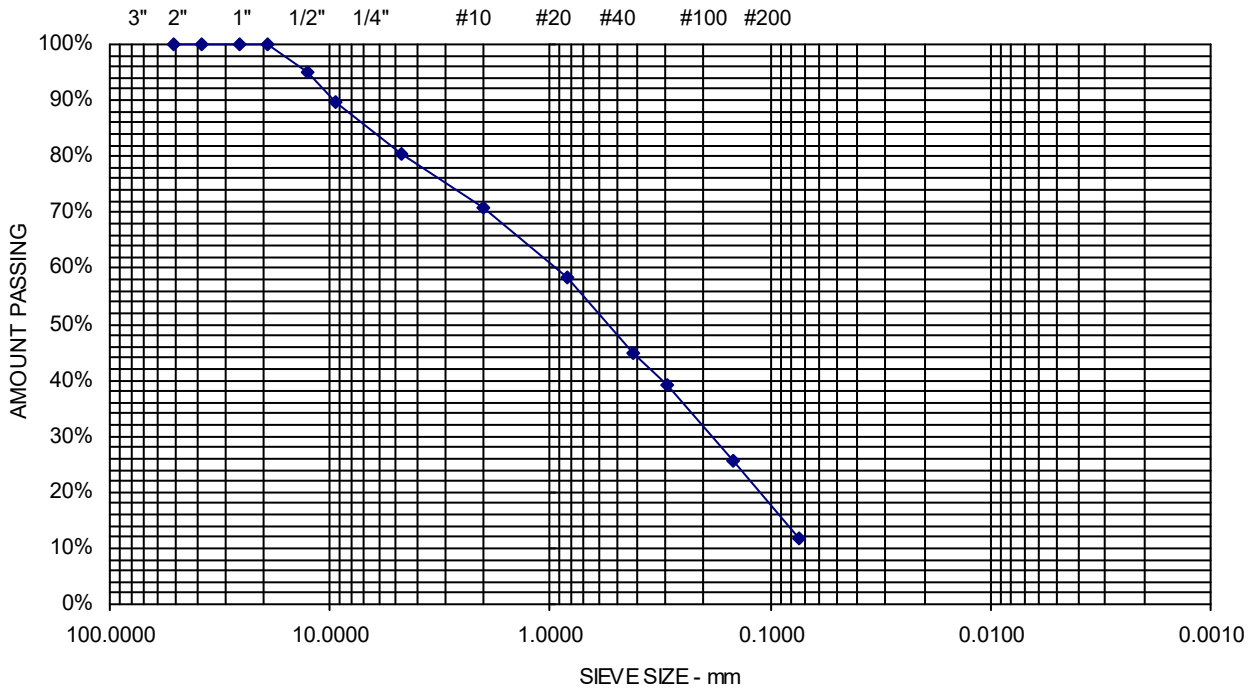
Project Name: WARWICK RI - PROPOSED SKATING RINK FACILITY - GEOTECHNICAL ENGINEERING SERVICES

Client: BETA GROUP, INC.

Material Source: **PC-3 0-24"**

Project Number: 23-0305
Lab ID: 5935T
Date Received: 3/6/2023
Date Completed: 3/7/2023
Tested By: JORDAN PAINE

STANDARD DESIGNATION (mm/µm)	SIEVE SIZE	AMOUNT PASSING (%)	
50 mm	**2"**	**100**	
38.1 mm	**1-1/2"**	**100**	
25.0 mm	**1"**	**100**	
19.0 mm	**3/4"**	**100**	
12.5 mm	**1/2"**	**95**	
9.5 mm	**3/8"**	**90**	
4.75 mm	**No. 4**	**80**	19.6% Gravel
2.00 mm	**No. 10**	**71**	
850 um	**No. 20**	**58**	
425 um	**No. 40**	**45**	68.8% Sand
300 um	**No. 50**	**39**	
150 um	**No. 100**	**26**	
75 um	**No. 200**	**11.6**	11.6% Fines



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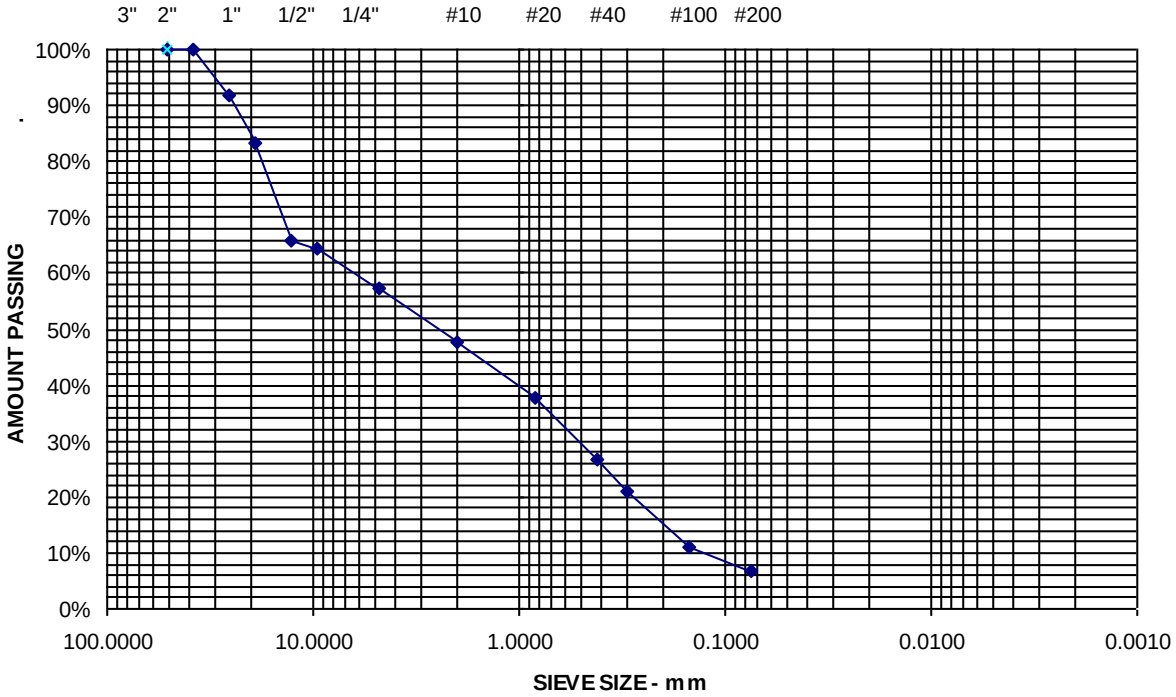
S.W.COLE ENGINEERING, INC.

Report of Gradation

ASTM C-117 & C-136

Project Name	WARWICK RI - PROPOSED SKATING RINK FACILITY - GEOTECHNICAL ENGINEERING SERVICES	Project Number	23-0305
Client	BETA GROUP, INC.	Lab ID	5936T
Material Type	TEST PIT SAMPLES	Date Received	3/6/2023
Material Source	B-101 2-4'	Date Completed	3/7/2023
		Tested By	JORDAN PAINE

STANDARD DESIGNATION (mm/µm)	SIEVE SIZE	AMOUNT PASSING (%)	SPECIFICATIONS (%)
50 mm	**2"**	**100**	
38.1 mm	**1-1/2"**	**100**	
25.0 mm	**1"**	**92**	
19.0 mm	**3/4"**	**83**	
12.5 mm	**1/2"**	**66**	
9.5 mm	**3/8"**	**64**	
4.75 mm	**No. 4**	**57**	
2.00 mm	**No. 10**	**48**	
850 um	**No. 20**	**38**	
425 um	**No. 40**	**27**	
300 um	**No. 50**	**21**	
150 um	**No. 100**	**11**	
75 um	**No. 200**	**6.7**	



Comments MC=20.6%

Derek Mello

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S.W.COLE ENGINEERING, INC.

Report of Gradation

ASTM C-117 & C-136

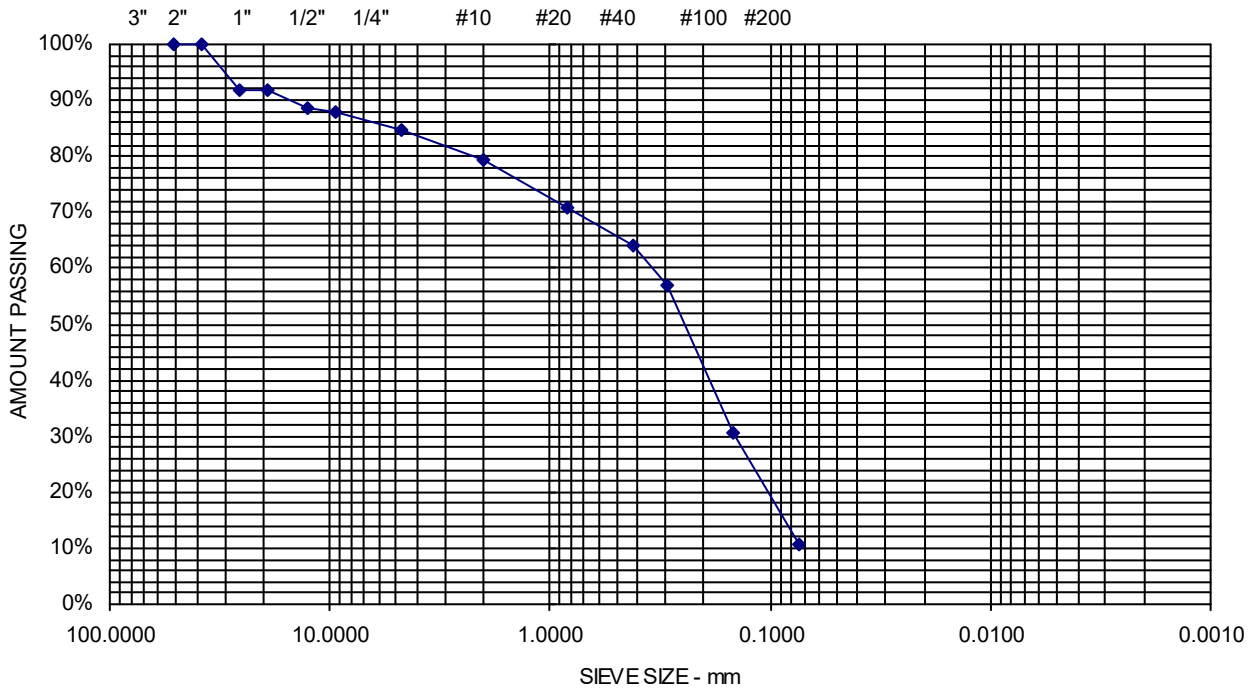
Project Name: WARWICK RI - PROPOSED SKATING RINK FACILITY - GEOTECHNICAL ENGINEERING SERVICES

Client: BETA GROUP, INC.

Material Source: **B-2 3D 5-7'**

Project Number: 23-0305
Lab ID: 5937T
Date Received: 3/6/2023
Date Completed: 3/7/2023
Tested By: JORDAN PAINE

STANDARD DESIGNATION (mm/µm)	SIEVE SIZE	AMOUNT PASSING (%)	
50 mm	**2"**	**100**	
38.1 mm	**1-1/2"**	**100**	
25.0 mm	**1"**	**92**	
19.0 mm	**3/4"**	**92**	
12.5 mm	**1/2"**	**89**	
9.5 mm	**3/8"**	**88**	
4.75 mm	**No. 4**	**85**	15.1% Gravel
2.00 mm	**No. 10**	**79**	
850 um	**No. 20**	**71**	
425 um	**No. 40**	**64**	74.3% Sand
300 um	**No. 50**	**57**	
150 um	**No. 100**	**31**	
75 um	**No. 200**	**10.5**	10.5% Fines



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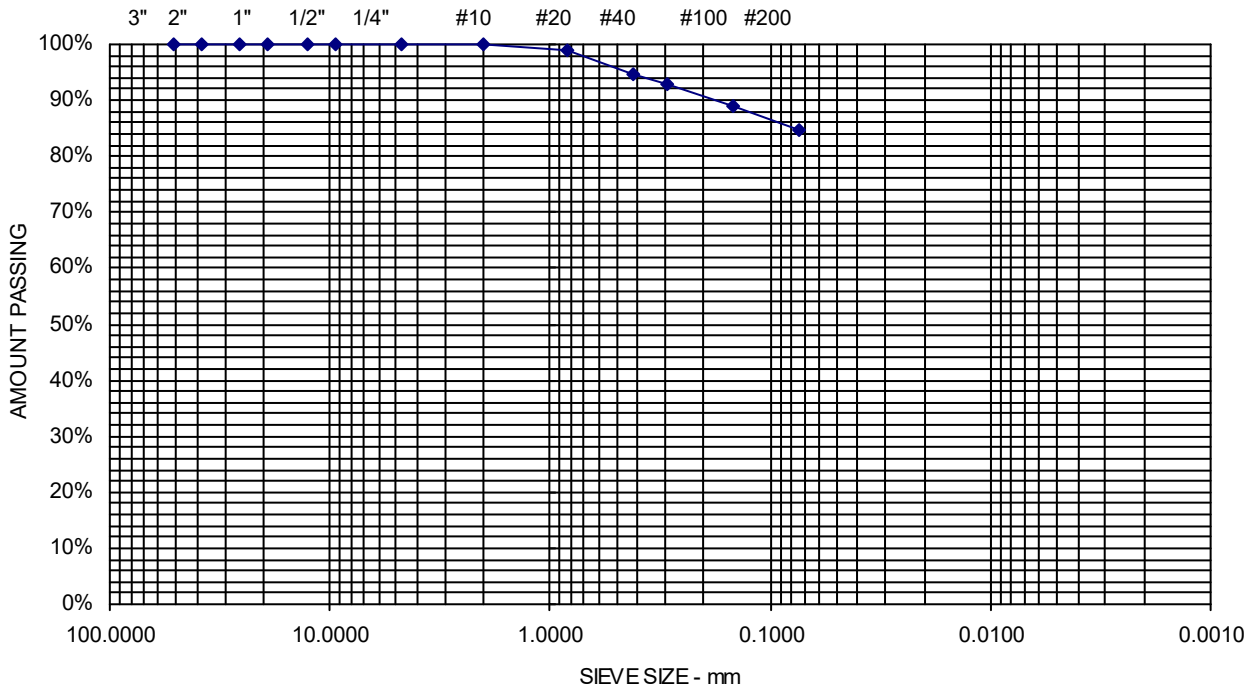
S.W.COLE ENGINEERING, INC.

Report of Gradation

ASTM C-117 & C-136

Project Name	WARWICK RI - PROPOSED SKATING RINK FACILITY - GEOTECHNICAL ENGINEERING SERVICES	Project Number	23-0305
Client	BETA GROUP, INC.	Lab ID	5938T
		Date Received	3/6/2023
		Date Completed	3/7/2023
Material Source	**B-4 3D 5-7'**	Tested By	JORDAN PAINE

STANDARD DESIGNATION (mm/µm)	SIEVE SIZE	AMOUNT PASSING (%)	
50 mm	**2"**	**100**	
38.1 mm	**1-1/2"**	**100**	
25.0 mm	**1"**	**100**	
19.0 mm	**3/4"**	**100**	
12.5 mm	**1/2"**	**100**	
9.5 mm	**3/8"**	**100**	
4.75 mm	**No. 4**	**100**	0% Gravel
2.00 mm	**No. 10**	**100**	
850 um	**No. 20**	**99**	
425 um	**No. 40**	**95**	15.1% Sand
300 um	**No. 50**	**93**	
150 um	**No. 100**	**89**	
75 um	**No. 200**	**84.9**	84.9% Fines



Comments: MC=25%

Sheet

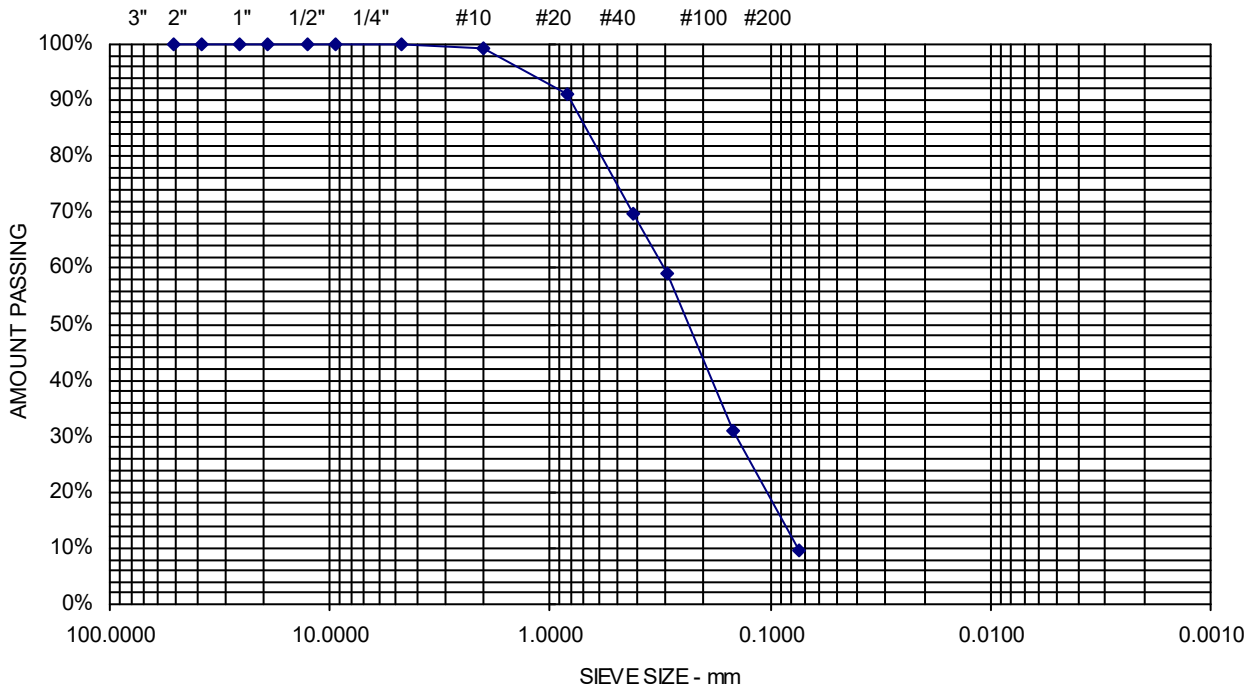
S.W.COLE ENGINEERING, INC.

Report of Gradation

ASTM C-117 & C-136

Project Name	WARWICK RI - PROPOSED SKATING RINK FACILITY - GEOTECHNICAL ENGINEERING SERVICES	Project Number	23-0305
Client	BETA GROUP, INC.	Lab ID	5940T
		Date Received	3/6/2023
		Date Completed	3/7/2023
Material Source	**B-5 5D 10-12'**	Tested By	JORDAN PAINE

STANDARD DESIGNATION (mm/µm)	SIEVE SIZE	AMOUNT PASSING (%)	
50 mm	**2"**	**100**	
38.1 mm	**1-1/2"**	**100**	
25.0 mm	**1"**	**100**	
19.0 mm	**3/4"**	**100**	
12.5 mm	**1/2"**	**100**	
9.5 mm	**3/8"**	**100**	
4.75 mm	**No. 4**	**100**	0% Gravel
2.00 mm	**No. 10**	**99**	
850 um	**No. 20**	**91**	
425 um	**No. 40**	**70**	90.2% Sand
300 um	**No. 50**	**59**	
150 um	**No. 100**	**31**	
75 um	**No. 200**	**9.8**	9.8% Fines



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Sheet

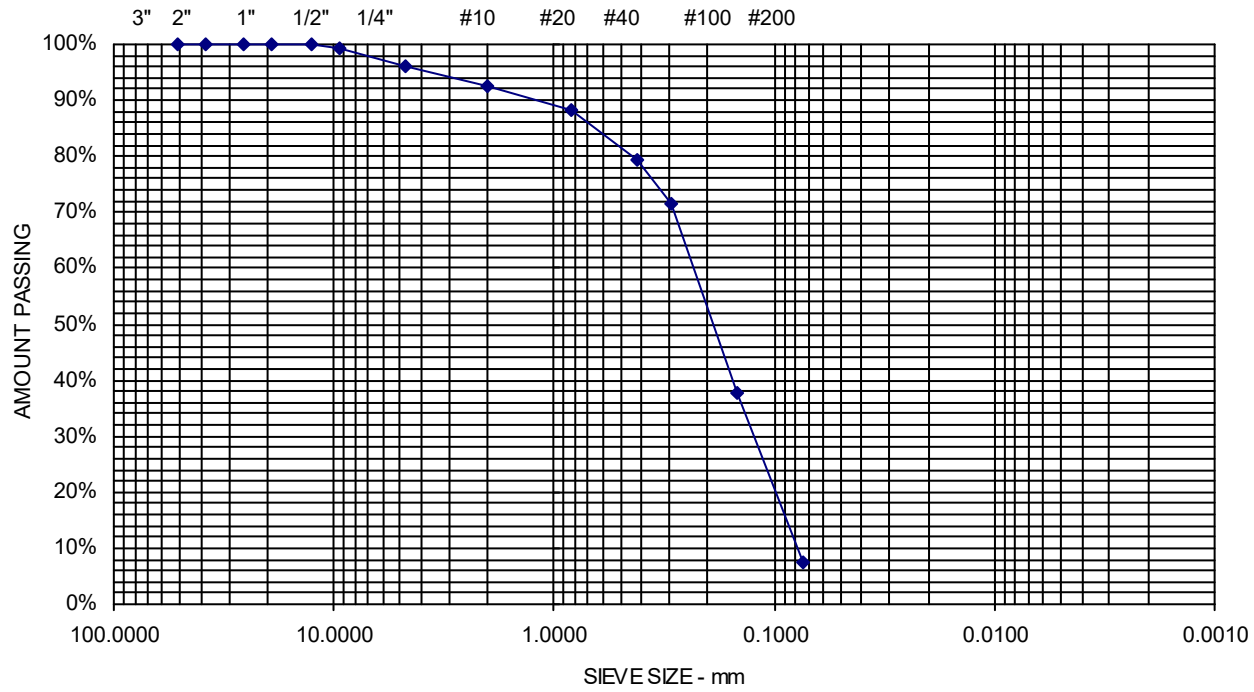
S.W.COLE ENGINEERING, INC.

Report of Gradation

ASTM C-117 & C-136

Project Name	WARWICK RI - PROPOSED SKATING RINK FACILITY - GEOTECHNICAL ENGINEERING SERVICES	Project Number	23-0305
Client	BETA GROUP, INC.	Lab ID	5939T
		Date Received	3/6/2023
		Date Completed	3/7/2023
Material Source	**B-6 3D 5-7'**	Tested By	JORDAN PAINE

STANDARD DESIGNATION (mm/µm)	SIEVE SIZE	AMOUNT PASSING (%)	
50 mm	**2"**	**100**	
38.1 mm	**1-1/2"**	**100**	
25.0 mm	**1"**	**100**	
19.0 mm	**3/4"**	**100**	
12.5 mm	**1/2"**	**100**	
9.5 mm	**3/8"**	**99**	
4.75 mm	**No. 4**	**96**	4% Gravel
2.00 mm	**No. 10**	**92**	
850 um	**No. 20**	**88**	
425 um	**No. 40**	**79**	88.4% Sand
300 um	**No. 50**	**72**	
150 um	**No. 100**	**38**	
75 um	**No. 200**	**7.6**	7.6% Fines



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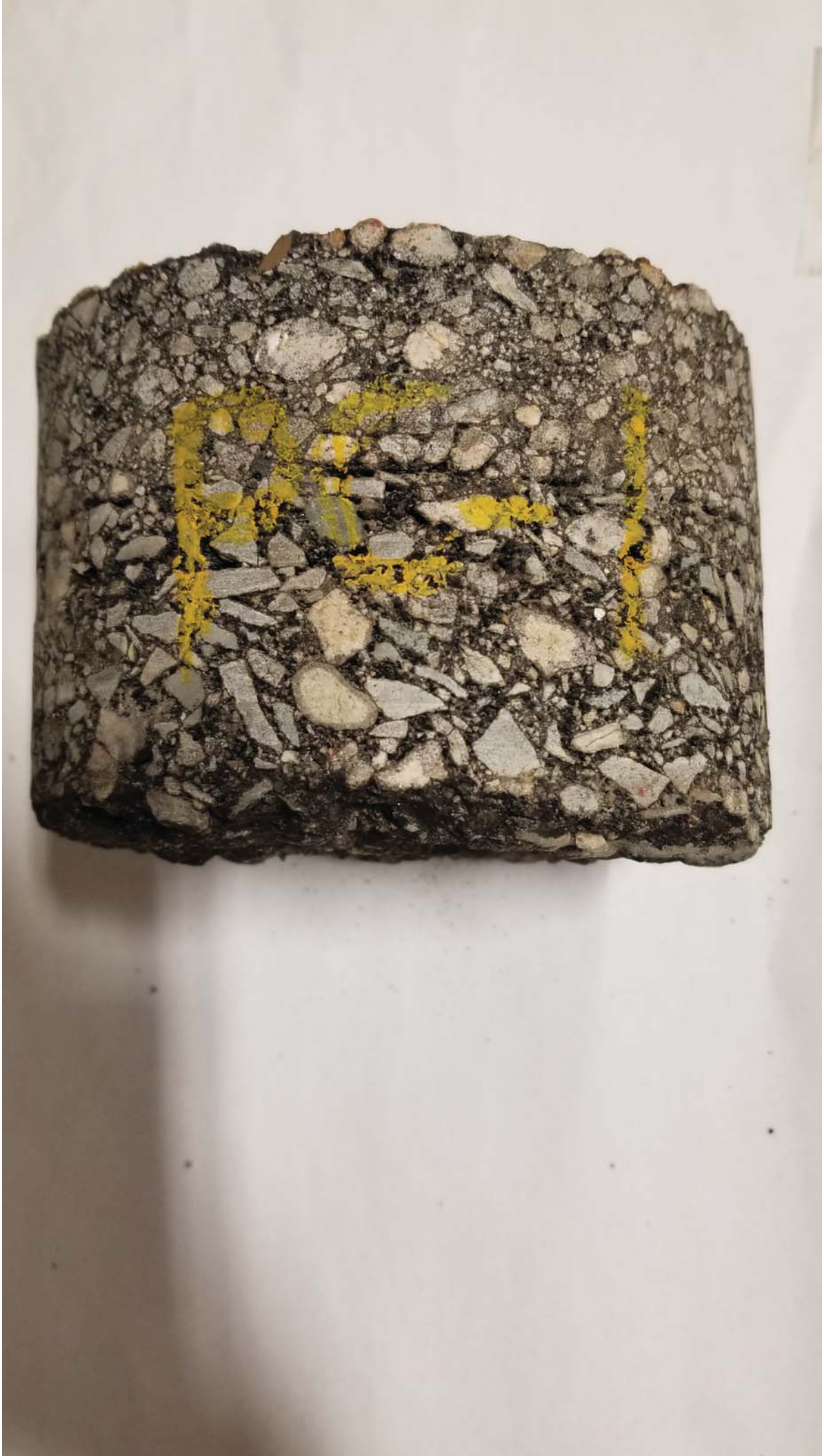
Sheet

APPENDIX E

Pavement Core Photos

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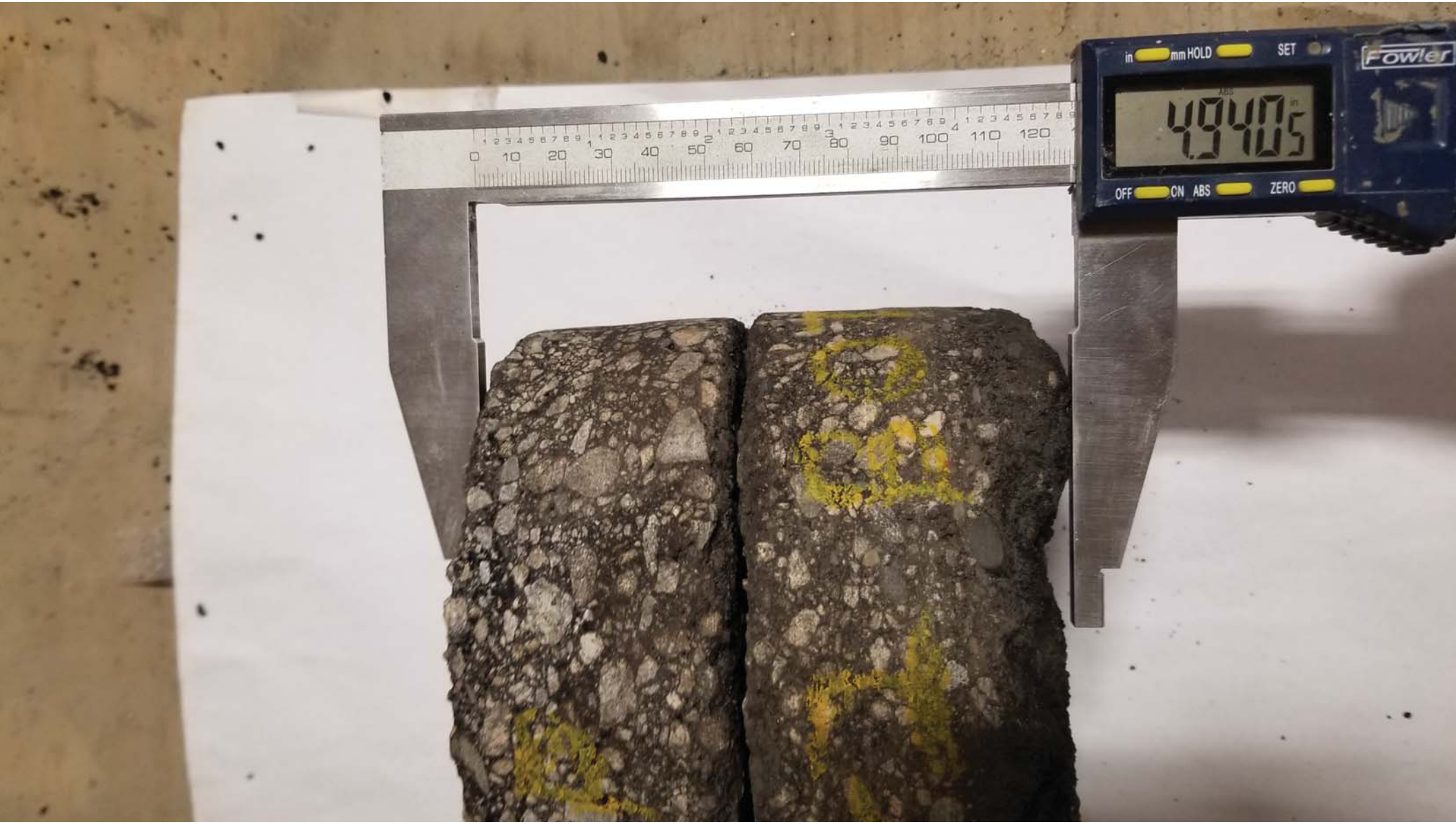
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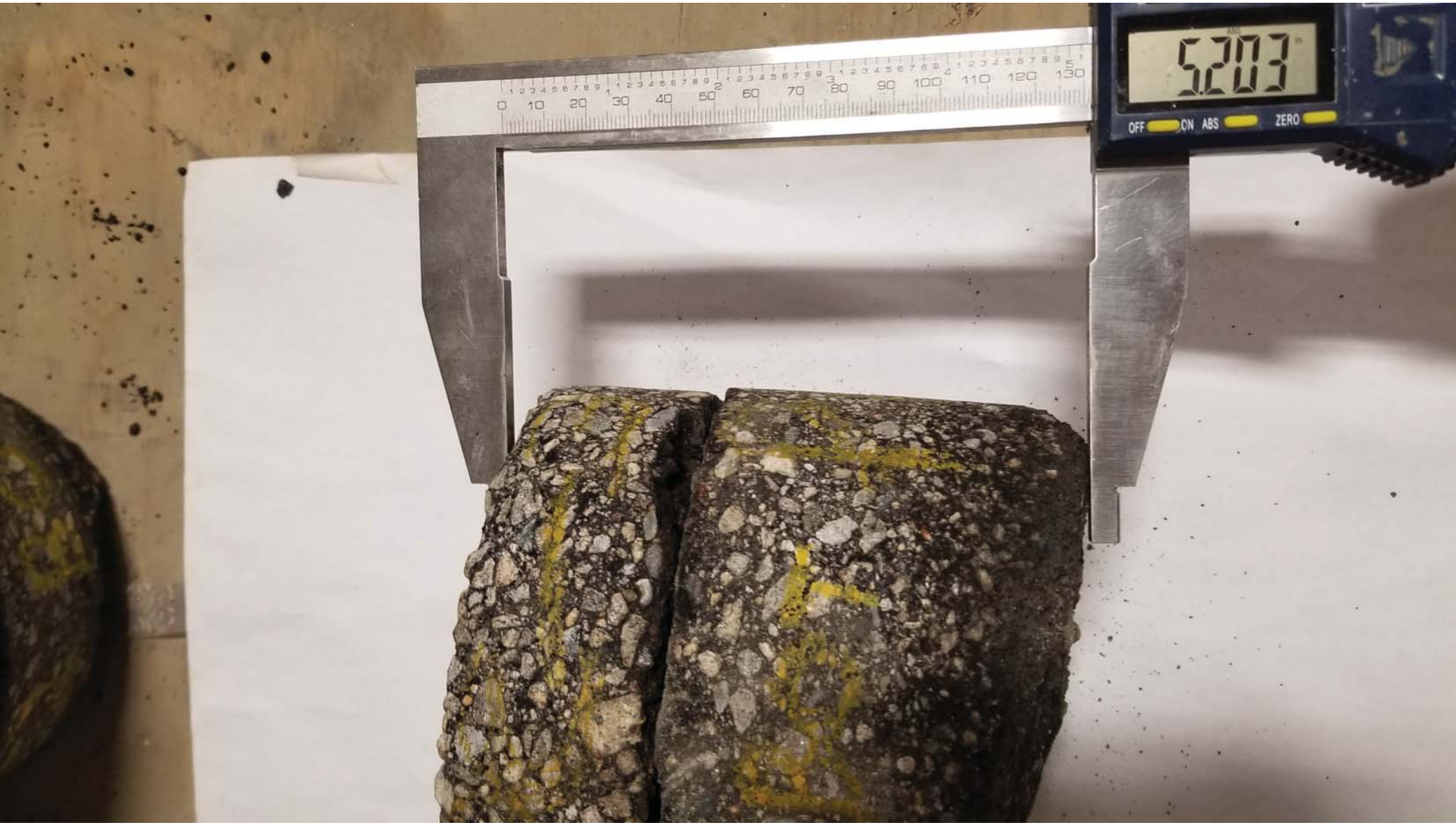
5.203
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APPENDIX B

RIDOT Acceptance Letter

Department of Transportation
Division of Highway and Bridge Maintenance
360 Lincoln Avenue
Warwick, RI 02888

December 8, 2023

Thomas Kravitz
65 Centerville Road
Warwick RI 02886

Subject: Physical Alteration Permit Application No. **23-112**
Location: 3275 Post Road Warwick RI 02886

Dear Thomas Kravitz:

In reference to the subject Physical Alteration Permit Application (PAPA) Number 23-112 for the proposed work in Warwick, the application package received on has been reviewed and found to meet our design requirements. The Physical Alteration Permit authorizing construction of the work within or impacting the State Highway Right-of-Way will be issued upon receipt and acceptance of the following:

- Original Insurance Certificate (Section 4.8 Insurance Requirements of the Department's Rules and Regulations for PAPA)
- Original bond in the amount of $$30,000 for the proposed work within or impacting the State Highway Right-of-Way (Section 4.7 Bond Requirements of the Department's Rules and Regulations for PAPA)
- Additional Final Requirements:
  a.) Please be aware; If the municipality is utilizing an outside contractor to conduct this work, RIDOT would also accept the inclusion of our Department as an additional oblige on any performance bond and as an additional insured on any insurance policy related to this project in lieu of the above stated original insurance certificate and original bond. A copy of all documents including RIDOT as the additional oblige or additional insurance shall be submitted to this office before the permit can be issued.
  b.) Please be aware; the Applicant is responsible for hiring independent inspection and testing services for the construction phase, as required under Section 4.9 of the PAPA regulations since the estimate exceeds $25,000. Proof of RI Professional Engineer stamped independent inspection certifying all work was done in accordance with the RIDOT Standard Specifications and approved permit plans shall be submitted to the Department upon completion of construction. A special condition will be included on the permit reflecting this requirement.

Please note that if all these documents are not received within three (3) years of the date of this letter, the permit application will expire and no longer be valid, requiring re-submission of the application. Please be advised that pursuant to Section 4.6 Part A of the Department's Rules and Regulations regarding Physical Alteration Permits (PAPA Manual), the collection of a new application fee with a re-submittal is required.

If you have any questions, please contact Arlene Nelson at (401) 734-4842.

THIS LETTER SHALL NOT BE CONSTRUED AS A PHYSICAL ALTERATION PERMIT AUTHORIZING CONSTRUCTION WITHIN OR IMPACTING THE STATE HIGHWAY RIGHT-OF-WAY. A PERMIT WILL NOT BE GRANTED UNTIL ALL OF THE DOCUMENTATION REQUESTED ABOVE HAS BEEN RECEIVED AND ACCEPTED.

Sincerely,

Matthew J. Ouellette, P.E.
Deputy State Highway Maintenance Operations Engineer

For additional information, please see the PAPA Manual at this URL:
http://www.dot.ri.gov/documents/doingbusiness/permits/PAPA_Manual.pdf

APPENDIX C

RIDEM Permit

RHODE ISLAND
DEPARTMENT OF ENVIRONMENTAL MANAGEMENT
OFFICE OF WATER RESOURCES
235 Promenade Street, Providence, Rhode Island 02908

November 17, 2023

Attention: Thomas Kravitz
City of Warwick
Sawtooth Annex Building
65 Centerville Road
Warwick, RI 02886

RE: WQC/STW File No. 23-140; UIC File No. 002207; RIPDES File No. RIR102569
City Hall Plaza Site Improvements
3275 Post Road
Assessor's Plat 245, Lot 61
Warwick, RI

Dear Mr. Kravitz:

The Rhode Island Department of Environmental Management Office of Water Resources (RIDEM OWR) has reviewed the above-referenced project for compliance with the RIDEM Groundwater Discharge (GWD)/Underground Injection Control (UIC) Program (Groundwater Discharge Rules: 250-RICR-150-05-4) and the Rhode Island Pollutant Discharge Elimination System Construction General Permit (CGP). The purpose of the project is to construct and maintain an ice rink & associated shade structure, an adjacent concession/rental building, associated adjacent parking areas with sidewalks, replacement of existing concrete driveways along adjacent roads, associated utilities, stormwater infrastructure, and landscaping. The parking areas will include some areas of pervious pavement. The stormwater infrastructure will include a closed stormwater drainage system which will discharge low flows into two (2) proposed underground infiltration practices consisting of infiltration chambers embedded in washed crushed stone. The drainage system will tie into an existing drainage system that will allow overflow in large storm events to flow to an eventual discharge to Apponaug Cove. The work is further described in your application and detailed on site plans consisting of 33 sheets as prepared by Jared Linhares, of BETA, Inc., received by RIDEM OWR on 10/30/2023.

This letter serves as your permit/authorization to discharge for the above-referenced project, provided that you comply with the application materials, the Groundwater Discharge Rules, the CGP and the following conditions:

1) You must submit the Notice of Start of Construction Form prior to commencement of any permitted site alterations or construction activity. The Start of Construction Form can be found on the Stormwater Construction Permitting website.

2) Prior to construction, you must erect or post a sign resistant to the weather and at least twelve (12) inches wide and eighteen (18) inches long, which identifies the initials "DEM" and the application number(s) assigned to this permit. The sign must be posted in a conspicuous location near the site access and maintained until the project is complete.

3) A copy of this permit, any inspection records, and a signed and updated SESC Plan, must be kept at the site at all times until the project is complete. Copies of this permit must be made available for review by any

RIDEM or City/Town representative upon request. Electronic versions of required documents that are readily accessible from the construction site are acceptable.

4) All fill material shall be clean and free of matter that could cause pollution of the waters of the State.

5) The stormwater collection and treatment system approved herein is for the discharge of stormwater only. Any other discharge is prohibited.

6) Any alterations, additions or modifications to the stormwater system from that approved herein, including permanent closure must be reviewed and approved by RIDEM OWR prior to implementation.

7) You must submit the Notice of Termination Form upon completion of the project and final site stabilization. The Notice of Termination Form can be found on the Stormwater Construction Permitting website.

8) You are responsible for the long-term inspection, cleaning and maintenance of the stormwater collection and treatment system to ensure proper performance of all components until documentation is provided to indicate that this responsibility has been assumed by another entity. Long-term operation and maintenance is to be as described in the Post-Construction Operation and Maintenance Plan entitled "Operation & Maintenance Plan, City Hall Plaza Site Improvements, Warwick, RI", dated September 2023, dated received 9/21/2023, with BMP location map dated received 11/17/2023, indicated as prepared by BETA, Inc., 701 George Washington Highway, Lincoln, Rhode Island 02865.

This permit is not transferable to any person except after written notice to the Director, in the form of a Permit Transfer Form available on the RIDEM Stormwater Construction Permitting website.

This UIC/GWD Registration will expire 4 years from the date of issuance if the stormwater discharge system has not been constructed and installed. Once a registration is expired, a new application must be submitted for any proposed activity subject to the Groundwater Discharge Rules. Your authorization to discharge under the CGP expires at midnight on September 25, 2025. If construction has not been completed by that date, there will be measures in place for you to reauthorize.

RIDEM's Rules and Regulations Governing the Establishment of Various Fees require that RIPDES CGP permit holders pay an Annual Fee of $100.00. An invoice will be sent to the owner on record in May/June of each year if the construction was still active as of December 31st of the previous year. The owner will be responsible for the Annual Fee until the construction activity has been completed, the site has been properly stabilized, and a completed Notice of Termination (NOT) has been received.

You are required to adhere to all above terms and conditions and carry out this project in compliance with the CGP and Groundwater Discharge Rules at all times. Issuance of this permit does not bar RIDEM, nor any of its various Divisions, from initiating any investigation and/or enforcement actions that it may deem necessary for violations of this permit or of any and all applicable statutes, regulations and/or permits.

This permit has the full force and effect of a permit issued by the Director. This permit does not relieve your obligation to obtain any other applicable local, state and federal permits prior to commencing construction and does not relieve you of any duties owed to adjacent landowners with respect to changes in drainage. RIDEM assumes no responsibilities for damages resulting from faulty design or construction.

If you have any questions regarding the contents of the permit, you may contact me at nicholas.pisani@dem.ri.gov or (401) 222-3961, extension 2777423.

Sincerely,

Nicholas A. Pisani, P.E.

Nicholas A. Pisani, P.E., Environmental Engineer IV
Stormwater Engineering and 401 Permitting
Office of Water Resources
Rhode Island Department of Environmental Management

ec: Jared Linhares, P.E., BETA, Inc.
Neal Personeus, RI DEM/UIC Program
RI DEM/UIC Program

APPENDIX D

RIHPHC Review Letter

STATE OF RHODE ISLAND

HISTORICAL PRESERVATION & HERITAGE COMMISSION

Old State House 150 Benefit Street Providence, RI 02903

Telephone 401-222-2678
TTY 401-222-3700

Fax 401-222-2968
www.preservation.ri.gov

Bridgid Byrne, Historic Preservation Specialist
Rhode Island Department of Transportation
Planning and Environmental Review
Two Capitol Hill, Room 370A
Providence, Rhode Island 02903-1124

Re: Physical Alteration Permit Application# 23-112 RIHPHC#17858
Location: 3275 Post Road, Warwick
Response Date: 10/17/23

Dear Ms. Byrne:

The Rhode Island Historical Preservation and Heritage Commission staff has reviewed the above-referenced permit application in accordance with the Rhode Island Historic Preservation Act (RIGL 42-45 et seq.) and the Procedures of the Rhode Island Historical Preservation and Heritage Commission.

The Subject Property is located within the Warwick Civic Center Historic District. RIHPHC has reviewed this project and opined that there will be No Adverse Effect on the Warwick Civic Center Historic District provided that an archaeological monitor is present for the installation of the three (3) Eastern supports for the shade structure. We previously called for in our July 14th, 2023, letter regarding The City of Warwick's EDI Grant.

These comments are provided in accordance with the Rhode Island Historic Preservation Act and Rhode Island General Laws and reflect our finding only on activities specifically covered by the Physical Alteration Permit Application. This finding does not apply to any larger project or development connected to the Physical Alteration Permit. If that larger project requires state or federal review, it should be submitted to this office under separate cover. If you have any questions, please contact Michaela Jergensen, or Charlotte Taylor of Project Review at this office.

Very truly yours,

Michaela A Jergensen

For: Jeffrey Emidy
Executive Director
Interim State Historic Preservation Officer

APPENDIX E

Soil Erosion and Sediment Control Plan

DRAFT Soil Erosion and Sediment Control Plan
(to be effective 1/1/17)
For:

City Hall Plaza Site Improvements

Warwick, RI 02899

Owner:	City of Warwick Thomas Kravitz, Planning Director 3275 Post Road Warwick, RI 02889 (401) 738-2009 thomas.j.kravitz@warwickri.gov
Operator: *TO BE DETERMINED UPON CONTRACT AWARD*	Company Name Name Address City, State, Zip Code Telephone Number Email Address
Estimated Project Dates:	Start Date: April 2024 Completion Date: May 2025
SESC Plan Prepared By:	BETA Group, Inc. Jared Linhares, P.E. 701 George Washington Highway Lincoln, RI 02865 401-333-2382 JLlinhares@BETA-Inc.com P.E. Reg. #13145
SESC Plan Preparation Date:	October 2023
SESC Plan Revision Date:	

OPERATOR CERTIFICATION

Upon contract award, the OPERATOR must sign this certification statement before construction may begin.

I certify under penalty of law that this document and all attachments were prepared under the direction or supervision in accordance with a system designed to assure that qualified personnel properly gather and evaluate the information submitted. Based on my inquiry of the person or persons who manage the system, or those persons directly responsible for gathering the information, the information submitted is, to the best of my knowledge and belief, true, accurate, and complete.

I am aware that there are significant penalties for submitting false information, including the possibility of fine and imprisonment for knowing violations. I am aware that it is the responsibility of the owner/operator to implement and amend the Soil Erosion and Sediment Control Plan as appropriate in accordance with the requirements of the RIPDES Construction General Permit.

_____

Operator Signature: Date

Contractor Representative: Name

Contractor Title: Title

Contractor Company Name: Company Name (if applicable)

Address: Mailing Address

Phone Number: Phone Number

Email Address: Email

TABLE OF CONTENTS

This Table of Contents is structured to be automatically populated by Microsoft Word.
Upon final completion of this template, "right-click" anywhere in the Table of Contents, select "Update Field", and then "Update entire table". Page numbers will automatically be synced with the changed document.

INTRODUCTION

This Construction Site Soil Erosion and Sediment Control Plan (SESC Plan) has been prepared for the City of Warwick for the City Hall Plaza Site Improvements Project. In accordance with the RIDEM Rhode Island Pollutant Discharge Elimination System (RIPDES) General Permit for Stormwater Discharge Associated with Construction Activity (RIPDES Construction General Permit ("CGP")), projects that disturb one (1) or more acres require the preparation of a SESC Plan. This SESC Plan provides guidance for complying with the terms and conditions of the RIPDES Construction General Permit and Minimum Standard 10 of the RI Stormwater Design and Installation Standards Manual. In addition, this SESC Plan is also consistent with Part D of the *RI SESC Handbook* entitled "Soil Erosion and Sediment Control Plans". This document does not negate or eliminate the need to understand and adhere to all applicable RIPDES regulations.

The purpose of erosion, runoff, and sedimentation control measures is to prevent pollutants from leaving the construction site and entering waterways or environmentally sensitive areas during and after construction. This SESC Plan has been prepared prior to the initiation of construction activities to address anticipated worksite conditions. The control measures depicted on the site plan and described in this narrative should be considered the minimum measures required to control erosion, sedimentation, and stormwater runoff at the site. Since construction is a dynamic process with changing site conditions, it is the operator's responsibility to manage the site during each construction phase so as to prevent pollutants from leaving the site. This may require the operator to revise and amend the SESC Plan during construction to address varying site and/or weather conditions, such as by adding or realigning erosion or sediment controls to ensure the SESC Plan remains compliant with the RIPDES Construction General Permit. Records of these changes must be added to the amendment log attached to the SESC Plan, and to the site plans as "red-lined" drawings. Please Note: **Even if practices are correctly installed on a site according to the approved plan, the site is only in compliance when erosion, runoff, and sedimentation are effectively controlled throughout the entire site.**

It is the responsibility of the site owner and the site operator to maintain the SESC Plan at the site, including all attachments, amendments and inspection records, and to make all records available for inspection by RIDEM during and after construction. (RIPDES CGP - Part III.G)

The site owner, the site operator, and the designated site inspector are required to review the SESC Plan and sign the Party Certification pages (Section 8). The primary contractor (if different) and all subcontractors (if applicable) involved in earthwork or exterior construction activities are also required to review the SESC Plan and sign the certification pages before construction begins.

Any questions regarding the SESC Plan, control measures, inspection requirements, or any other facet of this document may be addressed to the RIDEM Office of Water Resources, at 401-222-4700 or via email: water@dem.ri.gov.

ADDITIONAL RESOURCES

Rhode Island Department of Environmental Management
Office of Water Resources
235 Promenade Street
Providence, RI 02908-5767
phone: 401-222-4700
email: water@dem.ri.gov

RIDEM *RI Stormwater Design and Installation Standards Manual* (RISDISM) (as amended)
http://www.dem.ri.gov/pubs/regs/regs/water/swmanual15.pdf

RI Soil Erosion and Sediment Control Handbook http://www.dem.ri.gov/soilerosion2014final.pdfRIDEM 2013 RIPDES Construction General Permit
http://www.dem.ri.gov/pubs/regs/regs/water/ripdesca.pdfRhode Island Department of Transportation *Standard Specifications for Road and Bridge Design and Other Specifications* and *Standard Details*
http://www.dot.ri.gov/business/bluebook.php

RIDEM Office of Water Resources Coordinated Stormwater Permitting website
http://www.dem.ri.gov/programs/water/permits/ripdes/stormwater/coordinated-stormwater-permitting.phpRIDEM RIPDES Stormwater website
http://www.dem.ri.gov/programs/water/permits/ripdes/stormwater/RIDEM Water Quality website (for 303(d) and TMDL listings)
http://www.dem.ri.gov/programs/water/quality/

RIDEM Rhode Island Natural Heritage Program mailto:plan@dem.ri.gov

RIDEM Geographic Data Viewer – Environmental Resource Map
http://www.dem.ri.gov/maps/

Natural Resources Conservation Service - Rhode Island Soil Survey Program
http://www.ri.nrcs.usda.gov/technical/soils.html

Note:

The *Soil Survey of Rhode Island*, issued in 1980 is no longer available or supported. More information on site-specific soil data and maps for Rhode Island is available from the Soil Survey Staff, Natural Resources Conservation Service, United States Department of Agriculture through the Web Soil Survey. This information is available online at: http://websoilsurvey.nrcs.usda.gov.

EPA NPDES – Stormwater Discharges from Construction Activities webpage:
http://water.epa.gov/polwaste/npdes/stormwater/Stormwater-Discharges-From-Construction-Activities.cfm

EPA Construction Site Stormwater Runoff Control BMP Menu
http://water.epa.gov/polwaste/npdes/swbmp/Construction-Site-Stormwater-Run-Off-Control.

SECTION 1: SITE DESCRIPTION

1.1 Project/Site Information

Project/Site Name:

- City Hall Plaza Site Improvements
- The primary scope of work for the project is the construction of a proposed parking lot and ice rink complex adjacent to city hall in the city of Warwick. The proposed work includes construction of an ice rink and an associated rental/service building, a hot mix asphalt parking lot, permeable paver plaza areas as well as the installation of granite curbing, striping, chain link fence, screenwalls, and related misc. work.

Project Street/Location:

- 3275 Post Road Warwick RI, RI 02899
- Refer to Attachment A – General Location Map

Provide construction site estimates of the total area of the site and the total area of the site that is expected to undergo soil disturbance.

The following are estimates of the construction site area:

- Total Project Area 8.87 acres
- Total Project Area to be Disturbed 2.5 acres

1.3 Natural Heritage Area Information

RIPDES CGP - Part III.H
Each project authorized under the RIPDES Construction General Permit must determine if the site is within or directly discharges to a Natural Heritage Area (NHA). DEM Natural Heritage Areas include known occurrences of state and federal rare, threatened and endangered species. Review RIDEM NHA maps to determine if there are natural heritage areas on or near the construction site that may be impacted during construction. (See also the RIDEM Notice of Intent instructions which can be found at the following link: **http://www.dem.ri.gov/programs/benviron/water/permits/swcoord/pdf/maptutor.pdf**

Are there any Natural Heritage Areas being disturbed by the construction activity or will discharges be directed to the Natural Heritage Area as a result of the construction activity?

☒ Yes ☐ No

If yes, describe or refer to documentation which determines the likelihood of an impact on this area and the steps that will be taken to address any impacts.

- Impact will be minimal due to the site previously being developed as a parking lot and City Annex Building, which has recently been demolished; the proposed project will result in a reduction of impervious area.

1.4 Historic Preservation/Cultural Resources

The National Historic Preservation Act, and any state, local, and tribal historic preservation laws apply to construction activities. As with endangered species, some permits may specifically require you to assess the potential impact of your stormwater discharges on historic properties. However, whether or not this is

stated as a condition for permit coverage, the National Historic Preservation Act and any applicable state or tribal laws apply to you. Contact the Rhode Island Historic Preservation Officer (http://www.preservation.ri.gov/) or your Tribal Historic Preservation Officer (http://grants.cr.nps.gov/THPO_Review/index.cfm) for more information.

Are there any historic properties, historic cemeteries or cultural resources on or near the construction site?

☒ Yes ☐ No

Describe how this determination was made and summarize state or tribal review comments:

- A historic property search on www.preservation.ri.gov was performed.

If yes, describe or refer to documentation which determines the likelihood of an impact on this historic property, historic cemetery or cultural resource and the steps taken to address that impact including any conditions or mitigation measures that were approved by other parties.

- Impact will be minimal due to the site previously being developed as a parking lot and City Annex Building, which has recently been demolished; the proposed project will result in a reduction of impervious area. No work is proposed on the City Hall itself or the WWI Memorial.

SECTION 2: EROSION, RUNOFF, AND SEDIMENT CONTROL

RIPDES Construction General Permit – Part III.J.1

The purpose of erosion controls is to prevent sediment from being detached and moved by wind or the action of raindrop, sheet, rill, gully, and channel erosion. Properly installed and maintained erosion controls are the primary defense against sediment pollution.

Runoff controls are used to slow the velocity of concentrated water flows. By intercepting and diverting stormwater runoff to a stabilized outlet or treatment practice or by converting concentrated flows to sheet flow erosion and sedimentation are reduced.

Sediment controls are the last line of defense against moving sediment. The purpose is to prevent sediment from leaving the construction site and entering environmentally sensitive areas.

This section describes the set of control measures that will be installed before and during the construction project to avoid, mitigate, and reduce impacts associated with construction activity. Specific control measures and their applicability are contained in Section Four: Erosion Control Measures, Section Five: Runoff Control Measures, and Section Six: Sediment Control Measures of the *RI SESC Handbook*. The *RI SESC Handbook* can be found at the following address:

http://www.dem.ri.gov/soilerosion2014final.pdf

2.1 Avoid and Protect Sensitive Areas and Natural Features

Per RI Stormwater Design and Installation Standards Manual 3.3.7.1:

Areas of existing and remaining vegetation and areas that are to be protected as identified in the Section 1.6 of the SESC Plan must be clearly identified on the SESC Site Plans for each Phase of Construction. Prior to any land disturbance activities commencing on the site, the Contractor shall physically mark limits of disturbance (LOD) on the site and any areas to be protected within the site, so that workers can clearly identify the areas to be protected.

Constraints are identified to ensure a comprehensive understanding of the project and surrounding areas. The first goal in the low impact development (LID) site planning and design process is to avoid disturbance of natural features. This includes identification and preservation of natural areas that can be used in the protection of water resources. It is important to understand that minimizing the hydrologic alteration of a site is just as important as stormwater treatment for resource protection. Therefore, describe all site features and sensitive resources that exist at the site such as, view barriers,, steep slopes (>15%)that if disturbed will require additional erosion controls, areas with the potential to receive run-on from off-site areas, wetlands, surface waters, and their riparian buffers, specimen trees, natural vegetation, forest areas, stream crossings, historic properties, historic cemeteries or cultural resources that are to be preserved. ***This includes those site features that should be avoided within the designated limits of disturbance.*** *These areas are often identified on a constraints map or in a separate constraints report. For additional discussion on this topic refer to Appendix F. Site Constraint Map of the RI SESC Handbook.*

Note:

The *Soil Survey of Rhode Island*, issued in 1980 is no longer available or supported. More information on site-specific soil data and maps for Rhode Island is available from the Soil Survey Staff, Natural Resources Conservation Service, United States Department of Agriculture through the Web Soil Survey. This information is available online at: http://websoilsurvey.nrcs.usda.gov.

Describe and illustrate on SESC Site Plans Sensitive Areas and Natural Features and how each will be protected during construction activity. Examples of areas to be protected include vegetated buffers, forests, stands of trees on the perimeter and within the site, large diameter trees, areas designated for infiltration (QPAs), bioretention, rain gardens, and OWTS leachfields. Protection for stands of trees and individual trees to be preserved must be specified and such protection must comply with the RI SESC Handbook and extend to the drip line.

Describe and illustrate on SESC Site Plans based on Constraints Map, the areas that will be disturbed with each phase of construction and the control measures (signs, fences, etc.) that will be used to protect those areas that should not be disturbed. ***This includes marking for limits of disturbance at the perimeter and areas within the limits of disturbance.*** *Acceptable measures include but are not limited to construction fencing (plastic mesh, snow fence, chain link fence etc.) appropriate for the site, boundary markers using construction tape, flagged stakes, etc. for low density use, sediment barriers such as silt fence, compost socks with flagging where also required for sediment control, and signage. The narrative portion of the plan and SESC Site Plans must highlight measures to prevent soil compaction in areas designated as Qualified Pervious Areas (QPAs) and infiltration practices to protect infiltration capacity.*

The following measures will be taken to minimize disturbed areas and protect natural features and soil:

- Paved areas to be excavated will be sawcut, when necessary, prior to excavation, and the sawcut lines shall serve as defined limits of disturbance within the paved areas;
- Sedimentation & erosion control measures, where installed, shall serve as the limit of disturbance in those locations;
- The limit of disturbance in all other locations without either sawcuts or sedimentation & erosion control measures shall be delineated with clearly marked and highly visible indicators and/or barriers (stakes, flagging, snow fence or other measures as appropriate) for the duration of the work;
- Long-term material stockpiles will be placed in defined locations within the project area, and shall be protected as described herein and as shown in the construction details;
- The design has been developed to minimize disturbance to existing vegetation to the maximum extent possible;
- Vegetation (trees, shrubs, etc.) within and/or in close proximity to work areas will be protected from damage during construction, unless specifically designated for removal or limited trimming/limbing.

Feature Requiring Protection	Construction Phase #	Method of Protection	Sheet #
Apponaug Cove	1	Compost Filter Sock, Catch Basin Sediment Control Device	Sheet 7 of 33 Sheet 16 of 33

2.2 Minimize Area of Disturbance

Per RI Stormwater Design and Installation Standards Manual 3.3.7.2:

Will >5 acres be disturbed in order to complete this project?

☐ Yes ☒ No

If yes, phasing must be utilized at this site.

Will <5 acres be disturbed or will disturbance activities be completed within a six (6) month window?

☒ Yes ☐ No

If yes, phasing is not required as long as all other performance criteria will be met and phasing is not necessary to protect sensitive or highly vulnerable areas.

Phasing is not required for the project.

Based on the answers to the above questions will phasing be required for this project?

☐ Yes ☒ No

If No, provide substantive reasons why this was determined to be infeasible.

The project will not disturb greater than 5 acres; therefore, no phasing is required.

PHASING PLAN

For each phase of the construction project, provide site estimates of the total area of the project phase, and the total area of the project phase that is expected to undergo soil disturbance.

The following are estimates of each phase of the construction project:

(Copy and paste this section for projects with multiple phases)

Phase No. or Identifier	1
Total Area of Phase	2.5 acres
Area to be Disturbed	2.5 acres

Description of Construction Sequencing for Phase 1

Proper sequencing of construction activities is essential to maximize the effectiveness of erosion, runoff, and sediment control measures. Construction sequencing of construction activities for each phase must address the following elements:

1. *Installation of control measures identifying limits of disturbance and areas internal to the site that require protection before start of land disturbance.*
2. *Installation of all erosion, runoff, and sediment controls and temporary pollution prevention measures that are required to be in place and functional before any earthwork begins. This shall be done in accordance with the RI SESC Handbook and/or the RI Department of Transportation Standard Specifications for Road and Bridge Construction (as amended). Upon acceptable completion of site preparation and installation of erosion, runoff, and sediment controls and temporary pollution prevention measures, site construction activities may commence.*
3. *The phasing plan shall address the use of phasing to manage and limit increases in runoff rates and volumes during construction. Designated phases and timing of construction should also address the impacts to important or sensitive habitats.*
4. *Upon commencement of site construction activities, the operator shall initiate appropriate stabilization practices on all disturbed areas as soon as possible, but not more than fourteen (14) days after the construction activity in that area has temporarily or permanently ceased. Such temporary or permanent soil stabilization measures must be installed prior to initiating land disturbance in subsequent phases.*
5. *Routine inspection and maintenance and/or modification of erosion, runoff, and sediment controls and temporary pollution prevention measures while earthwork is ongoing is required.*

6. *Final site stabilization of any disturbed areas after earthwork has been completed and removal of temporary erosion, runoff, and sediment controls and temporary pollution prevention measures.*
7. *Activation of post-construction stormwater treatment conveyances and practices.*

Phase 1A – BEFORE EARTHWORK

- ☒ Installation of construction period erosion controls (compost filter sock, construction access, & catch basin sediment control devices).
- ☒ Installation of tree/vegetation protection measures and trimming, limbing or removal of designated trees.
- ☒ Sawcutting of all proposed pavement excavations.

Estimated Duration: Two Weeks

Phase 1B – DURING EARTHWORK

- ☒ Stormwater management and water system installations & stabilization prior to completion of other site improvements.
- ☒ Disturbed areas to be impervious (paved or concrete) will be cut or filled, graded, compacted, and stabilized with at least one course of bituminous concrete asphalt (in the case of parking areas and driveways) or concrete (in the case of walkways/sidewalks) within three (3) weeks of the initiation of work in that area.
- ☒ Disturbed areas to be pervious (grassed) will be stabilized with temporary seeding or erosion blanket no later than fourteen (14) days after completion of work in that area.
- ☒ Maintenance (cleaning and/or replacement) of catch basin sediment control devices.
- ☒ Water application on exposed erodible soils for dust control, as needed.

Estimated Duration: Twelve (12) months (dates T.B.D.)

Phase 1C – FINAL STABILIZATION

- ☒ Preparation and final seeding of grassed areas.
- ☒ Installation of proposed landscaping plantings (if applicable).
- ☒ Removal of catch basin sediment control devices.
- ☒ Removal of perimeter sedimentation and erosion controls (compost filter sock).

Estimated Duration: One (1) month (dates T.B.D.)

2.3 Minimize the Disturbance of Steep Slopes

Per RI Stormwater Design and Installation Standards Manual 3.3.7.3:

Are steep slopes (>15%) present within the proposed project area?

☐ Yes ☒ No

2.4 Preserve Topsoil

Per RI Stormwater Design and Installation Standards Manual 3.3.7.4:

Site owners and operators must preserve existing topsoil on the construction site to the maximum extent feasible and as necessary to support healthy vegetation, promote soil stabilization, and increase stormwater infiltration rates in the post-construction phase of the project.

Will existing topsoil be preserved at the site?

☒ Yes ☐ No

If Yes, describe how topsoil will be preserved at the site by describing the techniques that will be implemented to achieve appropriate depths of topsoil (4 inch minimum) and identify the locations where topsoil will be restored on SESC Site Plans.

The site operator shall strip topsoil in proposed project limit of disturbance areas. Topsoil shall be stockpiled in the location specified on the SESC plan. Stockpile areas shall be surrounded by compost filter sock or approved erosion control measures to prevent migration of soils during rain events. Upon project completion, the site operation shall redistribute topsoil over disturbed areas ensuring at minimum a 4" layer is provided over all disturbed areas. Additional material shall be brought on site should the need arise. Final topsoil areas have been shown on the site plans as landscape areas. Topsoil should be screened and free of weeds, sticks, and stones over ¾" in size and otherwise complying with section M.18.01 of the RIDOT Standard Specifications for Road and Bridge Construction. Contractor shall follow recommendations provided by the landscape plans and the Engineer.

Soil compaction must be minimized by maintaining limits of disturbance throughout construction. In instances where site soils are compacted the site owner and operator must restore infiltration capacity of the compacted soils by tilling or scarifying compacted soils and amending soils as necessary to ensure a minimum depth of topsoil is available in these areas. In areas where infiltrating stormwater treatment practices are located compacted soils must be amended such that they will comply the design infiltration rates established in the *RI Stormwater Design and Installation Standards Manual*.

Identify the methods that will be used to restore and amend topsoil at the site. Include references to plan notes and SESC Site Plan sheet numbers where this information is made available for the site operator.

In areas where over compaction has compromised the natural infiltration rate of onsite soils, the contractor shall scarify or till these areas to restore them to their natural state. Areas prone to over compaction are paths proposed to be used by construction equipment and construction equipment storage areas. Construction equipment storage areas are shown on the SESC Plan.

2.5 Stabilize Soils

Per RI Stormwater Design and Installation Standards Manual 3.3.7.5:

Upon completion and acceptance of site preparation and initial installation of erosion, runoff, and sediment controls and temporary pollution prevention measures, the operator shall initiate appropriate temporary or permanent stabilization practices during all phases of construction on all disturbed areas as soon as possible, but not more than fourteen (14) days after the construction activity in that area has temporarily or permanently ceased.

Any disturbed areas that will not have active construction activity occurring within 14 days must be stabilized using the control measures depicted in the SESC Site Plans, in accordance with the *RI SESC Handbook*, and per manufacturer product specifications.

Only areas that can be reasonably expected to have active construction work being performed within 14 days of disturbance will be cleared/grubbed at any one time. It is NOT acceptable to clear and grub the entire construction site if portions will not be active within the 14-day time frame. Proper phasing of clearing and grubbing activities shall include temporary stabilization techniques for areas cleared and grubbed that will not be active within the 14-day time frame.

All disturbed soils exposed prior to October 15 of any calendar year shall be seeded by that date if vegetative measures are the intended soil stabilization method. Any such areas that do not have adequate vegetative stabilization, as determined by the site operator or designated inspector, by November 15, must be stabilized through the use of non-vegetative erosion control measures. If work continues within any of these areas during the period from October 15 through April 15, care must be taken to ensure that only the area required for that day's work is exposed, and all erodible soil must be restabilized within 5 working days. In limited circumstances, stabilization may not be required if the intended function of a specific area of the site necessitates that it remain disturbed (i.e. construction of a motocross track).

Describe controls (i.e., temporary seeding with native vegetation, hydroseeding, mulching, application of rolled erosion control products, etc.) including design specifications and details that will be implemented to stabilize exposed soils where construction activities have temporarily or permanently ceased.

Temporary Vegetative Control Measures

- Hydroseeding, temporary seeding and mulch will be used as needed.

Temporary Non-Vegetative Control Measures

- Controls that may be utilized include street sweeping, water for dust control and mulching.

Permanent Vegetative Control Measures

- Following construction, the site will be restored with paving, loam and seed, and plantings to match existing conditions.

Permanent Non-Vegetative Control Measures

- Following construction, the site will be restored with paving, loam and seed, and plantings to match existing conditions.

2.6 Protect Storm Drain Outlets

Per RI Stormwater Design and Installation Standards Manual 3.3.7.7:

Temporary or permanent outlet protection must be used to prevent scour and erosion at discharge points through the protection of the soil surface, reduction in discharge velocities, and through the promotion of infiltration. Outlets often have high velocity, high volume flows, and require strong materials that will withstand the forces of stormwater. Storm drain outlet control measures also offer a last line of protection against sediment entering environmentally sensitive areas.

All stormwater outlets that may discharge sediment-laden stormwater flow from the construction site must be protected using the control practices depicted on the approved plan set and in accordance with the *RI SESC Handbook*.

Describe controls, including design specifications and details, which will be implemented to protect outlets discharging stormwater from the project.

See below for controls to be implemented to protect outlets discharging stormwater from the project.

Will temporary or permanent point source discharges be generated at the site as the result of construction of sediment traps or basins, diversions, and conveyance channels?

☐ Yes ☒ No

If No, discuss rationale for not including these elements in the SESC Plan.

There are no temporary or permanent point source discharges generated at the site.

2.7 Establish Temporary Controls for the Protection of Post-Construction Stormwater Treatment Practices

Per RI Stormwater Design and Installation Standards Manual 3.3.7.8:

Temporary measures shall be installed to protect permanent or long-term stormwater control and treatment measures as they are installed and throughout the construction phase of the project so that they will function properly when they are brought online.

Examples of temporary control measures that can be used to protect permanent stormwater control measures include: establishing temporary sediment barriers around infiltrating practices, ensuring proper material staging areas and equipment routing (i.e. do not allow construction equipment to compact areas where infiltrating practices will be installed), and by conducting final cleaning of structural long term practices after construction is completed.

List and describe all post-construction stormwater treatment practices that will be installed during the construction process. Next, outline how these measures will be protected during the construction phase of the project to ensure that they will function appropriately once they are brought online.

Will long-term stormwater treatment practices be installed at the site?

☒ Yes ☐ No

If Yes, describe the specific long-term stormwater treatment practices that will require protection from sedimentation and compaction. In addition, specifically reference SESC Site Plan Sheet Numbers which identify the location of these practices and the corresponding control measures that will be utilized for their protection including any associated specifications required for their installation and maintenance.

Protection During Construction Phase – Avoiding over-compaction of underlying soils during construction is critical to the proper function of the porous pavement parking lot. The areas will be delineated with a highly visible barrier and appropriate signage to alert equipment operators not to drive over the soils or to stockpile materials on the dry swale locations.

Long term stormwater treatment practices, that will use infiltration, will be staked off throughout the construction phases. No construction vehicles shall enter these staked areas to avoid sedimentation and compaction.

2.8 Divert or Manage Run-on from Up-gradient Areas

Per RI Stormwater Design and Installation Standards Manual 3.3.7.10:

Is stormwater from off-site areas anticipated to flow onto the project area or onto areas where soils will be disturbed?

☐ Yes ☒ No

If Yes, describe the specific runoff control measures (i.e., check dams, water bars, diversions, perimeter dikes, lined waterways, vegetated waterways, temporary line channels, sediment barriers, pipe slope drains, etc.) that will be utilized at the site including references to the SESC Site Plan Sheet Numbers, design specifications and details. See the RI SESC Handbook,Section Five: Runoff Control Measures for additional guidance.

- Not Applicable

Pre-Construction and Construction sub-watershed maps are included for each phase in this SESC Plan submittal.

Structural control measures will be used to limit stormwater flow from coming onto the project area, and to divert and slow on-site stormwater flow that is expected to impact exposed soils for the purpose of minimizing erosion, runoff, and the discharge of pollutants from the site.

Control measures shall be installed as depicted on the approved plan set and in accordance with the *RI SESC Handbook* or the *RI Department of Transportation Standard Specifications for Road and Bridge Construction*. **Run-on and Run-off Management**				
Construction Phase #	On-site or Off-site Run-on?	Control measure	Identified on Sheet #	Detail(s) is/are on Sheet #
1	On-site	Compost Filter Sock	Sheet 7 of 33	Sheet 16 of 33

2.9 Retain Sediment Onsite through Structural and Non-Structural Practices

Per RI Stormwater Design and Installation Standards Manual 3.3.7.12:

Once the erosion control measures and the run-on diversions are identified and located on the plans, the next step to site planning is sediment control and sediment management. Sediment barriers, inlet protection, construction entrances, stockpile containment, temporary sediment traps, and temporary sediment basins must be integrated into the SESC Plan if applicable. Refer to the RI SESC Handbook Section Six: Sediment Control Measures for additional guidance.

Per RI Stormwater Design and Installation Standards Manual 3.3.7.9:

SEDIMENT BARRIERS must be installed along the perimeter areas of the site that will receive stormwater from disturbed areas. This also may include the use of sediment barriers along the contour of disturbed slopes to maintain sheet flow and minimize rill and gully erosion during construction. Installation and maintenance of sediment barriers must be completed in accordance with the maintenance requirements specified by the product manufacturer or the *RI SESC Handbook*.

Will sediment barriers be utilized at the toe of slopes and other downgradient areas subject to stormwater impacts and erosion during construction?

☒ Yes ☐ No

If Yes, Describe the rationale for selecting control measures to serve as sediment barriers at the toe of slopes and other down gradient areas subject to stormwater impacts during construction. Describe the specific sediment barriers that will be used at the site in the table provided.

- Sediment barriers will be used to protect stormwater from discharging onto adjacent properties and sensitive areas.

- The structural soil & erosion control BMP's shall include compost filter sock along the downgradient limits of work, as depicted on the plans. Based on the hydrology of the project area (as defined in the watershed analysis), it is not anticipated that there will be additional uncontrolled runoff entering and flowing through the site from off-site locations.
- The Contractor shall provide any alternative structural practices that will be used on this project, if it is determined that any are required during construction.

Describe rationale for whether or sediment barriers are required at regular intervals along slopes in order to minimize the creation of concentrated flow paths (i.e. rilling, gully erosion) and to encourage sheet flow. Keep in mind that sediment barriers can be placed at the toe, top, face, and at grade breaks of exposed and erodible slopes to shorten slope length and spread runoff as sheet flow. The description of the selected control measures must focus on sediment barrier spacing as a function of slope length and steepness. Refer to the RI SESC Handbook, Section Six: Sediment Control Measure, Straw Wattles, Compost Tubes, and Fiber Rolls Control Measure for additional information on acceptable spacing distances.

Will sediment barriers be utilized along the contour of slopes to maintain sheet flow and minimize rill and gully erosion during construction?

☒ Yes ☐ No

If Yes, list the specific sediment barriers that will be used at the site in the table provided. Describe the rationale for the locations and spacing frequency selected by the designer based on slope length and steepness. For additional guidance refer to the RI SESC Handbook or sediment barrier manufacturer's specifications.

SEDIMENT BARRIERS			
Construction Phase #	Sediment Barrier Type	Sediment Barrier is Labeled on Sheet #	Detail is on Sheet #
1	Compost Filter Sock	Sheet 7 of 33	Sheet 16 of 33

Per RI Stormwater Design and Installation Standards Manual 3.3.7.6:

INLET PROTECTION will be utilized to prevent soil and debris from entering storm drain inlets. These measures are usually temporary and are implemented before a site is disturbed. ALL stormwater inlets &/or catch basins that are operational during construction and have the potential to receive sediment-laden stormwater flow from the construction site must be protected using control measures outlined in the *RI SESC Handbook*.

For more information on inlet protection refer to the *RI SESC Handbook*, Inlet Protection control measure.

Maintenance

The operator must clean, or remove and replace the inlet protection measures as sediment accumulates, the filter becomes clogged, and/or as performance is compromised. Accumulated sediment adjacent to the inlet protection measures should be removed by the end of the same work day in which it is found or by the end of the following work day if removal by the same work day is not feasible.

Describe controls, including design specifications and details, which will be implemented to protect all inlets receiving stormwater from the project during the entire duration of the project. For more information on inlet protection refer to the RI SESC Handbook Inlet Protection control measure.

Do inlets exist adjacent to or within the project area that require temporary protection?

☒ Yes ☐ No

If Yes, describe the method(s) of inlet protection, including maintenance requirements and complete the table provided.

The following lists the proposed storm drain inlet types selected from Section Six of the *RI SESC Handbook*. Each row is unique for each phase and inlet protection type.

INLET PROTECTION			
Construction Phase #	Inlet Protection Type	Inlet Protection is labeled on Sheet #	Detail(s) is/are on Sheet #
1	Catch Basin Sediment Control Device	Sheet 7 of 33	Sheet 16 of 33

CONSTRUCTION ENTRANCES will be used in conjunction with the stabilization of construction roads to reduce the amount of sediment tracking off the project. This project has avoided placing construction entrances on poorly drained soils where possible. Where poorly drained soils could not be eliminated, the detail includes subsurface drainage.

Any construction site access point must employ the control measures on the approved SESC site plans and in accordance with the *RI SESC Handbook*. Construction entrances shall be used in conjunction with the stabilization of construction roads to reduce the amount of mud picked up by construction vehicles. All construction access roads shall be constructed prior to any roadway accepting construction traffic.

The site owner and operator must:

1. Restrict vehicle use to properly designated exit points.

2. Use properly designed and constructed construction entrances at all points that exit onto paved roads so that sediment removal occurs prior to vehicle exit.

3. When and where necessary, use additional controls to remove sediment from vehicle tires prior to exit (i.e. wheel washing racks, rumble strips, and rattle plates).

4. Where sediment has been tracked out from the construction site onto the surface of off-site streets, other paved areas, and sidewalks, the deposited sediment must be removed by the end of the same work day in which the track out occurs. Track-out must be removed by sweeping, shoveling, or vacuuming these surfaces, or by using other similarly effective means of sediment removal.

Will construction entrances be utilized at the proposed construction site?

☒ Yes ☐ No

If Yes, indicate location(s) of vehicle entrance(s) and exit(s), and stabilization practices used to prevent sediment from being tracked off-site in the table provided. See also RI SESC Handbook, Section Six, Construction Entrances Measure.

CONSTRUCTION ENTRANCE			
Construction Phase #	Soil Type at the Entrance	Entrance is located on Sheet #	Detail is on Sheet #
1	12” Min. of 2” Crushed Stone	Sheet 7 of 33	Sheet 16 of 33

STOCKPILE CONTAINMENT will be used onsite to minimize or eliminate the discharge of soil, topsoil, base material or rubble, from entering drainage systems or surface waters. All stockpiles must be located within the limit of disturbance, protected from run-on with the use of temporary sediment barriers and provided with cover or stabilization to avoid contact with precipitation and wind where and when practical.

Stock pile management consists of procedures and practices designed to minimize or eliminate the discharge of stockpiled material (soil, topsoil, base material, rubble) from entering drainage systems or surface waters.

For any stockpiles or land clearing debris composed, in whole or in part, of sediment or soil, you must comply with the following requirements:

1. Locate piles within the designated limits of disturbance.
2. Protect from contact with stormwater (including run-on) using a temporary perimeter sediment barrier.
3. Where practicable, provide cover or appropriate temporary vegetative or structural stabilization to avoid direct contact with precipitation or to minimize sediment discharge.
4. NEVER hose down or sweep soil or sediment accumulated on pavement or other impervious surfaces into any stormwater conveyance, storm drain inlet, or surface water.
5. To the maximum extent practicable, contain and securely protect from wind.

Describe materials expected to be stockpiled or stored on-site and procedures for storage of materials to minimize exposure of the materials to stormwater and to eliminate the discharge of stockpiled material from entering drainage systems and surface waters. Refer to the RI SESC Handbook, Stockpile and Staging Area Management Control Measure for additional guidance. Complete the table provided.

STOCKPILE CONTAINMENT				
Construction Phase #	Run-on measures necessary? (yes/no)	Stabilization or Cover Type	Stockpile Containment Measure	Sheet #
1	No	Top and sub-soil piles should be covered or vegetated.	12" Dia. Compost Filter Sock/Staked Haybale	Sheet 7 of 33 Sheet 16 of 33

- All stockpiled materials shall be protected from stormwater run-on by placing poly sheeting under the stockpile and a berm of compost filter sock around the stockpile.
- All stockpiled materials shall have a tarpaulin or similar cover to prevent wind erosion.
- The following materials or substances will potentially be present on-site during construction:
  - Road base materials (Gravel borrow)
  - Landscaping materials (Loam, mulch, bio-filtration media)
  - Crushed stone

CONSTRUCTED SEDIMENT STRUCTURES

If each common drainage location receives water from an area with less than one (1) acre disturbed at a time, this section can be deleted and no sediment traps or basins are required. However, it is important to remember that there is still a requirement to retain sediment on-site. Therefore, if it is in the best professional judgment of the designer, that there is a condition or circumstance which may require structural controls (per Section 3.3.7.13 of the RI Stormwater Design and Installation Standards Manual), this section can be used.

TEMPORARY SEDIMENT TRAPS will be utilized onsite. There will be no disturbed drainage areas greater than one acre that will be exposed for longer than six months. Design and sizing calculations in accordance with the *RI SESC Handbook*, Section Six are found in __N/A___ of this SESC Plan. A summary of the calculations are provided below:

For Disturbed Areas 1 to 5 Acres – Those areas with a common drainage location that serves an area between one (1) and five (5) acres disturbed at one time, a temporary sediment trap must be provided where attainable and where the sediment trap is only intended to be used for a period of six (6) months or less. For longer term projects with a common drainage location that serves between one (1) and five (5) acres disturbed at one time, a temporary sediment basin must be provided where attainable. Temporary sediment trapping practices must be designed in accordance with the RI SESC Handbook and must be sized to have a total storage volume capable of storing one (1) inch of runoff from the contributing area or one hundred and thirty four (134) cubic yards per acre of drainage area. A minimum of fifty percent (50%) of the total volume shall be storage below the outlet (wet storage). See RISDISM 3.3.7.12 for requirements and RI SESC Handbook, Section Six: Temporary Sediment Traps Measure for design details.

Are temporary sediment traps required at the site?

☐ Yes ☒ No

If No, discuss rationale.

Although >1 acre will be disturbed, the nature of the work will be sequenced as to not disturb more than 1 acre at a time. There are no common drainage locations that serve an area between one (1) and five (5) acres that will be disturbed at one time. The areas will not be exposed for periods greater than six (6) months.

TEMPORARY SEDIMENT BASIN(S) will be utilized onsite. Every effort must be made to prevent erosion and control it near the source.

If the following criterion does not apply to your proposed construction project, then this section may be eliminated from the plan.

For Disturbed Areas of 1 to 5 Acres – Those areas with a common drainage location that serves an area between one (1) and five (5) acres disturbed at one time for longer than six (6) months.

For Disturbed Areas > 5 Acres – Those areas with a common drainage location that serves an area with greater than five (5) acres disturbed at one time, a temporary (or permanent) sediment basin must be provided where attainable until final stabilization of the site is complete. Temporary sediment basins must be designed in accordance with the RI SESC Handbook. The volume of wet storage shall be at least twice the sediment storage volume and shall have a minimum depth of two (2) feet. Sediment storage volume must accommodate a minimum of one year of predicted sediment load as calculated using the sediment volume formula in the RI SESC Handbook. In addition to sediment storage volume and wet storage volume, the sediment basin shall provide adequate residence storage volume to provide a minimum 10 hours residence time for a ten (10) -year frequency, twenty four (24) hour duration, Type III distribution storm. To the maximum extent practicable, outlet structures must be utilized that withdraw water from the surface of temporary sedimentation basins for the purpose of minimizing the discharge of pollutants. Exceptions may include periods of extended cold weather, where alternative outlets are required during frozen periods. If such a device is infeasible for portions of or the entire construction period justification must be made in the SESC Plan. Describe the reasons sediment basins are required for this project. They may include physical conditions, land ownership, construction operations etc. For design details see RI SESC Handbook Section Six: Temporary Sediment Basins Measure.

Are temporary sediment basins required at the site?

☐ Yes ☒ No

If No, discuss rationale.

Although >1 acre will be disturbed, the nature of the work will be sequenced as to not disturb more than 1 acre at a time. There are no common drainage locations that serve an area between one (1) and five (5) acres that will be disturbed at one time. The areas will not be exposed for periods greater than six (6) months.

2.10 Properly Design Constructed Stormwater Conveyance Channels

Conveyances are required to be designed for inlets to temporary sediment basins. The construction site planner must use best professional judgment to determine if additional conveyance design is required for run-on control or in any other location where velocity control is required.

Are temporary stormwater conveyance practices required in order to properly manage runoff within the proposed construction project?

☐ Yes ☒ No

If No, discuss rationale for not including conveyance measures in the SESC Plan.

It is not anticipated that any temporary stormwater conveyance practices will be needed to manage the runoff within the proposed construction project area. The majority of runoff will continue to sheet flow and be collected by the existing catch basins on site, which ultimately discharge to the closed drainage systems within the roadways adjacent to the property.

2.11 Erosion, Runoff, and Sediment Control Measure List

Complete the following table for each Phase of construction where Erosion, Runoff, and Sediment Control Measures are located. This table is to be used as part of the SESC Plan Inspection Report – please fill out accordingly.

It is expected that this table and corresponding Inspection Reports will be amended as needed throughout the construction project as control measures are added or modified.

Phase No. 1		
Location/Station	**Control Measure Description/Reference**	**Maintenance Requirement**
Perimeter	Compost Filter Sock	Inspection should be made after each storm event and repair or replacement should be made promptly as needed. Cleanout of accumulated sediment behind the filter sock if sediment accumulates to at least ½ of the original height of the barrier becomes filled with sediment. Compost filter sock should be inspected regularly, and sediment shall be cleared often to prevent buildup or damages.
All Catch Basins	Inlet Projection: Catch Basin Insert	Inlet protection devices shall remain installed below the grates until the contributing area is stabilized. Sediment shall be removed from the silt sack when the sediment has accumulated to half (½) of the depth of the silt sack. The sediment that is removed shall be disposed in an approved area.
Construction Entrances	Stone Stabilized Construction Access	Site entrances shall be maintained in a condition which will prevent tracking or flowing of sediment onto paved surfaces. Provide periodic top dressing with additional stone or additional length as conditions demand. Roads adjacent to entrance shall be clean at the end of each day. If maintenance alone is not enough to prevent excessive track out, increase length of entrance, modify construction access road surface, or install washrack or mudrack.
Site Wide	Stockpiles	Inspections should be made weekly during the rainy season and bi-monthly during the non-rainy season. Perimeter controls shall be replaced as required based on periodic inspection.
Street Sweeping/Water for Dust Control	Not Applicable	Weekly or as required by site conditions. RAWP states dust suppression techniques shall be employed at all times during soil disturbance.

SECTION 3: CONSTRUCTION ACTIVITY POLLUTION PREVENTION

Per RI Stormwater Design and Installation Standards Manual 3.3.7.14:

The purpose of construction activity pollution prevention is to prevent day to day construction activities from causing pollution.

This section describes the key pollution prevention measures that must be implemented to avoid and reduce the discharge of pollutants in stormwater. Example control measures include the proper management of waste, material handling and storage, and equipment/vehicle fueling/washing/maintenance operations.

Where applicable, include *RI SESC Handbook* or the *RI Department of Transportation Standard Specifications for Road and Bridge Construction* (as amended) specifications.

3.1 Existing Data of Known Discharges from Site

Per RIPDES Construction General Permit – Part III.I:

List and provide existing data (if available) on the quality of any known discharges from the site. Examples include discharges from existing stormwater collection systems, discharges from industrial areas of the site, etc.

Are there known discharges from the project area?

☒ Yes ☐ No

Describe how this determination was made:

- Project survey and observations made during site visits.

If yes, list discharges and locations:

- The site contains an existing drainage system which conveys flow from the site to the RIDOT stormwater system within Veterans Memorial Drive. The system ultimately discharges to Apponaug Cove.

Is there existing data on the quality of the known discharges?

☐ Yes ☒ No

If yes, provide data:

- Not Applicable

3.2 Prohibited Discharges

Per RI SESC Handbook – Part D

The following discharges are prohibited at the construction site:

- Contaminated groundwater, unless specifically authorized by the DEM. These types of discharges may only be authorized under a separate DEM RIPDES permit.
- Wastewater from washout of concrete, unless the discharge is contained and managed by appropriate control measures.
- Wastewater from washout and cleanout of stucco, paint, form release oils, curing compounds, and other construction materials.

- Fuels, oils, or other pollutants used in vehicle and equipment operation and maintenance. Proper storage and spill prevention practices must be utilized at all construction sites.
- Soaps or solvents used in vehicle and equipment washing.
- Toxic or hazardous substances from a spill or other release.

All types of waste generated at the site shall be disposed of in a manner consistent with State Law and/or regulations.

Will any of the above listed prohibited discharges be generated at the site?

☒ Yes ☐ No

If Yes, provide a list of those that will be generated at the site and provide a discussion of how they will be managed, including references to the specific SESC Site Plans where such control measures are specified.

- The Contractor shall designate the locations, if any, of concrete washout areas and amend this document accordingly. Under no circumstances will concrete washout areas be located where the discharge from same will create a nuisance or hazard (i.e., excavated areas, roadways, private property, etc.); furthermore, the Contractor shall immediately adjust the location or configuration of any concrete washout areas which are found to create a nuisance or hazard. All concrete washouts shall be discharged to a facility that will contain all liquid and concrete waste generated by the washout operations. The concrete washout facility shall adhere to the requirements of the revised Rhode Island Soil Erosion and Sediment Control Handbook.
- All other discharges will be prohibited from the site.

3.3 Proper Waste Disposal

Per RI SESC Handbook – Part D

Building materials and other construction site wastes must be properly managed and disposed of in a manner consistent with State Law and/or regulations.

- A waste collection area shall be designated on the site that does not receive a substantial amount of runoff from upland areas and does not drain directly to a waterbody or storm drain.
- All waste containers shall be covered to avoid contact with wind and precipitation.
- Waste collection shall be scheduled frequently enough to prevent containers from overfilling.
- All construction site wastes shall be collected, removed, and disposed of in accordance with applicable regulatory requirements and only at authorized disposal sites.
- Equipment and containers shall be checked for leaks, corrosion, support or foundation failure, or other signs of deterioration. Those that are found to be defective shall be immediately repaired or replaced.

Is waste disposal a significant element of the proposed project?

☒ Yes ☐ No

If Yes, identify potential building materials and other construction wastes and document how these wastes will be properly managed and disposed of at the construction site (i.e., trash disposal, sanitary wastes, recycling, and proper material handling). Include references to the specific SESC Site Plans where such control measures are specified.

- **Waste Materials** - All construction-generated waste materials will be collected and stored in a securely lidded metal dumpster which shall meet all local City and any State solid waste management regulations. All trash and construction debris from the site will be deposited in the dumpster. The dumpster will be emptied as needed, and the trash will be hauled off site. No construction waste materials will be buried onsite. All personnel will be instructed regarding the correct procedure for waste disposal. Notices stating these practices will be posted in the office trailer, and the individual who manages the day-to-day site operations will be responsible for ensuring that these procedures are followed.
- **Hazardous Waste** - Hazardous waste materials, if encountered, will be disposed of in the manner specified by local or State regulation or by the manufacturer. Site personnel will be instructed in these practices and the individual, who manages day-to-day site operations, will be responsible for seeing that these practices are followed.
- **Sanitary Waste** - All sanitary waste will be collected from the portable units a minimum of once a week by a licensed sanitary waste management contractor, as required by local regulation.

3.4 Spill Prevention and Control

Per RI SESC Handbook – Part D

All chemicals and/or hazardous waste material must be stored properly and legally in covered areas, with containment systems constructed in or around the storage areas. Areas must be designated for materials delivery and storage. All areas where potential spills can occur and their accompanying drainage points must be described. The owner and operator must establish spill prevention and control measures to reduce the chance of spills, stop the source of spills, contain and clean-up spills, and dispose of materials contaminated by spills. The operator must establish and make highly visible location(s) for the storage of spill prevention and control equipment and provide training for personnel responsible for spill prevention and control on the construction site.

Are spill prevention and control measures required for this particular project?

☒ Yes ☐ No

If Yes, describe all areas where potential spills can occur, and their accompanying drainage points, and describe the spill prevention and control plan to reduce the chance of spills, stop the source of spills, contain and clean up spills, dispose of materials contaminated by spills, and train personnel responsible for spill prevention and control. Provide the method of establishing and making highly visible the location(s) for the storage of spill prevention equipment. Refer to the RI SESC Handbook, Spill Prevention and Control Plan for guidance.

Spill prevention and control measures will be provided during construction of the project. It is not anticipated that chemicals and/or hazardous waste materials will be stored on site. However, if spills occur during construction activities, the contractor will implement the following spill prevention/ mitigation measures.

- A spill can potentially occur anywhere within the project sites.
- The following good housekeeping practices will be followed onsite during the construction project:
    - An effort will be made to store on-site only enough products and materials required to perform the anticipated work.
    - All materials stored onsite will be stored in a neat, orderly manner in their appropriate containers and, if possible, under a roof or other enclosure.

  - Products will be kept in their original containers with the original manufacturer's label.
  - Substances will not be mixed with one another unless recommended by the manufacturer.
  - Whenever possible, all of a product will be used up before disposing of the container.
  - Manufacturers' recommendations for proper use and disposal will be followed.
  - The site superintendent will inspect daily to ensure proper use and disposal of materials onsite.

- These practices shall be used to reduce the risks associated with hazardous materials:
  - Products will be kept in original containers unless they are not re-sealable.
  - Original labels and material safety data will be retained; they contain important product information.
  - If surplus product must be disposed of, manufacturers' or local and State recommended methods for proper disposal will be followed.

- In addition to the good housekeeping and material management practices discussed in the previous sections of this plan, the following practices shall be followed for spill prevention and cleanup:
  - Manufacturers' recommended methods for spill cleanup will be clearly posted and site personnel will be made aware of the procedures and the location of the information and cleanup supplies.
  - Materials and equipment necessary for spill cleanup will be kept in a storage area onsite. Equipment and materials will include but not be limited to brooms, dust pans, mops, rags, gloves, goggles, kitty litter, sand, sawdust, and plastic and metal trash containers specifically for this purpose.
  - All spills will be cleaned up immediately after discovery.
  - The spill area will be kept well ventilated and personnel will wear appropriate protective clothing to prevent injury from contact with a hazardous substance.
  - Spills of toxic or hazardous material will be reported to the appropriate State or local government agency, regardless of the size.
  - The spill prevention plan will be adjusted to include measures to prevent this type of spilt from reoccurring and how to clean up the spill if there is another one. A description of the spill, what caused it, and the cleanup measures will also be included.
  - The site superintendent responsible for the day-to-day site operations will be the spill prevention and cleanup coordinator. He will designate at least three other site personnel who will receive spill prevention and cleanup training. The individual will each become responsible for a particular stage of prevention and cleanup. The names of responsible spill personnel will be posted in the office trailer onsite.

3.5 Control of Allowable Non-Stormwater Discharges

Per RIPDES Construction General Permit – Part III.J.2.e:

Discharges not comprised of stormwater are allowed under the RIPDES Construction General Permit but are limited to the following: discharges which result from the washdown of vehicles where no detergents are used; external building wash-down where no detergents are used; the use of water to control dust; firefighting activities; fire hydrant flushing; natural springs; uncontaminated groundwater; lawn watering; potable water sources including waterline flushing; irrigation drainage; pavement wash waters where spills or leaks of toxic or hazardous materials have not occurred (unless all spilled materials have been removed) and where detergents are not used; and foundation or footing drains where flows are not contaminated with process materials such as solvents, or contaminated by contact with soils where spills or leaks of toxic or hazardous materials has occurred. If any of these discharges may reasonably be expected to be present and to be mixed with stormwater discharges, they must be specifically listed here.

Are there allowable non-Stormwater discharges present on or near the project area?

☒ Yes ☐ No

If yes, list the sources of allowable non-Stormwater discharge(s) associated with construction activity. For each of the allowable non-stormwater discharge(s) identified, describe the controls and measures that will be implemented at those locations to minimize pollutant contamination of these discharges and to separate them from temporary discharges of stormwater during construction.

List of allowable non-stormwater discharge(s) and the associated control measure(s):

- Water to control dust – no control measure required.
- Water from Concrete Washout – Concrete Washout Area provided by the Contractor as needed.

If any existing or proposed discharges consist of contaminated groundwater, such discharges are not authorized under the RIPDES Construction General Permit. These discharges must be permitted separately by seeking coverage to treat and discharge under a separate RIPDES individual permit or under the RIPDES Remediation General Permit. Contact the RIDEM Office of Water Resources RIPDES Permitting Program at 401-222-4700 for application requirements and additional information.

Are there any known or proposed contaminated discharges, including anticipated contaminated dewatering operations, planned on or near the project area?

☐ Yes ☒ No

If yes, list the discharge types and the RIPDES individual permit number(s) or RIPDES Remediation General Permit Authorization number(s) associated with these discharges.

- Discharge Type and RIPDES Individual Permit number : Not Applicable
- Discharge Type and RIPDES Remediation General Permit Authorization number: Not Applicable

3.6 Control Dewatering Practices

Per RI SESC Handbook – Part D

Site owners and operators are prohibited from discharging groundwater or accumulated stormwater that is removed from excavations, trenches, foundations, vaults, or other similar points of accumulation, unless such waters are first effectively managed by appropriate control measures.

Examples of appropriate control measures include, but are not limited to, temporary sediment basins or sediment traps, sediment socks, dewatering tanks and bags, or filtration systems (e.g. bag or sand filters) that are designed to remove sediment. Uncontaminated, non-turbid dewatering water can be discharged without being routed to a control.

At a minimum the following discharge requirements must be met for dewatering activities:

1. Do not discharge visible floating solids or foam.
2. To the extent feasible, utilize vegetated, upland areas of the site to infiltrate dewatering water before discharge. In no case will surface waters be considered part of the treatment area.
3. At all points where dewatering water is discharged, utilize velocity dissipation devices.
4. With filter backwash water, either haul it away for disposal or return it to the beginning of the treatment process.

5. Replace and clean the filter media used in dewatering devices when the pressure differential equals or exceeds the manufacturer's specifications.

6. Dewatering practices must involve the implementation of appropriate control measures as applicable (i.e. containment areas for dewatering earth materials, portable sediment tanks and bags, pumping settling basins, and pump intake protection.)

Is it at all likely that the site operator will need to implement construction dewatering in order to complete the proposed project?

☒ Yes ☐ No

If Yes, describe all areas where construction dewatering may be required and the proposed control measures that will be used to treat and manage dewatering fluids including all proposed discharge points. Proposed control measures must comply with the RI SESC Handbook. Include references to all relevant SESC Site Plans.

- Uncontaminated groundwater pumped out of construction excavations will be routed to and through adequately sized dewatering basins to remove (to the maximum extent possible) sediments contained within the groundwater. The locations and sizes of dewatering basins shall be as needed to receive and treat groundwater when it is encountered during construction, as determined by the Contractor. Under no circumstances will dewatering basins be located where the discharge from same will create a nuisance or hazard (i.e. excavated areas, roadways, private property, etc.); furthermore, the Contractor shall immediately adjust the location or configuration of any dewatering basins which are found to create a nuisance or hazard.

3.7 Establish Proper Building Material Staging Areas

Per RI SESC Handbook – Part D

All construction materials that have the potential to contaminate stormwater must be stored properly and legally in covered areas, with containment systems constructed in or around the storage areas. Areas must be designated for materials delivery and storage. Designated areas shall be approved by the site owner/engineer. Minimization of exposure is not required in cases where the exposure to precipitation and to stormwater will not result in the discharge of pollutants, or where exposure of a specific material or product poses little risk of stormwater contamination (such as final products and materials intended for outdoor use).

Describe construction materials expected to be stored on-site and procedures for storage of materials to minimize exposure of the materials to stormwater. Include references to all relevant SESC Site Plans.

- See Section 3.4 for procedures related to storage of materials to minimize exposure of the same to stormwater.
- The following materials or substances will potentially be present on-site during construction:
    - Fertilizers
    - Petroleum Based Products (Gasoline, Diesel Fuel, Motor Oil)
    - Cleaning Solvents
    - Bituminous Concrete Asphalt
    - Cement Concrete
    - Detergents
    - Wood
    - Liquid Asphalt/Tar

3.8 Minimize Dust

Per RI SESC Handbook – Part D

Dust control procedures and practices shall be used to suppress dust on a construction site during the construction process, as applicable. Precipitation, temperature, humidity, wind velocity and direction will determine amount and frequency of applications. However, the best method of controlling dust is to prevent dust production. This can best be accomplished by limiting the amount of bare soil exposed at one time. Dust Control measures outlined in the *RI SESC Handbook* shall be followed. Other dust control methods include watering, chemical application, surface roughening, wind barriers, walls, and covers.

Describe dust control practices that will be used to suppress dust and limit its generation (i.e. applying water, limiting the amount of bare soil exposed at one time etc.).

- Water for dust control will be applied prior to or during high wind conditions (forecasted or actual wind conditions of 20 mph or greater) to all areas of exposed erodible soil. Water shall be spray-applied to avoid ponding or erosion, either by truck (in roadway areas) or manually (in off-road areas).
- In addition, the Contractor shall limit the amount of bare soil exposed at one time.

3.9 Designate Washout Areas

Per RI SESC Handbook – Part D

At no time shall any material (concrete, paint, chemicals) be washed into storm drains, open ditches, streets, streams, wetlands, or any environmentally sensitive area. The site operator must ensure that construction waste is properly disposed of, to avoid exposure to precipitation, at the end of each working day.

Will washout areas be required for the proposed project?

☒ Yes ☐ No

If Yes, describe location(s) and control measures that will be used to minimize the discharge of pollutants from equipment and vehicle washing, wheel wash water, washout areas for concrete mixers, paint, stucco, etc. The recommended location(s) of washout areas should be identified, or at a minimum the locations where these washout areas should not be sited should be called out.

- The Contractor shall designate the locations, if any, of concrete washout areas and amend this document accordingly. Under no circumstances will concrete washout areas be located where the discharge from same will create a nuisance or hazard (i.e., excavated areas, roadways, private property, wetland resource areas, etc.); furthermore, the Contractor shall immediately adjust the location or configuration of any concrete washout areas which are found to create a nuisance or hazard.

3.10 Establish Proper Equipment/Vehicle Fueling and Maintenance Practices

Per RI SESC Handbook – Part D

Vehicle fueling shall not take place within regulated wetlands or buffer zone areas, or within 50-feet of the storm drain system. Designated areas shall be depicted on the SESC Site Plans, or shall be approved by the site owner.

Vehicle maintenance and washing shall occur off-site, or in designated areas depicted on the SESC Site Plans or approved of by the site owner. Maintenance or washing areas shall not be within regulated wetlands or buffer zone areas, or within 50-feet of the storm drain system. Maintenance areas shall be clearly designated, and barriers shall be used around the perimeter of the maintenance area to prevent stormwater contamination.

Construction vehicles shall be inspected frequently for leaks. Repairs shall take place immediately. Disposal of all used oil, antifreeze, solvents and other automotive-related chemicals shall be according to applicable regulations; at no time shall any material be washed down the storm drain or in to any environmentally sensitive area.

Describe equipment/vehicle fueling and maintenance practices that will be implemented to prevent pollutants from mixing with stormwater (e.g., secondary containment, drip pans, spill kits, etc.) Provide recommended location(s) of fueling/maintenance areas, or, at minimum, locations where fueling/maintenance should be avoided.

- All onsite vehicles shall be monitored for leaks, and shall receive regular preventive maintenance to reduce the chance of leakage. Petroleum products will be stored in tightly sealed containers that are clearly labeled. Any asphalt substances used onsite will be applied according to the manufacturer's recommendations.
- The Contractor shall determine locations, if any, for vehicle fueling and maintenance activities, provided that said locations are more than fifty (50) feet from any storm drainage inlet structure and outside of any known resource or buffer area.

3.11 Chemical Treatment for Erosion and Sediment Control

Per RI SESC Handbook – Appendix J

Chemical stabilizers, polymers, and flocculants are readily available on the market and can be easily applied to construction sites for the purposes of enhancing the control of erosion, runoff, and sedimentation. The following guidelines should be adhered to for construction sites that plan to use treatment chemicals as part of their overall erosion, runoff, and sedimentation control strategy.

The U.S. Environmental Protection Agency has conducted research into the relative toxicity of chemicals commonly used for the treatment of construction stormwater discharges. The research conducted by the EPA focused on different formulations of chitosan, a cationic compound, and both cationic and anionic polyacrylamide (PAM). In summary, the studies found significant toxicity resulting from the use of chitosan and cationic PAM in laboratory conditions, and significantly less toxicity associated with using anionic PAM. EPA's research has led to the conclusion that the use of treatment chemicals for erosion, runoff, and sedimentation control requires proper operator training and appropriate usage to avoid risk to aquatic species. In the case of cationic treatment chemicals additional safeguards may be necessary.

Application/Installation Minimum Requirements

If a site operator plans to use polymers, flocculants, or other treatment chemicals during construction the SESC plan must address the following:

1. Treatment chemicals shall not be applied directly to or within 100 feet of any surface water body, wetland, or storm drain inlet.

2. Use conventional erosion, runoff, and sedimentation controls prior to and after the application of treatment chemicals. Use conventional erosion, runoff, and sedimentation controls prior to chemical addition to ensure effective treatment. Chemicals may only be applied where treated stormwater is directed to a sediment control (e.g. temporary sediment basin, temporary sediment trap or sediment barrier) prior to discharge.

3. Sites shall be stabilized as soon as possible using conventional measures to minimize the need to use chemical treatment.

4. Select appropriate treatment chemicals. Chemicals must be selected that are appropriately suited to the types of soils likely to be exposed during construction and to the expected turbidity, pH, and flow rate of stormwater flowing into the chemical treatment system or treatment area. **Soil testing is essential. Using the wrong form of chemical treatment will result in some form of performance failure and unnecessary environmental risk.**

5. Minimize discharge risk from stored chemicals. Store all treatment chemicals in leak-proof containers that are kept under storm-resistant cover and surrounded by secondary containment structures (e.g., spill berms, decks, spill containment pallets), or provide equivalent measures, designed and maintained to minimize the potential discharge of treatment chemicals in stormwater or by any other means (e.g., storing chemicals in covered areas or having a spill kit available on site).

6. Use chemicals in accordance with good engineering practices and specifications of the chemical provider/supplier. You must also use treatment chemicals and chemical treatment systems in accordance with good engineering practices, and with dosing specifications and sediment removal design specifications provided by the supplier of the applicable chemicals, or document specific departures from these practices or specifications and how they reflect good engineering practice.

Will chemical stabilizers, polymers, flocculants or other treatment chemicals be utilized on the proposed construction project?

☐ Yes ☒ No

If Yes, create a Treatment Chemical Application Plan and describe how the owner or SESC Plan preparer/designer intends to educate the designated operator prior to the application of such treatment chemicals.

Treatment Chemical Application Plan Required Elements

Insert information listed below:

1. *List Manufacturer's name and product name for each treatment chemical proposed for use at the site.*
2. *Attach a copy of applicable Material Safety Data Sheets (MSDSs) or Safety Data Sheets (SDS) for each proposed treatment chemical.*
3. *Provide the results of third party toxicity testing of the materials proposed for use at the site.*
4. *Provide a certification from the site owner and operator that all proposed treatment chemicals are the same as those used in the toxicity tests and will not be altered in any way.*
5. *Provide an explanation as to why conventional erosion, runoff, and sediment control measures, alone or in combination, will not be sufficient to prevent turbidity impacts and sedimentation in downstream receptors.*
6. *Provide a plan prepared in consultation with the chemical treatment manufacturer(s) or authorized manufacturer's representative which includes the following:*
    a. *Identification of the areas of the site where treatment chemicals will be applied and the name, location, and distance to all downstream receptors that have the potential to be impacted from the discharges from the treatment areas.*
    b. *List the expected start and end dates or specific phases of the project during which each treatment chemical will be applied.*
    c. *Provide test results for representative soils from the site, and any recommendations from the manufacturer based on the soil tests, indicating the type of treatment chemical and the recommended application rate.*
    d. *List the frequency, method, and rates of application which are designed to ensure that treatment chemical concentrations will not exceed 50% of the IC25 or NOEC toxicity values, whichever is less, for each treatment chemical proposed.*

e. Provide the frequency of inspection and maintenance of the treatment chemical application system.

f. List the method proposed for the collection, removal, and disposal or stabilization of settled particles to prevent re-suspension.

g. Describe the training that will be provided to all persons who will handle and use treatment chemicals at the construction site. Training must include appropriate, product-specific training and proper dosing requirements for each product.

- It is not anticipated that a treatment chemical application will be required to control erosion, runoff, and sedimentation.

- The Contractor shall provide a treatment chemical application plan for review and approval, if it is determined that treatment chemicals are required during construction.

Treatment Chemical SESC Plan Weekly Inspection Report Documentation Requirements

1. Document the type and quantity of treatment chemicals applied.

2. List the date, duration of discharge, and estimated discharge rate.

3. Provide an estimate of the volume of water treated.

4. Provide an estimate of the concentration of treatment chemicals in the discharge, with supporting calculations.

3.12 Construction Activity Pollution Prevention Control Measure List

Complete the following table for each Phase of construction where Pollution Prevention Control Measures will be implemented. This table is to be used as part of the SESC Plan Inspection Report – please fill out accordingly.

It is expected that this table will be amended as needed throughout the construction project.

Phase No. #		
Location/Station	**Control Measure Description/Reference**	**Maintenance Requirement**
Construction Entrances	Stone Stabilized Construction Access	Site entrances shall be maintained in a condition which will prevent tracking or flowing of sediment onto paved surfaces. Provide periodic top dressing with additional stone or additional length as conditions demand. Roads adjacent to entrance shall be clean at the end of each day. If maintenance alone is not enough to prevent excessive track out, increase length of entrance, modify construction access road surface, or install washrack or mudrack.
Roads	Public roads within the construction site shall be clean at the end of each day	Street Sweep if construction site sediment is visible
Site Wide	Pick-up & proper handling and disposal of construction trash and debris	All loose trash and debris must be disposed of properly at the end of each working day
To Be Determined by Contractor as Needed		

SECTION 4: CONTROL MEASURE INSTALLATION, INSPECTION, and MAINTENANCE

4.1 Installation

Per RI SESC Handbook – Part D:

Complete the installation of temporary erosion, runoff, sediment, and pollution prevention control measures by the time each phase of earth-disturbance has begun. All stormwater control measures must be installed in accordance with good judgment, including applicable design and manufacturer specifications. Installation techniques and maintenance requirements may be found in manufacturer specifications and/or the *RI SESC Handbook*.

Include references to SESC Site Plans where installation requirements are located.

The erosion control details and installation locations are depicted on the Site Preparation Plan and Construction Detail sheets of the plan set. The Contractor shall amend this section if there are any departures from the specifications or a previous section in this document.

4.2 Monitoring Weather Conditions

Per RI SESC Handbook – Part D:

Anticipating Weather Events - Care will be taken to the best of the operator's ability to avoid disturbing large areas prior to anticipated precipitation events. Weather forecasts must be routinely checked, and in the case of an expected precipitation event of over 0.25-inches over a 24-hour period, it is highly recommended that all control measures should be evaluated and maintained as necessary, prior to the weather event. In the case of an extreme weather forecast (greater than one-inch of rain over a 24-hour period), additional erosion/sediment controls may need to be installed.

Storm Event Monitoring For Inspections - At a minimum, storm events must be monitored and tracked in order to determine when post-storm event inspections must be conducted. Inspections must be conducted and documented at least once every seven (7) calendar days and within twenty-four (24) hours after any storm event, which generates at least 0.25 inches of rainfall per twenty-four (24) hour period and/or after a significant amount of runoff or snowmelt.

In order for an operator to successfully satisfy this requirement list the weather gauge station that will be utilized to monitor weather conditions on the construction site. See www.wunderground.com or www.weather.gov for available stations.

The weather gauge station and website that will be utilized to monitor weather conditions on the construction site is as follows:

- There is a weather gauge station in Warwick (KRIWARWI84) that may be used to monitor weather conditions. The station can be found on:

  www.wunderground.com

4.3 Inspections

Per RI SESC Handbook – Part D:

Minimum Frequency - Each of the following areas must be inspected by or under the supervision of the owner and operator at least once every seven (7) calendar days and within twenty-four (24) hours after any storm event, which generates at least 0.25 inches of rainfall per twenty-four (24) hour period and/or after a significant amount of runoff or snowmelt:

a. All areas that have been cleared, graded, or excavated and where permanent stabilization has not been achieved;

b. All stormwater erosion, runoff, and sediment control measures (including pollution prevention control measures) installed at the site;

c. Construction material, unstabilized soil stockpiles, waste, borrow, or equipment storage, and maintenance areas that are covered by this permit and are exposed to precipitation;

d. All areas where stormwater typically flows within the site, including temporary drainage ways designed to divert, convey, and/or treat stormwater;

e. All points of discharge from the site;

f. All locations where temporary soil stabilization measures have been implemented;

g. All locations where vehicles enter or exit the site.

Reductions in Inspection Frequency - If earth disturbing activities are suspended due to frozen conditions, inspections may be reduced to a frequency of once per month. The owner and operator must document the beginning and ending dates of these periods in an inspection report.

Qualified Personnel – The site owner and operator are responsible for designating personnel to conduct inspections and for ensuring that the personnel who are responsible for conducting the inspections are "qualified" to do so. A "qualified person" is a person knowledgeable in the principles and practices of erosion, runoff, sediment, and pollution prevention controls, who possesses the skills to assess conditions at the construction site that could impact stormwater quality, and the skills to assess the effectiveness of any stormwater controls selected and installed to meet the requirements of the permit.

Recordkeeping Requirements - All records of inspections, including records of maintenance and corrective actions must be maintained with the SESC Plan. Inspection records must include the date and time of the inspection, and the inspector's name, signature, and contact information.

General Notes

- A separate inspection report will be prepared for each inspection.
- The Inspection Reference Number shall be a combination of the RIPDES Construction General Permit No - consecutively numbered inspections. ex/ Inspection reference number for the **4**th inspection of a project would be: RIR10#####-**4**
- Each report will be signed and dated by the Inspector and must be kept onsite.
- Each report will be signed and dated by the Site Operator.
- The corrective action log contained in each inspection report must be completed, signed, and dated by the site operator once all necessary repairs have been completed.
- It is the responsibility of the site operator to maintain a copy of the SESC Plan, copies of all completed inspection reports, and amendments as part of the SESC Plan documentation at the site during construction.

Failure to make and provide documentation of inspections and corrective actions under this part constitutes a violation of your permit and enforcement actions under 46-12 of R.I. General Laws may result.

4.4 Maintenance

Per RI SESC Handbook – Part D:

Maintenance procedures for erosion and sedimentation controls and stormwater management structures/facilities are described on the SESC Site Plans and in the *RI SESC Handbook*.

Site owners and operators must ensure that all erosion, runoff, sediment, and pollution prevention controls remain in effective operating condition and are protected from activities that would reduce their effectiveness. Erosion, runoff, sedimentation, and pollution prevention control measures must be maintained throughout the course of the project.

Note: It is recommended that the site operator designates a full-time, on-site contact person responsible for working with the site owner to resolve SESC Plan-related issues.

4.5 Corrective Actions

Per RI SESC Handbook – Part D:

If, in the opinion of the designated site inspector, corrective action is required, the inspector shall note it on the inspection report and shall inform the site operator that corrective action is necessary. The site operator must make all necessary repairs whenever maintenance of any of the control measures instituted at the site is required.

In accordance with the *RI SESC Handbook*, the site operator shall initiate work to fix the problem immediately after its discovery, and complete such work by the close of the next work day, if the problem does not require significant repair or replacement, or if the problem can be corrected through routine maintenance.

When installation of a new control or a significant repair is needed, site owners and operators must ensure that the new or modified control measure is installed and made operational by no later than seven (7) calendar days from the time of discovery where feasible. If it is infeasible to complete the installation or repair within seven (7) calendar days, the reasons why it is infeasible must be documented in the SESC Plan along with the schedule for installing the control measures and making it operational as soon as practicable after the 7-day timeframe. Such documentation of these maintenance procedures and timeframes should be described in the inspection report in which the issue was first documented. If these actions result in changes to any of the control measures outlined in the SESC Plan, site owners and operators must also modify the SESC Plan accordingly within seven (7) calendar days of completing this work.

SECTION 5: AMENDMENTS

Per RIPDES Construction General Permit – Part III.F:

This SESC Plan is intended to be a working document. It is expected that amendments will be required throughout the active construction phase of the project. **Even if practices are installed on a site according to the approved plan, the site is only in compliance when erosion, runoff, and sedimentation are effectively controlled throughout the entire site for the entire duration of the project.**

The SESC Plan shall be amended within seven (7) days whenever there is a change in design, construction, operation, maintenance or other procedure which has a significant effect on the potential for the discharge of pollutants, or if the SESC Plan proves to be ineffective in achieving its objectives (i.e. the selected control measures are not effective in controlling erosion or sedimentation).

In addition, the SESC Plan shall be amended to identify any new operator that will implement a component of the SESC Plan.

All revisions must be recorded in the Record of Amendments Log Sheet, which is contained in Attachment G of this SESC Plan, and dated red-lined drawings and/or a detailed written description must be appended to the SESC Plan. Inspection Forms must be revised to reflect all amendments. Update the Revision Date and the Version # in the footer of the Report to reflect amendments made.

All SESC Plan Amendments, except minor non-technical revisions, must be approved by the site owner and operator. Any amendments to control measures that involve the practice of engineering must be reviewed, signed, and stamped by a Professional Engineer registered in the State of RI.

The amended SESC plan must be kept on file at the site while construction is ongoing and any modifications must be documented.

Attach a copy of the Amendment Log.

See Attachment G: Amendment Log

SECTION 6: RECORDKEEPING

RIPDES Construction General Permit – Parts III.D, III.G, III.J.3.b.iii, & V.O

It is the site owner and site operator's responsibility to have the following documents available at the construction site and immediately available for RIDEM review upon request:

- A copy of the fully signed and dated SESC Plan, which includes:
  - A copy of the General Location Map
    INCLUDED AS ATTACHMENT A
  - A copy of all SESC Site Plans
    INCLUDED AS ATTACHMENT B
  - A copy of the RIPDES Construction General Permit *(To save paper and file space, do not include in DEM/CRMC submittal, for operator copy only)*
    INCLUDED AS ATTACHMENT C
  - A copy of any regulatory permits (RIDEM Freshwater Wetlands Permit, CRMC Assent, RIDEM Water Quality Certification, RIDEM Groundwater Discharge Permit, RIDEM RIPDES Construction General Permit authorization letter, etc.)
    INCLUDED AS ATTACHMENT D
  - The signed and certified NOI form or permit application form *(if required as part of the application, see RIPDES Construction General Permit for applicability)*
    INCLUDED AS ATTACHMENT E
  - Completed Inspection Reports w/Completed Corrective Action Logs
    INCLUDED AS ATTACHMENT F
  - SESC Plan Amendment Log
    INCLUDED AS ATTACHMENT G

SECTION 7: PARTY CERTIFICATIONS

RIPDES Construction General Permit – Part V.G

All parties working at the project site are required to comply with the Soil Erosion and Sediment Control Plan (SESC Plan including SESC Site Plans) for any work that is performed on-site. The site owner, site operator, contractors and sub-contractors are encouraged to advise all employees working on this project of the requirements of the SESC Plan. A copy of the SESC Plan is available for your review at the following location: 3275 Post Road, or may be obtained by contacting the site owner or site operator.

The site owner and site operator and each subcontractor engaged in activities at the construction site that could impact stormwater must be identified and sign the following certification statement.

I acknowledge that I have read and understand the terms and conditions of the Soil Erosion and Sediment Control (SESC) Plan for the above designated project and agree to follow the control measures described in the SESC Plan and SESC Site Plans.

Site Owner:

City of Warwick
Thomas Kravitz, Planning Director
3275 Post Road
Warwick, RI 02889
401-738-2009, thomas.j.kravitz@warwickri.gov

_____
signature/date

Site Operator:

Insert Company or Organization Name
Insert Name & Title
Insert Address
Insert City, State, Zip Code
Insert Telephone Number, Insert Fax/Email

_____
signature/date

Designated Site Inspector:

Insert Company or Organization Name
Insert Name & Title
Insert Address
Insert City, State, Zip Code
Insert Telephone Number, Insert Fax/Email

_____
signature/date

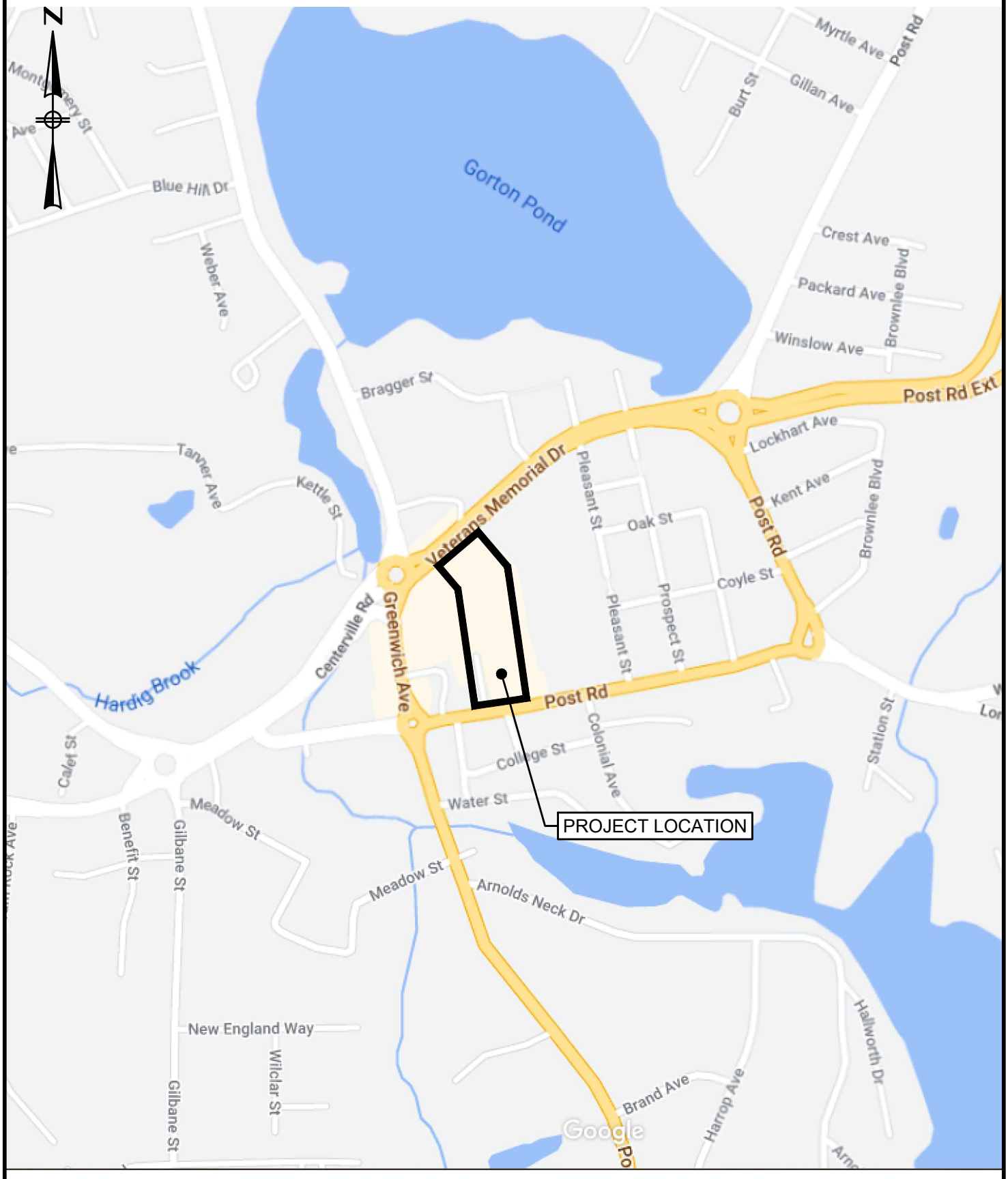
SubContractor SESC Plan Contact:

BETA Group, Inc.
Jared Linhares, PE, Project Manager
701 George Washington Highway
Lincoln, RI 02865
401-333-2382, JLinhares@BETA-Inc.com

_____
signature/date

LIST OF ATTACHMENTS

Attachment A - General Location Map



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GENERAL LOCATION MAP

City Hall Plaza Site Improvements

Warwick, RI

Attachment B – SESC Plan Site Maps

The RIDEM-approved set of project construction plans shall serve as the SESCP site maps, and are not included herein. Please refer to the RIDEM-approved plan set, which shall be kept on-site at all times for the duration of the project.

Attachment C - Copy of RIPDES Construction General Permit

The RIPDES Construction General Permit may be accessed, viewed and printed from the RIDEM web site, at the following address:

http://www.dem.ri.gov/programs/benviron/water/permits/ripdes/pdfs/cgp092620.pdf

A hard copy of the RIPDES CGP is not included herein.

Attachment D - Copy of Regulatory Permits

Attachment E - Copy of RIPDES NOI

Attachment F - Inspection Reports and Corrective Action Log

This appendix contains copies of all project stormwater inspection reports and corrective action logs performed in accordance with Section 5 – Maintenance and Inspection of this SESCP. Reports are presented in chronological order from most recent to oldest.

SESC Plan
Inspection Report Instructions

For all projects subject to the requirements of the *RI Stormwater Design and Installation Standards Manual* or the *RIPDES Construction General Permit* the site owner and operator are required to develop and comply with a site specific Soil Erosion and Sediment Control Plan (SESC Plan) in order to remain in compliance with applicable regulations.

This inspection report template has been provided by RIDEM for use by the site operator and designated inspector to document the adequacy and condition of erosion, runoff, sediment, and pollution prevention control measures specified for use on the construction site. It should be customized for your specific site conditions and consistent with the SESC Plan developed for your site.

Using the Inspection Report

This inspection report is designed to be customized according to the control measures and conditions at the site. On a copy of the applicable SESC Site Plans, number or label all stormwater control measures and areas of the site that will be inspected. Include all control measures (temporary traps, basins, inlet protection measures, etc.) and areas that will be inspected. Also, identify all point source discharges/outfalls, and the priority natural resource areas (i.e. streams, wetlands, mature trees, etc). List each control measure or area to be inspected separately in the site-specific control measure section of the inspection report.

Complete any items that will remain constant, such as the project information and control measure locations and descriptions. Then, print out multiple copies of this customized inspection report to use during the inspections.

When conducting the inspection, walk the site by following the SESC Site Plans and numbered control measure locations for inspection. Also note whether the overall site issues have been addressed. Customize this list according to the conditions at the site.

Minimum Monitoring and Reporting Requirements

Your site must be inspected by or under the supervision of the owner and operator at least once every seven (7) calendar days and within twenty-four (24) hours after any storm event which generates at least 0.25 inches of rainfall per twenty-four (24) hour period and/or after a significant amount of runoff. Read Section 4.2 of your SESC Plan for more information regarding the importance of monitoring weather conditions.

General Notes

- A separate inspection report will be prepared for each inspection.

Revision Date: May 1, 2015

- The Inspection Reference Number shall be a combination of the RIPDES Permit Authorization Number - consecutively numbered inspections. For example: Inspection reference number for the **4**th inspection of a project would be: RIR101000-**4**

- Each report will be signed and dated by the inspector and forwarded to the site operator within 24 hours of the inspection.

- Each report will be signed and dated by the site operator upon his/her receipt and after completion of all required corrective actions.

- It is the responsibility of the site operator to maintain a copy of the SESC Plan, copies of all completed inspection reports, and amendments as part of the SESC Plan documentation at the site during construction.

Corrective Actions

If the SESC Plan Inspection determines that corrective actions are necessary to install or repair control measures, the resultant actions taken must be documented by the site operator. The actions must be recorded in the Corrective Action Log attached to each SESC Plan inspection form. If the site operator disagrees with the corrective action recommendations, it must be documented, with justifiable reasons, in the Corrective Action Log, as well. **Required timeframes for corrective actions are established by regulation and are discussed in Section 4.5 of your SESC Plan.**

Amendments

All SESC Plan Amendments, except minor non-technical revisions, must be approved by the site owner and site operator. The revision must be recorded in the Record of Amendments Log Sheet within the SESC Plan, and dated red-line drawings and/or a detailed written description of the revision must be appended to the SESC Plan. Inspection forms must be revised to reflect all amendments. Update the *Revision Date* and the *Version* # in the footer of the report to reflect amendments made.

The SESC Plan shall be amended whenever there is a change in design, construction, operation, maintenance or other procedure, which has a significant effect on the potential for the discharge of pollutants, or if the SESC Plan proves to be ineffective in achieving its objectives.

******Remember that the regulations are performance-oriented. Even if all control measures are installed on a site according to the SESC Plan, the site is only in compliance when erosion, runoff, sedimentation, and pollution are effectively controlled. ******

SESC Plan Inspection Report

Project Information			
Name			
Location			
DEM Permit No.			
Site Owner	**Name**	**Phone**	**Email**
Site Operator	**Name**	**Phone**	**Email**

Inspection Information			
Inspector Name	**Name**	**Phone**	**Email**
Inspection Date		**Start/End Time**	
Inspection Type ❑ **Weekly** ❑ **Pre-storm event** ❑ **During storm event** ❑ **Post-storm event** ❑ **Other**			

Weather Information
Last Rain Event **Date:** **Duration (hrs):** **Approximate Rainfall (in):**
Rain Gauge Location & Source:
Weather at time of this inspection:

Check statement that applies then sign and date below:

☐ **I, as the designated Inspector, certify that this site has been inspected as required by regulation and I have determined that maintenance and corrective actions are not required at this time.**

☐ **I, as the designated Inspector, certify that this site has been inspected as required by regulation and I have made the determination that the site requires corrective actions. The required corrective actions are noted within this inspection report.**

	Print Name	**Signature**	**Date**
Inspector:			

The Site Operator acknowledges by his/her signature, the receipt of this SESC Plan inspection report and its findings. He/she acknowledges that all recommended corrective actions must be completed and documentation of all such corrective actions must be made in this inspection report per applicable regulations.

	Print Name	**Signature**	**Date**
Operator:			

Site-specific Control Measures

Number the structural and non-structural stormwater control measures identified in the SESC Plan and on the SESC Site Plans and list them below (add as necessary). Bring a copy of this inspection form and any applicable SESC Site Plans with you during your inspections. This list will assist you to inspect all control measures at your site.
FILL THIS TABLE USING THE SESC PLAN TABLES 2.11 & 3.12.

	Location/Station	**Control Measure Description**	**Installed & Operating Properly?**	**Assoc. Photo/ Figure #**	**Corrective Action Needed (Yes or No; if 'Yes', please detail action required)**
1	Example 1: Eastern Parcel – Slope No. 4 Adjacent to I-95. Straw Wattles	Straw Wattle. Section Six, Sediment Control Measures, Straw Wattles, Compost Tubes and Fiber Rolls - *RI SESC Handbook*.	❑Yes ❑No		
2	Example 2: Western Parcel – Green Street Construction Entrance	Stone Stabilized Pad. Section Six: Sediment Control Measures – Construction Entrances –*RI SESC Handbook*.	❑Yes ❑No		
3	Example 3: Hospital Main Footings – Excavation Area – SESC Site Plan Sheet No. 3.	Pump Intake Protection Using Stone Filled Sump with Standpipe. Section Six: Sediment Control Measures, Pump Intake Protection, *RI SESC Handbook.*	❑Yes ❑No		
4	Example 4: Bridge Abutment Construction Southbound Bridge Abutment, Bridge No. 244 – SESC Site Plan Sheet No. 18.	Prefabricated Concrete Washout Container with Ramp. Used to contain concrete washout during concrete pouring operations. Section Three: Pollution Prevention and Good Housekeeping, Concrete Washouts, *RI SESC Handbook*.	❑Yes ❑No		
5	INSERT TEXT	INSERT TEXT	❑Yes ❑No		
6	**Attention Operator:**	**You must modify this inspection form as the project progresses, control measure locations change, and amendments to the SESC Plan are instituted in the field.**	❑Yes ❑No		
7			❑Yes ❑No		
8			❑Yes ❑No		

	Location/Station	Control Measure Description	Installed & Operating Properly?	Assoc. Photo/ Figure #	Corrective Action Needed (Yes or No; if 'Yes', please detail action required)
9			❑Yes ❑No		
10			❑Yes ❑No		
11			❑Yes ❑No		
12			❑Yes ❑No		
13			❑Yes ❑No		
14			❑Yes ❑No		
15			❑Yes ❑No		
16			❑Yes ❑No		
17			❑Yes ❑No		
18			❑Yes ❑No		
19			❑Yes ❑No		
20			❑Yes ❑No		
21			❑Yes ❑No		
22			❑Yes ❑No		
23			❑Yes ❑No		
24			❑Yes ❑No		

	Location/Station	Control Measure Description	Installed & Operating Properly?	Assoc. Photo/ Figure #	Corrective Action Needed (Yes or No; if 'Yes', please detail action required)
25			❑Yes ❑No		
26			❑Yes ❑No		
27			❑Yes ❑No		
28			❑Yes ❑No		
29			❑Yes ❑No		
30			❑Yes ❑No		

(add more as necessary)

General Site Issues

*Below are some general site issues that should be assessed during inspections. Please **customize** this list as needed for conditions at the site.*

	Compliance Question		**Assoc. Photo/ Figure #**	**Corrective Action Needed (If 'Yes', please detail action required and include location/station)**
1	Have all control measures been installed as specified in the RISESC Handbook and prior to any earth disturbing activities?	❑Yes ❑No ❑ N/A		
2	Are appropriate limits of disturbance (LOD) established?	❑Yes ❑No ❑ N/A		
3	Are controls that limit runoff from exposed soils by diverting, retaining, or detaining flows (such as check dams, sediment basins, etc.) in place?	❑Yes ❑No ❑ N/A		
4	Are all temporary conveyance practices installed correctly and functioning as designed?	❑Yes ❑No ❑ N/A		
5	Has maintenance been performed as required to ensure continued proper function of all temporary conveyances practices?	❑Yes ❑No ❑ N/A		
6	Were all exposed soils seeded by October 15th?	❑Yes ❑No ❑ N/A		
7	Have soils been stabilized where earth disturbance activities have permanently or temporarily ceased on any portion of the site and will not resume for more than 14 days?	❑Yes ❑No ❑ N/A		
8	In instances where adequate vegetative stabilization was not established by November 15th, have non-vegetative erosion control measures must be employed?	❑Yes ❑No ❑ N/A		
9	If work is to continue from October 15th through April 15th, are steps taken to ensure that only the day's work area will be exposed and all erodible soil is stabilized within 5 working days?	❑Yes ❑No ❑ N/A		
10	Have inlet protection measures (such as fabric drop inlet protection, curb drop inlet protection, etc.) been properly installed?	❑Yes ❑No ❑ N/A		
11	Has the operator cleaned and maintained inlet protection measures when needed?	❑Yes ❑No ❑ N/A		
12	Has the operator removed accumulated sediment adjacent to inlet protection measures within 24 hours of detection?	❑Yes ❑No ❑ N/A		

	Compliance Question		**Assoc. Photo/ Figure #**	**Corrective Action Needed (If 'Yes', please detail action required and include location/station)**
13	Has the operator properly installed outlet protection (such as riprap, turf mats, etc.) at all temporary and permanent discharge points?	❑Yes ❑No ❑ N/A		
14	Are all outlet protection measures functioning properly in order to reduce discharge velocity, promote infiltration, and eliminate scour?	❑Yes ❑No ❑ N/A		
15	Have all discharge points been inspected to ensure the prevention of scouring and channel erosion?	❑Yes ❑No ❑ N/A		
16	Have sediment controls been installed along perimeter areas that will receive stormwater from earth disturbing activities?	❑Yes ❑No ❑ N/A		
17	Is the operator maintaining sediment controls in accordance with the requirements in the *RI SESC Handbook*?	❑Yes ❑No ❑ N/A		
18	Have temporary sediment barriers been installed around permanent infiltration areas (such as bioretention areas, infiltration basins, etc.)?	❑Yes ❑No ❑ N/A		
19	Have staging areas and equipment routing been implemented to avoid compaction where permanent infiltration areas will be located?	❑Yes ❑No ❑ N/A		
20	Are surface outlet structures (such as skimmers, siphons, etc.) installed for each temporary sediment basin? [Exception: frozen conditions]	❑Yes ❑No ❑ N/A		
21	Have all temporary sediment basins or traps been inspected and maintained as required to ensure proper function?	❑Yes ❑No ❑ N/A		
22	Does the project include the use of polymers, flocculants, or other chemicals to control erosion, sedimentation, or runoff from the site?	❑Yes ❑No ❑ N/A		
23	Are all chemicals being managed in accordance with Appendix J of the *RISESC Handbook* and current best management practices?	❑Yes ❑No ❑ N/A		
24	Has the site operator taken steps to **prohibit** the following pollutant discharges on the site?			
a	Contaminated groundwater.	❑Yes ❑No ❑ N/A		
b	Wastewater from washout of concrete; unless properly contained, managed, and disposed of.	❑Yes ❑No ❑ N/A		

	Compliance Question		**Assoc. Photo/ Figure #**	**Corrective Action Needed (If 'Yes', please detail action required and include location/station)**
c	Wastewater from washout and cleanout of stucco, paint, form release oils, curing compounds, and other construction products.	❑Yes ❑No ❑ N/A		
d	Fuels, oils, or other pollutants used in vehicle and equipment operation and maintenance.	❑Yes ❑No ❑ N/A		
e	Soaps or solvents used in vehicle and equipment washing.	❑Yes ❑No ❑ N/A		
f	Toxic or hazardous substances from a spill or other release.	❑Yes ❑No ❑ N/A		
25	Is the operator using properly constructed entrances/exits to the site so sediment removal occurs prior to vehicles exiting?	❑Yes ❑No ❑ N/A		
26	If needed, are additional controls (such as rumble strips, rattle plates, etc.) in place to remove sediment from tires prior to exiting?	❑Yes ❑No ❑ N/A		
27	Is sediment track-out being removed by the end of the same workday in which it occurs (via sweeping, shoveling, or vacuuming)?	❑Yes ❑No ❑ N/A		
28	Are all wastes generated at the site being managed and properly disposed of by the end of each workday?	❑Yes ❑No ❑ N/A		
29	Are all chemicals and hazardous waste materials stored properly in covered areas and surrounded by containment control systems?	❑Yes ❑No ❑ N/A		
30	Has the operator established highly visible locations for the storage of spill prevention and control equipment on the construction site?	❑Yes ❑No ❑ N/A		
31	Are allowable non-stormwater discharges being managed properly with adequate controls?	❑Yes ❑No ❑ N/A		
32	Is the site operator properly managing groundwater or stormwater that is removed from excavations, trenches, or similar points of accumulation?	❑Yes ❑No ❑ N/A		
33	Are proper procedures and controls in place for the storage of materials that may discharge pollutants if exposed to stormwater?	❑Yes ❑No ❑ N/A		
	Are stockpiles located within the limits of disturbance?	❑Yes ❑No ❑ N/A		

	Compliance Question		**Assoc. Photo/ Figure #**	**Corrective Action Needed (If 'Yes', please detail action required and include location/station)**
	Are stockpiles being protected from contact with stormwater using a temporary sediment barrier?	❑Yes ❑No ❑ N/A		
	Where needed, has cover or appropriate temporary vegetative or structural stabilization been utilized for stockpiles?	❑Yes ❑No ❑ N/A		
	Is the operator effectively managing the generation of dust through the use of water, chemicals, or minimization of exposed soil?	❑Yes ❑No ❑ N/A		
	Are designated washout areas (such as wheel washing stations, washout for concrete, paint, stucco, etc.) clearly marked on the site?	❑Yes ❑No ❑ N/A		
	Are vehicle fueling and maintenance areas properly located to prevent pollutants from impacting stormwater and sensitive receptors?	❑Yes ❑No ❑ N/A		
	(Other)			

(add more as necessary)

General Field Comments:

Photos:

(Associated photos – each photo should be dated and have a unique identification # and written description indicating where it is located within the project area. If a close up photo is required, it should be preceded with a photo including both the detail area and some type of visible fixed reference point. Photos should be annotated with Station numbers and other identifying information where needed.)

Photo #:	Station:
(insert Photo here)	Description:

Photo #:	Station:
(insert Photo here)	Description:

Photo #:	Station:
(insert Photo here)	Description:

Photo #:	Station:
(insert Photo here)	Description:

Photo #:	Station:
(insert Photo here)	Description:

Photo #:	Station:
(insert Photo here)	Description:

(add more as necessary)

Corrective Action Log

TO BE FILLED OUT BY SITE OPERATOR

Describe repair, replacement, and maintenance of control measures, actions taken, date completed, and note the person that completed the work.

	Location/Station	Corrective Action	Date Completed	Person Responsible
Operator Signature:			**Date:**	

Attachment G - Amendment Log

This appendix contains the log of all amendments made to the original SESCP during the construction phase of this project, in accordance with Section 6 – Amendments of this SESCP.

PROJECT:

Amendment Log

TO BE FILLED OUT BY SITE OPERATOR

Describe amendment(s) to be made to the SESC Plan, the date, and the person/title making the amendment. ALL amendments must be approved by the Site Owner.

#	Date	Description of Amendment	Amended by: Person/Title	Site Owner Must Initial
1				
2				
3				
4				
5				
6				
7				
8				
9				
10				

Add more lines/pages as necessary

APPENDIX F

Structural Certification

Package Steel Systems, Inc. Manufacturer of the *Package Steel Building System™*

15 Harback Road
Sutton, MA 01590

Tel 800.225.7242 | Tel 508.865.5871
Fax 508.865.9130

sales@packagesteel.com
packagesteel.com

Customer:	Project:	
Beta Group Inc	City Hall Rink Shelter	Date: 08/07/2023
701 George Washington Hwy	3275 Post Road	Project ID: 2305-038
Lincoln, RI 02865	Warwick, RI 02886	

Width:	Length:	Lt. Eave:	Rt. Eave:	Pitch:
75'-0"	120'-0"	17'-4 1/2"	17'-4 1/2"	5.0:12

To Whom It May Concern,
The building is designed and fabricated in accordance with the order documentation; The 14th Edition of the American Institute of Steel Construction (AISC) "Manual of Steel Construction"; AISI "North American Specification for the Design of Cold-Formed Steel Structural Members"; MBMA Low Rise Building Systems Manual; and applicable sections of the American Welding Society (AWS D1.1) specifications for the loads indicated.
The criteria for application of design loads are as follows:

Governing Code:	SBC-1 2021 RI State Building Code w/ IBC 18
Building Risk Category:	III- High
Occupancy Classification:	Group A-4 - Assembly

Dead Load:	4.50 psf	Ground Snow,Pg:	30.00 psf
Collateral Load:	10.0 psf	Flat Roof Snow,Pf:	30.00 psf
Live Load:	20.00 psf	Min. Local Unif. Snow:	30.00 psf
Live Load Reduction:	No	Snow Exp. Factor,Ce:	1.00
Seis.Imp. Factor,Ie:	1.25	Snow Therm. Factor,Ct:	1.20
Seis.Design Cat.,SDC:	B	Snow Imp. Factor,Is:	1.10
Soil Site Class:	d	Sloped Roof Factor,Cs:	1.00
Seismic Resp.Coef.,Ss:	0.174	Basic Wind Speed,V	136 mph
Seismic Resp.Coef.,S1:	0.060	Wind Imp. Factor,Iw:	1.00
Seismic Resp.Coef.,Sds:	0.186	Wind Exposure:	C
Seismic Resp.Coef.,Sd1:	0.096	Enclosure Type:	Open
Rain Intensity-1hr:	3.20 in/hr(100yr)	Int.Pres.Coef.,GCpi:	+/-0.00
Auxiliary Load:	None		

Note(s):
PSS is not responsible for additional loads due to drifting or sliding snow imposed on existing structure(s) in close proximity to the new structure. It is the buyer's responsibility to verify that close proximity structures, together with their foundations, are capable of resisting all additional loads that may result from the addition of the new structure and take necessary steps to reinforce the existing structure(s) as required.
Additional components, such as panel and trims, may be fabricated and provided for use in a Package Steel Systems, Inc. (PSS) building by other manufacturers. This Letter of Certification applies solely to the building frames and components as supplied by PSS and specifically excludes any foundation, masonry, general contract work, and materials not furnished by PSS. It also excludes any unauthorized modification to the PSS framing systems. The Buyer is responsible for verifying that the loads, specified above, are in compliance with those required by the local regulatory authorities.

Sincerely,

Joseph E. Berger, P.E.
Design Engineer

JOSEPH ELIJAH BERGER
No. 14366
REGISTERED
PROFESSIONAL ENGINEER
CIVIL

8/7/23

IAS ACCREDITED Metal Building Systems AC 472

MBMA METAL BUILDING MANUFACTURERS ASSOCIATION MEMBER

CITY OF WARWICK, RHODE ISLAND

CITY HALL PLAZA
SITE IMPROVEMENTS

BID # 2024-322

BID DOCUMENTS

JANUARY 2024

CITY OF WARWICK, RI

3275 POST ROAD, WARWICK, RI 02889

MAYOR

HONORABLE FRANK J. PICOZZI

CITY COUNCIL WARD 7

HONORABLE STEPHEN P. McALLISTER

SPECIFICATIONS TO GOVERN THIS PROJECT ARE THE R.I. STANDARD SPECIFICATIONS FOR ROAD AND BRIDGE CONSTRUCTION, AUGUST 2023, WITH ALL REVISIONS, AND THE STATE AND FEDERAL SPECIAL PROVISIONS INCLUDED IN THE CONTRACT DOCUMENTS.

STANDARD DETAILS FOR THIS PROJECT ARE R.I. STANDARD DETAILS, 2022 EDITION, WITH ALL REVISIONS.

ALL TRAFFIC CONTROL DEVICES SHALL CONFORM TO THE MANUAL ON TRAFFIC CONTROL DEVICES (MUTCD), 2009 EDITION, INCLUDING ALL REVISIONS.

ALL WORK SHALL COMPLY WITH THE PUBLIC RIGHT-OF-WAY ACCESSIBILITY GUIDELINES (PROWAG) AND THE AMERICANS DISABILITIES ACT OF 1990 (ADA) AND SECTION 504 OF THE REHABILITATION ACT OF 1973, SPECIFICALLY THE ADA STANDARDS FOR ACCESSIBLE DESIGN, LATEST EDITION, WITH ALL REVISIONS.

N

PROJECT LOCATION

LOCATION MAP

1" = 200'-0"

PREPARED BY:

BETA

www.BETA-Inc.com

PLAN INDEX

SHEET NO.	DESCRIPTION
1.1	COVER
1.2	ABBREVIATIONS & LEGEND
1.3	GENERAL NOTES
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2.1	PHASING PLAN
3.1	SITE PREPARATION PLAN
3.2	SITE PLAN
3.3	ADD ALTERNATES PLAN
3.4	GRADING PLAN
3.5	CURB TIE PLAN
3.6	DRAINAGE PLAN
3.7	BMP PLAN
3.8	UTILITIES PLAN
3.9	SIGNING AND STRIPING PLAN
4.1	PLANTING PLAN
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S0.0	FOUNDATION PLAN (BUILDING)
S0.1 - S0.2	NOTES & FOUNDATION DETAILS
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S1.1- S1.2	FRAMING & CMU DETAILS
S2.0 - S2.1	FIRST FLOOR SHEARWALLS / MOMENT FRAME ELEVATION DETAIL
E0.0	ELECTRICAL SYMBOL LEGEND AND NOTES
ES1.0-ES1.1	ELECTRICAL SITE UTILITY / ELECTRICAL SITE LIGHTING
E1.0 - E1.1	CONCESSION BUILDING ELECTRICAL / ICE RINK ELECTRICAL
E2.0 - E2.1	ELECTRICAL SCHEDULES / ELECTRICAL DETAILS
M0.1	MECHANICAL LEGEND, NOTES & ABBREVIATIONS
M1.0	CONCESSION BUILDING MECHANICAL
M2.0	MECHANICAL SCHEDULES
M3.0	MECHANICAL DETAILS
P0.1	CONCESSION BUILDING PLUMBING LEGEND, NOTES & SCHEDULES
P1.0	CONCESSION BUILDING PLUMBING SANITARY WASTE & VENT
P1.1	CONCESSION BUILDING PLUMBING DOMESTIC WATER & GAS
P2.0 - P2.1	PLUMBING DETAILS
R001	ICE RINK LEGEND AND SYMBOLS
R100	ICE RINK FLOOR PLAN
R200	REFRIGERATION ROOM PLAN
R500 - R502	ICE RINK DETAILS AND SECTIONS
R503	ICE RINK DETAILS AND SCHEDULES
R600	REFRIGERATION FLOW DIAGRAMS
DB100	ICE RINK DASHER BOARD PLAN
DB500	ICE RINK DASHER BOARD DETAILS AND SECTIONS
----------	SHELTER DRAWINGS
S1.0	FOUNDATION PLAN (SHELTER)
S1.1 - S1.2	NOTES & FOUNDATION DETAILS

LEGEND

GENERAL SYMBOLS

EXISTING	PROPOSED	
		CURB (TYPE AS NOTED)
		BERM
		EDGE OF PAVEMENT / LIMIT OF PAVEMENT
CB		CATCH BASIN (OR GUTTER INLET, DROP INLET, CATCH BASIN CURB INLET)
EHH		ELECTRIC HANDHOLE (NUMBER AS NOTED)
E	E	ELECTRIC MANHOLE
T	T	TELEPHONE MANHOLE (TYPE NOTED)
W	W	WATER MANHOLE (TYPE NOTED)
S	S	SEWER MANHOLE (TYPE NOTED)
D	D	DRAINAGE MANHOLE (TYPE NOTED)
GG	GG	GAS GATE / GAS SHUT OFF
WG	WG	WATER GATE / WATER SHUT OFF
HYD	HYD.	HYDRANT
FA	FAB	FIRE ALARM BOX
LP	LP	STREET LIGHT POLE
UP		UTILITY POLE
		SIGN
GUY	GUY	GUY POLE
12" RCP (AB)		ABANDONED UTILITY LINE (TYPE AS NOTED)
12" RCP	10'-12" RCP / D / 10'-8" PVC	DRAIN PIPE (SIZE AND SLOPE AS NOTED)
12" CS	S	SEWER MAIN (SIZE AS NOTED)
	S	SEWER SERVICE LINE
E		ELECTRIC DUCT
G 4" HP	G	GAS MAIN (SIZE AS NOTED)
GS	G	GAS SERVICE LINE
W 8" CI	W	WATER MAIN (SIZE AS NOTED)
WS	W	WATER SERVICE LINE
T	T	TELEPHONE DUCT (SIZE AS NOTED)
MB		MAIL BOX
		WOOD GUARD RAIL STEEL BEAM GUARD, WOOD OR STEEL POSTS (TYPE AS NOTED)
		STEEL GUARD RAIL, STEEL POSTS (TYPE NOTED)
		STONE WALL
		RETAINING WALL (TYPE NOTED)
BND	BND	HIGHWAY/PROPERTY BOUND (TYPE AS NOTED)
E.S.H.L.		STATE HIGHWAY LAYOUT LINE (S.H.L.)
Boundary Name		CITY, TOWN, COUNTY OR STATE BOUNDARY LINE
		PROPERTY LINE
T.E.B.	T.E.B.	TEMPORARY EASEMENT LINE
P.E.B.	P.E.B.	PERMANENT EASEMENT LINE
	2+00	CONSTRUCTION BASELINE
N00°00'00"E 000.00'		SURVEY LINE
		RAILROAD OR STREET RAILWAY TRACKS WITH SIDELINES
		WHEELCHAIR RAMP
		TREE (SIZE AND TYPE AS NOTED)
		HEDGE
X X X	X X X	FENCE (SIZE AND TYPE AS NOTED)
WF-1		EDGE OF WETLAND W/ FLAGGED NUMBER
		EDGE OF RIVER/STREAM LINE
		50 FT. WETLAND BUFFER LIMIT
		100 FT. WETLAND BUFFER LIMIT
		100 FT. RIVER FRONT LIMIT
		200 FT. RIVER FRONT LIMIT
		WOODED AREA / LIMIT OF CLEARING
x 00.0	x 00.00	SPOT GRADE
		SAW CUT LINE
		COMPOST FILTER SOCK
		TREE PROTECTION

EXISTING	PROPOSED	
		BUILDING
100	100	CONTOUR MAJOR
		CONTOUR MINOR
		DRIVEWAY DIRT
		DRIVEWAY PAVED
TP	TP	TEST PIT "QUALITY LEVEL A" DATA POINT
BH-15'		BORING
P-10'		PROBE
MW		MONITORING WELL
		CAP / PLUG PIPE

ABBREVIATIONS

GENERAL

ABAN.	ABANDON
ADJ.	ADJUST
AADT	ANNUAL AVERAGE DAILY TRAFFIC
APPROX.	APPROXIMATE
℄	BASELINE
BM	BENCH MARK
BIT.	BITUMINOUS
BB	BITUMINOUS BERM
BC	BITUMINOUS CURB
BOC	BOTTOM OF CURB
BOS	BOTTOM OF STEP
BOW	BOTTOM OF WALL
BD OR BND	BOUND
BLDG.	BUILDING
CEM.	CEMENT
℄	CENTER LINE
CLF	CHAIN LINK FENCE
CONC.	CONCRETE
CC	CONCRETE CURB
CONT.	CONTINUOUS
CONST.	CONSTRUCTION
CO.	COUNTY
CS	COMBINED SEWER PIPE
D	DELTA ANGLE (CENTRAL ANGLE OF HORIZ. CURVE)
DWY.	DRIVEWAY
EB	EAST BOUND
EP, EOP	EDGE OF PAVEMENT
EL.	ELEVATION
ETW	EDGE OF TRAVEL WAY
EXIST.	EXISTING
FLDSTN	FIELDSTONE
FDN.	FOUNDATION
GAR.	GARAGE
GRAN.	GRANITE
GC	GRANITE CURB
GE	GRANITE EDGING
GRAV.	GRAVEL
GD	GROUND
HOR.	HORIZONTAL
HMA	HOT MIX ASPHALT
HO	HOUSE
IP	IRON PIPE
JCT	JUNCTION
LT.	LEFT
LP	LOW POINT
MB	MAIL BOX
MAX.	MAXIMUM
MIN.	MINIMUM
NB	NORTH BOUND
NTS	NOT TO SCALE
OC	ON CENTER
PVMT.	PAVEMENT
PGL	PROFILE GRADE LINE
PROJ.	PROJECT
℗ OR PROP. LINE	PROPERTY LINE
PROP.	PROPOSED
R	RADIUS OF CURVATURE
RR	RAILROAD
R&D	REMOVE & DISPOSE
REM.	REMOVE
REMOD.	REMODEL
RET.	RETAINING
R&R	REMOVE AND RESET
R&S	REMOVE AND STACK
RT.	RIGHT
ROW	RIGHT-OF-WAY
RD.	ROAD
SHT.	SHEET
SHLD.	SHOULDER
SDWK.	SIDEWALK
SB	SOUTH BOUND OR STONE BOUND
SHLL	STATE HIGHWAY LAYOUT LINE
STA.	STATION
ST.	STREET
TAN	TANGENT
T	TANGENT DISTANCE OF CURVE/TRUCK PERCENTAGE
TEB	TEMPORARY EASEMENT BOUNDARY
TEMP.	TEMPORARY
TOC	TOP OF CURB
TOS	TOP OF STEP
TOW	TOP OF WALL
TP	TURNING POINT
TYP.	TYPICAL
VAR.	VARIABLE
VERT.	VERTICAL
VC	VERTICAL CURVE
VGC	VERTICAL GRANITE CURB
WB	WEST BOUND
WCR	CURB RAMP

UTILITIES

CB	CATCH BASIN
CBCI	CATCH BASIN WITH CURB INLET
CIP	CAST IRON PIPE
CIT	CHANGE IN TYPE
CL.	CLASS (PIPE, CONCRETE, EXCAVATION, ETC.)
COND.	CONDUIT
CAP	CORRUGATED ALUMINUM PIPE
CMP	CORRUGATED METAL PIPE
CPP	CORRUGATED PLASTIC PIPE
CSP	CORRUGATED STEEL PIPE
CULV.	CULVERT
CI	CURB INLET
DI	DROP INLET
DIP	DUCTILE IRON PIPE
DMH	DRAIN MANHOLE
EL. (OR ELEV.)	ELEVATION
FM	FORCE MAIN
F&C	FRAME AND COVER
F&G	FRAME AND GRATE
GIP	GALVANIZED IRON PIPE
GG	GAS GATE
GI	GUTTER INLET
HDW	HEADWALL
HYD.	HYDRANT
INV.	INVERT ELEVATION
LP	LIGHT POLE
MH	MANHOLE
PVC	POLY-VINYL-CHLORIDE PIPE
PWW	PAVED WATER WAY
R&D	REMOVE & DISPOSE
RCP	REINFORCED CONCRETE PIPE (CLASS III UNLESS NOTED)
SMH	SEWER MANHOLE
SD	SUBDRAIN
TSV&B	TAPPING SLEEVE, VALVE AND BOX
TS	TRAFFIC SIGNAL
TSC	TRAFFIC SIGNAL CONDUIT
UP	UTILITY POLE
VCP	VITRIFIED CLAY PIPE
WG	WATER GATE
WM	WATER METER/WATER MAIN
WIP	WROUGHT IRON PIPE

PREPARED BY

BETA
www.BETA-Inc.com

REGISTERED PROFESSIONAL

JARED LINHARES
No. 13145
REGISTERED PROFESSIONAL ENGINEER
CIVIL
1-31-24

SUBCONSULTANT

PROJECT

City Hall Plaza

Warwick, RI

TITLE

ABBREVIATIONS & LEGEND

NO.	REVISIONS	DATE

DRAWN BY:	WC
DESIGNED BY:	TD
CHECKED BY:	JL / KA
ISSUE DATE:	01/31/2024
BETA JOB NO.:	10694

SCALE

NONE

BID SET

SHEET NO.

1.2

GENERAL NOTES

1. SPECIFICATIONS TO GOVERN THIS PROJECT ARE THE R.I. STANDARD SPECIFICATIONS FOR ROAD AND BRIDGE CONSTRUCTION, AUGUST 2023, WITH ALL REVISIONS AND THE STATE AND FEDERAL SPECIAL PROVISIONS INCLUDED IN THE CONTRACT DOCUMENTS. STANDARD DETAILS FOR THIS PROJECT ARE R.I. STANDARD DETAILS, 2022 EDITION, WITH ALL REVISIONS.
2. ALL WORK SHALL CONFORM TO THE U.S. DEPARTMENT OF TRANSPORTATION, FEDERAL HIGHWAY ADMINISTRATION MANUAL ON UNIFORM TRAFFIC CONTROL DEVICES (MUTCD), LATEST EDITION WITH ALL REVISIONS.
3. ALL WORK SHALL COMPLY WITH THE PUBLIC RIGHT-OF-WAY ACCESSIBILITY GUIDELINES (PROWAG) AND THE AMERICANS DISABILITIES ACT OF 1990 (ADA) AND SECTION 504 OF THE REHABILITATION ACT OF 1973, SPECIFICALLY THE ADA STANDARDS FOR ACCESSIBLE DESIGN, LATEST EDITION, WITH ALL REVISIONS.
4. ALL SURFACE AND NEAR SURFACE WORK SHALL CONFORM TO THE RHODE ISLAND STATE BUILDING CODE AND TO THE CONTRACT DOCUMENTS. IN CASE OF CONFLICT, THE MORE STRINGENT REQUIREMENTS SHALL GOVERN.
5. CONTRACTOR SHALL REFER TO AND COORDINATE THE PROJECT REQUIREMENTS AS INDICATED ON THE GENERAL, CIVIL, AND STANDARD DETAIL DRAWINGS AND SPECIFICATIONS.
6. THE CONTRACTOR IS RESPONSIBLE FOR THE PROTECTION OF ALL STRUCTURES AND PIPING AGAINST FLOODING, FLOTATION AND OTHER DAMAGE DURING CONSTRUCTION.
7. THE CONTRACTOR SHALL TAKE ALL NECESSARY MEASURES TO PREVENT DAMAGE TO ADJACENT AND NEARBY STRUCTURES DURING CONSTRUCTION. ALL DAMAGE SHALL BE REPAIRED AT THE CONTRACTOR'S EXPENSE AND APPROVED BY THE CITY.
8. PRIOR TO CLOSING ANY ROADWAY (PARTIALLY OR COMPLETELY), THE CITY OF WARWICK, RIDOT, STATE POLICE, MUNICIPAL POLICE AND LOCAL FIRE OFFICIALS SHALL BE NOTIFIED BY THE CONTRACTOR. PUBLIC NOTIFICATIONS AND HEARINGS MAY BE REQUIRED. EACH PROPOSED CLOSING SHALL BE REQUESTED AT LEAST 4 WEEKS PRIOR TO CONSTRUCTION IN THE PUBLIC RIGHT-OF-WAY.
9. PRIOR TO ANY EXCAVATION, CONTRACTOR SHALL CALL "DIG SAFE" AT 1(888)-DIG-SAFE, AT LEAST 72 HOURS (EXCLUDING SATURDAYS, SUNDAYS AND HOLIDAYS) TO OBTAIN FIELD-MARKED UTILITY LOCATIONS.
10. CONTRACTOR IS APPRISED THAT SOME ENTITIES WITH UTILITY INFRASTRUCTURE WITHIN OR NEAR THE PROJECT AREA MAY NOT PARTICIPATE IN THE DIG-SAFE PROGRAM, AND MUST BE CONTACTED DIRECTLY TO HAVE THEIR UTILITIES FIELD-MARKED.
11. CONTRACTOR IS APPRISED THAT UTILITY PROVIDERS MAY NOT MARK ALL SUBSURFACE UTILITIES WITHIN THE PROJECT AREA, PARTICULARLY SERVICE CONNECTIONS AND/OR ABANDONED UTILITIES.
12. SEWER, WATER AND OTHER UTILITIES HAVE BEEN SHOWN ON THE SITE PLANS WHERE INFORMATION IS AVAILABLE. ALL ACTIVE SERVICE CONNECTIONS MUST BE MAINTAINED DURING CONSTRUCTION.
13. PIPING EXPOSED DURING EXCAVATION THAT IS NOT TO BE RELOCATED, ABANDONED, OR DEMOLISHED SHALL BE SUPPORTED IN-PLACE, BRACED, OR OTHERWISE PROTECTED DURING CONSTRUCTION ACTIVITIES.
14. CONTRACTOR SHALL FIELD VERIFY EXISTING STRUCTURE ELEVATIONS AND LOCATIONS, AND EXISTING PIPE INVERT ELEVATIONS AND LOCATIONS PRIOR TO SUBMITTING SHOP DRAWINGS FOR CONNECTING STRUCTURES.
15. THESE GENERAL NOTES ARE NOT INTENDED TO REPLACE THE SPECIFICATIONS FOR THIS CONTRACT. SEE SPECIFICATIONS FOR OTHER REQUIREMENTS IN ADDITION TO THE GENERAL NOTES.
16. OTHER CONSTRUCTION UPON THIS SITE BY OTHER CONTRACTORS MAY OCCUR DURING THE COURSE OF THIS CONTRACT. THE CONTRACTOR SHALL AT ALL TIMES COORDINATE HIS OPERATIONS WITH THOSE OF THE OTHER CONTRACTORS.
17. THE CONTRACTOR SHALL CONFINE ALL ACTIVITIES FOR CONSTRUCTION PURPOSES WITHIN THE INDICATED LIMITS OF WORK AS SHOWN IN THE CONTRACT DRAWINGS. ALL SURFACES DAMAGED OUTSIDE THE INDICATED LIMITS SHALL BE REPLACED IN KIND AT CONTRACTOR'S EXPENSE.
18. DUST CONTROL, USING CALCIUM CHLORIDE, SHALL BE PROVIDED FOR ALL SURFACES OF BACK FILLED AREAS, ALL EQUIPMENT ACCESS ROADWAYS AND/OR AS OTHERWISE DIRECTED BY THE OWNER/ENGINEER.

MAPPING

1. DEPICTED BASE MAPPING AND TOPOGRAPHY HAVE BEEN COMPILED FROM VARIOUS SOURCES. A FIELD SURVEY WAS COMPLETED BY GAROFALO & ASSOCIATES, INC., DATED MARCH 2023. THE OWNER DOES NOT WARRANTY THE ACCURACY OR CURRENCY OF THE DEPICTED INFORMATION.
2. THE LOCATION, SIZE, AND MATERIAL OF EXISTING PIPES, DUCTS, CONDUITS AND OTHER UNDERGROUND STRUCTURES AND/OR UTILITIES SHOWN ON THESE PLANS ARE FROM THE BEST SOURCES AVAILABLE AT PRESENT AND ARE NOT WARRANTED TO BE EXACT, NOR IS IT WARRANTED THAT ALL UNDERGROUND PIPES, UTILITIES OR STRUCTURES ARE SHOWN. EXACT LOCATION TO BE DETERMINED BY CONTRACTOR IN FIELD.
3. EXISTING UTILITIES HAVE BEEN PLOTTED FROM THE BEST AVAILABLE DATA AND ARE APPROXIMATE ONLY. PRIOR TO CONSTRUCTION, THE CONTRACTOR SHALL VERIFY LOCATIONS OF ALL EXISTING UTILITIES AND NOTIFY ALL UTILITY COMPANIES (PUBLIC AND PRIVATE).
4. PROPERTY LINES ARE SHOWN FOR INFORMATION ONLY.
5. THE HORIZONTAL COORDINATE SYSTEM IS RHODE ISLAND STATE PLANE, NAD83. THE VERTICAL DATUM IS NAVD88.

TEST PITS

1. PRIOR TO THE START OF ANY CONSTRUCTION, THE CONTRACTOR SHALL CONDUCT TEST PITS AS SHOWN, AT LOCATIONS WHERE CONFLICTS BETWEEN EXISTING PIPING OR STRUCTURES AND PROPOSED PIPING MAY OCCUR, AND WHERE DIRECTED BY THE ENGINEER. CONDUCT TEST PITS TO FIELD VERIFY THE EXACT SIZE, MATERIAL, LOCATION, INVERT ELEVATION AND ALIGNMENT (VERTICAL AND HORIZONTAL) OF EXISTING UNDERGROUND PIPES AND STRUCTURES. THE CONTRACTOR SHALL NOTIFY THE ENGINEER OF ANY CONFLICTS BETWEEN PROPOSED PIPING AND EXISTING PIPING PRIOR TO STARTING INSTALLATION OF THE PROPOSED PIPING. OTHER TEST PITS MAY BE REQUIRED DURING THE COURSE OF WORK.
2. ALL DIMENSIONS AND JOB RELATED CONDITIONS ARE TO BE VERIFIED BY THE CONTRACTOR. ANY DISCREPANCIES FOUND ARE TO BE BROUGHT TO THE ATTENTION OF THE OWNER/ENGINEER AND PROPERLY RESOLVED BEFORE PROCEEDING WITH THAT PORTION OF THE WORK. CONTINUATION WITH OTHER ASPECTS OF THE WORK SHALL PROCEED WITHOUT DELAY OR CAUSE FOR CLAIM.

EXISTING UTILITIES

1. EXISTING UTILITIES ENCOUNTERED DURING CONSTRUCTION SHALL BE PROTECTED AND SUPPORTED AT ALL TIMES BY THE CONTRACTOR. THE CONTRACTOR SHALL CONDUCT HIS OPERATIONS TO INTERFERE AS LITTLE AS POSSIBLE WITH EXISTING UTILITIES. THE CONTRACTOR SHALL HAVE NO CLAIM FOR ADDITIONAL COMPENSATION BY REASON OF DELAY AND/OR INCONVENIENCE IN ADAPTING HIS OPERATIONS ACCORDINGLY.
2. WHERE AN EXISTING UTILITY IS FOUND TO BE IN CONFLICT WITH THE PROPOSED WORK, THE LOCATION, ELEVATION AND SIZE OF THE UTILITY SHALL BE ACCURATELY DETERMINED WITHOUT DELAY BY THE CONTRACTOR, AND THE INFORMATION FURNISHED TO THE ENGINEER FOR THE RESOLUTION OF THE CONFLICT.
3. THE CONTRACTOR SHALL MAKE ALL ARRANGEMENTS FOR THE ALTERATION, RELOCATION AND ADJUSTMENT OF WATER, GAS, ELECTRIC, TELEPHONE, CABLE TV, FIRE ALARM, AND ANY OTHER PRIVATE UTILITIES BY THE UTILITY COMPANIES AS REQUIRED.

REMOVAL AND DISPOSAL

1. THE CONTRACTOR SHALL BE RESPONSIBLE FOR REMOVING AND LEGALLY DISPOSING (R&D) ALL MATERIALS INDICATED ON THE PLANS TO BE DISPOSED, INCLUDING BUT NOT LIMITED TO, MANHOLES, CATCH BASINS, PIPING, CONCRETE AND BITUMINOUS PAVEMENT, COBBLES, ROCK, TREES AND STUMPS, ETC. ALL GRIT AND DEBRIS FROM THE EXISTING STRUCTURES TO BE DEMOLISHED SHALL BE REMOVED AND DISPOSED OF AS INDICATED IN THE SPECIFICATIONS. ALL DEMOLITION MATERIAL INCLUDING CONCRETE, PIPE, AND BRICK THAT WAS IN CONTACT WITH SEWAGE SHALL BE DISPOSED OF IN ACCORDANCE WITH RIDEM REQUIREMENTS.
2. NOTIFY APPROPRIATE UTILITY COMPANIES TO TURN OFF AFFECTED SERVICES PRIOR TO REMOVAL AND DISPOSAL. SEAL WATER, SEWER, DRAINAGE AND GAS UTILITIES AND SERVICES AT EXCAVATION LIMITS OR AS REQUIRED, USING PLUGS, CAPS OR SEALS AS NEEDED.
3. UNDERGROUND PIPING TO BE ABANDONED AND REMAIN SHALL BE PROPERLY CAPPED UNLESS IT INTERFERES WITH NEW STRUCTURES, PIPES OR AS INDICATED, SPECIFIED AND DIRECTED BY ENGINEER.
4. REMOVE AND DISPOSE OF ALL EXISTING BITUMINOUS CONCRETE AND CEMENT CONCRETE, AS REQUIRED.

SEWER AND DRAIN

1. THE TERM "PROPOSED" (PROP) MEANS WORK TO BE CONSTRUCTED USING NEW MATERIALS OR WHERE APPLICABLE, RE-USING EXISTING MATERIALS IDENTIFIED AS "REMOVE AND RESET" (R&R).
2. WHERE EXISTING MATERIALS ARE ENCOUNTERED THAT, IN THE OPINION OF THE OWNER/ENGINEER ARE UNSUITABLE FOR BEDDING, BACK FILLING OR OTHER INTENDED USE, SUCH MATERIALS SHALL BE REMOVED AS DIRECTED AND REPLACED WITH SUITABLE GRAVEL BORROW, CRUSHED STONE AND/OR SELECTED BORROW, AS DIRECTED BY THE OWNER/ENGINEER AND PAID FOR UNDER THE APPROPRIATE BID ITEMS.
3. INVERTS AND DIRECTIONS OF PIPES AND CONDUITS ARE SHOWN FOR THE PURPOSE OF INDICATING THE BASIC PARAMETERS USED DURING THE DESIGN. HOWEVER, MINOR CHANGES IN HORIZONTAL AND VERTICAL LOCATIONS MAY BE REQUIRED DURING CONSTRUCTION AS FIELD CONDITIONS WARRANT. FINAL LOCATIONS OF OTHER PIPES AND/OR CONDUITS SHALL BE DETERMINED IN THE FIELD. ANY CHANGES SHALL BE APPROVED BY THE ENGINEER.
4. WHERE PIPING IS TO BE CONNECTED TO EXISTING STRUCTURES, THE CONTRACTOR SHALL FURNISH AND INSTALL ALL ADAPTERS, FITTINGS AND ADDITIONAL PIPE (REQUIRED AS A RESULT OF CUTTING THE EXISTING PIPE BACK) TO COMPLETE THE CONNECTION AS REQUIRED.
5. SEWER AND DRAIN SERVICE CONNECTIONS ARE LOCATED FOR ESTIMATING PURPOSES ONLY, EXACT LOCATIONS TO BE DETERMINED IN FIELD.
6. UNLESS OTHERWISE STIPULATED, ALL DRAINAGE PIPE SHALL BE AS INDICATED ON THE DRAWINGS, AND UNLESS SPECIFICALLY APPROVED BY THE ENGINEER, MANHOLES OR CATCH BASINS SHALL BE SOLID BLOCK OR PRECAST CONCRETE STRUCTURES CONFORMING TO THE LATEST RIDOT STANDARDS.
7. ALL DRAINAGE STUBS FOR FUTURE CONNECTIONS SHALL BE PLUGGED OR CAPPED AND LEFT WATER-TIGHT.

WATER

1. MINIMUM WATER PIPE COVER SHALL BE 5'-0" EXCEPT AS OTHERWISE INDICATED ON THE DRAWINGS OR APPROVED BY THE ENGINEER.
2. EXCEPT WHERE OTHERWISE NOTED, 18" MINIMUM VERTICAL CLEARANCE SHALL BE PROVIDED BETWEEN THE EXTERIOR OF WATER MAINS AND OTHER UTILITIES.
3. ALL WATER UTILITY IMPROVEMENTS SHALL COMPLY WITH THE APPLICABLE AMERICAN WATER WORKS ASSOCIATION (AWWA) STANDARDS AND KENT COUNTY WATER AUTHORITY (KCWA) RULES AND REGULATIONS, INCLUDING ALL ERRATA. IN CASE OF CONFLICT, THE MORE STRINGENT REQUIREMENTS SHALL GOVERN.
4. PIPE TAPPING SLEEVES AND REPAIR CLAMPS SHALL BE MADE OF STAINLESS STEEL AND PROVIDED WITH TYPE 304 STAINLESS STEEL BOLTS AND NUTS.
5. THE COMPLETED POTABLE WATER SERVICE SHALL BE SATISFACTORILY CLEANED, CHLORINATED, AND PRESSURE TESTED.
6. IN THE EVENT THAT TEMPORARY WATER BYPASS IS REQUIRED, THE CONTRACTOR SHALL SUBMIT A TEMPORARY WATER BYPASS PLAN TO THE ENGINEER FOR REVIEW, AND SHALL MAKE ANY CHANGES TO THE BYPASS PLAN AS DEEMED NECESSARY BY THE ENGINEER. IT SHALL BE THE CONTRACTOR'S RESPONSIBILITY TO ENSURE THAT ANY DWELLINGS/BUILDINGS WITH WATER SERVICES AFFECTED BY THE PROPOSED WORK BE PROVIDED WITH TEMPORARY WATER SERVICE.

SITE RESTORATION

1. EXCEPT WHERE NOTED BY PROPOSED CONTOUR LINES AND/OR SPOT ELEVATIONS, ALL FINAL CONTOUR LINE ELEVATIONS SHALL BE THE SAME AS EXISTING CONTOUR LINE ELEVATIONS.
2. JOINTS BETWEEN NEW BITUMINOUS CONCRETE ROADWAY PAVEMENT AND SAWCUT EXISTING PAVEMENT SHALL BE SEALED WITH BITUMEN AND BACKSANDED.
3. ALL CURBING DISTURBED BY CONSTRUCTION OPERATIONS SHALL BE RESET, RESTORED OR REPLACED IN KIND, IF DAMAGED, INCLUDING CEMENT CONCRETE, IN ACCORDANCE WITH THE CITY OF WARWICK AND RIDOT STANDARDS, REGARDLESS OF ITS PROXIMITY TO THE DRAIN OR SEWER, AS DIRECTED BY THE OWNER/ENGINEER. PAYMENT SHALL BE CONSIDERED PART OF AND PAID FOR UNDER THE APPROPRIATE PIPE ITEMS AS APPLICABLE UNLESS OTHERWISE INDICATED ON PLANS.
4. ALL SIDEWALK AND WHEELCHAIR RAMP AREAS DISTURBED BY THE CONTRACTOR'S OPERATIONS SHALL BE REPAIRED IN CONFORMANCE TO THE AMERICANS WITH DISABILITIES ACT (ADA) REQUIREMENTS AND THE ARCHITECTURAL ACCESS BOARD (AAB) REQUIREMENTS AT THE CONTRACTOR'S EXPENSE.
5. THE CONTRACTOR SHALL REMOVE AND RESET ALL SIGNS DISTURBED DURING CONSTRUCTION, IN CONFORMANCE WITH THE RIDOT STANDARD SPECIFICATIONS AND CONSTRUCTION STANDARDS.
6. AREAS OUTSIDE THE LIMITS OF PROPOSED WORK DISTURBED BY THE CONTRACTOR'S OPERATIONS SHALL BE RESTORED BY THE CONTRACTOR TO THEIR ORIGINAL CONDITION AT THE CONTRACTOR'S EXPENSE.

MAINTENANCE OF EXISTING FLOWS

1. FLOW IN ALL SANITARY SEWERS, COMBINED SEWERS AND DRAINS SHALL BE MAINTAINED AT ALL TIMES. CONTRACTOR SHALL PROVIDE BYPASS EQUIPMENT AS NECESSARY TO COMPLETE WORK. SEE SPECIFICATIONS.
2. THE CONTRACTOR SHALL PROVIDE ALL TEMPORARY EQUIPMENT, PIPING, FITTINGS AND APPURTENANCES NECESSARY TO COMPLETE THIS CONTRACT.
3. THE CONTRACTOR SHALL INSTALL AND MAINTAIN ALL TEMPORARY BYPASS-LINES UNTIL THE MODIFICATIONS AND CONSTRUCTION ARE COMPLETE.

EXCAVATION SUPPORT, DEWATERING

1. ALL CONSTRUCTION WORK SHALL BE PERFORMED IN THE DRY. THE CONTRACTOR SHALL PROVIDE, OPERATE AND MAINTAIN ALL PUMPS, DRAINS, WELL POINTS, SCREENS, OR OTHER FACILITIES NECESSARY TO CONTROL, COLLECT AND DISPOSE SURFACE AND SUBSURFACE WATER ENCOUNTERED IN THE PERFORMANCE OF THE WORK.
2. TRENCH/EXCAVATION DEWATERING MAY BE REQUIRED FOR THIS WORK; DISCHARGE OF FINES OR SEDIMENTS FROM DEWATERING OPERATIONS IS NOT PERMITTED. SEE SPECIFICATION AND STANDARD DETAILS FOR SILTATION BASIN/SEDIMENT CONTROL TRAP INSTALLATION/USAGE.
3. DISCHARGE FROM DEWATERING OPERATIONS SHALL NOT BE DIRECTLY DISCHARGED INTO THE COMBINED SEWER. ALL CONSTRUCTION DEWATERING SHALL HAVE SILT AND SEDIMENT REMOVED PRIOR TO DISCHARGE (SEE SPECIFICATIONS).

SOIL EROSION AND SEDIMENTATION CONTROL

1. THE CONTRACTOR SHALL FOLLOW THE APPROVED SITE SOIL EROSION AND SEDIMENTATION CONTROL (SESC) PLAN AND DIRECTION OF THE ENGINEER WITH REGARD TO INSTALLATION, MAINTENANCE, AND REPAIR OF ALL SESC MEASURES ON THE PROJECT SITE FOR THE FULL DURATION OF THE CONSTRUCTION PERIOD. TEMPORARY SESC MEASURES MAY INCLUDE, BUT SHALL NOT BE LIMITED TO, CONSTRUCTION ENTRANCE PADS, COMPOST FILTER SOCKS, CATCH BASIN INSERTS, ETC.
2. ALL SESC MEASURES SHALL BE INSTALLED BY THE CONTRACTOR AND INSPECTED BY THE ENGINEER PRIOR TO THE START OF CONSTRUCTION. THE SESC MEASURES SHALL BE REGULARLY INSPECTED, CLEANED AND MAINTAINED THROUGHOUT THE DURATION OF CONSTRUCTION OPERATIONS IN ACCORDANCE WITH THE SESC PLAN. SESC MEASURES SHALL ALSO BE INSPECTED AND CLEANED AFTER ALL SIGNIFICANT STORM EVENTS AS STIPULATED BY THE SESC PLAN AND AT THE DIRECTION OF THE OWNER OR ENGINEER.
3. CONTRACTOR SHALL MAINTAIN AN ADEQUATE SUPPLY OF SESC MEASURE MATERIALS ON SITE TO BE INSTALLED IN AREAS WHERE EXISTING SESC MEASURES HAVE FAILED OR ARE NECESSARY AS DETERMINED BY THE ENGINEER. NO WORK OR STORAGE OF CONSTRUCTION EQUIPMENT WILL BE PERMITTED OUTSIDE THE LIMIT OF DISTURBANCE.
4. THE CONTRACTOR SHALL COORDINATE WITH THE ENGINEER FOR REGULAR INSPECTION AND REPORTING REQUIREMENTS.
5. SESC MEASURES SHALL BE MAINTAINED UNTIL SITE WORK IS COMPLETE AND ALL EXPOSED SOILS ARE SATISFACTORILY STABILIZED. UPON PERMANENT STABILIZATION OF ALL DISTURBED SOILS, THE SESC MEASURES SHALL BE REMOVED AND PROPERLY DISPOSED. PROVIDE SESC MEASURES AT PERIMETERS OF ALL EXCAVATION AREAS, DISTURBED SURFACES AND AT ALL CATCH BASINS ADJACENT TO DISTURBED AREAS. PROVIDE COMPOST FILTER SOCKS IN ACCORDANCE WITH SPECIFICATION REQUIREMENTS AND AS SHOWN ON THE DETAIL DRAWINGS.
6. ALL MITIGATIVE FEATURES, FACILITIES AND SYSTEMS OF TREATMENT AND CONTROL THAT MAY BE INSTALLED OR USED SHALL BE PROPERLY MAINTAINED TO PREVENT HARM TO AREAS ADJACENT TO THE SITE.

TREE PRESERVATION

1. PROTECT TREES WITHIN THE PUBLIC RIGHT-OF-WAY BY INSTALLING TREE PROTECTION AROUND TREES, AS INDICATED IN THE CONTRACT DRAWINGS.
2. PRIOR TO CONSTRUCTION DETERMINE REQUIRED CLEARANCES AND CONTRACT LICENSED ARBORIST TO PRUNE TREES.
3. BRANCHES OR LIMBS DAMAGED DURING CONSTRUCTION SHALL BE CUT BACK TO THE TRUNK OR A LATERAL BRANCH.
4. MAKE EVERY EFFORT TO MAINTAIN EXCAVATION ACTIVITIES OUTSIDE LIMITS OF THE TREE CANOPY.
5. ROOTS LARGER THAN 1.5" IN DIAMETER ENCOUNTERED IN EXCAVATIONS SHALL BE CUT OFF SQUARELY USING A SHARP ARBORIST SAW.
6. MAINTAIN STORAGE OF EQUIPMENT AND MATERIALS OUTSIDE THE DISTANCE OF THE RADIUS OF THE TREE CANOPY.

SIDEWALK AND PAVEMENT RESTORATION

1. ALL EXISTING PAVEMENT DISTURBED BY THE CONTRACTOR'S OPERATIONS SHALL BE REPAIRED WITH TEMPORARY PAVEMENT AS DETAILED. TEMPORARY PAVEMENT SHALL BE INSTALLED WITHIN ALL DISTURBED PAVEMENT AREAS BY THE CLOSE OF WORK ON FRIDAY OF THE WEEK THE PAVEMENT WAS DISTURBED UNLESS OTHERWISE DIRECTED BY THE ENGINEER. AT NO TIME WILL DISTURBED PAVEMENT AREAS BE ALLOWED OVER WEEKENDS, HOLIDAYS, OR DURING SEVERE WEATHER CONDITIONS. TEMPORARY PAVEMENT SHALL REMAIN IN-PLACE FOR A MINIMUM PERIOD OF NINETY (90) CALENDAR DAYS AND ONE WINTER PRIOR TO INSTALLATION OF THE PERMANENT PAVEMENT TRENCH OR SURFACE RESTORATION.
2. ALL WALKS SHALL HAVE A CROWN OR CROSS-SLOPE OF 1/8" PER FOOT MINIMUM.
3. ALL PAVEMENT MARKINGS SHALL BE REPLACED IN KIND, OR IN ACCORDANCE WITH SPECIFICATIONS.

PREPARED BY

BETA

www.BETA-Inc.com

REGISTERED PROFESSIONAL

JARED LINHARES — No. 13145 — REGISTERED PROFESSIONAL ENGINEER — CIVIL — 1-31-24

SUBCONSULTANT

PROJECT

City Hall Plaza

Warwick, RI

TITLE

GENERAL NOTES

NO.	REVISIONS	DATE

DRAWN BY:	WC
DESIGNED BY:	TD
CHECKED BY:	JL / KA
ISSUE DATE:	01/31/2024
BETA JOB NO.:	10694

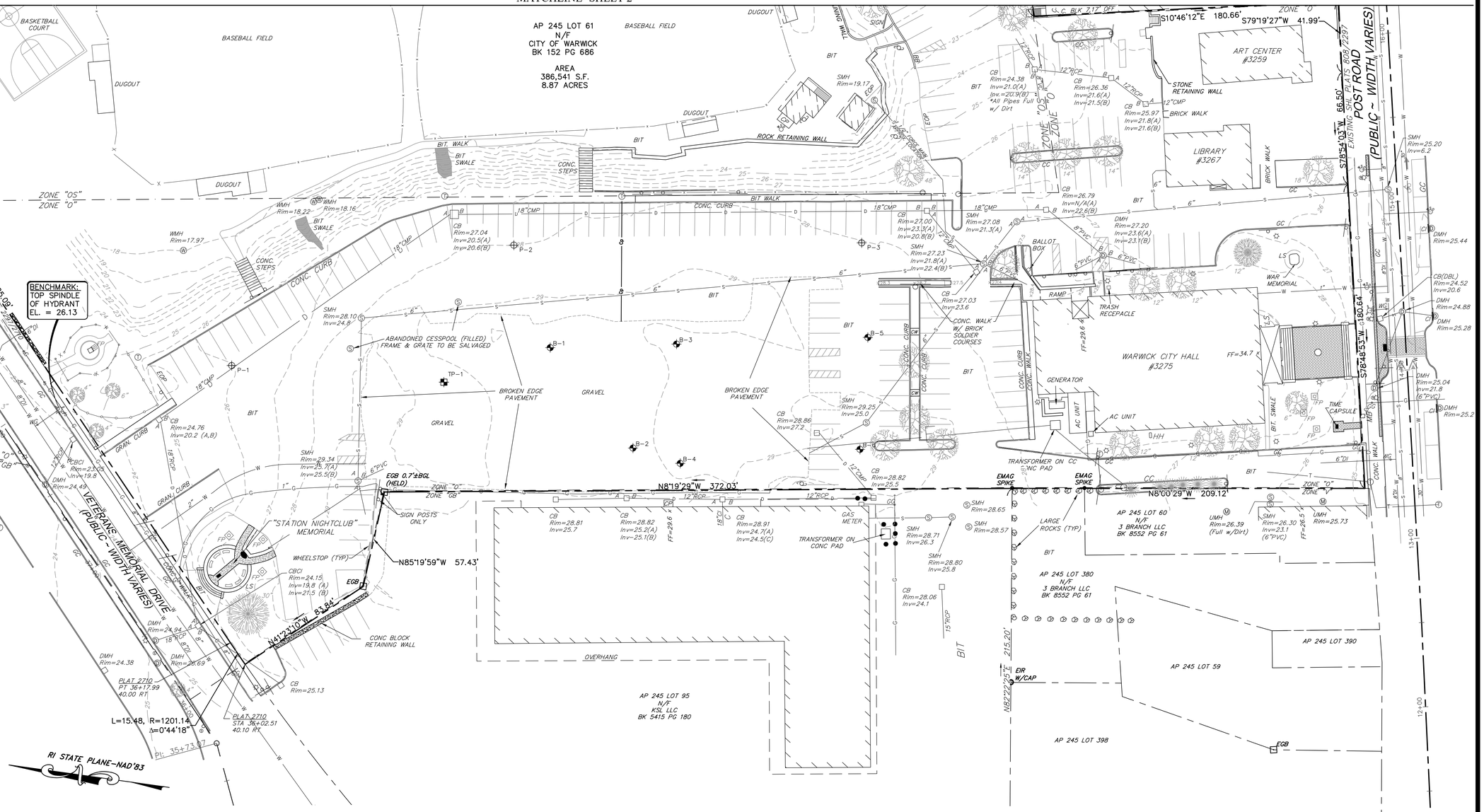
SCALE

NONE

BID SET

SHEET NO.

1.3



PLAN REFERENCES:

1. GRAND VIEW PLAT APPONAUG R.I. BELONGING TO JOHN THOMPSON ET. AL. BY J.A. LATHAM JULY 1894 – PB 3 PG 47/PLAT CARD 138
2. PLAT OF LAND IN WARWICK BELONGING TO FRANCIS HASWELL SURVEYED AND PLATTED BY J. HOWE 1854 – PLAT NO. 3
3. A PARTIAL COPY OF NO. 3 PLAN OF LAND IN WARWICK BELONGING TO FRANCIS HASWELL SURVEYED AND PLATTED BY J. HOWE 1854. PB 1 PG 29/PLAT CARD 27
4. ZONING PLAN FOR PAUL C. TOY JR. & JUDITH K. TOY LOCATED AT 3291 POST ROAD WARWICK RI, 02886 BY AMERICAN ENGINEERING, INC. 3/8/2016 REV. 3/25/2016
5. ADMINISTRATIVE SUBDIVISION NO. 3319 POST ROAD, WARWICK RHODE ISLAND (KENT COUNTY) BY WELCH ASSOCIATES LAND SURVEYORS, INC. – PLAT CARD 1367
6. PLAN OF LAND IN APPONAUG WARWICK R.I. SHOWING PROPOSED POST–OFFICE SITE BY A.E. MCGUINNESS APRIL12, 1939
7. PLAN OF LAND IN WARWICK, R.I. MADE FOR ST. BARNABAS CHURCH BY A.E. MCGUINNESS APRIL, 1959.
8. PLAN OF LAND IN WARWICK R.I. SURVEYED FOR INDUSTRIAL TRUST CO. BY WATERMAN ENGINEERING CO. SEPT. 1947
9. RHODE ISLAND STATE HIGHWAY PLAT NOS. 175, 175A, 808, 2297 & 2710
10. PLEASANT STREET, CITY OF WARWICK, R.I., AUG. 1953

NOTES:

1. THE PROJECT SITE IS LOCATED WITHIN ZONE "X" (AREA OF MINIMAL FLOODING) AS SHOWN ON F.E.M.A. FLOOD INSURANCE RATE MAP FOR THE CITY OF WARWICK, KENT COUNTY, RHODE ISLAND, COMMUNITY MAP NO. 44003C0129J, HAVING AN EFFECTIVE DATE OF OCTOBER 2, 2015.
2. THE UNDERGROUND UTILITIES SHOWN HAVE BEEN LOCATED FROM FIELD SURVEY INFORMATION AND EXISTING DRAWINGS. THE SURVEYOR MAKES NO GUARANTEE THAT THE UNDERGROUND UTILITIES SHOWN COMPRISE ALL SUCH UTILITIES IN THE AREA, EITHER IN SERVICE OR ABANDONED. THE SURVEYOR FURTHER DOES NOT WARRANT THAT THE UNDERGROUND UTILITIES SHOWN ARE IN THE EXACT LOCATION INDICATED ALTHOUGH HE DOES CERTIFY THAT THEY ARE LOCATED AS ACCURATELY AS POSSIBLE FROM INFORMATION AVAILABLE. THE SURVEYOR HAS NOT PHYSICALLY LOCATED THE UNDERGROUND UTILITIES. (PLEASE CONTACT DIGSAFE PRIOR TO CONSTRUCTION @ 1–888–344–7233)
3. HORIZONTAL DATUM: RHODE ISLAND STATE PLANE – NAD 83
   VERTICAL DATUM: NAVD 88*
   *DATUM WAS DERIVED BY OBSERVED GPS.
   VARIATIONS BETWEEN LOCAL BENCHMARKS MAY APPLY.
4. ELECTRIC EASEMENT TO BENEFIT CITY OF WARWICK BK 544 PG 338
5. BORING, TESTPIT & PAVEMENT CORE LOCATIONS BASED ON EXPLORATION LOCATION PLAN, PROPOSED ICE RINK, STEEL CANOPY AND RECREATIONAL BUILDING DATED 3/7/2023 PROVIDED BY BETA GROUP, INC.

1" = 30'

feet: 0, 15, 30, 60, 120, 180
meters: 0, 5, 10, 20, 40

PARCEL DATA

A.P. 245, LOT 51
N/F
CITY OF WARWICK
DEED BK 152 / PG 686
#3295 POST ROAD
LOT AREA:
386,541 S.F.± OR
8.87 ACRES±

STREET INDEX

POST ROAD
VETERAN MEMORIAL DRIVE

ZONING DATA

HISTORIC OVERLAY DISTRICT (H)

OFFICE (O)
MIN. LOT AREA: 7,000 S.F.
MIN. FRONTAGE: 70'
MIN. FRONT YARD: 25'
MIN. SIDE YARD: 8'
MIN. REAR YARD: 20'
MAX. BLDG. HEIGHT: 35'

OPEN SPACE (OS)
MIN. LOT AREA: 40,000 S.F.
MIN. FRONTAGE: 150
MIN. FRONT YARD: 40'
MIN. SIDE YARD: 30'
MIN. REAR YARD: 40'
MAX. BLDG. HEIGHT: 35'

* PLEASE REFER TO ZONING REGS. FOR ADDITIONAL INFORMATION.

CERTIFICATION:

THIS SURVEY HAS BEEN CONDUCTED AND THE PLAN HAS BEEN PREPARED PURSUANT TO SECTION 435–RICR–00–00–1.9 OF THE RULES AND REGULATIONS ADOPTED BY THE RHODE ISLAND BOARD OF REGISTRATION FOR PROFESSIONAL LAND SURVEYORS ON NOVEMBER 25, 2015, AS FOLLOWS:

TYPE OF BOUNDARY SURVEY	MEASUREMENT SPECIFICATION
BOUNDARY SURVEY	CLASS I
DATA ACCUMULATION SURVEY	CLASS III
TOPOGRAPHIC SURVEY	T–2

THE PURPOSE FOR THE CONDUCT OF THE SURVEY AND FOR THE PREPARATION OF THE PLAN IS AS FOLLOWS: TO PROVIDE A EXISTING CONDITIONS SURVEY FOR ASSESSOR'S LOT 61, PLAT 245 IN WARWICK, RHODE ISLAND.

BY: Samuel A. White, Jr.
SAMUEL A. WHITE LICENSE NO. 1781
LS A59–COA

EXISTING CONDITIONS SURVEY
FOR
WARWICK CITY HALL PLAZA
AP 245 LOTS 61
SITUATED ON
POST ROAD
WARWICK, RHODE ISLAND
PREPARED FOR
BETA GROUP, LLC

NO.	REVISION	BY	DATE

SAMUEL A. WHITE, JR.
No. 1781
PROFESSIONAL LAND SURVEYOR
3–21–2023

GAROFALO & ASSOCIATES, INC.
CIVIL & STRUCTURAL ENGINEERS\SURVEYORS
LAND PLANNERS\ENVIRONMENTAL SCIENTISTS
85 CORLISS STREET
P.O. BOX 6145
PROVIDENCE, R.I. 02940
TEL. 401-273-6000

JOB NO. 7443.00	DRAWN BY RSE
DWG. NO. 7443–ECS	CALCS BY RSE
SCALE: 1"=30'	APPROVED SAW
	DATE: MARCH 2023

SHEET
1
OF 2 SHEETS

GENERAL LEGEND & ABBREVIATIONS

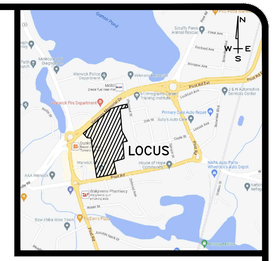
- ASSESSORS LINE
- EASEMENT LINE
- LOCUS PROPERTY LINE
- STATE HIGHWAY LINE
- SURVEY TIE LINE
- CHAIN LINK FENCE
- METAL FENCE
- COMMUNICATION LINE
- DRAIN LINE
- ELECTRIC LINE
- GAS LINE
- TELEPHONE LINE
- WATER LINE
- EXISTING CONTOUR MAJOR
- EXISTING CONTOUR MINOR
- EDH EXISTING DRILL HOLE
- EGM EXISTING GRANITE MONUMENT
- EIP EXISTING IRON PIPE
- EMN EXISTING MAGNETIC NAIL
- ENL EXISTING NAIL
- ERB EXISTING REBAR
- BOLLARD
- CB CATCH BASIN
- CLEAN OUT
- COMMUNICATION MANHOLE
- CURB INLET
- DRAIN MANHOLE
- EHH ELECTRIC HANDHOLE
- E ELECTRIC MANHOLE
- FP FLAG POLE
- GG GAS GATE
- GUY GUY WIRE
- HANDICAP PARKING STRIPING
- HYDRANT
- LIGHT POLE
- M MANHOLE (UNKNOWN)
- MP METAL POST
- SIGN
- S SEWER MANHOLE
- T TELEPHONE MANHOLE
- UTILITY POLE
- WG WATER GATE
- WS WATER SHUTOFF
- W WATER MANHOLE

AC	ACRES
AGL	ABOVE GROUND LEVEL
BGL	BELOW GROUND LEVEL
BB	BITUMINOUS BERM
BIT.	BITUMINOUS
CB/CI	CATCH BASIN CURB INLET
CC	CONCRETE CURB
GC	GRANITE CURB
CI	CURB INLET
CLF	CHAIN LINK FENCE
CONC.	CONCRETE
CP	CONCRETE PAD
CW	CONCRETE WALK
DCB	DOUBLE CATCH BASIN
EOP	EDGE OF PAVEMENT
GW	GUY WIRE
INV	INVERT
LS	LANDSCAPE
RIHB	RHODE ISLAND HIGHWAY BOUND
x164.5	SPOT GRADE ELEVATION
T-1	TESTPIT
B-1	BORING
P-1	PAVEMENT CORE

1" = 30'

feet: 0, 15, 30, 60, 120, 180

meters: 0, 5, 10, 20, 40



LOCUS MAP
N.T.S.

PLEASANT STREET (PUBLIC ~ 40 ' WIDE)
SPRUCE STREET (PUBLIC ~ 40 ' WIDE)
PROSPECT STREET (PUBLIC ~ 40 ' WIDE)
OAK STREET (PUBLIC ~ 40 ' WIDE)
COYLE STREET (PUBLIC ~ 40 ' WIDE)
PLEASANT STREET (PUBLIC ~ 40 ' WIDE)

RI STATE PLANE–NAD'83

ZONE "G" / ZONE "OS"
ZONE "A–7" / ZONE "V"

S11° 41' 24"E 50.00'
N11°41'24"W 220.00'
N78°18'36"E 106.80'
S78°18'36"W 112.87'
N70°51'51"E 138.01'
S78°18'36"W 280.30'
S78°18'36"W 240.00'
N78°18'36"E 33.00'
S20°17'25"E 121.36'
S78°18'36"W 65.57'
S4°50'07"E 362.59'
S4°50'07"E 128.86'
S2°57'31"E 112.47'
S73° 48' 28"W 71.42'
S73° 45' 34"W 83.44'

AP 245 LOT 176 N/F GREATREX CORP. BK 544 PG 211
AP 245 LOT 136 N/F GREATREX CORP. BK 544 PG 211
AP 245 LOT 175 N/F KEITH CHASE
AP 245 LOT 174 N/F RICHARD F. & AMY L. HARNEDY BK 6438 PG 65
AP 245 LOT 173 N/F RICHARD F. & AMY L. HARNEDY BK 700 PG 324
AP 245 LOT 172 N/F NARRAGANSETT ELECTRIC CO. BK 129 PG 190
AP 245 LOT 171 N/F ROSS COFFUA BK 9197 PG 138
AP 245 LOT 170 N/F ROSS COFFUA & MELINDA TIVEY BK 9197 PG 157
AP 245 LOT 169 N/F CITY OF WARWICK BK 155 PG 88
AP 245 LOT 168 N/F CITY OF WARWICK BK 155 PG 88
AP 245 LOT 167 N/F DESIREE NUTSELL BK 4968 PG 106
AP 245 LOT 166 N/F DESIREE NUTSELL BK 4968 PG 106
AP 245 LOT 165 N/F ANDREW J. LISI BK 8015 PG 273
AP 245 LOT 164 N/F ANDREW J. LISI BK 8015 PG 273
AP 245 LOT 69 N/F SCOTT K. ALLSTROM BK 3343 PG 189
AP 245 LOT 68 N/F COMPANION PARTNERS LLC BK 8715 PG 28
AP 245 LOT 67 N/F DORIS KAZANJIAN LIFE ESTATE BK 4969 PG 134

ERIHB (HELD) PLAT 2710 STA 42+00.10 38.20 RT
PLAT 2710 STA 41+43.08 40.00 RT
PC: 42+43.28
42+00
43+00
44+00

EGB (HELD FOR LINE)
EGB
EGB
EGB (HELD)
DMH Rim=16.62
BATTING CAGE
BASEBALL FIELD
CB Rim=14.70 HEADWALL 12"RCP Inv=14.4
CB Rim=16.82 Inv=14.1(A) 12"HDPE 12"HDPE
CONEX BOX
STORAGE SHED
METAL POST
BIT
BLOCK RET.
EOP
BB
CLF
BLK 1.0' ON

MATCHLINE "A"
MATCHLINE - SHEET 1
MATCHLINE - SHEET 1

EXISTING CONDITIONS SURVEY
FOR
WARWICK CITY HALL PLAZA
AP 245 LOTS 61
SITUATED ON
POST ROAD
WARWICK, RHODE ISLAND
PREPARED FOR
BETA GROUP, LLC

NO.	REVISION	BY	DATE

GAROFALO
GAROFALO & ASSOCIATES, INC.
CIVIL & STRUCTURAL ENGINEERS/SURVEYORS
LAND PLANNERS/ENVIRONMENTAL SCIENTISTS

85 CORLISS STREET
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JOB NO. 7443.00		DRAWN BY	RSE
DWG. NO. 7443–ECS		CALCS BY	RSE
SCALE: 1"=30'		APPROVED	SAW
		DATE:	MARCH 2023

SHEET

2

OF 2 SHEETS

GENERAL PHASING NOTES:

1. LIMIT OF DISTURBANCE DOWN TO ERODIBLE SURFACE SHALL BE CONTAINED WITHIN THE TEMPORARY CONSTRUCTION FENCING LIMITS UNTIL AREA HAS BEEN STABLIZED. FULL DEPTH PAVEMENT INSTALLATION OUTSIDE OF THE TEMPORARY FENCING LIMITS SHALL BE PERFORMED ONCE THE INTERIOR SITE HAS BEEN STABILIZED.
2. AN ADA ACCESSIBLE ROUTE MUST BE MAINTAINTED THROUGH THE SITE AT ALL TIMES DURING CONSTRUCTION. ACCESS TO THE EAST ENTRY TO CITY HALL MUST BE MAINTAINED AT ALL TIMES.
3. CONTRACTOR MUST ENSURE THAT VEHICULAR ACCESS TO 3287 POST ROAD IS MAINTAINED DURING CONSTRUCTION. CONTRACTOR MUST INFORM PROPERTY OWNER A MINUMUM OF 48 HOURS PRIOR TO ANY IMPROVEMENT WORK BEING DONE TO THE ACCESS DRIVEWAY RESULKTING IN NO VEHICULAR ACCESS.
4. PRIOR TO COMMENCING PHASE 1, THE CONTRACTOR SHALL ENSURE ALL SEDIMENT AND EROSION CONTROL MEASURES HAVE BEEN PROPERLY INSTALLED.

PHASE 1 NOTES:

1. CONTRACTOR SHALL PERFORM ALL UTILITY WORK (DRAIN, SEWER, WATER, GAS, ELECTRIC, TELECOM) AS REQUIRED FOR THE PROJECT.
2. CONTRACTOR SHALL PERFORM THE FULL DEPTH RECLAMATION, REGRADNG, AND CURBING INSTALLATION OF THE PARKING LOT AREA, INCLUDING ALL ADJUSTMENTS OF STRUCTURES, DEMOLITION AND SITE PREPARATION WORK, AND ALL OTHER WORK AS REQUIRED TO INSTALL BASE COURSE. BASE COURSE FOR THE PHASE 1 AREA SHALL BE INSTALLED BY NOVEMBER 15, 2024.
3. TEMPORARY PARKING SHALL BE STRIPED ALONG THE EASTERN SIDE OF THE PARKING LOT FOR ACCESS TO THE LOWER BASEBALL FIELDS. CONTRACTOR TO ADJUST TEMPORARY FENCING OF THE SITE TO ALLOW MINIMUM 20' DRIVEWAY ACCESS FOR TEMPORARY PARKING SPACES.
4. THE ADD ALTERNATE 1 PARKING AREA, IF APPLICABLE TO THE CONTRACT, SHOULD BE PERFORMED UNDER PHASE 1 AS DESCRIBED ABOVE.

PHASE 2 NOTES:

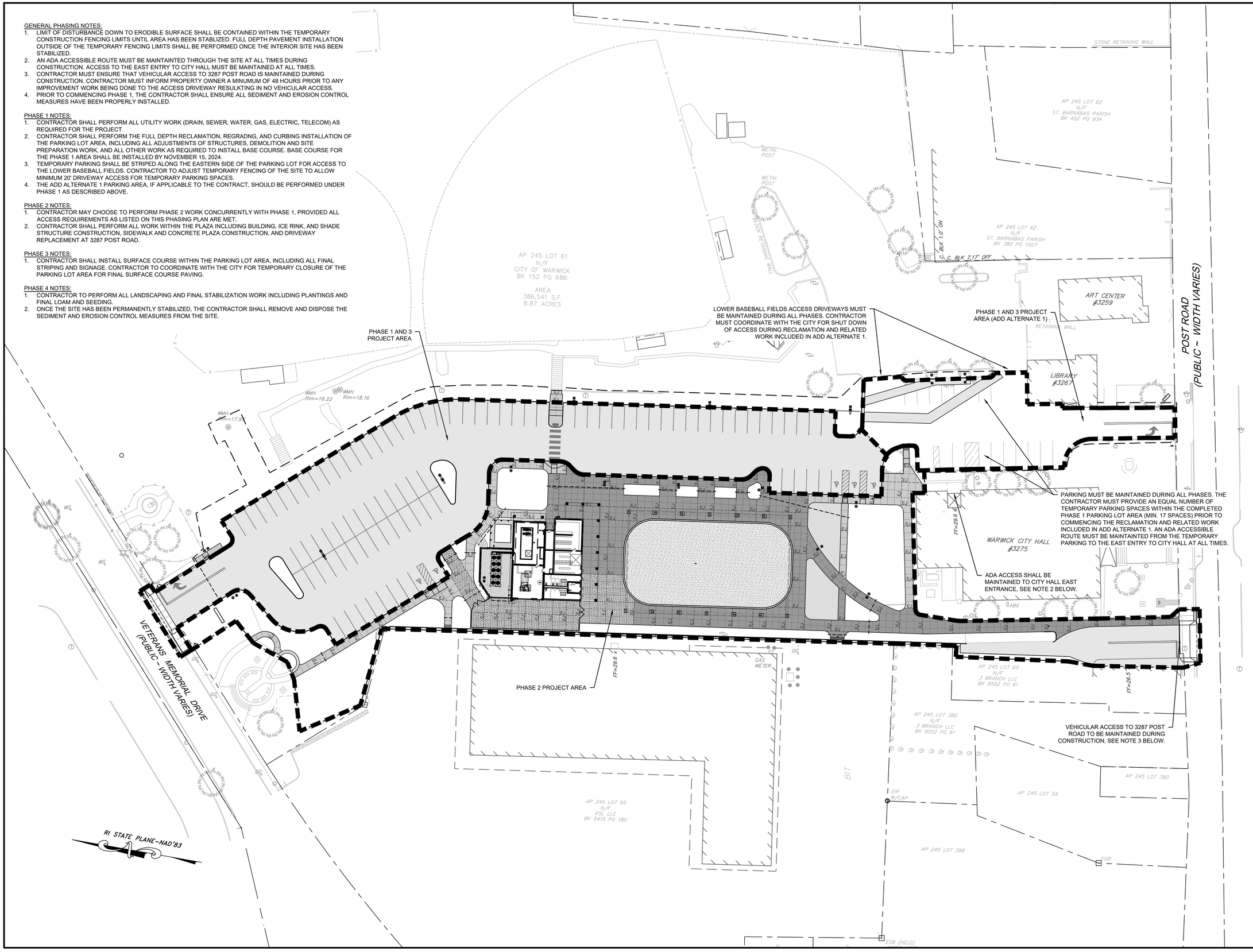
1. CONTRACTOR MAY CHOOSE TO PERFORM PHASE 2 WORK CONCURRENTLY WITH PHASE 1, PROVIDED ALL ACCESS REQUIREMENTS AS LISTED ON THIS PHASING PLAN ARE MET.
2. CONTRACTOR SHALL PERFORM ALL WORK WITHIN THE PLAZA INCLUDING BUILDING, ICE RINK, AND SHADE STRUCTURE CONSTRUCTION, SIDEWALK AND CONCRETE PLAZA CONSTRUCTION, AND DRIVEWAY REPLACEMENT AT 3287 POST ROAD.

PHASE 3 NOTES:

1. CONTRACTOR SHALL INSTALL SURFACE COURSE WITHIN THE PARKING LOT AREA, INCLUDING ALL FINAL STRIPING AND SIGNAGE. CONTRACTOR TO COORDINATE WITH THE CITY FOR TEMPORARY CLOSURE OF THE PARKING LOT AREA FOR FINAL SURFACE COURSE PAVING.

PHASE 4 NOTES:

1. CONTRACTOR TO PERFORM ALL LANDSCAPING AND FINAL STABILIZATION WORK INCLUDING PLANTINGS AND FINAL LOAM AND SEEDING.
2. ONCE THE SITE HAS BEEN PERMANENTLY STABILIZED, THE CONTRACTOR SHALL REMOVE AND DISPOSE THE SEDIMENT AND EROSION CONTROL MEASURES FROM THE SITE.



PREPARED BY

BETA
www.BETA-Inc.com

REGISTERED PROFESSIONAL

JARED LINHARES
No. 13145
REGISTERED PROFESSIONAL ENGINEER
CIVIL
1-31-24

SUBCONSULTANT

PROJECT

City Hall Plaza

Warwick, RI

TITLE

PHASING PLAN

NO.	REVISIONS	DATE

DRAWN BY:	CC / NS
DESIGNED BY:	NS / RC
CHECKED BY:	RC
ISSUE DATE:	01/31/2024
BETA JOB NO.:	10694

SCALE

30 0 30 60
SCALE IN FEET: 1"=30'

BID SET

SHEET NO.

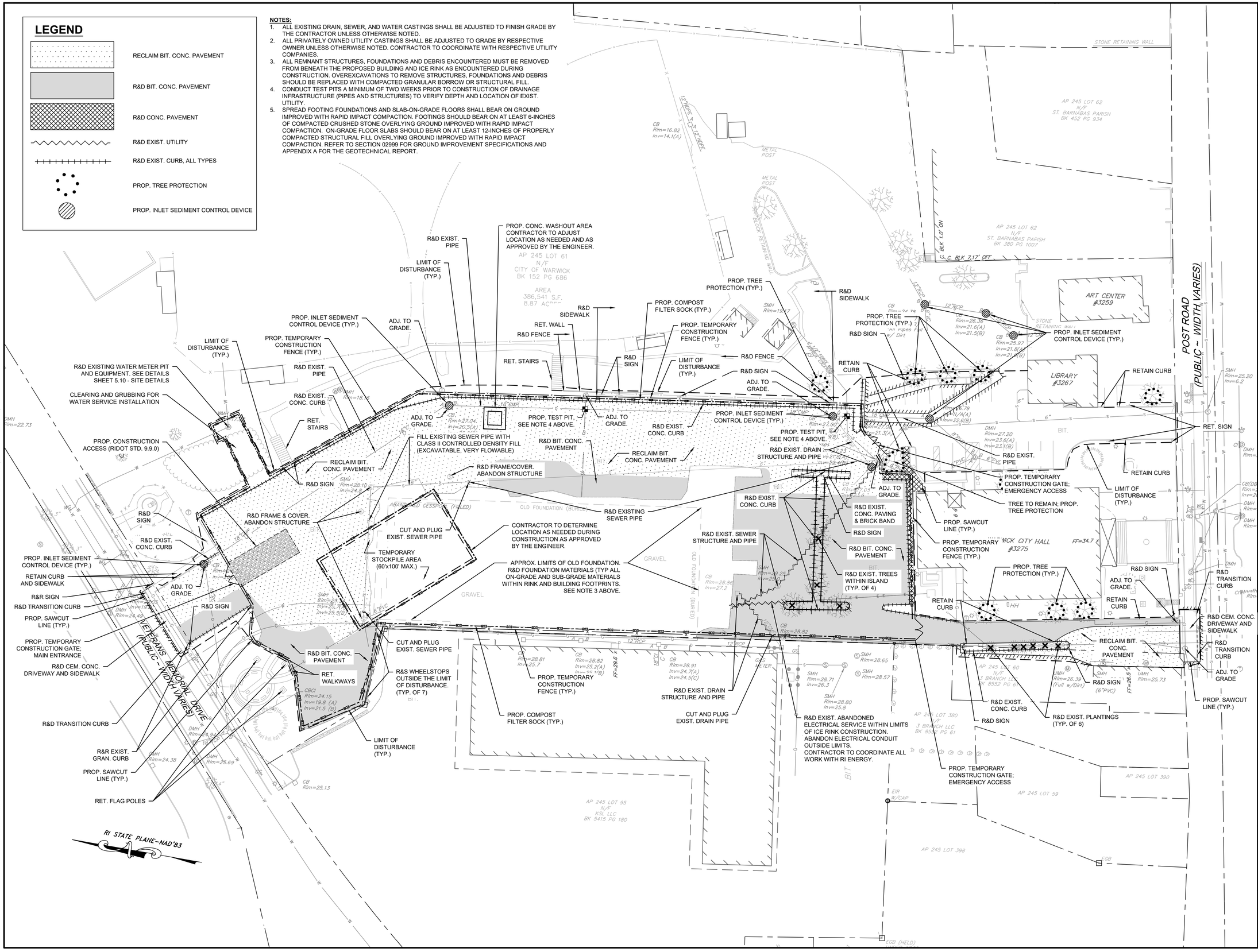
2.1

LEGEND

- RECLAIM BIT. CONC. PAVEMENT
- R&D BIT. CONC. PAVEMENT
- R&D CONC. PAVEMENT
- R&D EXIST. UTILITY
- R&D EXIST. CURB, ALL TYPES
- PROP. TREE PROTECTION
- PROP. INLET SEDIMENT CONTROL DEVICE

NOTES:

1. ALL EXISTING DRAIN, SEWER, AND WATER CASTINGS SHALL BE ADJUSTED TO FINISH GRADE BY THE CONTRACTOR UNLESS OTHERWISE NOTED.
2. ALL PRIVATELY OWNED UTILITY CASTINGS SHALL BE ADJUSTED TO GRADE BY RESPECTIVE OWNER UNLESS OTHERWISE NOTED. CONTRACTOR TO COORDINATE WITH RESPECTIVE UTILITY COMPANIES.
3. ALL REMNANT STRUCTURES, FOUNDATIONS AND DEBRIS ENCOUNTERED MUST BE REMOVED FROM BENEATH THE PROPOSED BUILDING AND ICE RINK AS ENCOUNTERED DURING CONSTRUCTION. OVEREXCAVATIONS TO REMOVE STRUCTURES, FOUNDATIONS AND DEBRIS SHOULD BE REPLACED WITH COMPACTED GRANULAR BORROW OR STRUCTURAL FILL.
4. CONDUCT TEST PITS A MINIMUM OF TWO WEEKS PRIOR TO CONSTRUCTION OF DRAINAGE INFRASTRUCTURE (PIPES AND STRUCTURES) TO VERIFY DEPTH AND LOCATION OF EXIST. UTILITY.
5. SPREAD FOOTING FOUNDATIONS AND SLAB-ON-GRADE FLOORS SHALL BEAR ON GROUND IMPROVED WITH RAPID IMPACT COMPACTION. FOOTINGS SHOULD BEAR ON AT LEAST 6-INCHES OF COMPACTED CRUSHED STONE OVERLYING GROUND IMPROVED WITH RAPID IMPACT COMPACTION. ON-GRADE FLOOR SLABS SHOULD BEAR ON AT LEAST 12-INCHES OF PROPERLY COMPACTED STRUCTURAL FILL OVERLYING GROUND IMPROVED WITH RAPID IMPACT COMPACTION. REFER TO SECTION 02999 FOR GROUND IMPROVEMENT SPECIFICATIONS AND APPENDIX A FOR THE GEOTECHNICAL REPORT.



PREPARED BY

BETA
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REGISTERED PROFESSIONAL

JARED LINHARES
No. 13145
REGISTERED PROFESSIONAL ENGINEER
CIVIL
1-31-24

SUBCONSULTANT

PROJECT

City Hall Plaza

Warwick, RI

TITLE

SITE PREPARATION PLAN

NO.	REVISIONS	DATE

DRAWN BY:	WC
DESIGNED BY:	TD
CHECKED BY:	JL / KA
ISSUE DATE:	01/31/2024
BETA JOB NO.:	10694

SCALE

30 0 30 60

SCALE IN FEET: 1"=30'

BID SET

SHEET NO.

3.1

CEMENT CONCRETE PAVING LEGEND

- 4" THICK CEMENT CONCRETE
- 5" THICK CEMENT CONCRETE
- 8" THICK CEMENT CONCRETE

PROP. PAD MOUNTED TRANSFORMER, OIL CONTAINMENT CURB, AND BOLLARDS
PROP. (2)-4" CONDUIT SECONDARY. (SEE ELECTRICAL SITE UTILITY PLAN)
LANDSCAPE AREA. SEE PLANTING PLAN (TYP)
PROP LIGHT FIXTURE & HANDHOLE, TYP. (SEE ELECTRICAL SITE UTILITY PLAN) (TYP.)
PROP. DRAINAGE CASTING (TYP.). SEE DRAINAGE PLAN.
PROP. GRAN. CURB 7.3.0 (TYP.)
LANDSCAPE AREA. SEE PLANTING PLAN (TYP)
PROP LIGHT FIXTURE & HANDHOLE, TYP. (SEE ELECTRICAL SITE UTILITY PLAN) (TYP.)
PROP. WCR (RI STD. 43.3.2)
PROP. 3" PVC IRRIGATION SLEEVE; EXTEND 12" BEYOND EDGE ON CONC. WALK AND CAP (TYP.)
RETAIN EXIST. CURB AND SIDEWALK
MATCH EXIST. SIDEWALK
PROP. TRANSITION CURB 7.3.1, 7.6.0
PROP. HMA PATCH (SEE DETAIL)
PROP. CEM. CONC. DRIVEWAY 43.4.0, 43.5.0
PROP. TRANSITION CURB 7.3.1
REMOVE AND RESET CURB 7.6.0
PROP. LARGE BRICK VENEER ENTRY WALL
PROP. TRANSITION CURB 7.3.2
PROP. CEM. CONC. SIDEWALK 43.1.0 (MATCH EXIST. SIDEWALK AND JOINT LAYOUT)
RI STATE PLANE-NAD'83
LIMIT OF DISTURBANCE (TYP.)
PROP. WCR #1 (SEE DETAILS)
PROP. WCR (RI STD. 43.3.0)
FULL DEPTH RECLAMATION (TYP.)
PROP. GRAN. CURB 7.3.0 (TYP.)
PROP. CEM. CONC. SIDEWALK 43.1.0 (TYP.)
PROP. 3" PVC IRRIGATION SLEEVE; EXTEND 12" BEYOND EDGE ON CONC. WALK AND CAP (TYP.)
PROP. SEWER CASTING (TYP.). SEE UTILITIES PLAN.
PROP. RINK BUILDING; REFER TO ARCHITECTURAL DRAWINGS
PROP. 4'-6" WIDE LOUVERED GATE
PROP. 10' HT. LOUVERED SCREEN FENCE
PROP. WCR (RI STD. 43.3.0)
PROP. GRAN. CURB 7.3.0 (TYP.)
LANDSCAPE AREA. SEE PLANTING PLAN (TYP.)
PROP. RINK SLAB; REFER TO REFRIGERATION DRAWINGS
PROP. AIR COOLED CONDENSER EQUIPMENT
PROP. CONC. FOOTING (TYP.); SEE STRUCTURAL PLANS
PROP. 10' WIDE DOUBLE BLACK VINYL CHAIN LINK GATE
PROP. 6. HT. BLACK VINYL CHAIN LINK FENCE
PROP. 8" THICK CEM. CONC. (TYP.)
PROP. CRUSHED 1-¾" STONE (TYP.); 12" DEPTH
PROP. 3" PVC SWEEP INTO BUILDING FOR FUTURE IRRIGATION
PROP. 10' WIDE DOUBLE BLACK VINYL CHAIN LINK GATE
PROP. SHADE STRUCTURE
PROP. SCREEN FENCE
PROP. 5" THICK CEM. CONC. (TYP.)
PROP. PRECAST CONC. CURB 7.1.0 (TYP.)
PROP. TRANSITION CURB 7.1.2
PROP. COLLAPSIBLE BOLLARD
PROP. DETECTABLE WARNING PANEL 48.1.0 (TYP.) (10' WIDTH)
PROP. TRANSITION CURB 7.1.2
PROP. TRANSITION CURB 7.1.2
PROP. UNIT PAVERS (TYP.)
PROP. DETECTABLE WARNING PANEL 48.1.0 (TYP.) (5' WIDTH)
PROP. TRANSITION CURB 7.1.2
PROP. CEM. CONC. SIDEWALK 43.1.0 (TYP.)
PROP LIGHT FIXTURE & HANDHOLE, TYP. (SEE ELECTRICAL SITE UTILITY PLAN) (TYP.)
REMOVE AND RESET CURB
RETAIN BRICK WALKWAY
PROP. SMALL BRICK VENEER ENTRY WALL
PROP. PERMANENT TRENCH PATCH (SEE DETAILS)
PROP. WCR #3 (SEE DETAILS)
PROP. WCR #5 (SEE DETAILS)
PROP. CEM. CONC. SIDEWALK 43.1.0 (TYP.)
PROP. WCR #4 (SEE DETAILS)
PROP. PERMEABLE PAVERS
PROP. 3" PVC IRRIGATION SLEEVE; EXTEND 12" BEYOND EDGE ON CONC. WALK AND CAP (TYP.)
PROP. CONTRACTION JOINT (TYP.)
PROP. COLLAPSIBLE BOLLARD
REMOVE AND RESET CURB 7.6.0
PROP. CEM. CONC. SIDEWALK 43.1.0 (MATCH EXIST. SIDEWALK, JOINT LAYOUT, AND STAMPED CONC. BAND)
PROP. TRANSITION CURB 7.3.1, 7.6.0
PROP. EXPANSION JOINT (TYP.)
PROP. CEM. CONC. SIDEWALK 43.1.0 (TYP.)
PROP. PRECAST CONC. CURB 7.1.0 (TYP.)
PROP. TRANSITION CURB 7.1.2
PROP. PRECAST CONC. CURB 7.1.0 (TYP.)
LANDSCAPE AREA. SEE PLANTING PLAN (TYP)
FULL DEPTH RECLAMATION (TYP.)
PROP. CEM. CONC. DRIVEWAY 43.4.0, 43.5.0
MATCH EXIST. SIDEWALK; RETAIN STAMPED CONC. BAND
PROP. TRANSITION CURB 7.3.1, 7.6.0
PROP. HMA PATCH (SEE DETAIL)
POST ROAD (PUBLIC ~ WIDTH VARIES)
VETERANS MEMORIAL DRIVE (PUBLIC ~ WIDTH VARIES)
ART CENTER #3259
LIBRARY #3267
WARWICK CITY HALL #3275
AP 245 LOT 61 N/F CITY OF WARWICK BK 152 PG 686 AREA 386,541 S.F. 8.87 ACRES
AP 245 LOT 62 N/F ST. BARNABAS PARISH BK 452 PG 934
AP 245 LOT 62 N/F ST. BARNABAS PARISH BK 380 PG 1007
AP 245 LOT 95 N/F KSL LLC BK 5415 PG 180
AP 245 LOT 59
AP 245 LOT 398
AP 245 LOT 60
AP 245 LOT 390
STONE RETAINING WALL
METAL POST
BLK 1.0' ON
C. BLK 7.17' OFF
EGB (HELD)

NOTES:
1. AN ARCHEOLOGICAL MONITOR IS REQUIRED TO BE PRESENT FOR THE INSTALLATION OF THE (3) EASTERN SUPPORTS FOR THE SHADE STRUCTURE. CONTRACTOR TO COORDINATE WORK WITH THE RHODE ISLAND HISTORICAL PRESERVATION AND HERITAGE COMMISSION (RIHPHC)

PREPARED BY

BETA
www.BETA-Inc.com

REGISTERED PROFESSIONAL

JARED LINHARES
No. 13145
REGISTERED PROFESSIONAL ENGINEER
CIVIL 1-31-24

SUBCONSULTANT

PROJECT

City Hall Plaza

Warwick, RI

TITLE

SITE PLAN

NO.	REVISIONS	DATE

DRAWN BY:	CC / NS
DESIGNED BY:	NS / RC
CHECKED BY:	RC
ISSUE DATE:	01/31/2024
BETA JOB NO.:	10694

SCALE

30 0 30 60
SCALE IN FEET: 1"=30'

BID SET

SHEET NO.

3.2

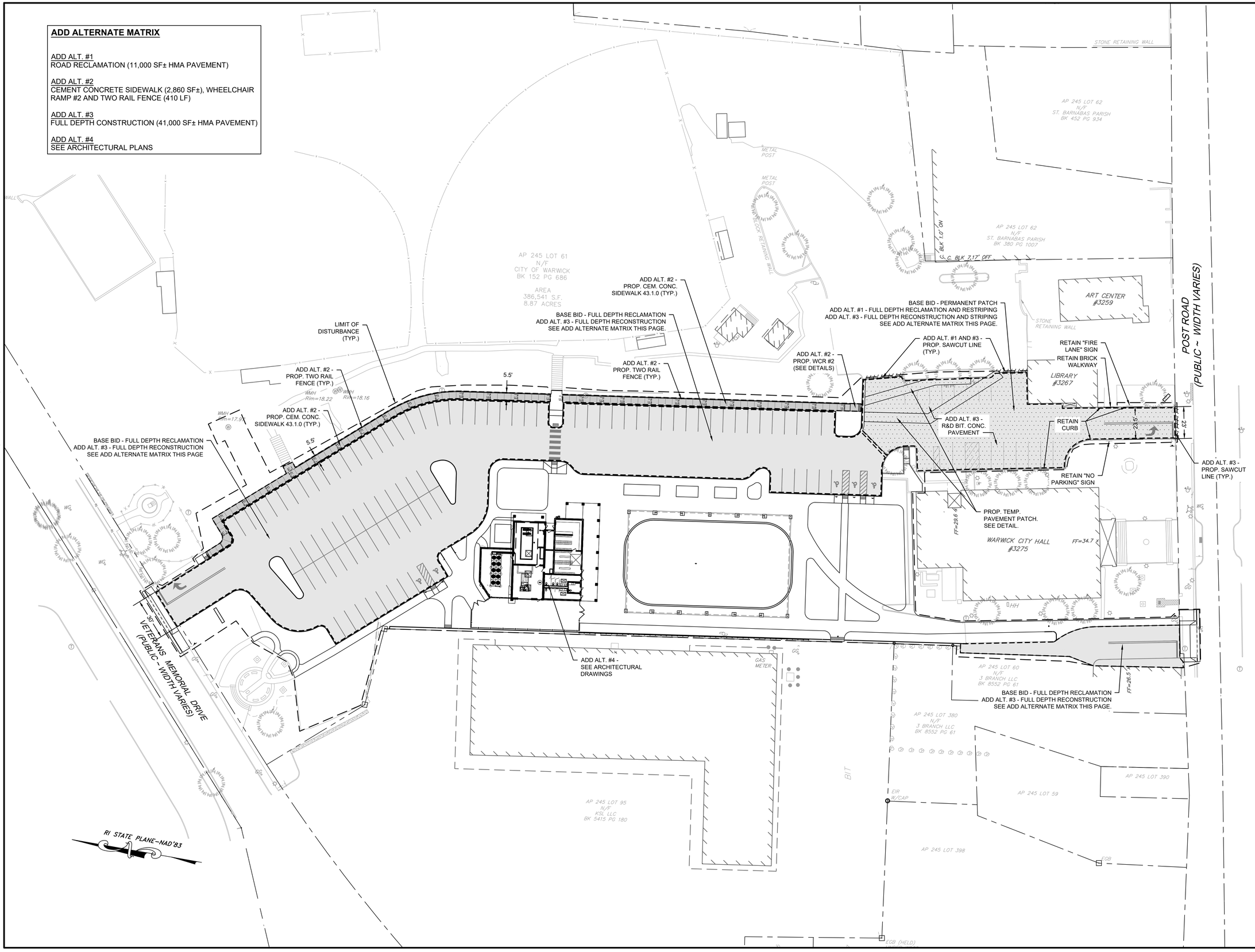
ADD ALTERNATE MATRIX

ADD ALT. #1
ROAD RECLAMATION (11,000 SF± HMA PAVEMENT)

ADD ALT. #2
CEMENT CONCRETE SIDEWALK (2,860 SF±), WHEELCHAIR RAMP #2 AND TWO RAIL FENCE (410 LF)

ADD ALT. #3
FULL DEPTH CONSTRUCTION (41,000 SF± HMA PAVEMENT)

ADD ALT. #4
SEE ARCHITECTURAL PLANS



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CIVIL
1-31-24

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TITLE

ADD ALTERNATES PLAN

NO.	REVISIONS	DATE

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BETA JOB NO.:	10694

SCALE

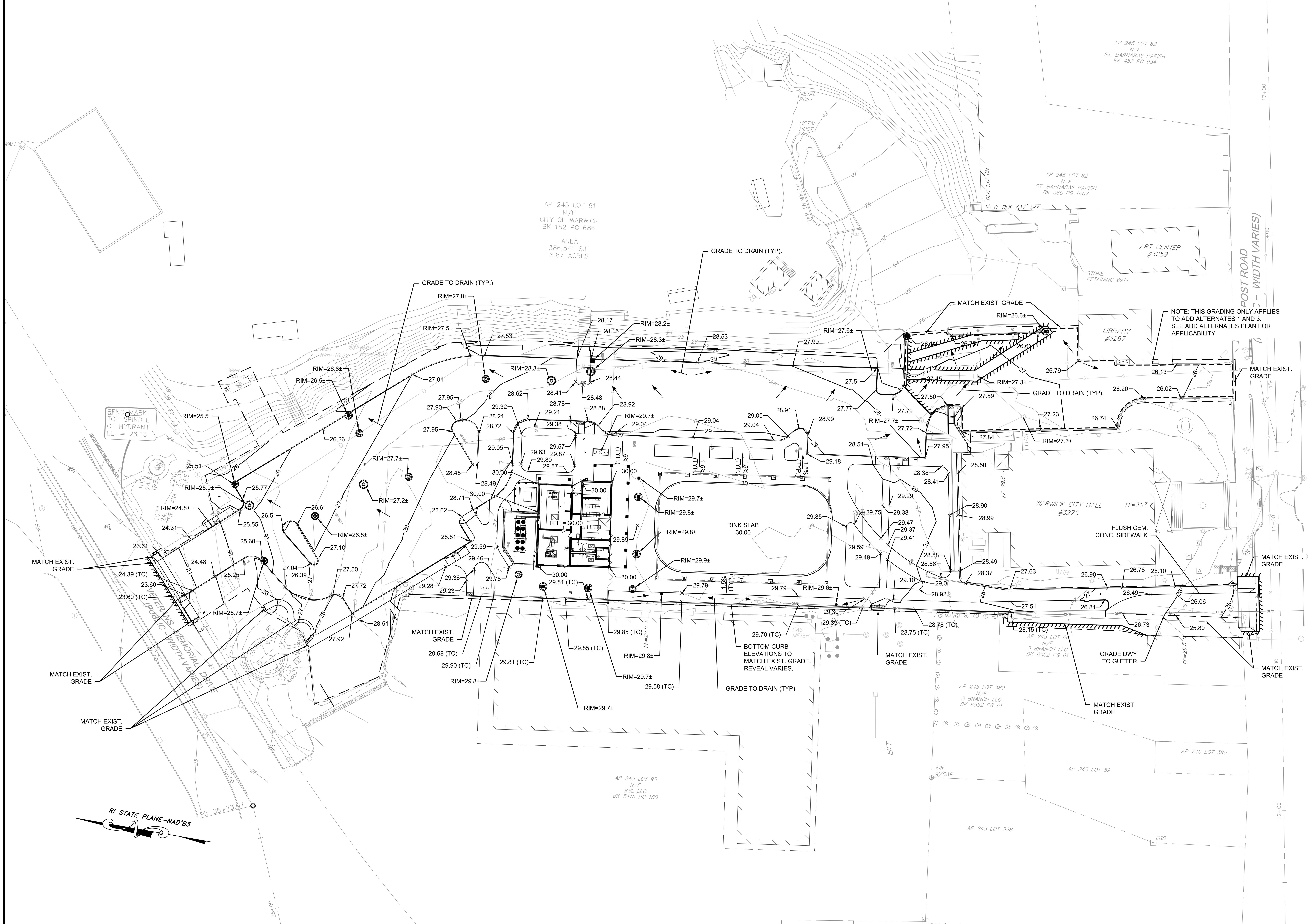
30 0 30 60
SCALE IN FEET: 1"=30'

BID SET

SHEET NO.

3.3

GRADING NOTES:
1. ALL CURB REVEAL SHALL BE 6" UNLESS OTHERWISE NOTED.
2. SPOT GRADES SHOWN ALONG CURB LINES ARE BOTTOM CURB ELEVATIONS UNLESS OTHERWISE NOTED.
3. ALL DOORWAY ENTRANCES SHALL BE A FLUSH CONDITION.



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TITLE

GRADING PLAN

NO.	REVISIONS	DATE

DRAWN BY:	WC
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CHECKED BY:	JL / KA
ISSUE DATE:	01/31/2024
BETA JOB NO.:	10694

SCALE

30 0 30 60
SCALE IN FEET: 1"=30'
UNLESS OTHERWISE NOTED OR CHANGED BY REPRODUCTION

BID SET

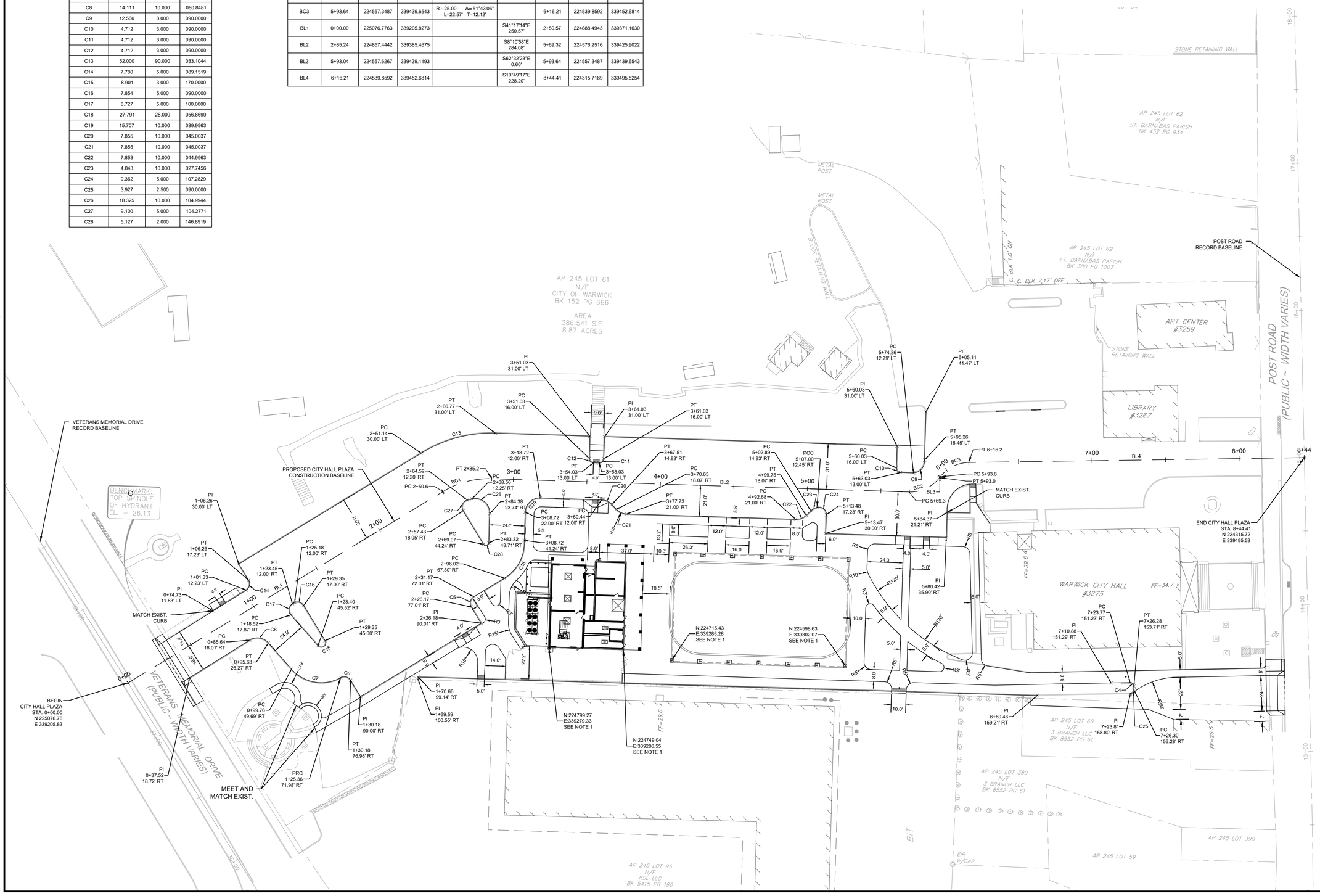
SHEET NO.
3.4

2/2/2024 2:00 PM \\BETA-INC.COM\RI\GLA\PLANNING LANDSCAPE\10000S\10694 - WARWICK, RI - CITY HALL PLAZA\AUTOCAD FILES\PLAN SET\10964 GRADING PLAN.DWG (BETA STD BW.CTB)

NOTE:
1. USE THESE 4 POINTS TO POSITION BUILDING. REFER TO STRUCTURAL DRAWINGS FOR FURTHER LAYOUT INFORMATION ON BUILDING FOUNDATION LAYOUT.

CITY HALL CURB CURVE DATA			
CURVE #	LENGTH	RADIUS	DELTA
C4	3.922	2.500	089.8779
C5	6.930	5.000	079.4071
C6	7.670	5.000	087.8915
C7	36.706	27.000	077.8915
C8	14.111	10.000	080.8481
C9	12.566	8.000	090.0000
C10	4.712	3.000	090.0000
C11	4.712	3.000	090.0000
C12	4.712	3.000	090.0000
C13	52.000	90.000	033.1044
C14	7.780	5.000	089.1519
C15	8.901	3.000	170.0000
C16	7.854	5.000	090.0000
C17	8.727	5.000	100.0000
C18	27.791	28.000	056.8690
C19	15.707	10.000	089.9963
C20	7.855	10.000	045.0037
C21	7.855	10.000	045.0037
C22	7.853	10.000	044.9963
C23	4.843	10.000	027.7456
C24	9.362	5.000	107.2829
C25	3.927	2.500	090.0000
C26	18.325	10.000	104.9944
C27	9.100	5.000	104.2771
C28	5.127	2.000	146.8919

CITY HALL CONSTRUCTION BASELINE DATA								
NUMBER	STARTING STATION	NORTHING	EASTING	CURVE DATA	LINE DATA	ENDING STATION	NORTHING	EASTING
BC1	2+50.57	224888.4943	339371.1630	R=60.00 Δ=33°06'16" L=34.67' T=17.83'		2+85.24	224857.4442	339385.4675
BC2	5+69.32	224576.2516	339425.9022	R=25.00 Δ=54°21'25" L=23.72' T=12.84'		5+93.04	224557.6267	339439.1193
BC3	5+93.64	224557.3487	339439.6543	R=25.00 Δ=51°43'06" L=22.57' T=12.12'		6+16.21	224539.8592	339452.6814
BL1	0+00.00	225076.7763	339205.8273		S41°17'14"E 250.57'	2+50.57	224888.4943	339371.1630
BL2	2+85.24	224857.4442	339385.4675		S8°10'58"E 284.08'	5+69.32	224576.2516	339425.9022
BL3	5+93.04	224557.6267	339439.1193		S62°32'23"E 0.60'	5+93.64	224557.3487	339439.6543
BL4	6+16.21	224539.8592	339452.6814		S10°49'17"E 228.20'	8+44.41	224315.7189	339495.5254



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PREPARED BY

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REGISTERED PROFESSIONAL

JARED LINHARES
No. 13145
REGISTERED PROFESSIONAL ENGINEER
CIVIL
1-31-24

SUBCONSULTANT

PROJECT

City Hall Plaza

Warwick, RI

TITLE

CURB TIE PLAN

NO.	REVISIONS	DATE

DRAWN BY:	WC
DESIGNED BY:	TD
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ISSUE DATE:	01/31/2024
BETA JOB NO.:	10694

SCALE

30 0 30 60
SCALE IN FEET: 1"=30'

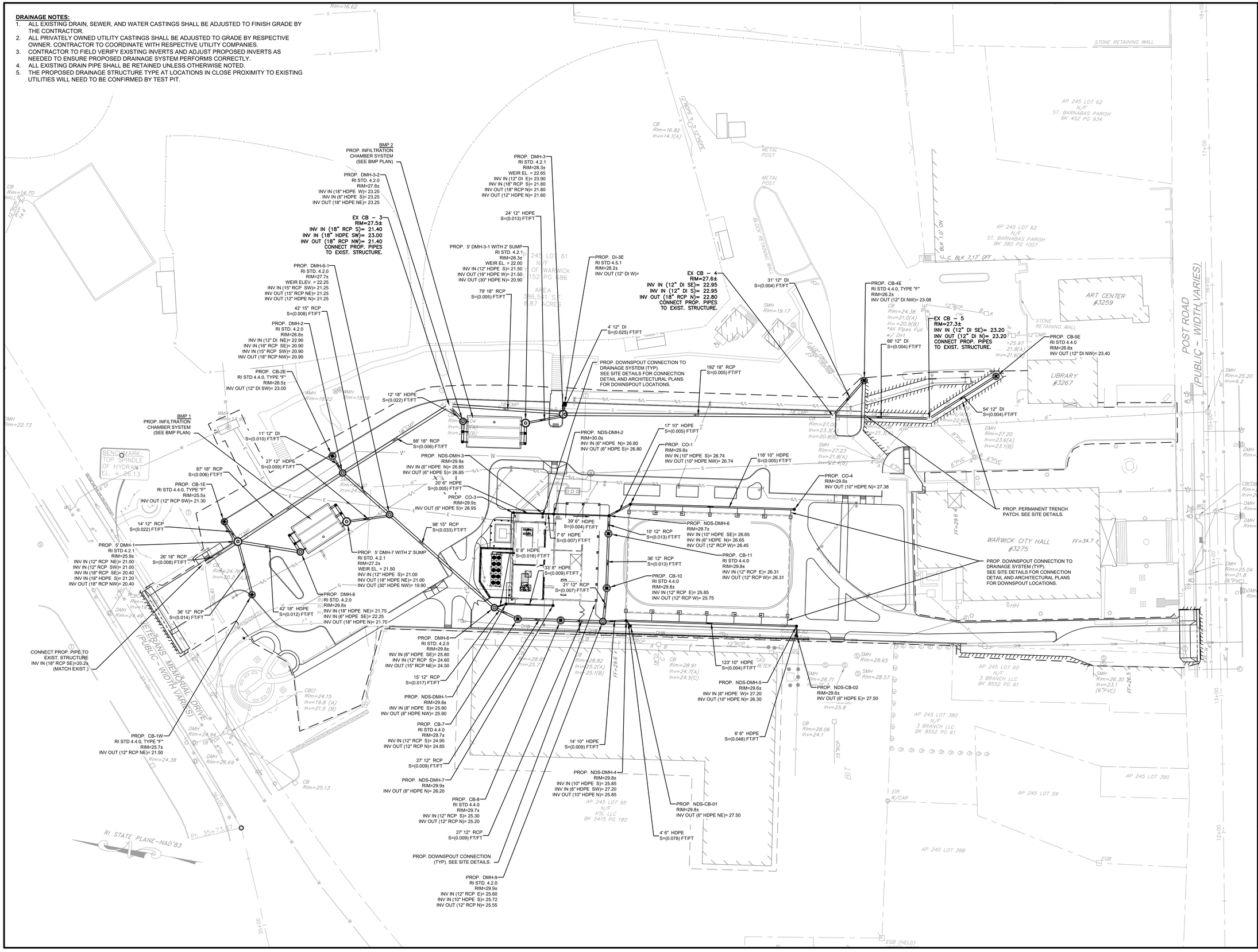
BID SET

SHEET NO.

3.5

DRAINAGE NOTES:

1. ALL EXISTING DRAIN, SEWER, AND WATER CASTINGS SHALL BE ADJUSTED TO FINISH GRADE BY THE CONTRACTOR.
2. ALL PRIVATELY OWNED UTILITY CASTINGS SHALL BE ADJUSTED TO GRADE BY RESPECTIVE OWNER. CONTRACTOR TO COORDINATE WITH RESPECTIVE UTILITY COMPANIES.
3. CONTRACTOR TO FIELD VERIFY EXISTING INVERTS AND ADJUST PROPOSED INVERTS AS NEEDED TO ENSURE PROPOSED DRAINAGE SYSTEM PERFORMS CORRECTLY.
4. ALL EXISTING DRAIN PIPE SHALL BE RETAINED UNLESS OTHERWISE NOTED.
5. THE PROPOSED DRAINAGE STRUCTURE TYPE AT LOCATIONS IN CLOSE PROXIMITY TO EXISTING UTILITIES WILL NEED TO BE CONFIRMED BY TEST PIT.



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City Hall Plaza

Warwick, RI

TITLE

DRAINAGE PLAN

NO.	REVISIONS	DATE

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ISSUE DATE:	01/31/2024
BETA JOB NO.:	10694

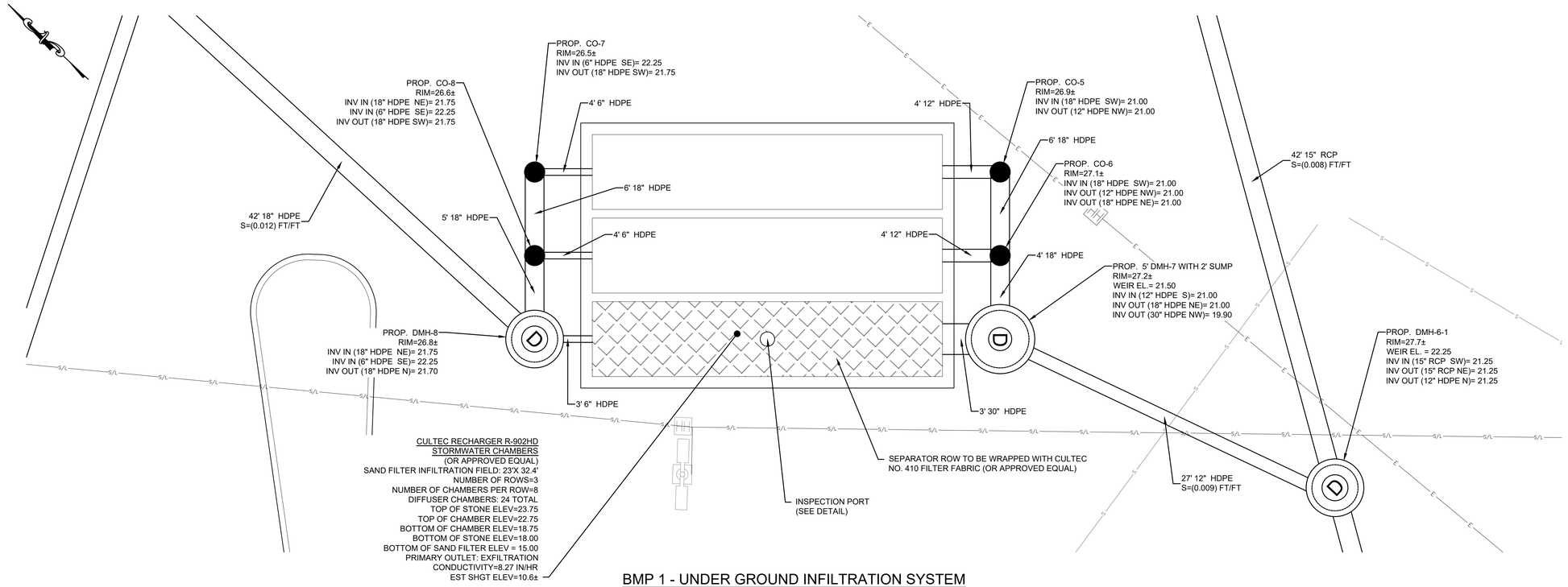
SCALE

30 0 30 60
SCALE IN FEET: 1"=30'

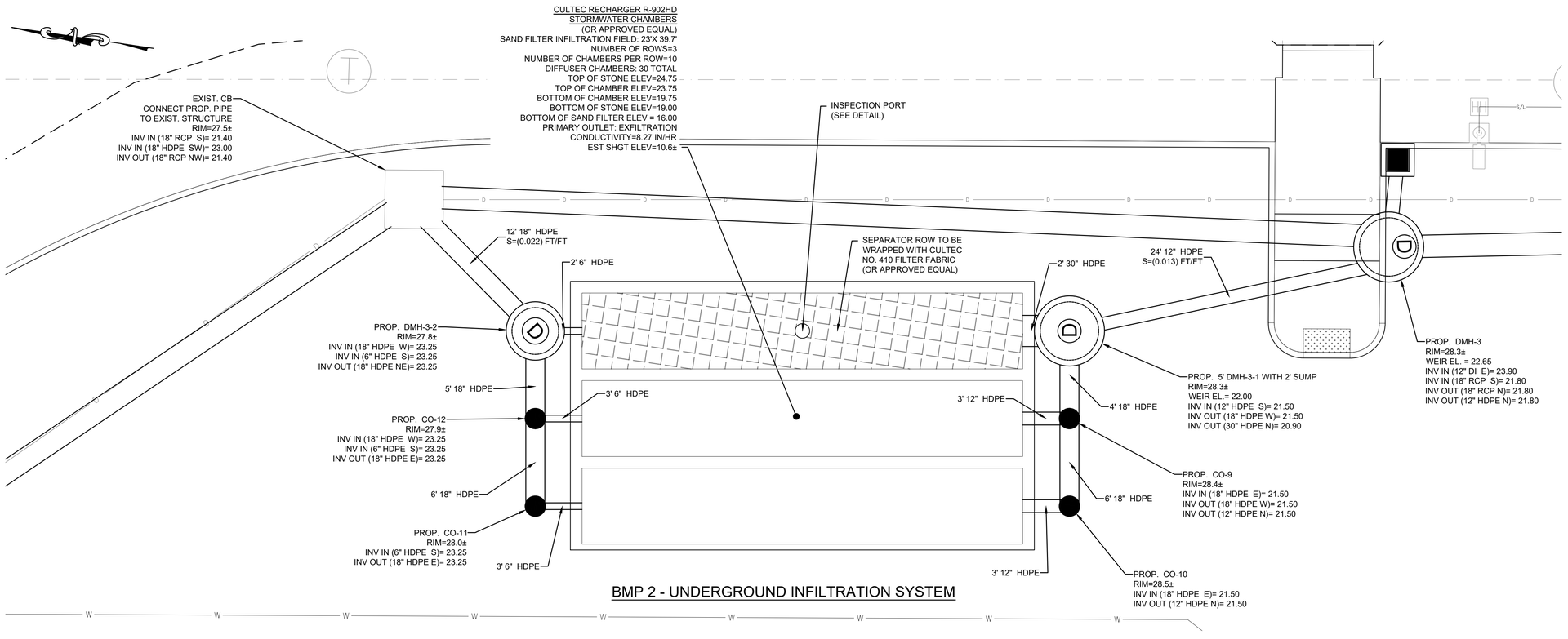
BID SET

SHEET NO.

3.6



BMP 1 - UNDER GROUND INFILTRATION SYSTEM



BMP 2 - UNDERGROUND INFILTRATION SYSTEM

PREPARED BY

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REGISTERED
PROFESSIONAL ENGINEER
CIVIL 1-31-24

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BMP PLAN

NO.	REVISIONS	DATE

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BETA JOB NO.:	10694

SCALE

5 0 5 10

SCALE IN FEET: 1"=5'

BID SET

SHEET NO.

3.7

UTILITY SERVICE NOTES:

1. WATER SYSTEM TO BE COORDINATED WITH KENT COUNTY WATER AUTHORITY (KCWA). ALL WORK SHALL BE IN ACCORDANCE WITH THE RULES AND REGULATIONS OF THE KENT COUNTY WATER AUTHORITY, LATEST EDITION, INCLUDING ALL ERRATUM.
2. WATER SERVICE SHALL HAVE A MINIMUM VERTICAL SEPARATION OF 18 INCHES FROM SEWER FORCE MAINS, SEWER PIPE, AND DRAINAGE PIPE PER KCWA REGULATIONS. SEWER AND DRAIN PIPES THAT DO NOT MEET THE MINIMUM SEPARATION MUST BE INSTALLED WITHIN A CARRIER PIPE PER KCWA DETAIL ON SHEET 5.10 - SITE DETAILS.
3. ELECTRIC AND GAS SERVICE TO BE COORDINATED WITH RI ENERGY. ALL WORK SHALL BE IN ACCORDANCE WITH THE SUPPLEMENT TO SPECIFICATIONS FOR ELECTRICAL INSTALLATIONS, UNDERGROUND COMMERCIAL DISTRIBUTION (UCD) INSTALLATION AND RESPONSIBILITY GUIDE, ELECTRIC SYSTEM BULLETIN NO. 759B AND THE LATEST EDITION OF RI ENERGY'S SPECIFICATIONS AND REQUIREMENTS FOR GAS INSTALLATIONS.
4. COMMUNICATION LINES TO BE COORDINATED WITH SERVICE PROVIDERS TO MEET THE NEED OF THE BUILDING.
5. ALL EXISTING DRAIN, SEWER, AND WATER CASTINGS SHALL BE ADJUSTED TO FINISH GRADE BY THE CONTRACTOR.
6. ALL PRIVATELY OWNED UTILITY CASTINGS SHALL BE ADJUSTED TO GRADE BY RESPECTIVE OWNER. CONTRACTOR TO COORDINATE WITH RESPECTIVE UTILITY COMPANIES.

PROP. 2" HDPE DOMESTIC WATER SERVICE (AWWA C901, 200 PSI)

A SOLID STAINLESS STEEL INSERT SHALL BE INSTALLED AT EACH CONNECTION AND A 12-FOOT TYPE "K" COPPER WHIP SHALL BE INSTALLED AT THE POINT OF ENTRY INTO THE BUILDING AND ABOVE GROUND HEATED ENCLOSURE.

EXISTING BELOW GRADE METER PIT TO BE REMOVED AND DISPOSED. PROP. ABOVE GROUND HEATED ENCLOSURE AND WATER SERVICE CONNECTION TO EXIST.6" DI WITH 6" GATE VALVE, BOX, AND CONCRETE COLLAR. CONTRACTOR TO COORDINATE WITH KCWA. REFER TO SHEET 3.8 - UTILITIES PLAN AND 5.10 - SITE DETAILS.

PROP. (1)-1" CONDUIT (SEE ELECTRICAL SITE UTILITY PLAN) CONTRACTOR TO COORDINATE ALL WORK WITH RI ENERGY.

PROP. HANDHOLE (SEE ELECTRICAL SITE UTILITY PLAN)

PROP. AIR COOLED CONDENSER UNIT (SEE REFRIGERATION ROOM PLAN)

PROP. DRAINAGE SYSTEM (SEE DRAINAGE PLAN)

PROP. SEWER CLEANOUT

74'-4" SDR-35 WASTE SERVICE S=(0.011) FT/FT INV @ BLDG=24.73

(2)-4" SDR-35 VENTS TO GREASE TRAP (SEE CONCESSION BUILDING PLUMBING SANITARY WASTE & VENT PLAN)

PROP. PAD MOUNTED TRANSFORMER, OIL CONTAINMENT CURB, AND BOLLARDS PROP. (2)-4" CONDUIT SECONDARY. (SEE ELECTRICAL SITE UTILITY PLAN) CONTRACTOR TO COORDINATE ALL WORK WITH RI ENERGY.

DRAIN PIPE SHALL BE INSTALLED WITHIN A CARRIER PIPE AT THE WATER SERVICE CROSSING PER KCWA DETAIL ON SHEET 5.10 - SITE DETAILS

PROP. CONCRETE ENCASED (2)-4" CONDUIT PRIMARY (SEE ELECTRICAL SITE UTILITY PLAN) CONTRACTOR TO COORDINATE ALL WORK WITH RI ENERGY.

PROP. UTILITY POLE (SEE ELECTRICAL SITE UTILITY PLAN) CONTRACTOR TO COORDINATE ALL WORK WITH RI ENERGY.

PROP. 4" GAS SERVICE CONTRACTOR TO COORDINATE ALL WORK WITH RI ENERGY.

GAS CONNECTION TO EXIST. STUB CONTRACTOR TO COORDINATE ALL WORK WITH RI ENERGY.

SEWER PIPE SHALL BE INSTALLED WITHIN A CARRIER PIPE AT THE WATER SERVICE CROSSING PER KCWA DETAIL ON SHEET 5.10 - SITE DETAILS

PROP. LIGHT FIXTURE AND HANDHOLE, TYP. (SEE ELECTRICAL SITE LIGHTING PLAN)

PROP. SEWER CLEANOUT

52'-4" SDR-35 SANITARY WASTE S=(0.030) FT/FT INV @ BLDG= 27.80

PROP. DROP SMH RIM=29.0± INV IN (4" NW)=23.95 INV IN (4" N)=23.95 INV IN (4" W)=23.95 INV OUT (6" S)=23.95

18'-4" SDR-35 S=(0.025) FT/FT

PROP. 1,000 GALLON GREASE TRAP RIM=29.7± INV IN (4" N)=27.70 INV OUT (4" E)=27.70 INV OUT (4" E)=27.70 INV OUT (4" S)=27.70

24'-4" SDR-35 KITCHEN WASTE S=(0.025) FT/FT INV @ BLDG=28.30

PROP. HANDHOLE (SEE ELECTRICAL SITE UTILITY PLAN)

EXIST. UTILITY POLE TO REMAIN

PROP. OVERHEAD PRIMARY WIRE (SEE ELECTRICAL SITE UTILITY PLAN). CONTRACTOR TO COORDINATE ALL WORK WITH RI ENERGY.

(1)-4" TELECOM CONDUIT WITH NYLON PULLSTRING (SEE ELECTRICAL SITE UTILITY PLAN)

PROP. GAS METER PAD AND BOLLARDS (QTY. 2) CONTRACTOR TO COORDINATE ALL WORK WITH RI ENERGY.

CONNECT PROP. PIPE TO EXIST. SMH. REBUILD EXIST. INVERTS INV IN (6" NW)=21.8± (EXIST.)

PROP. LIGHTING CONDUIT, TYP. (SEE ELECTRICAL SITE LIGHTING PLAN)

PROP. RINK HEADER PIPE (SEE ICE RINK FLOOR PLAN)

205'-6" SDR-35 SANITARY SERVICE S=(0.011) FT/FT

EXIST. TELECOM MANHOLE TO REMAIN

EXIST. OVERHEAD PRIMARY WIRE TO REMAIN

EXIST. UTILITY POLE TO REMAIN

RI STATE PLANE–NAD'83

POST ROAD (PUBLIC ~ WIDTH VARIES)

VETERANS MEMORIAL DRIVE (PUBLIC ~ WIDTH VARIES)

ART CENTER #3259

LIBRARY #3267

WARWICK CITY HALL #3275

AP 245 LOT 61 N/F CITY OF WARWICK BK 152 PG 686 AREA 386,541 S.F. 8.87 ACRES

AP 245 LOT 62 N/F ST. BARNABAS PARISH BK 452 PG 934

AP 245 LOT 62 N/F ST. BARNABAS PARISH BK 380 PG 1007

AP 245 LOT 380 N/F 3 BRANCH LLC BK 8552 PG 61

AP 245 LOT 390

AP 245 LOT 59

AP 245 LOT 95 N/F KSL LLC BK 5415 PG 180

AP 245 LOT 398

STONE RETAINING WALL

BLOCK RETAINING WALL

BLK 1.0' ON C. BLK 7.17' OFF

PREPARED BY

BETA

www.BETA-Inc.com

REGISTERED PROFESSIONAL

JARED LINHARES No. 13145 REGISTERED PROFESSIONAL ENGINEER CIVIL 1-31-24

SUBCONSULTANT

PROJECT

City Hall Plaza

Warwick, RI

TITLE

UTILITIES PLAN

NO.	REVISIONS	DATE

DRAWN BY:	WC
DESIGNED BY:	TD
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BETA JOB NO.:	10694

SCALE

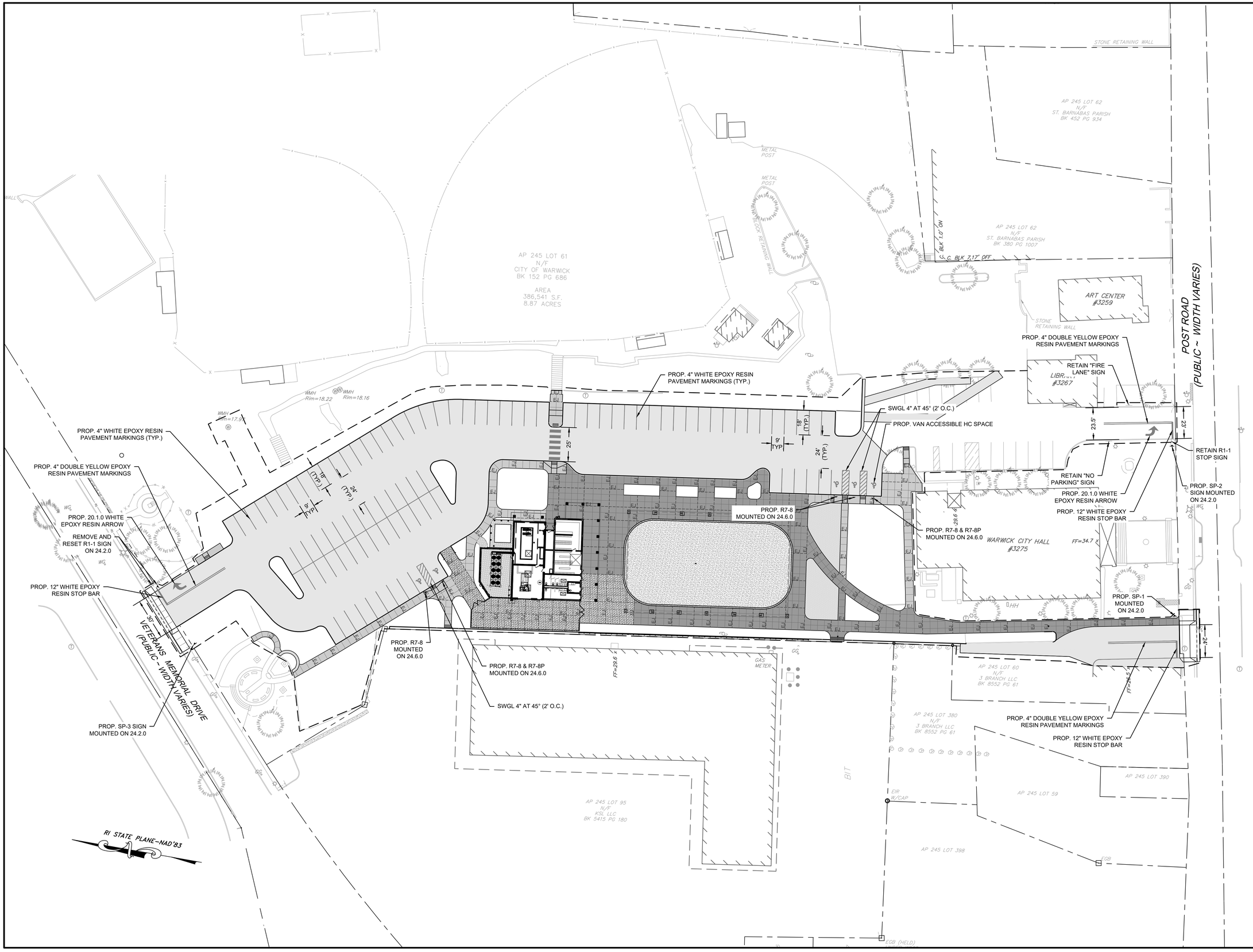
30 0 30 60

SCALE IN FEET: 1"=30'

BID SET

SHEET NO.

3.8



2/2/2024 2:11 PM \\BETA-INC.COM\RI\GLAP\PLANNING LANDSCAPE\10000S\10694 - WARWICK, RI - CITY HALL PLAZA\AUTOCAD FILES\PLAN SET\10964 STRIPING PLAN.DWG (BETA STD BW.CTB)

PREPARED BY

BETA
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REGISTERED PROFESSIONAL

JARED LINHARES
No. 13145
REGISTERED PROFESSIONAL ENGINEER
CIVIL

SUBCONSULTANT

PROJECT

City Hall Plaza

Warwick, RI

TITLE

SIGNING AND STRIPING PLAN

NO.	REVISIONS	DATE

DRAWN BY:	CC / NS
DESIGNED BY:	NS / RC
CHECKED BY:	RC
ISSUE DATE:	01/31/2024
BETA JOB NO.:	10694

SCALE

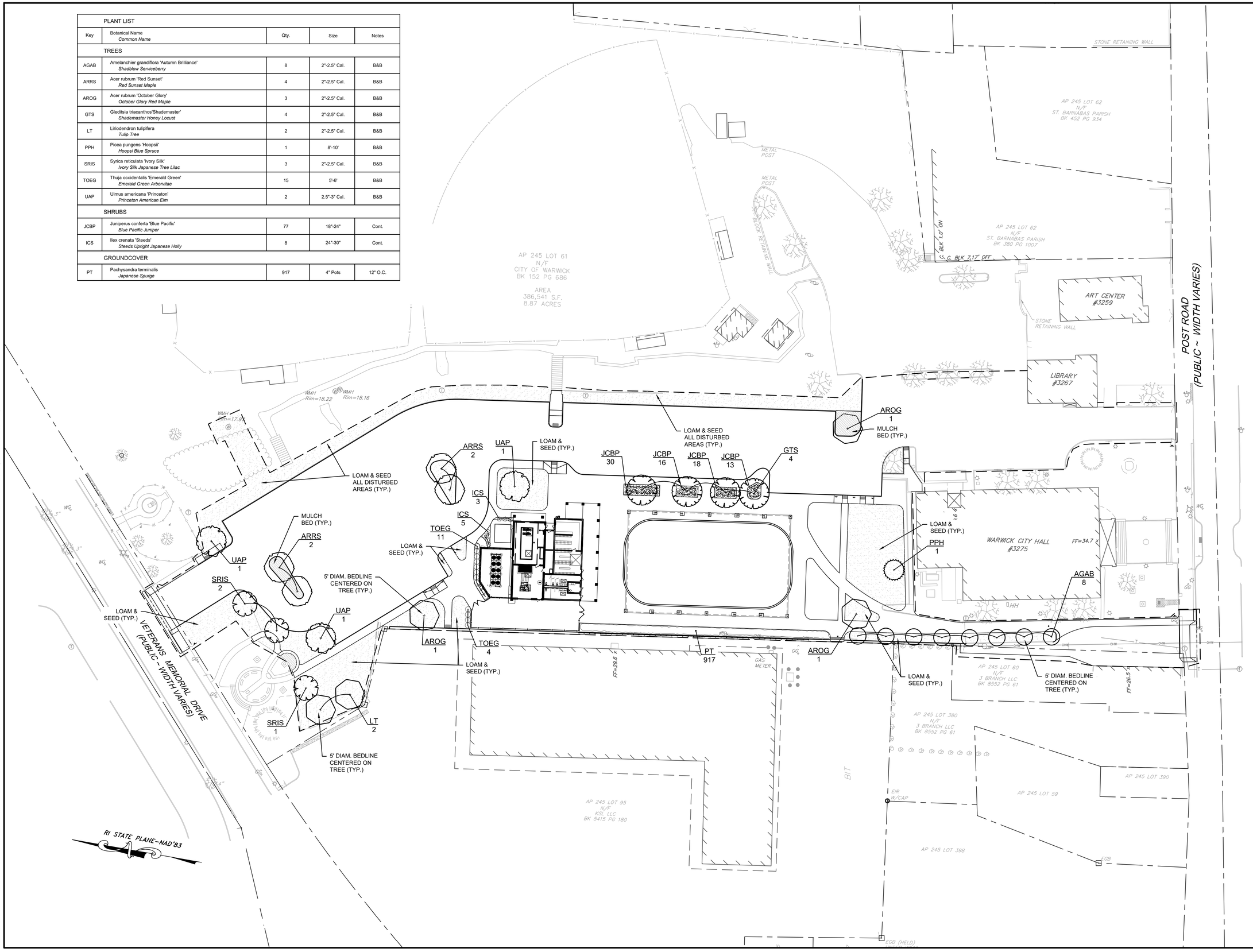
30 0 30 60
SCALE IN FEET: 1"=30'

BID SET

SHEET NO.

3.9

PLANT LIST				
Key	Botanical Name *Common Name*	Qty.	Size	Notes
	TREES			
AGAB	Amelanchier grandiflora 'Autumn Brilliance' *Shadblow Serviceberry*	8	2"-2.5" Cal.	B&B
ARRS	Acer rubrum 'Red Sunset' *Red Sunset Maple*	4	2"-2.5" Cal.	B&B
AROG	Acer rubrum 'October Glory' *October Glory Red Maple*	3	2"-2.5" Cal.	B&B
GTS	Gleditsia triacanthos'Shademaster' *Shademaster Honey Locust*	4	2"-2.5" Cal.	B&B
LT	Liriodendron tulipifera *Tulip Tree*	2	2"-2.5" Cal.	B&B
PPH	Picea pungens 'Hoopsii' *Hoopsi Blue Spruce*	1	8'-10'	B&B
SRIS	Syrica reticulata 'Ivory Silk' *Ivory Silk Japanese Tree Lilac*	3	2"-2.5" Cal.	B&B
TOEG	Thuja occidentalis 'Emerald Green' *Emerald Green Arborvitae*	15	5'-6'	B&B
UAP	Ulmus americana 'Princeton' *Princeton American Elm*	2	2.5"-3" Cal.	B&B
	SHRUBS			
JCBP	Juniperus conferta 'Blue Pacific' *Blue Pacific Juniper*	77	18"-24"	Cont.
ICS	Ilex crenata 'Steeds' *Steeds Upright Japanese Holly*	8	24"-30"	Cont.
	GROUNDCOVER			
PT	Pachysandra terminalis *Japanese Spurge*	917	4" Pots	12" O.C.



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PROJECT

City Hall Plaza

Warwick, RI

TITLE

PLANTING PLAN

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SCALE

30 0 30 60

SCALE IN FEET: 1"=30'

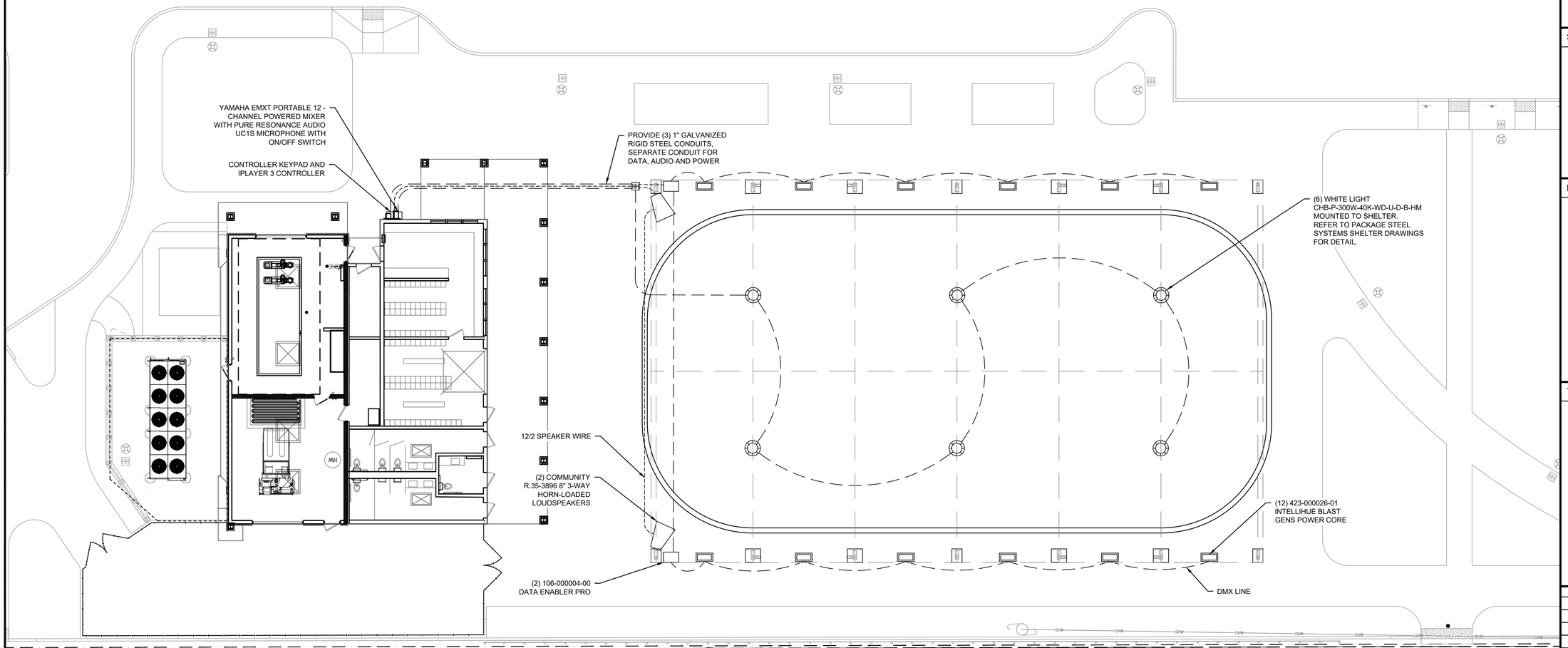
BID SET

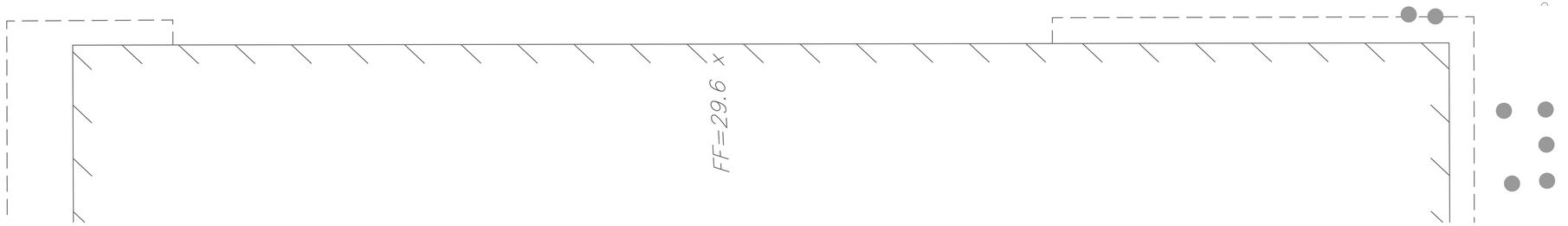
SHEET NO.

4.1

LIGHTING LIST:
(12) 423-000026-01 INTELLIHUE BLAST GENS POWER CORE
(6) WHITE LIGHT CHB-P-300W-40K-WD-U-D-B-HM
(2) 106-000004-00 DATA ENABLER PRO
(1) CONTROLLER KEYPAD
(1) IPLAYER 3 CONTROLLER

AUDIO EQUIPMENT LIST:
(2) COMMUNITY R.35-3896 8" 3-WAY HORN-LOADED LOUDSPEAKER
(1) YAMAHA EMX7 PORTABLE 12-CHANNEL POWERED MIXER
(1) PURE RESONANCE AUDIO UC1S MICROPHONE WITH ON/OFF SWITCH
(1) ATLAS SOUND DS7E ADJUSTABLE HEIGHT DESKTOP MIC STAND
(1) CBI MLC-20 XLR MICROPHONE CABLE - 20FT.
(2) PROCO NL4FX 4 POLE SPEAKON CABLE CONNECTORS
(300') WEST PENN AQ227 12/2 FIRE-ALARM SPEAKER WIRE





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REGISTERED PROFESSIONAL

SUBCONSULTANT

PROJECT
City Hall Plaza
Warwick, RI

TITLE
SPECIALTY LIGHTING PLAN ENLARGEMENT

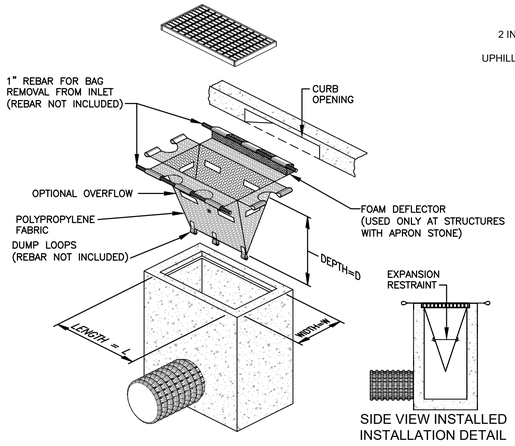
NO.	REVISIONS	DATE

DRAWN BY:	CC / NS
DESIGNED BY:	NS / RC
CHECKED BY:	RC
ISSUE DATE:	01/31/2024
BETA JOB NO.:	10694

SCALE

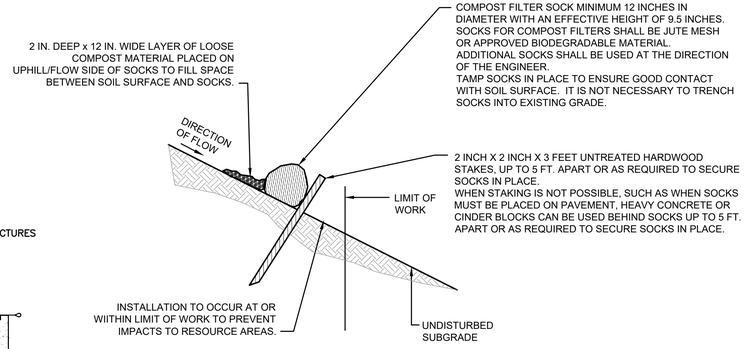
BID SET

SHEET NO.
4.2



INLET SEDIMENT CONTROL DEVICE (WITH OPTIONAL CURB DEFLECTOR)

NOT TO SCALE

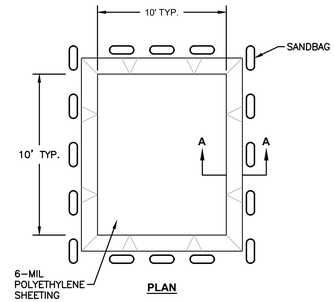


NOTES:

1. PROVIDE A MINIMUM SOCK DIAMETER OF 12 INCHES FOR SLOPES UP TO 50 FEET IN LENGTH WITH A SLOPE RATIO OF 3H:1V OR STEEPER. LONGER SLOPES OF 3H:1V MAY REQUIRE LARGER SOCK DIAMETER OR ADDITIONAL COURSING OF FILTER SOCKS TO CREATE A FILTER BERM. REFER TO MANUFACTURER'S RECOMMENDATIONS FOR SITUATIONS WITH LONGER OR STEEPER SLOPES.
2. INSTALL SOCKS ALONG CONTOURS AND PERPENDICULAR TO SHEET OR CONCENTRATED FLOW.
3. DO NOT INSTALL IN PERENNIAL, EPHEMERAL OR INTERMITTENT STREAMS.
4. CONFIGURE SOCKS AROUND EXISTING SITE FEATURES TO MINIMIZE SITE DISTURBANCE AND MAXIMIZE CAPTURE AREA OF STORMWATER RUN-OFF.

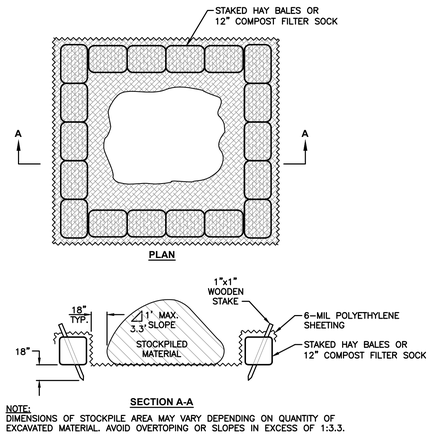
COMPOST FILTER SOCK

NOT TO SCALE



CONCRETE WASHOUT AREA

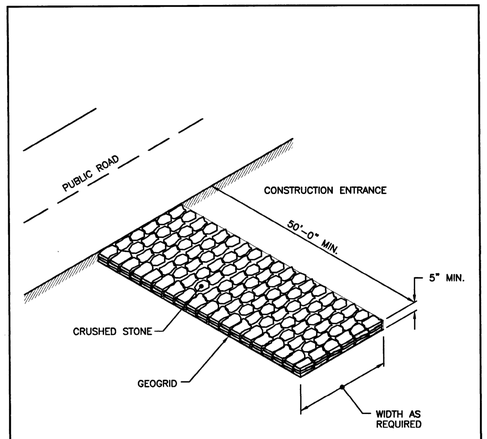
NOT TO SCALE



NOTE:
DIMENSIONS OF STOCKPILE AREA MAY VARY DEPENDING ON QUANTITY OF EXCAVATED MATERIAL. AVOID OVERTOPING OR SLOPES IN EXCESS OF 1:3.3.

PLAN OF TEMPORARY STOCKPILED AREA

NOT TO SCALE



NOTE:
SHALL BE IN ACCORDANCE WITH SECTION 211 OF THE R.I. STANDARD SPECIFICATIONS.

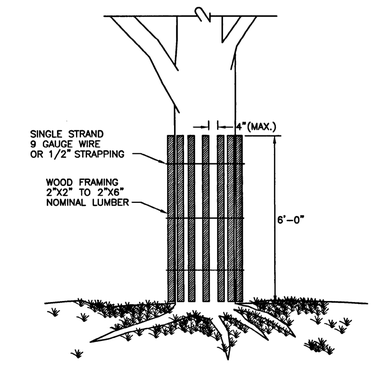
RHODE ISLAND DEPARTMENT OF TRANSPORTATION

REVISIONS NO.	BY	DATE

CONSTRUCTION ACCESS

James K. Capaldi, CHIEF ENGINEER TRANSPORTATION — Edmund F. Parker Jr., CHIEF DESIGN ENGINEER TRANSPORTATION — JUNE 15, 1998 ISSUE DATE

R.I. STANDARD 9.9.0



NOTE:
SHALL BE IN ACCORDANCE WITH SECTION L.11 OF THE STANDARD SPECIFICATIONS.

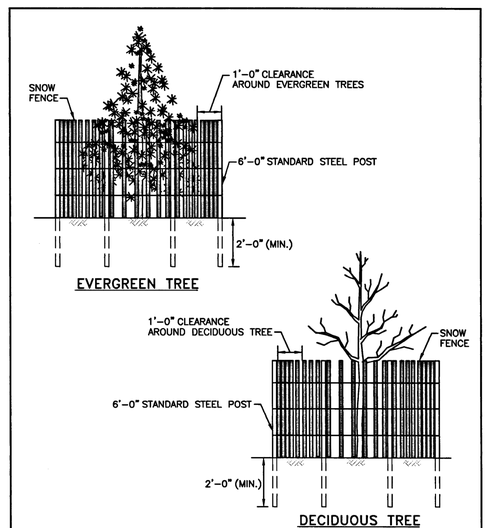
RHODE ISLAND DEPARTMENT OF TRANSPORTATION

REVISIONS NO.	BY	DATE

TREE PROTECTION DEVICE

James K. Capaldi, CHIEF ENGINEER TRANSPORTATION — Edmund F. Parker Jr., CHIEF DESIGN ENGINEER TRANSPORTATION — JUNE 15, 1998 ISSUE DATE

R.I. STANDARD 51.1.0



NOTE:
SHALL BE IN ACCORDANCE WITH SECTION L.11 OF THE R.I. STANDARD SPECIFICATIONS.

RHODE ISLAND DEPARTMENT OF TRANSPORTATION

REVISIONS NO.	BY	DATE

DRIP LINE TREE PROTECTION DEVICE FOR EXISTING TREES

James K. Capaldi, CHIEF ENGINEER TRANSPORTATION — Edmund F. Parker Jr., CHIEF DESIGN ENGINEER TRANSPORTATION — JUNE 15, 1998 ISSUE DATE

R.I. STANDARD 51.1.1

PREPARED BY

BETA
www.BETA-Inc.com

REGISTERED PROFESSIONAL

JARED LINHARES — No. 13145 — REGISTERED PROFESSIONAL ENGINEER — CIVIL — 1-31-24

SUBCONSULTANT

PROJECT

City Hall Plaza

Warwick, RI

TITLE

SITE DETAILS

NO.	REVISIONS	DATE

DRAWN BY:	WC
DESIGNED BY:	TD
CHECKED BY:	JL / KA
ISSUE DATE:	01/31/2024
BETA JOB NO.:	10694

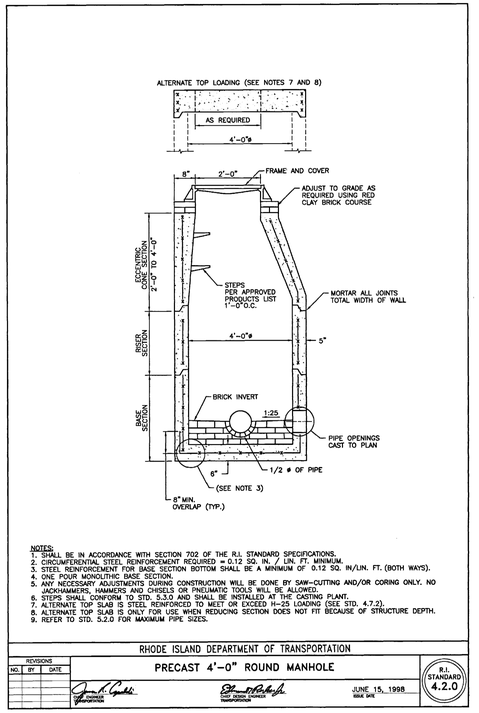
SCALE

AS SHOWN

BID SET

SHEET NO.

5.1



NOTES:
1. SHALL BE IN ACCORDANCE WITH SECTION 702 OF THE R.I. STANDARD SPECIFICATIONS.
2. CIRCUMFERENTIAL STEEL REINFORCEMENT REQUIRED = 0.12 SQ. IN. / LIN. FT. MINIMUM.
3. STEEL REINFORCEMENT FOR BASE SECTION BOTTOM SHALL BE A MINIMUM OF 0.12 SQ. IN/LIN. FT. (BOTH WAYS).
4. ONE POUR MONOLITHIC BASE SECTION.
5. ANY NECESSARY ADJUSTMENTS DURING CONSTRUCTION WILL BE DONE BY SAW-CUTTING AND/OR CORING ONLY. NO JACKHAMMERS, HAMMERS AND CHISELS OR PNEUMATIC TOOLS WILL BE ALLOWED.
6. STEPS SHALL CONFORM TO STD. 5.3.0 AND SHALL BE INSTALLED AT THE CASTING PLANT.
7. ALTERNATE TOP SLAB IS STEEL REINFORCED TO MEET OR EXCEED H-25 LOADING (SEE STD. 4.7.2).
8. ALTERNATE TOP SLAB IS ONLY FOR USE WHEN REDUCING SECTION DOES NOT FIT BECAUSE OF STRUCTURE DEPTH.
9. REFER TO STD. 5.2.0 FOR MAXIMUM PIPE SIZES.

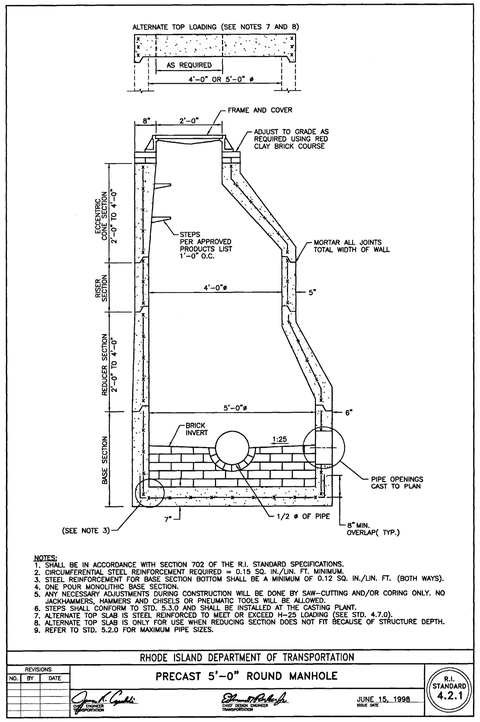
RHODE ISLAND DEPARTMENT OF TRANSPORTATION

REVISIONS NO.	BY	DATE

PRECAST 4'-0" ROUND MANHOLE

JUNE 15, 1998 ISSUE DATE

R.I. STANDARD 4.2.0



NOTES:
1. SHALL BE IN ACCORDANCE WITH SECTION 702 OF THE R.I. STANDARD SPECIFICATIONS.
2. CIRCUMFERENTIAL STEEL REINFORCEMENT REQUIRED = 0.15 SQ. IN./LIN. FT. MINIMUM.
3. STEEL REINFORCEMENT FOR BASE SECTION BOTTOM SHALL BE A MINIMUM OF 0.12 SQ. IN./LIN. FT. (BOTH WAYS).
4. ONE POUR MONOLITHIC BASE SECTION.
5. ANY NECESSARY ADJUSTMENTS DURING CONSTRUCTION WILL BE DONE BY SAW-CUTTING AND/OR CORING ONLY. NO JACKHAMMERS, HAMMERS AND CHISELS OR PNEUMATIC TOOLS WILL BE ALLOWED.
6. STEPS SHALL CONFORM TO STD. 5.3.0 AND SHALL BE INSTALLED AT THE CASTING PLANT.
7. ALTERNATE TOP SLAB IS STEEL REINFORCED TO MEET OR EXCEED H-25 LOADING (SEE STD. 4.7.0).
8. ALTERNATE TOP SLAB IS ONLY FOR USE WHEN REDUCING SECTION DOES NOT FIT BECAUSE OF STRUCTURE DEPTH.
9. REFER TO STD. 5.2.0 FOR MAXIMUM PIPE SIZES.

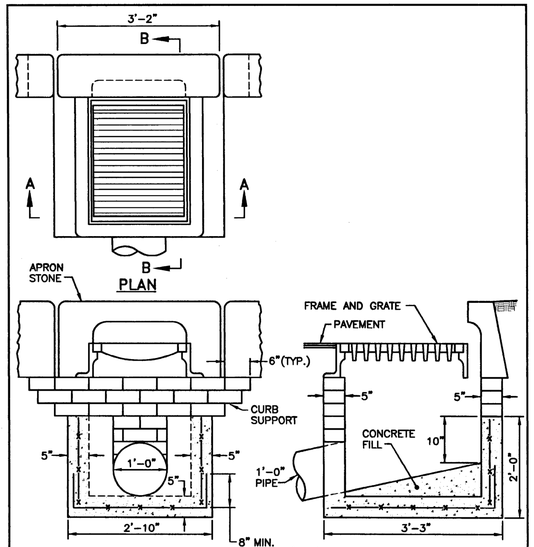
RHODE ISLAND DEPARTMENT OF TRANSPORTATION

REVISIONS NO.	BY	DATE

PRECAST 5'-0" ROUND MANHOLE

JUNE 15, 1998 ISSUE DATE

R.I. STANDARD 4.2.1



NOTES:
1. SHALL BE IN ACCORDANCE WITH SECTION 702 OF THE R.I. STANDARD SPECIFICATIONS.
2. MINIMUM REQUIRED CONCRETE REINFORCEMENT = 0.12 SQ. IN./LIN. FT. (EACH WAY).
3. MINIMUM COVER ON REINFORCEMENT SHALL BE 2".

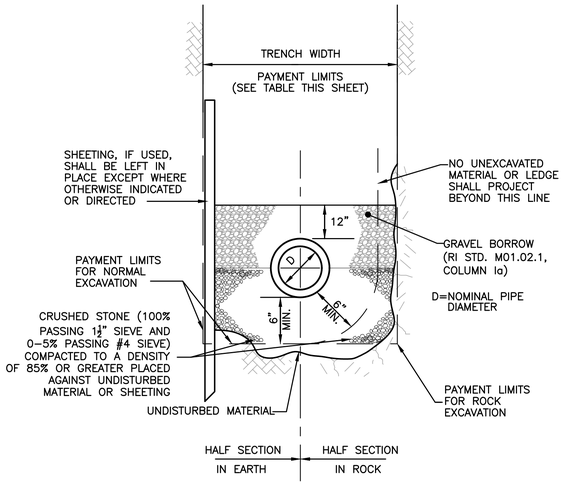
RHODE ISLAND DEPARTMENT OF TRANSPORTATION

REVISIONS NO.	BY	DATE

PRECAST CONCRETE DROP INLET LATERAL OUTLET

JUNE 15, 1998 ISSUE DATE

R.I. STANDARD 4.5.1

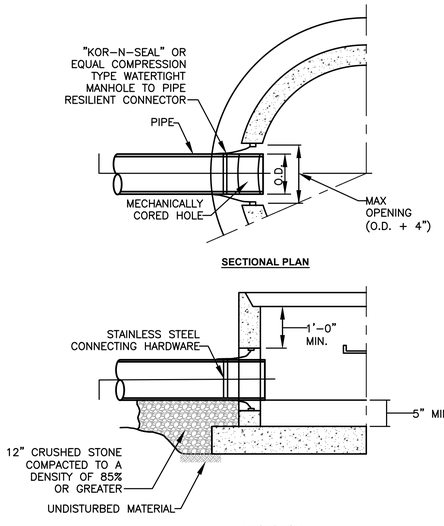


DRAIN TRENCH SECTION

MAXIMUM PAYMENT LIMITS						
DIAMETER OF PIPE D IN INCHES	TRENCH WIDTH IN FEET		TEMPORARY TRENCH PAVEMENT WIDTH IN FEET		PERMANENT TRENCH PAVEMENT WIDTH IN FEET*	
	TRENCH DEPTH		TRENCH DEPTH		TRENCH DEPTH	
	< OR = 10'	> 10' TO 20'	< OR = 10'	> 10' TO 20'	< OR = 10'	> 10' TO 20'
12 AND SMALLER	5.00	6.00	6.00	7.00	8.00	9.00
15	5.25	6.25	6.25	7.25	8.25	9.25
18	5.50	6.50	6.50	7.50	8.50	9.50
21	5.75	6.75	6.75	7.75	8.75	9.75
24	6.00	7.00	7.00	8.00	9.00	10.00
27	6.25	7.25	7.25	8.25	9.25	10.25
30	6.50	7.50	7.50	8.50	9.50	10.50
36	7.00	8.00	8.00	9.00	10.00	11.00
42	7.50	8.50	8.50	9.50	10.50	11.50
48	8.00	9.00	9.00	10.00	11.00	12.00
54	8.50	9.50	9.50	10.50	11.50	12.50
60	9.00	10.00	10.00	11.00	12.00	13.00
66	9.50	10.50	10.50	11.50	12.50	13.50
72	10.00	11.00	11.00	12.00	13.00	14.00

NOTES
1. PERMANENT TRENCH PAVEMENT INCLUDES 1' CUT BACK OF TEMPORARY PAVEMENT ALONG EACH SIDE OF THE TRENCH
2. TRENCH DEPTH MEASURED FROM THE EXISTING GROUND SURFACE TO 6" BELOW THE BOTTOM OF THE CONSTRUCTED PIPE.
3. QUANTITIES FOR PAYMENT SHALL BE IN ACCORDANCE WITH THE ABOVE LIMITS OR THE ACTUAL WIDTHS, WHICHEVER IS LESS.

TRENCH WIDTH SCHEDULE
NOT TO SCALE



CORED HOLE AND RESILIENT SEAL FOR CONNECTION PIPES TO EXISTING MANHOLES
NOT TO SCALE

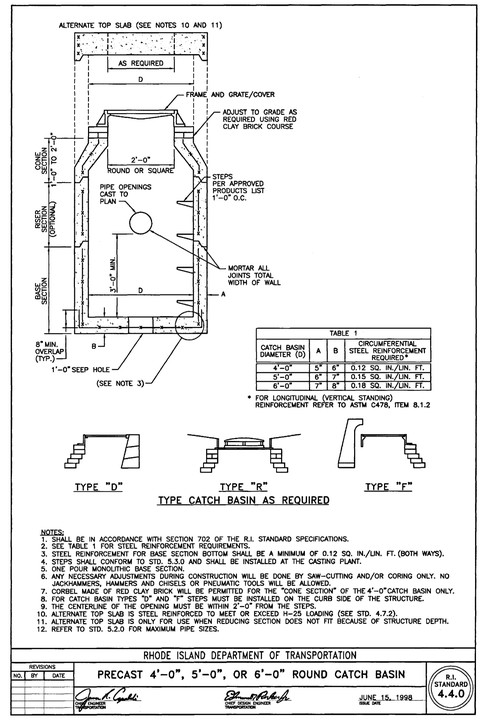


TABLE 1

CATCH BASIN DIAMETER (D)	A	B	CIRCUMFERENTIAL STEEL REINFORCEMENT REQUIRED*
4'-0"	5"	6"	0.12 SQ. IN./LIN. FT.
5'-0"	6"	7"	0.15 SQ. IN./LIN. FT.
6'-0"	7"	8"	0.18 SQ. IN./LIN. FT.

* FOR LONGITUDINAL (VERTICAL STANDING) REINFORCEMENT REFER TO ASTM C478, ITEM 8.1.2

NOTES:
1. SHALL BE IN ACCORDANCE WITH SECTION 702 OF THE R.I. STANDARD SPECIFICATIONS.
2. SEE TABLE 1 FOR STEEL REINFORCEMENT REQUIREMENTS.
3. STEEL REINFORCEMENT FOR BASE SECTION BOTTOM SHALL BE A MINIMUM OF 0.12 SQ. IN./LIN. FT. (BOTH WAYS).
4. STEPS SHALL CONFORM TO STD. 5.3.0 AND SHALL BE INSTALLED AT THE CASTING PLANT.
5. ONE POUR MONOLITHIC BASE SECTION.
6. ANY NECESSARY ADJUSTMENTS DURING CONSTRUCTION WILL BE DONE BY SAW-CUTTING AND/OR CORING ONLY. NO JACKHAMMERS, HAMMERS AND CHISELS OR PNEUMATIC TOOLS WILL BE ALLOWED.
7. CORBEL MADE OF RED CLAY BRICK WILL BE PERMITTED FOR THE "CONE SECTION" OF THE 4'-0"CATCH BASIN ONLY.
8. FOR CATCH BASIN TYPES "D" AND "F" STEPS MUST BE INSTALLED ON THE CURB SIDE OF THE STRUCTURE.
9. THE CENTERLINE OF THE OPENING MUST BE WITHIN 2'-0" FROM THE STEPS.
10. ALTERNATE TOP SLAB IS STEEL REINFORCED TO MEET OR EXCEED H-25 LOADING (SEE STD. 4.7.2).
11. ALTERNATE TOP SLAB IS ONLY FOR USE WHEN REDUCING SECTION DOES NOT FIT BECAUSE OF STRUCTURE DEPTH.
12. REFER TO STD. 5.2.0 FOR MAXIMUM PIPE SIZES.

RHODE ISLAND DEPARTMENT OF TRANSPORTATION

REVISIONS NO.	BY	DATE

PRECAST 4'-0", 5'-0", OR 6'-0" ROUND CATCH BASIN

JUNE 15, 1998 ISSUE DATE

R.I. STANDARD 4.4.0

PREPARED BY

BETA
www.BETA-Inc.com

REGISTERED PROFESSIONAL

JARED LINHARES
No. 13145
REGISTERED PROFESSIONAL ENGINEER
CIVIL 1-31-24

SUBCONSULTANT

PROJECT

City Hall Plaza

Warwick, RI

TITLE

SITE DETAILS

NO.	REVISIONS	DATE

DRAWN BY:	WC
DESIGNED BY:	TD
CHECKED BY:	JL / KA
ISSUE DATE:	01/31/2024
BETA JOB NO.:	10694

SCALE

AS SHOWN

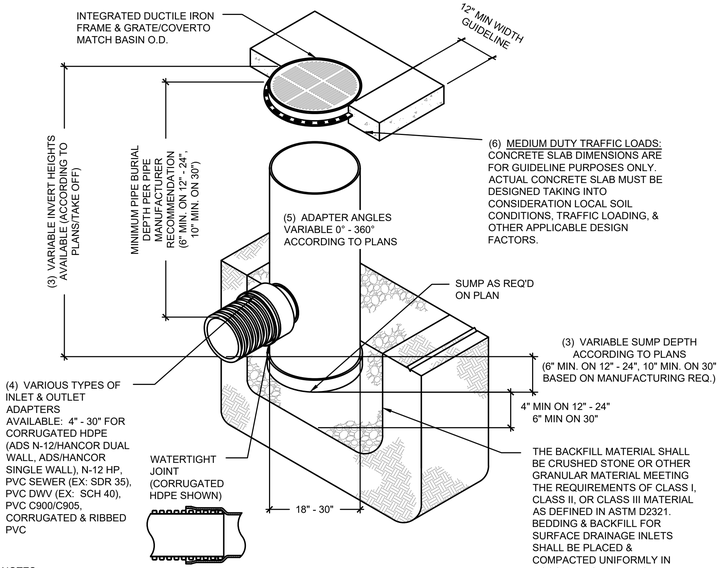
UNLESS OTHERWISE NOTED OR CHANGED BY REPRODUCTION

BID SET

SHEET NO.

5.2

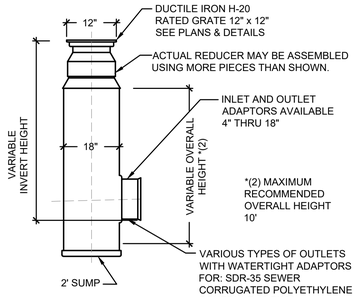
2/2/2024 2:15 PM \\BETA-INC.COM\RIGL\PLANNING LANDSCAPE\10000S\10694 - WARWICK, RI - CITY HALL PLAZA\AUTOCAD FILES\PLAN SET\10964 DETAILS CIVIL.DWG (BETA STD BW.CTB)



NOTES:
1. 12" PEDESTRIAN GRATES SHALL BE DUCTILE IRON PER ASTM A536 GRADE 70-50-05.
2. 12" " FRAMES SHALL BE DUCTILE IRON PER ASTM A536 GRADE 70-50-05.
3. DRAIN BASIN TO BE CUSTOM MANUFACTURED ACCORDING TO PLAN DETAILS. RISERS ARE NEEDED FOR BASINS OVER 84" DUE TO SHIPPING RESTRICTIONS.
4. DRAINAGE CONNECTION STUB JOINT TIGHTNESS SHALL CONFORM TO ASTM D3212 FOR CORRUGATED HDPE (ADS N-12/HANCOR DUAL WALL), N-12 HP, & PVC SEWER (4" - 24").
5. ADAPTERS CAN BE MOUNTED 0° TO 360°. TO DETERMINE MINIMUM ANGLE BETWEEN ADAPTERS SEE DETAILS.
6. 12" " PEDESTRIAN GRATES AND COVERS SHALL MEET H-20 LOAD RATING.
7. PROVIDE ENVIROHOODS (TRAP HOODS) AT ALL AREA DRAINS 18" IN DIA. AND GREATER.

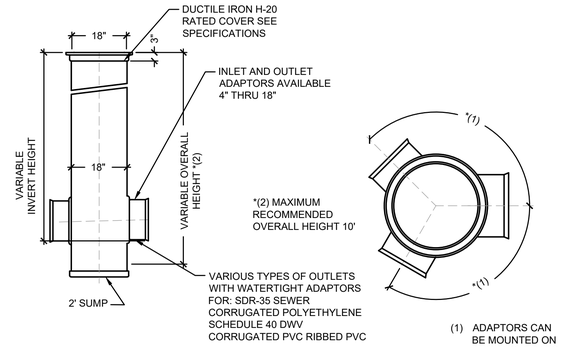
AREA DRAIN/DMH WITH PED. GRATE/COVER AT HARDSCAPE AREAS

SCALE: 1/2"=1'



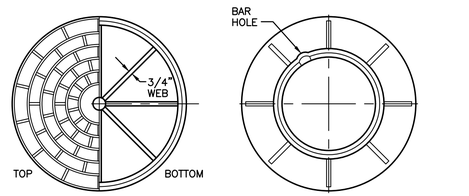
AREA DRAIN

SCALE: NTS



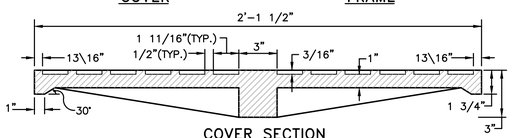
DRAINAGE MANHOLE

SCALE: NTS

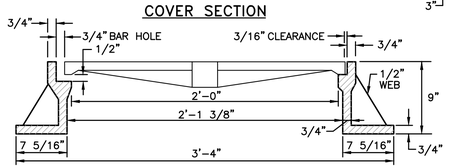


COVER

FRAME



COVER SECTION



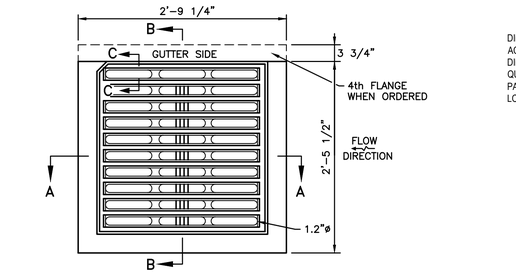
FRAME SECTION

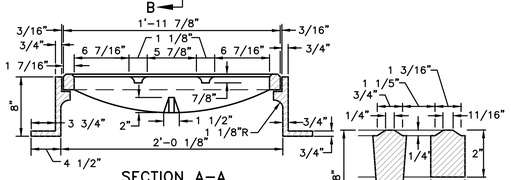
NOTES:
1. FRAME AND GRATE SHALL CONFORM TO SECTION M.04 OF THE R.I. STANDARD SPECIFICATIONS.
2. FRAME AND COVER SEATS MUST HAVE MACHINE FINISH.

HEAVY-DUTY ROUND FRAME AND COVER

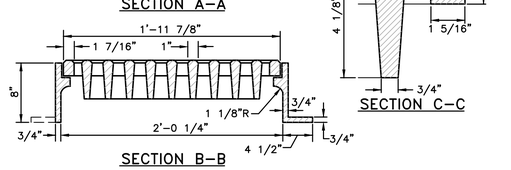
NOT TO SCALE

R.I. STANDARD 6.2.1

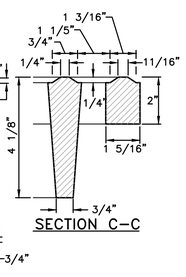




SECTION A-A



SECTION B-B

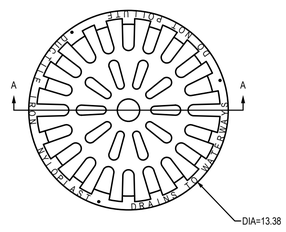


SECTION C-C

SQUARE FRAME AND GRATE (BICYCLE SAFE)

NOT TO SCALE

R.I. STANDARD 6.3.2

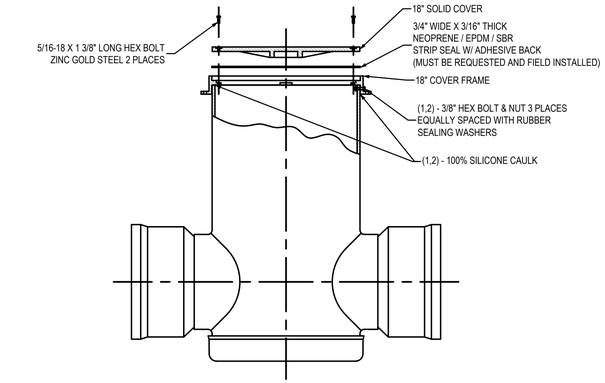


SECTION A-A

DIMENSIONS ARE FOR REFERENCE ONLY
ACTUAL DIMENSIONS MAY VARY
DIMENSIONS ARE IN INCHES
QUALITY: MATERIALS SHALL CONFORM TO ASTM A536 GRADE 70-50-05
PAINT: CASTINGS ARE FURNISHED WITH A BLACK PAINT
LOCKING DEVICE AVAILABLE UPON REQUEST

12" DOME LOCKING GRATE ASSEMBLY FOR PLANTING AREA DRAIN

SCALE: NOT TO SCALE

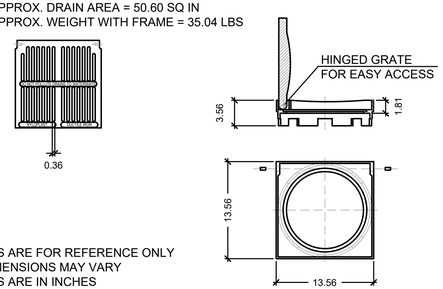


(1) - 3/8" HEX BOLTS WITH SEALING WASHERS AND SILICONE CAULK ARE NOT PROVIDED BY NYLOPLAST
(2) - THE PROCESS OF SEALING AND, IF DESIRED, BOLTING FRAME TO BASIN MUST BE DONE IN THE FIELD

18" LOCKING FRAME & COVER BOLTED TO DRAIN MANHOLE

SCALE: NOT TO SCALE

APPROX. DRAIN AREA = 50.60 SQ IN
APPROX. WEIGHT WITH FRAME = 35.04 LBS



DIMENSIONS ARE FOR REFERENCE ONLY
ACTUAL DIMENSIONS MAY VARY
DIMENSIONS ARE IN INCHES
GRATE MEETS H-20 LOAD RATING
QUALITY: MATERIALS SHALL CONFORM TO ASTM A536 GRADE 70-50-05
PAINT: CASTINGS ARE FURNISHED WITH A BLACK PAINT
SIZE OF OPENING MEETS REQUIREMENTS OF AMERICAN DISABILITY ACT AS STATED IN FEDERAL REGISTER PART III, DEPARTMENT OF JUSTICE, 28 CFR PART 36.
LOCKING DEVICE TO BE PROVIDED.

12" SQUARE CAST IRON FRAME AND GRATE FOR AREA DRAIN

SCALE: 1 1/2"=1'

PREPARED BY

BETA
www.BETA-Inc.com

REGISTERED PROFESSIONAL

JARED LINHARES
No. 13145
REGISTERED PROFESSIONAL ENGINEER
CIVIL 1-31-24

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BETA JOB NO.:	10694

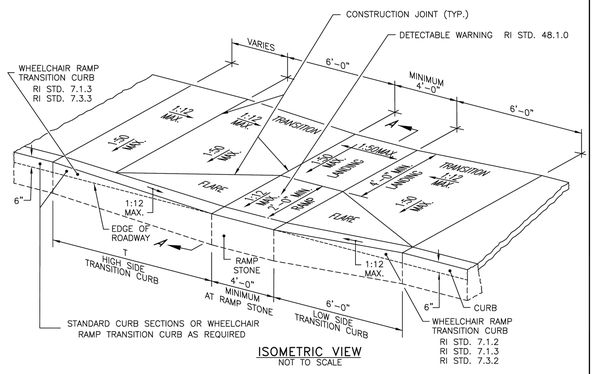
SCALE

AS SHOWN

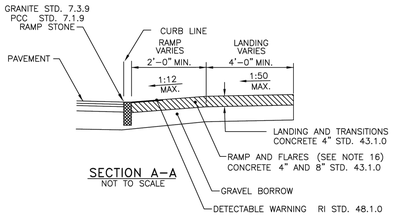
BID SET

SHEET NO.

5.3



ISOMETRIC VIEW
NOT TO SCALE



SECTION A–A
NOT TO SCALE

ROADWAY PROFILE GRADE	T (FT.)
0.00	6.0
0.01	7.0
0.02	8.0
0.03	9.5
0.04	11.5
0.05	15.0

NOTES:
1. SHALL BE IN ACCORDANCE WITH SECTION 905 OF THE RI STANDARD SPECIFICATIONS.
2. WHEN ANY OBSTRUCTION LOCATED IN THE SIDEWALK FALLS WITHIN A CROSSWALK AREA, THE WHEELCHAIR RAMP SHALL BE PLACED SUCH THAT THE OBSTRUCTION FALLS OUTSIDE OF THE RAMP.
3. AT NO TIME IS ANY PART OF THE WHEELCHAIR RAMP TO BE LOCATED OUTSIDE OF THE CROSSWALK, AND IT IS TO BE CENTERED WHENEVER POSSIBLE.
4. DRAINAGE FACILITIES ARE TO BE LOCATED UP–GRADE OF ALL WHEELCHAIR RAMPS.
5. LOCATION OF WHEELCHAIR RAMPS IS AS SHOWN ON CONTRACT DRAWINGS.
6. IN NO INSTANCE SHALL THE SIDEWALK CROSS SLOPE EXCEED 1:50 EXCEPT WITHIN THE RAMP AREA.
7. AN UNOBSTRUCTED PATH OF TRAVEL WITH A MINIMUM WIDTH OF 4'–0" SHALL BE MAINTAINED.
8. THE WHEELCHAIR RAMP SLOPE AND SIDE SLOPES (TRANSITIONS), MUST NOT BE STEEPER THAN 1:12. HOWEVER, THESE SLOPES MAY BE FLATTER THAN 1:12 WHEN WARRANTED BY SURROUNDING CONDITIONS.
9. WHERE THE ROAD PROFILE EXCEEDS 5% THE HIGH SIDE TRANSITION LENGTH (T) SHALL BE EIGHTEEN FEET (18'–0").
10. IN NO CASE, WHERE A STOP LINE IS WARRANTED, SHALL A RAMP BE PLACED BEHIND THE STOP LINE.
11. THE ENTRANCE OF THE WHEELCHAIR RAMP SHALL BE FLUSH WITH THE ROADWAY.
12. THE WHEELCHAIR RAMP SHALL BE CENTERED RADIALLY, OPPOSITE THE RADIUS POINT WHEN POSSIBLE.
13. MINIMUM LENGTH OF STRAIGHT OR CIRCULAR FILLER PIECES TO BE 3'–0" (GREATER LENGTHS PREFERRED).
14. ALL REQUIRED CUTTING OF CURB PIECES TO BE PAID FOR UNDER COST OF CURB.
15. DETECTABLE WARNINGS TO BE PAID FOR UNDER SECTION 942 OF THE RI STANDARD SPECIFICATIONS
16. 8" CONCRETE DEPTH FOR RADIUS WHEELCHAIR RAMPS ONLY. USE 4" DEPTH FOR TANGENT (MID–BLOCK) LOCATIONS.

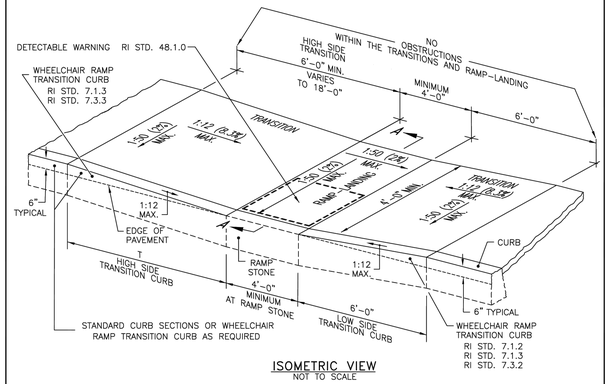
RHODE ISLAND DEPARTMENT OF TRANSPORTATION

REVISIONS		
NO.	BY	DATE
1	MLP	Oct 2005
2	MLP	Jun. 2008
3	MLP	Sep. 2012

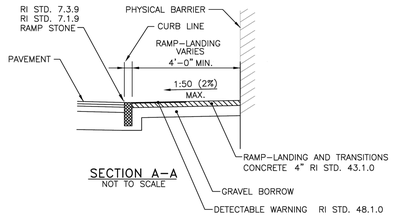
WHEELCHAIR RAMP

CHIEF ENGINEER TRANSPORTATION — CHIEF DESIGN ENGINEER TRANSPORTATION — JUNE 15, 1998 ISSUE DATE

R.I. STANDARD 43.3.0



ISOMETRIC VIEW
NOT TO SCALE



SECTION A–A
NOT TO SCALE

ROADWAY PROFILE GRADE	T (FT.)
0.00	6.0
0.01	7.0
0.02	8.0
0.03	9.5
0.04	11.5
0.05	15.0
> 0.05	18.0

NOTES:
1. THIS DETAIL MAY BE USED WHEN A PHYSICAL BARRIER IS PRESENT AND THERE IS INSUFFICIENT ROOM TO PROPERLY CONSTRUCT AN ADA ACCESSIBLE RAMP AND LANDING; A TECHNICAL INFEASIBILITY FINDING IS REQUIRED.
2. SHALL BE IN ACCORDANCE WITH SECTION 905 OF THE RI STANDARD SPECIFICATIONS.
3. THE RAMP–LANDING AND TRANSITIONS SHALL BE FREE OF OBSTRUCTIONS.
4. LOCATION OF THE RAMP–LANDING IS AS SHOWN ON CONTRACT DRAWINGS.
5. AN UNOBSTRUCTED PEDESTRIAN ACCESS ROUTE (PATH OF TRAVEL) WITH A MINIMUM WIDTH OF 4'–0" SHALL BE MAINTAINED.
6. THE ENTRANCE OF THE RAMP–LANDING SHALL BE FLUSH WITH THE PAVEMENT.
7. MINIMUM LENGTH OF STRAIGHT OR CIRCULAR FILLER PIECES TO BE 3'–0" (GREATER LENGTHS PREFERRED).
8. ALL REQUIRED CUTTING OF CURB PIECES TO BE PAID FOR UNDER COST OF CURB.
9. DETECTABLE WARNINGS TO BE PAID FOR UNDER SECTION 942 OF THE RI STANDARD SPECIFICATIONS

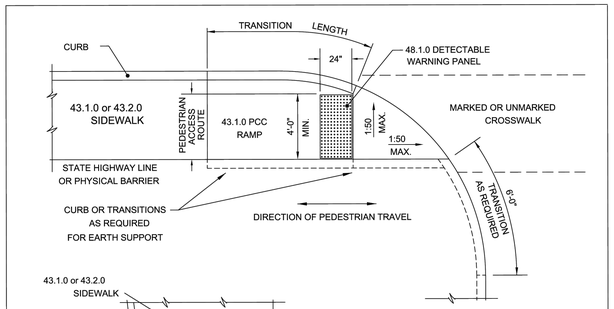
RHODE ISLAND DEPARTMENT OF TRANSPORTATION

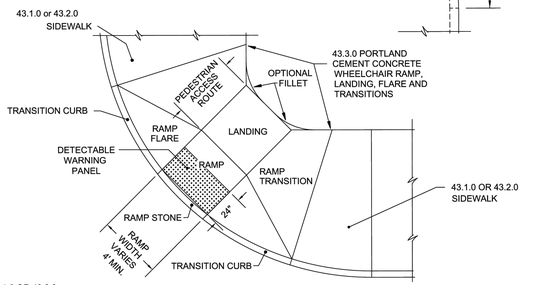
REVISIONS		
NO.	BY	DATE

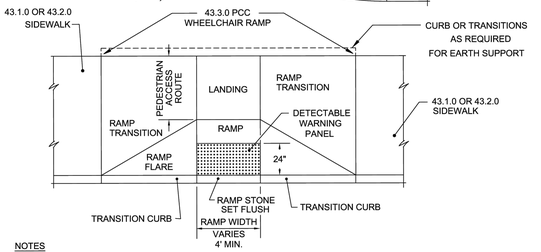
RAMP–LANDING FOR NARROW SIDEWALK

CHIEF ENGINEER TRANSPORTATION — CHIEF DESIGN ENGINEER TRANSPORTATION — MARCH 31, 2015 ISSUE DATE

R.I. STANDARD 43.3.2







NOTES
1. DETECTABLE WARNING PANEL SHALL BE IN ACCORDANCE WITH SECTION 942 OF THE RHODE ISLAND STANDARD SPECIFICATIONS; PANEL TO MATCH RAMP WIDTH.

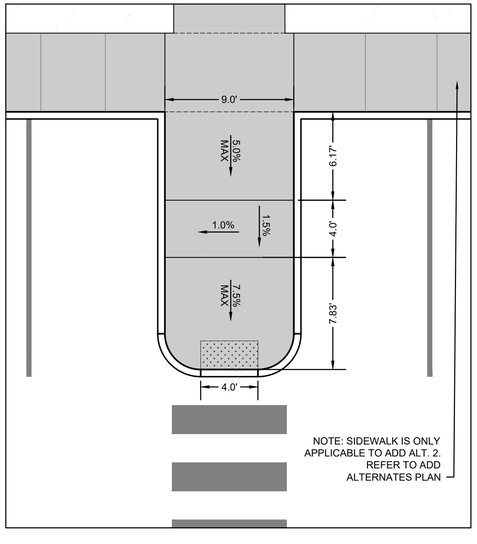
RHODE ISLAND DEPARTMENT OF TRANSPORTATION

REVISIONS		
NO.	BY	DATE
1	MLP	Mar 2005
2	MLP	Sep 2012

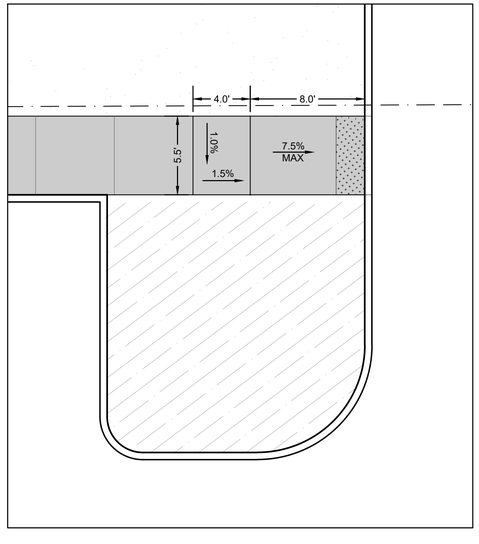
DETECTABLE WARNING PANEL PLACEMENT

CHIEF ENGINEER TRANSPORTATION — CHIEF DESIGN ENGINEER TRANSPORTATION — JUNE 15, 1998 ISSUE DATE

R.I. STANDARD 48.1.0

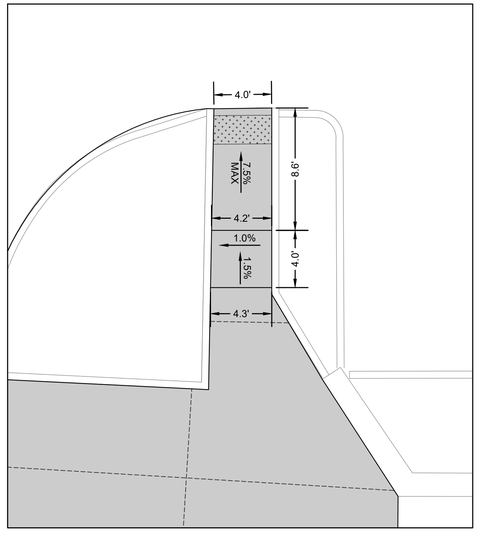


WHEELCHAIR RAMP DETAIL 1
1" = 5'

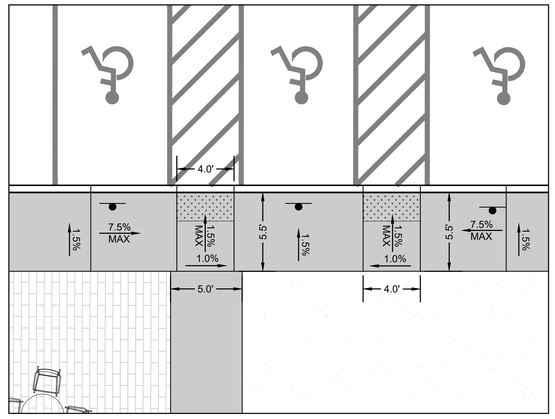


WHEELCHAIR RAMP DETAIL 2
1" = 5'

NOTE:
DETAIL IS ONLY APPLICABLE TO ADD ALT. 2. REFER TO ADD ALTERNATES PLAN



WHEELCHAIR RAMP DETAIL 3
1" = 5'



WHEELCHAIR RAMP DETAIL 4 & 5
1" = 5'

PREPARED BY

BETA
www.BETA-Inc.com

REGISTERED PROFESSIONAL

JARED LINHARES — No. 13145 — REGISTERED PROFESSIONAL ENGINEER CIVIL — 1-31-24

SUBCONSULTANT

PROJECT

City Hall Plaza

Warwick, RI

TITLE

SITE DETAILS

NO.	REVISIONS	DATE

DRAWN BY:	WC
DESIGNED BY:	TD
CHECKED BY:	JL / KA
ISSUE DATE:	01/31/2024
BETA JOB NO.:	10694

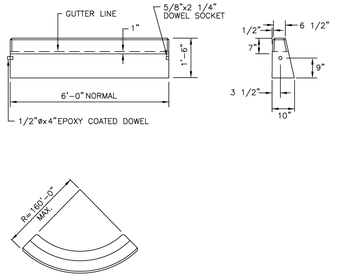
SCALE

AS SHOWN

BID SET

SHEET NO.

5.4



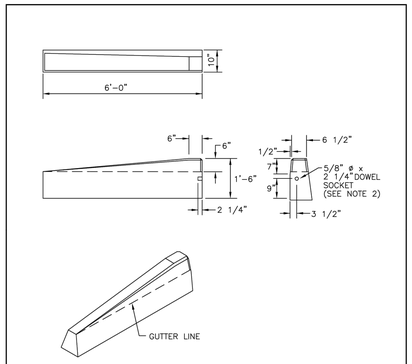
CIRCULAR CURB

NOTES:
1. SHALL BE IN ACCORDANCE WITH SECTION 906 OF THE R.I. STANDARD SPECIFICATIONS.
2. MINIMUM LENGTH OF STRAIGHT OR CIRCULAR FILLER PIECES TO BE 3'-0".
3. EXPOSED SURFACES TO HAVE A SPONGE FLOAT FINISH.
4. CIRCULAR CURB IS REQUIRED ON CURVES WITH RADII OF 160'-0" OR LESS. STRAIGHT CURB TO BE USED ON CURVES OF MORE THAN 160'-0" RADIUS.
5. EXPOSED EDGES TO HAVE A 3/4" CHAMFER.

RHODE ISLAND DEPARTMENT OF TRANSPORTATION

REVISIONS			PRECAST CONCRETE CURB	R.I. STANDARD 7.1.0
NO.	BY	DATE		
1	MLP	Mar 05		

CHIEF ENGINEER, CHIEF DESIGN ENGINEER, TRANSPORTATION — JUNE 15, 1998 ISSUE DATE

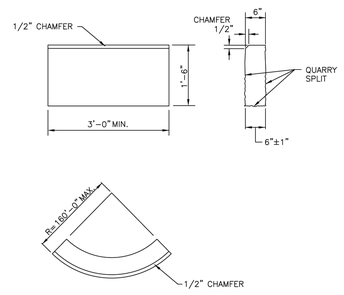


NOTES:
1. SHALL BE IN ACCORDANCE WITH SECTION 906 OF THE R.I. STANDARD SPECIFICATIONS.
2. DRAWING SHOWS TRANSITION CURB FOR ONE DIRECTION. FOR OTHER DIRECTION USE OPPOSITE HAND AND INCLUDE A 1/2" ø x 4" EPOXY COATED DOWEL.
3. EXPOSED SURFACES TO HAVE A SPONGE FLOAT FINISH.
4. EXPOSED EDGES TO HAVE A 3/4" CHAMFER.

RHODE ISLAND DEPARTMENT OF TRANSPORTATION

REVISIONS			6'-0" PRECAST CONCRETE TRANSITION CURB	R.I. STANDARD 7.1.2
NO.	BY	DATE		
1	MLP	Mar 05		

CHIEF ENGINEER, CHIEF DESIGN ENGINEER, TRANSPORTATION — JUNE 15, 1998 ISSUE DATE



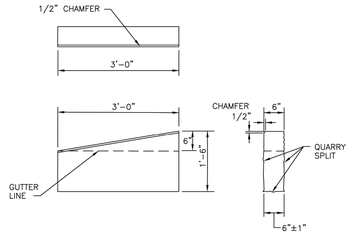
CIRCULAR CURB

NOTES:
1. SHALL BE IN ACCORDANCE WITH SECTION 906 OF THE R.I. STANDARD SPECIFICATIONS.
2. TOP SURFACE TO BE DRESSED BY SAW. REMAINDER MAY BE QUARRY SPLIT.
3. MINIMUM LENGTH OF STRAIGHT OR CIRCULAR PIECES TO BE 3'-0".
4. CIRCULAR CURB IS REQUIRED ON CURVES WITH RADII OF 160'-0" OR LESS. STRAIGHT CURB TO BE USED ON CURVES OF MORE THAN 160'-0" RADIUS.

RHODE ISLAND DEPARTMENT OF TRANSPORTATION

REVISIONS			GRANITE CURB	R.I. STANDARD 7.3.0
NO.	BY	DATE		
1	MLP	Mar 2005		
2	MLP	Sep 2012		

CHIEF ENGINEER, CHIEF DESIGN ENGINEER, TRANSPORTATION — JUNE 15, 1998 ISSUE DATE

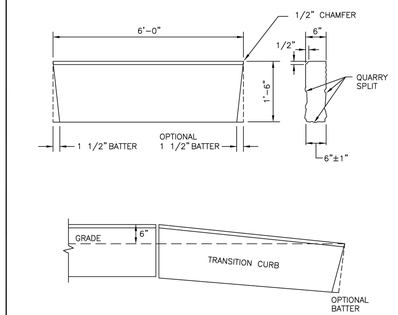


NOTES:
1. SHALL BE IN ACCORDANCE WITH SECTION 906 OF THE R.I. STANDARD SPECIFICATIONS.
2. TOP SURFACE TO BE DRESSED BY SAW. REMAINDER MAY BE QUARRY SPLIT.

RHODE ISLAND DEPARTMENT OF TRANSPORTATION

REVISIONS			3'-0" GRANITE TRANSITION CURB	R.I. STANDARD 7.3.1
NO.	BY	DATE		
1	MLP	Mar 2005		
2	MLP	Jun 2010		
3	MLP	Sep 2012		

CHIEF ENGINEER, CHIEF DESIGN ENGINEER, TRANSPORTATION — JUNE 15, 1998 ISSUE DATE

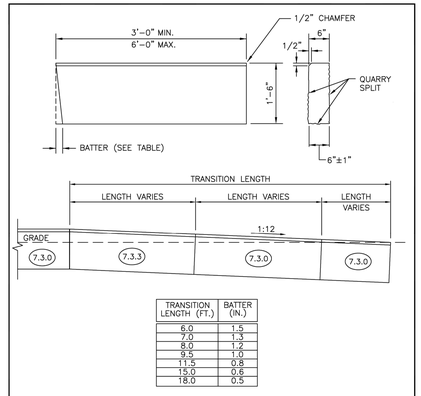


NOTES:
1. SHALL BE IN ACCORDANCE WITH SECTION 906 OF THE R.I. STANDARD SPECIFICATIONS.
2. THE CONTRACTOR MAY CUT EXISTING CURB SECTIONS AS REQUIRED TO MEET THIS DETAIL AND THE R.I. STANDARD SPECIFICATIONS, WHERE OLD CURBING IS BEING REUSED.
3. TOP SURFACE TO BE DRESSED BY SAW. REMAINDER MAY BE QUARRY SPLIT.

RHODE ISLAND DEPARTMENT OF TRANSPORTATION

REVISIONS			6'-0" GRANITE TRANSITION CURB	R.I. STANDARD 7.3.2
NO.	BY	DATE		
1	MLP	Mar 2005		
2	MLP	Sep 2012		

CHIEF ENGINEER, CHIEF DESIGN ENGINEER, TRANSPORTATION — JUNE 15, 1998 ISSUE DATE



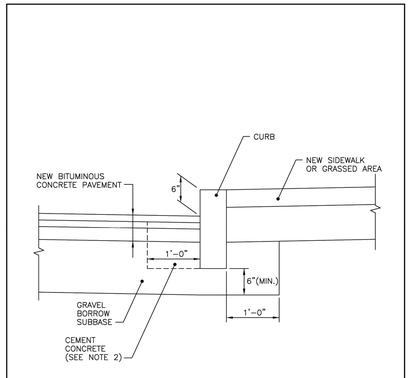
TRANSITION LENGTH (FT.)	BATTER (IN.)
6.0	1.5
7.0	1.3
8.0	1.2
9.5	1.0
11.5	0.8
15.0	0.6
18.0	0.5

NOTES:
1. SHALL BE IN ACCORDANCE WITH SECTION 906 OF THE R.I. STANDARD SPECIFICATIONS.
2. THE CONTRACTOR MAY CUT EXISTING CURB SECTIONS AS REQUIRED TO MEET THIS DETAIL AND THE R.I. STANDARD SPECIFICATIONS, WHERE OLD CURBING IS BEING REUSED.
3. MINIMUM LENGTH OF STRAIGHT OR CIRCULAR CURB FILLER PIECES TO BE 3'-0" (GREATER LENGTHS PREFERRED).
4. TOP SURFACE TO BE DRESSED BY SAW. REMAINDER MAY BE QUARRY SPLIT.

RHODE ISLAND DEPARTMENT OF TRANSPORTATION

REVISIONS			GRANITE WHEELCHAIR RAMP TRANSITION CURB	R.I. STANDARD 7.3.3
NO.	BY	DATE		
1	MLP	Mar 2005		
2	MLP	Jun 2012		

CHIEF ENGINEER, CHIEF DESIGN ENGINEER, TRANSPORTATION — JUNE 15, 1998 ISSUE DATE

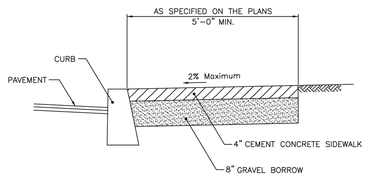


NOTES:
1. SHALL BE IN ACCORDANCE WITH SECTION 906 OF THE R.I. STANDARD SPECIFICATIONS.
2. CEMENT CONCRETE SHALL BE USED ONLY WHEN THE CURB IS SET AFTER THE BASE AND/OR BINDER COURSES ARE IN PLACE, OTHERWISE THE CEMENT CONCRETE WILL BE ELIMINATED AND THE GRAVEL BROUGHT UP TO BOTTOM OF THE BASE COURSE.

RHODE ISLAND DEPARTMENT OF TRANSPORTATION

REVISIONS			CURB SETTING DETAIL	R.I. STANDARD 7.6.0
NO.	BY	DATE		
1	MLP	Mar 05		

CHIEF ENGINEER, CHIEF DESIGN ENGINEER, TRANSPORTATION — JUNE 15, 1998 ISSUE DATE

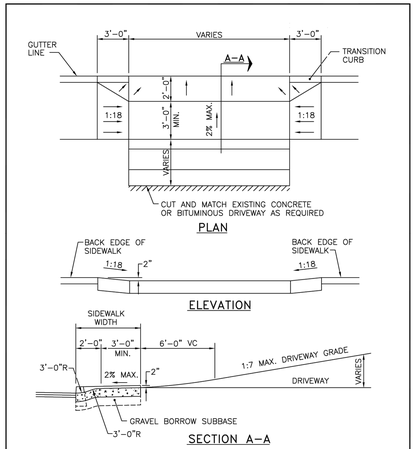


NOTES
1. SHALL BE IN ACCORDANCE WITH SECTION 905 OF THE R.I. STANDARD SPECIFICATIONS.
2. FOR CURB SETTING DETAIL REFERENCE STD. 7.6.0.

RHODE ISLAND DEPARTMENT OF TRANSPORTATION

REVISIONS			CEMENT CONCRETE SIDEWALK	R.I. STANDARD 43.1.0
NO.	BY	DATE		
1	MLP	3/1/05		
2	MLP	06/01/10		

CHIEF ENGINEER, CHIEF DESIGN ENGINEER, TRANSPORTATION — JUNE 15, 1998 ISSUE DATE

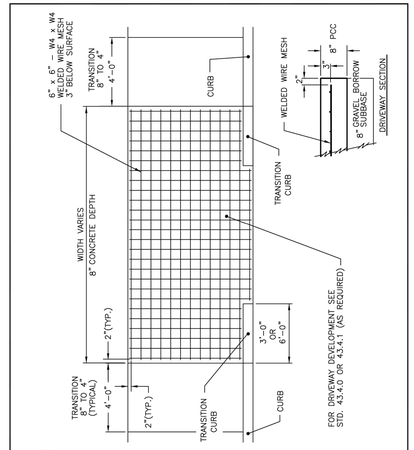


NOTES:
1. SHALL BE IN ACCORDANCE WITH SECTION 905 OF THE R.I. STANDARD SPECIFICATIONS.
2. WHEN DRIVEWAY IS BELOW BACK EDGE OF SIDEWALK PROFILE, STD. 43.4.1 MUST BE USED.

RHODE ISLAND DEPARTMENT OF TRANSPORTATION

REVISIONS			DRIVEWAY DEVELOPMENT FOR 3'-0" TRANSITION CURB	R.I. STANDARD 43.4.0
NO.	BY	DATE		
1	MLP	3/01/05		
2	MLP	6/27/06		
3	MLP	6/01/10		

CHIEF ENGINEER, CHIEF DESIGN ENGINEER, TRANSPORTATION — JUNE 15, 1998 ISSUE DATE



NOTE:
SHALL BE IN ACCORDANCE WITH SECTION 905 OF THE R.I. STANDARD SPECIFICATIONS.

RHODE ISLAND DEPARTMENT OF TRANSPORTATION

REVISIONS			CEMENT CONCRETE DRIVEWAYS	R.I. STANDARD 43.5.0
NO.	BY	DATE		
1	MLP	1/15/05		
2	MLP	7/21/06		
3	MLP	6/01/10		

CHIEF ENGINEER, CHIEF DESIGN ENGINEER, TRANSPORTATION — JUNE 15, 1998 ISSUE DATE

PREPARED BY

BETA
www.BETA-Inc.com

REGISTERED PROFESSIONAL

JARED LINHARES
No. 13145
REGISTERED PROFESSIONAL ENGINEER
CIVIL 1-31-24

SUBCONSULTANT

PROJECT

City Hall Plaza

Warwick, RI

TITLE

SITE DETAILS

NO.	REVISIONS	DATE

DRAWN BY:	WC
DESIGNED BY:	TD
CHECKED BY:	JL / KA
ISSUE DATE:	01/31/2024
BETA JOB NO.:	10694

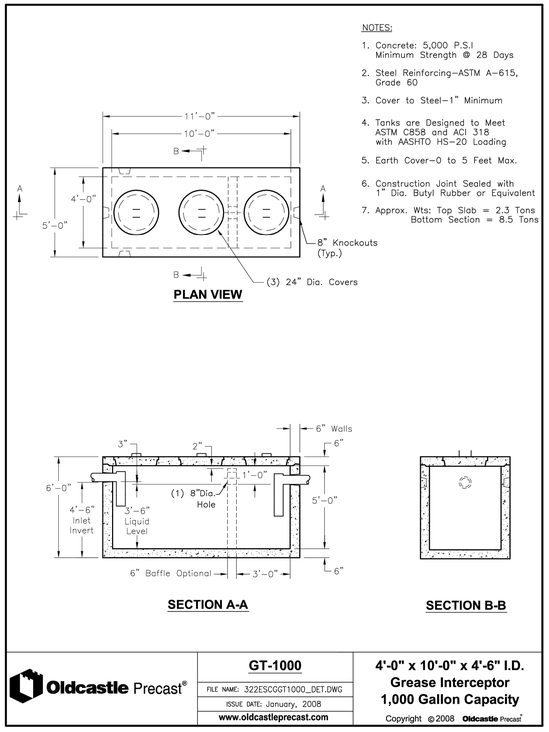
SCALE

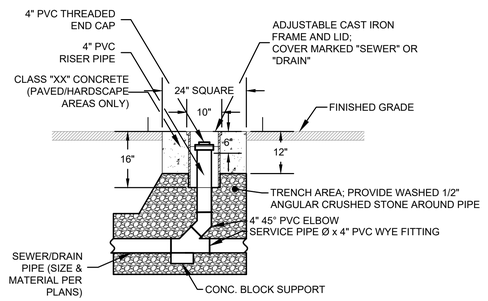
AS SHOWN

BID SET

SHEET NO.

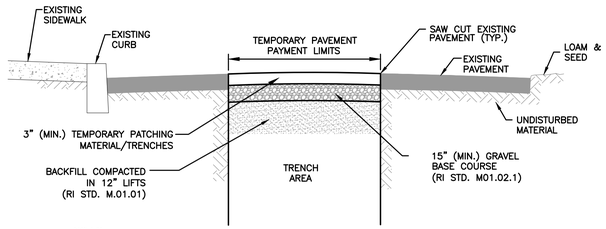
5.5





TYPICAL DRAIN CLEANOUT DETAIL

N.T.S.

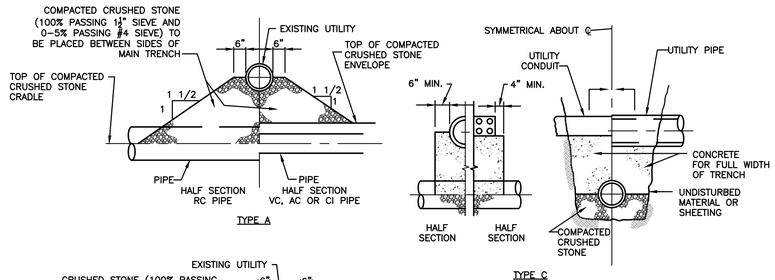


NOTES:

1. BITUMINOUS CONCRETE SHALL ADHERE TO RIDOT STANDARD SPECIFICATIONS, SECTION 401.
2. GRANULAR BASE MATERIAL SHALL BE COMPACTED TO 95% OF MODIFIED PROCTOR DENSITY (AASHTO T180), AND SHALL ADHERE TO RIDOT STANDARD SPECIFICATIONS, SECTION 301.
3. ANY TEMPORARY PATCH INSTALLED PRIOR TO SEPTEMBER 1 IN ANY YEAR SHALL BE REPLACED WITH PERMANENT PATCH NO LATER THAN DECEMBER 1 OF THAT YEAR. TEMPORARY PATCHES MADE BETWEEN SEPTEMBER 1 AND MARCH 30 SHALL BE MAINTAINED BY THE CONTRACTOR UNTIL A PERMANENT PATCH CAN BE INSTALLED, NO LATER THAN JUNE 15.
4. IF TEMPORARY PATCH IS INSTALLED, CONTRACTOR MAY ALLOW NO MORE THAN 45 DAYS FOR SETTLING BEFORE PERMANENT RESTORATION. THE CONTRACTOR SHALL BE RESPONSIBLE TO MAINTAIN TEMPORARY ROADWAY RESTORATIONS IN A SAFE CONDITION FOR ALL TYPES OF TRAVEL UNTIL A PERMANENT PAVEMENT REPAIR HAS BEEN MADE. TO ENSURE PROPER MAINTENANCE, THE CONTRACTOR SHALL PERFORM PERIODIC INSPECTION OF EACH TEMPORARY PATCH UNTIL IT IS REPLACED WITH A PERMANENT PATCH.

TEMPORARY PAVEMENT

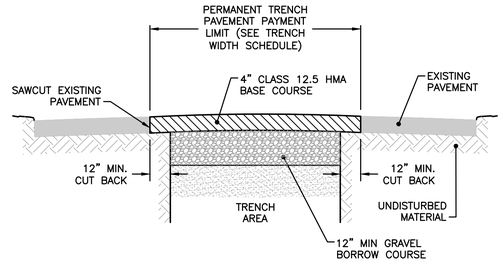
NOT TO SCALE



NOTE: TYPE C SUPPORT TO BE PROVIDED WHERE DIRECTED

TYPICAL SUPPORTS FOR UTILITES

NOT TO SCALE

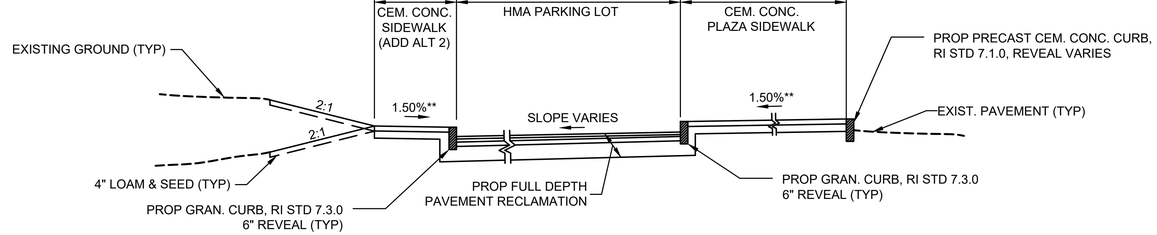


NOTES

1. MAXIMUM PAVEMENT THICKNESS PER COURSE NOT TO EXCEED 3 INCHES.
2. CONTRACTOR TO VARY PAVEMENT THICKNESS TO MAINTAIN A MINIMUM CROSS SECTIONAL SLOPE EQUALING 0.02 FT/FT.
3. CUT BACK DISTANCES SHALL BE AS DIRECTED BY THE ENGINEER, HOWEVER UNDER NO CIRCUMSTANCES LESS THAN THE MINIMUM INDICATED.

PERMANENT TRENCH WIDTH PAVEMENT

NOT TO SCALE



TYPICAL FULL DEPTH PAVEMENT RECLAMATION SECTION

NTS

** TOLERANCE FOR CONSTRUCTION ±0.5%

PAVEMENT NOTES

FULL DEPTH RECLAMATION

EXISTING PAVEMENT TO BE SCARIFIED AND MIXED WITH GRAVEL FROM UPPER 13 INCHES OF PARKING LOT PAVEMENT STRUCTURE. EXCESS MATERIAL TO BE REMOVED IF NECESSARY TO ENSURE FINAL SURFACE COURSE GRADES MATCH PROPOSED ELEVATIONS CALLED FOR ON GRADING PLAN.

SURFACE COURSE:	1.5" HMA SURFACE COURSE - CLASS 9.5 OVER
BASE COURSE:	2.5" HMA BASE COURSE - CLASS 12.5 OVER
SUB-BASE:	8" RECLAIMED SUB-BASE MATERIAL

FULL DEPTH PAVEMENT (ADD ALTERNATE 3)

SURFACE COURSE:	1.5" HMA SURFACE COURSE - CLASS 9.5 OVER
BASE COURSE:	2.5" HMA BASE COURSE - CLASS 12.5 OVER
SUB-BASE:	12" GRAVEL BORROW SUB-BASE COURSE

HMA DRIVEWAY APRONS

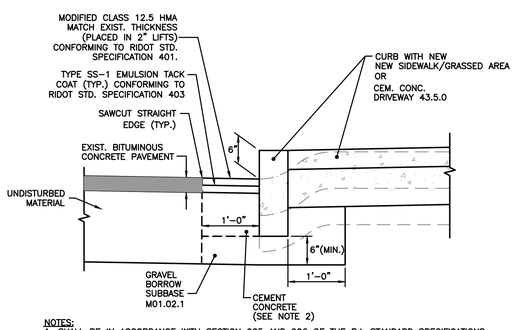
SURFACE:	3" HMA SURFACE COURSE - CLASS 9.5 OVER
SUB-BASE:	8" GRAVEL BORROW

CEMENT CONCRETE SIDEWALKS AND WHEELCHAIR RAMPS

SURFACE:	4" DEPTH CEMENT CONCRETE WALK SURFACE (SEE DETAILS AND PLANS FOR TYPE AND CONDITION) 4000 PSI, 3/4" OVER
BASE COURSE:	8" GRAVEL BORROW

CEMENT CONCRETE DRIVEWAYS AND RADIAL WHEELCHAIR RAMPS

SURFACE:	8" DEPTH CEMENT CONCRETE WALK SURFACE 4000 PSI, 3/4" OVER
BASE COURSE:	8" GRAVEL BORROW



NOTES:

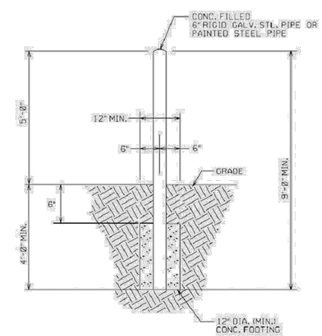
1. SHALL BE IN ACCORDANCE WITH SECTION 905 AND 906 OF THE R.I. STANDARD SPECIFICATIONS.
2. CEMENT CONCRETE SHALL BE USED ONLY WHEN THE CURB IS SET AFTER THE BASE AND/OR BINDER COURSES ARE IN PLACE, OTHERWISE THE CEMENT CONCRETE WILL BE ELIMINATED AND THE GRAVEL BROUGHT UP TO BOTTOM OF THE BASE COURSE.
3. CURB SETTNG AND DRIVEWAY DEVELOPMENT SHALL CONFORM TO R.I. STANDARD 7.6.0 AND 43.4.0.

PERMANENT HMA PATCH DETAIL

NOT TO SCALE

National Grid / Supplement to Specifications for Electrical Installations / ESB 759B July 2010

29.0 BOLLARD DETAIL



TYPICAL BOLLARD DETAIL

44 For the latest authorized version, please refer to the company's website at http://www.nationalgridus.com/electricalspecifications.

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REGISTERED PROFESSIONAL

JARED LINHARES
No. 13145
REGISTERED PROFESSIONAL ENGINEER
CIVIL 1-31-24

SUBCONSULTANT

PROJECT

City Hall Plaza

Warwick, RI

TITLE

SITE DETAILS

NO.	REVISIONS	DATE

DRAWN BY:	WC
DESIGNED BY:	TD
CHECKED BY:	JL / KA
ISSUE DATE:	01/31/2024
BETA JOB NO.:	10694

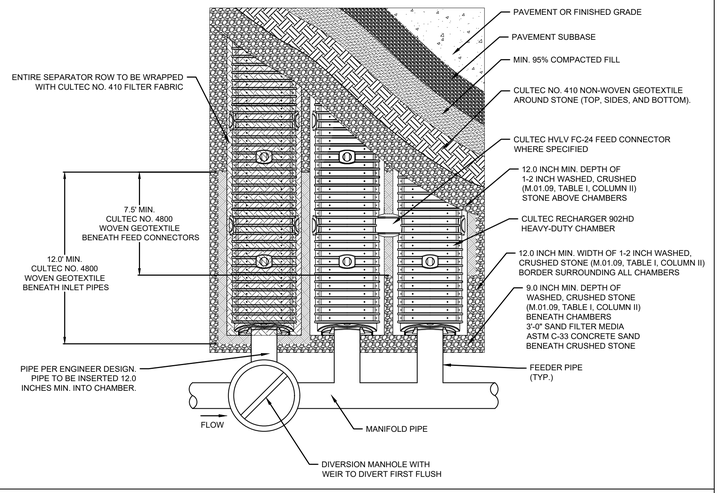
SCALE

AS SHOWN

BID SET

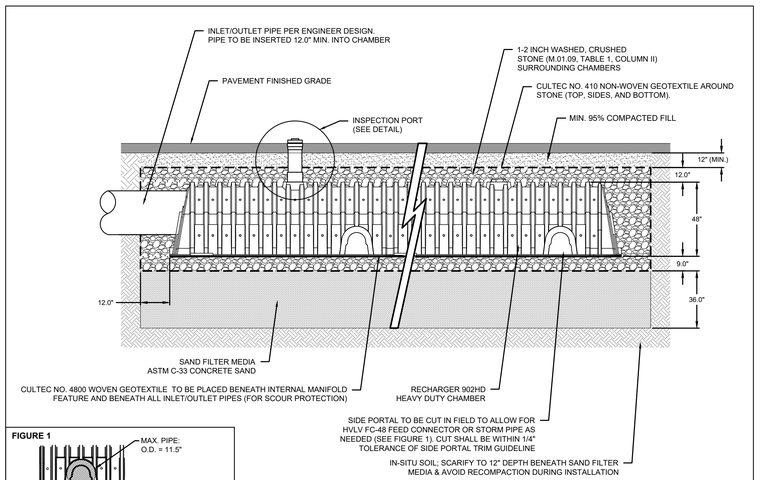
SHEET NO.

5.6



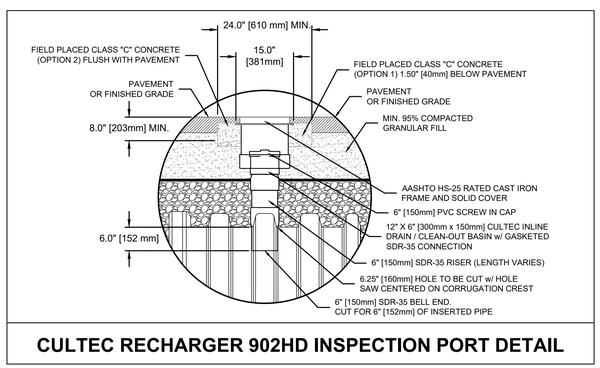
CULTEC RECHARGER 902HD TYPICAL PLAN VIEW

(OR APPROVED EQUAL)



CULTEC RECHARGER 902HD TYPICAL LONGITUDINAL SECTION VIEW

(OR APPROVED EQUAL)



CULTEC RECHARGER 902HD INSPECTION PORT DETAIL

(OR APPROVED EQUAL)

CULTEC RECHARGER 902HD® SPECIFICATIONS

GENERAL

CULTEC RECHARGER® 902HD CHAMBERS ARE DESIGNED FOR UNDERGROUND STORMWATER MANAGEMENT. THE CHAMBERS MAY BE USED FOR RETENTION, RECHARGING, DETENTION OR CONTROLLING THE FLOW OF ON-SITE STORMWATER RUNOFF.

CHAMBER PARAMETERS

1. THE CHAMBERS SHALL BE MANUFACTURED IN THE U.S.A. OR CANADA BY CULTEC, INC. OF BROOKFIELD, CT (CULTEC.COM, 203-775-4416).
2. THE CHAMBERS SHALL BE DESIGNED AND TESTED IN ACCORDANCE WITH ASTM F2787 "STANDARD PRACTICE FOR STRUCTURAL DESIGN OF THERMOPLASTIC CORRUGATED WALL STORMWATER COLLECTION CHAMBERS". THE LOAD CONFIGURATION SHALL INCLUDE:
   A. INSTANTANEOUS AASHTO DESIGN TRUCK LIVE LOAD AT MINIMUM COVER
   B. MAXIMUM PERMANENT (50-YEAR) COVER LOAD
   C. 1-WEEK PARKED AASHTO DESIGN TRUCK LOAD
3. THE CHAMBERS SHALL MEET THE REQUIREMENTS OF ASTM F3430-20 "STANDARD SPECIFICATION FOR CELLULAR POLYPROPYLENE (PP) CORRUGATED WALL STORMWATER COLLECTION CHAMBERS".
4. THE INSTALLED CHAMBER SYSTEM SHALL PROVIDE RESISTANCE TO THE LOADS AND LOAD FACTORS AS DEFINED IN THE AASHTO LRFD BRIDGE DESIGN SPECIFICATIONS SECTION 12.12, WHEN INSTALLED ACCORDING TO CULTEC'S RECOMMENDED INSTALLATION INSTRUCTIONS. THE STRUCTURAL DESIGN OF THE CHAMBERS SHALL INCLUDE THE FOLLOWING:
   A. THE CREEP MODULUS SHALL BE 50-YEAR AS SPECIFIED IN ASTM F3430
   B. THE MINIMUM SAFETY FACTOR FOR LIVE LOADS SHALL BE 1.75
   C. THE MINIMUM SAFETY FACTOR FOR DEAD LOADS SHALL BE 1.95
5. THE CHAMBER SHALL BE STRUCTURAL FOAM INJECTION MOLDED OF BLUE VIRGIN HIGH MOLECULAR WEIGHT IMPACT-MODIFIED POLYPROPYLENE.
6. THE CHAMBER SHALL BE ARCHED IN SHAPE.
7. THE CHAMBER SHALL BE OPEN-BOTTOMED.
8. THE CHAMBER SHALL BE JOINED USING AN INTERLOCKING OVERLAPPING RIB METHOD. CONNECTIONS MUST BE FULLY SHOULDERED OVERLAPPING RIBS, HAVING NO SEPARATE COUPLINGS.
9. THE NOMINAL CHAMBER DIMENSIONS OF THE CULTEC RECHARGER®902HD SHALL BE 48 INCHES (1219 MM) TALL, 78 INCHES (1981 MM) WIDE AND 4.25 FEET (1.30 M) LONG. THE INSTALLED LENGTH OF A JOINED RECHARGER 902HD SHALL BE 3.67 FEET (1.12 M).
10. MULTIPLE CHAMBERS MAY BE CONNECTED TO FORM DIFFERENT LENGTH ROWS. EACH ROW SHALL BEGIN AND END WITH A SEPARATELY FORMED CULTEC RECHARGER® 902HD END CAP. MAXIMUM INLET OPENING ON THE END CAP IS 30 INCHES (750 MM) HDPE OR 36 INCHES (900 MM) PVC.
11. THE CHAMBER SHALL HAVE TWO SIDE PORTALS TO ACCEPT CULTEC HVLV™ FC-48 FEED CONNECTORS TO CREATE AN INTERNAL MANIFOLD. MAXIMUM ALLOWABLE PIPE SIZE IN THE SIDE PORTAL IS 10 INCHES (250 MM) HDPE AND 12 INCHES (300 MM) PVC.
12. THE NOMINAL CHAMBER DIMENSIONS OF THE CULTEC HVLV™ FC-48 FEED CONNECTOR SHALL BE 12 INCHES (305 MM) TALL, 16 INCHES (406 MM) WIDE AND 49 INCHES (1245 MM) LONG.
13. THE NOMINAL STORAGE VOLUME OF THE RECHARGER 902HD CHAMBER SHALL BE 17.31 FT^3/ FT (1.61 M^3 / M) - WITHOUT STONE. THE NOMINAL STORAGE VOLUME OF A JOINED RECHARGER 902HD SHALL BE 63.47 FT^3 / UNIT (1.80 M^3 / UNIT) - WITHOUT STONE.
14. THE NOMINAL STORAGE VOLUME OF THE HVLV™ FC-48 FEED CONNECTOR SHALL BE 0.913 FT^3 / FT (0.085 M^3 / M) - WITHOUT STONE.
15. THE RECHARGER 902HD CHAMBER SHALL HAVE 5 CORRUGATIONS.
16. THE CHAMBER SHALL BE CAPABLE OF ACCEPTING A 6 INCH (150 MM) INSPECTION PORT OPENING AT THE TOP CENTER OF EACH CHAMBER, CENTERED ON THE CORRUGATION CREST.
17. THE CHAMBER SHALL BE MANUFACTURED IN A FACILITY EMPLOYING CULTEC'S QUALITY CONTROL AND ASSURANCE PROCEDURES.
18. MAXIMUM ALLOWABLE COVER OVER THE TOP OF THE CHAMBER SHALL BE 8.3 FEET (2.53 M).

END CAP PARAMETERS

1. THE CULTEC RECHARGER® 902HD END CAP (REFERRED TO AS 'END CAP') SHALL BE MANUFACTURED IN THE U.S.A. BY CULTEC, INC. OF BROOKFIELD, CT (CULTEC.COM, 203-775-4416).
2. THE END CAP SHALL BE TWIN-SHEET THERMOFORMED OF VIRGIN HIGH MOLECULAR WEIGHT POLYETHYLENE.
3. THE END CAP SHALL BE JOINED AT THE BEGINNING AND END OF EACH ROW OF CHAMBERS USING AN INTERLOCKING OVERLAPPING RIB METHOD. CONNECTIONS MUST BE FULLY SHOULDERED OVERLAPPING RIBS, HAVING NO SEPARATE COUPLINGS.
4. THE NOMINAL DIMENSIONS OF THE END CAP SHALL BE 48.5 INCHES (1231 MM) TALL, 78 INCHES (1982 MM) WIDE AND 9.7 INCHES (246 MM) LONG. WHEN JOINED WITH A RECHARGER 902HD CHAMBER, THE INSTALLED LENGTH OF THE END CAP SHALL BE 6.2 INCHES (157 MM).
5. THE NOMINAL STORAGE VOLUME OF THE END CAP SHALL BE 5.34 FT^3/ FT (0.50 M^3 / M) - WITHOUT STONE. THE NOMINAL STORAGE VOLUME OF AN INTERLOCKED END CAP SHALL BE 2.76 FT^3 / UNIT (0.08 M^3 / UNIT) - WITHOUT STONE.
6. MAXIMUM INLET OPENING ON THE END CAP IS 30 INCHES (750 MM) HDPE OR 36 INCHES (900 MM) PVC.
7. THE END CAP SHALL PROVIDE RESISTANCE TO THE LOADS AND LOAD FACTORS AS DEFINED IN THE AASHTO LRFD BRIDGE DESIGN SPECIFICATIONS SECTION 12.12.

CULTEC HVLV FC-48 FEED CONNECTOR PRODUCT SPECIFICATIONS

GENERAL

CULTEC HVLV FC-48 FEED CONNECTORS ARE DESIGNED TO CREATE AN INTERNAL MANIFOLD FOR CULTEC RECHARGER MODEL 902HD STORMWATER CHAMBERS.

FEED CONNECTOR PARAMETERS

1. THE FEED CONNECTOR SHALL BE MANUFACTURED BY CULTEC, INC. OF BROOKFIELD, CT. (203-775-4416 OR 1-800-428-5832)
2. THE FEED CONNECTOR SHALL BE VACUUM THERMOFORMED OF BLACK HIGH MOLECULAR WEIGHT HIGH DENSITY POLYETHYLENE (HMWHDPE).
3. THE FEED CONNECTOR SHALL BE ARCHED IN SHAPE.
4. THE FEED CONNECTOR SHALL BE OPEN-BOTTOMED.
5. THE NOMINAL DIMENSIONS OF THE CULTEC HVLV FC-48 FEED CONNECTOR SHALL BE 12 INCHES (305 mm) TALL, 16 INCHES (406 mm) WIDE AND 49 INCHES (1245 mm) LONG.
6. THE NOMINAL STORAGE VOLUME OF THE HVLV FC-48 FEED CONNECTOR SHALL BE 0.913 FT^3 / FT (0.085 m^3 / m) - WITHOUT STONE.
7. THE HVLV FC-48 FEED CONNECTOR SHALL HAVE 4 CORRUGATIONS.
8. THE HVLV FC-48 FEED CONNECTOR MUST BE FORMED AS A WHOLE UNIT HAVING TWO OPEN END WALLS AND HAVING NO SEPARATE END PLATES OR SEPARATE END WALLS. THE UNIT SHALL FIT INTO THE SIDE PORTALS OF THE CULTEC RECHARGER STORMWATER CHAMBER AND ACT AS CROSS FEED CONNECTIONS CREATING AN INTERNAL MANIFOLD.
9. THE FEED CONNECTOR SHALL BE DESIGNED TO WITHSTAND AASHTO HS-25 DEFINED LOADS WHEN INSTALLED ACCORDING TO CULTEC'S RECOMMENDED INSTALLATION INSTRUCTIONS.
10. THE FEED CONNECTOR SHALL BE MANUFACTURED IN AN ISO 9001:2008 CERTIFIED FACILITY.

CULTEC NO. 410™ NON-WOVEN GEOTEXTILE

CULTEC NO. 410™ NON-WOVEN GEOTEXTILE MAY BE USED WITH CULTEC CONTACTOR® AND RECHARGER® STORMWATER INSTALLATIONS TO PROVIDE A BARRIER THAT PREVENTS SOIL INTRUSION INTO THE STONE.

GEOTEXTILE PARAMETERS

1. THE GEOTEXTILE SHALL BE PROVIDED BY CULTEC, INC. OF BROOKFIELD, CT. (203-775-4416 OR 1-800-428-5832)
2. THE GEOTEXTILE SHALL BE BLACK IN APPEARANCE.
3. THE GEOTEXTILE SHALL HAVE A TYPICAL WEIGHT OF 4.5 OZ/SY (142 G/M).
4. THE GEOTEXTILE SHALL HAVE A TENSILE STRENGTH VALUE OF 120 LBS (533 N) PER ASTM D4632 TESTING METHOD.
5. THE GEOTEXTILE SHALL HAVE AN ELONGATION @ BREAK VALUE OF 50% PER ASTM D4632 TESTING METHOD.
6. THE GEOTEXTILE SHALL HAVE A MULLEN BURST VALUE OF 225 PSI (1551 KPA) PER ASTM D3786 TESTING METHOD.
7. THE GEOTEXTILE SHALL HAVE A PUNCTURE STRENGTH VALUE OF 65 LBS (289 N) PER ASTM D4833 TESTING METHOD.
8. THE GEOTEXTILE SHALL HAVE A CBR PUNCTURE VALUE OF 340 LBS (1513 N) PER ASTM D6241 TESTING METHOD.
9. THE GEOTEXTILE SHALL HAVE A TRAPEZOID TEAR VALUE OF 50 LBS (222 N) PER ASTM D4533 TESTING METHOD.
10. THE GEOTEXTILE SHALL HAVE A AOS VALUE OF 70 U.S. SIEVE (0.212 MM) PER ASTM D4751 TESTING METHOD.
11. THE GEOTEXTILE SHALL HAVE A PERMITTIVITY VALUE OF 1.7 SEC-1 PER ASTM D4491 TESTING METHOD.
12. THE GEOTEXTILE SHALL HAVE A WATER FLOW RATE VALUE OF 135 GAL/MIN/SF (5500 L/MIN/SM) PER ASTM D4491 TESTING METHOD.
13. THE GEOTEXTILE SHALL HAVE A UV STABILITY @ 500 HOURS VALUE OF 70% PER ASTM D4355 TESTING METHOD.

CULTEC NO. 4800™ WOVEN GEOTEXTILE

CULTEC NO. 4800 WOVEN GEOTEXTILE IS DESIGNED AS A UNDERLAYMENT TO PREVENT SCOURING CAUSED BY WATER MOVEMENT WITHIN THE CULTEC CHAMBERS AND FEED CONNECTORS UTILIZING THE CULTEC MANIFOLD FEATURE. IT MAY ALSO BE USED AS A COMPONENT OF THE CULTEC SEPARATOR ROW TO ACT AS A BARRIER TO PREVENT SOIL/CONTAMINANT INTRUSION INTO THE STONE WHILE ALLOWING FOR MAINTENANCE.

GEOTEXTILE PARAMETERS

1. THE GEOTEXTILE SHALL BE PROVIDED BY CULTEC, INC. OF BROOKFIELD, CT. (203-775-4416 OR 1-800-428-5832)
2. THE GEOTEXTILE SHALL BE BLACK IN APPEARANCE.
3. THE GEOTEXTILE SHALL HAVE A TENSILE STRENGTH OF 550 X 550 LBS (2,448 X 2,448 N) PER ASTM D4632 TESTING METHOD.
4. THE GEOTEXTILE SHALL HAVE A ELONGATION @ BREAK RESISTANCE OF 20 X 20% PER ASTM D4632 TESTING METHOD.
5. THE GEOTEXTILE SHALL HAVE A WIDE WIDTH TENSILE RESISTANCE OF 5,070 X 5,070 LBS/FT (74 X 74 KN/M) PER ASTM D4595 TESTING METHOD.
6. THE GEOTEXTILE SHALL HAVE A WIDE WIDTH TENSILE RESISTANCE @ 2% STRAIN OF 960 X 1,096 LBS/FT (14 X 16 KN/M) PER ASTM D4595 TESTING METHOD.
7. THE GEOTEXTILE SHALL HAVE A WIDE WIDTH TENSILE RESISTANCE @ 5% STRAIN OF 2,740 X 2, 740 LBS/FT (40 X 40 KN/M) PER ASTM D4595 TESTING METHOD.
8. THE GEOTEXTILE SHALL HAVE A WIDE WIDTH TENSILE RESISTANCE @ 10% STRAIN OF 4,800 X 4,800 LBS/FT (70 X 70 KN/M) PER ASTM D4595 TESTING METHOD.
9. THE GEOTEXTILE SHALL HAVE A CBR PUNCTURE RESISTANCE OF 1,700 LBS (7,560 N) PER ASTM D6241 TESTING METHOD.
10. THE GEOTEXTILE SHALL HAVE A TRAPEZOIDAL TEAR RESISTANCE OF 180 X 180 LBS (801 X 801 N) PER ASTM D4533 TESTING METHOD.
11. THE GEOTEXTILE SHALL HAVE AN APPARENT OPENING SIZE OF 40 US STD. SIEVE (0.425 MM) PER ASTM D4751 TESTING METHOD.
12. THE GEOTEXTILE SHALL HAVE A PERMITTIVITY RATING OF 0.15 SEC-1 PER ASTM D4491 TESTING METHOD.
13. THE GEOTEXTILE SHALL HAVE A WATER FLOW RATING OF 11.5 GPM/FT2 (470 LPM/M2) PER ASTM D4491 TESTING METHOD.
14. THE GEOTEXTILE SHALL HAVE A UV RESISTANCE OF 80% @ 500 HRS. PER ASTM D4355 TESTING METHOD.

NOTE:

A CULTECH RECHARGER CHAMBER SYSTEM IS DETAILED ABOVE. AN APPROVED EQUAL WILL BE CONSIDERED.

PREPARED BY

BETA

www.BETA-Inc.com

REGISTERED PROFESSIONAL

JARED LINHARES — RHODE ISLAND — No. 13145 — REGISTERED PROFESSIONAL ENGINEER — CIVIL — 1-31-24

SUBCONSULTANT

PROJECT

City Hall Plaza

Warwick, RI

TITLE

SITE DETAILS

NO.	REVISIONS	DATE

DRAWN BY:	WC
DESIGNED BY:	TD
CHECKED BY:	JL / KA
ISSUE DATE:	01/31/2024
BETA JOB NO.:	10694

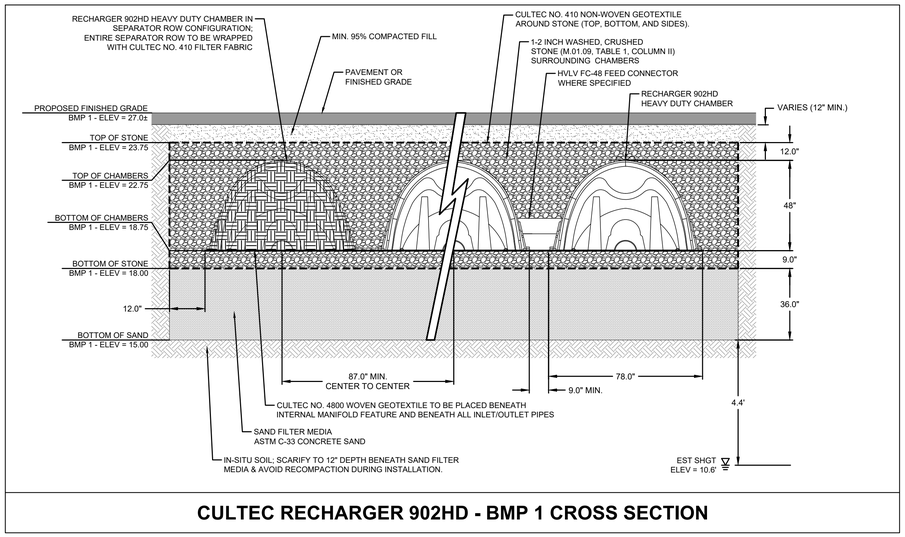
SCALE

AS SHOWN

BID SET

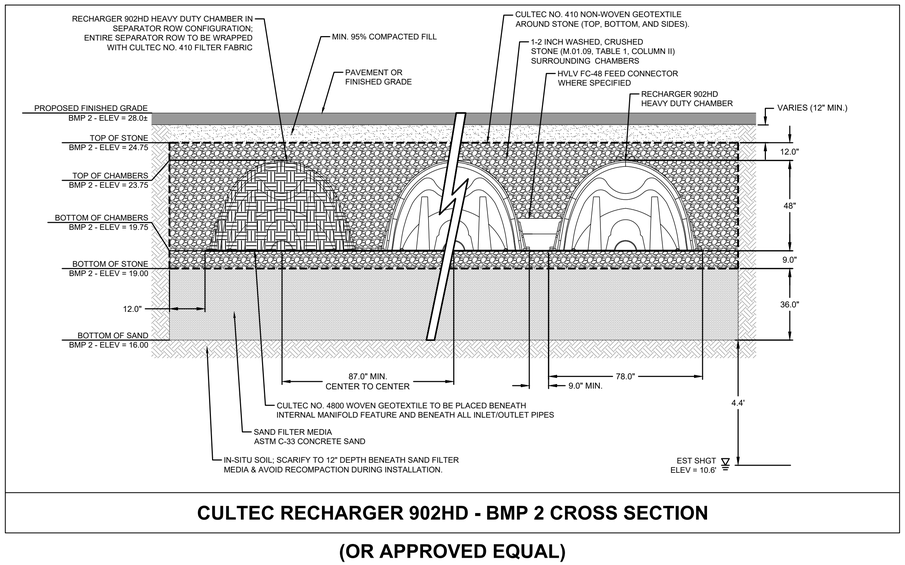
SHEET NO.

5.7



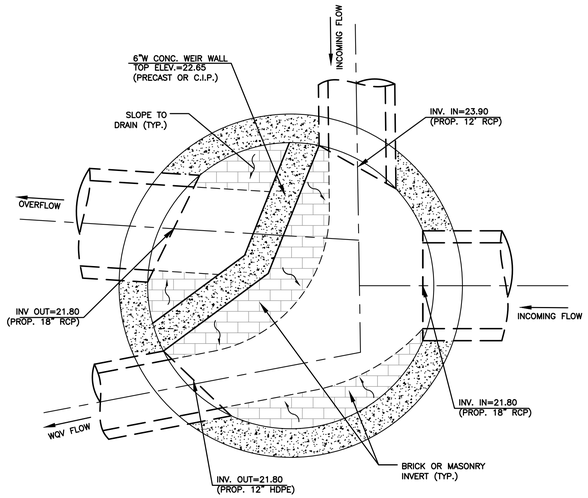
CULTEC RECHARGER 902HD - BMP 1 CROSS SECTION

(OR APPROVED EQUAL)



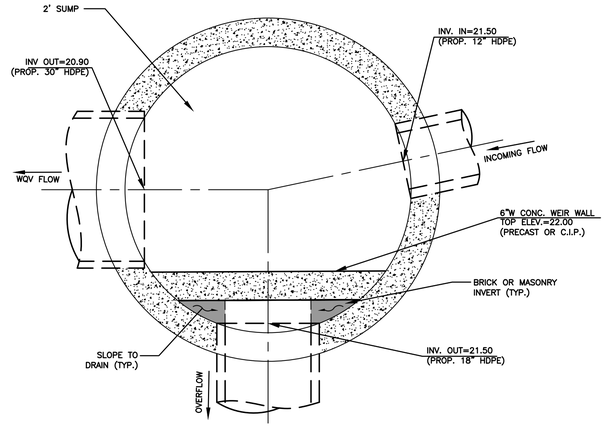
CULTEC RECHARGER 902HD - BMP 2 CROSS SECTION

(OR APPROVED EQUAL)



NOTES:
1. SHALL BE IN ACCORDANCE WITH SECTION 702 OF THE R.I. STANDARD SPECIFICATIONS.
2. DEPICTED WEIR WALL ORIENTATION IS FOR DIVERSION MANHOLES WHERE WATER QUALITY FLOW PIPE IS PERPENDICULAR TO THE INCOMING PIPE.

PROPOSED 5' DIVERSION MANHOLE (DMH-3)
NOT TO SCALE



NOTES:
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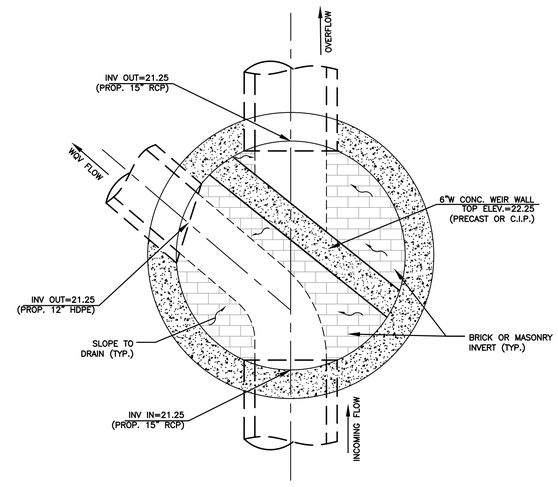
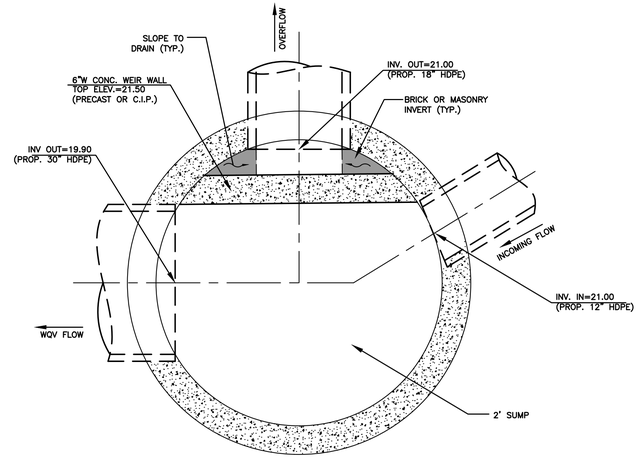
2. DEPICTED WEIR WALL ORIENTATION IS FOR DIVERSION MANHOLES WHERE WATER QUALITY FLOW PIPE IS PERPENDICULAR TO THE INCOMING PIPE.
3. INSTALL DIVERSION MANHOLES, INCLUDING A MINIMUM 24" SUMP, DIRECTLY UPSTREAM OF THE SEPARATOR ROW.

PROPOSED 5' DIVERSION MANHOLE (DMH3-1)
NOT TO SCALE



NOTES:
1. SHALL BE IN ACCORDANCE WITH SECTION 702 OF THE R.I. STANDARD SPECIFICATIONS.
2. DEPICTED WEIR WALL ORIENTATION IS FOR DIVERSION MANHOLES WHERE WATER QUALITY FLOW PIPE IS PERPENDICULAR TO THE INCOMING PIPE.

PROPOSED DIVERSION MANHOLE (DMH6-1)
NOT TO SCALE



NOTES:
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2. DEPICTED WEIR WALL ORIENTATION IS FOR DIVERSION MANHOLES WHERE WATER QUALITY FLOW PIPE IS PERPENDICULAR TO THE INCOMING PIPE.
3. INSTALL DIVERSION MANHOLES, INCLUDING A MINIMUM 24" SUMP, DIRECTLY UPSTREAM OF THE SEPARATOR ROW.

PROPOSED 5' DIVERSION MANHOLE (DMH-7)
NOT TO SCALE

NOTE:
A CULTECH RECHARGER CHAMBER SYSTEM IS DETAILED ABOVE. AN APPROVED EQUAL WILL BE CONSIDERED.

PREPARED BY

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REGISTERED PROFESSIONAL

JARED LINHARES
No. 13145
REGISTERED PROFESSIONAL ENGINEER
CIVIL 1-31-24

SUBCONSULTANT

PROJECT

City Hall Plaza

Warwick, RI

TITLE

SITE DETAILS

NO.	REVISIONS	DATE

DRAWN BY:	WC
DESIGNED BY:	TD
CHECKED BY:	JL / KA
ISSUE DATE:	01/31/2024
BETA JOB NO.:	10694

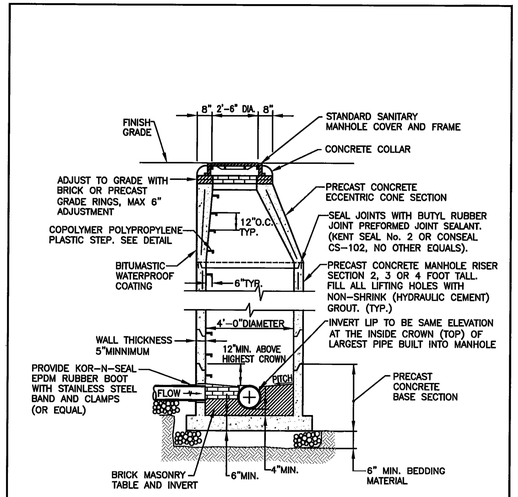
SCALE

AS SHOWN

BID SET

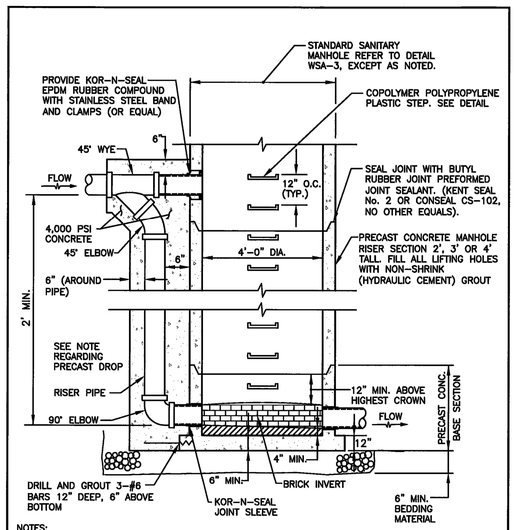
SHEET NO.

5.8



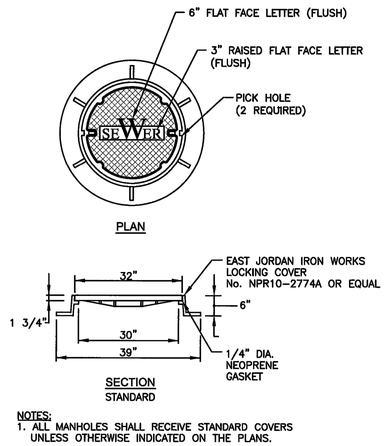
NOTES:
1. ALL JOINTS SHALL BE TONGUE AND GROOVE WITH BUTYL RUBBER JOINT PREFORMED SEALANT.
2. ALL LIFTING HOLES OR INDENTS ARE TO BE SEALED WITH NON-SHRINKING (HYDRAULIC CEMENT) GROUT.

Detail No. WSA - 3
Sanitary Manhole
Contract DD
Date: May 2017 | Scale: Not to Scale
WARWICK SEWER AUTHORITY
125 Arthur Devine Boulevard
Warwick, Rhode Island 02889



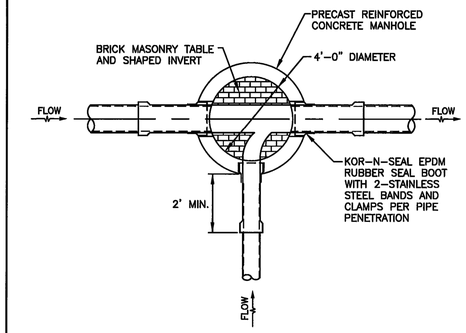
NOTES:
1. WHERE PRECAST DROPS ARE PROPOSED, THE CONTRACTOR SHALL SUBMIT DETAILED SHOP DRAWINGS OF THE DROP UNITS FOR APPROVAL BY THE ENGINEER PRIOR TO CONSTRUCTION.
2. RISER PIPE SHALL BE THE SAME DIAMETER AS THE INLET PIPE OR 8" DIAMETER, WHICHEVER IS LARGER.

Detail No. WSA - 8
Drop Manhole Detail
Contract DD
Date: May 2017 | Scale: Not to Scale
WARWICK SEWER AUTHORITY
125 Arthur Devine Boulevard
Warwick, Rhode Island 02889



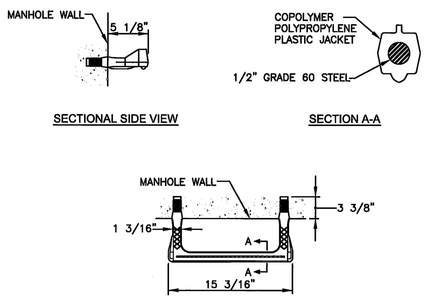
NOTES:
1. ALL MANHOLES SHALL RECEIVE STANDARD COVERS UNLESS OTHERWISE INDICATED ON THE PLANS.
2. COVERS TO HAVE NO VENT HOLES.
3. COVER MUST BE SUITABLE FOR H-20 HIGHWAY LOADING.

Detail No. WSA - 5
Sanitary Manhole Cover
Contract DD
Date: May 2017 | Scale: Not to Scale
WARWICK SEWER AUTHORITY
125 Arthur Devine Boulevard
Warwick, Rhode Island 02889

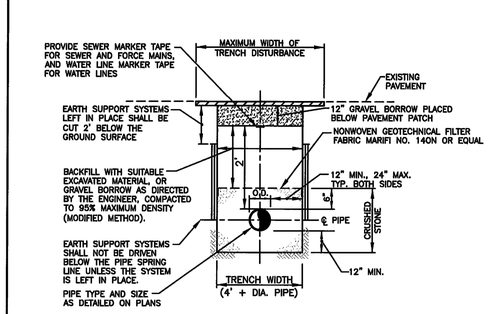


NOTES:
1. MINIMUM INVERT DROP BETWEEN INLET AND OUTLET PIPE SHALL BE 0.1'.
2. MAXIMUM INVERT DROP BETWEEN INLET AND OUTLET SHALL BE 24".

Detail No. WSA - 6
Manhole Invert Table
Contract DD
Date: May 2017 | Scale: Not to Scale
WARWICK SEWER AUTHORITY
125 Arthur Devine Boulevard
Warwick, Rhode Island 02889

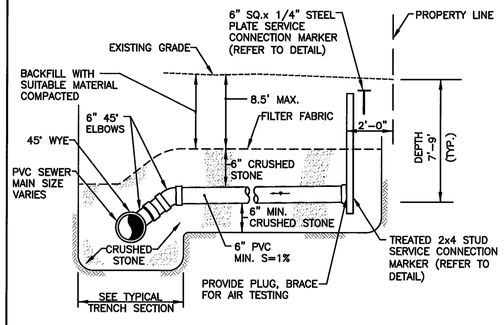


Detail No. WSA -7
Manhole Step
Contract DD
Date: May 2017 | Scale: Not to Scale
WARWICK SEWER AUTHORITY
125 Arthur Devine Boulevard
Warwick, Rhode Island 02889



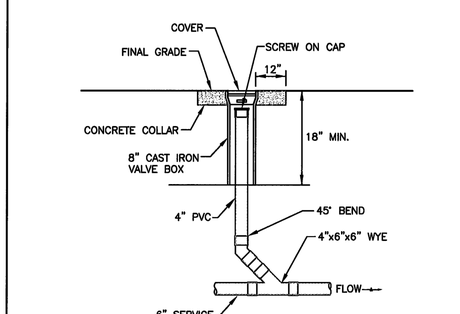
NOTE:
AS A MINIMUM, FILTER FABRIC SHALL BE PLACED ON THE TOP OF THE BEDDING. PLACEMENT OF FILTER FABRIC ON THE TOP, BOTTOM AND SIDES OF THE BEDDING WILL BE DETERMINED ON A SITE SPECIFIC BASIS BY THE ENGINEER.

Detail No. WSA -15
Typical Trench
Contract DD
Date: May 2017 | Scale: Not to Scale
WARWICK SEWER AUTHORITY
125 Arthur Devine Boulevard
Warwick, Rhode Island 02889



NOTE:
AS A MINIMUM, FILTER FABRIC SHALL BE PLACED ON THE TOP OF THE BEDDING. PLACEMENT OF FILTER FABRIC ON THE TOP, BOTTOM AND SIDES OF THE BEDDING WILL BE DETERMINED ON A SITE SPECIFIC BASIS BY THE ENGINEER.

Detail No. WSA - 17
Typical Service Connection Profile (Less Than 10' Depth)
Contract DD
Date: May 2017 | Scale: Not to Scale
WARWICK SEWER AUTHORITY
125 Arthur Devine Boulevard
Warwick, Rhode Island 02889



NOTE:
COVER SHALL BE CAST IRON, LOCKING LID MARKED SEWER AND DESIGNED FOR H-20 TRAFFIC LOADING.

Detail No. WSA - 21
Service Cleanout
Contract DD
Date: May 2017 | Scale: Not to Scale
WARWICK SEWER AUTHORITY
125 Arthur Devine Boulevard
Warwick, Rhode Island 02889

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REGISTERED PROFESSIONAL
JARED LINHARES
No. 13145
REGISTERED PROFESSIONAL ENGINEER
CIVIL 1-31-24

SUBCONSULTANT

PROJECT
City Hall Plaza
Warwick, RI

TITLE
SITE DETAILS

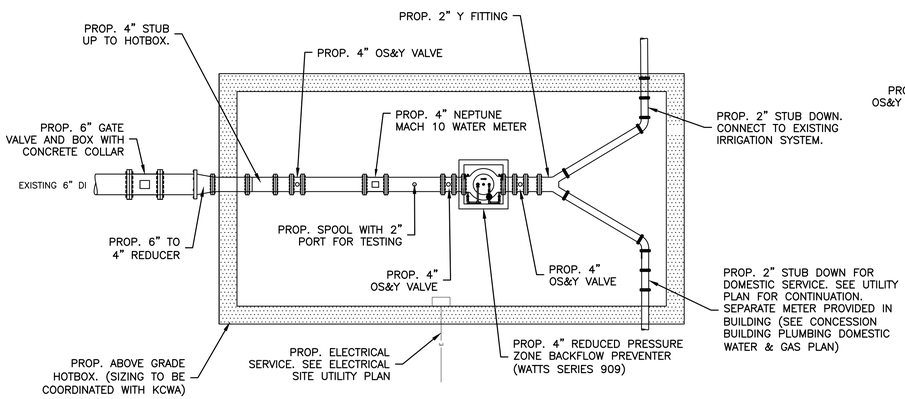
NO.	REVISIONS	DATE

DRAWN BY:	WC
DESIGNED BY:	TD
CHECKED BY:	JL / KA
ISSUE DATE:	01/31/2024
BETA JOB NO.:	10694

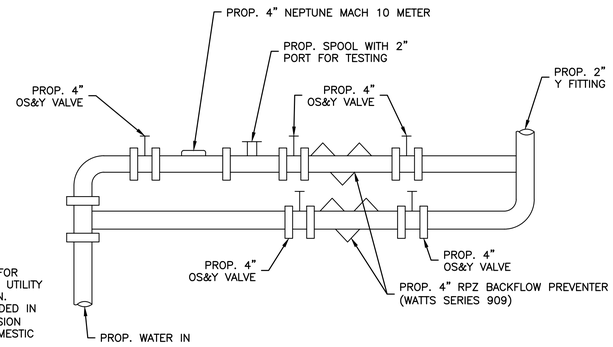
SCALE
AS SHOWN
UNLESS OTHERWISE NOTED OR CHANGED BY REPRODUCTION

BID SET

SHEET NO.
5.9



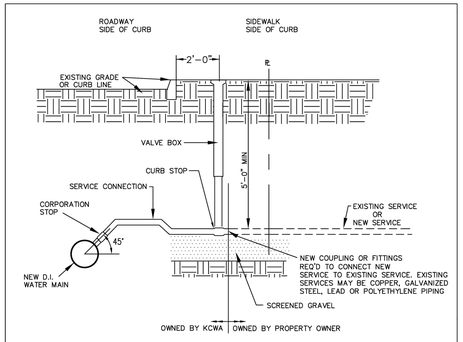
PLAN VIEW



SECTION VIEW

NOTES:
1. ALL WORK TO BE COORDINATED AND APPROVED BY KENT COUNTY WATER AUTHORITY (KCWA) AND SHALL BE IN CONFORMANCE WITH THE APPLICABLE AMERICAN WATER WORKS ASSOCIATION (AWWA) STANDARDS AND KENT COUNTY WATER AUTHORITY (KCWA) RULES AND REGULATIONS, INCLUDING ALL ERRATA.
2. EXISTING BELOW GRADE METER PIT TO BE REMOVED AND DISPOSED.
3. EXISTING EQUIPMENT TO BE REMOVED AND REPLACED ABOVE GRADE.
4. CONTRACTOR TO SUBMIT SHOP DRAWINGS OF ALL COMPONENTS INCLUDING BUT NOT LIMITED TO BACKFLOW PREVENTERS, METERS, FITTINGS, PIPES, UTILITY SUPPORTS, CONCRETE PAD, ETC. TO VERIFY SIZES PRIOR TO ORDERING. ALL COMPONENT SHOP DRAWINGS ARE TO BE REVIEWED AND APPROVED BY THE ENGINEER AND KCWA.
5. CONTRACTOR TO SUBMIT SHOP DRAWING OF FINAL LAYOUT OF ALL COMPONENTS AND CUTSHEET OF SELECTED ABOVE GRADE HOTBOX. FINAL SIZING OF THE HOTBOX TO BE APPROVED BY THE ENGINEER AND KCWA.
6. ALL SYSTEM COMPONENTS MUST CONFORM TO THE PROJECT SPECIFICATIONS, KENT COUNTY WATER AUTHORITY REGULATIONS, THE NATIONAL FIRE PROTECTION ASSOCIATION STANDARDS, INCLUDING NF-20, AND STATE, LOCAL AND FEDERAL REGULATIONS AND CODES.
7. A MINIMUM CLEARANCE OF 12" SHALL BE MAINTAINED AROUND BACKFLOW PREVENTER.
8. AFTER DOMESTIC AND IRRIGATION LINE SPLIT, THE IRRIGATION LINE SHALL HAVE A VACUUM BREAKER PER PLUMBING CODE.

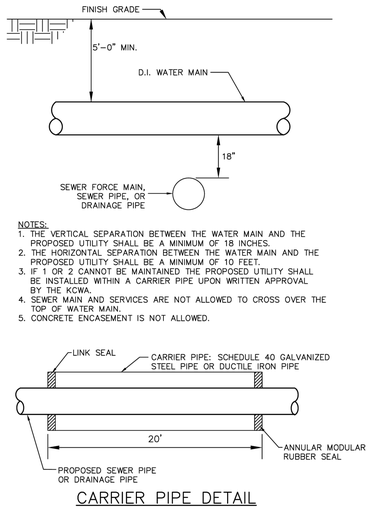
WATER HOTBOX DETAIL
1/2" = 1'



NOTE:

1.) SERVICE MATERIALS PER KCWA SPECIFICATION UNLESS CITY OR TOWN CODES REQUIRE SPECIFIC MATERIALS THAT HAVE BEEN APPROVED BY KCWA.
2.) SERVICE LINE FROM CURB BOX TO BUILDING SHALL BE INSPECTED, TESTED AND APPROVED BY THE LOCAL PLUMBING INSPECTOR.

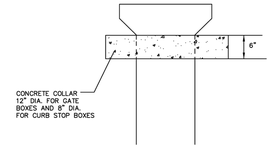
KENT COUNTY WATER AUTHORITY
KCWA "proudly serving"
SERVICE CONNECTION
NOT TO SCALE
DATE: 09/2006
SERCONDET.DWG



NOTES:
1. THE VERTICAL SEPARATION BETWEEN THE WATER MAIN AND THE PROPOSED UTILITY SHALL BE A MINIMUM OF 18 INCHES.
2. THE HORIZONTAL SEPARATION BETWEEN THE WATER MAIN AND THE PROPOSED UTILITY SHALL BE A MINIMUM OF 10 FEET.
3. IF 1 OR 2 CANNOT BE MAINTAINED THE PROPOSED UTILITY SHALL BE INSTALLED WITHIN A CARRIER PIPE UPON WRITTEN APPROVAL BY THE KCWA.
4. SEWER MAIN AND SERVICES ARE NOT ALLOWED TO CROSS OVER THE TOP OF WATER MAIN.
5. CONCRETE ENCASEMENT IS NOT ALLOWED.

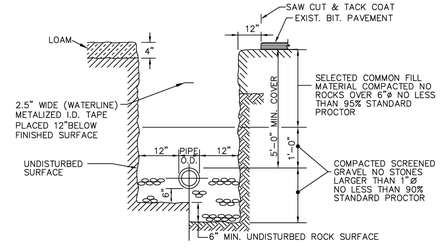
CARRIER PIPE DETAIL

KENT COUNTY WATER AUTHORITY
KCWA "proudly serving"
UTILITY SEPERATION
NOT TO SCALE
DATE: 09/2006
UTILSEPD.DWG



GATE BOXES AND CURB STOP BOXES

KENT COUNTY WATER AUTHORITY
KCWA "proudly serving"
CONCRETE COLLAR
NOT TO SCALE
DATE: 09/2006
CONCCOLLAR.DWG



NOTES:

1. ROADWAY RESTORATION IN ACCORDANCE WITH COMMUNITY OR RIDOT.

KENT COUNTY WATER AUTHORITY
KCWA "proudly serving"
TRENCH INSTALLATION IN ROCK AND SOIL
NOT TO SCALE
DATE: 09/2006
TRENCHDT.DWG

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No. 13145
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SUBCONSULTANT

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BETA JOB NO.:	10694

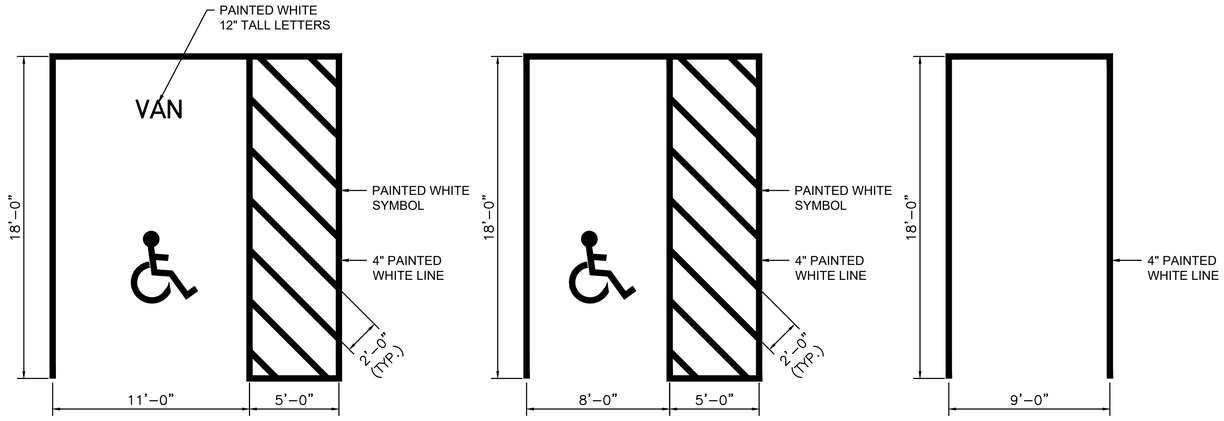
SCALE

AS SHOWN

BID SET

SHEET NO.

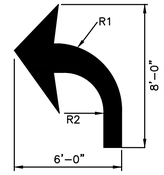
5.10



VAN ACCESSIBLE PARKING STALL | **STANDARD ACCESSIBLE PARKING STALL** | **STANDARD PARKING STALL**

PARKING STALL STRIPING DETAIL

SCALE: $\frac{1}{4}$"=1'–0"



R1 = 3'–2"
R2 = 2'–2"

NOTES:

1. SHALL BE IN ACCORDANCE WITH SECTION T.20 OF THE R.I. STANDARD SPECIFICATIONS.
2. THE LONGITUDINAL SPACE BETWEEN WORD OR SYMBOL MESSAGES, INCLUDING ARROWS, SHOULD BE AT LEAST FOUR TIMES THE HEIGHT OF THE CHARACTER FOR LOW SPEED ROADS BUT NOT MORE THAN TEN TIMES THE HEIGHT OF THE CHARACTER UNDER ANY CONDITIONS.
3. THE SPACING OF THE PAVEMENT MARKINGS WILL BE AS SHOWN ON THE PLAN AND AS PER THE MUTCD.
4. SYMBOLS AND WORDS SHALL MEET THE REQUIREMENTS OF THE FHWA "STANDARD ALPHABET AND SYMBOLS FOR HIGHWAY PAVEMENT MARKINGS.

PAVEMENT MARKINGS ARROWS
NOT TO SCALE

R.I. STANDARD 20.1.0

GENERAL NOTES:

1. ALL MARKINGS SHALL BE IN ACCORDANCE WITH SECTION T.20 OF THE RI STANDARD SPECIFICATIONS.
2. ALL CROSSWALK AND STOP LINE MARKINGS SHALL BE WHITE.
3. CROSSWALK AND STOP LINE MARKINGS SHALL ONLY BE INSTALLED WHERE CALLED FOR ON THE PLANS.

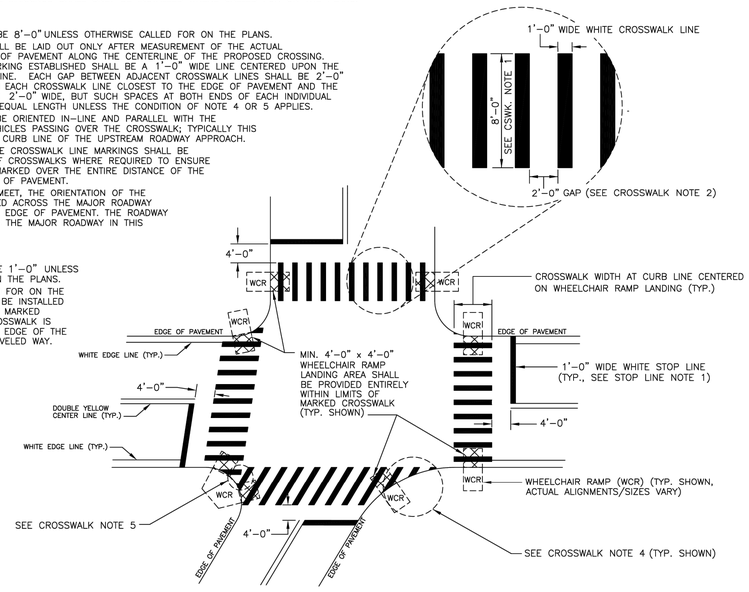
CROSSWALK NOTES:

1. CROSSWALK WIDTH SHALL BE 8'–0" UNLESS OTHERWISE CALLED FOR ON THE PLANS.
2. CROSSWALK MARKINGS SHALL BE LAID OUT ONLY AFTER MEASUREMENT OF THE ACTUAL DISTANCE BETWEEN EDGES OF PAVEMENT ALONG THE CENTERLINE OF THE PROPOSED CROSSING. THE FIRST CROSSWALK MARKING ESTABLISHED SHALL BE A 1'–0" WIDE LINE CENTERED UPON THE MIDPOINT OF THIS CENTERLINE. EACH GAP BETWEEN ADJACENT CROSSWALK LINES SHALL BE 2'–0" WIDE. THE SPACE BETWEEN EACH CROSSWALK LINE CLOSEST TO THE EDGE OF PAVEMENT AND THE LATTER MAY BE LESS THAN 2'–0" WIDE, BUT SUCH SPACES AT BOTH ENDS OF EACH INDIVIDUAL CROSSWALK SHALL BE OF EQUAL LENGTH UNLESS THE CONDITION OF NOTE 4 OR 5 APPLIES.
3. CROSSWALK LINES SHALL BE ORIENTED IN–LINE AND PARALLEL WITH THE PREDOMINANT PATH OF VEHICLES PASSING OVER THE CROSSWALK; TYPICALLY THIS WILL BE PARALLEL TO THE CURB LINE OF THE UPSTREAM ROADWAY APPROACH.
4. SHORTER SEGMENTS OF THE CROSSWALK LINE MARKINGS SHALL BE INSTALLED AT THE ENDS OF CROSSWALKS WHERE REQUIRED TO ENSURE THAT THE CROSSWALK IS MARKED OVER THE ENTIRE DISTANCE OF THE CROSSING BETWEEN EDGES OF PAVEMENT.
5. WHERE TWO CROSSWALKS MEET, THE ORIENTATION OF THE CROSSWALK LINES INSTALLED ACROSS THE MAJOR ROADWAY SHALL BE CARRIED TO THE EDGE OF PAVEMENT. THE ROADWAY RUNNING LEFT TO RIGHT IS THE MAJOR ROADWAY IN THIS DETAIL.

STOP LINE NOTES:

1. STOP LINE WIDTH SHALL BE 1'–0" UNLESS OTHERWISE CALLED FOR ON THE PLANS.
2. UNLESS OTHERWISE CALLED FOR ON THE PLANS, STOP LINES SHALL BE INSTALLED PARALLEL TO THE NEAREST MARKED CROSSWALK OR, IF NO CROSSWALK IS MARKED, PARALLEL TO THE EDGE OF THE NEAREST INTERSECTING TRAVELED WAY.

CROSSWALK DETAIL

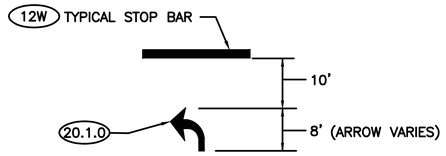


RHODE ISLAND DEPARTMENT OF TRANSPORTATION
PAVEMENT MARKINGS – CROSSWALKS AND STOP LINES

Robert Rocchio, CHIEF ENGINEER OF INFRASTRUCTURE, TRANSPORTATION
Daniel McKee, GOVERNOR, STATE OF RHODE ISLAND, EXECUTIVE DEPARTMENT
FEBRUARY 27, 2018 ISSUE DATE

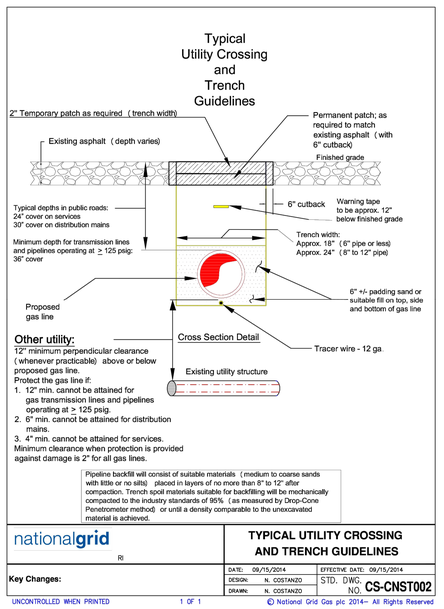
R.I. STANDARD 20.3.0

NO.	BY	DATE



TURNING LANE MARKINGS

NOT TO SCALE



nationalgrid
RI

TYPICAL UTILITY CROSSING AND TRENCH GUIDELINES

Key Changes:	DATE: 09/15/2014	EFFECTIVE DATE: 09/15/2014
	DESIGN: N. COSTANZO	STD. DWG. NO. CS-CNST002
	DRAWN: N. COSTANZO	

UNCONTROLLED WHEN PRINTED 1 OF 1

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No. 13145
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SUBCONSULTANT

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ISSUE DATE:	01/31/2024
BETA JOB NO.:	10694

SCALE

AS SHOWN

BID SET

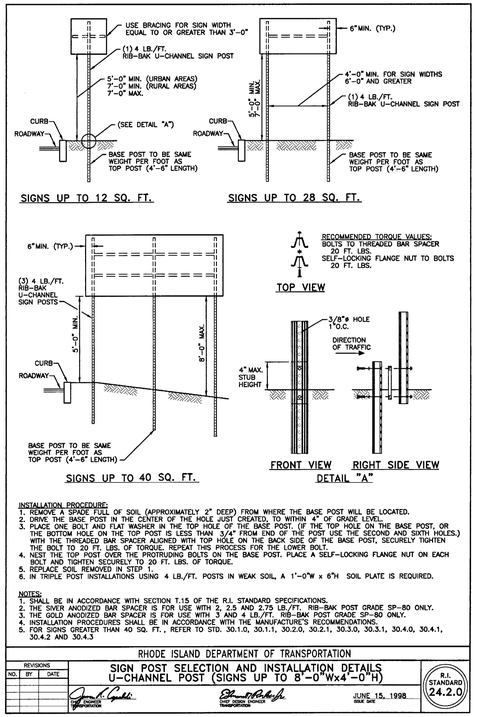
SHEET NO.

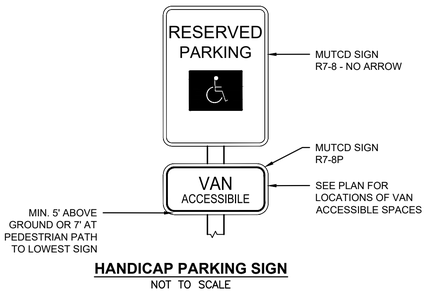
5.11

TRAFFIC SIGN SUMMARY

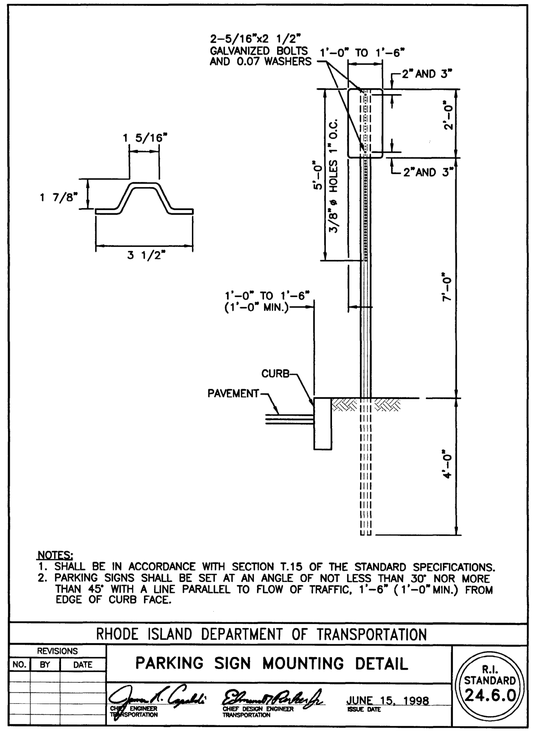
IDENTIFICATION NUMBER	TEXT	SIZE OF SIGN		TEXT DIMENSIONS (INCHES)			NUMBER OF SIGNS REQUIRED	COLOR			POST SIZE AND NUMBER REQUIRED	UNIT AREA (S.F.)	TOTAL AREA (S.F.)
		WIDTH	HEIGHT	LETTER HEIGHT	VERTICAL SPACING	ARROW RTE. MKR.		BACK-GROUND	LEGEND	BORDER			
R7-8		12 in	18 in	SEE 2009 MUTCD STANDARDS			4	WHITE	GREEN	GREEN	U-CHANNEL 4	1.5	6.00
R7-8P		18 in	9 in				2	WHITE	GREEN	GREEN	MOUNT 2 W/ R7-8	1.125	2.25
SP-1		30 in	30 in	4D 4D 4D	5.3 4.5 3.0 5.2	N/A	1	BLUE	WHITE	WHITE	U-CHANNEL 1	6.25	6.25
SP-2		30 in	30 in	4D 4D	4.1 4.5 4.0 4.1	ARROW 9.375X2 @180°	1	BLUE	WHITE	WHITE	U-CHANNEL 1	6.25	6.25
SP-3		30 in	30 in	4D 4D	4.1 4.5 4.0 4.1	ARROW 9.375X2 @0°	1	BLUE	WHITE	WHITE	U-CHANNEL 1	6.25	6.25

NOTES:
1. ALL U-CHANNEL POSTS SHALL BE GALVANIZED ACCORDING TO ASTM A123 AND MEET REQUIREMENTS OUTLINED IN THE "RIDOT STANDARD SPECIFICATIONS FOR ROAD AND BRIDGE CONSTRUCTION" OR "THE BLUE BOOK" (LATEST EDITION).
2. SEE THE 2009 "MANUAL ON UNIFORM TRAFFIC CONTROL DEVICES", 2012 REVISIONS AND SUPPLEMENTS TO THE MUTCD, AND "STANDARD HIGHWAY SIGNS" FOR THE LATEST SPECIFICATIONS ON TEXT DIMENSIONS AND COLOR.





HANDICAP PARKING SIGN
NOT TO SCALE



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SCALE
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BID SET

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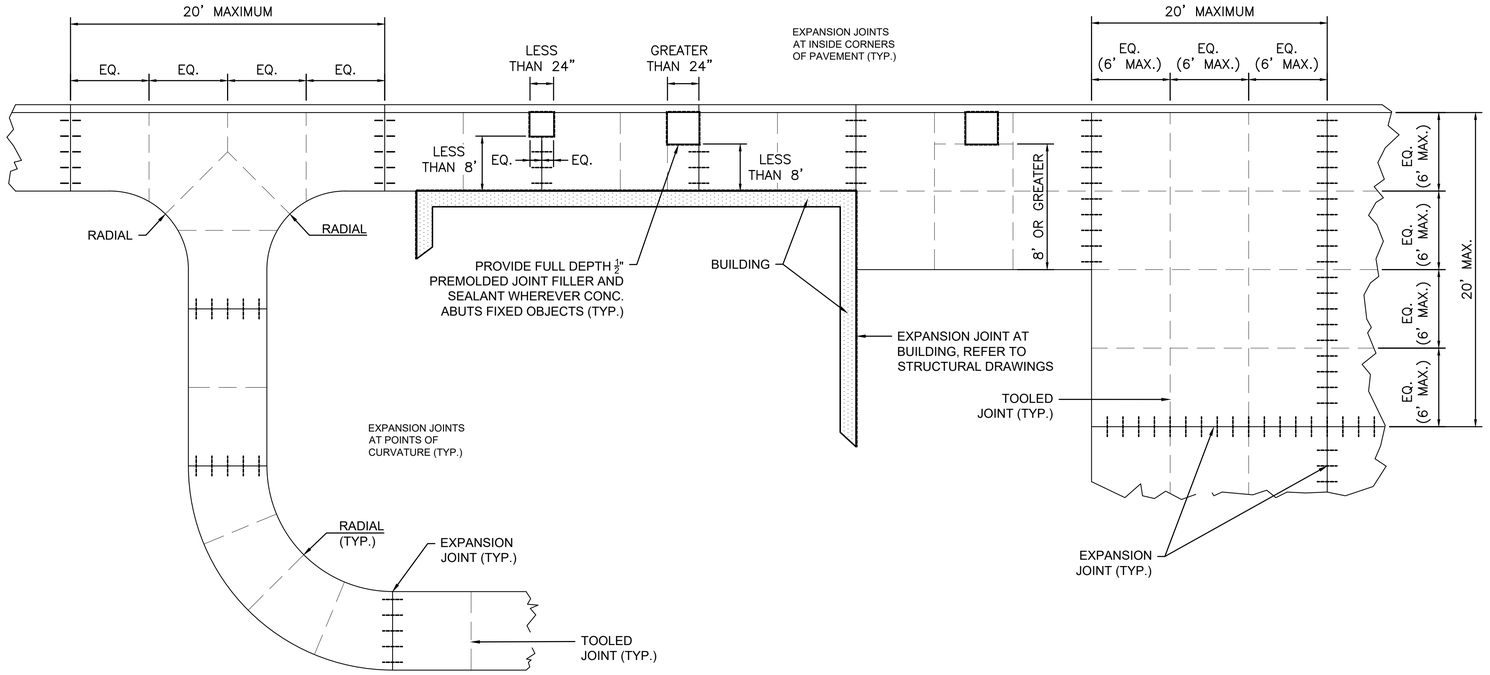
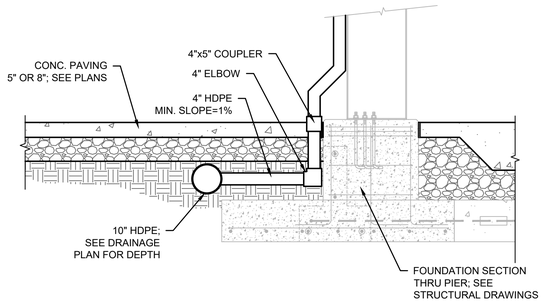
5.12

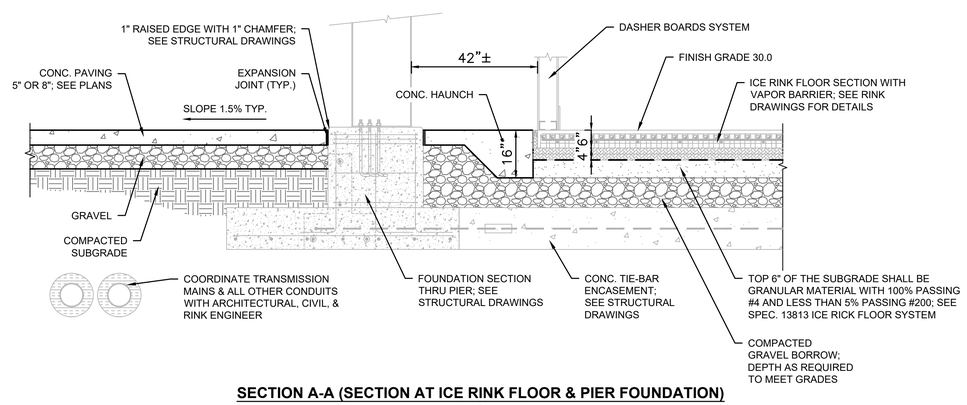


TYPICAL JOINT PLACEMENT IN CONCRETE
NOT TO SCALE

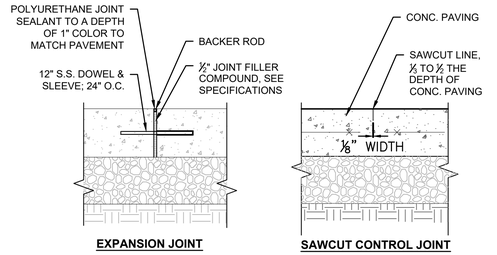


DRAINAGE DETAIL AT SHELTER FOUNDATION
SCALE: ½"=1'–0"

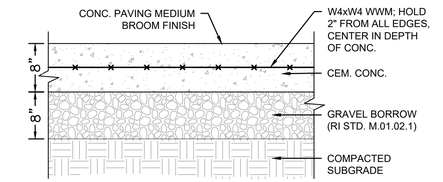
UNIT PAVER ON GRAVEL BASE
SCALE: 1"=1'–0"



SECTION A-A (SECTION AT ICE RINK FLOOR & PIER FOUNDATION)
SCALE: ½"=1'–0"

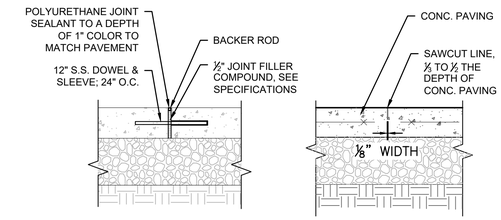


EXPANSION JOINT **SAWCUT CONTROL JOINT**

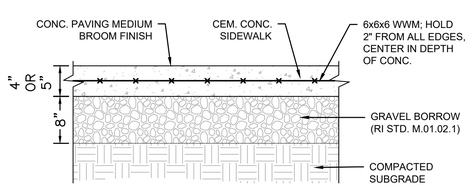


NOTES:
1. SEE PLAN FOR LIMITS.
2. SLOPE PAVEMENT PER GRADING PLANS.

CEMENT CONCRETE @ UTILITY AREA
SCALE: 1"=1'–0"

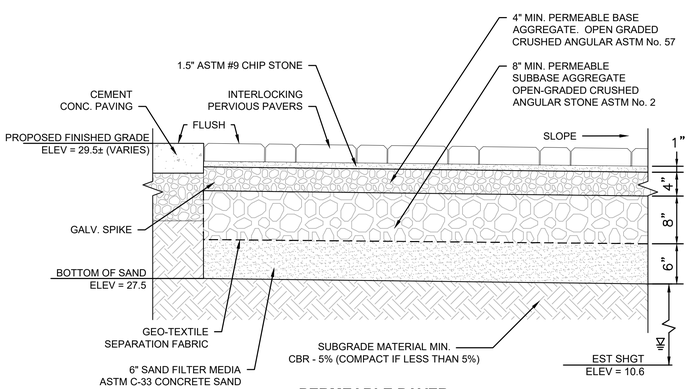


EXPANSION JOINT **SAWCUT CONTROL JOINT**



NOTES:
1. SEE PLAN FOR LIMITS.
2. SLOPE PAVEMENT PER GRADING PLANS.

CEMENT CONCRETE PAVING AT RINK AREA
SCALE: 1"=1'–0"



PERMEABLE PAVER
SCALE: 1"=1'–0"

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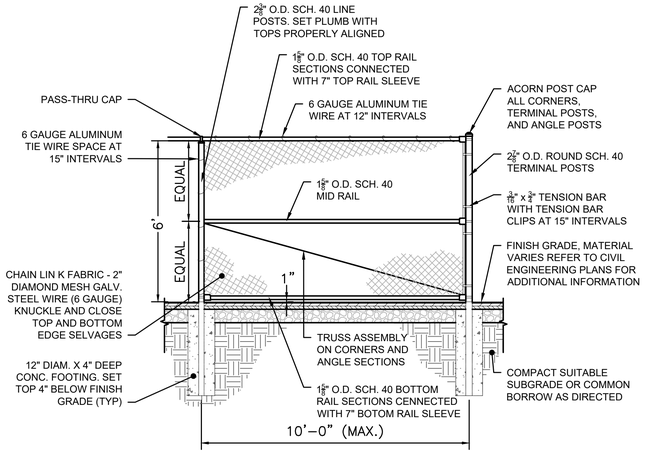
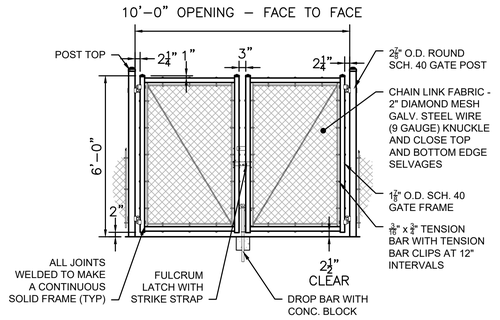
SHEET NO.
5.13

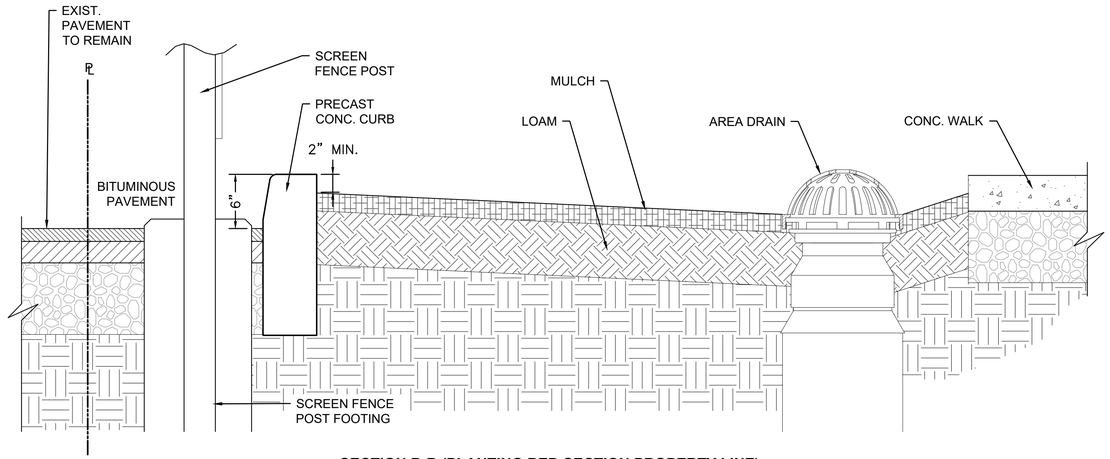


6' HIGH BLACK VINYL CHAIN LINK FENCE

SCALE: ⅜"=1'

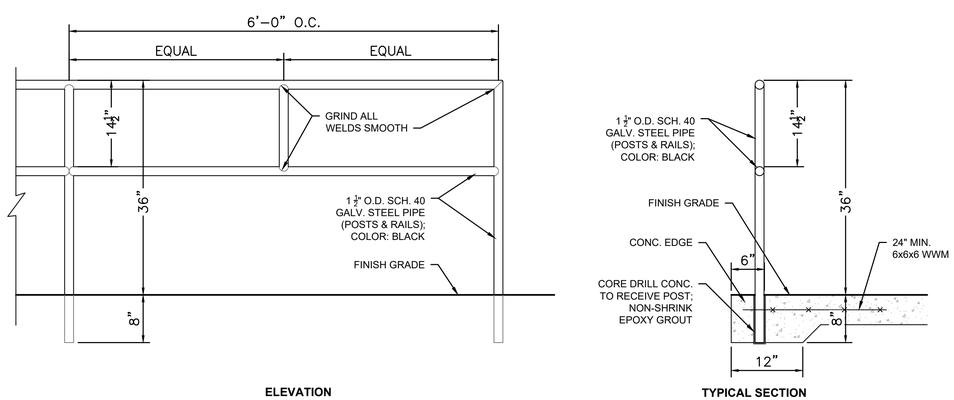


DOUBLE GATE ELEVATION



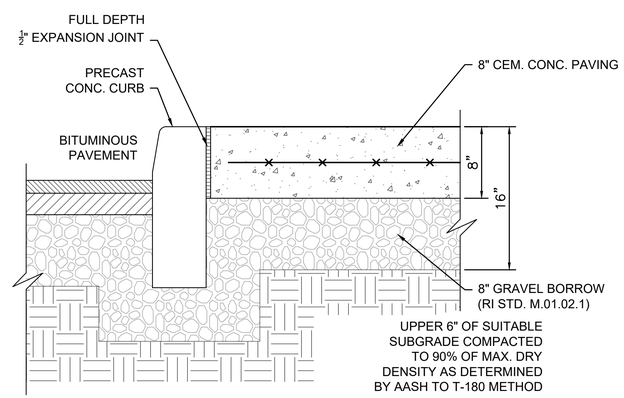
SECTION B-B (PLANTING BED SECTION PROPERTY LINE)

SCALE: 1½"=1'–0"



ADD ALT. # 2 PEDESTRIAN TWO RAIL BARRIER

SCALE: 1"=1'–0"



SECTION C-C SIDEWALK & CONCRETE CURB AT ZAMBONI MAINTENANCE AREA

SCALE: 1½"=1'–0"

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PROJECT

City Hall Plaza

Warwick, RI

TITLE

SITE DETAILS

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DESIGNED BY:	NS / RC
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SCALE

AS SHOWN

BID SET

SHEET NO.

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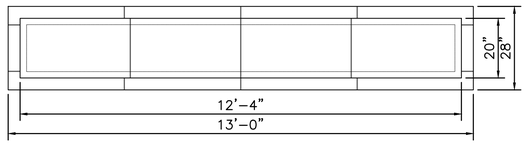
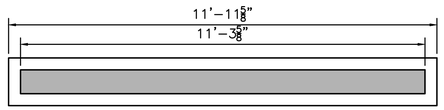
ELEVATION



GRANITE CAP LAYOUT

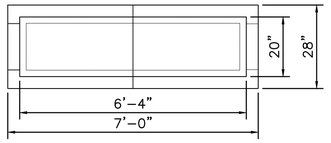


CMU CORE AND VENEER LAYOUT

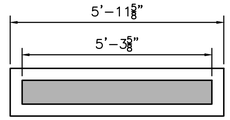
LARGE BRICK VENEER ENTRY WALL

SCALE: ½"=1'–0"

ELEVATION



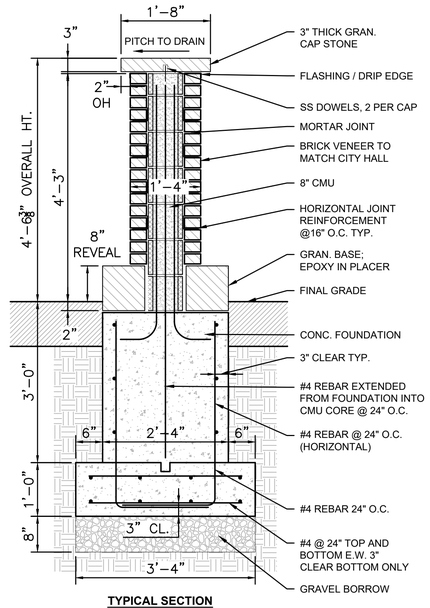
GRANITE CAP LAYOUT



CMU CORE AND VENEER LAYOUT

SMALL BRICK VENEER ENTRY WALL

SCALE: ½"=1'–0"

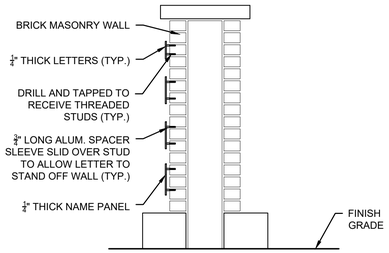


TYPICAL SECTION

NOTE:
ALLOW FOR MOISTURE REMOVAL SYSTEM BETWEEN CMU AND BRICK FACING MATERIALS THAT ALLOWS FOR MOISTURE ENTERING TO DRAIN THROUGH WEEP HOLES, TYP. FOR BRICK MASONRY PIER AND WALL

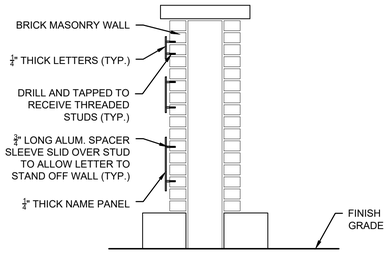
ENTRY WALL SECTION (LARGE & SMALL)

SCALE: ¾"=1'–0"



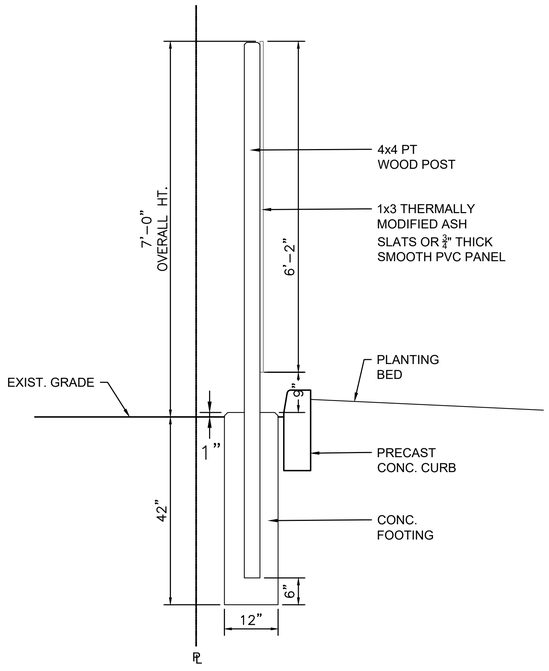
RAISED LETTERS AT SMALL ENTRY WALL

SCALE: ¾"=1'–0"



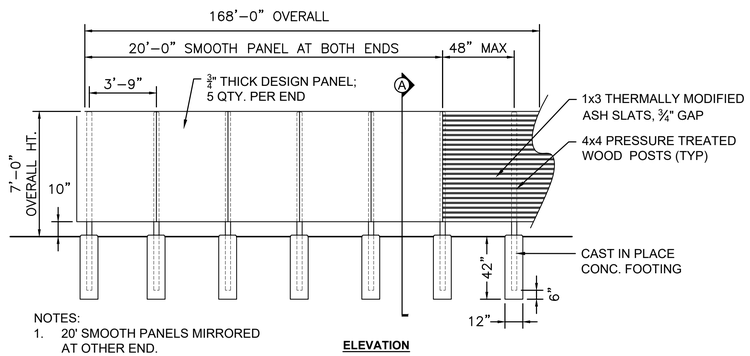
RAISED LETTERS AT LARGE ENTRY WALL

SCALE: ¾"=1'–0"



SECTION A - SCREEN FENCE

SCALE: ¾"=1'–0"

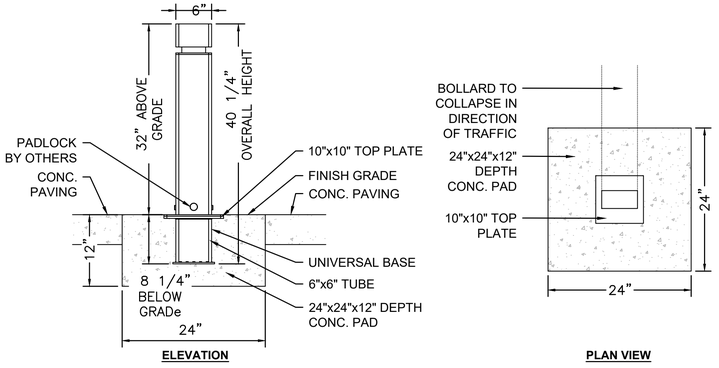


NOTES:
1. 20' SMOOTH PANELS MIRRORED AT OTHER END.
2. COORDINATE GRAPHICS WITH PROJECT LANDSCAPE ARCHITECT.

ELEVATION

SCREEN FENCE

SCALE: ¼"=1'–0"



ELEVATION **PLAN VIEW**

NOTE:
1. SEE SPECIFICATIONS FOR MANUFACTURER, MODEL AND FINISH.

COLLAPSIBLE BOLLARD

SCALE: 1½"=1'–0"

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City Hall Plaza

Warwick, RI

TITLE

SITE DETAILS

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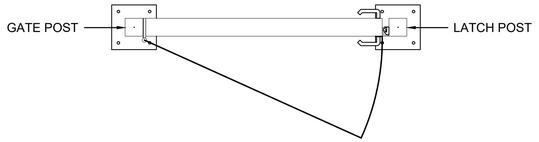
SCALE

AS SHOWN

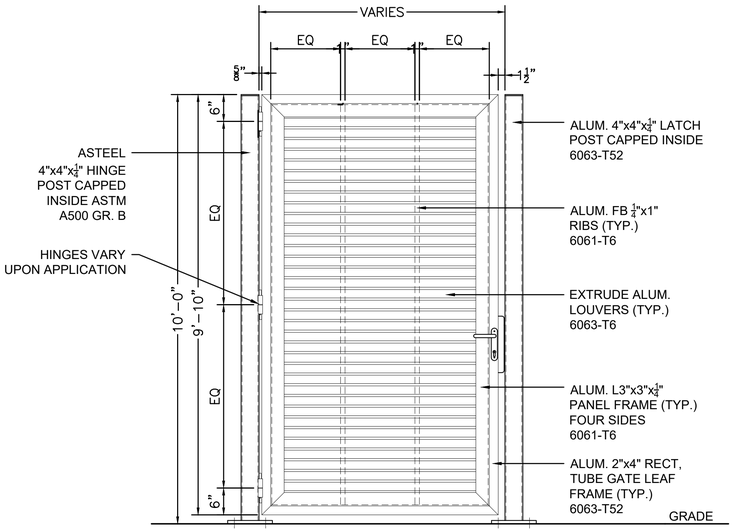
BID SET

SHEET NO.

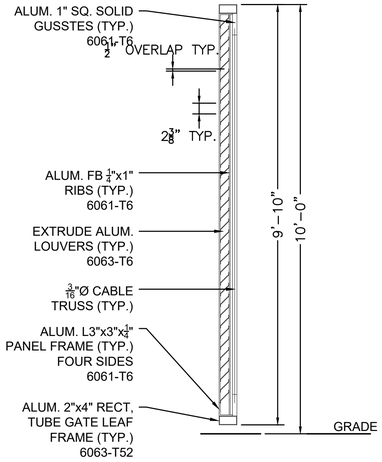
5.15



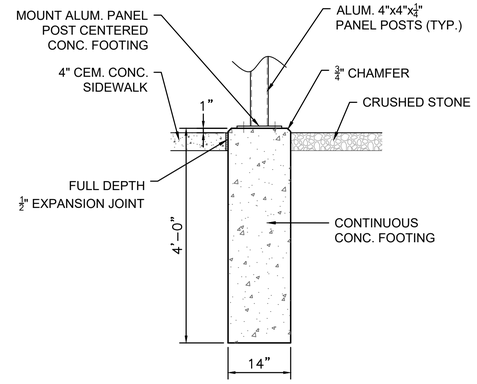
PLAN VIEW
SINGLE SWING GATE ASSEMBLY



ELEVATION VIEW
SINGLE SWING GATE ASSEMBLY

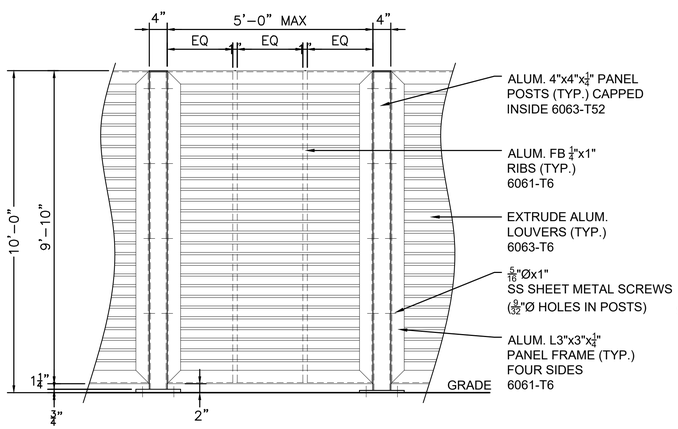


TYPICAL SECTION
SINGLE SWING GATE ASSEMBLY

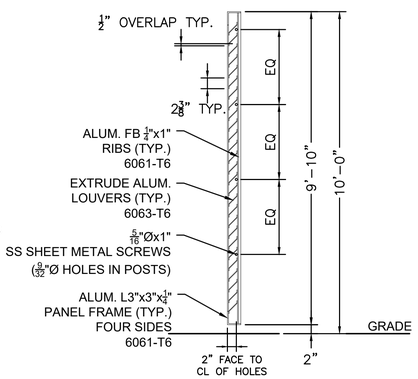


LOUVERED PANEL FENCE FOOTING
SCALE: 3/4"=1'-0"

PLAN VIEW
TYPICAL PANEL

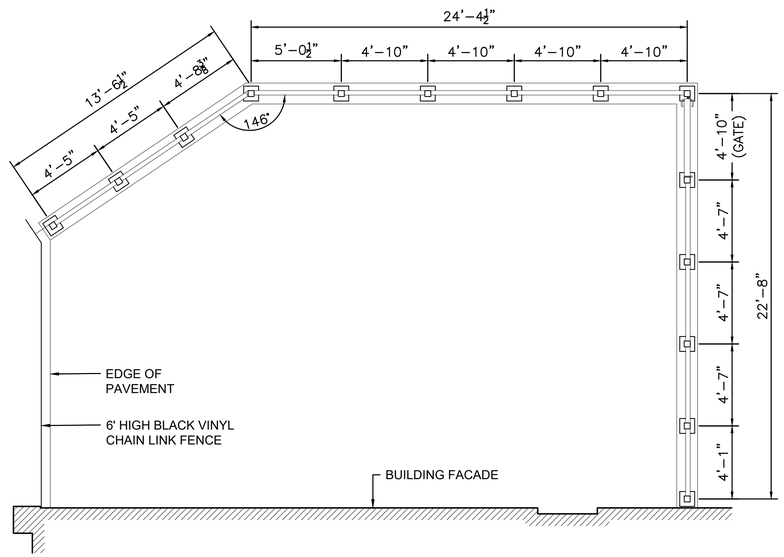


ELEVATION VIEW
TYPICAL PANEL



TYPICAL PANEL SECTION

LOUVERED PANEL FENCE
SCALE: 3/4"=1'-0"



LOUVERED PANEL FENCE LAYOUT
SCALE: 1/4"=1'-0"

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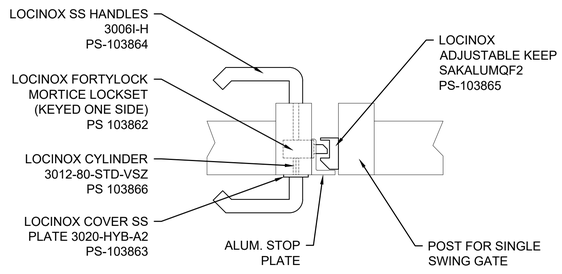
SCALE

AS SHOWN

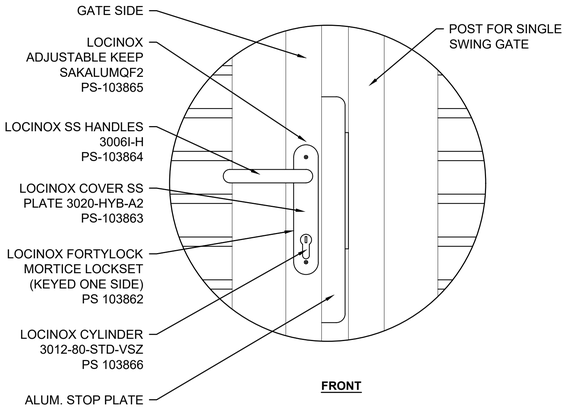
BID SET

SHEET NO.

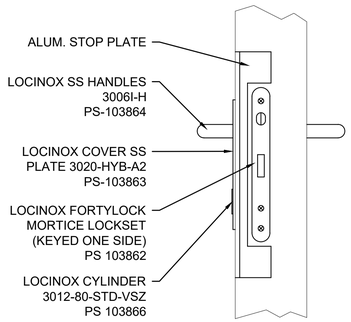
5.16



TOP

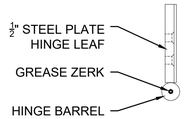


FRONT



SIDE

LATCH AND LOCK DETAIL
SCALE: 3"=1'–0"



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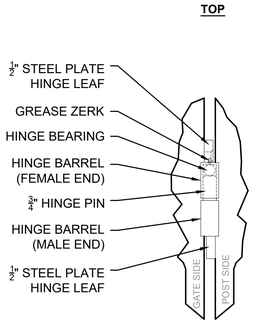

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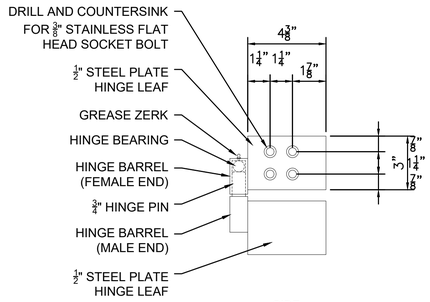
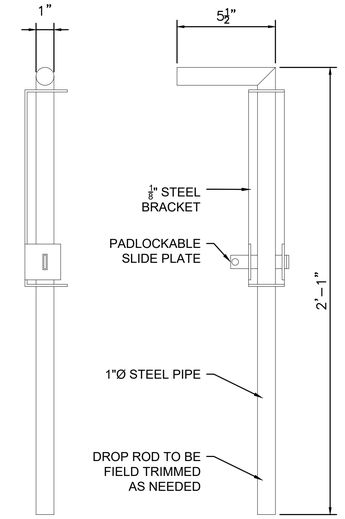


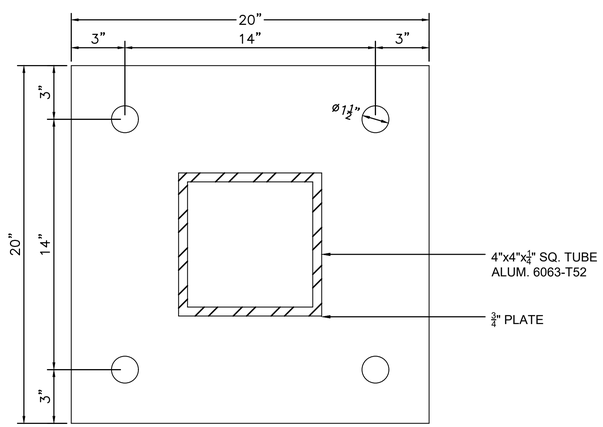
SIDE

NOTES:
1. ZERK END IS FEMALE AND BOLTS TO GATE FRAME. MALE END IS TO BE FIELD WELDED TO GATE POST. (CAN BE SHOP WELDED UPON REQUEST) FIELD WELDING ALLOWS FOR MINOR ADJUSTMENTS TO BE MADE FOR PROPER ALIGNMENT.
2. A "STOP" CAN BE FIELD WELDED TO THE GATE POST ABOVE THE HINGE TO PREVENT LIFT OFF.
3. GORILLA HINGES ARE PRE-GREASED, BUT SHOULD BE GREASED AGAIN UPON INSTALLATION AND PERIODICALLY TO MAINTAIN PROPER FUNCTION.

GORILLA HINGE DETAIL
SCALE: 3"=1'–0"



DROP ROD DETAIL
SCALE: 3"=1'–0"



TYPICAL BASE PLATE
SCALE: 3"=1'–0"

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AS SHOWN

BID SET

SHEET NO.

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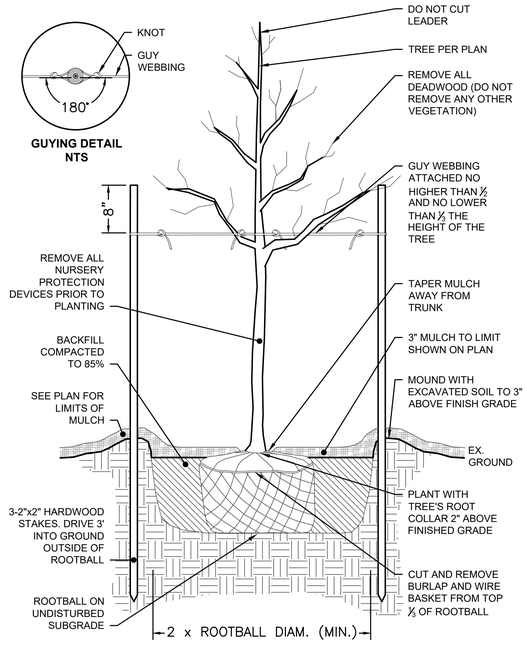
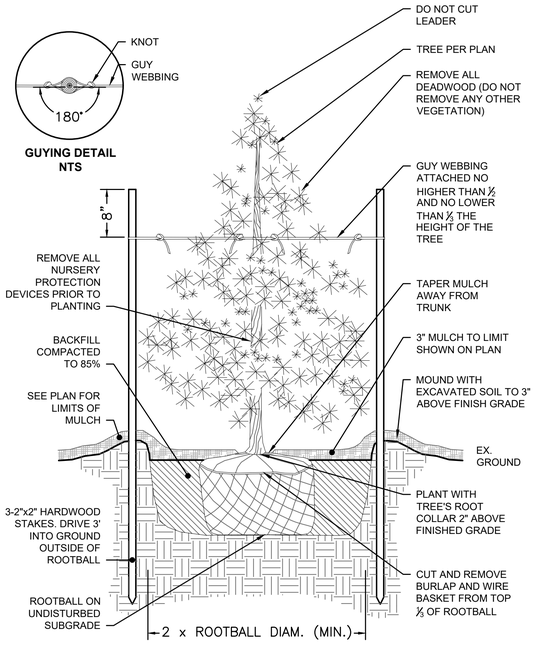
GUYING DETAIL
NTS



NOTE:
AFTER THE GUARANTEE PERIOD THE CONTRACTOR WILL BE RESPONSIBLE FOR THE REMOVAL OF STAKES AND GUY WEBBING.

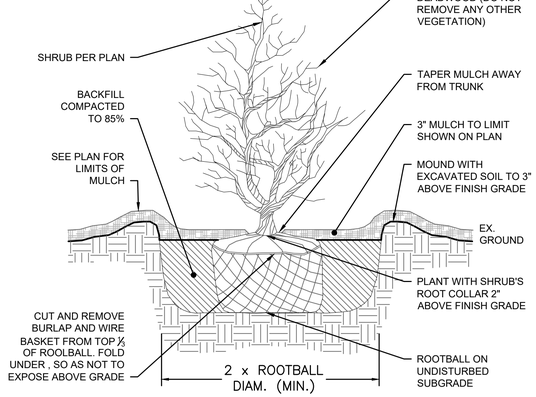
DECIDUOUS TREE STAKING & PLANTING
NOT TO SCALE

GUYING DETAIL
NTS

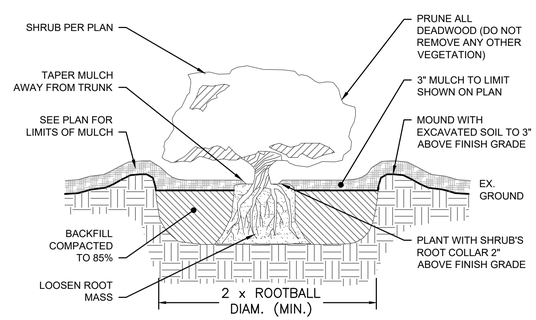


NOTE:
AFTER THE GUARANTEE PERIOD THE CONTRACTOR WILL BE RESPONSIBLE FOR THE REMOVAL OF STAKES AND GUY WEBBING.

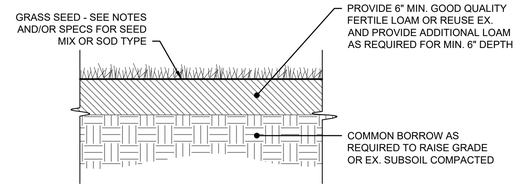
EVERGREEN TREE STAKING & PLANTING
NOT TO SCALE



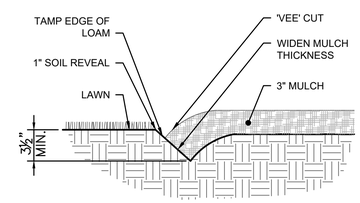
SHRUB PLANTING
NOT TO SCALE



CONTAINER GROWN TREE & SHRUB PLANTING
NOT TO SCALE

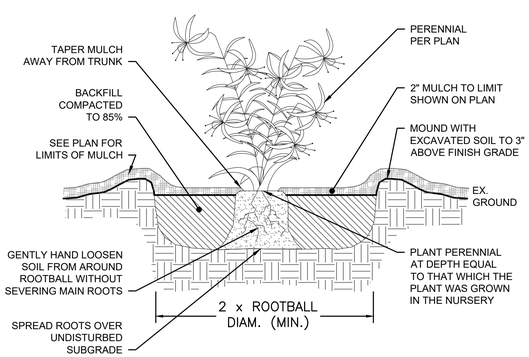


LOAM AND SEED
NOT TO SCALE



NOTE:
LOCATE BEDLINE AS SHOWN ON PLAN.

BEDLINE EDGE
NOT TO SCALE



PERENNIALS & GRASSES PLANTING
NOT TO SCALE

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Warwick, RI

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BETA JOB NO.:	10694

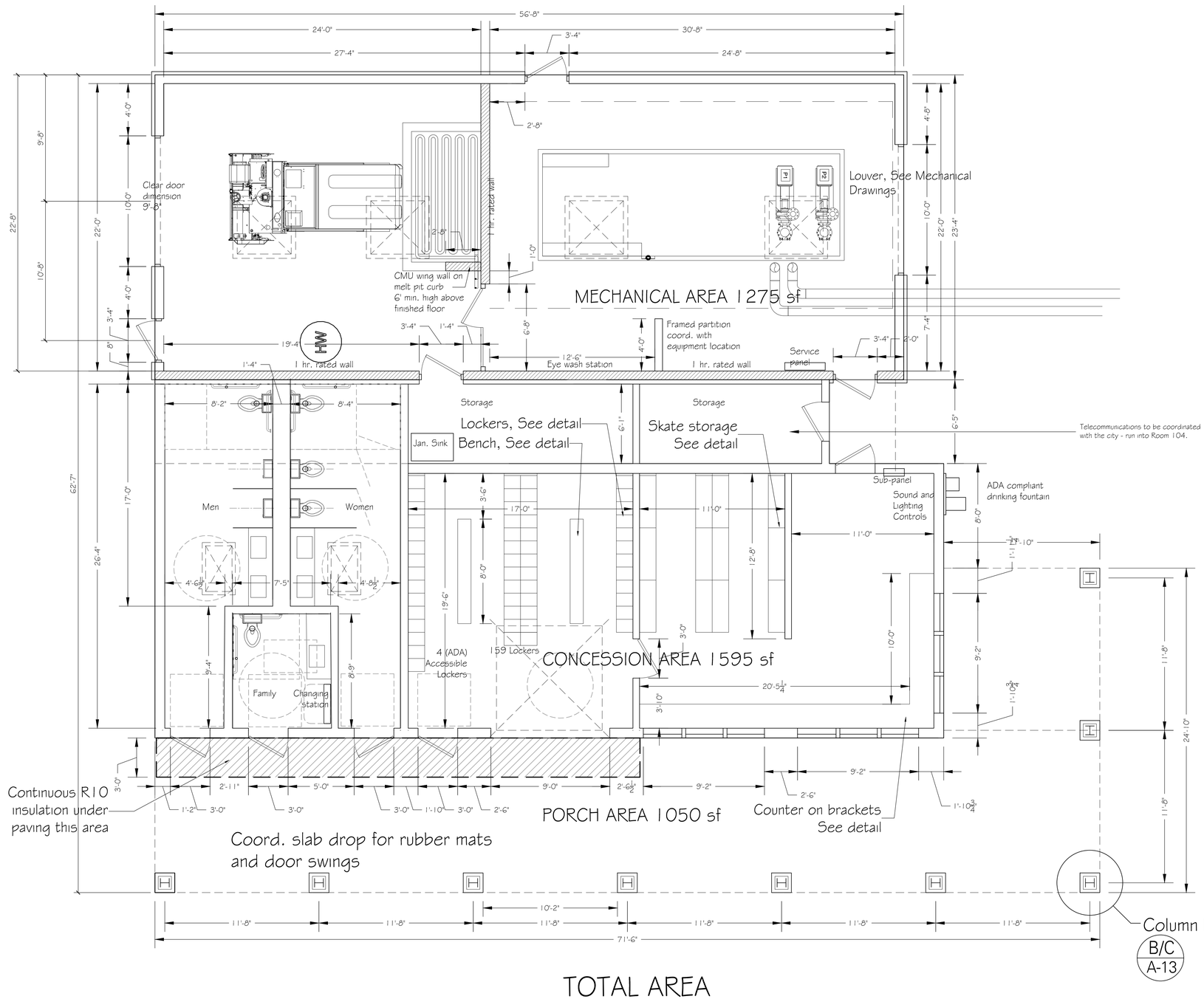
SCALE

AS SHOWN

BID SET

SHEET NO.

5.18



GLEN S. FONTECCHIO No. 2225 REGISTERED ARCHITECT

Glen S Fontecchio

PREPARED BY

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REGISTERED PROFESSIONAL

SUBCONSULTANT

PROJECT

Warwick Ice Rink

Warwick, RI

TITLE

First Floor Plan

NO.	REVISIONS	DATE

DRAWN BY: GSF

DESIGNED BY: GSF

CHECKED BY: GSF

ISSUE DATE: 1/31/2024

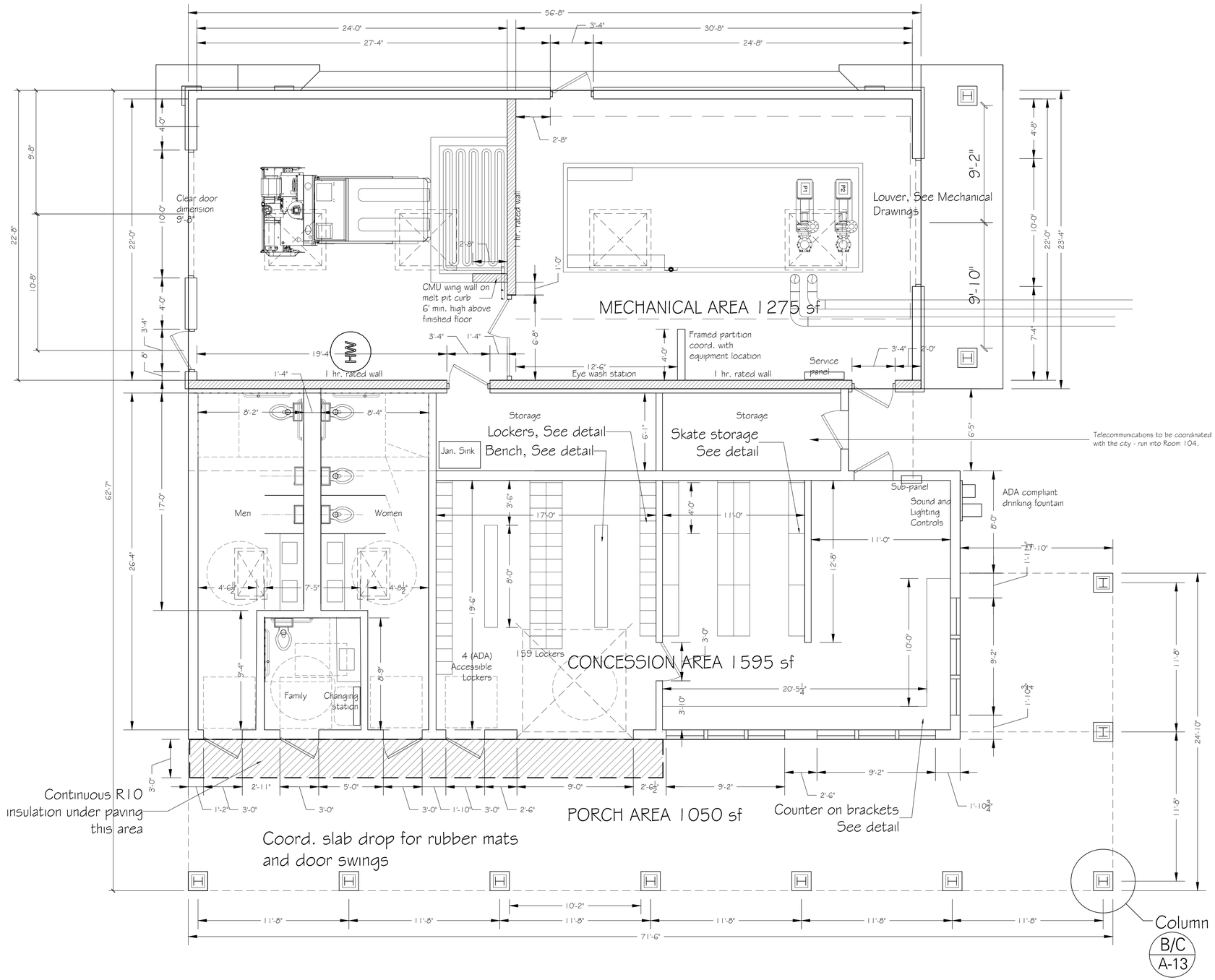
BETA JOB NO.: 10694

SCALE

1/4" = 1'0"

SHEET NO.

A-1



TOTAL AREA
3920sf

PREPARED BY

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SUBCONSULTANT

PROJECT

Warwick Ice Rink

Warwick, RI

TITLE

First Floor Plan
Add Alternate No. 4

NO.	REVISIONS	DATE

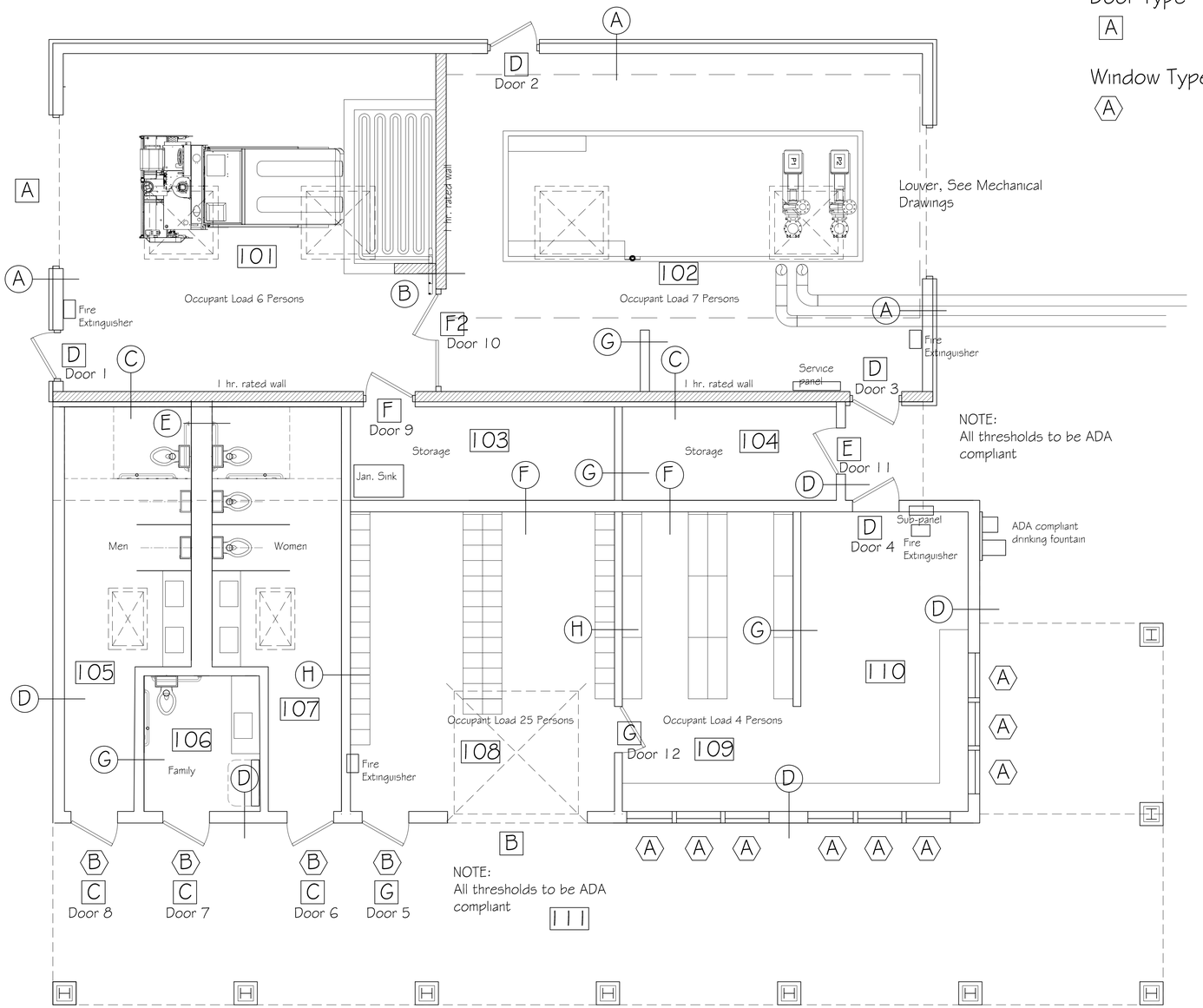
DRAWN BY: GSF
DESIGNED BY: GSF
CHECKED BY: GSF
ISSUE DATE: 1/31/2024
BETA JOB NO.: 10694

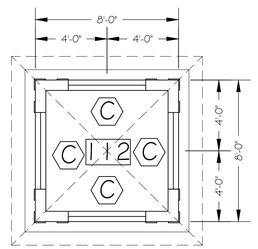
SCALE

1/4" = 1'0"

SHEET NO.

A-1a





CUPOLA

* SEE SHEET A10 FOR WALL TYPES

WARWICK SKATING RINK
CODE SUMMARY

Use Assembly A-4, Outdoor Skating Rink
with related accessory uses including garage for ice conditioner, refrigeration system, food concession, and restrooms

Proposed type of construction per Table 601
Type IIB, combustible, not protected by an approved sprinkler system

Allowable area / building footprint per Table 503
9,500 square feet / 2 stories
This allowable area is substantially larger than the proposed structures.

1. Concession Building 4000 square feet / single story
2. Roof structure over open rink 7,200 square feet / single story

Additional Notes:
8" CMU constructon of ice conditioner garage and refrigeration system rooms to isolate the remainder of the facility from noise, vibration, and provide 1 hour rated separation between these elements and the rest of the structure.

GLENN S. FONTECCHIO No. 2225 REGISTERED ARCHITECT

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SUBCONSULTANT

PROJECT
Warwick Ice Rink
Warwick, RI

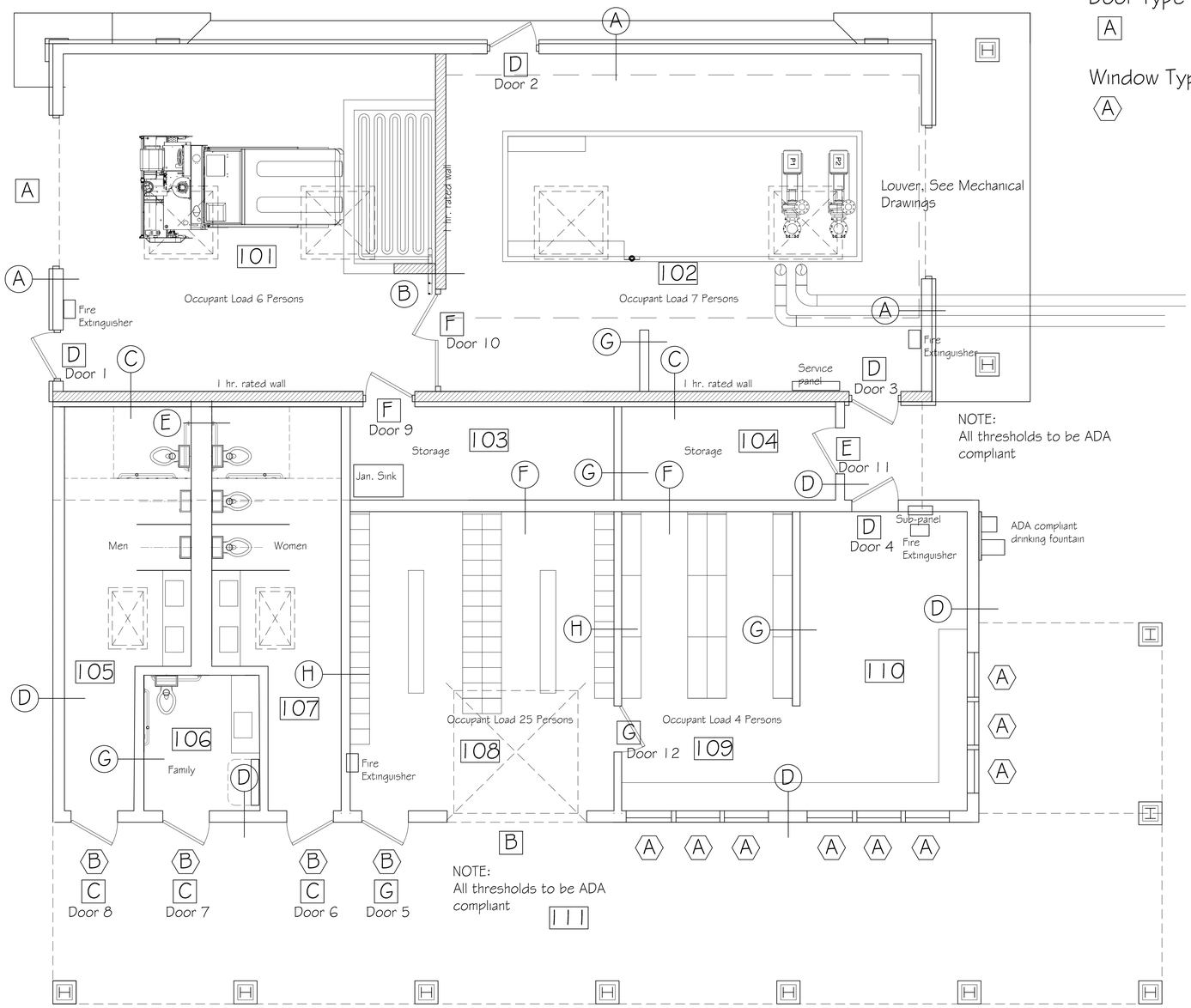
TITLE
Wall Type Plan

NO.	REVISIONS	DATE

DRAWN BY: GSF
DESIGNED BY: GSF
CHECKED BY: GSF
ISSUE DATE: 1/31/2024
BETA JOB NO.: 10694

SCALE
1/4" = 1'0"

SHEET NO.
A-2



WARWICK SKATING RINK
CODE SUMMARY

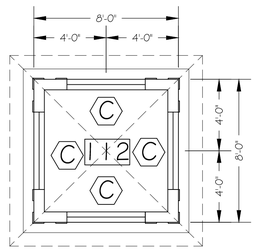
Use Assembly A-4, Outdoor Skating Rink
with related accessory uses including garage for ice conditioner, refrigeration system, food concession, and restrooms

Proposed type of construction per Table 601
Type IIB, combustible, not protected by an approved sprinkler system

Allowable area / building footprint per Table 503
9,500 square feet / 2 stories
This allowable area is substantially larger than the proposed structures.

1. Concession Building 4000 square feet / single story
2. Roof structure over open rink 7,200 square feet / single story

Additional Notes:
8" CMU constructon of ice conditioner garage and refrigeration system rooms to isolate the remainder of the facility from noise, vibration, and provide 1 hour rated separation between these elements and the rest of the structure.



CUPOLA

* SEE SHEET A10 FOR WALL TYPES

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PREPARED BY
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SUBCONSULTANT

PROJECT
Warwick Ice Rink
Warwick, RI

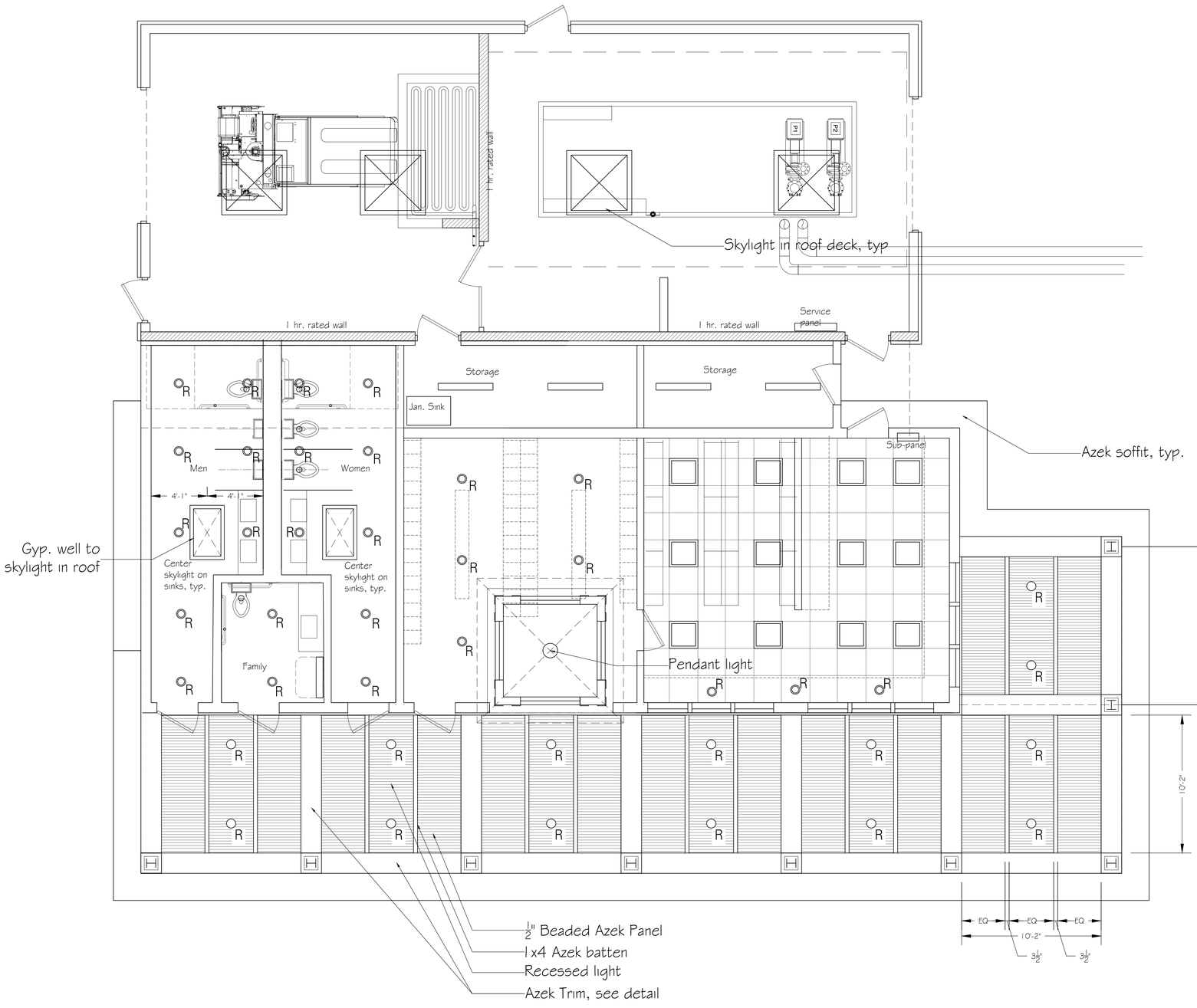
TITLE
Wall Type Plan
Add Alternate No. 4

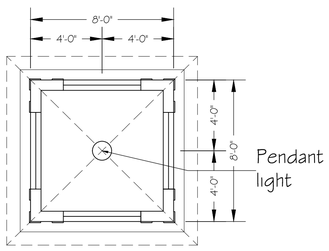
NO.	REVISIONS	DATE

DRAWN BY: GSF
DESIGNED BY: GSF
CHECKED BY: GSF
ISSUE DATE: 1/31/2024
BETA JOB NO.: 10694

SCALE
1/4" = 1'0"

SHEET NO.
A-2a





CUPOLA

LEGEND

T	Track 6' long with three heads each
S	Service Light. LED
R	Recessed light fixture
S	Switch
S_3	Three-way switch
S	Surface mounted light fixture
W	Wall mounted light fixture
F	Shower fan light fixture with remote inline fan
P	Pendant light fixture note: provide ceiling fan mounting hardware

NOTE: Azek is the basis for design, but other solid composite material may be submitted for review and approval.

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PROJECT

Warwick Ice Rink

Warwick, RI

TITLE

Reflected Ceiling Plan

NO.	REVISIONS	DATE

DRAWN BY: GSF

DESIGNED BY: GSF

CHECKED BY: GSF

ISSUE DATE: 1/31/2024

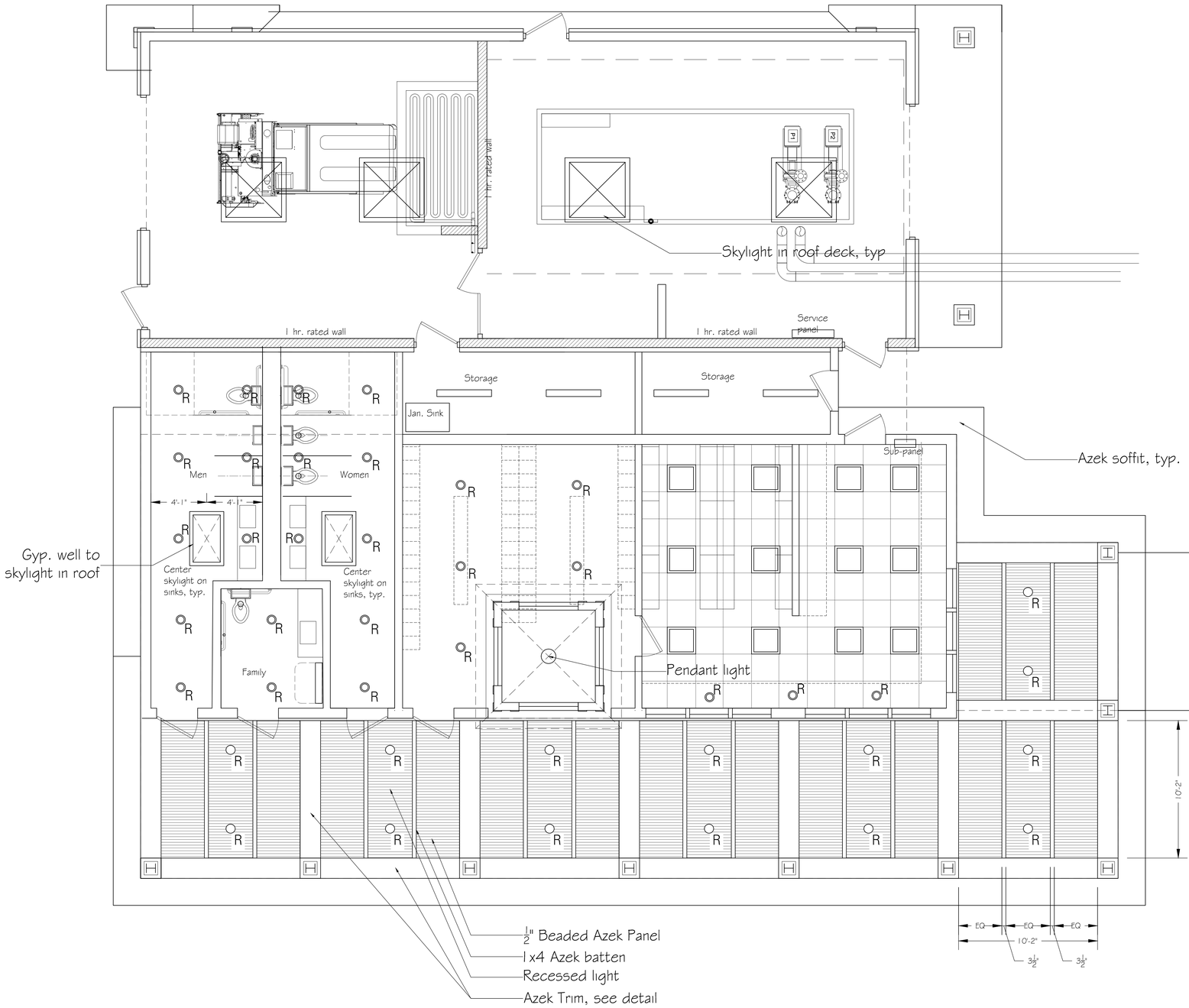
BETA JOB NO.: 10694

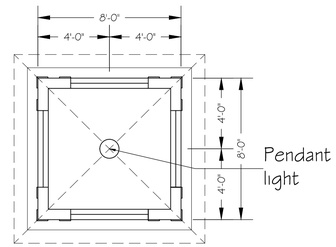
SCALE

1/4" = 1'0"

SHEET NO.

A-3





CUPOLA

LEGEND

T	Track 6' long with three heads each
S	Service Light. LED
R	Recessed light fixture
S	Switch
S_3	Three-way switch
S	Surface mounted light fixture
W	Wall mounted light fixture
F	Shower fan light fixture with remote inline fan
P	Pendant light fixture note: provide ceiling fan mounting hardware

NOTE: Azek is the basis for design, but other solid composite material may be submitted for review and approval.

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PROJECT

Warwick Ice Rink

Warwick, RI

TITLE

Reflected Ceiling Plan Add Alternate No. 4

NO.	REVISIONS	DATE

DRAWN BY: GSF

DESIGNED BY: GSF

CHECKED BY: GSF

ISSUE DATE: 1/31/2024

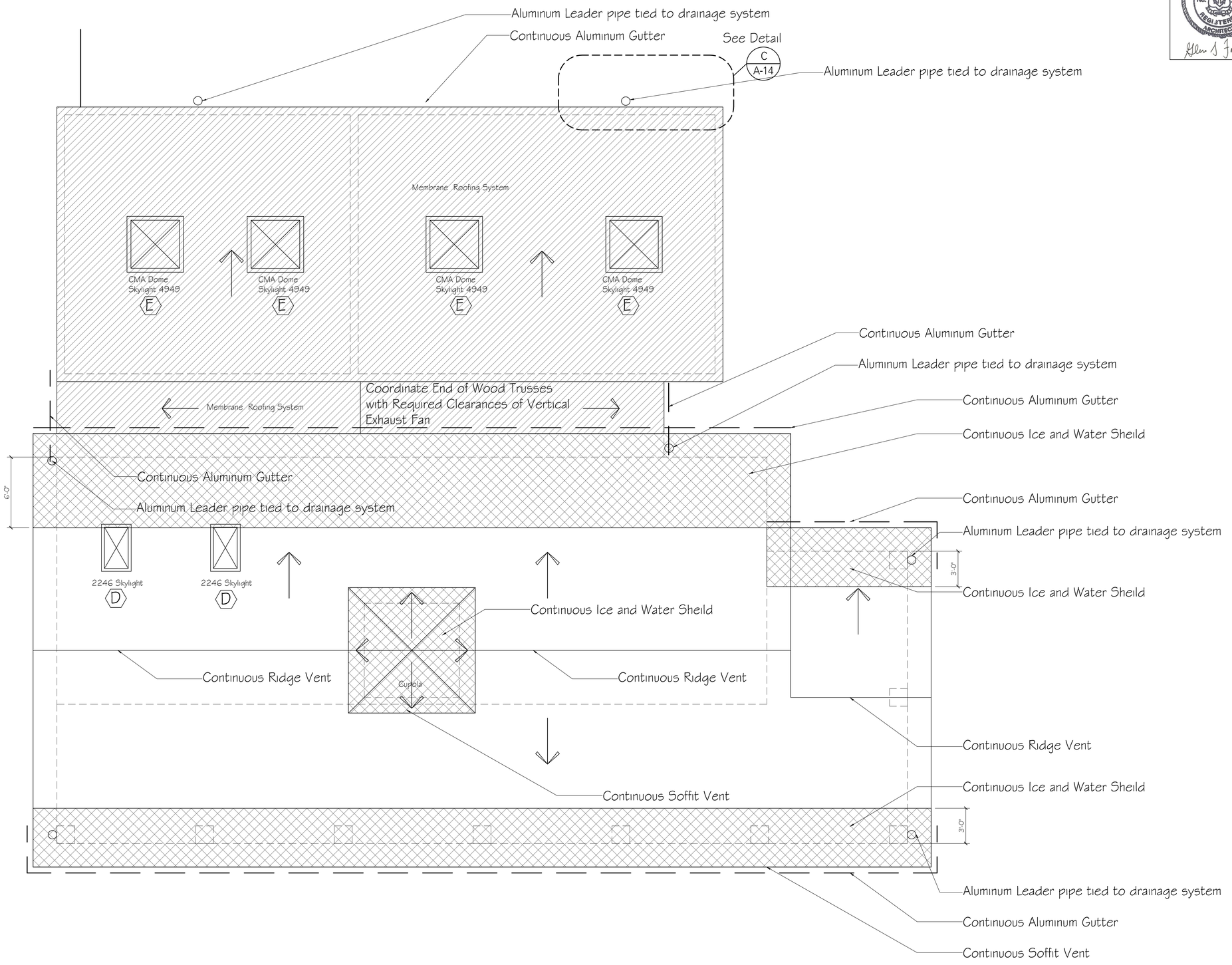
BETA JOB NO.: 10694

SCALE

1/4" = 1'0"

SHEET NO.

A-3a



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No. 2225
REGISTERED ARCHITECT

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Warwick Ice Rink

Warwick, RI

TITLE

Roof Plan

NO.	REVISIONS	DATE

DRAWN BY: GSF

DESIGNED BY: GSF

CHECKED BY: GSF

ISSUE DATE: 1/31/2024

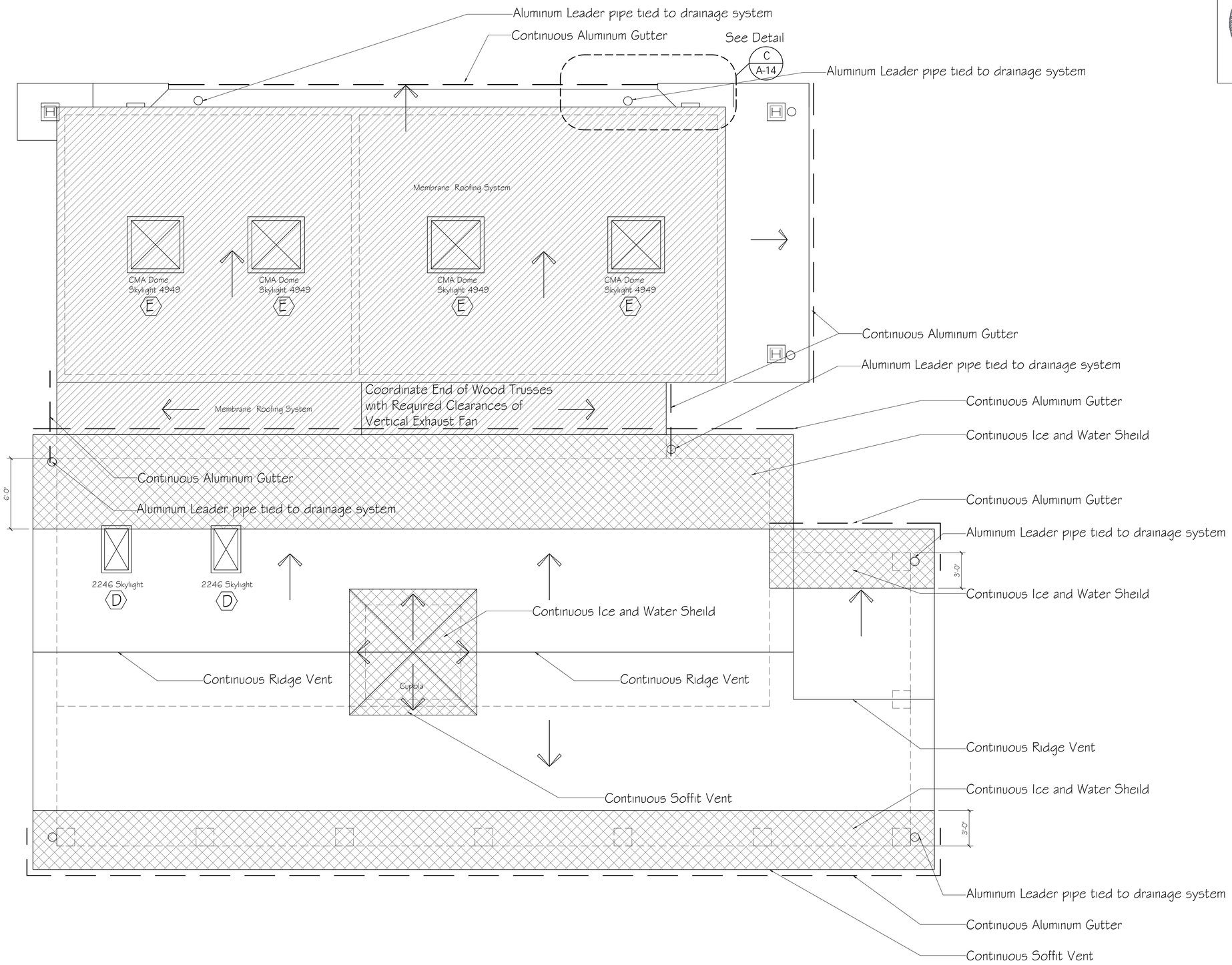
BETA JOB NO.: 10694

SCALE

1/4" = 1'0"

SHEET NO.

A-4



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PROJECT

Warwick Ice Rink

Warwick, RI

TITLE

Roof Plan
Add Alternate No. 4

NO.	REVISIONS	DATE

DRAWN BY: GSF

DESIGNED BY: GSF

CHECKED BY: GSF

ISSUE DATE: 1/31/2024

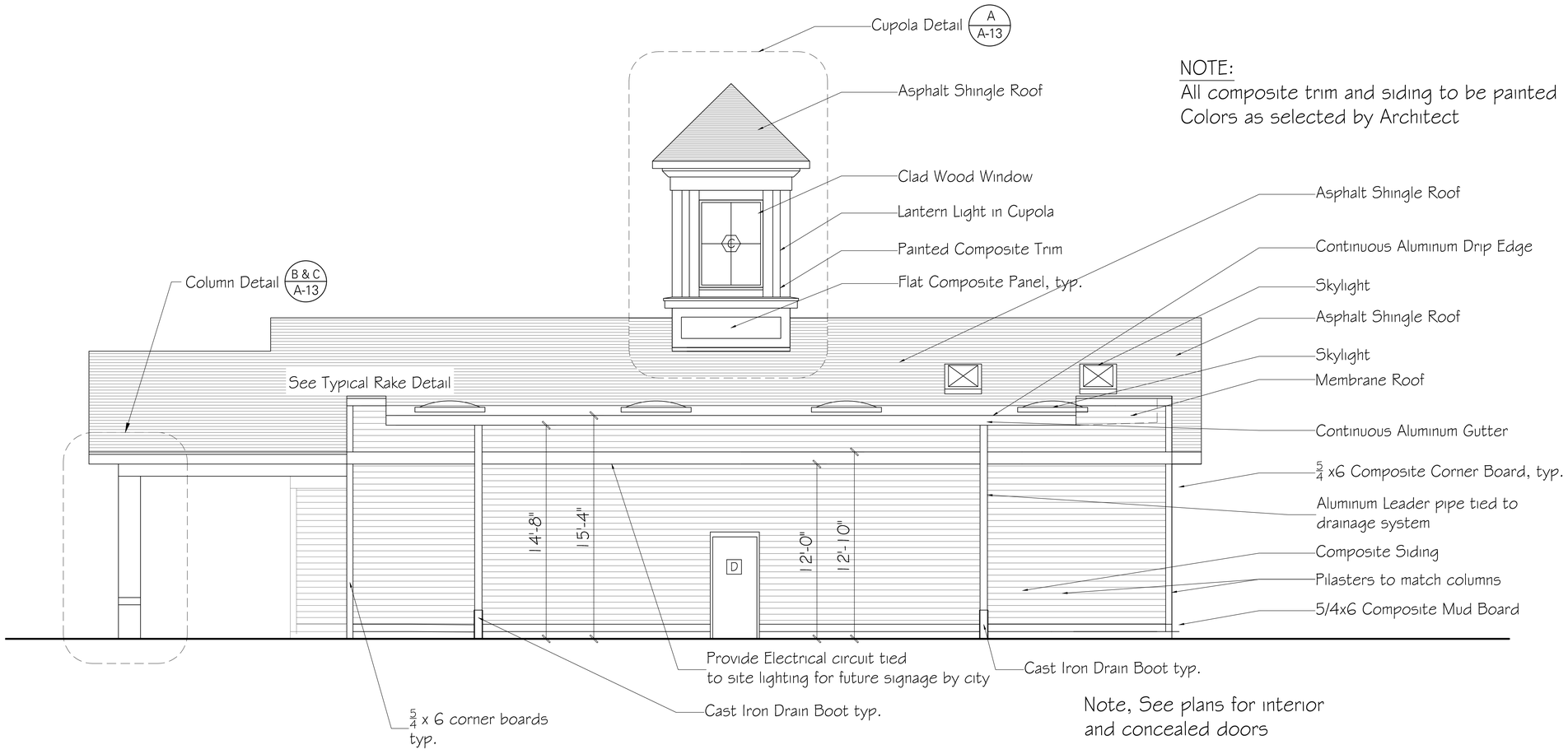
BETA JOB NO.: 10694

SCALE

1/4" = 1'0"

SHEET NO.

A-4a



NOTE:
All composite trim and siding to be painted
Colors as selected by Architect

Note, See plans for interior and concealed doors

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PROJECT

Warwick Ice Rink

Warwick, RI

TITLE

North Elevation

NO.	REVISIONS	DATE

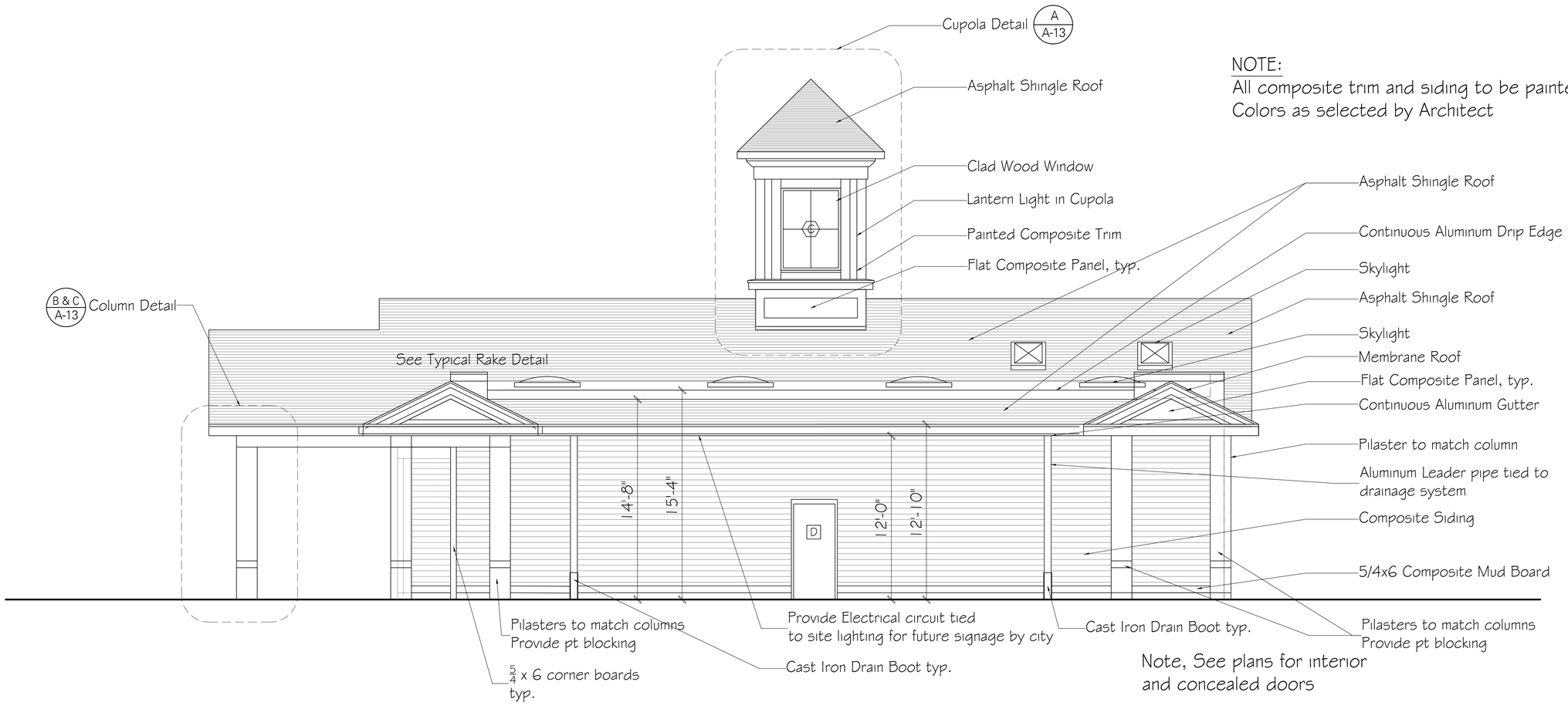
DRAWN BY: GSF
DESIGNED BY: GSF
CHECKED BY: GSF
ISSUE DATE: 1/31/2024
BETA JOB NO.: 10694

SCALE

1/4" = 1'0"

SHEET NO.

A-5



NOTE:
All composite trim and siding to be painted
Colors as selected by Architect

Note, See plans for interior and concealed doors

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PROJECT

Warwick Ice Rink

Warwick, RI

TITLE

North Elevation
Add Alternate No. 4

NO.	REVISIONS	DATE

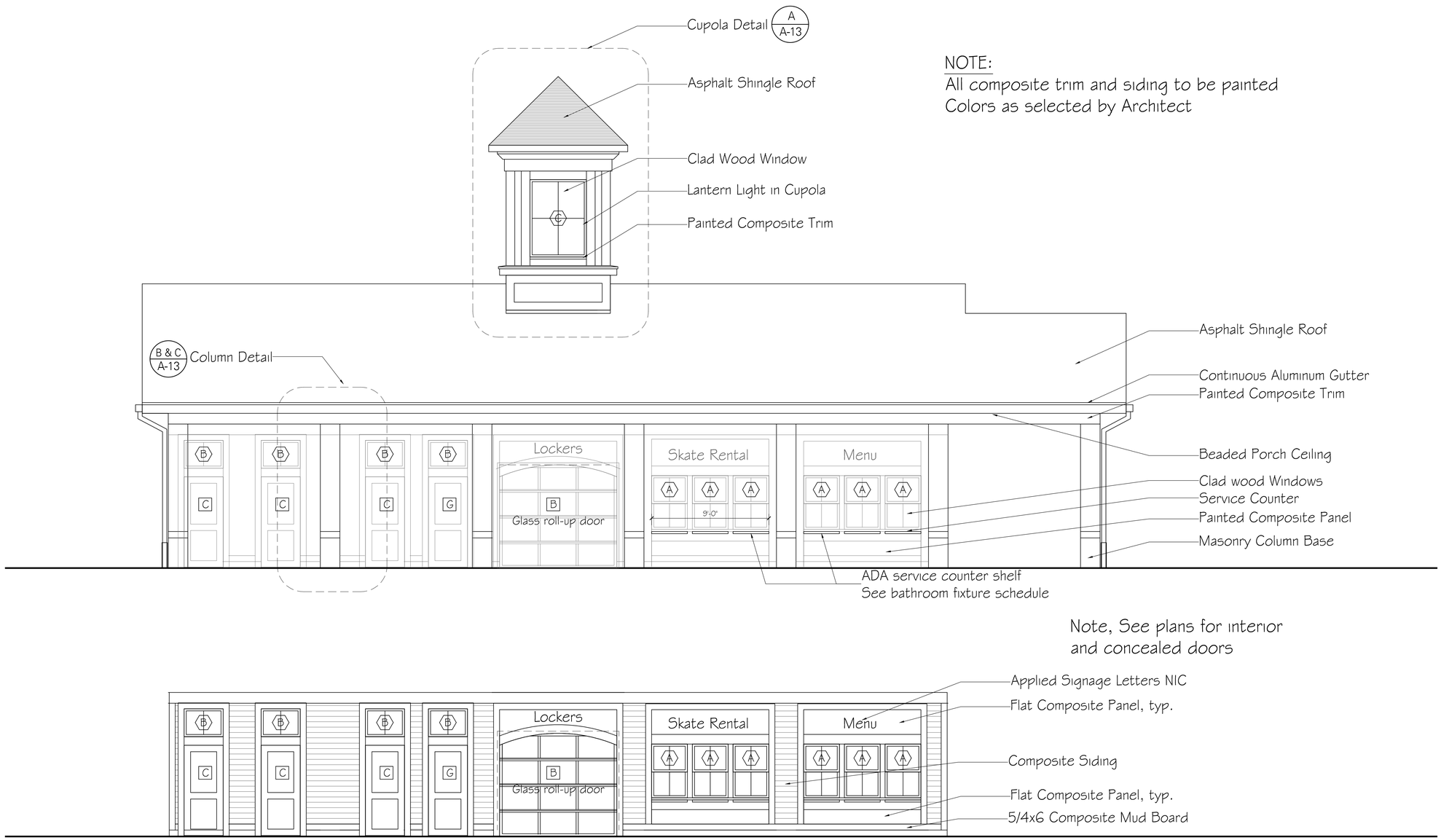
DRAWN BY: GSF
DESIGNED BY: GSF
CHECKED BY: GSF
ISSUE DATE: 1/31/2024
BETA JOB NO.: 10694

SCALE

1/4" = 1'0"

SHEET NO.

A-5a



NOTE:
All composite trim and siding to be painted
Colors as selected by Architect

Note, See plans for interior and concealed doors

Elevation with columns omitted for clarity

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PROJECT

Warwick Ice Rink

Warwick, RI

TITLE

South Elevation

NO.	REVISIONS	DATE

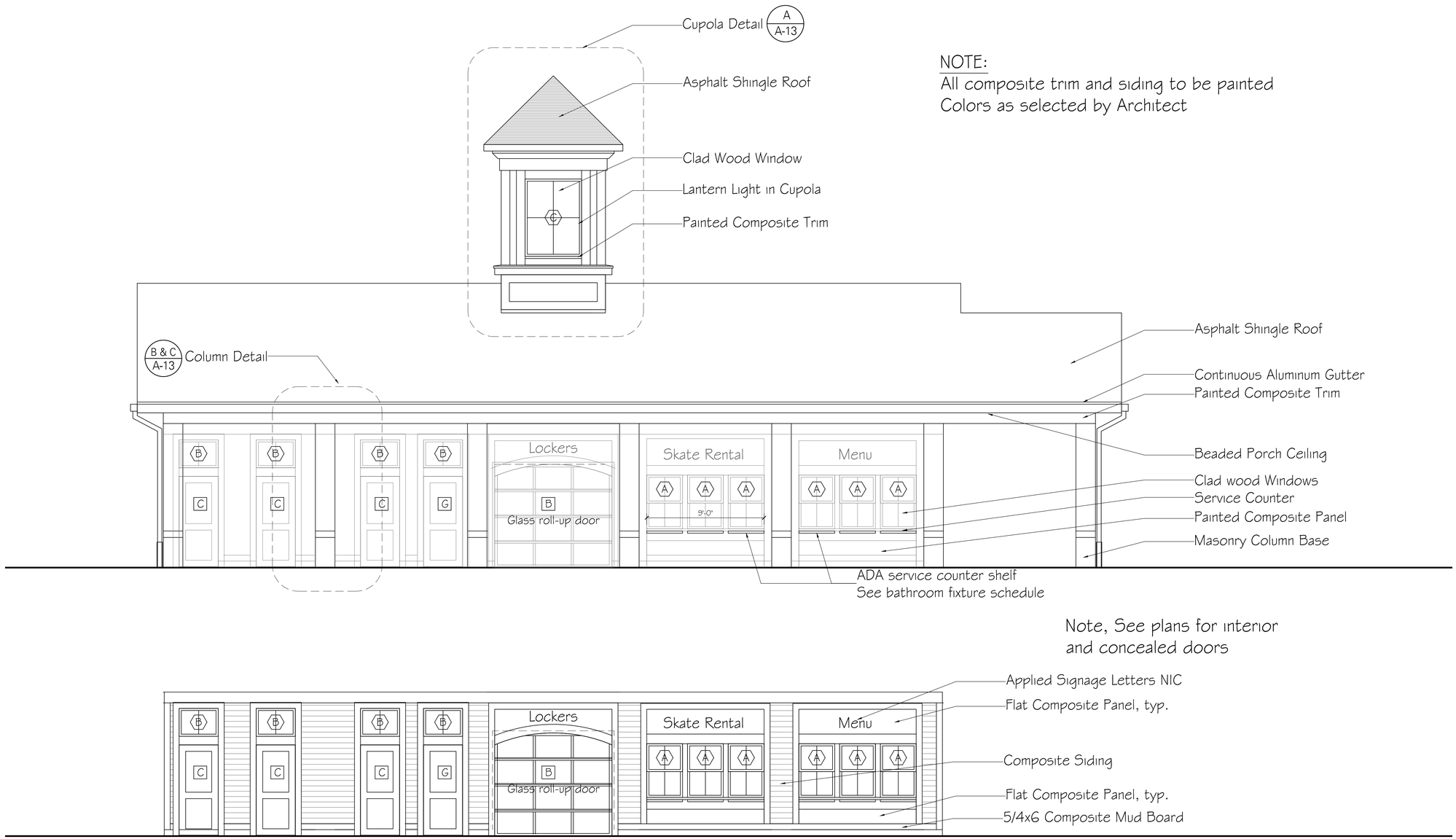
DRAWN BY: GSF
DESIGNED BY: GSF
CHECKED BY: GSF
ISSUE DATE: 1/31/2024
BETA JOB NO.: 10694

SCALE

1/4" = 1'0"

SHEET NO.

A-6



NOTE:
All composite trim and siding to be painted
Colors as selected by Architect

Note, See plans for interior
and concealed doors

Elevation with columns
omitted for clarity

GLEN S. FONTECCHIO
No. 2225
REGISTERED ARCHITECT

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PROJECT

Warwick Ice Rink

Warwick, RI

TITLE

South Elevation
Add Alternate No. 4

NO.	REVISIONS	DATE

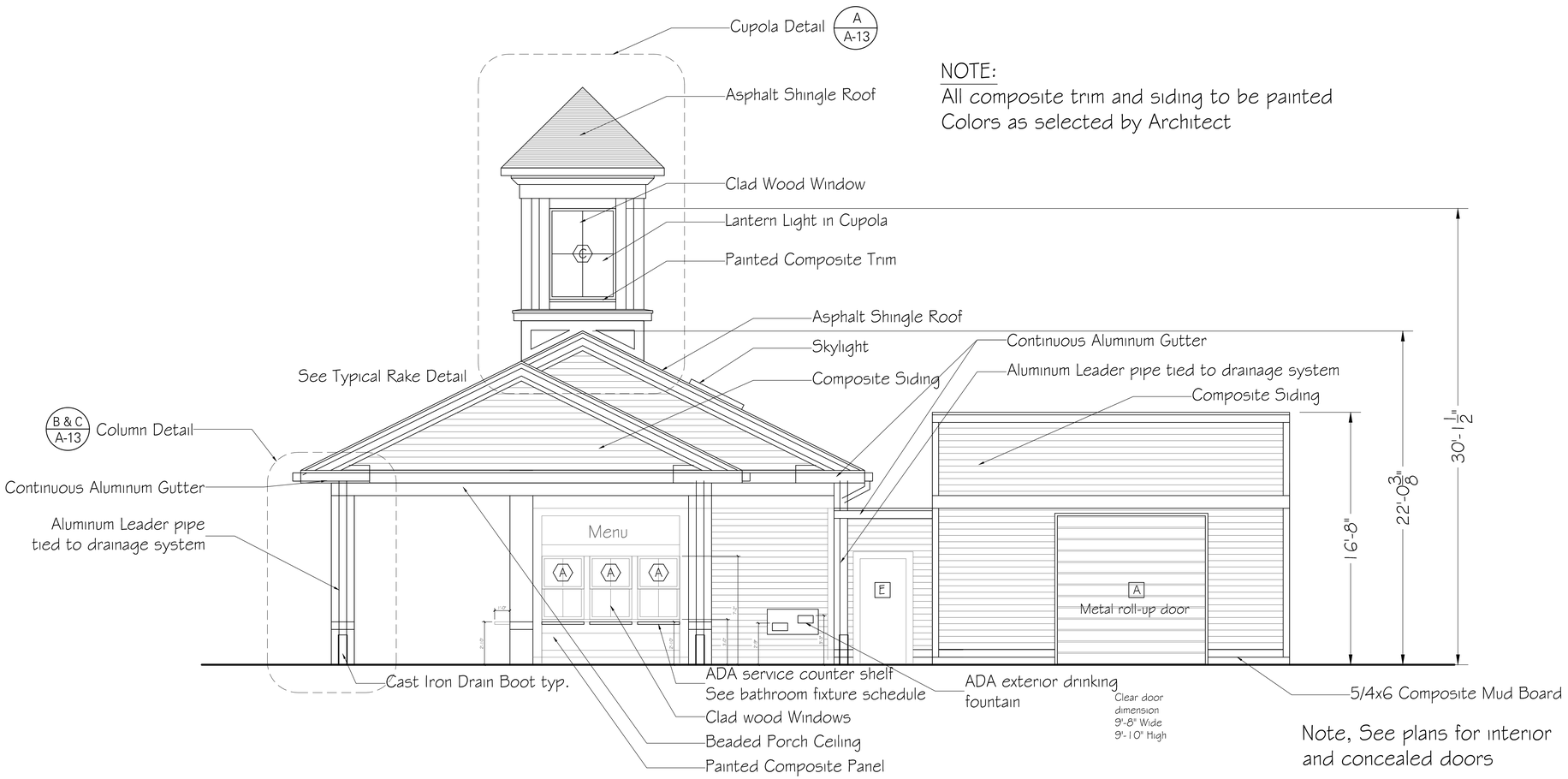
DRAWN BY: GSF
DESIGNED BY: GSF
CHECKED BY: GSF
ISSUE DATE: 1/31/2024
BETA JOB NO.: 10694

SCALE

1/4" = 1'0"

SHEET NO.

A-6a



NOTE:
All composite trim and siding to be painted
Colors as selected by Architect

Note, See plans for interior and concealed doors

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Warwick Ice Rink

Warwick, RI

TITLE

East Elevation

NO.	REVISIONS	DATE

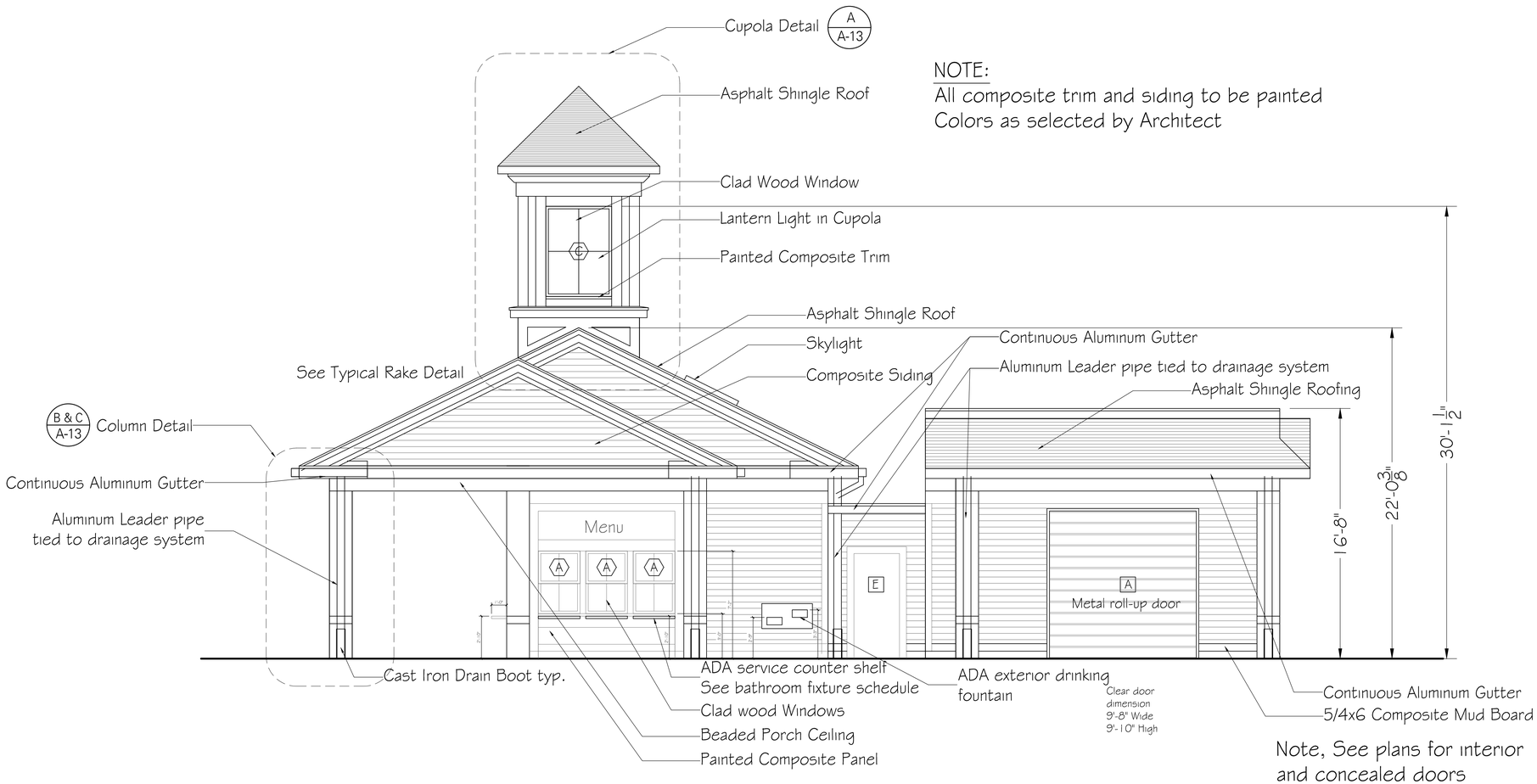
DRAWN BY: GSF
DESIGNED BY: GSF
CHECKED BY: GSF
ISSUE DATE: 1/31/2024
BETA JOB NO.: 10694

SCALE

1/4" = 1'0"

SHEET NO.

A-7



NOTE:
All composite trim and siding to be painted
Colors as selected by Architect

Note, See plans for interior and concealed doors

GLEN S. FONTECCHIO No. 2229 REGISTERED ARCHITECT

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SUBCONSULTANT

PROJECT

Warwick Ice Rink

Warwick, RI

TITLE

East Elevation
Add Alternate No. 4

NO.	REVISIONS	DATE

DRAWN BY: GSF
DESIGNED BY: GSF
CHECKED BY: GSF
ISSUE DATE: 1/31/2024
BETA JOB NO.: 10694

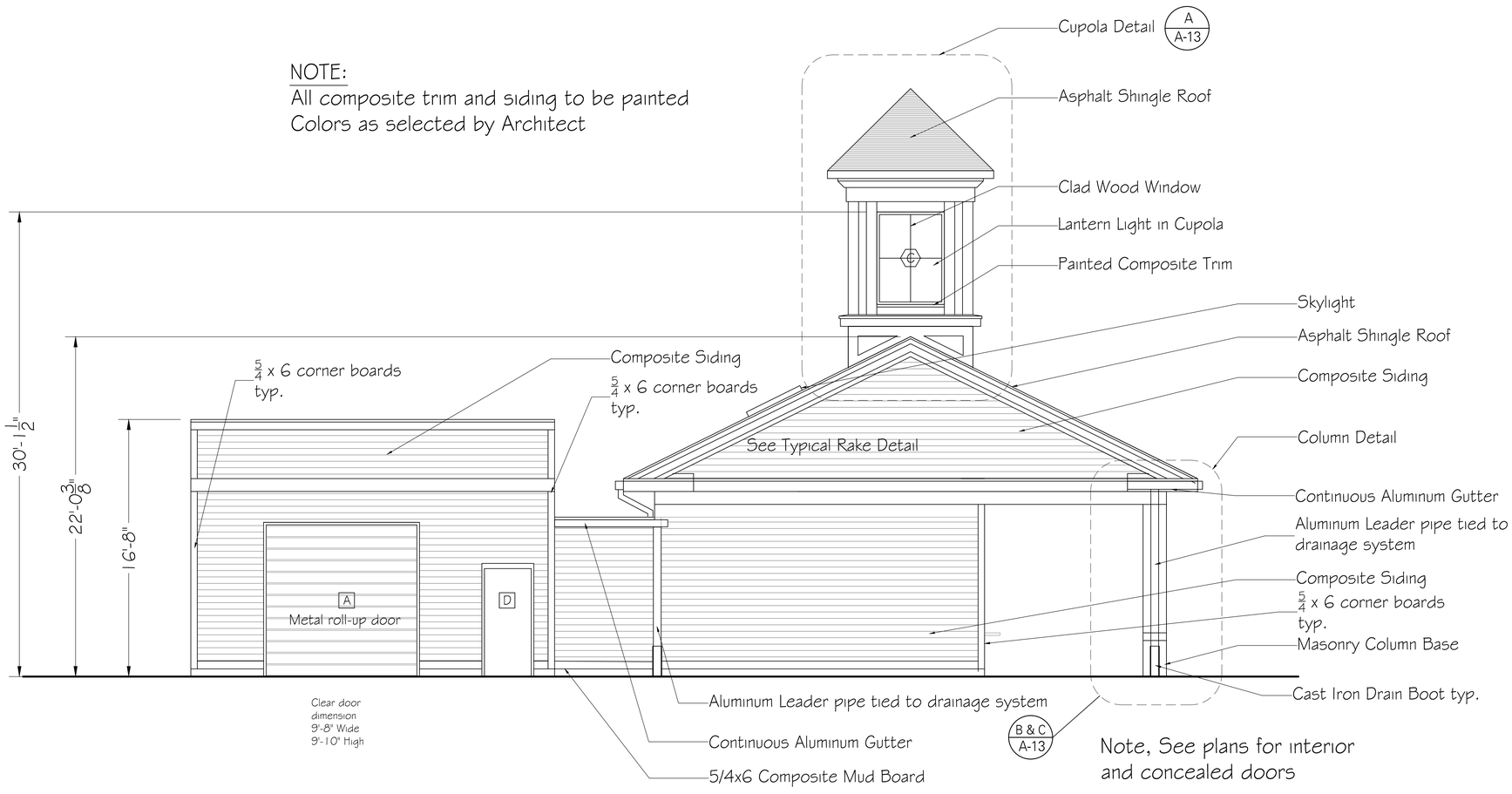
SCALE

1/4" = 1'0"

SHEET NO.

A-7a

NOTE:
All composite trim and siding to be painted
Colors as selected by Architect



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Warwick Ice Rink

Warwick, RI

TITLE

West Elevation

NO.	REVISIONS	DATE

DRAWN BY: GSF
DESIGNED BY: GSF
CHECKED BY: GSF
ISSUE DATE: 1/31/2024
BETA JOB NO.: 10694

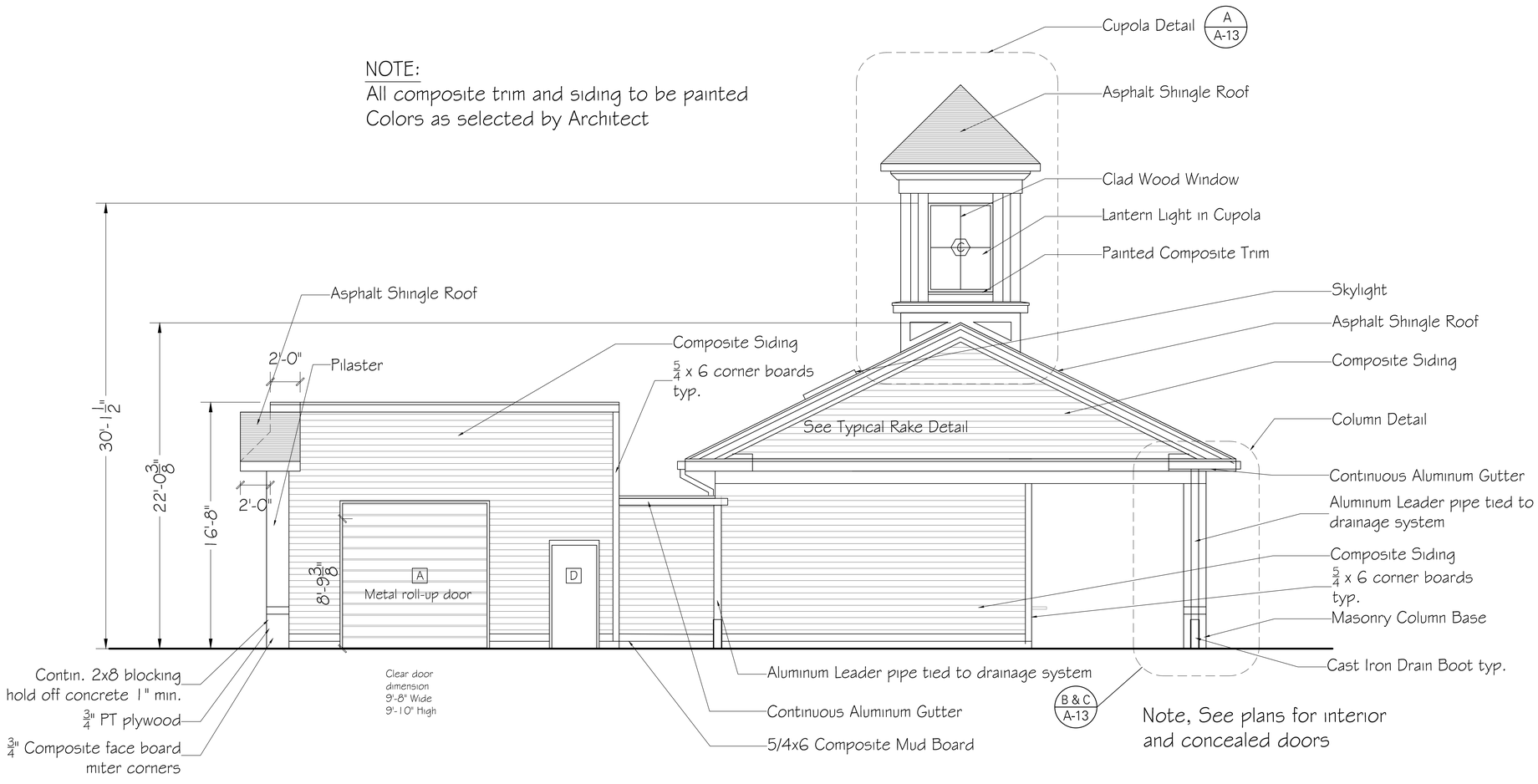
SCALE

1/4" = 1'0"

SHEET NO.

A-8

NOTE:
All composite trim and siding to be painted
Colors as selected by Architect



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Warwick Ice Rink

Warwick, RI

TITLE

West Elevation
Add Alternate No. 4

NO.	REVISIONS	DATE

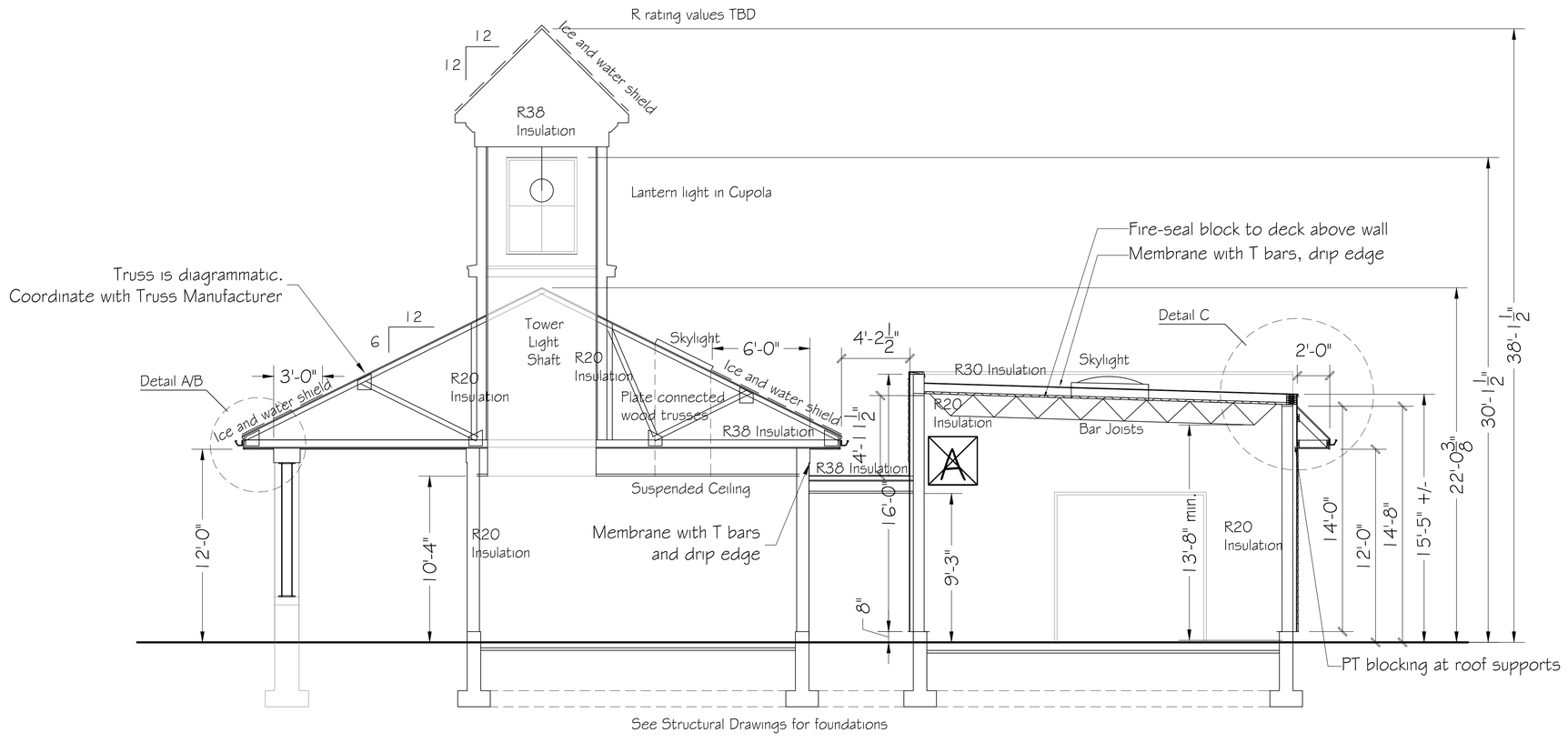
DRAWN BY: GSF
DESIGNED BY: GSF
CHECKED BY: GSF
ISSUE DATE: 1/31/2024
BETA JOB NO.: 10694

SCALE

1/4" = 1'0"

SHEET NO.

A-8a



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Warwick Ice Rink

Warwick, RI

TITLE

Section A

NO.	REVISIONS	DATE

DRAWN BY: GSF

DESIGNED BY: GSF

CHECKED BY: GSF

ISSUE DATE: 1/31/2024

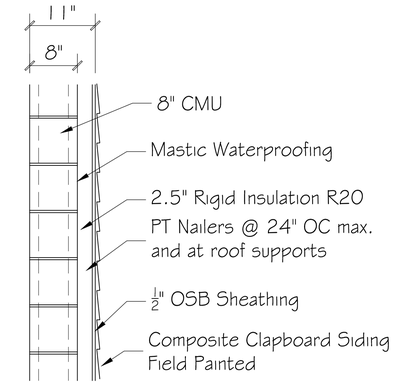
BETA JOB NO.: 10694

SCALE

1/4" = 1'0"

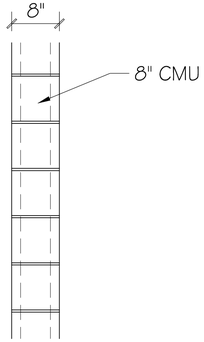
SHEET NO.

A-9



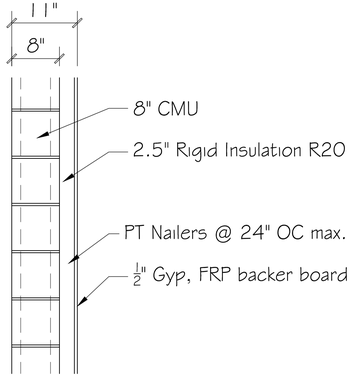
A

Exterior Wall-R20



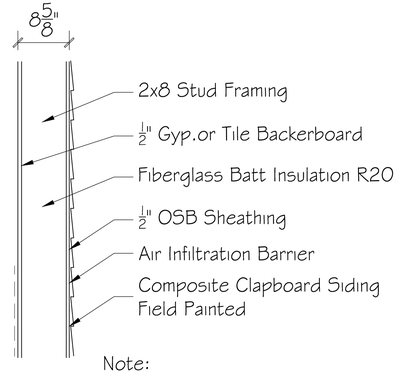
B

Interior Wall



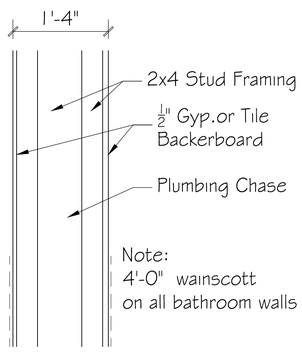
C

Interior Wall- R20



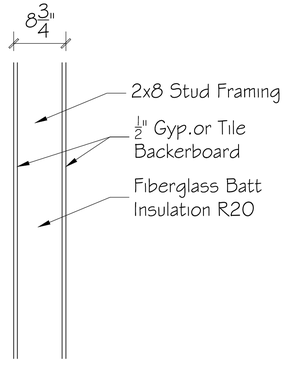
D

Exterior Wall- R20



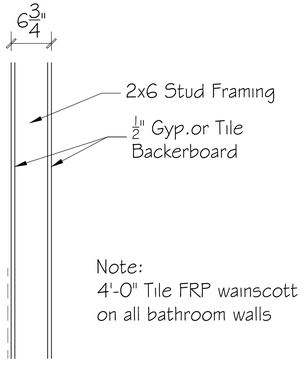
E

Bathroom Chase Wall



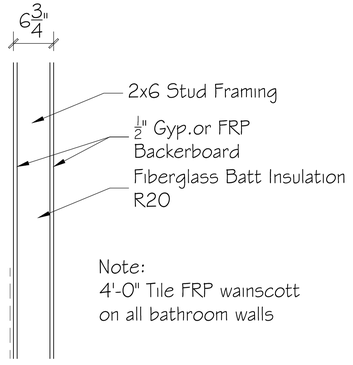
F

Interior Wall- R20



G

Interior Wall



H

Interior Wall- R20

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No. 2225
REGISTERED ARCHITECT

PREPARED BY

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PROJECT

Warwick Ice Rink

Warwick, RI

TITLE

Wall Types

NO.	REVISIONS	DATE

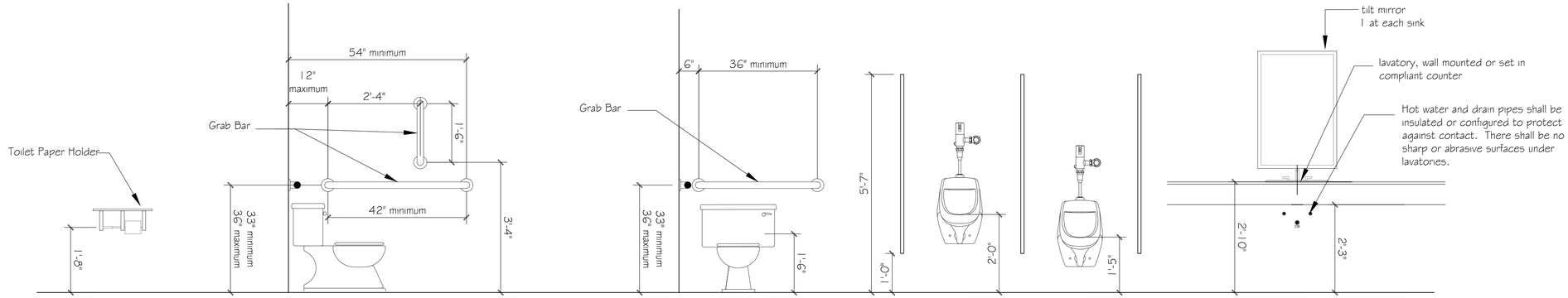
DRAWN BY:	GSF
DESIGNED BY:	GSF
CHECKED BY:	GSF
ISSUE DATE:	1/31/2024
BETA JOB NO.:	10694

SCALE

1"" = 1'0"

SHEET NO.

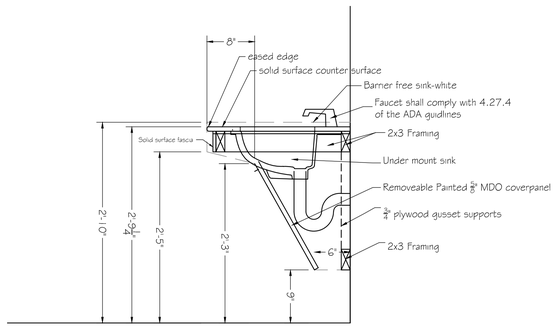
A-10



Standard Bathroom Details

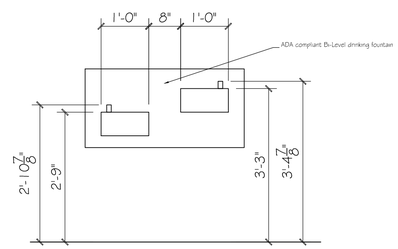
Scale: Not to Scale

NOTE
Grab bars shall have a circular cross section with a diameter of $1\frac{1}{4}$" minimum and 2" maximum or shall provide equivalent graspability complying with section 609.2.1 of the ADA standards

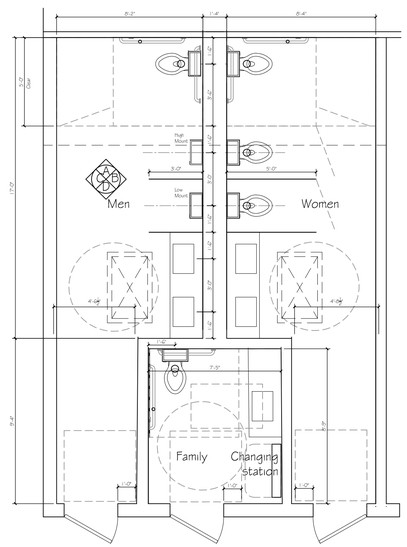


Sink Section

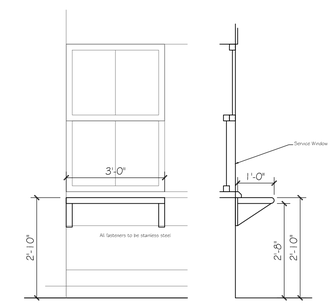
Scale: 1" = 1'-0"



Not to Scale



Scale: 1/4" = 1'-0"

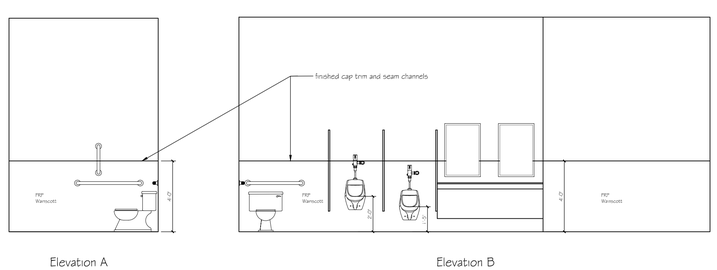


Accessible Service Window Shelf

Scale: 1/2" = 1'-0"

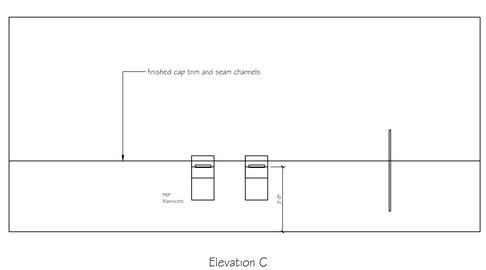
FIXTURE SCHEDULE

Under mounted sink:	American Standard - Oval Shaped, Model Number 0495
Sink Faucet:	American Standard - Selectronic Lavatory Faucet, Model Number 605x.165 (gooseneck spout)
Wall Mounted Toilet:	American Standard - Afwall 1.28 GPF, Model Number 2257.101
Toilet Flush Valve:	American Standard - Selectronic 1.28 GPF, Model Number 6065.121
Wall Mounted Urinal:	American Standard - Washbrook Urinal 125-1.0 GPF, Model Number 6590
Urinal Flush Valve:	American Standard - Selectronic DC Powered Proximity Exposed .5GPF, Model Number 6063.051
Toilet Tissue Holder:	Double Roll, Locked Bobrick, B-4288
Paper Towel Dispenser:	Combination Manual Dispenser with C fold towels and 3.8 gal recessed trash receptical
Soap Dispenser:	Surface mounted soap dispenser, Bobrick, B-4112
Exterior Drinking Fountain:	Elkay Model EDFP217C Note: This unit is non refrigerated - no electric service needed.
Changing Station:	ADA compliant, Corrosion resistant Koala Kare model KB200-01 or approved equal, color: gray
Service Window Shelf	36"x12"x10" stainless steel shelf, 18 ga., min. 200# capacity w/ Welded joints and bullnose face, no sharp edges by AMGOOD

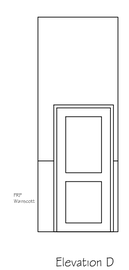


Elevation A

Elevation B



Elevation C



Elevation D

Typical Bathroom Elevation - Others Similar Scale: 1/4" = 1'-0"

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REGISTERED PROFESSIONAL

SUBCONSULTANT

PROJECT

Warwick Ice Rink

Warwick, RI

TITLE

Bathroom Details and Fixture Schedule

NO.	REVISIONS	DATE

DRAWN BY: GSF

DESIGNED BY: GSF

CHECKED BY: GSF

ISSUE DATE: 1/31/2024

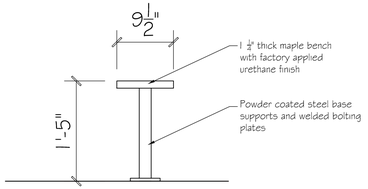
BETA JOB NO.: 10694

SCALE

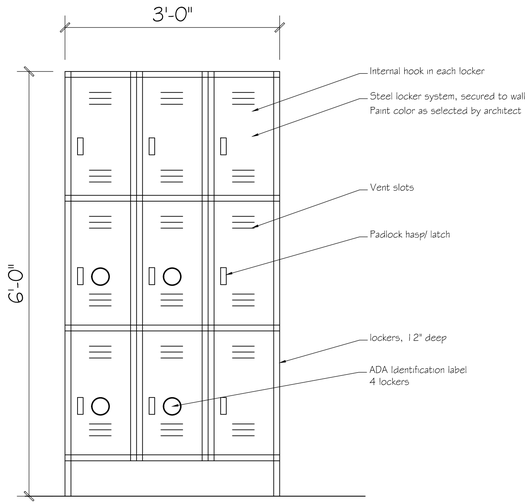
AS NOTED

SHEET NO.

A-11

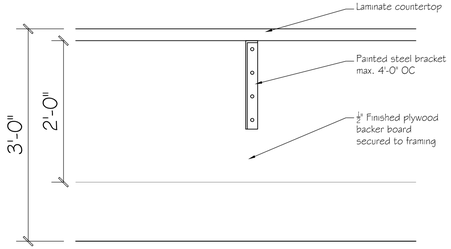


Bench Detail
See plan for location.

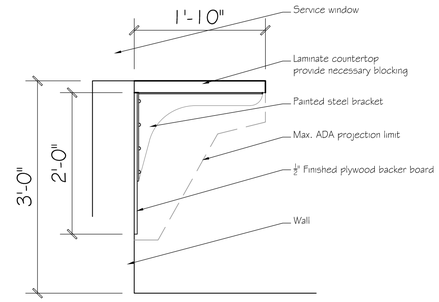


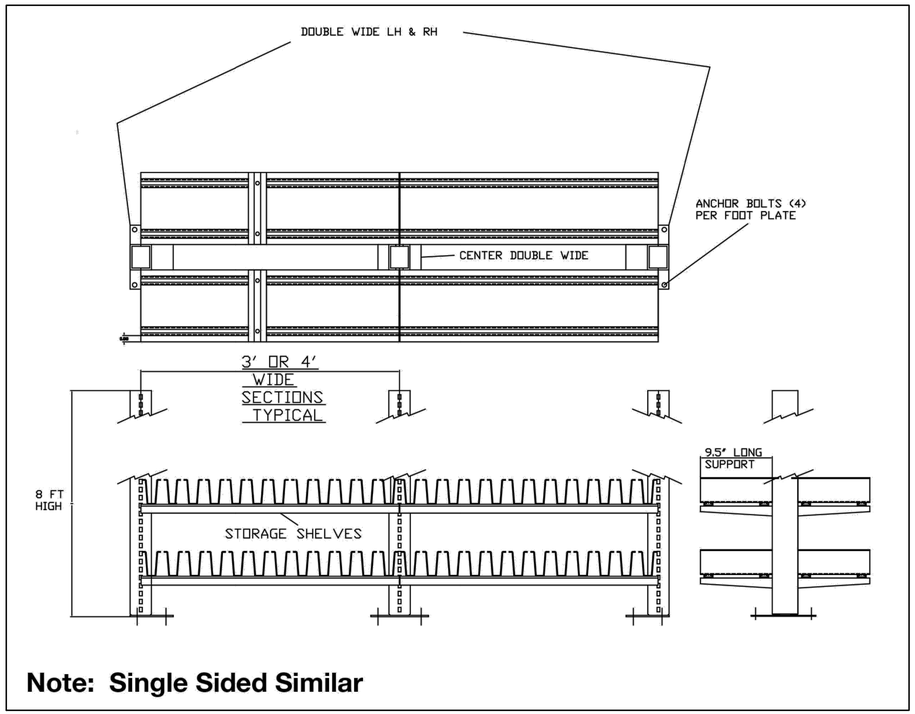
Locker Detail
See plan for layout.

4 (ADA) Accessible Lockers Provide Identification labels



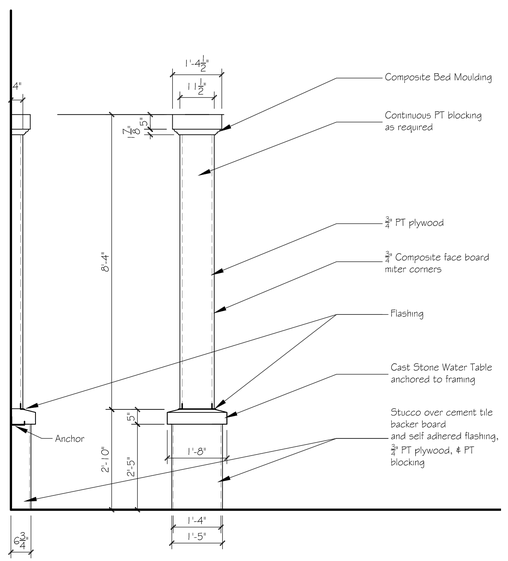
Counter
See plan for limits.



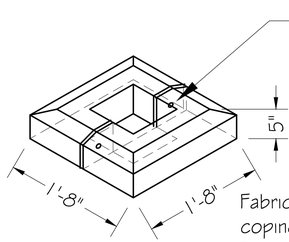


Note: Single Sided Similar

Skate Storage
See plan for layout. Minimum capacity 200 pairs.



Pilaster Detail
Scale: 1/2" = 1'-0"



Fabricate precast concrete watertable coping in 2 halves.
Trim legs at pilasters to fit
Anchor coping to substrate with metal anchors and mortar/adhesive

Watertable Coping
Scale: 1/" = 1'-0"

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BETA
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REGISTERED PROFESSIONAL

GLENN S. FONTECCHIO No. 2225 REGISTERED ARCHITECT

SUBCONSULTANT

PROJECT

Warwick Ice Rink

Warwick, RI

TITLE

Additional Details

NO.	REVISIONS	DATE

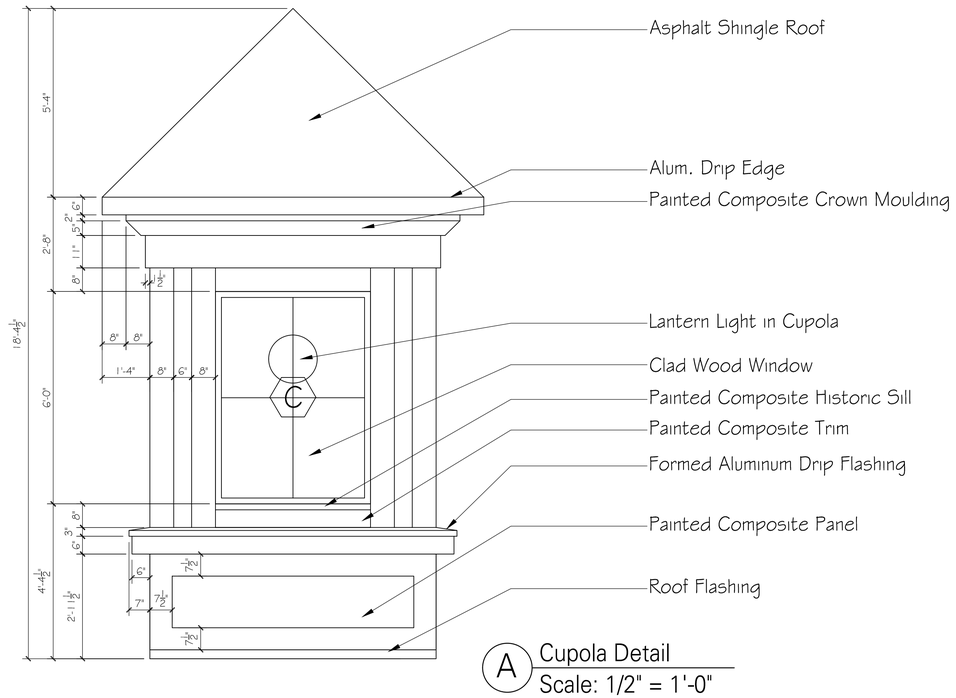
DRAWN BY: GSF
DESIGNED BY: GSF
CHECKED BY: GSF
ISSUE DATE: 1/31/2024
BETA JOB NO.: 10694

SCALE

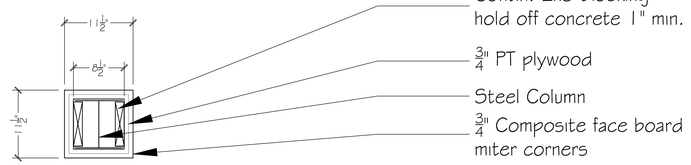
1/2" = 1'-0"

SHEET NO.

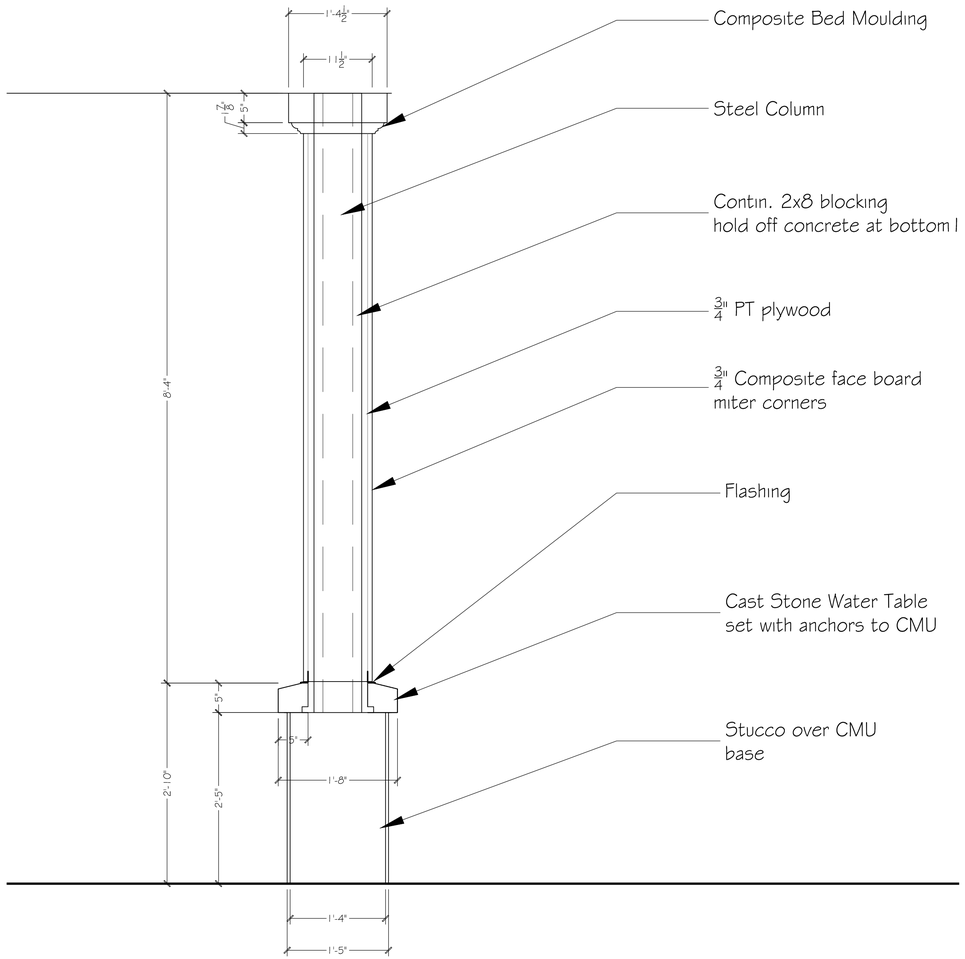
A-12



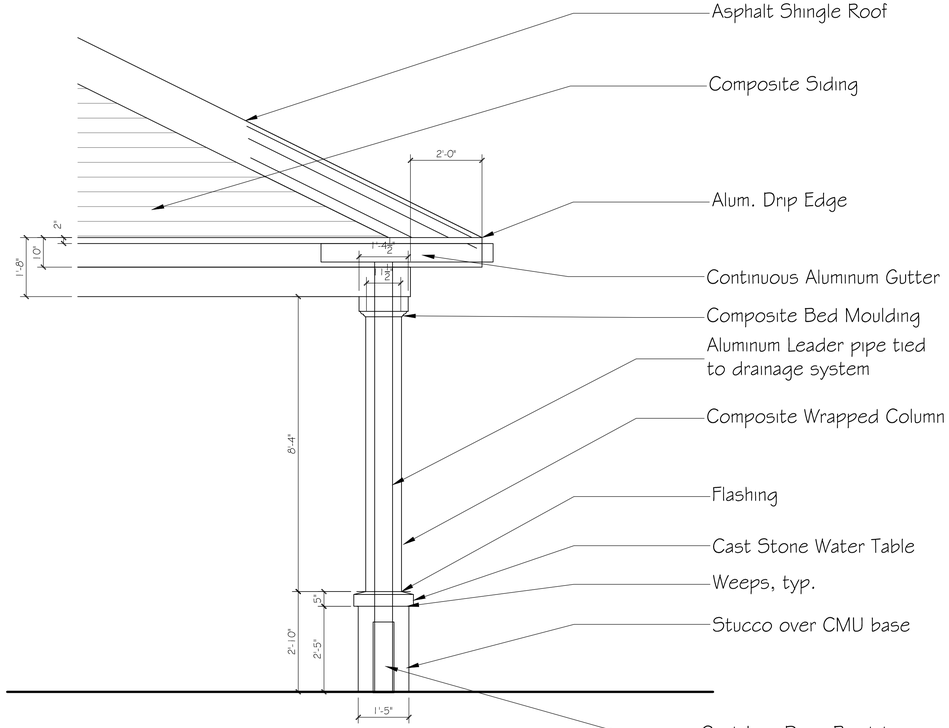
A Cupola Detail
Scale: 1/2" = 1'-0"



PLAN



C Column Section
Scale: 1/" = 1'-0"



B Column Detail
Scale: 1/2" = 1'-0"

See A-12 for Pilaster Details

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SUBCONSULTANT

PROJECT

Warwick Ice Rink

Warwick, RI

TITLE

Cupola and Column Details

NO.	REVISIONS	DATE

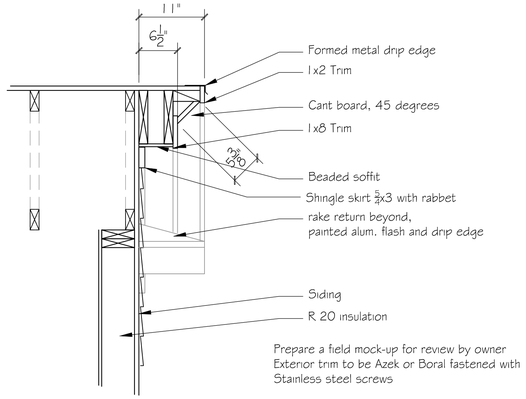
DRAWN BY: GSF
DESIGNED BY: GSF
CHECKED BY: GSF
ISSUE DATE: 1/31/2024
BETA JOB NO.: 10694

SCALE

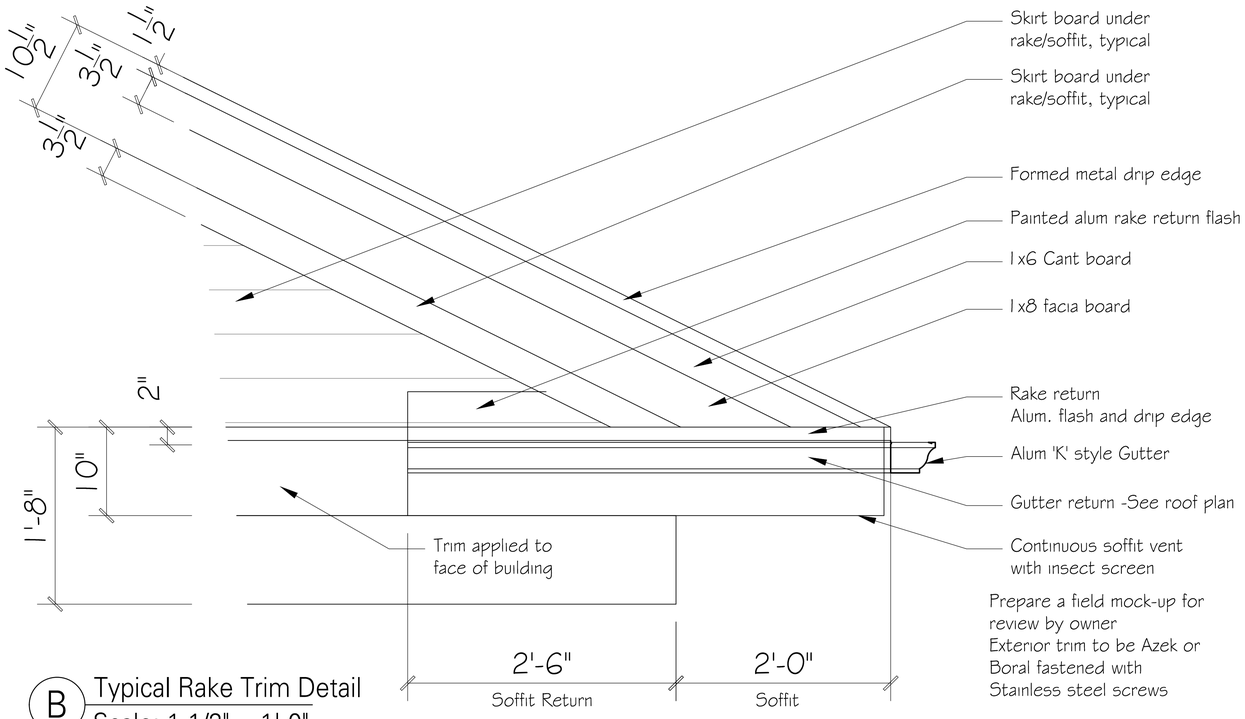
As Noted

SHEET NO.

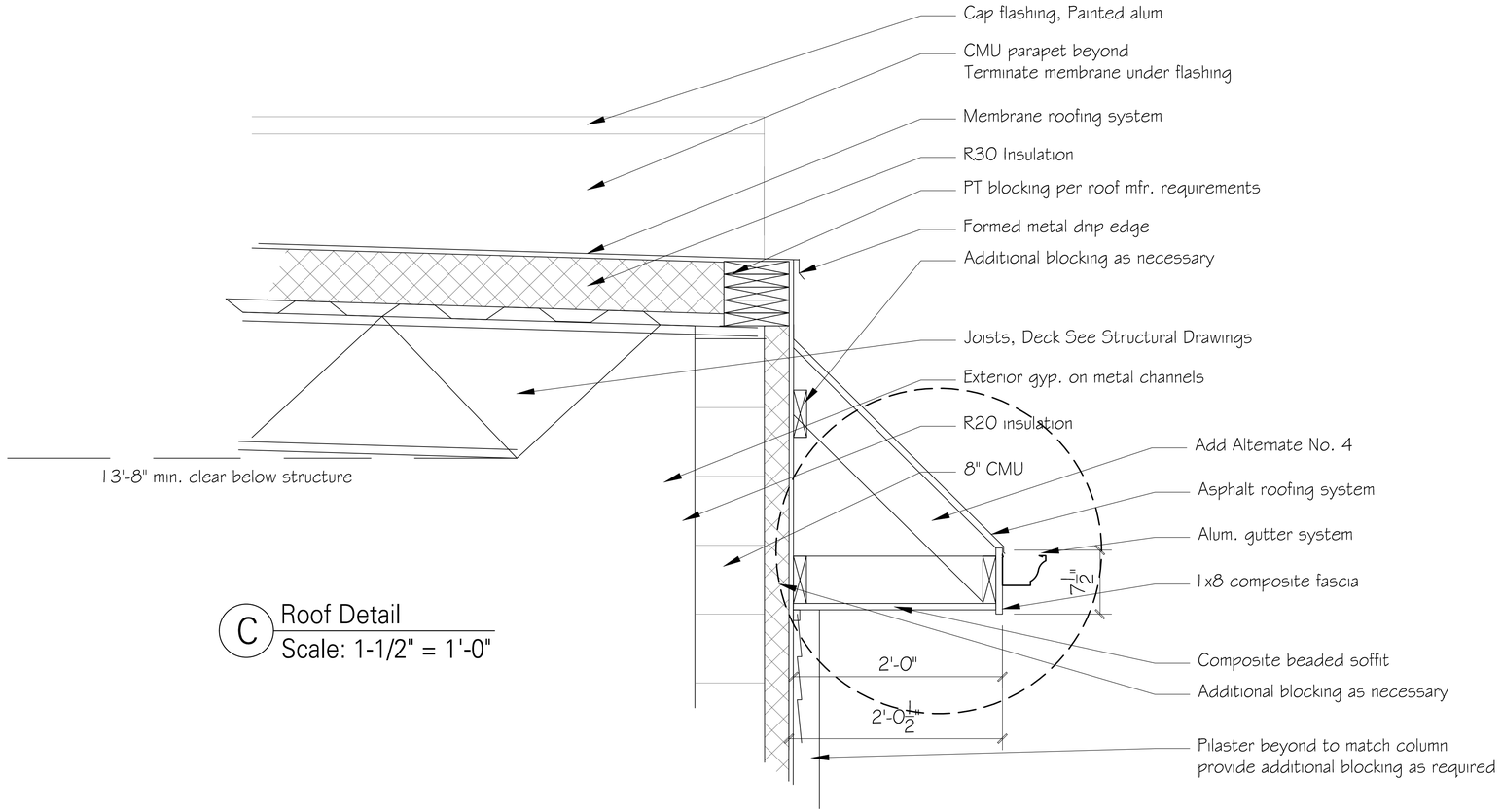
A-13



A Typical Rake Section
Scale: 1" = 1'-0"



B Typical Rake Trim Detail
Scale: 1-1/2" = 1'-0"



C Roof Detail
Scale: 1-1/2" = 1'-0"

GLEN S. FONTECCHIO
No. 2225
REGISTERED ARCHITECT

PREPARED BY

BETA
www.BETA-Inc.com

REGISTERED PROFESSIONAL

SUBCONSULTANT

PROJECT

Warwick Ice Rink

Warwick, RI

TITLE

Roof Details
Sheet 1

NO.	REVISIONS	DATE

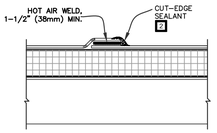
DRAWN BY:	GSF
DESIGNED BY:	GSF
CHECKED BY:	GSF
ISSUE DATE:	1/31/2024
BETA JOB NO.:	10694

SCALE

1/4" = 1'0"

SHEET NO.

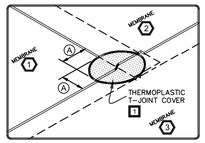
A-14



DIMENSIONS	mm	
(A) 2-1/4"	57	MIN.

NOTE:

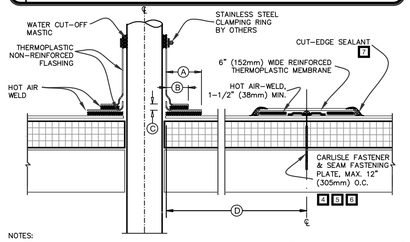
1. WHEN USING 60 OR 80-MIL MEMBRANE, APPLY A 4-1/2" (114mm) DIAMETER "T-JOINT" COVER AT ALL FIELD SPLICE INTERSECTIONS.
2. APPROXIMATELY 1/8" (3mm) DIAMETER BEAD OF CUT-EDGE SEALANT IS REQUIRED ON CUT EDGES OF REINFORCED TPO MEMBRANE AND RECOMMENDED ON CUT EDGES OF SURE-FLEX PVC MEMBRANE.



MEMBRANE SPLICE

U-2

CAUTION: DETAIL NOT FOR USE ON 25 OR 30-YEAR WARRANTY PROJECTS. PRE-FABRICATED/PRE-MOLDED ACCESSORIES MUST BE UTILIZED. ACCEPTABLE PIPE FLASHINGS SHALL CONFORM WITH THERMOPLASTIC UNIVERSAL DETAILS U-8A, 8C OR 8D.



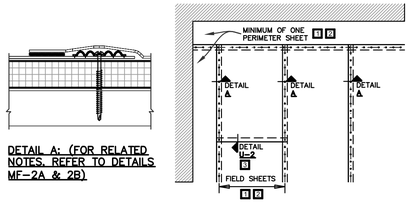
NOTES:

1. REMOVE ALL EXISTING LEAD AND FLASHING MATERIAL BEFORE INSTALLING FIELD FABRICATED PIPE FLASHING.
2. TEMPERATURE OF THE PIPE PENETRATION MUST NOT EXCEED 140°F (60°C) WHEN USING PVC AND 160°F (71°C) WHEN USING TPO FLASHING.
3. THERMOPLASTIC NON-REINFORCED FLASHING WRAPPED AROUND PIPE SHALL HAVE MINIMUM 1-1/2" (38mm) VERTICAL HOT AIR WELD.
4. INSTALL A MINIMUM OF 4 SEAM FASTENING PLATES FOR PIPES WITH A DIAMETER UP TO 6" (152mm). ADDITIONAL SEAM FASTENING PLATES WILL BE REQUIRED FOR PIPES GREATER THAN 6" (152mm) IN DIAMETER AND SHALL BE SPACED 12" (305mm) ON CENTER MAXIMUM.
5. FASTENERS/PLATES ARE NOT REQUIRED ON ADHERED SYSTEMS UNLESS PIPE DIAMETER EXCEEDS 18" (500mm).
6. ON MECHANICALLY FASTENED SYSTEMS, HP-X FASTENERS AND PIRANHA PLATES OR HP-XTRA FASTENERS AND PIRANHA XTRA PLATES ARE REQUIRED OVER STEEL AND WOOD DECKS. ON CONCRETE DECKS, CD-10 OR HD 14-10 FASTENERS ARE USED WITH PIRANHA PLATES.
7. APPROXIMATELY 1/8" (3mm) DIAMETER BEAD OF CUT-EDGE SEALANT IS REQUIRED ON CUT EDGES OF REINFORCED TPO MEMBRANE AND RECOMMENDED ON CUT EDGES OF SURE-FLEX PVC MEMBRANE.

DIMENSIONS	mm	
(A) 1-1/2"	38	TO
2"	51	
(B) 1"	25	MIN.
(C) 1/2"	13	MIN.
(D) 12"	305	APPROX.

FIELD FABRICATED PIPE FLASHING

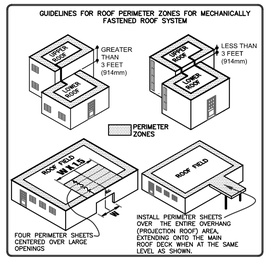
U-8B



DETAIL A: (FOR RELATED NOTES, REFER TO DETAILS MF-2A & 2B)

NOTES:

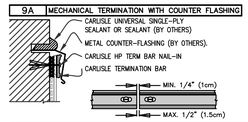
1. **WHEN USING 10' (3048mm) OR** 12' (3658mm) WIDE TPO FIELD SHEETS, 6' (1829mm) WIDE PERIMETER SHEETS ARE UTILIZED. WHEN USING 8' (2438mm) WIDE TPO FIELD SHEETS, 4' (1219mm) WIDE PERIMETER SHEETS ARE UTILIZED. **WHEN USING 10' (3048mm)** WIDE PVC FIELD SHEETS, 5' (1524mm) WIDE PERIMETER SHEETS ARE UTILIZED. WHEN USING 81" (2057mm) WIDE PVC FIELD SHEETS, 40.5" (1029mm) WIDE PERIMETER SHEETS ARE USED.
2. **REFER TO CARLISLE SPECIFICATIONS** FOR REQUIRED NUMBER OF PERIMETER SHEETS, SHEET WIDTH AND MEMBRANE FASTENING DENSITY.
3. END LAPS DO NOT REQUIRE MECHANICAL FASTENING AND SHALL BE OVERLAPPED 2" (51mm) MINIMUM. REFER TO THERMOPLASTIC **DETAIL U-2.**



MEMBRANE SECUREMENT

MF-2

9A MECHANICAL TERMINATION WITH COUNTER FLASHING



NOTES:

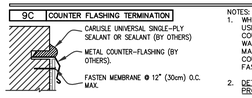
1. APPLY ON HARD SMOOTH SURFACE ONLY; NOT FOR USE ON EXPOSED WOOD.
2. DO NOT WRAP TERMINATION BAR AROUND CORNERS.
3. DETAIL REQUIRED FOR USE ON WARRANTY PROJECTS EXCEEDING 20-YEARS.
4. DETAIL **9E** MUST BE USED AT VERTICAL JOINTS IN PANEL WALLS.

9B SHEET METAL COPING (BY OTHERS)

NOTES:

1. FOR CARLISLE SecurEdge COPING, REFER TO INSTALLATION INSTRUCTIONS PUBLISHED SEPARATELY.
2. MEMBRANE MUST BE EXTENDED TO CORNERS TO PROVIDE COMPLETE COVERAGE OF THE TOP WALL SURFACE.

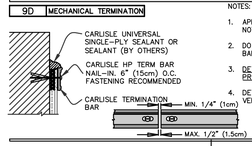
9C COUNTER FLASHING TERMINATION



NOTES:

1. WHEN MECHANICAL FASTENERS ARE USED TO PENETRATE THE METAL COUNTER-FLASHING, USE EPDM WASHERS, APPLY WATER CUT-OFF MASTIC UNDER THE COUNTER-FLASHING OR CAULK THE FASTENER HEADS.
2. DETAIL NOT FOR USE ON WARRANTY PROJECTS EXCEEDING 10-YEARS.

9D MECHANICAL TERMINATION



NOTES:

1. APPLY ON HARD SMOOTH SURFACE ONLY; NOT FOR USE ON EXPOSED WOOD.
2. DO NOT WRAP COMPRESSION TERMINATION BAR AROUND CORNERS.
3. DETAIL NOT FOR USE ON WARRANTY PROJECTS EXCEEDING 20-YEARS.
4. DETAIL **9E** MUST BE USED AT VERTICAL JOINTS IN PANEL WALLS.

APPLICABLE BONDING ADHESIVE.

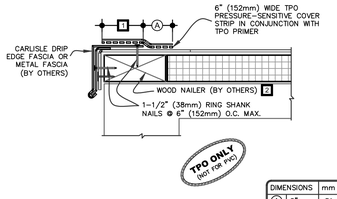
WATER CUT-OFF MASTIC- MUST BE HELD UNDER CONSTANT COMPRESSION.

MEMBRANE TERMINATIONS
PAGE 1 OF 2

MAXIMUM WARRANTY: 30 YEARS

U-9

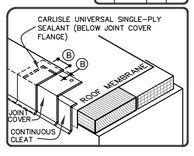
CAUTION: DETAIL NOT FOR USE ON 25 OR 30-YEAR WARRANTY PROJECTS. ACCEPTABLE EDGING SHALL CONFORM WITH THERMOPLASTIC UNIVERSAL DETAILS U-1B, U-1C, U-1D, U-1E OR U-1F.



NOTES:

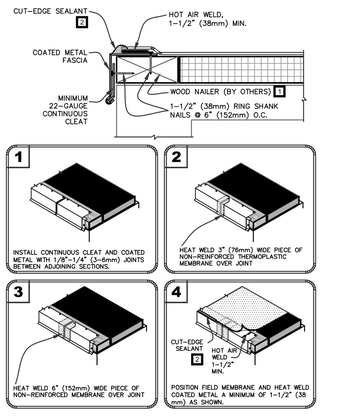
1. METAL FASCIA DECK FLANGE MUST BE TOTALLY COVERED BY TPO PRESSURE-SENSITIVE COVER STRIP WITH MINIMUM 2" (51mm) COVERAGE PAST NAIL HEADS.
2. WOOD NAILER MUST EXTEND PAST TOTAL WIDTH OF METAL FASCIA DECK FLANGE.
3. TO REMOVE FINISHING OILS, SCRUB METAL FLANGE WITH WEATHERED MEMBRANE CLEANER; ALLOW TO DRY PRIOR TO APPLYING TPO PRIMER.
4. APPLY TPO PRIMER TO METAL FLANGE AND MEMBRANE SURFACE PRIOR TO INSTALLING TPO PRESSURE-SENSITIVE COVER STRIP.
5. WHEN METAL FASCIA BY OTHERS IS USED, FASTENER TYPE AND FASTENING FREQUENCY SHALL BE RECOMMENDED BY METAL EDGE MANUFACTURER.
6. TO ENSURE TPO PRESSURE-SENSITIVE COVER STRIP CONFORMS TO STEP-OFFS, HEAT COVER STRIP AT SPLICE INTERSECTIONS PRIOR TO ROLLING.

DIMENSIONS	mm	
(A) 2"	51	MIN.
(B) 1/2"	13	TO
1"	25	



SecurSeal DRIP EDGE FASCIA

U-1A

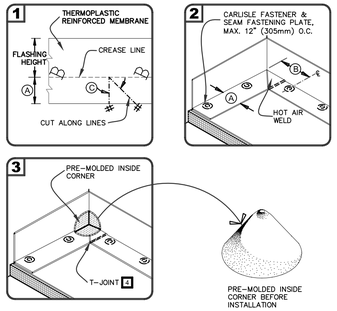


NOTES:

1. WOOD NAILER MUST EXTEND PAST TOTAL WIDTH OF METAL FASCIA DECK FLANGE.
2. APPROXIMATELY 1/8" (3mm) DIAMETER BEAD OF CUT-EDGE SEALANT IS REQUIRED ON CUT EDGES OF REINFORCED TPO MEMBRANE AND RECOMMENDED ON CUT EDGES OF SURE-FLEX PVC MEMBRANE.

SecurWELD COATED DRIP EDGE FASCIA

U-1B



NOTES:

1. POSITION FASTENING PLATES 6" TO 9" (152 TO 229mm) FROM THE CORNER AND 1/2" TO 1" (13 TO 25mm) FROM EDGE OF MEMBRANE.
2. APPROXIMATELY 1/8" (3mm) DIAMETER BEAD OF CUT-EDGE SEALANT IS REQUIRED ON CUT EDGES OF REINFORCED TPO MEMBRANE AND RECOMMENDED ON CUT EDGES OF SURE-FLEX PVC MEMBRANE.
3. REFER TO CARLISLE SPECIFICATIONS FOR ACCEPTABLE CARLISLE FASTENERS AND PLATES.
4. WHEN USING 60 OR 80-MIL MEMBRANE, APPLY A 4-1/2" (114mm) DIAMETER "T-JOINT" COVER AT ALL FIELD SPLICE INTERSECTIONS.

DIMENSIONS	mm	
(A) 6"	152	APPROX.
(B) 6"-9"	152-229	
(C)	45-DEGREES APPROX.	

PRE-MOLDED INSIDE CORNER FLASHING

U-15A

Details for reference only. Coordinate final details with manufacturers written specs and details

PREPARED BY

GLENN S. FONTECCHIO No. 2225 REGISTERED ARCHITECT

BETA www.BETA-Inc.com

REGISTERED PROFESSIONAL

SUBCONSULTANT

PROJECT

Warwick Ice Rink

Warwick, RI

TITLE

Roof Details Sheet 2

NO.	REVISIONS	DATE

DRAWN BY: GSF

DESIGNED BY: GSF

CHECKED BY: GSF

ISSUE DATE: 1/31/2024

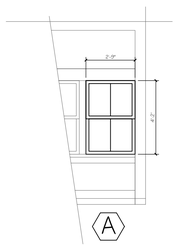
BETA JOB NO.: 10694

SCALE

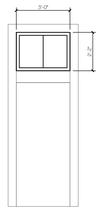
Not to Scale

SHEET NO.

A-15



A

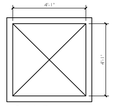


B

C

2246 Skylight

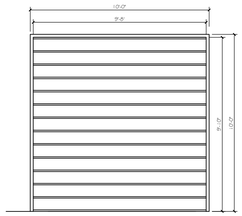
D



CMA Dome
Skylight 4949

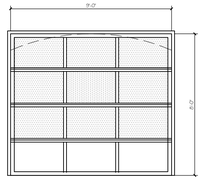
E

NOTE:
All windows to have SDLs



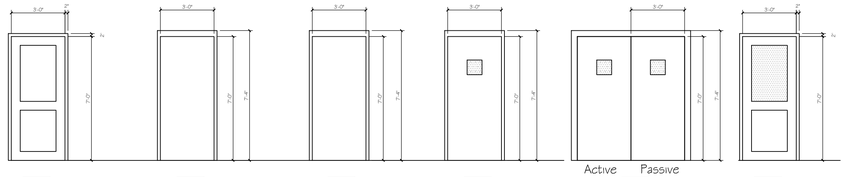
A

Roll Up - Steel



B

Roll Up - Alum., Glass



C

Outswing - Steel
Doors 6,7,8

D

Outswing - Steel
Doors 1,2,3,4

E

Inswing - Steel
Door 11

F

Interior - Steel
Door 9
Fire Rated w/
vision panel

Active Passive

F2

Interior - Steel
Door 10
Fire Rated w/
vision panel

G

Interior - Steel, Glass
Doors 5,12

Note: Coordinate rubber mat. transitions with door thresholds
to ensure ADA compliance and clear, unobstructed door swings

Coord. Hardware and Keying with City
All hardware and thresholds to be ADA compliant

Openings Schedule

Opening Number(s)	Qty	Hardware Group	Elevation	Nominal Width	Nominal Height	Type	Hand	Label	Frame Catalog	Frame Series	Frame Mat'l	Frame Gauge	Frame Profile	Jamb Depth	Facing (Jamb, Hd)	Anchor Type	Frame Construction	Door Label	Door Catalog	Door Series	Door Mat'l	Door Thickness	Door Type	Door Top	Lite Kit	Door Core	Door Finish	Remarks
1	1	03	E-1	36"	84"	Single	RHR		Ceco	S	A60	16	SU	5 3/4"	2", 4"	A17	V2		Ceco	LP	A60	1 3/4"	F	CWELD/TC		POLYS	PG	
2	1	03	E-1	36"	84"	Single	RHR		Ceco	S	A60	16	SU	5 3/4"	2", 4"	A17	V2		Ceco	LP	A60	1 3/4"	F	CWELD/TC		POLYS	PG	
3	1	03	E-2	36"	84"	Single	LHR		Ceco	S	A60	16	SU	5 3/4"	2", 4"	A17	V2		Ceco	LP	A60	1 3/4"	F	CWELD/TC		POLYS	PG	
4	1	03	E-1	36"	84"	Single	RHR		Ceco	S	A60	16	SU	5 3/4"	2", 4"	A17	V2		Ceco	LP	A60	1 3/4"	F	CWELD/TC		POLYS	PG	
5	1	03	E-3	36"	84"	Single	LHR		Ceco	S	A60	16	SU	5 3/4"	2", 2"	A04	V2		Ceco	LP	A40	1 3/4"	E205	CWELD/TC	SLIMTR	POLYS	PG	
6	1	02	E-4	36"	84"	Single	RHR		Ceco	S	A60	16	SU	5 3/4"	2", 2"	A04	V2		Ceco	LP	A40	1 3/4"	E201	CWELD/TC		POLYS	PG	
7	1	01	E-3	36"	84"	Single	LHR		Ceco	S	A60	16	SU	5 3/4"	2", 2"	A04	V2		Ceco	LP	A40	1 3/4"	E201	CWELD/TC		POLYS	PG	
8	1	02	E-3	36"	84"	Single	LHR		Ceco	S	A60	16	SU	5 3/4"	2", 2"	A04	V2		Ceco	LP	A40	1 3/4"	E201	CWELD/TC		POLYS	PG	
9	1	05	E-2	36"	84"	Single	LHR	BW	Ceco	S	A60	16	SU	5 3/4"	2", 4"	A17	V2	BW	Ceco	LP	A60	1 3/4"	V	CWELD/TC	SLIMTR	POLYS	PG	Wire glass.
10	1	04	E-1	36"	84"	Single	RHR	BW	Ceco	S	A60	16	SU	5 3/4"	2", 4"	A17	V2	BW	Ceco	LP	A60	1 3/4"	V	CWELD/TC	SLIMTR	POLYS	PG	Wire glass.
11	1	05	E-5	36"	84"	Single	LH		Ceco	S	A60	16	SU	5 3/4"	2", 2"	A04	V2		Ceco	LP	A60	1 3/4"	F	CWELD/TC		POLYS	PG	
12	1	03	E-3	36"	84"	Single	LHR		Ceco	S	A60	16	SU	5 3/4"	2", 2"	A04	V2		Ceco	LP	A40	1 3/4"	E205	CWELD/TC	SLIMTR	POLYS	PG	

GLEN S. FONTECCHIO
No. 2228
REGISTERED
ARCHITECT

PREPARED BY

BETA
www.BETA-Inc.com

REGISTERED PROFESSIONAL

SUBCONSULTANT

PROJECT

Warwick Ice Rink

Warwick, RI

TITLE

Doors and Windows

NO.	REVISIONS	DATE

DRAWN BY: GSF
DESIGNED BY: GSF
CHECKED BY: GSF
ISSUE DATE: 1/31/2024
BETA JOB NO.: 10694

SCALE

1./4" = 1'0"

SHEET NO.

A-16

WARWICK ICE RINK

ROOM #	FLOOR	BASE	WALLS	CEILING	TRIM	HARDWARE	NOTES	FIXTURES
LOWER LEVEL								
101	Slab	Not Applicable	CMU Painted	Exposed Structure Painted	Not Applicable	Satin Nickel		
102	Two-Part Epoxy	Not Applicable	CMU Painted	Exposed Structure Painted	Not Applicable	Satin Nickel		
103	Two-Part Epoxy	Vinyl Base	Gypsum Painted	Gypsum Painted	Not Applicable	Satin Nickel		
104	Two-Part Epoxy	Vinyl Base	Gypsum Painted	Gypsum Painted	Not Applicable	Satin Nickel		
105	Two-Part Epoxy	Vinyl Base	Gypsum Painted, FRP Wainscott	Gypsum Painted	Painted Wood	Satin Nickel	** Rubber Floor Mat	
106	Two-Part Epoxy	Vinyl Base	Gypsum Painted, FRP Wainscott	Gypsum Painted	Painted Wood	Satin Nickel	** Rubber Floor Mat	
107	Two-Part Epoxy	Vinyl Base	Gypsum Painted, FRP Wainscott	Gypsum Painted	Painted Wood	Satin Nickel	** Rubber Floor Mat	
108	Two-Part Epoxy	Vinyl Base	Gypsum Painted	Gypsum Painted	Painted Wood	Satin Nickel	** Rubber Floor Mat / Finished Cupola Above	Lockers / Benches
109	Two-Part Epoxy	Vinyl Base	Gypsum Painted	Acoustical Ceiling Tile	Painted Wood	Satin Nickel		Skate Shelves
110	Two-Part Epoxy	Vinyl Base	Gypsum Painted	Acoustical Ceiling Tile	Painted Wood	Satin Nickel		Counters on brackets
111	*	Not Applicable	N/A	Beaded Panel Painted	Not Applicable	Satin Nickel	*See Site Drawings for Paving	
112 (Tower)	Not Applicable	Not Applicable	Gypsum Painted	Gypsum Painted	Painted Wood	Not Applicable	Pendant Light Fixture	

* See Site Drawings

** Coordinate Rubber Mat in all identified spaces. Provide all transitions as neceesary to maintain ADA Compliance. Coordinate with Door Threshold to allow for clear door swing.

GLENN S. FONTECCHIO No. 2225 REGISTERED ARCHITECT

PREPARED BY

BETA www.BETA-Inc.com

REGISTERED PROFESSIONAL

SUBCONSULTANT

PROJECT

Warwick Ice Rink

Warwick, RI

TITLE

Finish Schedule

NO.	REVISIONS	DATE

DRAWN BY: GSF

DESIGNED BY: GSF

CHECKED BY: GSF

ISSUE DATE: 1/31/2024

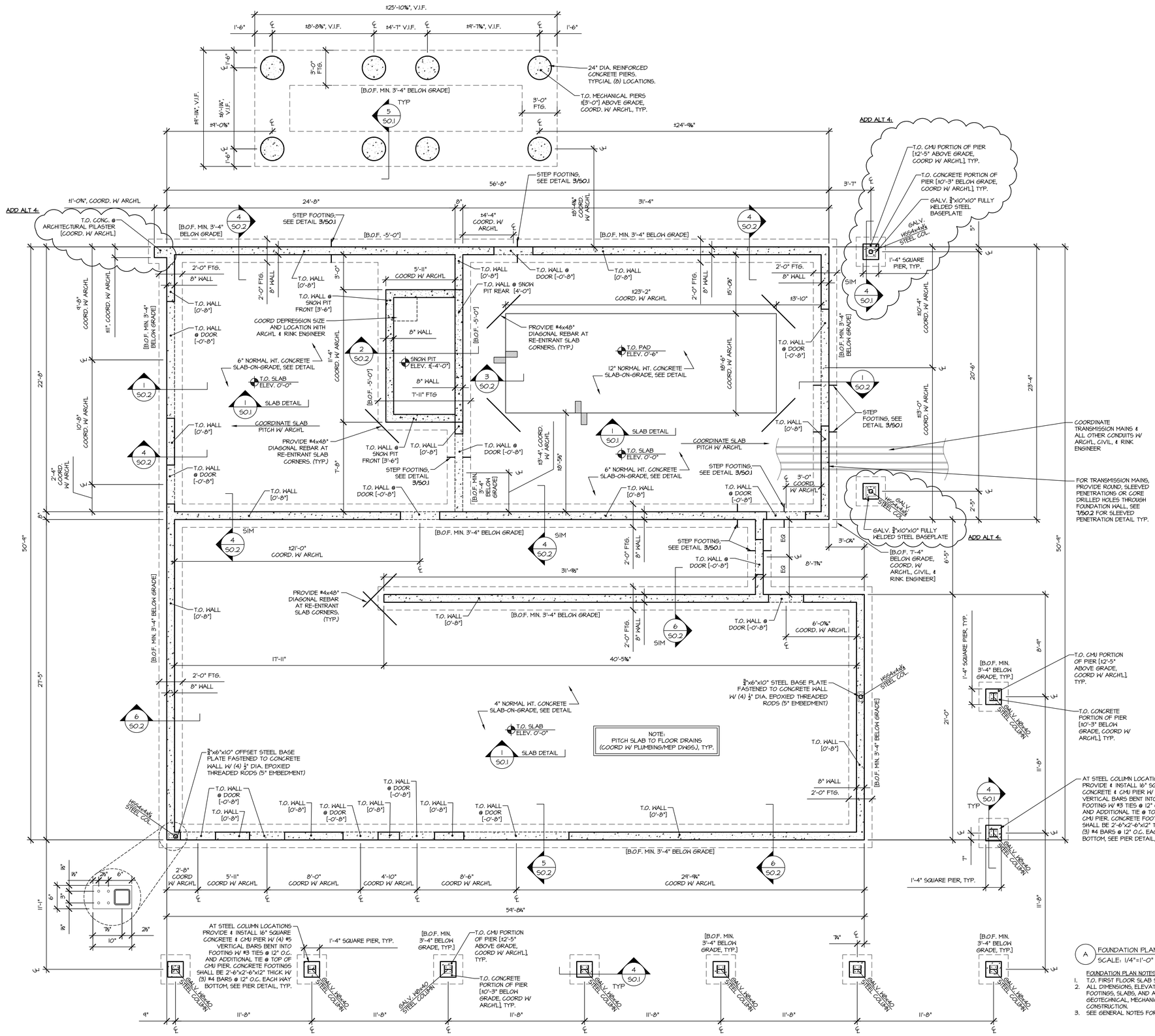
BETA JOB NO.: 10694

SCALE

No Scale

SHEET NO.

A-17



Camera / O'Neill
Consulting Engineers

CAMERA - O'NEILL CONSULTING ENGINEERS
Structural Engineering - Design
201 Clock Tower Square
Portsmouth, RI 02871
888.308.7541

PREPARED BY

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REGISTERED PROFESSIONAL ENGINEER (STRUCTURAL)

SUBCONSULTANT

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Structural Engineering - Design
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PROJECT

City Hall Plaza

Warwick, RI

TITLE

Foundation Plan

NO.	REVISIONS	DATE

DRAWN BY: MJB / AJH
DESIGNED BY: MJB / AJH
CHECKED BY: MVC
ISSUE DATE: 01/31/2024
BETA JOB NO.: 10694
SCALE AS NOTED

BID SET

SHEET NO. S0.0

GENERAL NOTES:

1. GENERAL CONTRACTOR SHALL FULLY COORDINATE AND VERIFY ALL DIMENSIONS, ELEVATIONS, GRADES, IMPLIED LOCATIONS, AND SIZES SHOWN ON STRUCTURAL DRAWINGS WITH EXISTING FIELD CONDITIONS AND ALL CONSULTANT DRAWINGS AND REPORTS INCLUDING GEOTECHNICAL REPORT.

2. ALL SIGNIFICANT DISCREPANCIES FOUND SHALL BE REPORTED TO THE ARCHITECT OF RECORD.

CODE INFORMATION AND DESIGN LOADS (EXCEPT AS NOTED):

BUILDING CODE: RI SBC-1 2021 (WARWICK, RI)
RELATED REFERENCE: ASCE 7-10

SNOW AND ROOF LOADS/FACTORS:
- MIN. ROOF LIVE LOAD: 20 PSF
- GROUND SNOW LOAD (Pg): 30 PSF
- FLAT ROOF SNOW LOAD (Pf): 30 PSF
- SNOW LOAD IMPORTANCE FACTOR (Is): 1.0
- SNOW EXPOSURE FACTOR (Ce): 1.0
- THERMAL FACTOR (Ct): 1.0

GEOTECHNICAL FACTORS:
- FROST DEPTH: 3'-4"
- ASSUMED SITE SOIL CLASSIFICATION TYPES (AS SPECIFIED BY THE UNIFIED SOIL CLASSIFICATION SYSTEM): GM, GC, SM, SM-SC AND ML (SHALL BE VERIFIED BY GEOTECHNICAL ENGINEER LICENSED IN THE PROJECT STATE).
- ASSUMED SITE DESIGN LATERAL SOIL PRESSURE: 45 PSF PER FOOT OF DEPTH (SHALL BE VERIFIED BY GEOTECHNICAL ENGINEER LICENSED IN THE PROJECT STATE).
- ASSUMED SOIL BEARING CAPACITY: SEE "FOUNDATION NOTES" IT IS ASSUMED THAT THE SOILS SUPPORTING THIS CONSTRUCTION PROJECT ARE SUITABLE TO SUPPORT THE PROPOSED BUILDING (WITH THE SPECIFIED FOUNDATION ELEMENTS), SIDEWALKS, AND PAVEMENTS WITHOUT ADVERSE AFFECTS DUE TO SETTLEMENT, DIFFERENTIAL SETTLEMENT, BUOYANCY, ETC. THE DEVELOPER, GENERAL CONTRACTOR, AND/OR OWNERS SHALL RETAIN THE SERVICES OF A QUALIFIED GEOTECHNICAL ENGINEER TO TEST AND EVALUATE THE SITE IN, AROUND, AND BELOW THE BUILDING FOOTPRINT TO VERIFY THESE ASSUMPTIONS AND PROVIDE A GEOTECHNICAL ENGINEERING REPORT.

SEISMIC FACTORS:
- GROUND ACCELERATIONS: Ss=.174g, S1=.060g
- SEISMIC IMPORTANCE FACTOR (Ie): 1.0
- OCCUPANCY CATEGORY: II
- SEISMIC DESIGN CATEGORY: B
- SEISMIC SITE CLASS (ASSUMED): D
- ANALYSIS PROCEDURE: EQUIV. LATERAL FORCE PROCEDURE
- LATERAL FORCE RESISTING SYSTEM: ORDINARY CMU SHEARWALLS & LIGHT-FRAMED WALLS SHEATHED WITH WOOD STRUCTURAL PANELS RATED FOR SHEAR RESISTANCE

WIND FACTORS:
- RISK CATEGORY: II
- BASIC WIND SPEED (V): 127 MPH
- EXPOSURE CATEGORY: B
- TOPOGRAPHIC FACTOR (Kzt): 1.0
- ENCLOSURE CLASSIFICATION: ENCLOSED
- INTERNAL PRESSURE COEFF GCpi: ±0.18 (ENCLOSED BLDG.)

FOUNDATION NOTES:

1. ALL TOPSOIL, SUBSOIL, AND SOIL CONTAINING ORGANIC OR UNSUITABLE BEARING MATERIAL SHALL BE CLEARED FROM THE BUILDING FOOTPRINT.
2. ALL SOIL SUPPORTED FOOTINGS SHALL BE FOUNDED UPON COMPACTED NATURAL SUBGRADE OR MECHANICALLY IMPROVED SUBGRADE WITH A BEARING CAPACITY OF AT LEAST 3000 PSF. SOIL BEARING CAPACITY SHALL BE VERIFIED BY A PROFESSIONAL GEOTECHNICAL ENGINEER REGISTERED IN THE PROJECT STATE. SEE GEOTECHNICAL REPORT PREPARED BY S.W. COLE ENGINEERING, INC.
3. G.C. SHALL BE RESPONSIBLE FOR DETERMINING THE SITE'S SUITABILITY TO SUPPORT THE BUILDING. FURTHERMORE, THE G.C. SHALL BE RESPONSIBLE FOR CONSTRUCTING THIS BUILDING AND SURROUNDING SITE/SUBGRADE IN STRICT ACCORDANCE WITH THIS REQUIREMENT.
5. ALL FOOTINGS SHALL EXTEND AT LEAST 40" BELOW FINISHED GRADE. G.C. SHALL COORDINATE ALL PROPOSED GRADES PRIOR TO CONSTRUCTION.
6. BEDROCK / LEDGE SHALL BE EXCAVATED A MINIMUM OF 4" BELOW BOTTOM OF FOOTING ELEVATION AND COVERED WITH A LAYER OF COMPACTED GRAVEL.
7. SOIL SHALL BE COMPACTED TO NOT LESS THAN 95% OF MAXIMUM DRY DENSITY PER ASTM D1557 IN LIFTS NOT TO EXCEED 6" LOOSE DEPTH.
8. BACKFILL SYMMETRICALLY AGAINST ALL FOUNDATION WALLS IN INCREMENTS NOT TO EXCEED 2 FEET MAXIMUM DIFFERENTIAL.
9. SEE PLUMBING AND ELECTRICAL DRAWINGS FOR UNDER FLOOR SYSTEMS AND SPECIAL GRANULAR FILL MATERIAL REQUIREMENTS.
10. NO FOOTINGS OR SLABS SHALL BE POURED INTO OR AGAINST SUBGRADE CONTAINING FREE WATER OR ICE.
11. ALL SLABS-ON-GRADE SHALL BE PLACED ON A LAYER OF COMPACTED FINE GRANULAR FILL UNDER A 10 MIL. POLY VAPOR RETARDER. COORDINATE ADDITIONAL SUBGRADE PREPARATION REQUIREMENTS WITH CIVIL AND/OR GEOTECHNICAL ENGINEERS OF RECORD.
12. ALL SLABS-ON-GRADE SHALL BE PLACED ON A VAPOR BARRIER ON A 12" COMPACTED GRAVEL BASE.
13. FORCES DUE TO HYDROSTATIC PRESSURE HAVE NOT BEEN CONSIDERED IN THE DESIGN OF THE FOUNDATION FOR THIS STRUCTURE. IT IS THE RESPONSIBILITY OF THE GENERAL CONTRACTOR/OWNER TO CONFIRM WITH A GEOTECHNICAL ENGINEER, CIVIL ENGINEER, OR OTHER QUALIFIED DESIGN PROFESSIONAL TO ENSURE HYDROSTATIC FORCES DO NOT EXIST.
14. GENERAL CONTRACTOR SHALL COORDINATE ALL INSULATION, DRAINAGE, DAMP-PROOFING AND WATER-PROOFING DETAILS WITH ARCHITECT OF RECORD.
15. A MODIFIED PROCTOR TEST SHALL BE PERFORMED BY A SOILS TESTING LAB ON EACH TYPE OF SOIL TO BE COMPACTED.
16. FIELD DENSITY TESTS SHALL BE PERFORMED BY AN INDEPENDENT SOILS TESTING LAB TO VERIFY COMPACTION. A COPY OF ALL TEST REPORTS SHALL BE FILED WITH THE ARCHITECT OF RECORD.

CONCRETE NOTES:

1. ALL FOOTING AND WALL CONCRETE SHALL HAVE A COMPRESSIVE STRENGTH OF NOT LESS THAN 4000 PSI AT 28 DAYS (ENTRAINED AIR CONTENT BETWEEN 4.5% AND 7%.
2. ALL INTERIOR SLAB CONCRETE SHALL HAVE A COMPRESSIVE STRENGTH OF NOT LESS THAN 3000 PSI AT 28 DAYS AND CONTAIN NO AIR ENTRAINMENT.
3. ALL EXTERIOR SLAB CONCRETE SHALL HAVE A COMPRESSIVE STRENGTH OF NOT LESS THAN 4000 PSI AT 28 DAYS (ENTRAINED AIR CONTENT BETWEEN 4.5% AND 7%).
4. ALL CONCRETE SHALL CONTAIN AN APPROVED WATER-REDUCING ADMIXTURE.
5. NO CALCIUM CHLORIDE SHALL BE USED IN ANY CONCRETE.
6. ALL REINFORCING BARS SHALL BE ASTM A-615 GRADE 60 UNLESS NOTED OTHERWISE.
7. ALL REINFORCING BAR SPLICES SHALL CONFORM TO REQUIREMENTS OF ACI 318, BUT IN NO CASE SHALL THEY BE LESS THAN 2'-0" OR 48xDIA.
8. ALL WELDED WIRE FABRIC SHALL CONFORM TO ASTM A-185, Fy=60 KSI
9. ALL WELDED WIRE FABRIC SHALL BE LAPPED TWO (2) FULL MESH PANELS AT SIDES AND ENDS AND BE SECURELY WIRED TOGETHER.
10. SEE ARCHITECTURAL DRAWINGS FOR TYPE AND LOCATION OF ALL FLOOR FINISHES, FLOOR DEPRESSIONS AND CUT OUTS.
11. COORDINATE ALL FOUNDATION PENETRATIONS WITH ARCHITECT, PLUMBING, MECHANICAL, ELECTRICAL CONTRACTORS AND LOCAL AGENCIES.
12. ALL CONCRETE SHALL BE DETAILED, FORMED, HANDLED, PLACED, AND PROTECTED IN ACCORDANCE WITH PROCEDURES AND GUIDELINES PRESCRIBED IN THE LATEST EDITION OF "BUILDING CODE REQUIREMENTS FOR REINFORCED CONCRETE" ACI-318, MANUAL OF STANDARD PRACTICE FOR REINFORCED CONCRETE STRUCTURES, ACI-301, AND ACI-305/306 GUIDES FOR HOT/COLD WEATHER CONCRETING.
13. GENERAL CONTRACTOR SHALL CAREFULLY COORDINATE ALL FORM-WORK, REBAR PLACEMENT, CONCRETE MIX DESIGN, AND CONCRETE PLACEMENT TO ENSURE ACCURATE AND COMPLETE CONCRETE DISTRIBUTION THROUGHOUT. ALL PRECAUTIONS, SHALL BE TAKEN TO AVOID "HONEYCOMBING" AND VOIDS IN CONCRETE FOUNDATION. TECHNIQUES, SUCH AS PRE-STAGING CONCRETE VIBRATORS IN CONGESTED AREAS, MODIFIED CONCRETE MIX DESIGNS TO PROMOTE COMPLETE DISTRIBUTION, ETC. SHALL BE EMPLOYED AT THE CONTRACTOR'S DISCRETION.
14. CONCRETE VOIDS AND EXCESSIVE "HONEY-COMBING" SHALL BE DOCUMENTED AND REPORTED TO THE ARCHITECT OF RECORD FOR ANALYSIS AND PREPARATION OF A REPAIR METHOD. PARGING, DRY-PACKING, AND "FLOATING" THE ADJACENT SLAB TO FILL VOIDS ARE UN-ACCEPTABLE METHODS OF REPAIR FOR FILLING SIGNIFICANT VOIDS.
15. G.C. SHALL COORDINATE ALL CONCRETE FINISHES WITH ARCHITECT OF RECORD. ALL CONCRETE THAT SHALL BE CONSIDERED ARCHITECTURALLY EXPOSED SHALL BE POURED AND FINISHED IN A MANNER WHICH WILL PRODUCE THE DESIRED ARCHITECTURAL FINISH. G.C. SHALL COORDINATE THE CONCRETE MIX DESIGN (I.E. SELF CONSOLIDATING CONCRETE), REBAR PLACEMENT, AND METHODS OF VIBRATION TO PRODUCE A FULLY CONSOLIDATED CONCRETE POUR FREE OF VOIDS AND/OR "HONEY-COMBING".
16. CHECKED SHOP DRAWINGS (5 SETS) SHOWING REINFORCING DETAILS, INCLUDING STEEL SIZES, SPACING AND PLACEMENT, SHALL BE SUBMITTED BY THE CONTRACTOR FOR APPROVAL PRIOR TO FABRICATION. THE GENERAL CONTRACTOR MUST REVIEW THE SHOP DRAWINGS PRIOR TO SUBMISSION TO THE ARCHITECT OF RECORD. ALL COPIES OF THE SHOP DRAWING SUBMITTALS SHALL BEAR A DATED AND SIGNED SHOP DRAWING STAMP WHICH DOCUMENTS THE GENERAL CONTRACTOR'S APPROVAL.
17. A MIX DESIGN (5 COPIES) SHALL BE SUBMITTED FOR APPROVAL FOR EACH TYPE OF CONCRETE. MIX DESIGN SUBMITTAL SHALL INCLUDE HISTORICAL BREAK DATA FOR EACH MIX OF CONCRETE.
18. A SET OF FOUR (4) CONCRETE TESTS CYLINDERS SHALL BE TAKEN BY AN INDEPENDENT CONCRETE TESTING LAB ON EACH DAY WHEN CONCRETE PLACEMENT EXCEEDS 5 CUBIC YARDS. ONE CYLINDER SHALL BE BROKEN AT 7 DAYS, TWO AT 28 DAYS, AND ONE AT 56 DAYS. A COPY OF ALL TEST REPORTS SHALL BE FILED WITH THE ARCHITECT OF RECORD.

STRUCTURAL STEEL NOTES:

1. ALL DETAILING, FABRICATION AND ERECTION SHALL CONFORM TO THE AISC SPECIFICATIONS AND CODES, LATEST EDITION.
2. ALL WIDE FLANGE SECTION STRUCTURAL BEAMS (W) SHALL BE ASTM A992 Fy = 50 KSI. BASE PLATES, CHANNELS, ANGLES, AND MISC. STRUCTURAL STEEL SHALL BE ASTM A-36, Fy = 36 KSI. ALL SQUARE AND RECTANGULAR HOLLOW STRUCTURAL SECTIONS (HSS) SHALL BE ASTM A-500 GRADE B FY MINIMUM 46 KSI.
3. ALL ANCHOR BOLTS AND THREADED RODS SHALL CONFORM TO THE REQUIREMENTS OF ASTM F1554 AND A307.
4. ALL BOLTS, NUTS AND WASHERS SHALL CONFORM TO THE REQUIREMENTS OF ASTM A-325 FOR 3/4" DIAMETER HIGH STRENGTH BOLTS UNLESS NOTED OTHERWISE.
5. ALL WELDING ELECTRODES SHALL BE E70XX.
6. ALL WELDING SHALL BE DONE BY CERTIFIED WELDERS AND SHALL CONFORM TO THE AWS "CODE FOR ARC AND GAS WELDING IN BUILDING CONSTRUCTION", LATEST EDITION.
7. NO CONNECTION SHALL CONSIST OF LESS THAN TWO 3/4" DIAMETER BOLTS OR WELDS DEVELOPING A MINIMUM OF 10,000 POUNDS UNLESS NOTED OTHERWISE.
8. ALL FILLET WELDS SHALL BE A MINIMUM OF 1/4" UNLESS NOTED OTHERWISE.
9. ALL WELDS SHALL BE VISUALLY INSPECTED AND ALL FULL PENETRATION WELDS SHALL BE INSPECTED BY ULTRA-SONIC TESTING.
10. AN INDEPENDENT STEEL TESTING AGENCY SHALL PERFORM ALL INSPECTION AND TESTING. THE STRUCTURAL STEEL FABRICATOR AND ERECTOR SHALL SCHEDULE ALL WORK TO ALLOW THE ABOVE TESTING REQUIREMENTS TO BE COMPLETED. A COPY OF ALL TEST REPORTS SHALL BE FILED WITH THE ARCHITECT.
11. THE CONTRACTOR SHALL BE RESPONSIBLE FOR THE CONTROL OF ALL ERECTION PROCEDURES AND SEQUENCES WITH RELATION TO TEMPERATURE DIFFERENTIALS AND STABILITY.
12. AFTER FABRICATION, ALL STEEL, EXCEPT THAT TO BE GALVANIZED, SHALL BE CLEANED OF ALL RUST, LOOSE MILL SCALE AND OTHER FOREIGN MATERIALS AND RECEIVE ONE COAT OF APPROVED PRIMER PAINT OR APPROVED PREFATORY APPLICATION SPECIFIED BY THE CORROSION INHIBITING COATING MANUFACTURER.
13. THE FABRICATOR SHALL FURNISH CHECKED SHOP AND ERECTION DRAWINGS AND OBTAIN APPROVAL PRIOR TO FABRICATING ANY STRUCTURAL STEEL.
14. CUTS, HOLES, OPENINGS, ETC. REQUIRED IN STRUCTURAL STEEL MEMBERS FOR THE WORK OF OTHER TRADES SHALL BE SHOWN ON SHOP DRAWINGS FOR STRUCTURAL STEEL AND SHALL BE MADE IN THE SHOP. BURNING OF HOLES OR CUTS IN STRUCTURAL STEEL MEMBERS IN THE FIELD WILL NOT BE PERMITTED EXCEPT BY WRITTEN PERMISSION FROM THE STRUCTURAL ENGINEER OF RECORD.
15. FULL MOMENT CONNECTIONS SHALL BE DESIGNED AND DETAILED TO DEVELOP THE FULL CAPACITY OF THE MEMBERS BEING CONNECTED.
16. SUBMIT SHOP DRAWINGS FOR REVIEW AND APPROVAL PRIOR TO CONSTRUCTION.
17. THE DESIGN, FABRICATION, PAINTING, AND ERECTION OF STEEL JOISTS SHALL CONFORM TO THE APPLICABLE REQUIREMENTS OF THE STEEL JOIST INSTITUTE (SJI) STANDARD SPECIFICATIONS.
18. CONTINUOUS HORIZONTAL BRIDGING SHALL BE PROVIDED WITH DESIGN AND CONNECTION DETAILS CONFORMING TO SJI SPECIFICATIONS. ALL BRIDGING SHALL BE INSTALLED BEFORE ANY CONSTRUCTION LOADS ARE PLACED ON THE JOISTS. THE ENDS OF ALL BRIDGING LINES SHALL BE SECURELY ANCHORED TO ADJACENT WALLS OR BEAMS AT TERMINATION POINTS.
19. SUBMIT SHOP DRAWINGS FOR REVIEW AND APPROVAL PRIOR TO CONSTRUCTION.

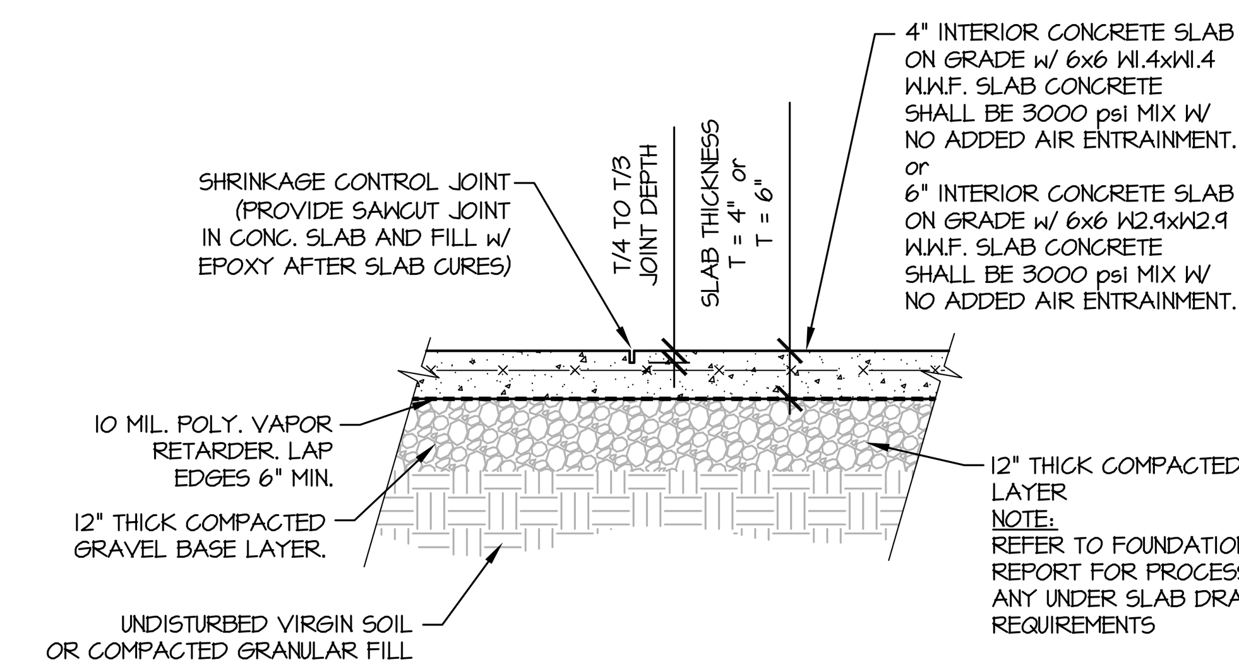
STEEL DECK NOTES:

1. ALL STEEL DECKING SHALL CONFORM TO THE STEEL DECK INSTITUTE (SDI) APPLICABLE SPECIFICATIONS AND REQUIREMENTS. INSTALLATION SHALL BE PER THE MANUFACTURER'S RECOMMENDATIONS IN ACCORDANCE WITH SDI SPECIFICATIONS.
2. STEEL DECK SHALL TYPICALLY BE STORED OFF THE GROUND AT THE JOBSITE, AND BE PROTECTED FROM THE ELEMENTS WITH A WATERPROOF COVERING WHERE REQUIRED.
3. DECK SHEETS SHALL BE PLACED IN ACCORDANCE WITH APPROVED ERECTION LAYOUT DRAWINGS SUPPLIED BY THE DECK MANUFACTURER AND IN CONFORMANCE WITH THE MANUFACTURER'S STANDARDS. UNLESS NOTED OTHERWISE, END LAPS SHALL OCCUR OVER SUPPORTS AND SHALL NOT BE LESS THAN 2" MINIMUM.
4. ALL STEEL TO BE USED FOR DECKING SHALL BE GALVANIZED.
5. REFER TO ARCHITECTURAL PLANS FOR ADDITIONAL FINISH REQUIREMENTS.
6. UNLESS NOTED OTHERWISE ON PLANS, THE FOLLOWING DECKING SHALL BE PROVIDED: STEEL DECK SHALL BE 1½" (TYPE B) 20 GAUGE STEEL ROOF DECK (G-90 GALVANIZED) BY VULCRAFT, OR APPROVED EQUAL.
7. SUBMIT SHOP DRAWINGS FOR REVIEW AND APPROVAL PRIOR TO CONSTRUCTION.

STRUCTURAL LUMBER, ENGINEERED LUMBER:

1. ALL MATERIAL AND WORKMANSHIP SHALL BE IN ACCORDANCE WITH THE LATEST EDITION OF "TIMBER CONSTRUCTION STANDARDS" OF THE AMERICAN INSTITUTE OF TIMBER CONSTRUCTION AND THE "NATIONAL DESIGN SPECIFICATION FOR STRESS-GRADE LUMBER AND ITS FASTENINGS" OF THE NATIONAL FOREST PRODUCTS ASSOCIATION.
2. THE MINIMUM GRADES AND DESIGN VALUES REQUIRED FOR CONVENTIONAL, STRUCTURAL LUMBER SHALL BE:
3. STUDS: CONSTRUCTION GRADE SPRUCE-PINE-FIR, FC=1000 PSI, E=1,300,000 PSI,
4. JOISTS/RAFTERS/BEAMS: SPRUCE-PINE-FIR NO. 2, FB=875 PSI, E=1,400,000 PSI
5. PRESSURE TREATED LUMBER: SOUTHERN PINE NO. 1, E=1,400,000 PSI
6. ALL EXTERIOR WALL STUDS SHALL BE AT LEAST 2x6 @ 16" O.C. UNLESS NOTED OTHERWISE. FURTHERMORE, ALL WALL STUDS ADJACENT TO STEEL COLUMNS SHALL BE FASTENED TO FACE OF COLUMN WITH HILTI X-U POWDER DRIVEN FASTENERS @ 16" O.C.
7. ALL MULTIPLE MEMBER BEAMS AND HEADERS SHALL BE SUPPORTED ON NOT LESS THAN AN EQUAL NUMBER OF STUDS AT EACH END, UNLESS NOTED OTHERWISE.
8. WOOD COLUMNS MADE WITH THREE OR MORE WOOD STUDS SHALL BE NAILED TOGETHER WITH 16d NAILS. NAIL SPACING SHALL BE IN 2 ROWS, SPACED 8" O.C. FROM BOTH SIDES STAGGERED 4" APART.
9. UNLESS OTHERWISE NOTED, ALL EXTERIOR OPENINGS SHALL HAVE NOT LESS THAN ONE JACK STUD AND TWO FULL HEIGHT STUDS AT EACH SIDE OF THE OPENING. ALL INTERIOR BEARING WALL OPENINGS SHALL HAVE NOT LESS THAN TWO JACK STUDS AND ONE FULL HEIGHT STUD AT EACH SIDE OF THE OPENING UNLESS NOTED OTHERWISE.
10. ALL CONVENTIONAL LUMBER ROOF RAFTERS SHALL HAVE A SIMPSON UPLIFT ANCHOR AT EACH BEARING LOCATION. USE SIMPSON LSSU SKEWED AND/OR SLOPED HANGERS AT EACH RAFTER AS REQUIRED. PROVIDE AND INSTALL 1.25"x20 GA. RIDGE STRAPS (10) 8d NAILS) AT ALL CONVENTIONAL RAFTER PAIRS (OR APPROVED SUBSTITUTION).
11. FLUSH FRAMING SHALL BE SUPPORTED BY JOIST HANGERS DESIGNED FOR THE FULL CAPACITY OF THE SUPPORTED MEMBER.
12. PROVIDE AND INSTALL DOUBLE FLOOR JOISTS OR PROPERLY DESIGNED TRUSSES UNDER ALL PARTITIONS RUNNING PARALLEL TO SPAN.
13. ALL WOOD IN CONTACT WITH CONCRETE OR MASONRY SHALL BE PRESSURE TREATED WITH PRESERVATIVE.
14. EXTERIOR WALL SHEATHING SHALL BE MINIMUM 15/32 APA STRUCTURAL I RATED SHEATHING OR EXTERIOR GRADE. SHEATHING SHALL BE NAILED WITH 8d NAILS NOT LESS THAN 6" O.C. ON ALL PANEL EDGES. ALL WALL HORIZONTAL PANEL EDGES WITHIN 48" OF BUILDING CORNERS MUST BE BLOCKED AND NAILED. SHEATHING PANELS SHALL BE INSTALLED TO SPAN ACROSS FLOOR LEVELS (CENTERED ON BAND JOIST) TO ACHIEVE CONTINUOUS UPLIFT LOAD PATH FROM ROOF TO FOUNDATION.
15. SUB-FLOORING SHALL BE 3/4" TONGUE & GROOVE APA STRUCTURAL I RATED SHEATHING EXPOSURE 1 UNLESS NOTED OTHERWISE. FASTEN SUB-FLOOR TO SUPPORTING FRAMING WITH INDUSTRY STANDARD SUB-FLOOR ADHESIVE AND 8d NAILS @ 6" O.C.
16. ROOF SHEATHING ON FLAT ROOFS SHALL BE MINIMUM ¾" T&G APA STRUCTURAL I RATED SHEATHING.
17. ROOF SHEATHING ON NON-CURVED SLOPING FRAMING SHALL BE MINIMUM ⅝" T&G APA STRUCTURAL I RATED SHEATHING.
18. ROOF SHEATHING ON FLAT ROOFS AND NON-CURVED SLOPING FRAMING SHALL BE NAILED WITH 8d NAILS NOT MORE THAN 6" O.C. ON ALL SUPPORTED PANEL EDGES. NAILS SHALL BE SPACED 4" O.C. IN AREAS WITHIN 48" OF RIDGES, HIPS, RAKES, AND EAVES.
19. ROOF SHEATHING ON CURVED FRAMING MEMBERS SHALL BE THREE LAYERS OF ¼" APA RATED PLYWOOD SHEATHING WITH END AND SIDE JOINTS STAGGERED BETWEEN SUCCESSIVE LAYERS. EACH LAYER OF SHEATHING SHALL BE FASTENED TO THE SUPPORTING FRAMING WITH 8d RINK-SHANK NAILS @ 12" O.C. ALL NAILS SHALL BE STAGGERED BETWEEN NAILS FROM SUCCESSIVE LAYERS.
20. SOLID BLOCKING SHALL BE PROVIDED AT RIDGES AND EAVES TO SUPPORT AND FASTEN PANEL EDGES IN ALL CIRCUMSTANCES FOR ALL ROOF TYPES WHERE STANDARD FRAMING DOES NOT PROVIDE SUBSTRATE FOR CONTINUOUS PANEL EDGE SUPPORT AND FASTENING.
21. ENGINEERED LUMBER SUPPLIER SHALL SUBMIT TO THE ENGINEER OF RECORD FOR APPROVAL, SHOP DRAWINGS FOR ALL ENGINEERED LUMBER AND I-JOISTS. SHOP DRAWINGS SHALL INCLUDE BUT ARE NOT LIMITED TO: FRAMING LAYOUT PLAN, MEMBER SIZES, NAILING PATTERNS FOR MULTIPLE MEMBERS, BEARING LENGTHS, CONNECTION HANGERS, BLOCKING, BRIDGING, AND SQUASH BLOCKS.
22. LAMINATED VENEER LUMBER (LVL), LAMINATED STRAND LUMBER (LSL), AND PARALLEL STRAND LUMBER (PSL) SHALL BE VERSA-LAM BY BOISE CASCADE OR EQUAL.
23. LVL AND PSL BEAMS SHALL HAVE THE FOLLOWING MINIMUM PROPERTIES: FB = 3100 PSI, FT = 2150 PSI, FC = 750 PSI FC = 3000 PSI, FV = 285 PSI, E = 2,000,000 PSI
24. PSL COLUMNS/POSTS SHALL HAVE THE FOLLOWING MINIMUM PROPERTIES: FB = 2650 PSI, FT = 1650 PSI, FC = 750 PSI FC = 3000 PSI, FV = 285 PSI, E = 1,700,000 PSI
25. LVL'S AND PSL'S SHALL BE FREE OF FINGER JOINTS, SCARF JOINTS OR MECHANICAL CONNECTIONS FOR THE FULL LENGTH OF THE MEMBER.
26. ADHESIVE USED SHALL BE WATERPROOF, MEETING THE REQUIREMENTS OF ASTM D-2559-76.
27. ALL SIMPSON CONNECTORS (HANGERS, STRAPS, UPLIFT CONNECTORS, POST CAPS, ECT.) SHALL BE COATED WITH Z-MAX CORROSION RESISTANCE OR APPROVED SUBSTITUTE.
28. ALL FASTENERS IN CONTACT WITH PRESSURE-TREATED LUMBER SHALL BE CERTIFIED FOR USE WITH THE PRESERVATIVE TREATMENT USED.
29. ALL FASTENERS EXPOSED TO MOISTURE, EXPECTED CONDENSATION, PRESSURE TREATED LUMBER, AND/OR THE WEATHER SHALL BE MADE FROM NON-CORROSIVE MATERIALS OR COATED WITH AN APPROVED ANTI-CORROSIVE COATING CERTIFIED AND APPROVED FOR USE WITH THE MATERIALS TO BE FASTENED.
30. ALL PORCH ROOF AND FLOOR BEAMS SHALL BE FASTENED TO RESIST UPLIFT LOADS WITH SIMPSON PC/EPC POST CAPS AND 48" LONG (UNLESS OTHERWISE NOTED) SIMPSON 20GA COIL STRAPS. STRAPS SHALL BE CENTERED OVER THE TOP OF THE BEAM AND BENT DOWN ALONG BOTH SIDES OF POST. FASTEN STRAPS WITH 10D NAILS THROUGH ALL AVAILABLE NAIL HOLES.
31. ALL CEILING FRAMING (INCLUDING TRUSS BOTTOM CHORDS) ADJACENT TO EXTERIOR WALLS SHALL BE FRAMED IN ORDER TO BRACE THE EXTERIOR WALLS AGAINST LATERAL MOVEMENTS. COORDINATE ALL CEILING FRAMING WITH ARCHITECT OF RECORD.
32. AT ALL OVER FRAMED ROOF CONDITIONS FRAMED WITH CONVENTIONAL LUMBER, PROVIDE & INSTALL CONTINUOUS 2X8 CLEAT FASTENED THROUGH SHEATHING AND INTO EACH ROOF RAFTER WITH (2) #10 DECKING SCREWS. FASTEN OVER-FRAMED RAFTERS TO CLEAT WITH (4) 16d TOE-NAILS AND SINGLE #10 DECKING SCREW THROUGH TOP OF RAFTER.

GENERAL NOTES - PRE-ENGINEERED WOOD TRUSSES:
1. WOOD TRUSSES SHALL BE DESIGNED PER THE "DESIGN SPECIFICATION FOR METAL PLATE CONNECTED WOOD TRUSSES", PUBLISHED BY THE TRUSS PLATE INSTITUTE.
2. ALL ROOF TRUSSES AND OVERHANGING WOOD MEMBERS SHALL BE HELD DOWN WITH UPLIFT ANCHORS PER TRUSS MANUFACTURER'S REQUIREMENTS.
3. WOOD TRUSS FABRICATOR SHALL SUBMIT TO THE ARCHITECT FOR APPROVAL PRIOR TO FABRICATION, SHOP DRAWINGS BEARING SEAL AND SIGNATURE OF THE DESIGN PROFESSIONAL ENGINEER, REGISTERED IN THE STATE OF RHODE ISLAND. SHOP DRAWINGS SHALL BE REVIEWED AND APPROVED BY THE GENERAL CONTRACTOR PRIOR TO SUBMITTING TO ARCHITECT. SHOP DRAWINGS SHALL INCLUDE BUT ARE NOT LIMITED TO: TRUSS LAYOUT PLAN; TRUSS DETAIL SHEETS SHOWING CONFIGURATION, DIMENSIONS, LOADS, MEMBER SIZES AND GRADES, MEMBER FORCES, CONNECTION PLATE SIZES, PERMANENT BRACING REQUIREMENTS, TRUSS CONNECTION HANGERS FOR FLUSH FRAMING, TEMPORARY BRACING REQUIREMENTS, UPLIFT ANCHORAGE HARDWARE (SPECIFIED BY TRUSS DESIGNER), ETC.
4. TRUSS DESIGNER SHALL INCLUDE ALL LOADS REQUIRED BY THE RHODE ISLAND STATE BUILDING CODE AND ALL FURTHER REQUIREMENTS INCLUDED IN THE STRUCTURAL AND ARCHITECTURAL CONTRACT DOCUMENTS. ADDITIONAL REQUIREMENTS MAY INCLUDE, BUT ARE NOT LIMITED TO ADDITIONAL DESIGN LOADS DUE TO WIND AND/OR EARTHQUAKE, SNOW DRIFTING, POINT LOADS AND/OR ADDITIONAL LOADING FROM OTHER FRAMING MEMBERS, SPECIAL TOP CHORD SLOPE REQUIREMENTS FOR DRAINAGE, ETC. TRUSS DESIGNER SHALL CAREFULLY COORDINATE ALL LOADS DUE TO MECHANICAL EQUIPMENT AND PLUMBING FIXTURES WITH THE G.C., ARCHITECT, AND MECHANICAL DESIGN.
5. TRUSS DESIGNER SHALL DESIGN, MANUFACTURE, AND FURNISH ALL FLOOR TRUSSES WHICH MEET A LIVE LOAD DEFLECTION CRITERIA OF L/600 AND ALL ROOF TRUSSES WHICH MEET A TOTAL LOAD DEFLECTION CRITERIA OF THE LESSER OF ¾" OR L/360 UNLESS SPECIFICALLY APPROVED OTHERWISE.
6. WOOD TRUSS ERECTOR SHALL BE RESPONSIBLE FOR DESIGN AND INSTALLATION OF ALL TEMPORARY ERECTION BRACING.
7. TRUSS SPACING SHOWN IN STRUCTURAL ENGINEERING PLANS ARE FOR REFERENCE ONLY. GENERAL CONTRACTOR SHALL REFER TO APPROVED TRUSS SHOP DRAWINGS FOR ACTUAL TRUSS LAYOUT AND SPACING (FOR BOTH BIDDING AND CONSTRUCTION PURPOSES).
8. TRUSS LAYOUT AND DESIGN SHALL BE COORDINATED WITH THE MECHANICAL EQUIPMENT LAYOUT.



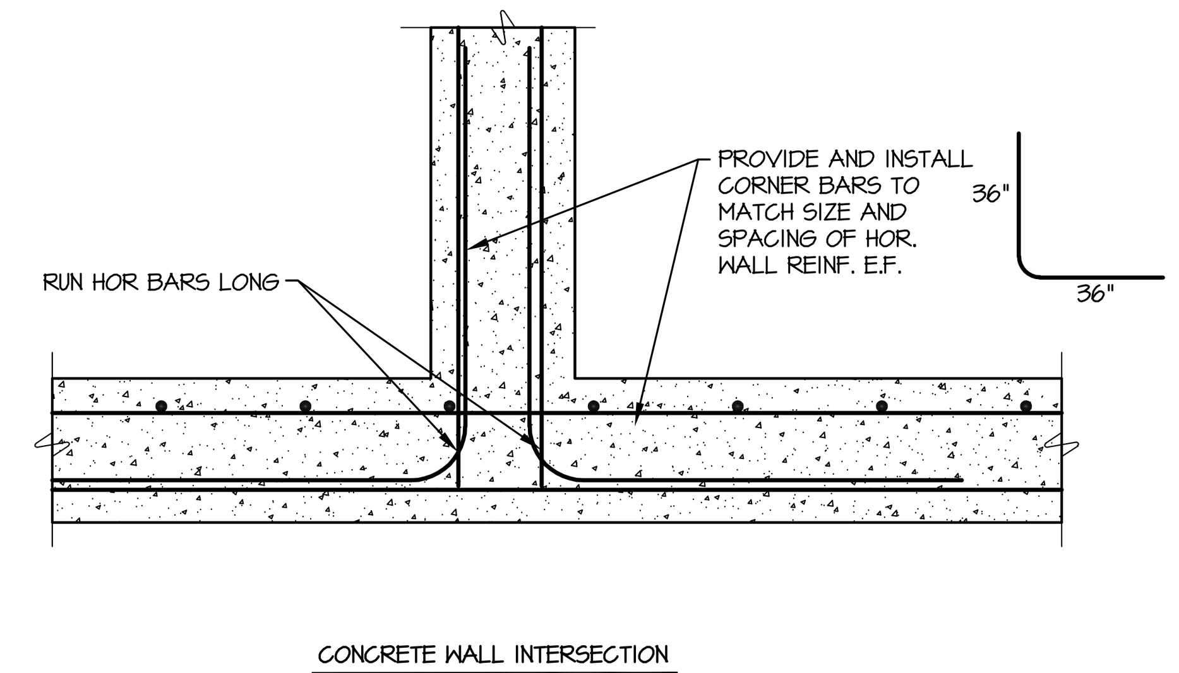
1. SAWCUT SHRINKAGE CONTROL JOINTS SHALL BE PROVIDED WITHIN 12 HRS. OF SLAB PLACEMENT, AS SOON AS CONCRETE IS CAPABLE OF SUPPORTING SAWCUTTING EQUIPMENT.

2. LOCATE SHRINKAGE CONTROL JOINTS AS INDICATED ON SLAB PLAN, OR AT MAXIMUM SPACING OF 20 FT. O.C. IF NOT INDICATED ON PLANS. RESULTING SHAPE SHALL NOT BE GREATER THAN 400 S.F. NOR EXCEED A 1.5 : 1 LENGTH TO WIDTH RATIO.

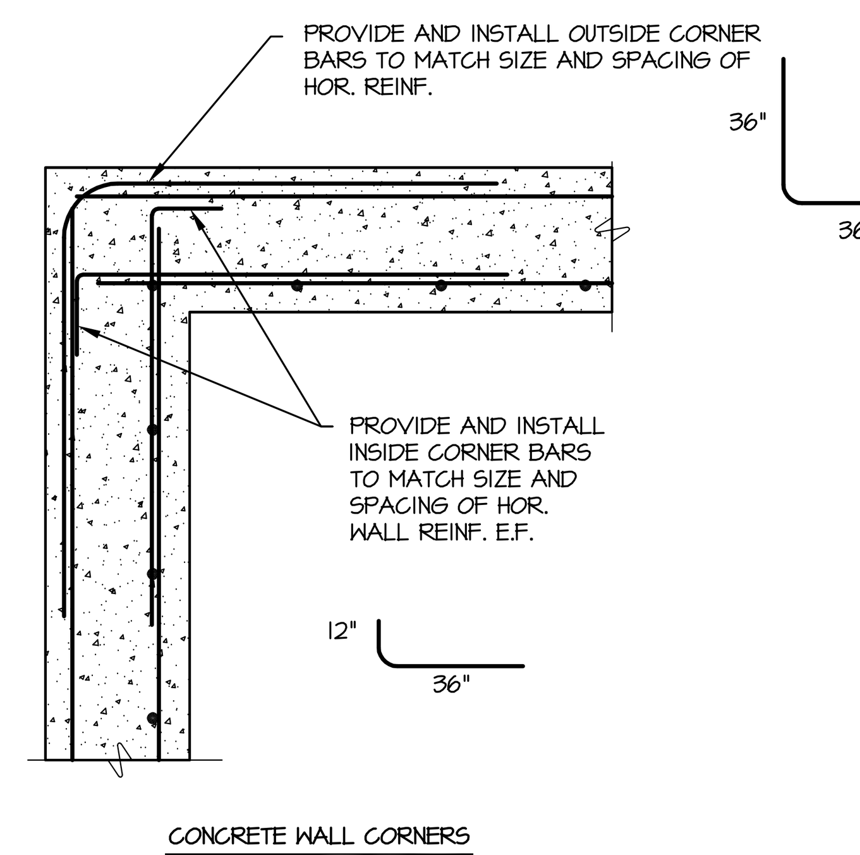
3. OPTIONALLY, THE SHRINKAGE CONTROL MAY SUBSTITUTE PRE-FABRICATED PLASTIC STRIPS INSTEAD OF SAWCUTTING. SUBMIT CATALOG CUTS FOR APPROVAL PRIOR TO USING.

4. INSTALLATION OF ALL NON-STRUCTURAL CONCRETE SLABS-ON-GRADE SHALL CONFORM TO ALL REQUIREMENTS OF THE LATEST ADDITIONS OF BOTH, ACI-360 AND ACI-302.

1 TYP. INTERIOR SLAB ON GRADE DETAIL
SCALE: NONE

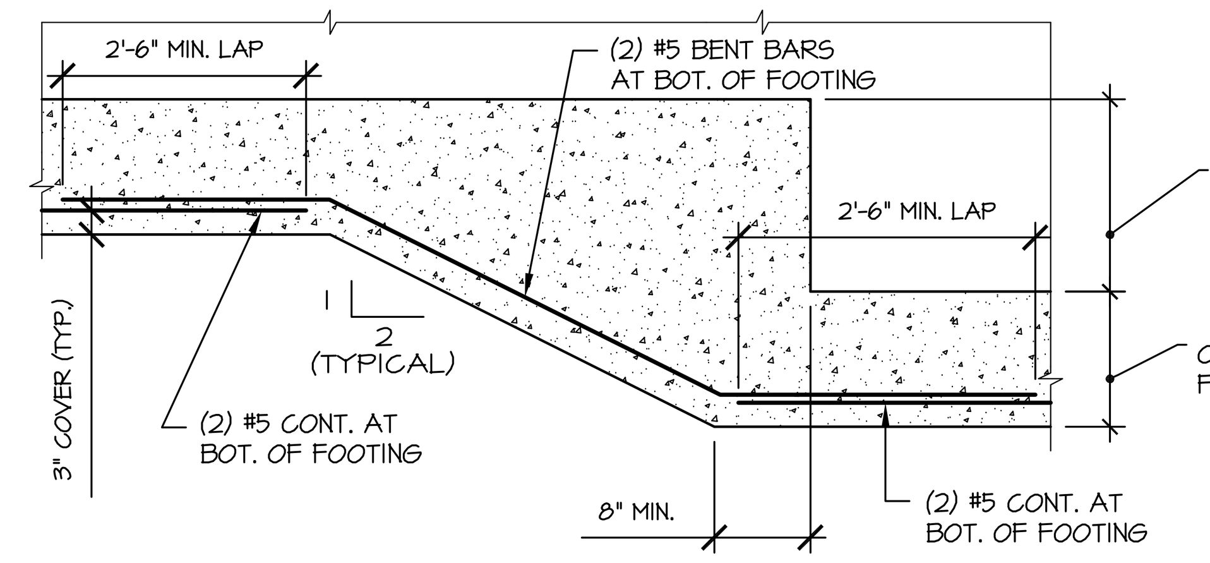


CONCRETE WALL INTERSECTION

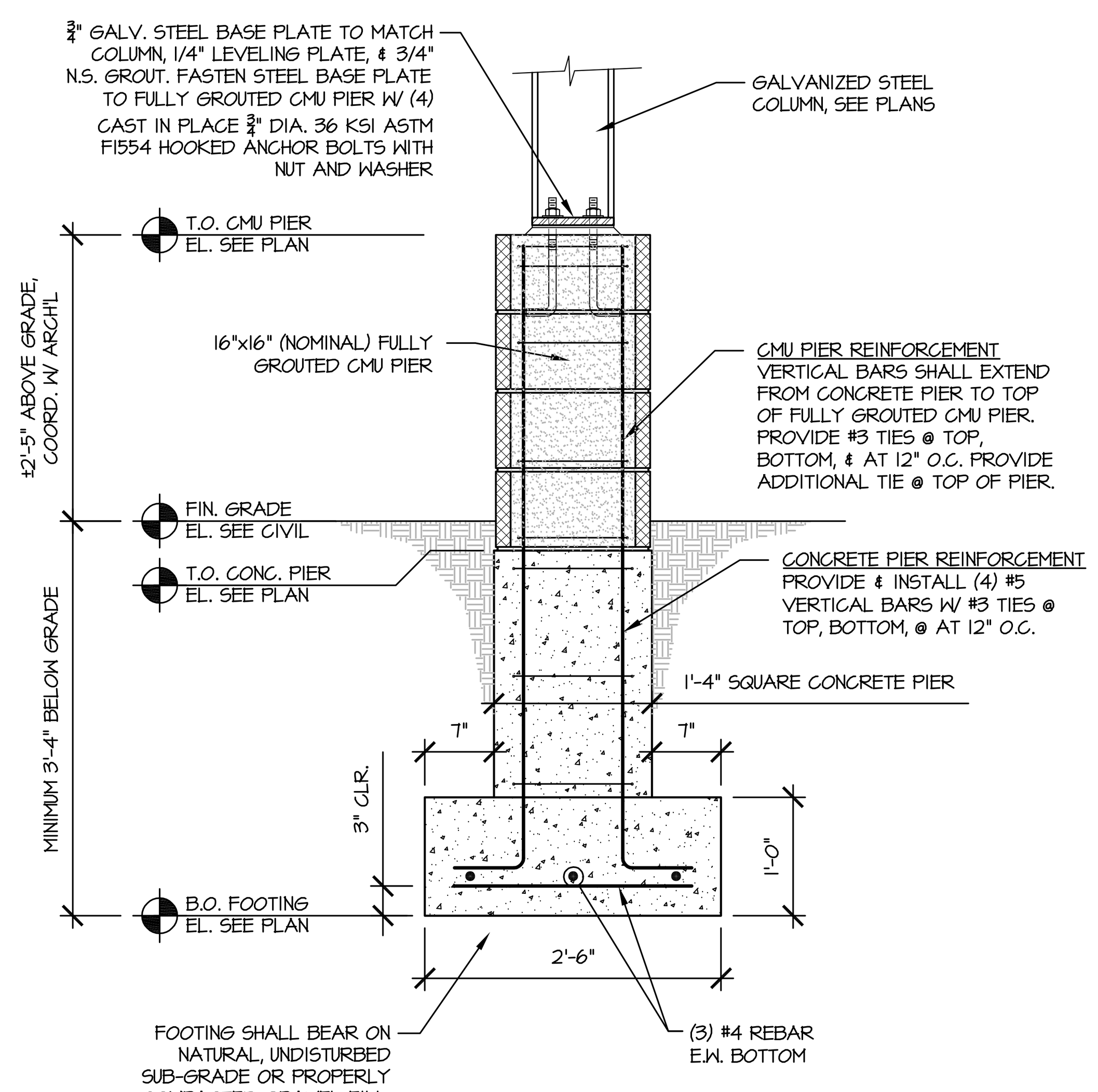


CONCRETE WALL CORNERS

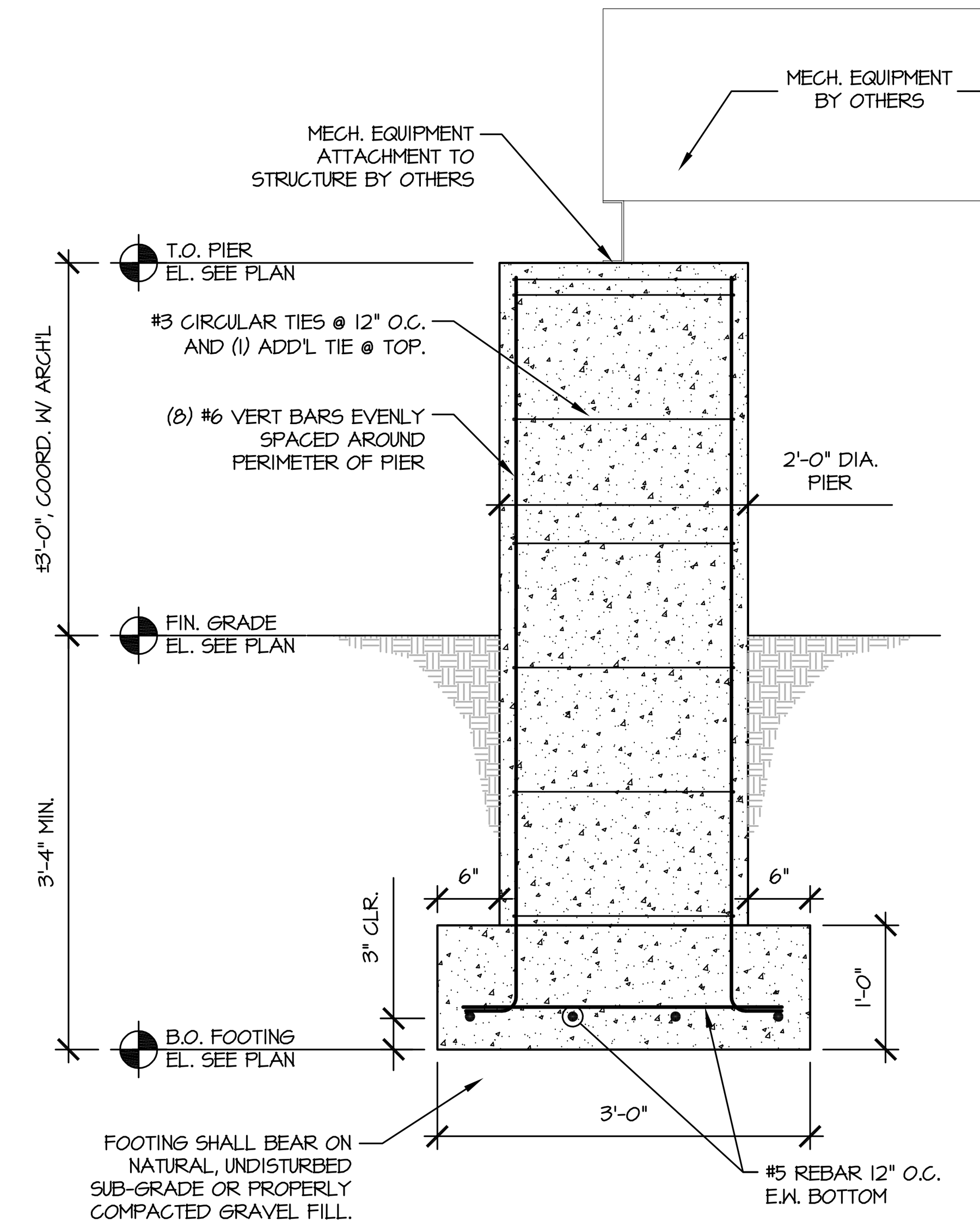
2 TYP. REINFORCED CONCRETE WALL DETAILS
SCALE: NONE



3 TYPICAL STEPPED FOOTING DETAIL
SCALE: 3/4"=1'-0"



4 SECTION THROUGH PIER AT STEEL COLUMNS
SCALE: 3/4"=1'-0"



5 SECTION THROUGH MECHANICAL PLATFORM FOUNDATION
SCALE: 3/4"=1'-0"

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PROJECT

City Hall Plaza

Warwick, RI

TITLE

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NO.	REVISIONS	DATE

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DESIGNED BY: MJB / AJH

CHECKED BY: MVC

ISSUE DATE: 01/31/2024

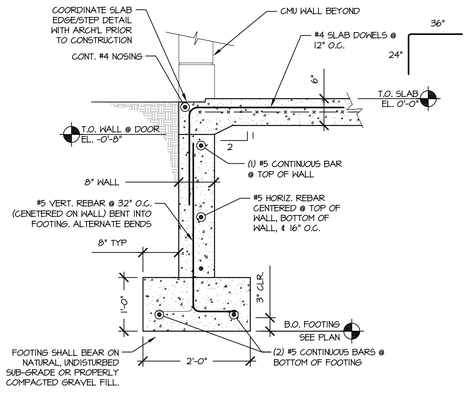
BETA JOB NO.: 10694

SCALE AS NOTED

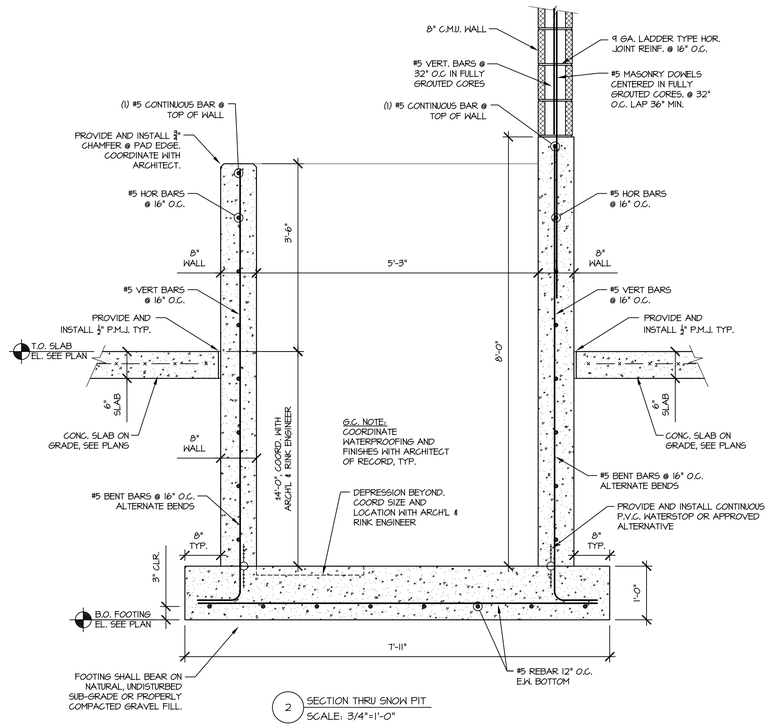
UNLESS OTHERWISE NOTED OR CHANGED BY REPRODUCTION

BID SET

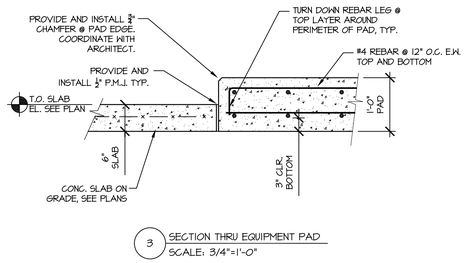
SHEET NO. S0.1



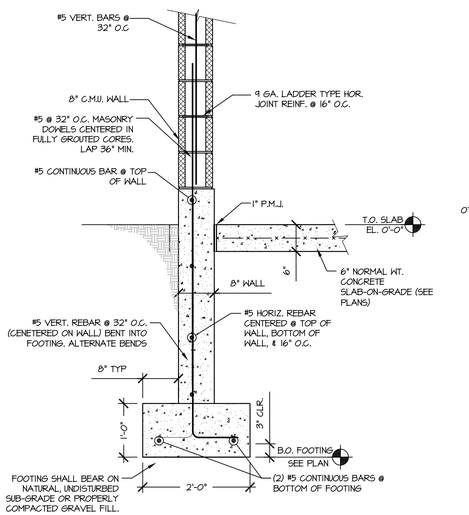
1 SECTION THRU FOUNDATION @ ZAMBONI / EQUIPMENT ROOM DOORS
SCALE: 3/4"=1'-0"



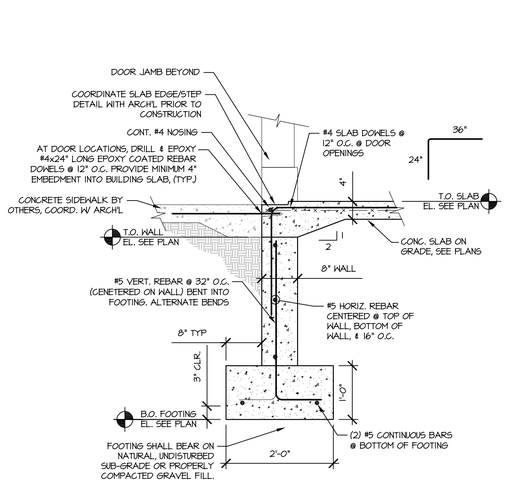
2 SECTION THRU SNOW PIT
SCALE: 3/4"=1'-0"



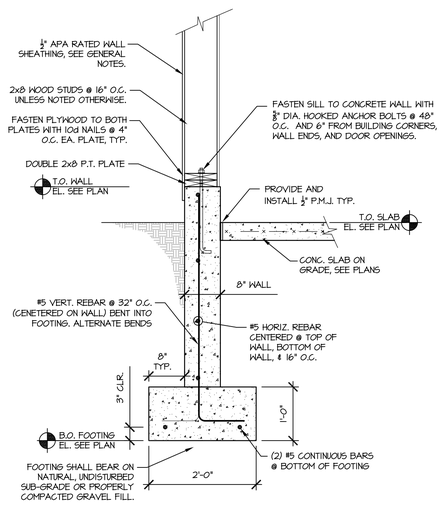
3 SECTION THRU EQUIPMENT PAD
SCALE: 3/4"=1'-0"



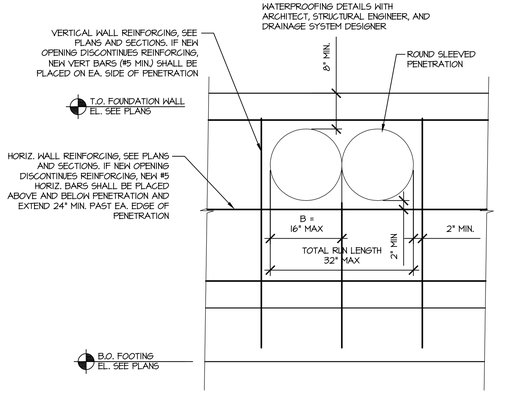
4 TYPICAL FOUNDATION WALL SECTION @ CMU PORTION OF BUILDING
SCALE: 3/4"=1'-0"



5 SECTION THRU SKATING BUILDING DOORS
SCALE: 3/4"=1'-0"



6 SECTION THRU SKATING BUILDING WALL
SCALE: 3/4"=1'-0"



7 TYPICAL FOUNDATION WALL PIPE SLEEVE PENETRATION
SCALE: 3/4"=1'-0"

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BETA JOB NO.: 10694

SCALE AS NOTED

BID SET

SHEET NO. S0.2

OVERFRAMED ROOF NOTE
OVERFRAME RAFTERS ONTO OPPOSING LOWER ROOF. AT ALL OVER FRAMED ROOF CONDITIONS, PROVIDE & INSTALL CONTINUOUS 2x8 CLEAT FASTENED THROUGH SHEATHING AND INTO EACH ROOF RAFTER WITH (2) #10 DECKING SCREWS. FASTEN OVER-FRAMED RAFTERS TO CLEAT WITH (4) 16d TOE-NAILS AND SINGLE #10 DECKING SCREW THROUGH TOP OF RAFTER. SEE GENERAL NOTES

OVER-FRAME RAFTERS ONTO OPPOSING RAFTERS, SEE NOTE THIS SHEET

PROVIDE AND INSTALL ¼"x4"x8" BEARING PLATE WITH (2) ¾" x 6" LONG HEADED STUD ANCHORS IN BEAM POCKET. FILL POCKET WITH MASONRY ONCE BEAM IS IN PLACE

GALV. C10x15.3 STEEL CHANNEL OUTRIGGER W/ FULLY WELDED STEEL PLATE BOLTED TO FACE OF CMU WALL. SEE ELEVATION DETAIL. PROVIDE P.T. TOP FLANGE NAILER (DROPPED)

10&11 S1.1 ELEVATION DETAIL

COORDINATE ARCHITECTURAL PILASTERS W/ ARCH'L, TYP.

ADD ALT 4:

OVER-FRAME RAFTERS ONTO OPPOSING RAFTERS, SEE NOTE THIS SHEET

PROVIDE AND INSTALL ¼"x4"x8" BEARING PLATE WITH (2) ¾" x 6" LONG HEADED STUD ANCHORS IN BEAM POCKET. FILL POCKET WITH MASONRY ONCE BEAM IS IN PLACE

T.O. C.M.U. @ REAR WALL [14'-0"]

9 S1.1

2x8 RAFTERS W/ 2x6 SOFFIT JOISTS @ 16" O.C., SEE DETAIL

P.T. 2x12 LOW PERIMETER ROOF LEDGER, SEE DETAIL

8" CMU LINTEL

CANTILEVERED P.T. 2x10 LEDGER, SEE NOTE

2'-0" CANTILEVER

CANTILEVERED P.T. 2x10 LEDGER NOTE:
FASTEN 12'-0" LONG PIECE OF P.T. 2x10 LEDGER TO GROUTED CORES OF CMU WALL W/ ½" DIA. EXPANSION ANCHORS @ 32" O.C. STAGGERED. LEDGER SHALL CANTILEVER A MAXIMUM DISTANCE OF 2'-0" BEYOND THE END OF THE CMU WALL.
PROVIDE & INSTALL (2) ½" DIA. EXPANSION ANCHORS AT LAST CMU CORE PRIOR TO CANTILEVERED PORTION. LEDGER SHALL BE INSTALLED IN DIRECT CONTACT WITH CMU WALL. G.C. SHALL COORDINATE WATERPROOFING, FLASHING, INSULATION DETAIL W/ ARCHITECT PRIOR TO CONSTRUCTION

PROVIDE AND INSTALL ¼"x4"x8" BEARING PLATE WITH (2) ¾" x 6" LONG HEADED STUD ANCHORS IN BEAM POCKET. FILL POCKET WITH MASONRY ONCE BEAM IS IN PLACE

GALV. HSS4x4x¼ STEEL COL.

T.O. C.M.U. @ SIDE WALL [16'-0"]

12 S1.1

PROVIDE AND INSTALL ⅜"x4"x8" JOIST BEARING PLATES WITH (2) ¾"x 6" LONG HEADED STUD ANCHORS IN FULLY GROUTED C.M.U. (TYPICAL UNLESS NOTED OTHERWISE)

G.C. NOTE:
S.C. SHALL PROVIDE & INSTALL TAPERED INSULATION AS REQUIRED TO PROVIDE POSITIVE DRAINAGE AND PREVENT PONDING ON FLAT ROOF MEMBERS

1½"-20 GA. (TYPE B) GALV. STEEL ROOF DECK (TYP.) FASTEN TO FRAMING W/ 5/8" DIA. PUDDLE WELDS (36/4 PATTERN) AND (2) #10 TEK SCREWS PER SPAN @ SIDE LAPS. INCREASE PATTERN TO 36/1 AT BUILDING PERIMETER AND OPENINGS

24" CMU LINTEL

L550 (TYP.)

H3 (TYP.)

10'-0" BACKSPAN

GALV. HSS4x4x¼ STEEL COL.

1'-0"

(5) EQUAL SPACES

4"

T.O. C.M.U. @ INTERIOR WALL [14'-0"]

COORD. SIZE & LOCATION OF SKYLIGHT OPENINGS W/ ARCH'L PRIOR TO CONSTRUCTION, TYP.

7 S1.1

(6) EQUAL SPACES

1'-0"

2x8 RAFTERS @ 16" O.C.

CANTILEVERED P.T. 2x10 LEDGER, SEE DETAIL

P.T. TOP FLANGE NAILER (DROPPED)

W4x22 (+24")

L4x4x¼

16K4

COORD. SIZE & LOCATION OF SKYLIGHT OPENINGS W/ ARCH'L PRIOR TO CONSTRUCTION, TYP.

6 S1.1

SEE TYPICAL DETAIL FOR ROOF OPENING FRAMES (TYP.)

T.O. C.M.U. @ SIDE WALL [16'-0"]

PROVIDE AND INSTALL ¼"x4"x8" BEARING PLATE WITH (2) ¾" x 6" LONG HEADED STUD ANCHORS IN BEAM POCKET. FILL POCKET WITH MASONRY ONCE BEAM IS IN PLACE

8" CMU LINTEL

T.O. C.M.U. @ FRONT WALL [16'-0"]

PROVIDE AND INSTALL ¾"x4"x8" JOIST BEARING PLATES WITH (2) ¾"x 6" LONG HEADED STUD ANCHORS IN FULLY GROUTED C.M.U. (TYPICAL UNLESS NOTED OTHERWISE)

5 S1.1

T.O. C.M.U. @ FRONT WALL [16'-0"]

8" CMU LINTEL

PROVIDE AND INSTALL ¼"x4"x8" BEARING PLATE WITH (2) ¾" x 6" LONG HEADED STUD ANCHORS IN BEAM POCKET. FILL POCKET WITH MASONRY ONCE BEAM IS IN PLACE

UPLIFT ANCHORAGE NOTE
PROVIDE SIMPSON H3 UPLIFT ANCHORS AT ALL LOW ROOF RAFTER BEARING LOCATIONS UNLESS OTHERWISE NOTED

JOIST SUPPLIER NOTE:
COORDINATE JOIST SEAT REQUIREMENTS WITH ROOF PITCH. COORDINATE WITH ARCHITECTURAL DRAWINGS

BRIDGING NOTE
TYPICAL JOIST NOTE:
SUPPLY AND INSTALL HORIZONTAL AND BOLTED BRIDGING IN ACCORDANCE WITH S.J.I. REQUIREMENTS.

MASONRY VENEER NOTE
DESIGN OF FLASHINGS, TIES, EXPANSION JOINTS AND THEIR SPACING, WEEPS, ETC. IS THE RESPONSIBILITY OF OTHERS AND HAS SPECIFICALLY NOT BEEN DESIGNED BY CAMERA-O'NEILL CONSULTING ENGINEERS

PROVIDE AND INSTALL ¼"x4"x8" BEARING PLATE WITH (2) ¾" x 6" LONG HEADED STUD ANCHORS IN BEAM POCKET. FILL POCKET WITH MASONRY ONCE BEAM IS IN PLACE

LOW FLAT ROOF LEDGER NOTE:
AT CMU WALL, FASTEN CONTINUOUS P.T. 2x8 LEDGER TO GROUTED CORES OF CMU WALL W/ ½" DIA. DRILLED & EPOXIED THREADED RODS @ 32" O.C. STAGGERED. AT WOOD STUD WALL, FASTEN CONTINUOUS 2x8 LEDGER THROUGH SHEATHING INTO WALL STUDS W/ ¼"x4" SIMPSON SDHS SCREWS @ 16" O.C. STAGGERED

PROVIDE AND INSTALL ½"x4"x8" BEARING PLATE WITH (2) ¾" x 6" LONG HEADED STUD ANCHORS IN BEAM POCKET. FILL POCKET WITH MASONRY ONCE BEAM IS IN PLACE

8" CMU LINTEL

T.O. C.M.U. @ SIDE WALL [16'-0"]

P.T. 2x10 LOW PERIMETER ROOF LEDGER, SEE DETAIL

HSS4x4x¼ STEEL COL.

PROVIDE AND INSTALL ½"x4"x8" BEARING PLATE WITH (2) ½" x 6" LONG HEADED STUD ANCHORS IN BEAM POCKET. FILL POCKET WITH MASONRY ONCE BEAM IS IN PLACE

G.C. NOTE:
G.C. SHALL PROVIDE & INSTALL TAPERED INSULATION AS REQUIRED TO PROVIDE POSITIVE DRAINAGE AND PREVENT PONDING ON FLAT ROOF MEMBERS

LOW FLAT ROOF LEDGER, SEE NOTE

2x8 LOW FLAT ROOF JOISTS @ 16" O.C.

LL-2K (2x8)

QUAD 2x6 HEADER

2x8 @ 16" O.C. WOOD STUD BEARING WALL (SHOWN SHADED)

PROVIDE AND INSTALL ½"x4"x8" BEARING PLATE WITH (2) ¾" x 6" LONG HEADED STUD ANCHORS IN BEAM POCKET. FILL POCKET WITH MASONRY ONCE BEAM IS IN PLACE

2x8 WD STUD STUB BEARING WALL @ 16" O.C. DIRECTLY ABOVE DROPPED BEAM BELOW (SHOWN SHADED)

TRIPLE 2x8 POST

CONTINUOUS QUAD 18" LVL BEAM DROPPED

T.O. C.M.U. @ REAR WALL [14'-0"]

9 S1.1

PROVIDE AND INSTALL ¼"x4"x8" BEARING PLATE WITH (2) ¾" x 6" LONG HEADED STUD ANCHORS IN BEAM POCKET. FILL POCKET WITH MASONRY ONCE BEAM IS IN PLACE

T.O. C.M.U. @ SIDE WALL [16'-0"]

12 S1.1

TRUSS DESIGNER NOTE:
DROP FIRST TRUSS TO ACCOMMODATE RAKE OUTLOOKERS. COORD W/ ARCH'L

FRAMER NOTE:
GABLE END WALL STUDS SHALL BE FRAMED FULL-HEIGHT FROM SECOND FLOOR FRAMING TO BOTTOM CHORD OF GABLE END TRUSS

TRUSS EAVE BLOCKING, SEE NOTE THIS SHEET

GALV W8x40 STEEL BEAM W/ TOP FLANGE NAILER (DROPPED)

HSS4x4x¼ STEEL COL.

LL-2K

T.O.W. OTHERS

GABLE END WALL NOTE
CEILINGS/BOTTOM CHORD OF TRUSS SHALL BE FASTENED TO EFFECTIVELY BRACE GABLE END WALLS

TRUSS DESIGNER NOTE:
DROP FIRST TRUSS TO ACCOMMODATE RAKE OUTLOOKERS. COORD W/ ARCH'L

FRAMER NOTE:
GABLE END WALL STUDS SHALL BE FRAMED FULL-HEIGHT FROM SECOND FLOOR FRAMING TO BOTTOM CHORD OF GABLE END TRUSS

TRUSS MANUFACTURERS NOTE:
COORDINATE SKYLIGHT ROUGH OPENING DIMENSIONS W/ ARCH'L

PRE-ENGINEERED WOOD GIRDER TRUSS

PROVIDE & INSTALL ½" PLYWOOD SHEATHING ON INSIDE FACE OF CUPOLA WALL STUDS

TRUSS DESIGNER NOTE:
1500 LB WIND (UP OR DOWN) AT BOTTOM CHORD

TRUSS DESIGNER NOTE:
LOAD AT EACH LOW CUPOLA LEDGER: 300 PLF DEAD LOAD 100 PLF SNOW LOAD (SHOWN HATCHED), TYP.

FASTEN TOP & BOTTOM CHORDS OF TRUSSES THROUGH SHEATHING INTO CUPOLA WALL STUDS W/ ¼"x6" SIMPSON SDHS SCREWS @ 16" O.C. STAGGERED, TYP.

PRE-ENGINEERED WOOD GABLE ROOF TRUSSES @ 24" O.C.

TRUSS DESIGNER NOTE:
1500 LB WIND (UP OR DOWN) AT BOTTOM CHORD

PRE-ENGINEERED WOOD GIRDER TRUSS

CUPOLA LEDGER, SEE NOTE

3 S1.1

TRUSS DESIGNER NOTE:
COORDINATE LOCATION & ROUGH OPENING CUPOLA W/ ARCH'L

FRAMER NOTE:
CUPOLA WALLS SHALL BE FRAMED W/ FULL HEIGHT 2x8 SPF#1/#2 STUDS @ 16" O.C. UNLESS NOTED OTHERWISE

TRUSS DESIGNER NOTE:
1500 LB WIND (UP OR DOWN) AT BOTTOM CHORD

FRAMER NOTE:
LEAVE GAP BETWEEN CUPOLA WALL FRAMING & GIRDER TRUSS TO ACCOMMODATE CONTINUOUS SHEATHING DOWN TO LEDGER BELOW, TYP.

TRUSS DESIGNER NOTE:
1500 LB WIND (UP OR DOWN) AT BOTTOM CHORD

QUAD 2x6 HEADER

QUAD 7.25" L.V.L. HEADER

PRE-ENGINEERED WOOD GIRDER TRUSS

QUAD 7.25" L.V.L. HEADER

FRAMER NOTE:
LEAVE GAP BETWEEN CUPOLA WALL FRAMING & GIRDER TRUSS TO ACCOMMODATE CONTINUOUS SHEATHING DOWN TO LEDGER BELOW, TYP.

PROVIDE & INSTALL DOUBLE 2x6 BLOCKING BETWEEN TRUSSES TO ACCOMMODATE EXTERIOR WALL FASTENING, TYPICAL NOT SHOWN FOR CLARITY)

TRUSS RIDGE BLOCKING, SEE NOTE THIS SHEET

TRUSS DESIGNER NOTE:
DROP FIRST TRUSS TO ACCOMMODATE RAKE OUTLOOKERS. COORD W/ ARCH'L

CONT. GALV. W8x40 STEEL BEAM W/ TOP FLANGE NAILER (DROPPED)

GABLE END WALL NOTE
CEILINGS/BOTTOM CHORD OF TRUSS SHALL BE FASTENED TO EFFECTIVELY BRACE GABLE END WALLS

PROVIDE AND INSTALL SIMPSON LSTI-49 18GA RIDGE STRAPS @ OPPOSING HIP PAIRS. CENTER STRAP AT PEAK (NOT SHOWN FOR CLARITY)

2 S1.1

2x6 RAFTER @ 16" O.C.

L580 TYP.

2x6 BLOCKING @ 16" O.C. TYP.

2x6 RAFTER @ 16" O.C.

2x6 BLOCKING @ 16" O.C. TYP.

2x6 RAFTER @ 16" O.C.

2x6 BLOCKING @ 16" O.C. TYP.

2x6 RAFTER @ 16" O.C.

2x6 BLOCKING @ 16" O.C. TYP.

2x6 RAFTER @ 16" O.C.

2x6 BLOCKING @ 16" O.C. TYP.

2x4 BEARING PLATE FASTENED THROUGH SHEATHING INTO FRAMING, SEE DETAIL 2/S1.1 (SHOWN SHADED)

G.C. NOTE:
ALL CUTS AND JOINERY FOR CUPOLA COMPRESSION PEAK SHALL BE GEOMETRICALLY PRECISE TO ACHIEVE FULL CONTACT/BEARING OF RAFTER SURFACES AGAINST ONE ANOTHER.

B CUPOLA ROOF FRAMING
SCALE: 1/4"=1'-0"

T.O.T. PSL POST

LL-2K (2x8)

3 S1.1

FRAMER NOTE:
PSL POSTS SHALL BE FRAMED CONTINUOUS FULL HEIGHT FROM BOTTOM CHORD OF ROOF TRUSS TO TOP OF WALL PLATES, TYPICAL

FASTEN TOP CHORD OF TRUSS THROUGH SHEATHING INTO PSL POST W/ (4) ¼"x5" SIMPSON SDHS SCREWS, TYPICAL

QUAD 2x6 HEADER

2x6 JOISTS @ 16" O.C.

QUAD 2x6 HEADER

QUAD 2x6 HEIGHT

FRAMER NOTE:
LEAVE GAP BETWEEN CUPOLA WALL FRAMING & GIRDER TRUSS TO ACCOMMODATE CONTINUOUS SHEATHING DOWN TO LEDGER BELOW TYP.

LJ-2K (2x8)

PROVIDE & INSTALL (2) 96" LONG SIMPSON CMSTC16 COILED STRAPS FROM INSIDE FACE OF EACH CORNER PSL STUD, DOWN AND UNDER PSL, L.V.L. LEDGER, & GIRDER TRUSS, AND UP FACE OF GIRDER TRUSS VERTICAL WEB MEMBER. FILL ALL AVAILABLE NAIL HOLES W/ 16d SINKER NAILS TYP.

C CUPOLA CEILING FRAMING
SCALE: 1/4"=1'-0"

CUPOLA LEDGER NOTE
PROVIDE & INSTALL CONTINUOUS DOUBLE 11.875" L.V.L. LEDGER FASTENED TO GIRDER TRUSS W/ (2) ¼"x6" SIMPSON SDHS SCREWS AT 16" O.C. PROVIDE MIN. (3) SDHS SCREWS WITHIN 12" OF THE END OF EACH L.V.L. CUPOLA LEDGER, TYP.

TRUSS RIDGE BLOCKING
PROVIDE AND INSTALL SOLID BLOCKING EA. SIDE OF RIDGE TO SUPPORT AND FASTEN SHEATHING PANEL EDGES. SEE GENERAL NOTES

TRUSS EAVE BLOCKING
PROVIDE AND INSTALL SOLID BLOCKING @ EAVE TO SUPPORT AND FASTEN SHEATHING PANEL EDGES. SEE GENERAL NOTES

TRUSS DESIGNER NOTE
TRUSS DESIGNER IS RESPONSIBLE FOR SPECIFYING ALL CONNECTION AND UPLIFT HARDWARE. TRUSSES SHALL BE DESIGNED TO MEET ALL BEARING REQUIREMENTS. APPROACHES TO ACHIEVE REQUIRED BEARING INCLUDE, BUT ARE NOT LIMITED TO, BEARING ENCHANCERS, ADDITIONAL TRUSS PLIES, DIFFERENT MATERIALS, ETC SEE GENERAL NOTES FOR ADDITIONAL REQUIREMENTS/INFORMATION

A ROOF FRAMING
SCALE: 1/4"=1'-0"

PLAN NOTES:
1. #J-#K JACK AND KING STUDS SHALL BE SAME DIMENSIONAL STUD LUMBER AS ADJACENT STUDS. (i.e. 2J-2K MEANS 2 FULL-HEIGHT KING STUDS WITH 2 JACK STUDS SUPPORTING THE HEADER)
2. HUS10 = INDICATES SIMPSON STRONG-TIE TYPE HANGER REQUIRED AT BEAM CONNECTION. ALL SIMPSON HANGERS SHALL BE INSTALLED PER MANUFACTURER'S SPECIFICATIONS WITH THE MAXIMUM FASTENER SIZE AND QUANTITY.
3. UNLESS OTHERWISE NOTED ON PLANS, ALL HEADERS OVER DOOR AND WINDOW OPENINGS SHALL BE SUPPORTED ON EA. END BY A SINGLE JACK STUD GANGED TO A DOUBLE KING STUD.
4. BEAMS AND COLUMNS ON PLAN MARKED "P.T." DENOTE PRESSURE TREATED OR WOLMANIZED LUMBER.
5. REFER TO GENERAL NOTES FOR FURTHER REQUIREMENTS.
6. ALL FULL-HEIGHT COLUMNS WHICH PASS THROUGH FLOOR OR CEILING FRAMING SYSTEMS SHALL BE FULLY BLOCKED AND TIED INTO THAT FRAMING TO EFFECTIVELY BRACE THE COLUMN IN BOTH DIRECTIONS.
7. ALL PLATFORM FRAMED POSTS, WALLS, AND/OR BEAM LOADS SHALL BE TRANSFERRED TO SUPPORTS BELOW WITH CRIPPLE STUDS, "SQUASH BLOCKS", AND/OR FULL-DEPTH SOLID BLOCKING.
8. ALL MULTI-PLY WOOD AND/OR ENGINEERED MEMBERS SHALL BE GANGED TOGETHER IN ACCORDANCE WITH MANUFACTURER'S REQUIREMENTS AND PREVAILING STATE BUILDING CODE.
9. REFER TO GENERAL NOTES AND PREVAILING STATE BUILDING CODE FOR CONNECTIONS NOT SPECIFICALLY SPECIFIED ON PLANS.
10. MEMBER LAYOUT DEPICTED ON THIS PLAN IS INTENDED AS A GENERAL GUIDE TO FRAMING. THE EXACT FRAMING LAYOUT, MATERIAL TAKE-OFF, AND FRAMING METHOD SHALL BE CLOSELY COORDINATED WITH THE ARCHITECTURAL AND STRUCTURAL DRAWINGS AND ULTIMATELY DETERMINED BY THE GENERAL CONTRACTOR. ANY SUBSTANTIAL CHANGE IN FRAMING METHOD/LAYOUT SHALL BE REPORTED TO ARCHITECT OF RECORD.
11. ALL DIMENSIONS, ELEVATIONS, SHELVES, BEAM POCKETS, CUT-OUTS, UNDERGROUND UTILITIES, PIERS, FOOTINGS, SLABS, AND ALL OTHER ITEMS SHALL BE FULLY COORDINATED WITH CIVIL, GEOTECHNICAL, MECHANICAL, ARCHITECTURAL AND ALL OTHER TRADES' DRAWINGS PRIOR TO CONSTRUCTION.
12. ALL TRIM, SOFFITS, RAKES, EAVES, BRACKETS, GUTTERS, CORBELS, BUILD-OUTS, PAD-OUTS, AND ALL OTHER APPLIED ARCHITECTURAL FEATURES AND EMBELLISHMENTS BE THE RESPONSIBILITY OF OTHERS AND FULLY COORDINATED WITH THE ARCHITECT OF RECORD.
13. ▶ DENOTES FULL MOMENT CONNECTION

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PROJECT

City Hall Plaza

Warwick, RI

TITLE

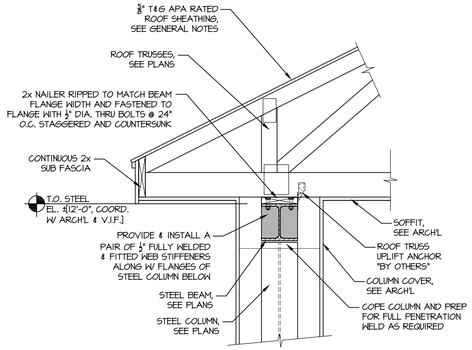
Roof Framing

NO.	REVISIONS	DATE

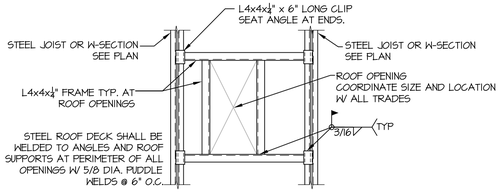
DRAWN BY: MJB / AJH
DESIGNED BY: MJB / AJH
CHECKED BY: MVC
ISSUE DATE: 01/31/2024
BETA JOB NO.: 10694
SCALE AS NOTED

BID SET

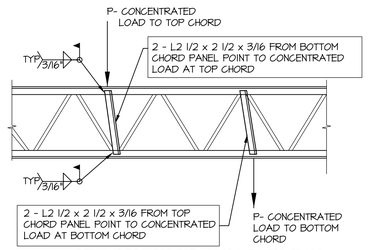
SHEET NO. S1.0



1 SECTION THROUGH STEEL FRAME @ PORCH
SCALE: 3/4"=1'-0"

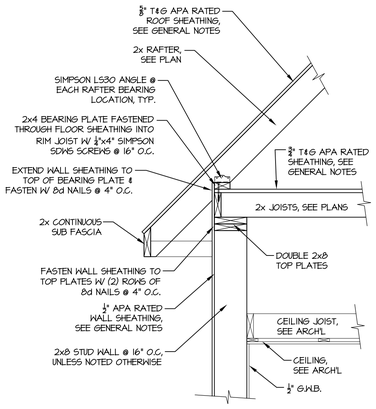


4 TYPICAL EQUIPMENT, DUCT, AND ROOF ACCESS OPENING
SCALE: NONE

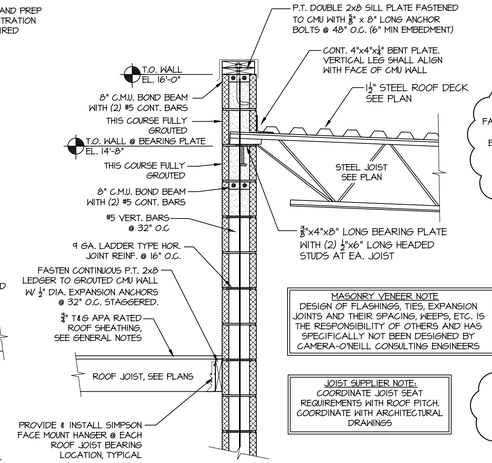


DETAIL IS REQUIRED FOR LOADS IN EXCESS OF 100 POUNDS. LOADS IN EXCESS OF 100 POUNDS SHALL BE SUBMITTED TO ENGINEER OF RECORD FOR APPROVAL

8 TYP. JOIST REINF. DETAIL
SCALE: 3/4"=1'-0"



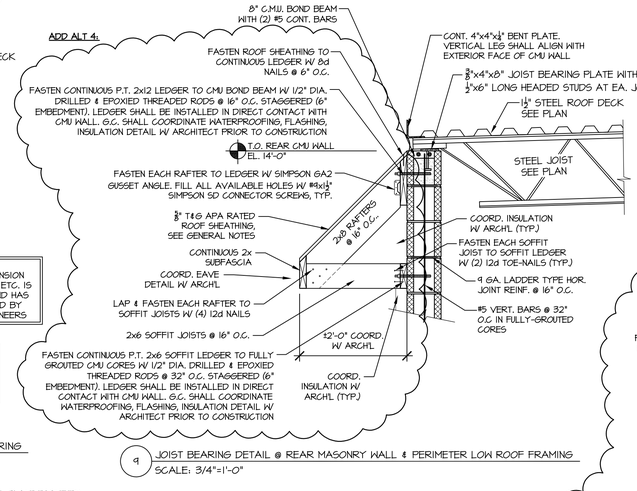
2 SECTION THROUGH CUPOLA EAVE TYP.
SCALE: 3/4"=1'-0"



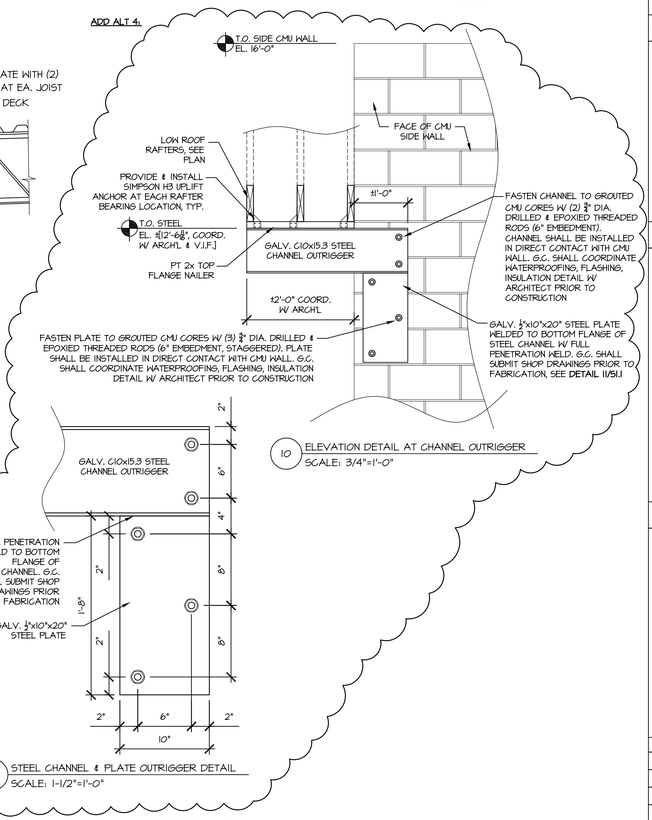
MASONRY VENEER NOTE
DESIGN OF FLASHINGS, TIES, EXPANSION JOINTS AND THEIR SPACING, WEEPS, ETC. IS THE RESPONSIBILITY OF OTHERS AND HAS SPECIFICALLY NOT BEEN DESIGNED BY CAMERA-O'NEILL CONSULTING ENGINEERS

JOIST SUPPLIER NOTE:
COORDINATE JOIST SEAT REQUIREMENTS WITH ROOF PITCH. COORDINATE WITH ARCHITECTURAL DRAWINGS

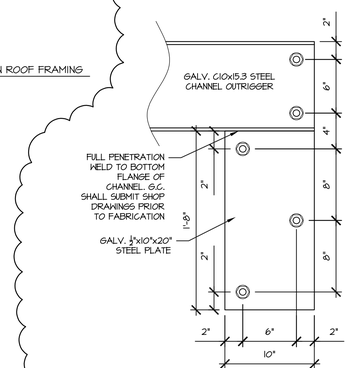
5 SECTION THRU EXTERIOR MASONRY WALL AT JOIST BEARING
SCALE: 3/4"=1'-0"



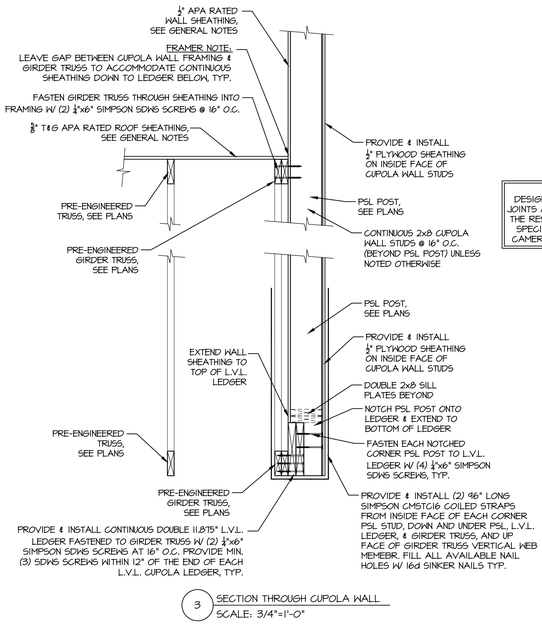
9 JOIST BEARING DETAIL @ REAR MASONRY WALL & PERIMETER LOW ROOF FRAMING
SCALE: 3/4"=1'-0"



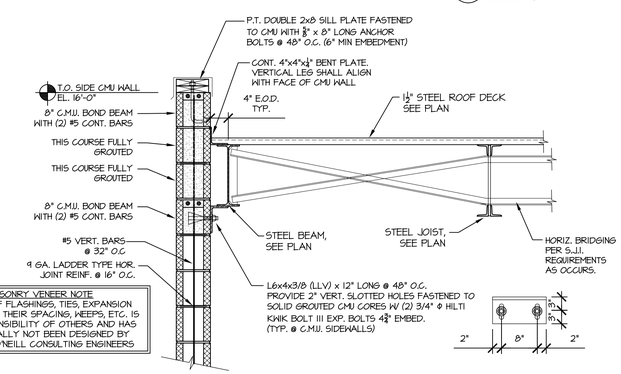
10 ELEVATION DETAIL AT CHANNEL OUTRIGGER
SCALE: 3/4"=1'-0"



11 STEEL CHANNEL & PLATE OUTRIGGER DETAIL
SCALE: 1-1/2"=1'-0"



3 SECTION THROUGH CUPOLA WALL
SCALE: 3/4"=1'-0"



MASONRY VENEER NOTE
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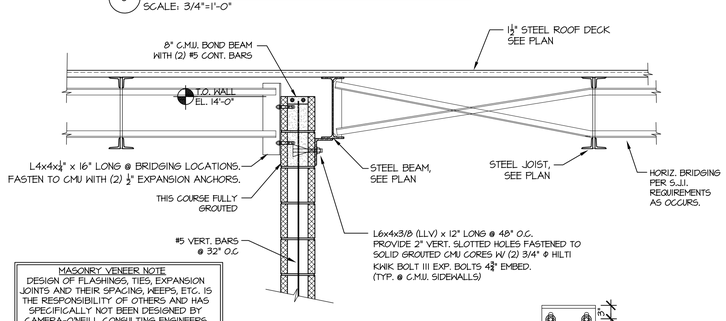
6 SECTION THRU EXTERIOR MASONRY WALL - PARALLEL FRAMING
SCALE: 3/4"=1'-0"



MASONRY VENEER NOTE
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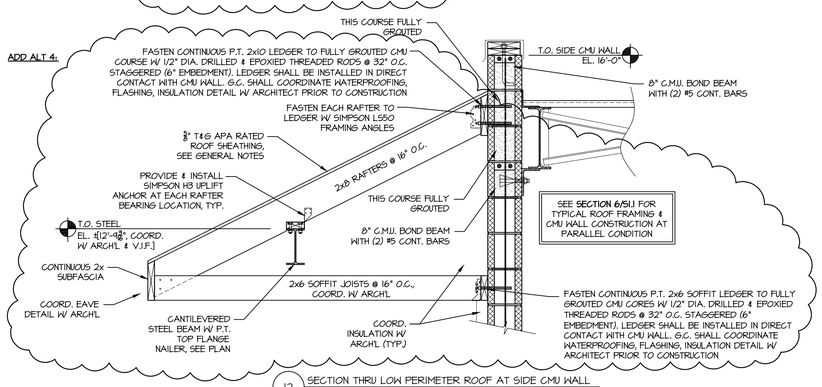
7 SECTION THRU INTERIOR MASONRY WALL
SCALE: 3/4"=1'-0"



12 SECTION THRU LOW PERIMETER ROOF AT SIDE CMU WALL
SCALE: 3/4"=1'-0"

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PROJECT

City Hall Plaza

Warwick, RI

TITLE

Framing Details

NO.	REVISIONS	DATE

DRAWN BY: MJB / AJH
DESIGNED BY: MJB / AJH
CHECKED BY: MVC
ISSUE DATE: 01/31/2024
BETA JOB NO.: 10694
SCALE: AS NOTED

BID SET

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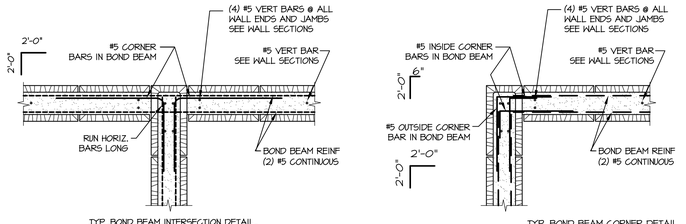
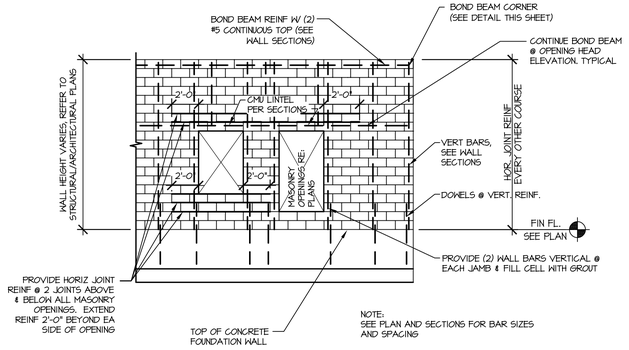


TYP. BOND BEAM INTERSECTION DETAIL

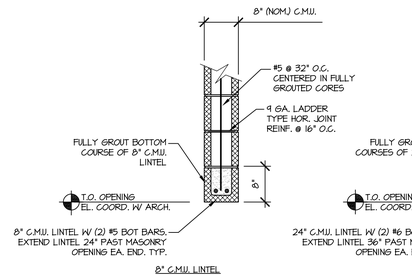
TYP. BOND BEAM CORNER DETAIL

1. PROVIDE CORNER BARS TO MATCH AND LAP WITH BOND BEAM REINF OR PROVIDE 90° HOOK.
2. EXTEND HORIZ JOINT REINF TO END OF WALL IN BOTH DIRECTIONS SO THAT IT LAPS AT THE CORNER.

1 TYPICAL C.M.U. DETAILS
SCALE: NONE



2 TYPICAL C.M.U. DETAILS
SCALE: NONE



3 TYPICAL CMU LINTEL DETAILS
SCALE: 3/4"=1'-0"

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TITLE

CMU Details

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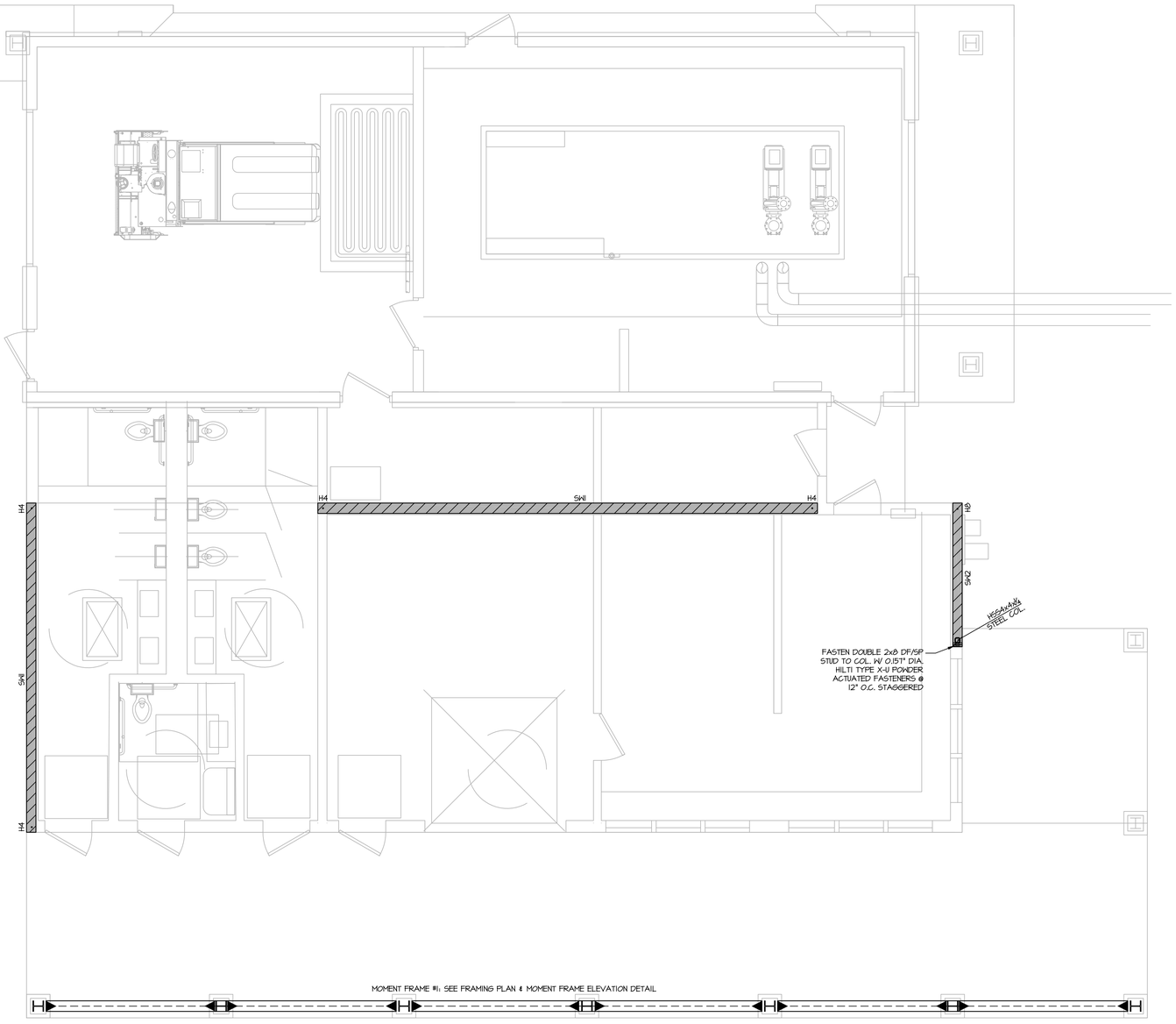
SHEET NO. S1.2



1 / S2.1
ELEVATION DETAIL

A FIRST FLOOR SHEAR WALLS
SCALE: 1/4"=1'-0"

HOLDOWN NOTES:

1. ALL THREADED ROD HOLDOWNS SHALL BE FASTENED TO CONCRETE FOUNDATIONS WITH HILTI HIT HY 200 EPOXY SYSTEM INSTALLED IN STRICT ACCORDANCE WITH MANUFACTURER'S REQUIREMENTS.
2. ALL MULTI-PLY WALL STUDS FASTENED TO HOLDOWNS SHALL BE GANGED TOGETHER IN ACCORDANCE WITH BUILDING CODE AND GENERAL NOTES.
3. WHERE UPPER WALL IS NOT IN LINE WITH LOWER WALL, "ST1" STRAP HOLDOWNS SHALL BE EXTENDED THROUGH FLOOR SHEATHING AND FASTENED TO BEAMS / BLOCKING BELOW. STRAP MAY BE EXTENDED DOWN AND BENT AROUND UNDERSIDE OF FRAMING AS REQUIRED. SEE TYPICAL SHEARWALL DETAILS FOR FURTHER INFORMATION.
4. ALL DIMENSIONS, ELEVATIONS, SHELVES, BEAM POCKETS, CUT-OUTS, UNDERGROUND UTILITIES, PIERS, FOOTINGS, SLABS, AND ALL OTHER ITEMS SHALL BE FULLY COORDINATED WITH CIVIL, GEOTECHNICAL, MECHANICAL, ARCHITECTURAL AND ALL OTHER TRADES' DRAWINGS PRIOR TO CONSTRUCTION.

FIRST FLOOR SHEARWALLS

SHEARWALL ID TAG	PLYWOOD FACE	SHEETROCK FACE	WALL STUDS @ PANEL EDGES	BLOCKING @ EDGES?	NAILING @ PANEL EDGES
SW1	OUTER	INNER	SINGLE 2x6	UNBLOCKED	8d @ 6" O.C.
SW2	OUTER	INNER	SINGLE 2x6	BLOCKED	8d @ 6" O.C.

HOLDOWN SCHEDULE

HOLDOWN ID TAG ON PLAN	SIMPSON MODEL #	HOLDOWN FASTENED TO:	FASTENERS TO FRAMING	THREADED ROD DIAMETER	THREADED ROD EMBEDMENT WHEN INSTALLED IN CONCRETE
H4	HDU4-SDS2.5	DOUBLE SPF WALL STUDS	SDS SCREWS	5/8" DIA.	8"
H8	HDU8-SDS2.5	TRIPLE SPF WALL STUD	SDS SCREWS	7/8" DIA.	12"

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PROJECT

City Hall Plaza

Warwick, RI

TITLE

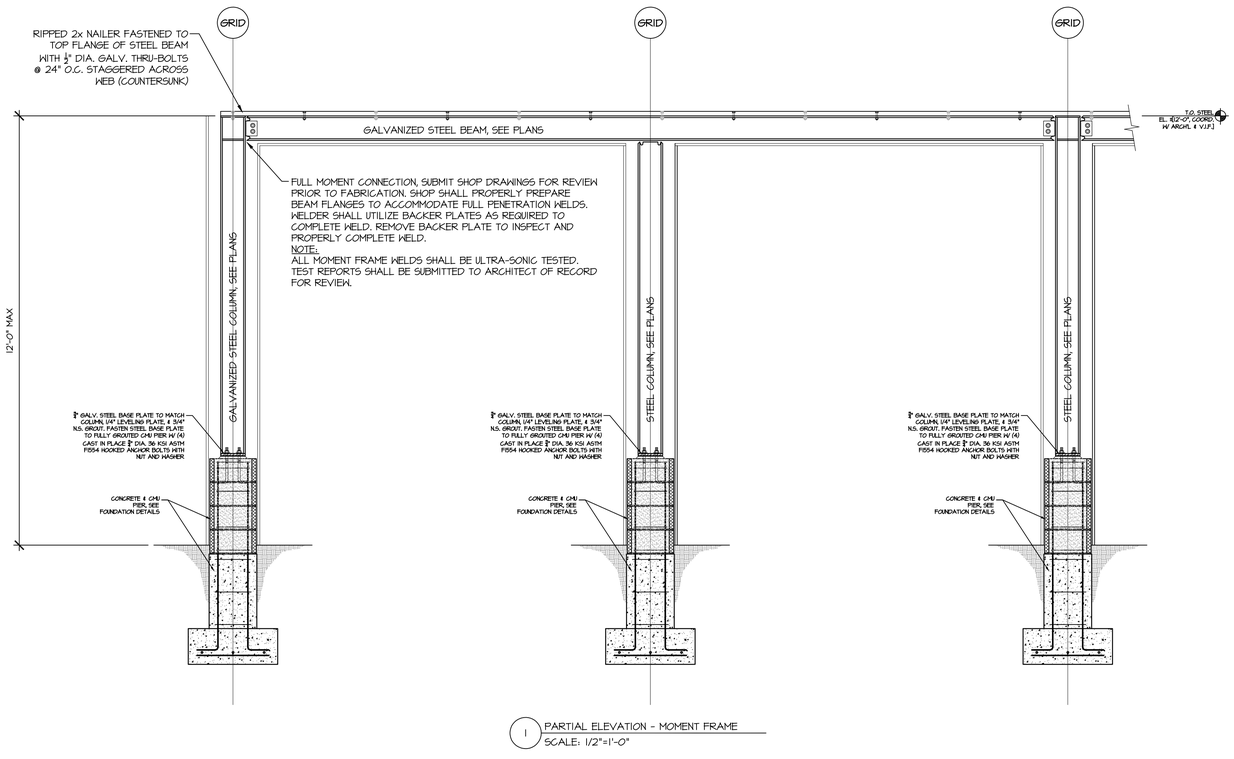
First Floor Shearwalls

NO.	REVISIONS	DATE

DRAWN BY: MJB / AJH
DESIGNED BY: MJB / AJH
CHECKED BY: MVC
ISSUE DATE: 01/31/2024
BETA JOB NO.: 10694
SCALE AS NOTED

BID SET

SHEET NO. S2.0



1 PARTIAL ELEVATION - MOMENT FRAME
SCALE: 1/2"=1'-0"

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PROJECT

City Hall Plaza

Warwick, RI

TITLE

Moment Frame Elevation Detail

NO.	REVISIONS	DATE

DRAWN BY:	MJB / AJH
DESIGNED BY:	MJB / AJH
CHECKED BY:	MVC
ISSUE DATE:	01/31/2024
BETA JOB NO.:	10694
SCALE	AS NOTED

BID SET

SHEET NO. S2.1

LEGEND NOTES

MOUNTING HEIGHTS SHALL BE AS INDICATED UNLESS INDICATED OTHERWISE ON ELECTRICAL DRAWINGS OR ARCHITECTURAL ELEVATIONS

ALL SYMBOLS MAY NOT BE SHOWN ON PLANS

HOMERUNS

P-1 — HOMERUN TO PANELBOARD. "P" DENOTES PANEL, "1" DENOTES CIRCUIT NUMBER, 20 AMP 1 POLE CIRCUIT BREAKER UNLESS INDICATED OTHERWISE. WIRING SHALL BE 2#12+1#12G IN 3/4"C AT MINIMUM.

30/3 — P-2,4,6 — 2#10+1#10G IN 3/4"C — MULTI-POLE HOMERUN TO PANELBOARD. "P" DENOTES PANEL, "2,4,6" DENOTES CIRCUIT NUMBERS, "30/3" DENOTES 30 AMP 3 POLE CIRCUIT BREAKER. WIRING SHALL BE AS INDICATED.

RACEWAYS AND WIRING

- E — 2#10,#10G EMERGENCY ONLY WIRING
- CT — CABLE TRAY – REFER TO SPECIFICATIONS FOR REQUIREMENTS
- FLEXIBLE CONNECTION TO EQUIPMENT. RACEWAY AND CONDUCTOR RATING TO MATCH ASSOCIATED BRANCH CIRCUIT OR FEEDER.
- BRANCH CIRCUIT OR FEEDER CONCEALED IN FINISHED AREA.
- BRANCH CIRCUIT OR FEEDER CONCEALED UNDER FINISHED FLOOR.
- BRANCH CIRCUIT OR FEEDER TURNING UP TOWARDS OBSERVER.
- BRANCH CIRCUIT OR FEEDER TURNING DOWN AWAY FROM OBSERVER.
- CONDUIT STUBBED ABOVE CEILING.

LIGHTING FIXTURES

- A / 2a — SURFACE OR RECESSED MOUNTED LIGHTING FIXTURE ON NORMAL CIRCUIT. "A" DENOTES FIXTURE TYPE, "2" DENOTES CIRCUIT NUMBER, "a" DENOTES SWITCH CONTROL.
- LIGHTING FIXTURE WIRED TO CONSTANT-ON OR NORMAL EMERGENCY CIRCUIT
- SURFACE OR RECESSED MOUNTED LINEAR LIGHTING FIXTURE
- PENDANT MOUNTED LINEAR LIGHTING FIXTURE
- ROUND RECESSED LIGHTING FIXTURE
- DECORATIVE PENDANT LIGHTING FIXTURE
- WALL MOUNTED LIGHTING FIXTURE
- WALL WASH OR DIRECTIONAL LIGHTING FIXTURE
- CEILING MOUNTED ILLUMINATED EXIT SIGN. SINGLE OR DOUBLE FACE, WITH OR WITHOUT ARROWS AS INDICATED ON DRAWINGS
- WALL MOUNTED ILLUMINATED EXIT SIGN – SHADING INDICATES FACE PLATE(S)
- SELF-CONTAINED EMERGENCY LIGHTING UNIT
- SEE — REMOTE EMERGENCY LIGHTING HEADS – SINGLE OR DOUBLE AS SHOWN.
- POLE MOUNTED SITE LIGHTING FIXTURE
- TRACK LIGHTING AND HEADS; LENGTH OF TRACK AND QUANTITY OF HEADS AS SHOWN ON FLOOR PLANS
- INV — INVERTER

LIGHTING CONTROL DEVICES

- Sa — SINGLE POLE TOGGLE SWITCH; SUBSCRIPT INDICATES LIGHTING FIXTURE CONTROL.
- S3a — THREE WAY TOGGLE SWITCH; SUBSCRIPT INDICATES LIGHTING FIXTURE CONTROL.
- S4a — FOUR WAY TOGGLE SWITCH; SUBSCRIPT INDICATES LIGHTING FIXTURE CONTROL.
- SKa — KEY OPERATED SWITCH; SUBSCRIPT INDICATES LIGHTING FIXTURE CONTROL.
- SP — SINGLE POLE TOGGLE SWITCH WITH RED PILOT LIGHT.
- Smc — DECORATOR LOW VOLTAGE MOMENTARY SWITCH. PROVIDE WATTSTOPPER #DCC2-COLOR BY THE ARCHITECT OR APPROVED EQUAL. 'a' DENOTES LIGHTING FIXTURE CONTROL.
- OC — CEILING MOUNTED OCCUPANCY SENSOR.
- VC — CEILING MOUNTED DUAL TECHNOLOGY VACANCY SENSOR WITH POWER PACK. PROVIDE WATTSTOPPER #DT-300 WITH #BZ-50 POWER OR APPROVED EQUAL. 'a,b' DENOTES LIGHTING FIXTURE CONTROLS.
- OC — WALL MOUNTED VACANCY SENSOR.
- VS — WALL MOUNTED VACANCY SENSOR.
- PC — PHOTOCELL.
- TC — TIME CLOCK.

RECEPTACLES AND POWER DEVICES

- IG, 2, 48", WP — DUPLEX RECEPTACLE, "2" DENOTES CIRCUIT NUMBER, "48"" DENOTES MOUNTING HEIGHT (18" UNLESS OTHERWISE NOTED), "IG" DENOTES ISOLATED GROUND TYPE DEVICE, "WP" DENOTES WEATHER PROOF COVER
- DUPLEX RECEPTACLE MOUNTED 6" ABOVE COUNTER TOP OR AS INDICATED ON ARCHITECTURAL PLANS
- DOUBLE DUPLEX RECEPTACLE
- DOUBLE DUPLEX RECEPTACLE MOUNTED 6" ABOVE COUNTER TOP OR AS INDICATED ON THE ARCHITECTURAL PLANS
- DUPLEX RECEPTACLE ONE HALF SWITCH CONTROLLED
- EWC — DUPLEX RECEPTACLE FOR ELECTRIC WATER COOLER. PROVIDE DEDICATED 20A/1P GFCI CIRCUIT BREAKER UNLESS NOTED OTHERWISE.
- DUPLEX RECEPTACLE FLOOR MOUNTED
- L6-30 — SPECIAL PURPOSE RECEPTACLE, "L6-30" DENOTES TYPE, SEE POWER PLANS FOR EXACT TYPES USED
- SINGLE RECEPTACLE
- DUPLEX GROUND FAULT CIRCUIT INTERRUPTER RECEPTACLE
- U2 — DUPLEX RECEPTACLE WITH (2) USB TYPE A PORTS.
- 12 — FACTORY WIRED, FIELD ASSEMBLED UL LISTED, MULTIOUTLET ASSEMBLY. "12" DENOTES SINGLE RECEPTACLES MOUNTED ON 12" CENTERS
- FIELD WIRED, UL LISTED, OF MULTIOUTLET ASSEMBLY, QUANTITY AND TYPE DEVICES AS INDICATED
- SURFACE MOUNTED RACEWAY, DIVIDED RACEWAY WITH DATA AND DUPLEX RECEPTACLES AS INDICATED
- PP — POWER POLE ASSEMBLY
- PT — FIRE RATED POKE-THRU WITH FLUSH MOUNTED DEVICES. REFER TO DRAWINGS FOR ADDITIONAL INFORMATION.
- FF — FIRE RATED FURNITURE FEED WITH FLEXIBLE CONNECTION TO FURNITURE SYSTEM. REFER TO DRAWINGS FOR ADDITIONAL INFORMATION.
- FB — FIRE RATED FLOOR BOX WITH FLUSH MOUNTED DEVICES. REFER TO DRAWINGS FOR ADDITIONAL INFORMATION.

POWER DISTRIBUTION SYSTEM

- DISTRIBUTION PANEL
- PANELBOARD, SURFACE MOUNTED
- PANELBOARD, FLUSH MOUNTED
- J — JUNCTION BOX, SIZED PER NEC
- 2 — MOTOR, "2" DENOTES HORSEPOWER
- STP — MANUAL MOTOR STARTER WITH THERMAL OVERLOAD. "P" DENOTES PILOT LIGHT
- MAGNETIC MOTOR STARTER WITH ENCLOSURE, MINIMUM SIZE NEMA 1
- 30/3 — NON-FUSED DISCONNECT SWITCH: "30/3" DENOTES 30 AMP/3 POLE SWITCH
- 30/20/3 — FUSED DISCONNECT SWITCH: "30/20/3" DENOTES 30 AMP/3 POLE SWITCH, 20 AMP FUSES
- COMBINATION MAGNETIC STARTER AND FUSED DISCONNECT SWITCH. SIZE OF STARTER, SWITCH AND FUSE AS REQUIRED
- T15 — DRY-TYPE DISTRIBUTION TRANSFORMER. "15" DENOTES SIZE.
- ATS — AUTOMATIC TRANSFER SWITCH
- KT2 — "K" FACTOR DRY TYPE TRANSFORMER. "2" DENOTES SIZE
- TVSS — TRANSIENT VOLTAGE SURGE SUPPRESSION
- M — METER SOCKET AND UTILITY METER BY UTILITY COMPANY
- CB — ENCLOSED CIRCUIT BREAKER
- EGB — ELECTRICAL GROUNDING BUSBAR
- EMGB — ELECTRICAL MAIN GROUNDING BUSBAR
- GROUND

MISCELLANEOUS

- CP — CONTROL PANEL
- PB — PULL BOX – SIZED PER NEC FOR CONDUITS ENTERING AND LEAVING AS REQUIRED
- TV — CABLE TELEVISION OUTLET, WALL MOUNTED. E.C. SHALL PROVIDE 3/4" EMPTY CONDUIT WITH PULL STRING TO NEAREST ACCESSIBLE CEILING. PROVIDE FACEPLATE WITH TYPE "F" CONNECTOR AT BOX.
- P — PUSHBUTTON AND PLATE
- C — 120 VOLT RECESSED CLOCK HANGER OUTLET
- CENTRAL SYSTEM CLOCK WIRED TO CORRECTIVE CLOCK WIRING SYSTEM 12" DIAMETER UNLESS OTHERWISE NOTED "SP" DENOTES SHATTER GUARD
- CS — CLOCK/SPEAKER COMBINATION
- MCP — MASTER CLOCK PANEL
- I — INTERCOM
- MIP — MASTER INTERCOM PANEL
- DOOR BELL/BUZZER, LOW VOLTAGE
- TL — LOW VOLTAGE TRANSFORMER
- MUSHROOM TYPE PUSHBUTTON STATION FOR ACTIVATION OF SHUNT-TRIP DEVICE ON INDICATED CIRCUIT BREAKER
- COAXIAL CABLE OUTLET

TELECOMMUNICATIONS

TELECOMMUNICATIONS:
E.C. SHALL PROVIDE A DOUBLE GANG BACK BOX WITH SINGLE GANG REDUCER, 1" CONDUIT AND PULLSTRING STUBBED OUT ABOVE ACCESSIBLE CEILING AT ALL LOCATIONS. ALL DEVICES SHALL BE MOUNTED AT 18" AFF UNLESS OTHERWISE NOTED.

- TELEPHONE OUTLET
- W — TELEPHONE OUTLET MOUNTED 54"AFF
- TELEPHONE OUTLET FLOOR MOUNTED
- COMPUTER SYSTEM OUTLET
- COMPUTER SYSTEM OUTLET, FLOOR MOUNTED
- COMBINATION TELEPHONE/DATA OUTLET
- PP T/D — COMBINATION TELEPHONE/DATA POWER POLE ASSEMBLY
- TGB — TELECOMMUNICATIONS GROUNDING BUSBAR
- TMGB — TELECOMMUNICATIONS MAIN GROUNDING BUSBAR

SITE LEGEND

- UTILITY POLE
- MH — MANHOLE; REFER TO DETAIL FOR ADDITIONAL INFORMATION.
- HH — HANDHOLE; REFER TO DETAIL FOR ADDITIONAL INFORMATION.
- T — PAD MOUNTED TRANSFORMER
- P — PRIMARY CONDUIT DUCT BANK
- S — SECONDARY CONDUIT DUCT BANK
- T — TELEPHONE SERVICE CONDUIT DUCT BANK
- CATV — CABLE TELEVISION CONDUIT DUCT BANK
- FA — FIRE ALARM CONDUIT DUCT BANK
- OPE — OVERHEAD PRIMARY ELECTRIC
- OSE — OVERHEAD SECONDARY ELECTRIC

ABBREVIATIONS

3R	NEMA 3R RATING	KVA	KILOVOLT-AMPERES
4X	NEMA 4X RATING	KVAR	KILOVOLT-AMPERES REACTIVE
A	AMPERES	KW	KILOWATTS
AFF	ABOVE FINISHED FLOOR	MCB	MAIN CIRCUIT BREAKER
AFG	ABOVE FINISHED GRADE	MCC	MOTOR CONTROL CENTER
AHJ	AUTHORITY HAVING JURISDICTION	MD	MOTORIZED DAMPER
AIC	AMPERE INTERRUPTING CAPACITY	MLO	MAIN LUGS ONLY
ARCH	ARCHITECT	NC	NORMALLY CLOSED
ATS	AUTOMATIC TRANSFER SWITCH	NEC	NATIONAL ELECTRICAL CODE
AWG	AMERICAN WIRE GAUGE	NL	NIGHT LIGHT
C	CONDUIT	NO	NORMALLY OPEN
C/B	CIRCUIT BREAKER	NTS	NOT TO SCALE
C.T.	CURRENT TRANSFORMER	ø	PHASE
CAT	CATALOG	P	POLE
CKT	CIRCUIT	PC	PLUMBING CONTRACTOR
CU	COPPER	P.T.	POTENTIAL TRANSFORMER
DWG	DRAWING	PVC	POLYVINYL CHLORIDE
E	WIRED ON EMERGENCY CIRCUIT	RL	NEW LOCATION OF RELOCATED DEVICE
EC	ELECTRICAL CONTRACTOR	SM	SURFACE MOUNT
EM	EMERGENCY	ST	SHUNT TRIP
ETD	EXISTING TO BE DEMOLISHED	T/D	TEL/DATA
ETR	EXISTING TO REMAIN	TEL	TELEPHONE
ETRL	EXISTING TO BE RELOCATED	TYP	TYPICAL
ETRP	EXISTING TO BE REPLACED	UG	UNDERGROUND
G	GROUND	UNO	UNLESS NOTED OTHERWISE
GC	GENERAL CONTRACTOR	V	VOLT
GFI	GROUND FAULT INTERRUPTER	VIF	VERIFY IN FIELD
HVAC	HEATING, VENTILATION, AIR CONDITIONING CONTRACTOR	W	WATT
IG	ISOLATED GROUND	WP	WEATHERPROOF
KCMIL	ONE THOUSAND CIRCULAR MILS	XFMR	TRANSFORMER

LIGHTING FIXTURE NOTES

1. PROVIDE ACCESSORIES AND MOUNTING HARDWARE FOR ALL FIXTURES.
2. COLORS SHALL BE AS SELECTED BY ARCHITECT.
3. COORDINATE EXACT LOCATIONS OF ALL FIXTURES WITH ARCHITECT'S REFLECTED CEILING PLAN, ELEVATIONS, SECTIONS, AND THE WORK OF OTHER TRADES PRIOR TO ROUGH-IN.
4. E.C. SHALL ENSURE THAT ALL PROPOSED SWITCHES AND DIMMER SWITCHES ARE COMPATIBLE WITH THE LIGHT FIXTURE(S) INDICATED TO BE CONTROLLED. INSTALL ALL SWITCHES AND DIMMER SWITCHES PER MANUFACTURER'S RECOMMENDATIONS AND REQUIREMENTS.
5. ALL SELF CONTAINED EMERGENCY LIGHTING UNITS AND EXIT LIGHTING IN THE BUILDING SHALL BE CONNECTED TO THE NEAREST UN-SWITCHED LIGHTING CIRCUIT SERVING THE AREA WITH 2#12 & 1#12G, 3/4" CONDUIT UNLESS OTHERWISE NOTED.
6. LOCATIONS OF ALL SWITCHES SHALL COMPLY WITH ADA CRITERIA.
7. WHERE SWITCH CONTROLS ("a", "b", ETC.) ARE INDICATED, WIRE THE SWITCHES TO THE RESPECTIVE LIGHT FIXTURE. IF A FIXTURE HAS TWO OR MORE SWITCH DESIGNATIONS, WIRE FIXTURE SO THAT IT WILL BE CONTROLLED BY THE SWITCHES INDICATED.
8. WIRE EXIT SIGNS TO LIGHTING CIRCUIT SERVING THE AREA AHEAD OF ALL CONTROLS.
9. WIRE NIGHT LIGHTING FIXTURES FOR 24/7 OPERATION VIA UN-SWITCHED CIRCUIT AS INDICATED.
10. METAL ROOF DECKS SHALL NOT BE TAPPED FOR SUPPORT OF ANY LIGHTING FIXTURES OR ELECTRICAL EQUIPMENT. PROVIDE UNISTRUT OR OTHER SUPPLEMENTAL SUPPORT FITTINGS TO BE ATTACHED TO BUILDINGS STRUCTURAL FRAMING AS REQUIRED TO SUPPORT ALL LIGHTING FIXTURES AND ELECTRICAL EQUIPMENT.

BRANCH CIRCUIT WIRING NOTES

1. WIRING IS SHOWN ON DRAWINGS ONLY FOR SPECIFIC ROUTES OR SPECIAL CONDITIONS.
2. WIRING AND CONDUIT SHALL BE REQUIRED BETWEEN ALL OUTLETS INDICATED WITH CIRCUIT NUMBERS AND PANEL DESIGNATIONS.
3. ALL SWITCH CONTROLS SHALL BE PROVIDED WITH WIRING AND CONDUIT AS REQUIRED.
4. ALTHOUGH ALL BRANCH CIRCUIT WIRING AND CONDUIT IS NOT SHOWN, IT IS THE INTENT OF THESE DOCUMENTS THAT A COMPLETE BRANCH CIRCUIT WIRING SYSTEM BE INSTALLED.
5. A GREEN GROUNDING CONDUCTOR SHALL BE RUN WITH ALL CIRCUITS. VERIFY CONDUIT SIZE TO ENSURE IT CAN ACCOMMODATE ALL PHASE, NEUTRAL AND GROUND CONDUCTORS.
6. PROVIDE A NEUTRAL CONDUCTOR TO ALL NEW LIGHTING SWITCH BOXES PER NEC ARTICLE 404.2.
7. IN ALL NON-DWELLING TYPE OCCUPANCIES, ALL 125-VOLT THROUGH 250-VOLT RECEPTACLES SUPPLIED BY SINGLE-PHASE BRANCH CIRCUITS RATED 150 VOLTS OR LESS TO GROUND, 50 AMPERES OR LESS, AND ALL RECEPTACLES SUPPLIED BY THREE-PHASE BRANCH CIRCUITS RATED 150 VOLTS OR LESS TO GROUND, 100 AMPERES OR LESS, SHALL HAVE GROUND-FAULT CIRCUIT-INTERRUPTER PROTECTION FOR PERSONNEL PER NEC ARTICLE 210.8(B)(2).
8. PROVIDE TAMPER RESISTANT RECEPTACLES IN ALL AREAS REQUIRED BY NEC ARTICLE 406.12 (DWELLING UNITS), 406.13 (GUEST ROOMS) AND 406.14 (CHILDCARE FACILITIES).
9. ALL 15A OR 20A, 120V BRANCH CIRCUITS IN DWELLING UNITS SUPPLYING OUTLETS (INCLUDING SMOKE ALARMS) IN FAMILY ROOMS, DINING ROOMS, LIVING ROOMS, PARLORS, LIBRARIES, DENS, BEDROOMS, SUNROOMS, RECREATION ROOMS, CLOSETS, HALLWAYS, OR SIMILAR ROOMS OR AREAS MUST BE PROTECTED BY A LISTED AFCI DEVICE OF THE COMBINATION TYPE PER NEC ARTICLE 210.12(A).
10. ALL 15A AND 20A, 125V SINGLE PHASE RECEPTACLES IN DWELLING UNITS SHALL BE GFCI PROTECTED PER NEC ARTICLE 210.8(A).
11. ALL 120-VOLT, SINGLE-PHASE, 15 AND 20 AMP BRANCH CIRCUITS SUPPLYING OUTLETS OR DEVICES INSTALLED IN DWELLING UNIT KITCHENS, FAMILY ROOMS, DINING ROOMS, LIVING ROOMS, PARLORS, LIBRARIES, DENS, BEDROOMS, SUNROOMS, RECREATION ROOMS, CLOSETS, HALLWAYS, LAUNDRY AREAS, OR SIMILAR ROOMS OR AREAS SHALL BE ARC-FAULT PROTECTED PER NEC ARTICLE 210.12.
12. ALL ARC FAULT CIRCUITS IN ALL LIVING UNITS SHALL BE PROVIDED WITH A SEPARATE NEUTRAL PER CIRCUIT.
13. WHERE EXISTING SWITCHES AND RECEPTACLES ARE INDICATED TO REMAIN, THIS CONTRACTOR SHALL REPLACE SAID DEVICE(S) AND DEVICE PLATE(S) WITH NEW TO MATCH THE NEW CONSTRUCTION. WHERE THEY ARE INDICATED AS RELOCATED, EXTEND BRANCH CIRCUIT WIRING TO NEW LOCATION AND PROVIDE NEW DEVICE AND DEVICE PLATE TO MATCH NEW CONSTRUCTION.

MECHANICAL/PLUMBING EQUIPMENT TAG

RTU 1 — MECHANICAL/PLUMBING EQUIPMENT TAG. "RTU" DENOTES EQUIPMENT TYPE, "1" DENOTES EQUIPMENT NUMBER. REFER TO "SCHEDULE FOR MECHANICAL/PLUMBING EQUIPMENT" FOR ALL CIRCUIT INFORMATION, INCLUDING BUT NOT LIMITED TO BRANCH CIRCUIT WIRING, CONDUIT SIZE, VOLTAGE, PHASE, DISCONNECT SWITCH, AND CIRCUIT BREAKER. REFER TO MECHANICAL, PLUMBING, AND FIRE PROTECTION PLANS FOR EXACT EQUIPMENT LOCATIONS AND EQUIPMENT TYPE ABBREVIATIONS.

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PROJECT

City Hall Plaza

Warwick, RI

TITLE

ELECTRICAL SYMBOL LEGEND AND NOTES

NO.	REVISIONS	DATE

DRAWN BY:	WMS
DESIGNED BY:	WMS
CHECKED BY:	DJC
ISSUE DATE:	01/31/2024
BETA JOB NO.:	10694

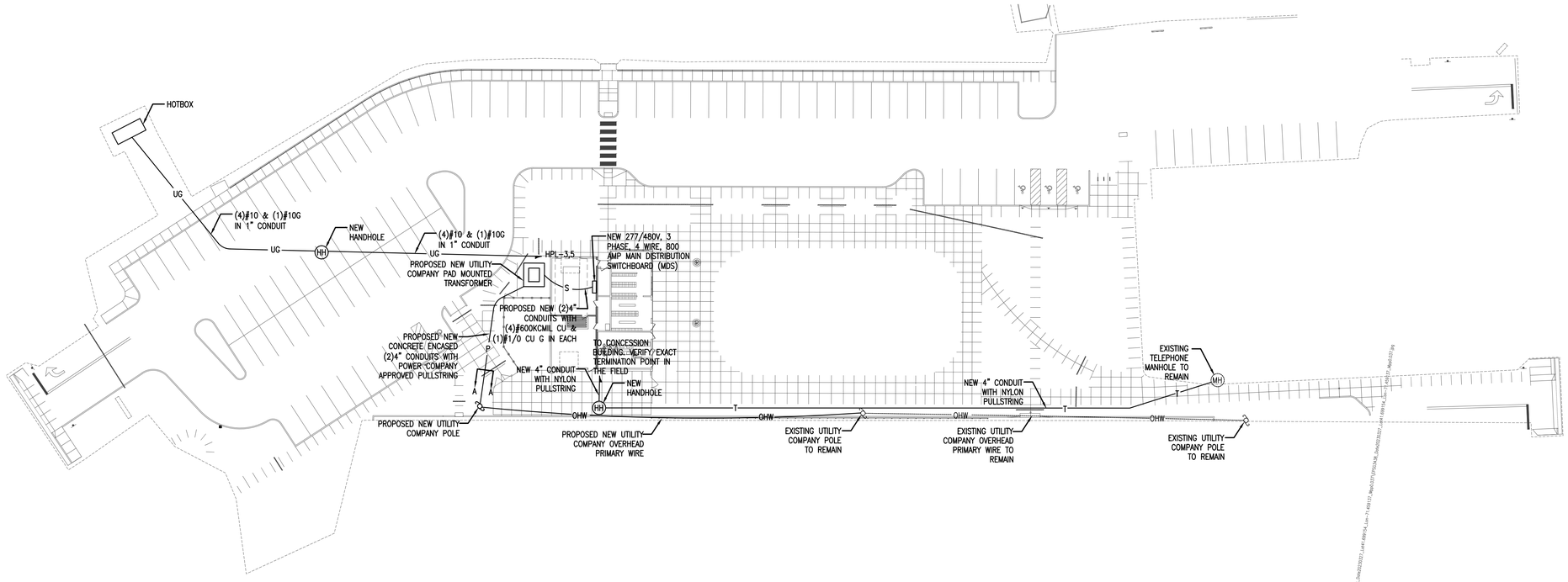
SCALE

AS NOTED

Bid Set

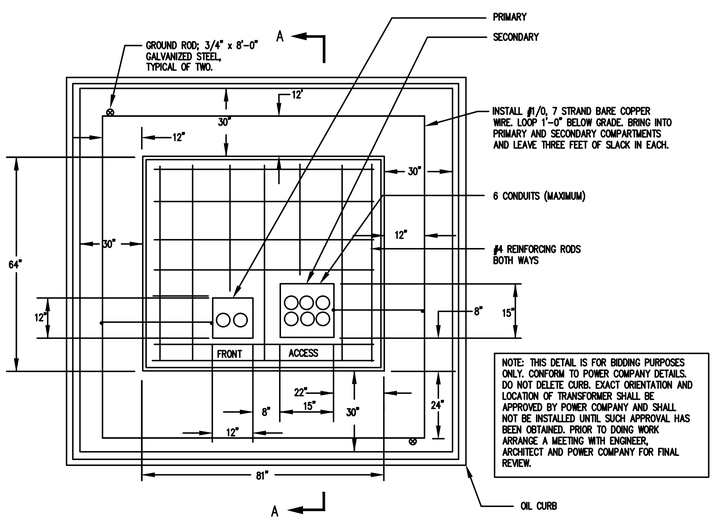
SHEET NO.

E0.0



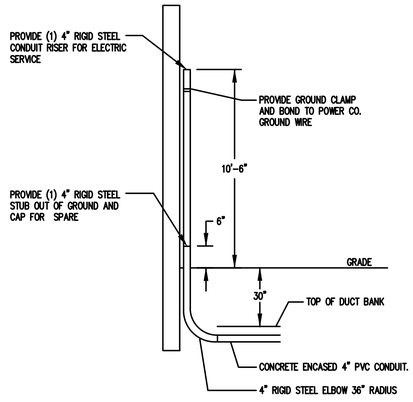
ELECTRICAL SITE UTILITY PLAN

SCALE: 1" = 30'-0"



TRANSFORMER PAD WITH OIL CURB DETAIL

NOT TO SCALE (CONFORM TO POWER COMPANY STANDARDS)



PRIMARY RISER POLE DETAIL

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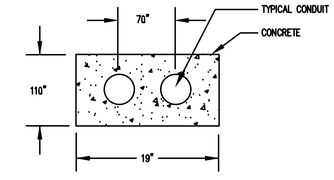

PRIMARY DUCTBANK DETAIL

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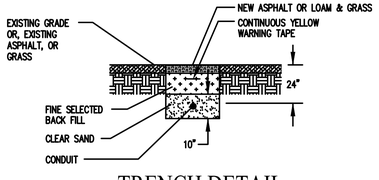

TRENCH DETAIL

NOT TO SCALE

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PROJECT

City Hall Plaza

Warwick, RI

TITLE

ELECTRICAL SITE UTILITY PLAN

NO.	REVISIONS	DATE

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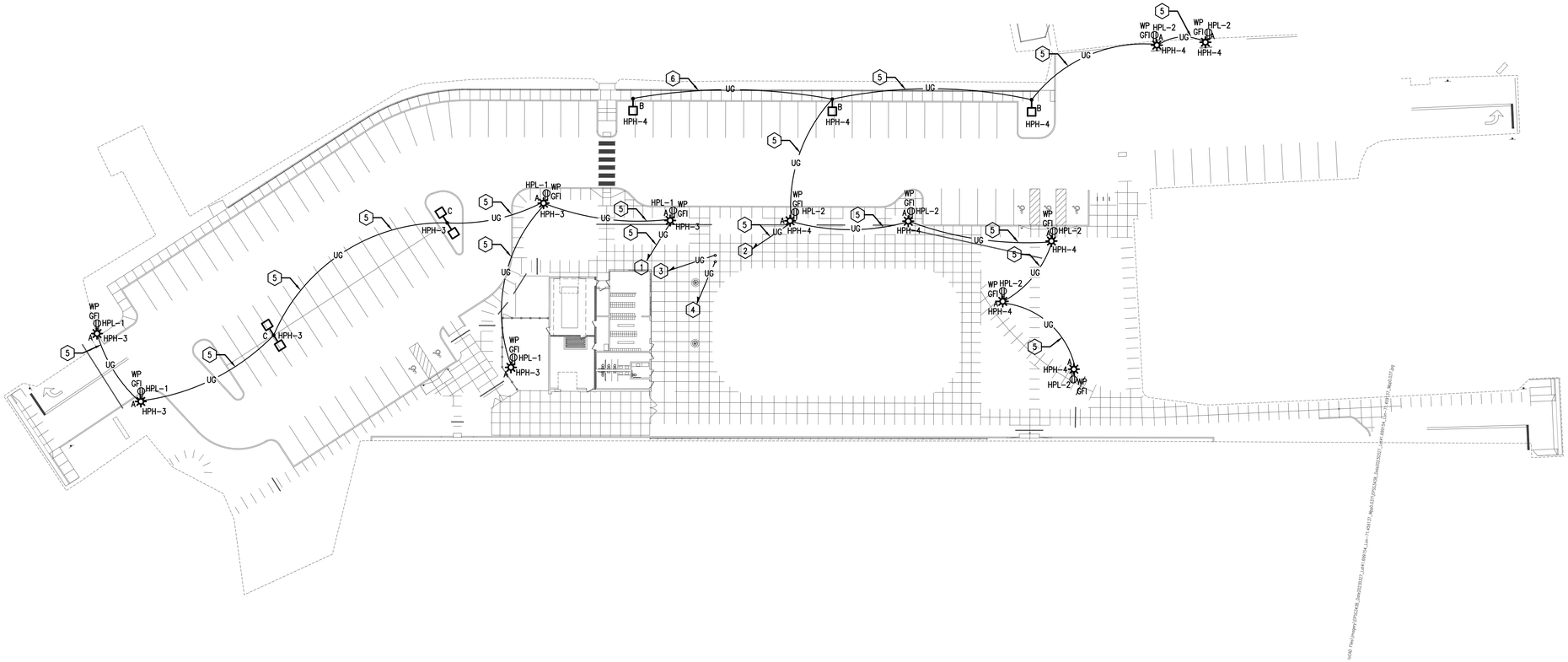
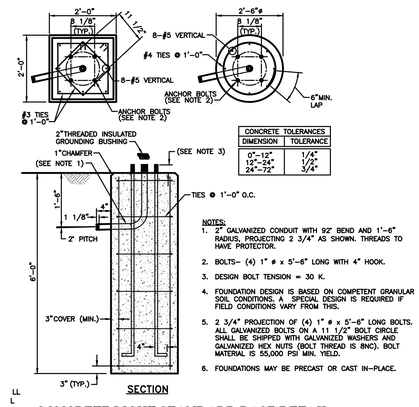


ELECTRICAL SITE LIGHTING PLAN

SCALE: 1" = 30'-0"

KEYED NOTES:

1. HPH-3 FOR LIGHTING VIA LIGHTING CONTACTOR "d" HPL-1 FOR RECEPTACLES VIA CONTACTOR "e".
2. HPH-4 FOR LIGHTING VIA LIGHTING CONTACTOR "d" HPL-2 FOR RECEPTACLES VIA CONTACTOR "e".
3. 1" CONDUIT WITH (1) CAT6 CABLE. EXTEND UNDERGROUND FROM THE IPLAYER 3 IN THE CONCESSION AREA, RISE CONCEALED IN THE FOUNTING OF THE ICE RINK STRUCTURE, TO THE DATA ENABLER. SEE SHEET E1.1 FOR ENABLER LOCATION.
4. 1" CONDUIT WITH (4)#12 AND (1)#12G. EXTEND ONE CIRCUIT TO THE DATA ENABLER AND THE SECOND TO SERVE THE TYPE D LIGHT FIXTURES. SEE SHEET E1.1 FOR ENABLER AND LIGHT FIXTURE LOCATIONS.
5. 1" CONDUIT WITH (4)#10 & (1)#10G.
6. 1" CONDUIT WITH (2)#10 & (1)#10G.



CONCRETE TOLERANCES	
DIMENSION	TOLERANCE
0"-12"	1/4"
12"-24"	1/2"
24"-72"	3/4"

NOTES:
1. 2" GALVANIZED CONDUIT WITH 92° BEND AND 1'-6" RADIUS, PROJECTING 2 3/4" AS SHOWN. THREADS TO HAVE PROTECTOR.
2. BOLTS- (4) 1" ø x 5'-6" LONG WITH 4" HOOK.
3. DESIGN BOLT TENSION = 30 K.
4. FOUNDATION DESIGN IS BASED ON COMPETENT GRANULAR SOIL CONDITIONS. A SPECIAL DESIGN IS REQUIRED IF FIELD CONDITIONS VARY FROM THIS.
5. 2 3/4" PROJECTION OF (4) 1" ø x 5'-6" LONG BOLTS. ALL GALVANIZED BOLTS ON A 11 1/2" BOLT CIRCLE SHALL BE SHIPPED WITH GALVANIZED WASHERS AND GALVANIZED HEX NUTS (BOLT THREAD IS 8NC). BOLT MATERIAL IS 55,000 PSI MIN. YIELD.
6. FOUNDATIONS MAY BE PRECAST OR CAST IN-PLACE.

CONCRETE LIGHT STANDARD BASE DETAIL

NOT TO SCALE

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ELECTRICAL SITE LIGHTING PLAN

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BETA JOB NO.:	10694

SCALE

AS NOTED

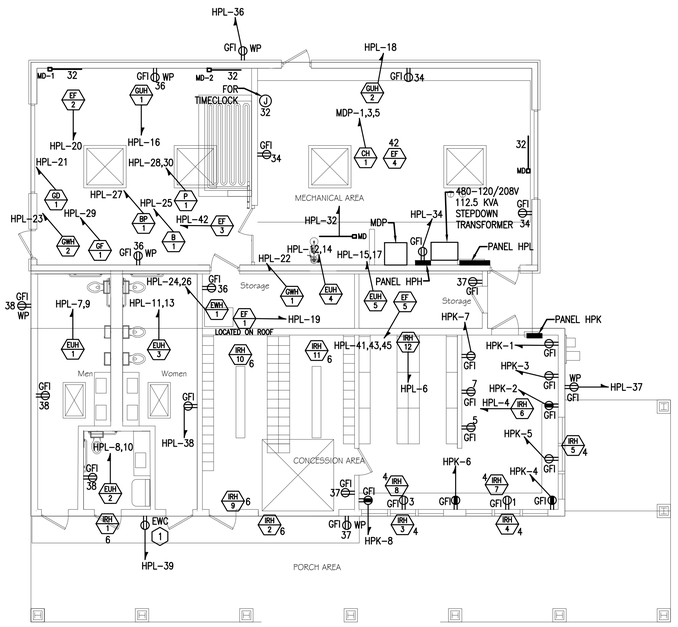
Bid Set

SHEET NO.

ES1.1

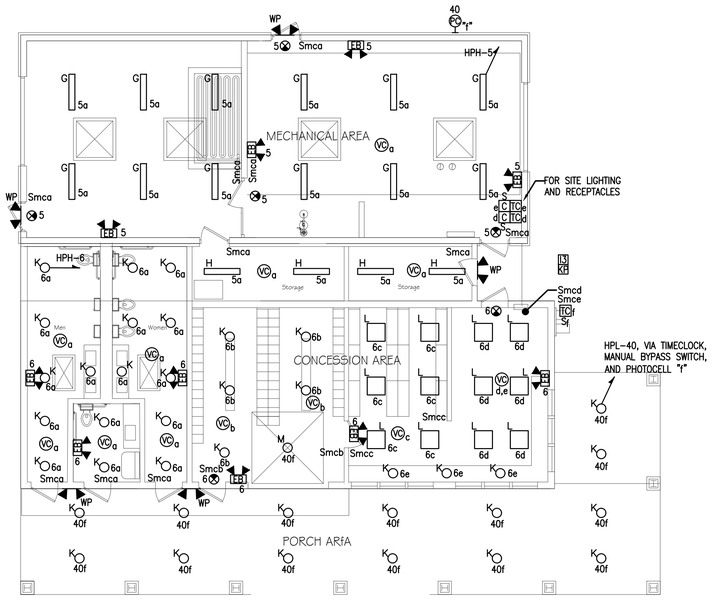
KEYED NOTES:

1. SERVED VIA A 20A/1P GFI CIRCUIT BREAKER IN THE PANEL INDICATED.



CONCESSION BUILDING ELECTRICAL POWER AND SYSTEMS PLAN

SCALE: 1/8" = 1'-0"



CONCESSION BUILDING ELECTRICAL LIGHTING PLAN

SCALE: 1/8" = 1'-0"

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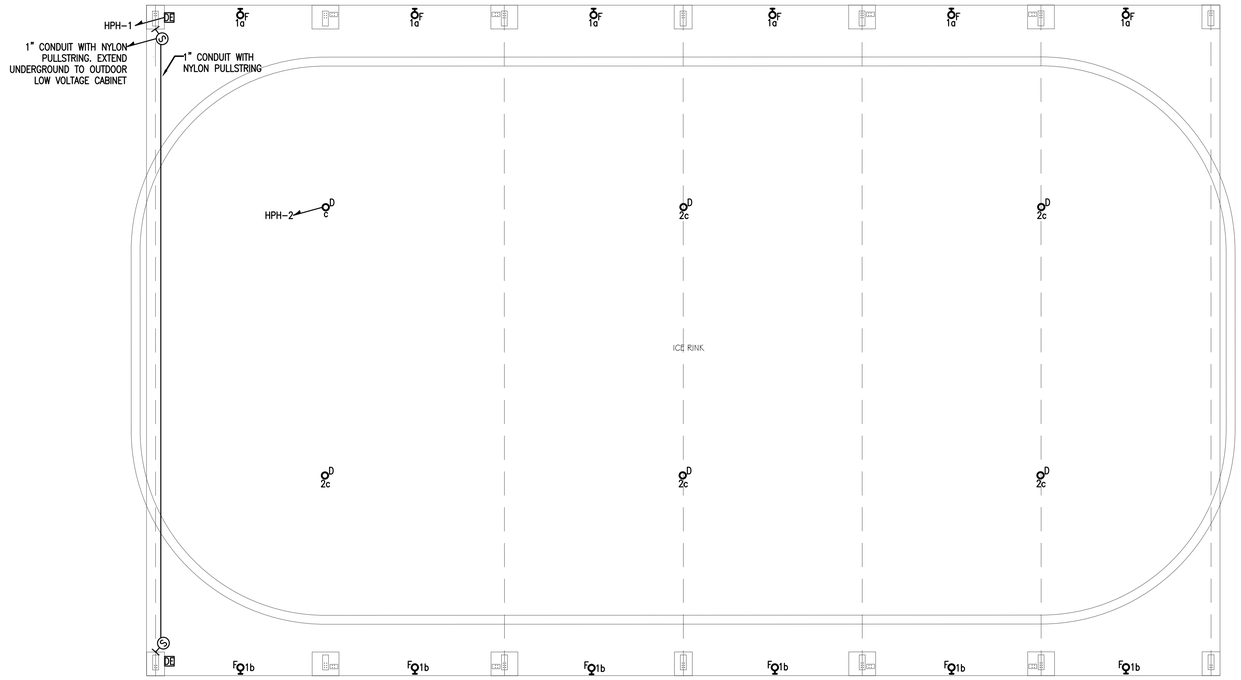
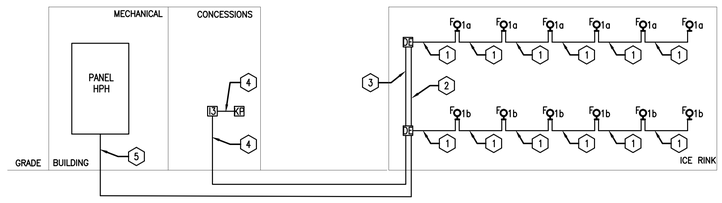
SHEET NO.

E1.0



ICE RINK ELECTRICAL PLAN

SCALE: 1/8" = 1'-0"



ICE RINK LIGHTING CONTROLS DETAIL

NOT TO SCALE

ICE RINK LIGHTING CONTROLS KEYED NOTES:

1. (3)#12 AND (1)#12G IN 3/4" CONDUIT. ONE #12 SHALL BE USED FOR THE DATA SIGNAL FROM DATA ENABLER.
2. (2)#12 AND (1)#12G IN 3/4" CONDUIT.
3. (1)CAT 6 4 COND. CABLE IN 3/4" CONDUIT.
4. (1)CAT 6 4 COND. CABLE IN 1" CONDUIT.
5. (4)#12 AND (1)#12G IN 1" CONDUIT. (2)#12 FOR DATA ENABLER, REMAINER TO SERVE GENERAL LIGHTING IN ICE RINK.

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PROJECT

City Hall Plaza

Warwick, RI

TITLE

ICE RINK ELECTRICAL PLAN

NO.	REVISIONS	DATE

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SCALE

AS NOTED

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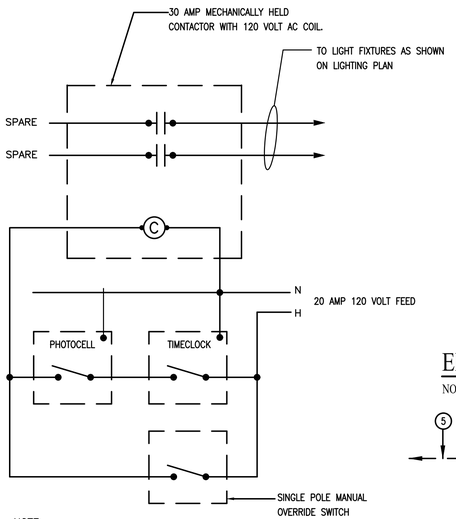
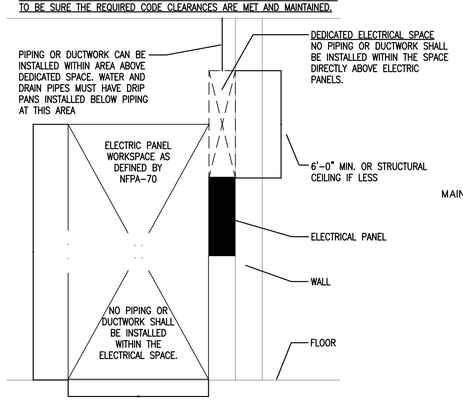


NOTE:
1. CONTACTOR SHALL BE INSTALLED IN A NEMA TYPE 1 GENERAL PURPOSE ENCLOSURE.

LIGHTING CONTACTOR CONTROL DETAIL

NOT TO SCALE

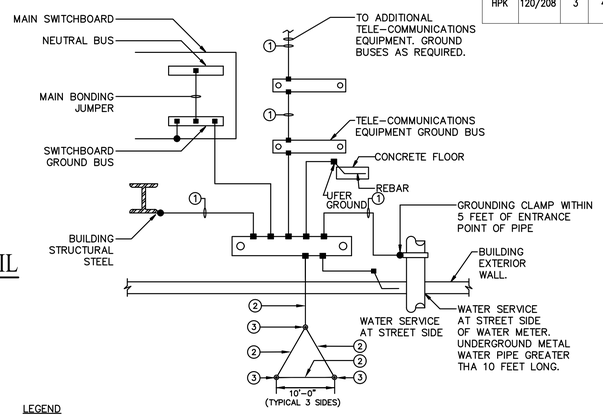
ELECTRICAL CONTRACTOR SHALL COORDINATE INSTALLATION OF HIS SYSTEMS WITH THOSE OF THE HVAC, PLUMBING, AND FIRE PROTECTION CONTRACTORS TO BE SURE THE REQUIRED CODE CLEARANCES ARE MET AND MAINTAINED.



ELECTRICAL SYSTEMS COORDINATION DETAIL

NOT TO SCALE

MAIN DISTRIBUTION PANEL "MDP"					
VOLTAGE: 120/208V			PHASE: 3		
BUS RATING (CU): 800 AMPS			WIRE: 4		
MAINS: 800A MAIN CIRCUIT BREAKER			AIC: 65K		
CKT NO	OVERCURRENT DEVICE (AMP) FRAME	TRIP	POLES	DESCRIPTION OF LOAD	
1	600	500	3	ICE RINK CONTROL PANEL	
2	225	200	3	PANEL "HPH"	
3	225	–	3	BUSSED SPACE WITH PROVISIONS	
4	225	–	3	BUSSED SPACE WITH PROVISIONS	

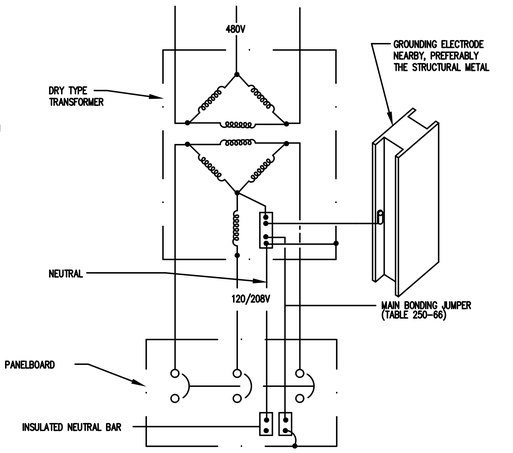


LEGEND

- ● INDICATES BOLTED CONNECTION
- ■ INDICATES EXOTHERMIC WELD CONNECTION, COMPATABLE WITH MATERIALS BEING JOINED
- ① 3/0 AWG INSULATED COPPER GROUND CONDUCTOR IN 1 1/4" CONDUIT
- ② 3/0 AWG BARE COPPER GROUND CONDUCTOR
- ③ 3/4" x 10'-0" LONG COPPER-CLAD GROUND ROD DRIVEN WITH TOP 1'-0" BELOW GRADE

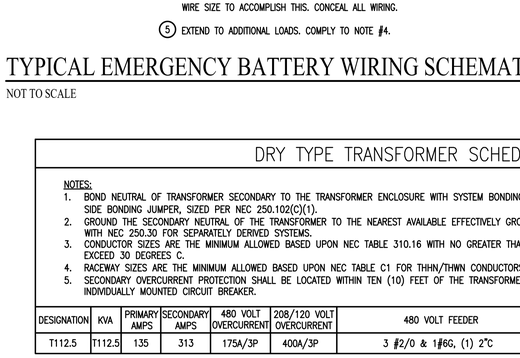
BUILDING GROUNDING ELECTRODE SYSTEM DETAIL

PANELBOARD SCHEDULE																											
PANEL DESIGNATION	VOLTS	PHASE	WIRES	MAINS MLO: MAIN LUGS ONLY MCB: MAIN CKT. BKR. BUS SIZE	OVERCURRENT DEVICE FRAME AMPS	OVERCURRENT DEVICE TRIP AMPS	BRANCH DEVICES BKR. POLES	BREAKER AMPS 15	20	25	30	40	50	60	70	* TOTAL POLES	MOUNTING S: SURFACE F: FLUSH	GROUND BUS	ADDITIONAL BRANCH C.B.'S	REMARKS
HPH	277/480	3	4	225	225	200	1	17								30	S	Y	(1)175A/3P	
							2													
							3													
HPL	120/208	3	4	400	400	400	1	38								60	S	Y	(1)100A/3P (1)20A/1P GFI	
							2	7		1										
							3				1									
HPK	120/208	3	4	100	100	100	1	18								30	S	Y		
							2													
							3													



DRY TYPE TRANSFORMER GROUNDING DETAIL

NOT TO SCALE



1. TO LOCAL UNSWITCHED EGRESS LIGHTING CIRCUIT. CONCEAL ALL WIRING.
2. HARD WIRE TO JUNCTION BOX (DO NOT PLUG IN).
3. BATTERY UNIT. SEE SPECIFICATIONS. SIZE UNIT TO HANDLE FULL LOAD FOR 1 1/2 HOURS TO 87 1/2% OF VOLTAGE OR PROVIDE ADDITIONAL UNITS TO ACCOMPLISH THIS. MOUNT SO THAT IT CAN BE READILY MAINTAINED AND TESTED.
4. (2) #10 (MINIMUM SIZE) IN 1/2" CONDUIT GROUP LOADS TO LIMIT VOLTAGE DROP TO 5% OR INCREASE WIRE SIZE TO ACCOMPLISH THIS. CONCEAL ALL WIRING.
5. EXTEND TO ADDITIONAL LOADS. COMPLY TO NOTE #4.

TYPICAL EMERGENCY BATTERY WIRING SCHEMATIC

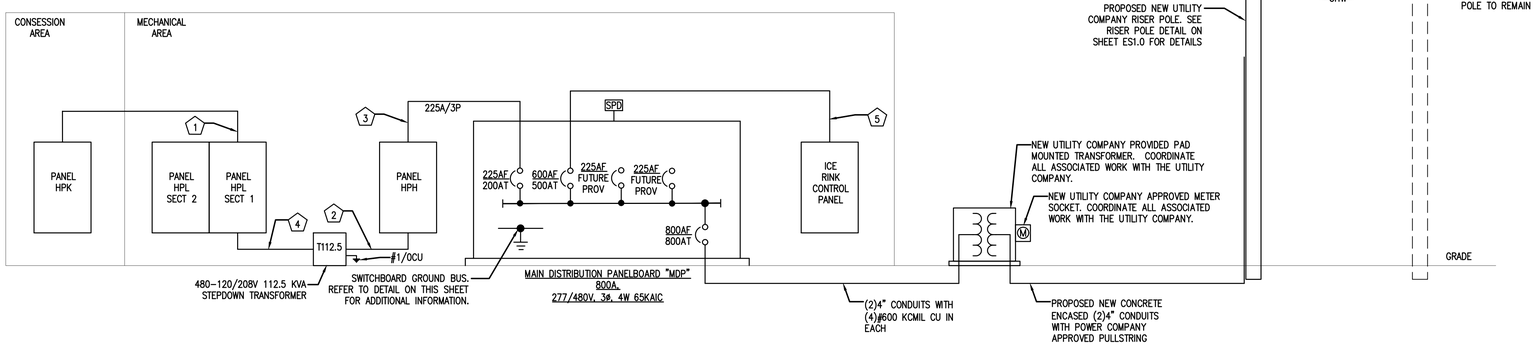
NOT TO SCALE

LEGEND OF FEEDER SIZES – (COPPER CONDUCTORS)					
FEEDER (*)	CONDUCTORS (3 PHASE, 3 WIRE) WITH GROUND	RACEWAY SIZE	CONDUCTORS (3 PHASE, 4 WIRE) WITH GROUND	RACEWAY SIZE	NORMAL AMPERE RATING
1	–	–	4#2 & 1#8G	1 1/2"	100
2	3#2/0 & 1#6G	2"	–	–	175
3	–	–	4#3/0 & 1#6G	2"	200
4	–	–	4#500KCMIL & 1#3G	4"	400
5	2 SETS (3#250KCMIL & 1#2G)	(2) 2 1/2"	–	–	500

NOTES

1. CONDUCTORS SIZES ARE THE MINIMUM ALLOWED BASED UPON NEC TABLE 310.16 WITH NO GREATER THAN THREE CURRENT CARRYING CONDUCTORS PER RACEWAY IN AN AMBIENT NOT TO EXCEED 30 DEGREES CELSIUS.
2. RACEWAY SIZES ARE THE MINIMUM ALLOWED BASED UPON NEC TABLE C1 FOR THHN/THWN CONDUCTORS IN EMT. RACEWAY SIZES SHALL BE INCREASED TO ACCOMMODATE DIFFERING INSULATION SYSTEMS AND RACEWAY TYPES TO LIMIT RACEWAY FILL TO LESS THAN 40%.
3. FEEDERS DESIGNATED IN MULTIPLE SETS SHALL HAVE THE REQUIRED SETS INSTALLED IN PARALLEL.

DRY TYPE TRANSFORMER SCHEDULE (COPPER CONDUCTORS)											
NOTES: 1. BOND NEUTRAL OF TRANSFORMER SECONDARY TO THE TRANSFORMER ENCLOSURE WITH SYSTEM BONDING JUMPER. THE GROUNDING CONDUCTOR IN THE 120/208V FEEDER IS THE SUPPLY SIDE BONDING JUMPER, SIZED PER NEC 250.102(C)(1). 2. GROUND THE SECONDARY NEUTRAL OF THE TRANSFORMER TO THE NEAREST AVAILABLE EFFECTIVELY GROUNDED WATER PIPE, STRUCTURAL STEEL AND/OR DRIVEN GROUND ROD IN ACCORDANCE WITH NEC 250.30 FOR SEPARATELY DERIVED SYSTEMS. 3. CONDUCTOR SIZES ARE THE MINIMUM ALLOWED BASED UPON NEC TABLE 310.16 WITH NO GREATER THAN THREE CURRENT CARRYING CONDUCTORS PER RACEWAY IN AN AMBIENT NOT TO EXCEED 30 DEGREES C. 4. RACEWAY SIZES ARE THE MINIMUM ALLOWED BASED UPON NEC TABLE C1 FOR THHN/THWN CONDUCTORS IN EMT, FLEXIBLE METAL CONDUIT OR LIQUIDTIGHT. 5. SECONDARY OVERCURRENT PROTECTION SHALL BE LOCATED WITHIN TEN (10) FEET OF THE TRANSFORMER SECONDARY TERMINALS EITHER IN A PANELBOARD (MAIN BREAKER) OR IN AN INDIVIDUALLY MOUNTED CIRCUIT BREAKER.										
DESIGNATION	KVA	PRIMARY AMPS	SECONDARY AMPS	480 VOLT OVERCURRENT	208/120 VOLT OVERCURRENT	480 VOLT FEEDER	120/208 VOLT FEEDER	GROUNDING (SEE NOTE 2)	DIMENSIONS H	W	D
T112.5	T112.5	135	313	175A/3P	400A/3P	3 #2/0 & 1#6G, (1) 2"C	4 #600 KCMIL & 1#1/0 G, (1) 4"C	1#1/0-3/4"C	42	36	24



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PROJECT

City Hall Plaza

Warwick, RI

TITLE

ELECTRICAL SCHEDULES AND DETAILS

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DRAWN BY: WMS
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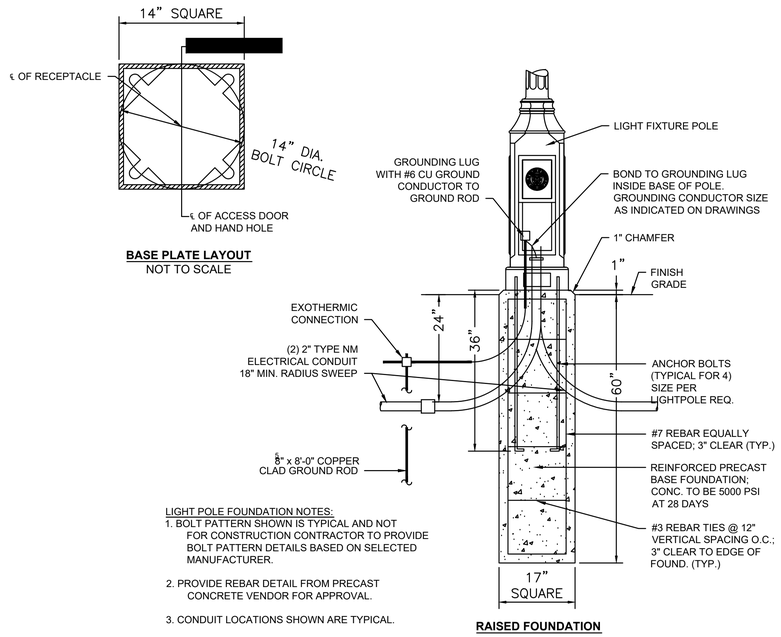
SCALE

AS NOTED

Bid Set

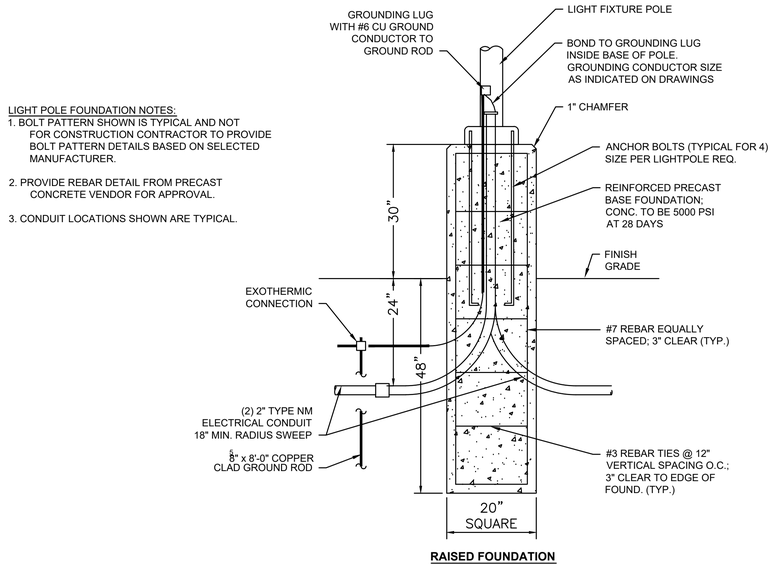
SHEET NO.

E2.0



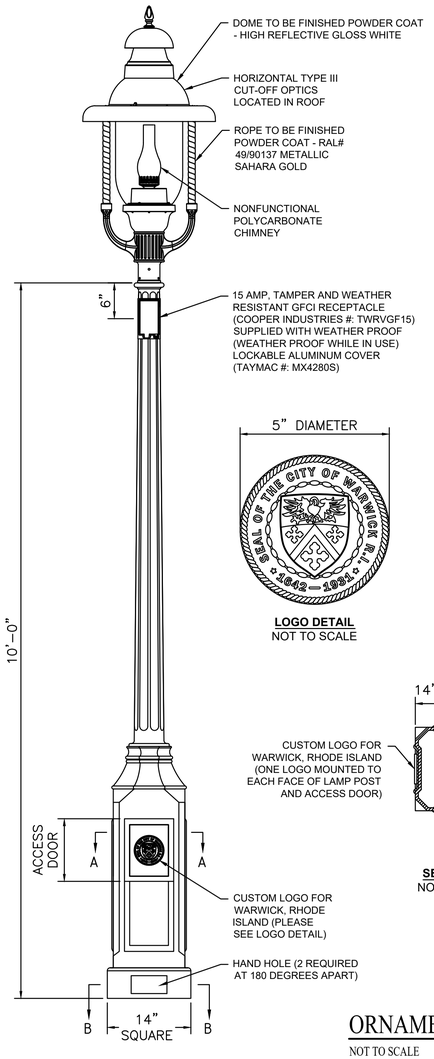
LIGHTING FIXTURE TYPE A POLE BASE DETAIL

NOT TO SCALE



LIGHTING FIXTURE TYPES B AND C POLE BASE DETAIL

NOT TO SCALE



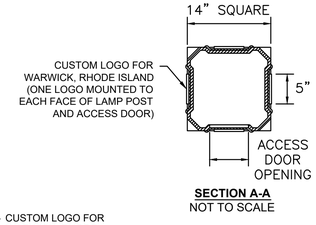
LOGO DETAIL
NOT TO SCALE

LUMINAIRE SPECIFICATIONS

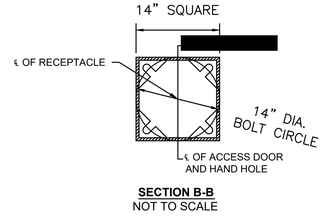
MANUFACTURER:	SPRING CITY ELECTRICAL MFG. CO.
STYLE:	QUALITY HILL LED LUMINAIRE
HEIGHT:	44 13/16"
WIDTH:	22 1/4" DIAMETER
MATERIAL:	CAST ALUMINUM ALLOY ANSI 356 PER A.S.T.M. B26-95
FINISH:	
• BODY:	POWDER COAT - RIVER TEXTURE GLOSS BLACK
• ROOF:	POWDER COAT - WHITE
• ROPE:	POWDER COAT - RAL# 49/90137 METALLIC SAHARA GOLD
LAMPING:	40 WATT LED SYSTEM
VOLTAGE:	ELECTRONIC WIRED AT 120-277 VOLTS
COLOR TEMP.:	2700K (WARM WHITE)
OPTICAL SYSTEM:	TYPE III REFRACTIVE OPTICS (ASYMMETRIC DISTRIBUTION)
GLOBE:	CLEAR ACRYLIC
SURGE:	ALMQLT-LE040-EVX-2G2-27-CR3-YBRO-CMP-FBR-CU
MODIFIER:	CHIMNEY WITH BRASS HOLDER
CATALOG NO.	

LAMP POST SPECIFICATIONS

STYLE:	QUALITY HILL
HEIGHT:	10'-0"
BASE:	14" SQUARE
MATERIAL:	ONE PIECE, CAST DUCTILE IRON PER A.S.T.M. A536-84 GRADE 65-45-12
FINISH:	POWDER COAT - RIVER TEXTURE GLOSS
ACCESS DOOR:	BLACK
GROUND PROVISIONS:	LOCATED IN BASE DRILL AND TAP WALL OPPOSITE ACCESS DOOR TO ACCOMODATE A 1/4"-20 GROUND STUD (GROUND STUD PROVIDED BY OTHERS)
ANCHOR BOLTS:	(4) 3/4" X 24" + 3" HOOK (FULLY GALVANIZED WITH 1 GALVANIZED NUT AND 1 GALVANIZED WASHER PER BOLT)
BOLT PROJECTION:	3" REQUIRED
TENON:	2 7/8" DIA. X 3" HIGH (TO ACCEPT LUMINAIRE)
CATALOG NO.:	
POST:	
ANCHOR BOLTS:	DPSQLT-14-10.00-TN2.88-3.00-(4)DP-GFWI-CU 323/1NW



SECTION A-A
NOT TO SCALE



SECTION B-B
NOT TO SCALE

ORNAMENTAL LIGHT FIXTURE

NOT TO SCALE

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SCALE

AS NOTED

Bid Set

SHEET NO.

E2.1

DUCTWORK PLAN GENERAL NOTES

1. UOI, DUCTWORK SHALL BE MOUNTED AS HIGH AS POSSIBLE, EXCEPT THAT DUCTWORK HEIGHT SHALL BE ADJUSTED AS NECESSARY FOR THE PROPER INSTALLATION OF EQUIPMENT, PIPING, AND CONDUIT.
2. WHERE BRANCH DUCT SIZES TO DIFFUSERS AND GRILLES ARE NOT INDICATED, SEE THE BRANCH DUCT COLUMN OF THE DIFFUSER AND GRILLE SCHEDULE.
3. WHERE VOLUME DAMPERS ARE INACCESSIBLE, PROVIDE WORM GEAR DRIVE AND CABLE ASSEMBLIES SIMILAR TO METROPOLITAN AIR TECHNOLOGIES ROTOTWIST MODEL RT-200/250 SERIES WITH MODEL RT-CCR CEILING CAP. TO THE GREATEST EXTENT POSSIBLE, GROUP CEILING CAPS IN SPACES SUCH AS STORAGE ROOMS, CLOSETS, JANITORS ROOMS, MECHANICAL/ELECTRICAL ROOMS, ETC.
4. DUCTWORK VISIBLE THROUGH THE FACE OF DIFFUSERS, GRILLES, AND LOUVERS SHALL BE PAINTED BLACK
5. EXPOSED ROUND DUCTWORK SHALL BE SPIRAL LOCKSEAM TYPE.
6. UOI, ACOUSTICAL LINING SHALL BE 1" THICK.
7. DUCTWORK DIMENSIONS INDICATED ARE INSIDE CLEAR DIMENSIONS

TAG LEGEND

EQUIPMENT (REQUIRING POWER)	EQUIPMENT DESIGNATION / NUMBER
EQUIPMENT (NON-POWERED)	EQUIPMENT DESIGNATION / NUMBER
REGISTERS, GRILLES & DIFFUSERS	TYPICAL FOR # DESIGNATION / BALANCE TO CFM INDICATED

HYDRONIC PIPING DIAGRAM LEGEND

SYMBOL	DESCRIPTION
P-##	PUMP, ## REPRESENTS PUMP P-##
	PUMP & PUMP ACCESSORY FLOOR SUPPORT
	REINFORCED CONCRETE HOUSEKEEPING PAD
	FLOW DIRECTION
	NON-SLAM CHECK VALVE, GLOBE STYLE
	SWING CHECK VALVE
	WYE STRAINER
	WYE STRAINER WITH BLOWDOWN VALVE
	MULTI-PURPOSE/TRIPLE DUTY VALVE
	SUCTION DIFFUSER
	TWO WAY CONTROL VALVE, TWO POSITION
	TWO WAY CONTROL VALVE, MODULATING
	THREE WAY CONTROL VALVE, TWO POSITION
	THREE WAY CONTROL VALVE, MODULATING
	ASME RELIEF VALVE
	PRESSURE REGULATING/REDUCING VALVE
	QUARTER TURN SHUT-OFF VALVE
	MANUAL BALANCING VALVE
	AUTOMATIC BALANCING VALVE
	FLEXIBLE CONNECTION
	HOSE CONNECTION
	GAUGE COCK (NEEDLE VALVE)
	COIN VENT - TACO 417
	AUTOMATIC AIR VENT - TACO HY-VENT/414
	AUTOMATIC AIR VENT - TACO 409
	REDUCER
	PRESSURE GAUGE
	THERMOMETER
P	CONTROL SYSTEM PRESSURE SENSOR
T	CONTROL SYSTEM TEMPERATURE SENSOR
	PRESSURE & TEMPERATURE TEST PORT
	3/4" BALL DRAIN VALVE WITH HOSE THREAD
CABV	COMBINATION AUTOMATIC BALANCING VALVE
CSTR	COMBINATION STRAINER

GENERAL MECHANICAL NOTES

1. MECHANICAL EQUIPMENT AND SUCH OTHER APPARATUS AS MAY REQUIRE MAINTENANCE AND OPERATION FROM TIME TO TIME SHALL BE MADE EASILY ACCESSIBLE. ALTHOUGH THE EQUIPMENT MAY BE SHOWN ON THE DRAWINGS IN CERTAIN LOCATIONS, THE CONSTRUCTION MAY DISCLOSE THAT SUCH LOCATIONS DO NOT MAKE ITS POSITION READILY ACCESSIBLE. IN SUCH CASES, THE OWNER OR HIS REPRESENTATIVE SHALL BE NOTIFIED BEFORE ADVANCING THE CONSTRUCTION TO A STAGE WHERE A CHANGE WILL REFLECT ADDITIONAL EXPENSE.
2. THE DRAWINGS SHOW THE LAYOUT OF THE MECHANICAL SYSTEMS AND INDICATE THE APPROXIMATE LOCATIONS OF DUCTWORK, PIPING, BRANCHES AND ELBOWS, AND EQUIPMENT. THE RUNS AND QUANTITY OF DUCTWORK, PIPING, OFFSETS AND ELBOWS AS SHOWN ON THE DRAWINGS ARE DIAGRAMMATIC ONLY. THE EXACT ROUTING OF QUANTITY DUCTWORK, PIPING, OFFSETS AND ELBOWS SHALL BE DETERMINED BY THE STRUCTURAL CONDITIONS, POSSIBLE OBSTRUCTIONS AND COORDINATION DRAWINGS. THIS SHALL NOT BE CONSTRUED TO MEAN THAT THE DESIGN OF THE SYSTEMS MAY BE CHANGED, BUT REFERS ONLY TO EXACT RUNS BETWEEN GIVEN POINTS.
3. IT SHALL BE THE RESPONSIBILITY OF THE HVAC CONTRACTOR TO STUDY ALL DRAWINGS AND DETAILS SO THAT THE INSTALLATION OF ALL NEW WORK CAN BE FULLY COORDINATED. COORDINATE WITH ALL TRADES TO AVOID INTERFERENCE OF EQUIPMENT.
4. HVAC WORK IS INDICATED DIAGRAMMATICALLY. EXACT LOCATION OF ALL COMPONENTS ARE TO BE DETERMINED IN THE FIELD AND BY THE ACTUAL BUILDING CONDITIONS. EQUIPMENT, DUCTS OR PIPES INTERFERING WITH OTHER INSTALLATIONS SHALL BE RELOCATED AS REQUIRED.
5. HVAC CONTRACTOR SHALL COORDINATE ALL WALL, CEILING, FLOOR, ROOF AND BEAM PENETRATIONS WITH ARCHITECT AND STRUCTURAL ENGINEER.
6. PRODUCTS REQUIRED BY CONSTRUCTION BUT NOT SPECIFICALLY DESCRIBED HEREIN SHALL BE AS SELECTED BY THE CONTRACTOR SUBJECT TO THE APPROVAL OF THE A/E.
7. PROVIDE ALL MATERIALS, LABOR, AND ACCESSORIES FOR A COMPLETE AND OPERABLE SYSTEMS AND AS REQUIRED BY THE EQUIPMENT MANUFACTURER'S INSTALLATION INSTRUCTIONS.
8. INSTALL ALL MATERIALS, ACCESSORIES AND EQUIPMENT ACCORDING TO MANUFACTURER'S INSTALLATION INSTRUCTIONS FOR A COMPLETE AND OPERABLE SYSTEMS AS INDICATED ON THE DRAWINGS MANUFACTURERS INSTRUCTIONS.
9. ALL MISCELLANEOUS STRUCTURAL SUPPORTS REQUIRED FOR HVAC EQUIPMENT INSTALLATION SHALL BE PROVIDED BY MECHANICAL CONTRACTOR.
10. INSTALL ALL PIPING BELOW DUCTWORK UNLESS CLEARANCE CONDITION REQUIRES PIPING TO BE ABOVE.
11. WHERE DUCTWORK PENETRATES ANY SMOKE AND/OR FIRE RATED PARTITIONS PROVIDE UL LISTED DYNAMIC FIRE AND/OR SMOKE DAMPERS PER NFPA GUIDELINES. INSTALL DAMPER PER MANUFACTURE INSTRUCTIONS.
12. ALL CEILING MOUNTED EQUIPMENT SHALL BE INSTALLED IN SUCH A WAY THAT LIGHTS, PIPING, AND DUCTWORK DO NOT BLOCK ACCESS TO UNITS AND RELATED ACCESSORIES.
13. EXACT ELEVATION FOR SIDE WALL DIFFUSERS, REGISTERS AND GRILLES SHALL BE APPROVED BY THE ARCHITECT BEFORE INSTALLATION.
14. INSTALL ROOM THERMOSTATS OR SENSORS 54" (MAXIMUM) ABOVE FINISHED FLOOR OR AS OTHERWISE DIRECTED BY THE ARCHITECT.

ABBREVIATIONS

ABBREVIATION	DESCRIPTION
AD	ACCESS DOOR
AFF	ABOVE FINISHED FLOOR
AP	ACCESS PANEL
AH	AIR HANDLER
AHJ	AUTHORITY HAVING JURISDICTION
APD	AIR PRESSURE DROP
ATC	AUTOMATIC TEMPERATURE CONTROL
BHP	BREAK HORSEPOWER
BTU	BRITISH THERMAL UNIT
BTUH	BTU/HOUR
BMS	BUILDING MANAGEMENT SYSTEM
CAP	CAPACITY
CFM	CUBIC FEET PER MINUTE
COP	COEFFICIENT OF PERFORMANCE
CU	CONDENSING UNIT
CUH	CABINET UNIT HEATER
dB	DECIBELS
DN	DOWN
DX	DIRECT EXPANSION
EAT	ENTERING AIR TEMPERATURE (DRY BULB)
EBB	ELECTRIC BASEBOARD
E.C.	ELECTRICAL CONTRACTOR
EDB	ENTERING DRY BULB TEMPERATURE
EER	ENERGY EFFICIENCY RATIO
EF	EXHAUST FAN
ESP	EXTERNAL STATIC PRESSURE
ETR	EXISTING TO REMAIN
EWB	ENTERING WET BULB TEMPERATURE
EWT	ENTERING WATER TEMPERATURE
°F	DEGREES FAHRENHEIT
FD	FIRE DAMPER
FSD	COMBINATION FIRE/SMOKE DAMPER
FT	FEET
FT WG	FEET WATER GAUGE
FLA	FULL LOAD AMPS
FPM	FEET PER MINUTE
G.C.	GENERAL CONTRACTOR
HP	HORSEPOWER
HSPF	HEATING SEASON PERFORMANCE FACTOR
HW	HOT WATER
IN	INCHES
IPLV	INTEGRATED PART LOAD VALUE
IN WG	INCHES WATER GAUGE
KW	KILOWATTS
MAX	MAXIMUM
MBH	THOUSANDS OF BTU / HOUR
M.C.	MECHANICAL CONTRACTOR
MCA	MINIMUM CIRCUIT AMPACITY
MIN	MINIMUM
MOP	MAXIMUM OVERCURRENT PROTECTION
NTS	NOT TO SCALE
OA	OUTSIDE AIR
PH	PHASE
QTY	QUANTITY
RPM	REVOLUTIONS PER MINUTE
SP	STATIC PRESSURE
SPD	STATIC PRESSURE DROP
TSP	TOTAL STATIC PRESSURE
TYP	TYPICAL
UOI	UNLESS OTHERWISE INDICATED
VD	VOLUME DAMPER

MECHANICAL LEGEND

SYMBOL	DESCRIPTION
	DUCTWORK (DOUBLE LINE)
	DUCTWORK WITH ACOUSTICAL LINING (DOUBLE LINE)
	DUCTWORK (SINGLE LINE)
	DUCTWORK WITH ACOUSTICAL LINING (SINGLE LINE)
	FLEXIBLE DUCTWORK
	DUCTWORK, PIPING AND EQUIPMENT TO BE DEMOLISHED
	RECTANGULAR/ROUND SUPPLY AIR DUCTWORK UP
	RECTANGULAR/ROUND RETURN AIR DUCTWORK UP
	RECTANGULAR/ROUND EXHAUST AIR DUCTWORK UP
	RECTANGULAR/ROUND SUPPLY AIR DUCTWORK DOWN
	RECTANGULAR/ROUND RETURN AIR DUCTWORK DOWN
	RECTANGULAR/ROUND EXHAUST AIR DUCTWORK DOWN
	VOLUME DAMPER - REMOTE VOLUME DAMPER TYPE ABOVE INACCESSIBLE CEILINGS OR CONSTANT AIRFLOW REGULATORS PER SCHEDULE
CFM	BALANCE OUTDOOR AIR TO CFM SHOWN
	CONTROL DAMPER
	ELBOW UP
	ELBOW DOWN
	TEE DOWN
	TEE UP
	PIPE GUIDE
	PIPE ANCHOR
	FLOW DIRECTION
	PIPE CLEANOUT
	CONNECT TO EXISTING
	AIR ENTERING OPENING
	AIR LEAVING OPENING
CO	CARBON MONOXIDE DETECTOR
NO	NITRIC OXIDE DETECTOR
RD	REFRIGERANT DETECTOR
PS	PRESSURE SENSOR
T	THERMOSTAT OR TEMPERATURE SENSOR
T	THERMOSTAT GUARD w/ KEY LOCK
	CONTROL CONNECTION

PREPARED BY

BETA
www.BETA-Inc.com

REGISTERED PROFESSIONAL

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PROJECT

City Hall Plaza

Warwick, RI

TITLE

MECHANICAL LEGEND, NOTES & ABBREVIATIONS

NO.	REVISIONS	DATE

DRAWN BY:	JPK
DESIGNED BY:	JPK
CHECKED BY:	GAA
ISSUE DATE:	01/31/2024
BETA JOB NO.:	10694

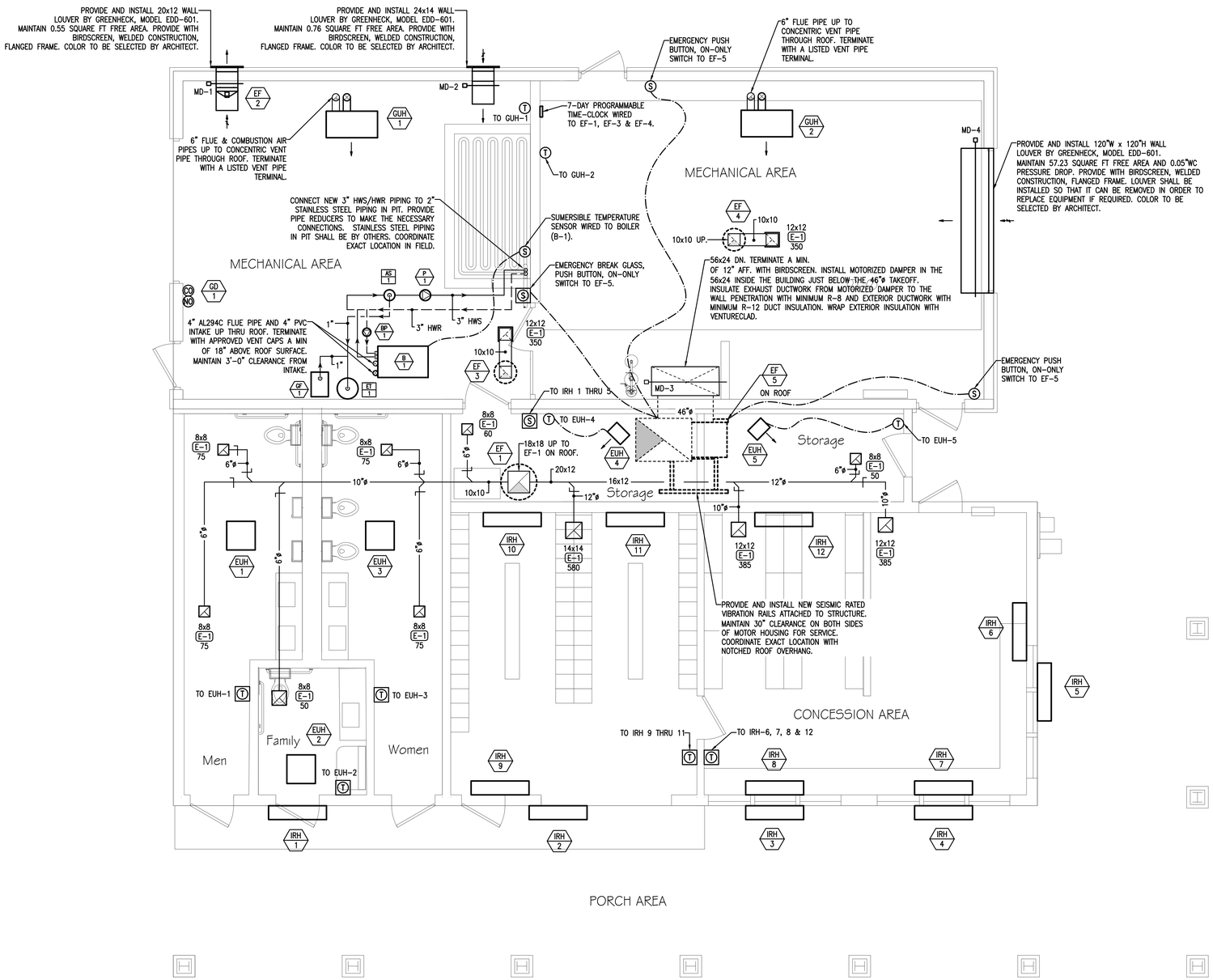
SCALE

AS NOTED

Bid Set

SHEET NO.

M0.1



CONCESSION BUILDING MECHANICAL PLAN

SCALE: 1/4" = 1'-0"

PREPARED BY

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CONCESSION BUILDING MECHANICAL PLAN

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AS NOTED

Bid Set

SHEET NO.

M1.0

GAS FIRED UNIT HEATER SCHEDULE

GENERAL		PERFORMANCE									ELECTRICAL				PHYSICAL		REMARKS			
		FURNACE					FAN													
TAG	LOCATION	INPUT MBH	OUTPUT MBH	EFFICIENCY (%)	LAT (°F)	STAGES	CFM	ESP (IN WG)	RPM	SPEED	HP	AMPS	VOLTAGE	PHASE	MAX MOUNTING HEIGHT (FT)	MANUFACTURER MODEL	TYPE	RATINGS	FEATURES	INSTALL
GUH-1	MECHANICAL ROOM	250.0	205.0	82.0	117.0	1	3,995	–	1,075	HIGH	1/3	7.15	120	1	18.0	MODINE PTX250SS0111SBAN	①	①	1 2 3	①②
GUH-2	MECHANICAL ROOM	250.0	205.0	82.0	117.0	1	3,995	–	1,075	HIGH	1/3	7.15	120	1	18.0	MODINE PTX250SS0111SBAN	①	①	1 2 3	①②

① NATURAL GAS FIRED, POWER VENTED, PROPELLER FAN TYPE

① 70°F EAT

1 PROGRAMMABLE THERMOSTAT WITH AUTO/OFF SYSTEM SWITCH AND AUTO/ON FAN SWITCH, HEATING STAGES AS INDICATED
2 CONCENTRIC VENT KIT, HORIZONTAL
3 PROVIDE WITH GAS PRESSURE REGULATOR

① SEE DETAIL
② INSTALL PER MANUFACTURERS INSTRUCTIONS

PUMP SCHEDULE

GENERAL		PERFORMANCE		ELECTRICAL				PHYSICAL		REMARKS			
TAG	SERVICE	GPM	TDH (FT WG)	WATTS	HP	VOLTAGE	PHASE	PIPE CONNECTION (IN)	MANUFACTURER MODEL	TYPE	RATINGS	FEATURES	INSTALL
BP1	BOILER PUMP	39.0	12.0	480	0.6	120	1	1-1/2	TACO VR15M	①	①	1 2	①②
P-1	SYSTEM PUMP	80	20.0	1,550	2.1	208	1	2-1/2	TACO VR25H	②	①	1 2	①

① CARTRIDGE CIRCULATOR
② VERTICAL INLINE PUMP

① WATER AT 180°F

1 ALL IRON, ECM MOTOR
2 ANSI B16.1 CLASS 125 (175 PSIG AT 250°F)

① SEE DETAILS
② PUMP ENABLE/DISABLE BASED ON BOILER CONTROLLER

BOILER SCHEDULE

GENERAL		PERFORMANCE									ELECTRICAL			PHYSICAL		REMARKS			
		MAXIMUM FIRE				GAS PRESSURE		WATER SIDE											
TAG	LOCATION	MIN. INPUT MBH	MAX. INPUT MBH	GROSS OUTPUT MBH	THERMAL EFFICIENCY (%)	MIN IN. WC	MAX IN. WC	GPM MIN FLOW	GPM MAX. FLOW	LWT (°F)	AMPS	VOLTAGE	PHASE	SHIPPING WEIGHT (LBS)	MANUFACTURER MODEL	TYPE	RATINGS	FEATURES	INSTALL
B-1	MECHANICAL ROOM	39.9	399.0	387.0	95.0	3.5"	14.0"	4.0	39.0	180.0	12.0	120	1	538.0	HTP ELX-400FBN	①	①	1 2 3	①②③

① NATURAL GAS FIRED, CONDENSING, DIRECT VENT AND COMBUSTION AIR

① WATER SIDE AT 160°F EWT, MAXIMUM FIRE

1 ACID NEUTRALIZER KIT
2 STAINLESS STEEL HEAT EXCHANGER
3 BUILT-IN BOILER CONTROLS
4 4" STAINLESS STEEL VENT KIT.

① SEE DETAIL
② PROVIDE A CONDENSATE DRAIN TO THE FLOOR DRAIN, WITH ACID NEUTRALIZER. CONNECT BOTH THE BOILER CONDENSATE DRAIN AND THE VENT DRAIN (AS APPLICABLE) UPSTREAM OF THE NEUTRALIZER.
③ VENT PIPING SHALL BE INSTALLED BY A LICENSED PLUMBER OR A LICENSED GAS FITTER. WHERE REQUIRED BY THE AHJ, COMBUSTION AIR PIPING ALSO SHALL BE INSTALLED BY A LICENSED PLUMBER OR A LICENSED GAS FITTER.

ELECTRIC UNIT HEATER SCHEDULE

GENERAL		PERFORMANCE					ELECTRICAL			PHYSICAL	REMARKS			
TAG	LOCATION	KW	STAGES	MBH	CFM	FAN SPEED	AMPS	VOLTAGE	PHASE	MANUFACTURER MODEL	TYPE	RATINGS	FEATURES	INSTALL
EUH-1	MENS RESTROOM	3.0	1	10.2	–	HIGH	–	208	1	KING KDSRU2030-3	①	①	1 2 3	①②
EUH-2	WOMENS RESTROOM	3.0	1	10.2	–	HIGH	–	208	1	KING KDSRU2030-3	①	①	1 2 3	①②
EUH-3	FAMILY RESTROOM	2.0	1	6.8	–	HIGH	–	208	1	KING KDSRU2020-3	①	①	1 2 3	①②
EUH-4	STORAGE	3.3	1	11.2	520	HIGH	15.9	208	1	KING KB2003-1-T-B1	②	①	1 2	①②
EUH-5	STORAGE	3.3	1	11.2	520	HIGH	15.9	208	1	KING KB2003-1-T-B1	②	①	1 2	①②

① FAN FORCED, COMMERCIAL ELECTRIC CEILING HEATER
② FAN FORCED, COMMERCIAL ELECTRIC UNIT HEATER

① UL LISTED

1 FURNISH AND INSTALL 120V, HARD WIRED, 7 DAY PROGRAMMABLE. WALL MOUNTED THERMOSTAT (WIRED BY E.C)
2 DISCONNECT SWITCH
3 RECESSED MOUNTING FRAME

① INSTALL PER MANUFACTURES INSTRUCTIONS
② COLOR TO BE DETERMINED BY ARCHITECT

EXHAUST FAN SCHEDULE

GENERAL			PERFORMANCE				ELECTRICAL					PHYSICAL		REMARKS			
TAG	LOCATION	SERVICE	CFM	ESP (IN WG)	MOTOR RPM	SONES	HP	VOLTAGE	PHASE	FLA	MOP	WEIGHT (LBS)	MANUFACTURER MODEL	TYPE	RATINGS	FEATURES	INSTALL
EF-1	ROOF	GENERAL EXHAUST	1750	0.50	1,725	15.3	1/2	115	1	6.4	20.0	129.0	GREENHECK G-120-VG	①	① ②	1 2 3	①②
EF-2	MECHANICAL AREA	GAS DETECTION	400	0.25	1100	6.0	1/4	115	1	2.85	20.0	150.0	GREENHECK AER-E20C-610-VG	②	① ②	1	①②
EF-3	MECHANICAL AREA	GENERAL EXHAUST	350	0.25	860.0	4.2	1/8	115	1	0.85	20.0	47.0	GREENHECK CUE-99-C	①	① ②	1 2 3 4 5	①②
EF-4	MECHANICAL AREA	GENERAL EXHAUST	350	0.25	860.0	4.2	1/8	115	1	0.85	20.0	47.0	GREENHECK CUE-99-C	①	① ②	1 2 3 4 5	①②
EF-5	MECHANICAL AREA	EMERGENCY EXHAUST	30,000	0.50	1,725	46.0	15.0	208	3	46.2	110.0	630.0	GREENHECK USF-40-3-B4-00-01-01	③	① ②	1 6 THRU 21	①②③

① CENTRIFUGAL ROOF MOUNTED EXHAUST FAN
②
③ BELT DRIVE UTILITY SET EXHAUST FAN

① SOUND PERFORMANCE CERTIFIED IN ACCORDANCE TO AMCA 211/311
② UL LISTED

1 SPEED CONTROLLER
2 BACKDRAFT DAMPER
3 14" INSULATED ROOF CURB
4 SPARK RESISTANCE MOTOR
5 ALUMINUM CONSTRUCTION
6 NEMA PREMIUM EFFICIENT MOTOR
7 MOTOR WITH CLASS B OR GREATER INSULATION
8 STANDARD DRIVES
9 COATED FINISH
10 COATING – PERMATECTOR GRAY RAL-7023, MILL FINISH ON ALUMINUM COMPONENTS

11 ROTATION – CW
12 BEARINGS – L(10) LIFE OF 80K HOURS
13 DISCHARGE POSITION – UB
14 SWITCH – NEMA 3R, TOGGLE.
15 POLISHED STEEL SHAFT
16 BOLTED ACCESS DOOR
17 DRAIN CONNECTION – 1" PIPE THREAD WITH PLUG
18 SLIP FIT INLET CONNECTION
19 PUNCHED OUTLET FLANGE
20 STEEL WEATHERHOOD
21 ALUMINUM RUB RING

① INSTALL PER MANUFACTURERS INSTRUCTIONS.
② INSTALL DISCONNECT SWITCH AT THE FAN
③ PROVIDE AND INSTALL EQUIPMENT RAILS AND SECURE TO STRUCTURE. COORDINATE INSTALLATION WITH ARCHITECT/STRUCTURAL.

GAS DETECTOR SCHEDULE

GD-1:
PROVIDE AND INSTALL VENTILATION CONTROL CO/NO2 MONITOR GAS DETECTOR SYSTEM MANUFACTURED BY TOXALERT MODEL GVU-3, WITH:
AUDIBLE ALARM, SILENCE SWITCH, POWER/FAN ON INDICATOR, HIGH GAS CONCENTRATION INDICATOR.
INSTALL PER MANUFACTURERS INSTRUCTION AND INTERLOCK WITH EF-2 AND INTAKE MOTORIZED DAMPER MD-2

MOTORIZED DAMPER SCHEDULE

MD-1 & MD-2
LOW LEAKAGE CLASS-2 MOTORIZED DAMPER WITH 120/1/60 POWERED ACTUATOR. REFER TO PLANS FOR SIZE & QUANTITY. DAMPER SHALL BE INTERLOCKED WITH CO/NO2 MONITORING SYSTEM.

MD-3
LOW LEAKAGE CLASS-2 MOTORIZED DAMPER WITH 120/1/60 POWERED ACTUATOR. REFER TO PLANS FOR SIZE & QUANTITY. DAMPER SHALL BE INTERLOCKED WITH REFRIGERANT LEAK MONITORING SYSTEM.

MD-4
LOW LEAKAGE CLASS-2 MOTORIZED DAMPER WITH 120/1/60 POWERED ACTUATOR. DOUBLE WALL, INSULATED BLADES WITH AIR TIGHT SEALS AND GASKETS. REFER TO PLANS FOR SIZE & QUANTITY. DAMPER SHALL BE INTERLOCKED WITH REFRIGERANT LEAK MONITORING SYSTEM.

DIFFUSER AND GRILLE SCHEDULE

GENERAL	PHYSICAL		REMARKS		
TAG	BLOW PATTERN	MANUFACTURER MODEL	TYPE	FEATURES	INSTALL
E-1	–	PRICE 635	①	1 2	①②

① RETURN/EXHAUST/TRANSFER GRILLE, 45° FIXED BLADES ON 1/2" CENTERS, BLADES PARALLEL TO LONG DIMENSION, CONCEALED FASTENING SCREWS, ALUMINUM CONSTRUCTION, WHITE FINISH.

1 REFER TO ARCHITECTURAL DRAWINGS FOR MOUNTING TYPE.
2 INSULATED PLENUM BOX

TAG LEGEND
SIZE (IN.)
0x0
XOX — TAG: S=SUPPLY R=RETURN E=EXHAUST
000 — CFM

① *REFER TO ARCHITECTURAL DRAWINGS TO CONFIRM MOUNTING TYPE OF ALL GRILLES AND DIFFUSERS PRIOR TO ORDERING
② PROVIDE A DUCT MOUNTED VOLUME DAMPER AT EACH BRANCH DUCT CONNECTED TO A DIFFUSER OR GRILLE. EXCEPTIONS:
- TRANSFER AIR APPLICATIONS (GRILLE IS NOT CONNECTED BY A DUCTWORK SYSTEM TO A FAN)
- EXHAUST AND RETURN GRILLES WHERE ONLY ONE GRILLE SERVES THE FAN/AIR HANDLING SYSTEM
- GRILLES CONNECTED TO RELIEF AIR HOODS AND RELIEF AIR LOUVERS

GAS FIRED INFRARED HEATER SCHEDULE

GENERAL		PERFORMANCE				ELECTRICAL			PHYSICAL			REMARKS			
TAG	LOCATION	INPUT MBH (HIGH)	INPUT MBH (LOW)	MIN. GAS PRESSURE ("WC)	MAX GAS PRESSURE ("WC)	AMPS	VOLTAGE	PHASE	SUGGESTED MOUNTING HEIGHT (FT)	WEIGHT (LBS)	MANUFACTURER MODEL	TYPE	RATINGS	FEATURES	INSTALL
IRH-1	PORCH AREA	35.0	24.0	7.0	14.0	0.1	120	1	11.0	55.0	STERLING SUNSCAPE	①	①	1 2 3 4	① ②
IRH-2	PORCH AREA	35.0	24.0	7.0	14.0	0.1	120	1	11.0	55.0	STERLING SUNSCAPE	①	①	1 2 3 4	① ②
IRH-3	PORCH AREA	35.0	24.0	7.0	14.0	0.1	120	1	11.0	55.0	STERLING SUNSCAPE	①	①	1 2 3 4	① ②
IRH-4	PORCH AREA	35.0	24.0	7.0	14.0	0.1	120	1	11.0	55.0	STERLING SUNSCAPE	①	①	1 2 3 4	① ②
IRH-5	PORCH AREA	35.0	24.0	7.0	14.0	0.1	120	1	11.0	55.0	STERLING SUNSCAPE	①	①	1 2 3 4	① ②
IRH-6	CONCESSION AREA	35.0	24.0	7.0	14.0	0.1	120	1	11.0	55.0	STERLING SUNSCAPE	①	①	1 2 3 4	① ②
IRH-7	CONCESSION AREA	35.0	24.0	7.0	14.0	0.1	120	1	11.0	55.0	STERLING SUNSCAPE	①	①	1 2 3 4	① ②
IRH-8	CONCESSION AREA	35.0	24.0	7.0	14.0	0.1	120	1	11.0	55.0	STERLING SUNSCAPE	①	①	1 2 3 4	① ②
IRH-9	CONCESSION AREA	35.0	24.0	7.0	14.0	0.1	120	1	11.0	55.0	STERLING SUNSCAPE	①	①	1 2 3 4	① ②
IRH-10	CONCESSION AREA	35.0	24.0	7.0	14.0	0.1	120	1	11.0	55.0	STERLING SUNSCAPE	①	①	1 2 3 4	① ②
IRH-11	CONCESSION AREA	35.0	24.0	7.0	14.0	0.1	120	1	11.0	55.0	STERLING SUNSCAPE	①	①	1 2 3 4	① ②
IRH-12	CONCESSION AREA	35.0	24.0	7.0	14.0	0.1	120	1	11.0	55.0	STERLING SUNSCAPE	①	①	1 2 3 4	① ②

① NATURAL GAS FIRED, INFRARED HEATER

① ANSI Z83.19 & ANSI Z83.26

1 TWO STAGE GAS VALVE
2 HEAT SHIELD
3 CONTROL SWITCH
4 WALL MOUNTING BRACKET

① INSTALL PER MANUFACTURERS INSTRUCTIONS
② MAINTAIN MANUFACTURERS CLEARANCE REQUIREMENTS

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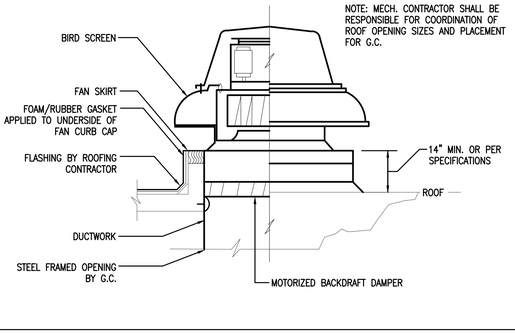
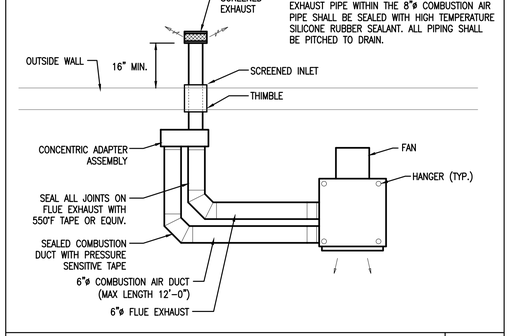
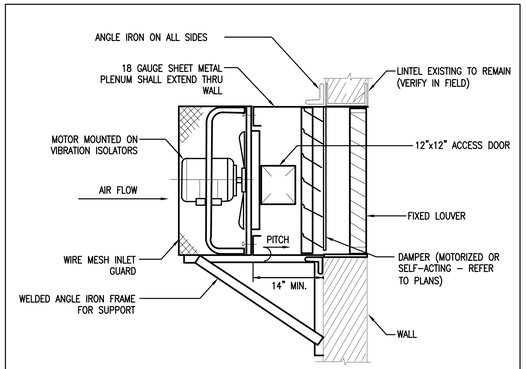


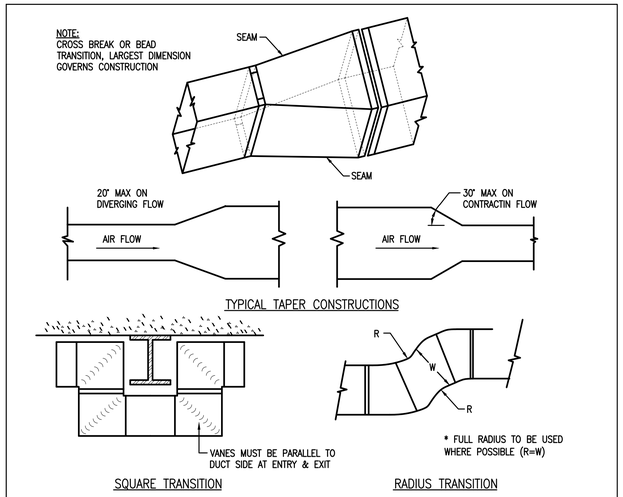
ROOF MOUNTED EXHAUST FAN DETAIL | NTS



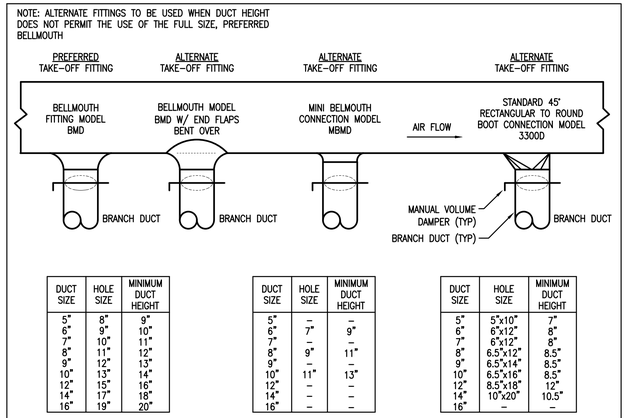
SEALED COMBUSTION GAS UNIT HEATER DETAIL | NTS



SIDEWALL PROPELLER FAN DETAIL | NTS



DUCT TRANSITION & OFFSET DETAIL | NTS

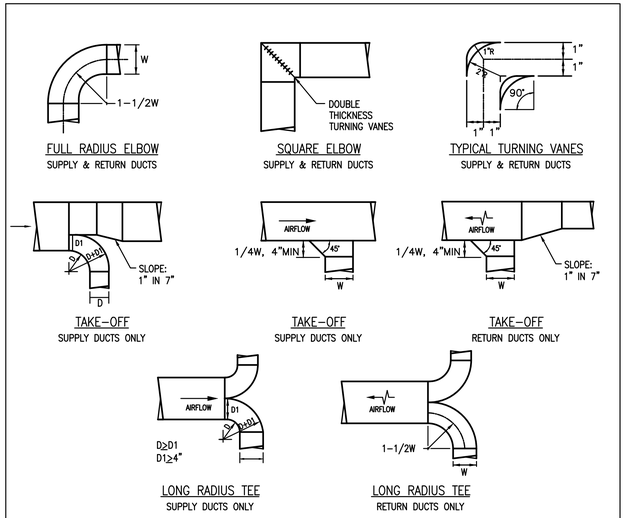


DUCT SIZE	HOLE SIZE	MINIMUM DUCT HEIGHT
5"	8"	9"
6"	9"	10"
7"	10"	11"
8"	11"	12"
9"	12"	13"
10"	13"	14"
12"	15"	16"
14"	17"	18"
16"	19"	20"

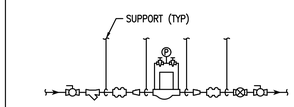
DUCT SIZE	HOLE SIZE	MINIMUM DUCT HEIGHT
5"	–	–
6"	7"	9"
7"	–	–
8"	9"	11"
9"	–	–
10"	11"	13"
12"	–	–
14"	–	–
16"	–	–

DUCT SIZE	HOLE SIZE	MINIMUM DUCT HEIGHT
5"	5"x10"	7"
6"	6"x12"	8"
7"	6"x12"	8"
8"	6.5"x12"	8.5"
9"	6.5"x14"	8.5"
10"	6.5"x16"	8.5"
12"	8.5"x18"	12"
14"	10"x20"	10.5"
16"	–	–

ROUND BRANCH DUCT TAKE-OFF DETAIL | NTS

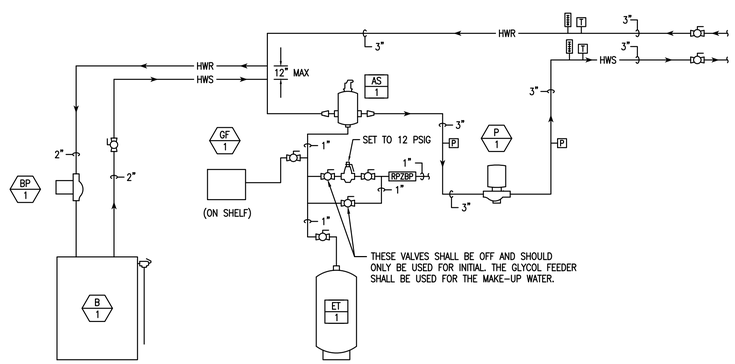


TYPICAL DUCT ELBOWS AND TAKE-OFFS DETAIL | NTS

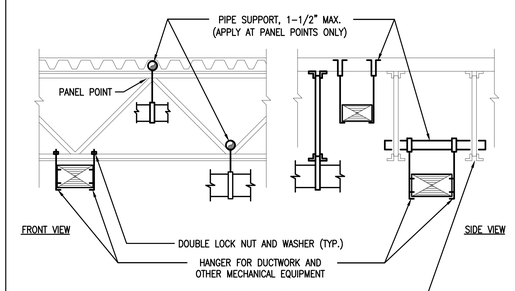


IN-LINE PUMP HYDRONIC PIPING DIAGRAM | NTS

BOILER HYDRONIC PIPING ACCESSORIES	
TAG	DESCRIPTION
AS-1	AIR SEPARATOR, TACO AC02-125, 2" INLET AND OUTLET, 80 GPM AT 2.5 FT WPD
ET-1	EXPANSION TANK, TACO CA215-125, 57 GALLON TANK VOLUME, 57 GALLON ACCEPTANCE VOLUME
GF-1	GLYCOL FEEDER, SKIDMORE MODEL CG-16-22, 16 GALLON TANK, 115V TO 12Vdc POWER SUPPLY (INSTALL FEEDER ON SHELF)



HYDRONIC PIPING DIAGRAM | NTS



NOTES:

1. WHERE POSSIBLE, HANGERS SHALL BE SUSPENDED FROM WIDE FLANGE BEAMS IN LIEU OF JOISTS.
2. PIPES AND EQUIPMENT SHALL NOT BE SUPPORTED FROM METAL DECKS OR BRIDGING.
3. HANGERS AND SUPPORTING MEMBERS SHALL BE LOCATED AT PANEL POINTS OF JOISTS ONLY.
4. THE SUM OF ALL HANGER LOADS SHALL NOT EXCEED 250 LBS. PER JOIST. IF MAXIMUM LOAD WILL BE EXCEEDED, AN ALTERNATE LOADING DETAIL SHALL BE SUBMITTED FOR APPROVAL BY ENGINEER.
5. ALL HANGERS AND SUPPORTS MUST BE COORDINATED WITH ALL OTHER TRADES.
6. ECCENTRIC BEAM LOADING IS NOT ALLOWED.

DUCTWORK JOIST LOADING METHODS DETAIL | NTS

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PROJECT

City Hall Plaza

Warwick, RI

TITLE

MECHANICAL DETAILS

NO.	REVISIONS	DATE

DRAWN BY:	JPK
DESIGNED BY:	JPK
CHECKED BY:	GAA
ISSUE DATE:	01/31/2024
BETA JOB NO.:	10694

SCALE

AS NOTED

Bid Set

SHEET NO.

M3.0

EXPANSION TANK SCHEDULE

SYMBOL	MANUFACTURER	MODEL #	CAPACITY	MAX. ACCEPT. FACTOR	CW SUPPLY	REMARKS
ET-1	AMTROL	ST-12C-DD	6.4 GALLONS	3.2	3/4"	THERM-X-TROL, IN-LINE, ASME RATED, MAX. OPERATING TEMPERATURE – 200°F, MAX. WORKING PRESSURE – 150 PSIG, CHARGE TO CITY WATER PRESSURE.

NOTE:
1. INSTALL PER ALL STATE & LOCAL CODES AND MANUFACTURERS INSTALLATION REQUIREMENTS.

THERMOSTATIC MIXING VALVE SCHEDULE

SYMBOL	MANUFACTURER	MODEL #	FLOW RATE	WATER SUPPLY		REMARKS
				INLETS	OUTLET	
TMV-1	LEONARD	TM-26-LF	10 GPM	1¼"	1¼"	THERMOSTATIC MIXING VALVE, LEAD-FREE, SET TEMPERATURE TO 120°F, MAX DIFF. PRESSURE = 5 PSI. PROVIDE WALL MOUNTING BRACKET.

NOTE:
1. INSTALL PER RI CODE AND MANUFACTURER'S REQUIREMENTS.

DRAIN SCHEDULE

SYMBOL	TYPE	MANUFACTURER	MODEL	OUTLET	STRAINER	REMARKS
FD-1	FLOOR DRAIN	WATTS	FD-100-A	2"	6" DIA. NICKEL BRONZE	CAST IRON BODY, NO-HUB, ADJUSTABLE STRAINER, VANDAL RESISTANT.
FD-2	FLOOR DRAIN	WATTS	FD-100-B	4"	8" DIA. NICKEL BRONZE	CAST IRON BODY, NO-HUB, CAST IRON GRATE, SEDIMENT BUCKET, VANDAL RESISTANT.
TD-1	TRENCH DRAIN	WATTS	D8-EO-RGS	4"	DUCTILE IRON	PRE-SLOPED TRENCH DRAIN, DUCTILE IRON FRAME & REINFORCED GALVANIZED STEEL SLOTTED GRATING. POLYPROPYLENE CHANNELS, NO HUB BOTTOM OR END OUTLET(S). 8' LONG x 6" WIDE. INSTALL PER MANUFACTURER'S INSTRUCTIONS.

NOTES:
1. ALL FLOOR DRAINS & SINKS SHALL HAVE TRAP SEAL GASKETS EQUAL TO "SURE SEAL".
2. INSTALL PER ALL STATE & LOCAL CODES AND MANUFACTURER'S INSTALLATION REQUIREMENTS.

ELECTRIC WATER HEATER SCHEDULE

SYMBOL	MANUFACTURER	MODEL #	CAPACITY	RECOVERY		WATER SUPPLY		ELECTRICAL					REMARKS
				GPH	ΔT	CW	HW	AMPS	WATTS	VOLTS	PHASE	HZ	
EWH-1	STATE	PCE 20	20 GALLONS	20	80°	1¼"	1¼"	–	4 KW	208	1	60	SHELF MOUNTED ELECTRIC WATER HEATER LOCATED ABOVE SERVICE SINK. PROVIDE & INSTALL DRAIN PAN. COORDINATE EXACT LOCATION WITH ARCHITECT PRIOR TO INSTALLATION. PIPE DRAIN LINES TO FLOOR DRAIN. WATER HEATER SHALL HAVE 150 PSI WORKING PRESSURE.

NOTES:
1. INSTALL PER ALL STATE & LOCAL CODES AND MANUFACTURERS INSTALLATION REQUIREMENTS.

GAS FIRED WATER HEATER SCHEDULE

SYMBOL	MANUFACTURER	MODEL #	CAPACITY	RECOVERY		WATER SUPPLY		GAS	ELECTRICAL					REMARKS
				GPH	ΔT	CW	HW	CFH	AMPS	WATTS	VOLTS	PHASE	HZ	
GWH-1	A.O. SMITH	BTH-120	60 GALLONS	138	100°	1¼"	1¼"	120	–	–	120	1	60	GAS-FIRED WATER HEATER, 1¼" GAS CONNECTION, 3.5"W.C.-14"W.C., 98% HIGH EFFICIENCY. 4" INTAKE & EXHAUST FLUES, UL LISTED MATERIAL APPROVED FOR USE AS FLUE GAS VENT. COORDINATE EXACT LOCATIONS WITH ARCHITECT PRIOR TO INSTALLATION. COORDINATE DRAIN LINE TO FLOOR DRAIN.
GWH-2	A.O. SMITH	BTH-250	100 GALLONS	291	100°	1¼"	1¼"	250	–	–	120	1	60	GAS-FIRED WATER HEATER, 1¼" GAS CONNECTION, 3.5"W.C.-14"W.C., 98% HIGH EFFICIENCY. 4" INTAKE & EXHAUST FLUES, UL LISTED MATERIAL APPROVED FOR USE AS FLUE GAS VENT. COORDINATE EXACT LOCATIONS WITH ARCHITECT PRIOR TO INSTALLATION. COORDINATE DRAIN LINE TO FLOOR DRAIN.

NOTES:
1. INSTALL PER ALL STATE & LOCAL CODES AND MANUFACTURER'S INSTALLATION REQUIREMENTS. PROVIDE CONDENSATE NEUTRALIZING KITS AT EACH WATER HEATER FOR CONDENSATE DRAIN.

PLUMBING FIXTURE SCHEDULE

SYMBOL	DESCRIPTION	FIXTURE				FIXTURE			SERVICES					REMARKS
		MANUFACTURER	MODEL	TYPE	SIZE	MANUFACTURER	MODEL	TYPE	S/W	V	CW	HW	TW	
P-1	WATER CLOSET	AMERICAN STANDARD	3451.001	FLOOR MOUNTED	1.28 GPF	AMERICAN STANDARD	6065.121.002	SENSOR FLUSH VALVE	4"	2"	1"	–	–	VITREOUS CHINA, ELONGATED, LOW CONSUMPTION SENSOR FLUSH VALVE. PROVIDE OPEN FRONT SEAT AMERICAN STANDARD #5901.100 OR EQUAL. PROVIDE WALL CARRIER. PROVIDE HEAVY DUTY CHROME PLATED SUPPLY & STOP. BARRIER FREE, ADA COMPLIANT. COORDINATE INSTALLATION OF ADA FIXTURES W/ ARCHITECTURAL DRAWINGS.
P-1A	WATER CLOSET – ADA	AMERICAN STANDARD	3461.001	FLOOR MOUNTED	1.28 GPF	AMERICAN STANDARD	6065.121.002	SENSOR FLUSH VALVE	4"	2"	1"	–	–	VITREOUS CHINA, ELONGATED, LOW CONSUMPTION SENSOR FLUSH VALVE. PROVIDE OPEN FRONT SEAT AMERICAN STANDARD #5901.100 OR EQUAL. PROVIDE WALL CARRIER. PROVIDE HEAVY DUTY CHROME PLATED SUPPLY & STOP. BARRIER FREE, ADA COMPLIANT. COORDINATE INSTALLATION OF ADA FIXTURES W/ ARCHITECTURAL DRAWINGS.
P-2	LAVATORY	AMERICAN STANDARD	0495.221	UNDER MOUNT	17⅛"x14⅛"	AMERICAN STANDARD	605B.105	SENSOR	1-1/2"	1-1/2"	1/2"	1/2"	1/2"	UNDER COUNTER MOUNTED, VITREOUS CHINA, DECK MOUNTED SINGLE HOLE FAUCET, 0.5 GPM SENSOR FAUCET, PROVIDE #PK00.WRK BATTERY POWERED PACK, #605XTMV1070 THERMOSTATIC MIXING VALVE. PROVIDE GRID DRAIN W/ OVERFLOW. PROVIDE OFFSET P-TRAP & TRUEBRO LAVGUARD INSULATION ON EXPOSED PIPING. BARRIER FREE, ADA COMPLIANT. COORDINATE INSTALLATION OF ADA FIXTURES W/ ARCHITECTURAL DRAWINGS.
P-3	URINAL	AMERICAN STANDARD	6590.001	WALL HUNG	0.5 GPF	AMERICAN STANDARD	6063.051	SENSOR FLUSH VALVE	2"	2"	1/2"	–	–	VITREOUS CHINA, TOP-SPUD FLUSH VALVE, LOW CONSUMPTION SENSOR FLUSH VALVE. PROVIDE WALL CARRIER. PROVIDE HEAVY DUTY CHROME PLATED SUPPLY & STOP.
P-3A	URINAL – ADA	AMERICAN STANDARD	6590.001	WALL HUNG	0.5 GPF	AMERICAN STANDARD	6063.051	SENSOR FLUSH VALVE	2"	2"	1/2"	–	–	VITREOUS CHINA, TOP-SPUD FLUSH VALVE, LOW CONSUMPTION SENSOR FLUSH VALVE. PROVIDE HEAVY DUTY CHROME PLATED SUPPLY & STOP. BARRIER FREE, ADA COMPLIANT. COORDINATE INSTALLATION OF ADA FIXTURES W/ ARCHITECTURAL DRAWINGS.
P-4	EXTERIOR DRINKING FOUNTAIN	ELKAY	EDFP217C	WALL HUNG	BI LEVEL	–	–	–	1-1/2"	1-1/2"	1/2"	–	–	OUTDOOR WATER COOLER – BARRIER FREE, ADA COMPLIANT. COORDINATE INSTALLATION OF ADA FIXTURES W/ ARCHITECTURAL DRAWINGS.
P-5	SERVICE SINK	FIAT	MSB2424	FLOOR MOUNTED	24"x24"x10"	CHICAGO	540-LD897SGCCP	MANUAL	3"	2"	1/2"	1/2"	–	FLOOR MOUNTED, PRECAST TERAZZO. WALL MOUNTED CHROME PLATED LEVER FAUCET, VACUUM BREAKER. PROVIDE SPLASH GUARD, MOP & HOSE BRACKETS.
P-6	EMERGENCY SHOWER/EYEWASH	GUARDIAN	G1950P	FLOOR MOUNTED	–	GUARDIAN	G3800	–	–	–	1-1/4"	1-1/4"	1-1/4"	COMBINATION EYE/FACEWASH & SHOWER SAFETY STATION. CHROME PLATED SHOWER VALVE FURNISHED W/ STAINLESS STEEL ARM & PULL ROD. TWO SPRAY HEADS W/ DUST COVERS. INTERNAL FLOW CONTROL & FILTER. OSHA APPROVED GUARDIAN MODEL #G3800 EMERGENCY THERMOSTATIC MIXING VALVE W/ TEMPERATURE SET AT 80°.
HB-1	HOSE BIBB	JR SMITH	5670-H-CP	WALL MOUNTED	3½"x2¾"	–	–	–	–	–	1/2"	–	–	BRASS BODY, VACUUM BREAKER AND REMOVABLE WHEEL HANDLE.
HB-2	HOSE BIBB	LEONARD	SW-75-EVBD	WALL MOUNTED	25"x10"	–	–	–	–	–	1/2"	–	–	MANUAL WATER BLENDER HOSE RACK – TWO STOP AND CHECK VALVES W/ COLOR CODED HEAT RESISTANT HANDLES, MIXING CHAMBER, DIAL THERMOMETER, VACUUM BREAKER, HOSE CONNECTION & STAINLESS STEEL HOSE RACK. 125 PSI MAX WATER PRESSURE. COORDINATE MOUNTING HEIGHTS W/ ARCHITECT.
WH-1	WALL HYDRANT	JR SMITH	5509QT-WC-CP	WALL MOUNTED	4"x2½"	–	–	–	–	–	3/4"	–	–	EXPOSED WALL MOUNTED, CHROME PLATED, NON-FREEZE WALL HYDRANT W/ INTEGRAL VACUUM BREAKER AND STAINLESS STEEL RECESSED LOCKABLE BOX.

NOTES:
1. ALL BARRIER FREE & ADA FIXTURES SHALL BE INSTALLED PER ADA AND STATE REQUIREMENTS.
2. ALL PLUMBING FIXTURES, EQUIPMENT & ACCESSORIES SHALL BE INSTALLED PER MANUFACTURER'S REQUIREMENTS.
3. REFER TO ARCHITECTURAL DRAWINGS FOR PLUMBING FIXTURE, INCLUDING ADA FIXTURE, MOUNTING HEIGHTS.

PLUMBING GENERAL NOTES

1. GENERAL NOTES, SYMBOLS LIST AND DETAILS ARE APPLICABLE TO ALL PLUMBING DRAWINGS.
2. DRAWINGS ARE DIAGRAMMATIC: DETERMINE LOCATIONS OF SYSTEMS AND COMPONENTS IN FIELD. DO NOT SCALE DRAWINGS.
3. NEITHER ACCURACY NOR COMPLETION OF UTILITY LOCATIONS SHOWN ON DRAWINGS IS GUARANTEED. DETERMINE EXACT LOCATIONS OF EXISTING UTILITIES IN FIELD, WHETHER OR NOT SHOWN ON DRAWINGS. EXERCISE CAUTION AND IDENTIFY LOCATIONS OF UNMARKED UTILITY LINES AS NECESSARY TO PERFORM WORK OF THIS SECTION.
4. ALL PLUMBING WORK SHALL BE IN ACCORDANCE WITH THE PRESIDING PLUMBING CODE AND ALL APPLICABLE LOCAL CODES.
5. IT SHALL BE THE RESPONSIBILITY OF THIS CONTRACTOR TO COORDINATE WORK WITH THAT OF ALL OTHER TRADES, INCLUDING (BUT NOT LIMITED TO), ELECTRICAL, HVAC, PROCESS PIPING, FIRE PROTECTION, STRUCTURAL AND GENERAL ARCHITECTURE.
6. ANY INTERFERENCE SHALL BE BROUGHT TO THE ATTENTION OF THE GENERAL CONTRACTOR, AND/OR THE OWNER'S REPRESENTAITVE, AND RESOLVED PRIOR TO THE INSTALLATION OF THE WORK INVOLVED.
7. ALL PIPING PENETRATING CEILINGS AND WALLS SHALL BE INSTALLED WITH CHROME (STAINLESS WHERE NOTED) PLATED ESCUTCHEONS AT THE PENETRATION. ALL PIPING PENETRATING EXTERIOR WALLS AND ROOFS SHALL BE FLASHED IN AN APPROVED MANNER AND SHALL BE SEALED WEATHERTIGHT. PIPING PENETRATING RATED PARTITIONS SHALL BE PROTECTED WITH UL LISTED SEALS OF EQUAL RATING AND AS REQUIRED BY LOCAL CODE AUTHORITY.
8. MANUFACTURERS' MODEL NUMBERS ARE SPECIFIED SOLELY TO ESTABLISH STANDARDS OF QUALITY FOR PERFORMANCE AND MATERIALS.
9. ALL PRODUCT INSTALLATION SHALL ADHERE TO THE MANUFACTURERS' RECOMMENDATIONS.
10. PROVIDE ACCESS PANELS FOR ALL EQUIPMENT THAT REQUIRES PERIODIC SERVICE AND FOR ALL VALVES.
11. CONTRACTOR SHALL COORDINATE ELECTRICAL CHARACTERISTICS AND REQUIREMENTS OF ALL PLUMBING EQUIPMENT WITH THE ELECTRICAL DRAWINGS, AND SHALL FURNISH EQUIPMENT WIRED FOR THE VOLTAGES SHOWN HEREIN.
12. ALL PLUMBING EQUIPMENT, PIPING, INSULATION, ETC., INSTALLED IN HVAC PLENUM SPACES SHALL MEET CODE REQUIREMENTS FOR SMOKE AND COMBUSTIBILITY.
13. PROVIDE SHUTOFF VALVES ON ALL BRANCH PIPING AND SUPPLIES TO INDIVIDUAL FIXTURES AND EQUIPMENT. PROVIDE BALL VALVES ON ALL WATER MAIN BRANCHES IN CORRIDORS AND WHERE INDICATED ON DRAWINGS. ALL VALVES SHALL BE ACCESSIBLE.
14. ALL SLEEVES THROUGH CONCRETE FLOORS AND ALL CORE DRILLING OF CONCRETE FLOORS AND WALLS SHALL BE BY THIS CONTRACTOR. CONCRETE PADS AND PLATFORMS FOR WORK OF THIS SECTION WILL BE PROVIDED BY GENERAL CONTRACTOR. PROVIDE INFORMATION AS NECESSARY TO COORDINATE WORK.
15. RUN PIPING CONCEALED WHERE POSSIBLE, UNLESS SPECIFIED OTHERWISE.
16. STRUCTURAL WELDING SHALL BE 1/4-INCH FILLET UNLESS REQUIRED OTHERWISE.
17. PROVIDE CLAMPS, OFFSETS, EXPANSION JOINTS, ANCHORS AND GUIDES AS NECESSARY TO PREVENT STRESS ON PIPING.
18. PROVIDE BALANCING VALVES AT SYSTEM LOOP RETURNS AND AT RETURN RISERS, PROVIDE SHUTOFF VALVES AT SYSTEM LOOP SUPPLIES AND SUPPLY RISERS.
19. PROVIDE VENTS AT HIGH POINTS IN PIPING SYSTEMS AND DRAIN VALVES AT LOW POINTS.
20. PROVIDE GAUGE FITTINGS AND THERMOMETER WELLS AT HOT WATER SUPPLY AND RETURN BRANCHES AND AT PUMP INLETS AND OUTLETS.
21. VERIFY EXACT SIZES, LOCATIONS, INVERTS AND ELEVATIONS PRIOR TO RUNNING ANY PIPING. REFER TO ARCHITECTURAL DRAWINGS AND FOOD SERVICE DRAWINGS FOR EXACT LOCATIONS OF ALL FIXTURES AND EQUIPMENT.
22. PIPE SUPPORTS FOR PLUMBING IN BUILDING SHAFTS ARE BY THIS CONTRACTOR. CAREFULLY COORDINATE WITH PLACEMENT OF STEEL GRATE SUPPORT BEAMS. SHAFT PIPE SUPPORT SHALL BEAR FROM WALL AND FROM FLOOR SUPPORT BEAMS.
23. GENERAL FLOOR CONTROL VALVES OF PIPED SERVICES SHALL BE IN THE PIPE SHAFTS UNLESS OTHERWISE INDICATED.
24. OBTAIN GAS PERMITS AND DEFRAY ALL COSTS INCIDENTAL TO THE GAS PIPING SYSTEM. CONTRACTORS WORK SHALL COMMENCE ON THE HOUSE SIDE OF THE UTILITY COMPANY METER.
25. A SUITABLE DRIP OF CONDENSATE POCKET SHALL BE INSTALLED AT THE BOTTOM OF ALL GAS RISERS.
26. ALL GAS PIPING TO COMPLY WITH LOCAL AND STATE CODES.
27. GAS PIPING AND SAFETY DEVICES SHALL CONFORM TO REQUIREMENTS OF NFPA 54 AND SHALL BE SUBJECT TO THE INSPECTION AND APPROVAL OF THE AUTHORITY HAVING JURISDICTION.
28. PROVIDE A SUITABLE GAS COCK VALVE AT EACH BRANCH RUNOUT FROM THE MAIN SERVING GAS OUTLETS AND INDIVIDUAL GAS FIXTURES.
29. GAS PIPING SHALL BE TESTED ACCORDING TO THE STATE FUEL GAS CODE AND NATIONAL CODE PROVISIONS OF THE LOCAL PLUMBING INSPECTOR. IF INSPECTION OF THE TEST SHOWS DEFECTS, SUCH DEFECTIVE WORK AND MATERIAL SHALL BE REPLACED AND INSPECTION AND TEST SHALL BE REDONE.
30. PLUMBING CONTRACTOR IS RESPONSIBLE FOR EXTENDING ALL REGULATOR VENTS TO ATMOSPHERE. REGULATORS ARE PART OF EQUIPMENT GAS TRAIN. PIPE ALL GAS TRAN VENTS FROM HVAC BOILERS TO ATMOSPHERE.
31. NO PIPING SHALL RUN OVER ELECTRICAL PANELS.
32. ALL PIPING THAT PENETRATES FLOORS OR FIRE RATED WALLS SHALL BE FIRE STOPPED W/ HILTI CAULKING PER MANUFACTURERS RECOMMENDATIONS.
33. ELECTRICAL SUB CONTRACTOR IS RESPONSIBLE FOR PROVIDING POWER TO ALL EQUIPMENT AND CONTROLS WITHIN THE PLUMBING SYSTEMS FOR THIS PROJECT.
34. PC TO ORGANIZE/LOCATE CUT OUTS FOR PIPING/CONDUITS RUNNING PERPENDICULAR TO THE FLOOR JOISTS W/ GC. COORDINATE AND VERIFY IN FIELD.
35. COORDINATE ALL CEILING AND WALL MOUNTED FIXTURES AND EQUIPMENT WITH ARCHITECTURAL DRAWING. LOCATE FIXTURES AND EQUIPMENT AS INDICATED ON ARCHITECTURAL DRAWINGS WHERE ACCEPTABLE BY CODE.
36. ALL SLEEVES THROUGH CONCRETE FLOORS AND FIRE RATED WALLS OR PARTITIONS SHALL BE FIRE STOPPED WITH UL RATED ASSEMBLIES OF EQUAL FIRE RATING.

PLUMBING LEGEND

CW	COLD WATER
CW	COLD WATER BELOW FLOOR OR BURIED
HW	HOT WATER
HWR	HOT WATER RECIRCULATION
S / W	SOIL OR WASTE
S/W	SOIL OR WASTE BELOW FLOOR OR BURIED
V	VENT
V	VENT BELOW FLOOR OR BURIED
G	NATURAL OR PROPANE GAS
GV	GAS VENT
AI	AIR INTAKE
	CONTINUATION
UP / RISER	PIPE RISER
DR / DN	PIPE DROP OR DOWN
TEE	PIPE TEE
	BALL VALVE
	GATE VALVE
	SOLENOID VALVE
PRV	PRESSURE REDUCING VALVE
VIV	VALVE IN VERTICAL
CV	CHECK VALVE
	GAS SHUT-OFF VALVE
BVA	BALANCING VALVE ASSEMBLY
W & T	WASTE & TRAP
CO, WCO	CLEANOUT PLUG OR WALL CLEANOUT
FCO	FLOOR CLEANOUT
	CAPPED PIPE
	ARROW INDICATES DIRECTION OF FLOW
.01	ARROW INDICATES DIRECTION OF SLOPE
	UNION
WTS	WATERTIGHT SLEEVE
HB	HOSE BIBB
WH	WALL HYDRANT
	INLINE PUMP OR CIRCULATOR
FD	FLOOR DRAIN
FS	FLOOR SINK
TD	TRENCH DRAIN
RPBP	REDUCED PRESSURE BACKFLOW PREVENTER
WM	WATER METER
GM	GAS METER
T	THERMOMETER
PG	PRESSURE GAUGE WITH PETCOCK
T&P	TEMPERATURE AND PRESSURE RELIEF VALVE
VTR	VENT THRU ROOF
VIF	VERIFY EXACT LOCATION, SIZE & LOCATION IN FIELD
I.E.	INVERT ELEVATION
TYP	TYPICAL
NTS	NOT TO SCALE
AFF	ABOVE FINISHED FLOOR
FFE	FINISHED FLOOR ELEVATION
F&I	FURNISH & INSTALL
LPC	LIMIT OF PLUMBING CONTRACT
GC	GENERAL CONTRACTOR
FPC	FIRE PROTECTION CONTRACTOR
PC	PLUMBING CONTRACTOR
EC	ELECTRICAL CONTRACTOR
HVAC	HVAC CONTRACTOR
S=.01	SLOPE = 1/8" PER FOOT
S=.02	SLOPE = 1/4" PER FOOT

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PROJECT

City Hall Plaza

Warwick, RI

TITLE

CONCESSION BUILDING PLUMBING LEGEND, NOTES & SCHEDULES

NO.	REVISIONS	DATE

DRAWN BY:	AG
DESIGNED BY:	AG
CHECKED BY:	ARV
ISSUE DATE:	01/31/2024
BETA JOB NO.:	10694

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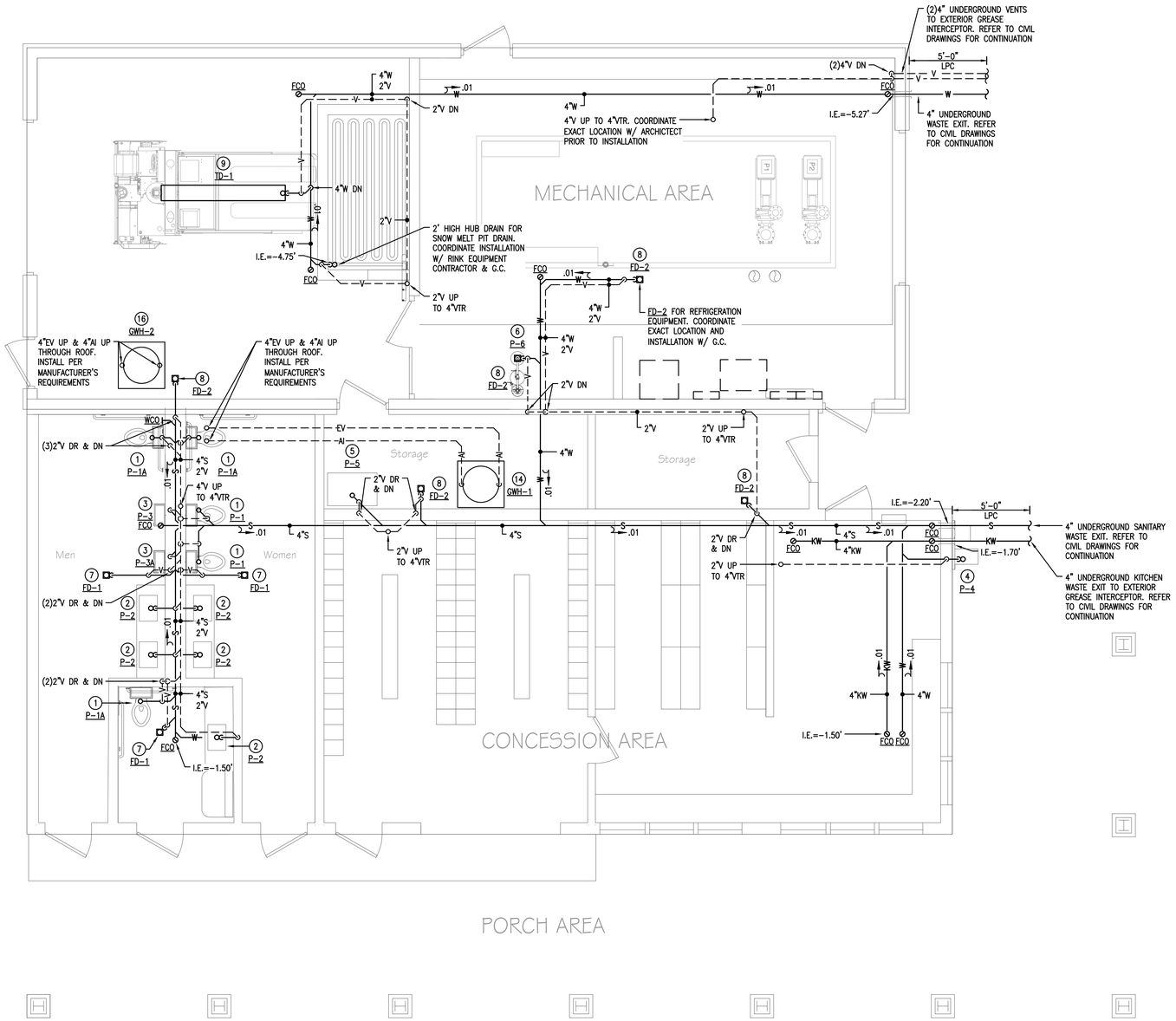
P0.1

NOTE:
COORDINATE INSTALLATION OF PLUMBING EQUIPMENT AND PIPING WITH RINK EQUIPMENT INSTALLING CONTRACTOR & GC



CONCESSION BUILDING PLUMBING SANITARY WASTE & VENT PLAN

SCALE: 1/4" = 1'-0"

PLUMBING KEY NOTES

1. NEW FLOOR MOUNTED WATERCLOSET W/ FLUSH VALVE: 1"CW DR, 4"S DN & 2"V DR
2. NEW UNDERMOUNT LAVATORY & FAUCET: 1/2"CW DR, 1/2"HW DR, 1½"W DN, 1½"V DR
3. NEW WALL HUNG URINAL W/ FLUSH VALVE: ¾"CW DR, 2"S DN, 1½"V DR
4. NEW EXTERIOR DRINKING FOUNTAIN: ½"CW DR, 1½"W DN, 1½"V DR
5. NEW FLOOR MOUNTED SERVICE SINK & FAUCET: 1/2"CW DR, 1/2"HW DR, 3"W DN, 2"V DN
6. NEW EMERGENCY EYE WASH & SHOWER W/ MIXING VALVE: ½"CW DR, ½"HW DR, ½"TW
7. NEW 2" FLOOR DRAIN: 2"W DN, 2"V DN
8. NEW 4" FLOOR DRAIN: 4"W DN, 2"V DN
9. NEW 4" TRENCH DRAIN: 4"W DN, 2"V DN
10. NEW WALL MOUNTED HOSE BIBB: 1/2"CW DR
11. NEW WALL MOUNTED HOSE RACK: 1"CW DR, 1"HW DR
12. NEW EXTERIOR WALL HYDRANT: 3/4"CW DR
13. NEW 20 GALLON ELECTRIC WATER HEATER: 1¼"CW DR, 1¼"HW DR, ¾"TW
14. NEW 60 GALLON GAS-FIRED WATER HEATER: 1¼"CW DR, 1¼"HW DR, ¾"TW, 1¼"G DR (120 CFH)
15. NEW THERMOSTATIC MIXING VALVE: 1¼"CW DR, 1¼"HW(140°F) DR, 1¼"HW(120°F) DR, ¾"HWR DR
16. NEW 100 GALLON GAS-FIRED WATER HEATER: 1¼"CW DR, 1¼"HW DR, ¾"TW, 1½"G DR (250 CFH)

NOTE:
CONNECT ALL DOMESTIC WATER, SANITARY WASTE & VENT AND NATURAL GAS SUPPLY PIPING FROM NEW FIXTURES & EQUIPMENT TO RESPECTIVE MAIN LINES. COORDINATE EXACT LOCATIONS IN FIELD PRIOR TO INSTALLATION. TRENCH PIPING AS REQUIRED.

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Warwick, RI

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CONCESSION BUILDING PLUMBING SANITARY WASTE & VENT PLAN

NO.	REVISIONS	DATE

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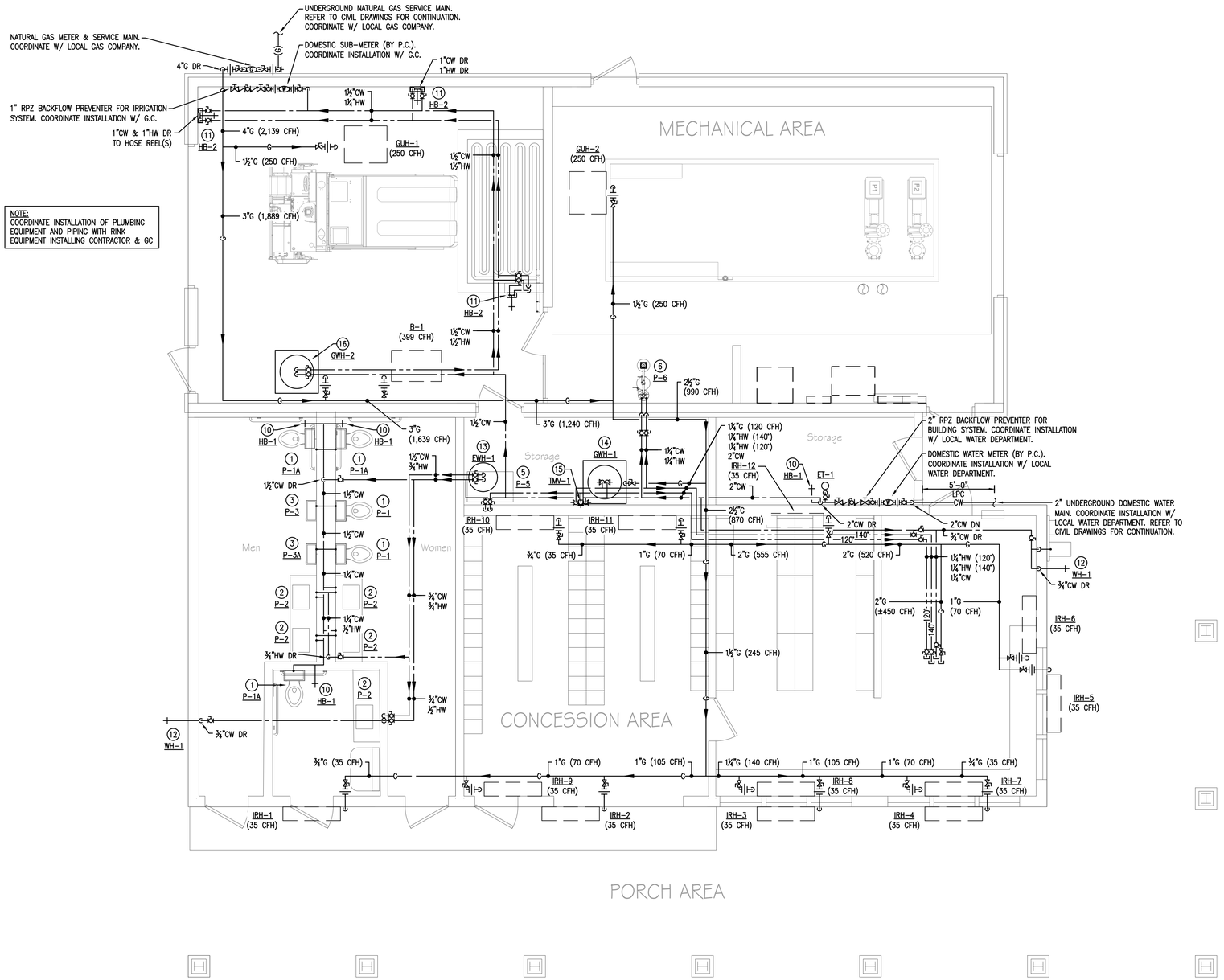
P1.0



NOTE:
COORDINATE INSTALLATION OF PLUMBING EQUIPMENT AND PIPING WITH RINK EQUIPMENT INSTALLING CONTRACTOR & GC

PLUMBING KEY NOTES

1. NEW FLOOR MOUNTED WATERCLOSET W/ FLUSH VALVE: 1"CW DR, 4"S DN & 2"V DR
2. NEW UNDERMOUNT LAVATORY & FAUCET: 1/2"CW DR, 1/2"HW DR, 1½"W DN, 1½"V DR
3. NEW WALL HUNG URINAL W/ FLUSH VALVE: ¾"CW DR, 2"S DN, 1½"V DR
4. NEW EXTERIOR DRINKING FOUNTAIN: ½"CW DR, 1½"W DN, 1½"V DR
5. NEW FLOOR MOUNTED SERVICE SINK & FAUCET: 1/2"CW DR, 1/2"HW DR, 3"W DN, 2"V DN
6. NEW EMERGENCY EYE WASH & SHOWER W/ MIXING VALVE: ½"CW DR, ½"HW DR, ½"TW
7. NEW 2" FLOOR DRAIN: 2"W DN, 2"V DN
8. NEW 4" FLOOR DRAIN: 4"W DN, 2"V DN
9. NEW 4" TRENCH DRAIN: 4"W DN, 2"V DN
10. NEW WALL MOUNTED HOSE BIBB: 1/2"CW DR
11. NEW WALL MOUNTED HOSE RACK: 1"CW DR, 1"HW DR
12. NEW EXTERIOR WALL HYDRANT: 3/4"CW DR
13. NEW 20 GALLON ELECTRIC WATER HEATER: 1¼"CW DR, 1¼"HW DR, ¾"TW
14. NEW 60 GALLON GAS-FIRED WATER HEATER: 1¼"CW DR, 1¼"HW DR, ¾"TW, 1¼"G DR (120 CFH)
15. NEW THERMOSTATIC MIXING VALVE: 1¼"CW DR, 1¼"HW(140°F) DR, 1¼"HW(120°F) DR, ¾"HWR DR
16. NEW 100 GALLON GAS-FIRED WATER HEATER: 1¼"CW DR, 1¼"HW DR, ¾"TW, 1½"G DR (250 CFH)

NOTE:
CONNECT ALL DOMESTIC WATER, SANITARY WASTE & VENT AND NATURAL GAS SUPPLY PIPING FROM NEW FIXTURES & EQUIPMENT TO RESPECTIVE MAIN LINES. COORDINATE EXACT LOCATIONS IN FIELD PRIOR TO INSTALLATION. TRENCH PIPING AS REQUIRED.

CONCESSION BUILDING PLUMBING DOMESTIC WATER & GAS PLAN

SCALE: 1/4" = 1'-0"

PREPARED BY

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PROJECT

City Hall Plaza

Warwick, RI

TITLE

CONCESSION BUILDING PLUMBING DOMESTIC WATER & GAS PLAN

NO.	REVISIONS	DATE

DRAWN BY:	AG
DESIGNED BY:	AG
CHECKED BY:	ARV
ISSUE DATE:	01/31/2024
BETA JOB NO.:	10694

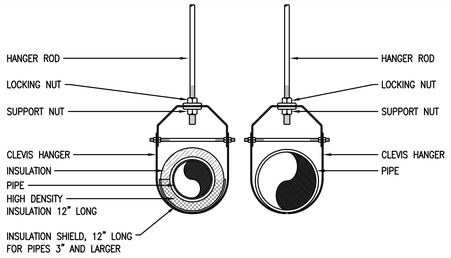
SCALE

AS NOTED

Bid Set

SHEET NO.

P1.1

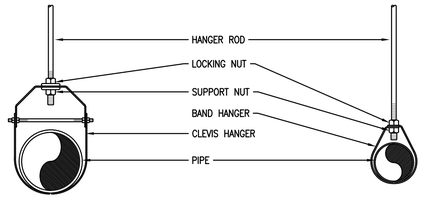


HANGER ROD SCHEDULE	
PIPE SIZE	ROD SIZE
UP TO 2"	3/8" DIA.
2 1/2" THRU 3"	1/2" DIA.
4" AND 5"	5/8"
6" – 8"	3/4"
10 & 12"	7/8"

HANGER ROD SPACING	
PIPE SIZE	MAX. ALLOWABLE SPACING
1"	7'
1 1/4"	8'
1 1/2"	9'
2"	10'
2 1/2"	11'
3" – 12"	12'

INSULATED AND NON INSULATED PLUMBING SYSTEMS

1 CLEVIS PIPE HANGER/ROD INSTALLATION NTS



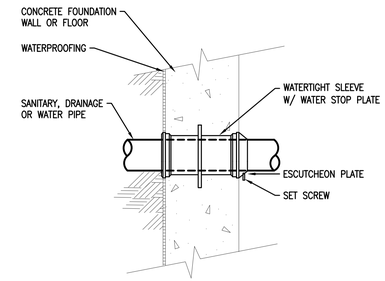
5-INCH AND LARGER

4-INCH AND SMALLER

HANGER ROD SCHEDULE	
PIPE SIZE	ROD SIZE
UP TO 2"	3/8" DIA.
2 1/2" & 3"	1/2" DIA.
4" AND 5"	5/8"
6" – 8"	3/4"
10 & 12"	7/8"

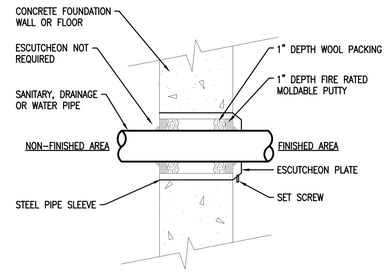
HANGER ROD SPACING	
PIPE SIZE	MAX. ALLOWABLE SPACING
1"	7'
1 1/4"	8'
1 1/2"	9'
2"	10'
2 1/2"	11'
3" – 12"	12'

2 CLEVIS-BAND HANGER/ROD INSTALLATION NTS

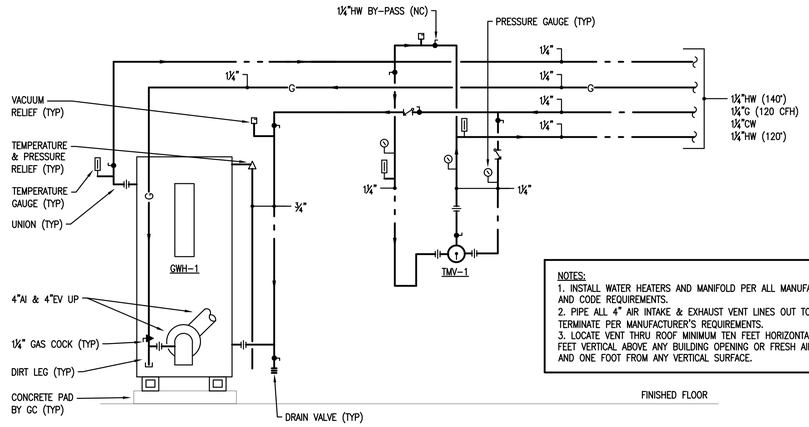


3 NEW CONSTRUCTION WATER TIGHT SLEEVE NTS

NOTE:
FIRESTOP SEALANTS AND PIPING PENETRATIONS THROUGH FIRE RATED ASSEMBLIES SHALL COMPLY WITH THE UL FIRE RESISTANCE DIRECTORY.

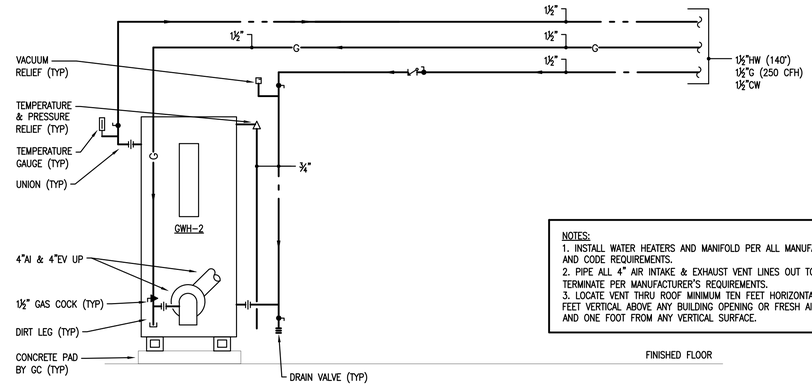


4 MASONRY WALL FIRE RATED SLEEVE NTS



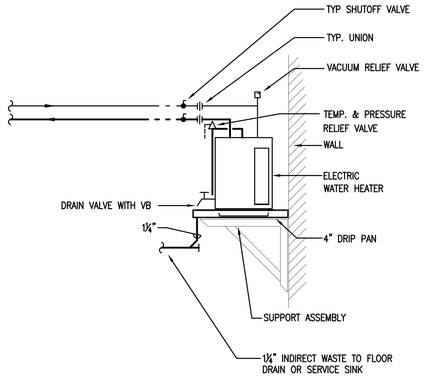
NOTES:
1. INSTALL WATER HEATERS AND MANIFOLD PER ALL MANUFACTURER'S AND CODE REQUIREMENTS.
2. PIPE ALL 4" AIR INTAKE & EXHAUST VENT LINES OUT TO EXTERIOR. TERMINATE PER MANUFACTURER'S REQUIREMENTS.
3. LOCATE VENT THRU ROOF MINIMUM TEN FEET HORIZONTAL OR THREE FEET VERTICAL ABOVE ANY BUILDING OPENING OR FRESH AIR INTAKE, AND ONE FOOT FROM ANY VERTICAL SURFACE.

5 GAS FIRED WATER HEATER DIAGRAM (GHW-1) NTS

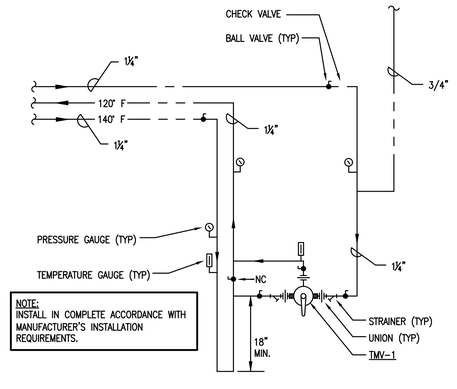


NOTES:
1. INSTALL WATER HEATERS AND MANIFOLD PER ALL MANUFACTURER'S AND CODE REQUIREMENTS.
2. PIPE ALL 4" AIR INTAKE & EXHAUST VENT LINES OUT TO EXTERIOR. TERMINATE PER MANUFACTURER'S REQUIREMENTS.
3. LOCATE VENT THRU ROOF MINIMUM TEN FEET HORIZONTAL OR THREE FEET VERTICAL ABOVE ANY BUILDING OPENING OR FRESH AIR INTAKE, AND ONE FOOT FROM ANY VERTICAL SURFACE.

6 GAS FIRED WATER HEATER DIAGRAM (GHW-2) NTS

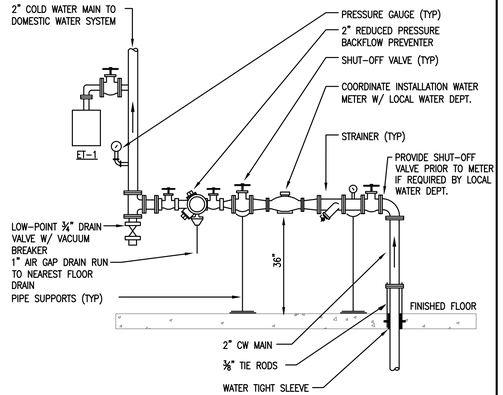


7 WALL MOUNTED EWH DIAGRAM NTS

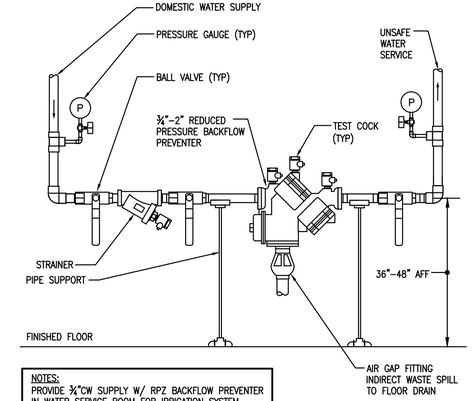


NOTE:
INSTALL IN COMPLETE ACCORDANCE WITH MANUFACTURER'S INSTALLATION REQUIREMENTS.

8 THERMOSTATIC MIXING VALVE ASSEMBLY NTS



9 DOMESTIC WATER SERVICE NTS



NOTES:
PROVIDE ¾"CW SUPPLY W/ RPZ BACKFLOW PREVENTER IN WATER SERVICE ROOM FOR IRRIGATION SYSTEM. REFER TO CONTRACT DRAWINGS FOR LOCATIONS.

10 REDUCED PRESSURE BACKFLOW PREVENTER NTS

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SCALE

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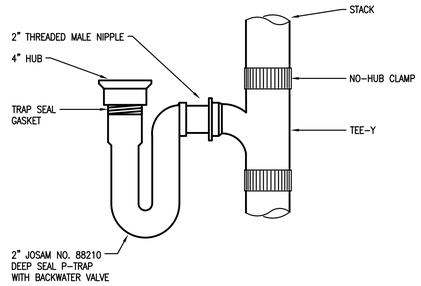
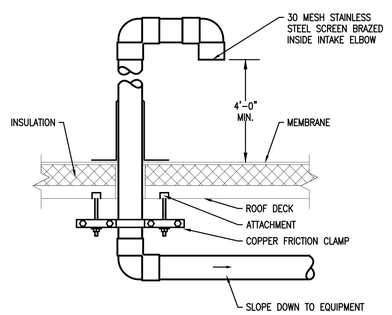
P2.0

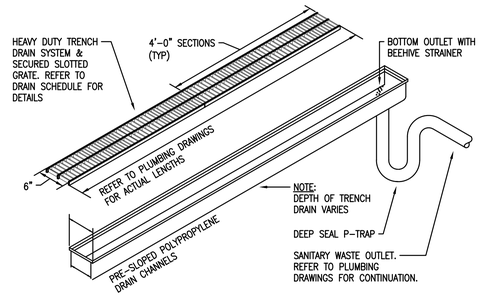


NOTE:
TRAP TO BE INSTALLED ABOVE CEILING. PROVIDE ACCESS PANEL AS REQUIRED.

1 HUB DRAIN DIAGRAM NTS

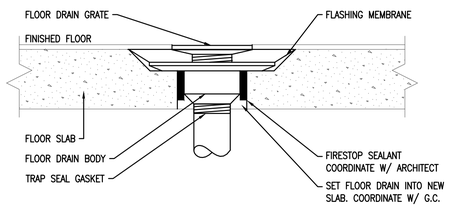


2 FRESH AIR INTAKE THROUGH ROOF NTS

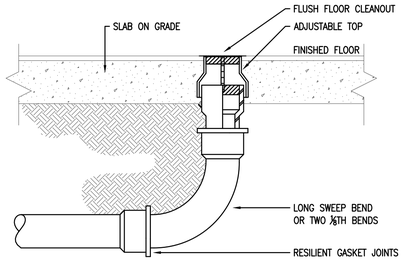


NOTE:
COORDINATE INSTALLATION OF TRENCH DRAIN SYSTEM WITH GC AND RELATED TRADES PRIOR TO INSTALLATION.

3 TRENCH DRAIN DETAIL NTS

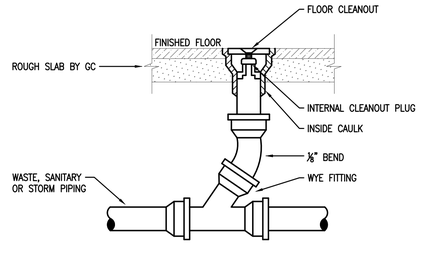


4 FLOOR DRAIN INSTALLATION - NEW SLAB NTS



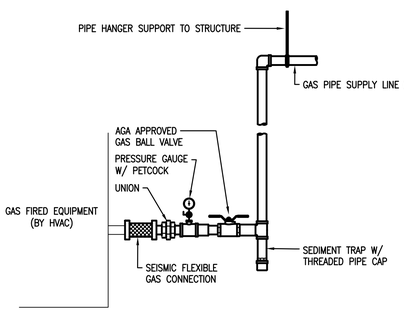
NOTE:
REFER TO CONTRACT SPECIFICATIONS FOR CLEANOUT TYPE

5 END OF RUN FCO INSTALLATION NTS

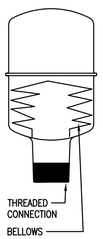


NOTE:
REFER TO CONTRACT SPECIFICATIONS FOR CLEANOUT TYPE

6 IN THE RUN CLEANOUT NTS



7 GAS FIRED EQUIPMENT PIPING DIAGRAM NTS

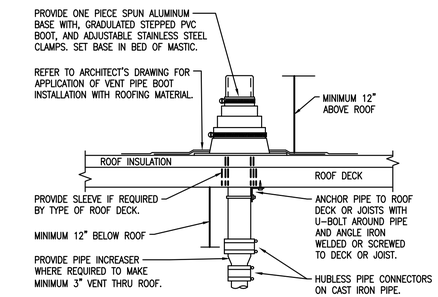


SPECIFICATIONS & NOTES

1. ALL H & CW PIPING, FIXTURES & EQUIPMENT SHALL BE PROTECTED FROM WATER HAMMER EITHER BELLOWS TYPE; HAMMER ARRESTORS OR SHOCK ARRESTORS.
2. ARRESTORS SHALL BE LOCATED IN AN ACCESSIBLE LOCATIONS. PROVIDE RATED ACCESS PANELS WHERE REQUIRED.
3. ALL BRANCH PIPING SUPPLYING FLUSH VALVES SHALL BE PROTECTED BY BELLOWS TYPE SHOCK ARRESTORS MANUFACTURED BY ZURN, J.R. SMITH, AMTROL OR WADE.
4. LOCATE & SIZE BELLOWS TYPE SHOCK ARRESTORS AS PER SELECTED MANUFACTURER'S & PDI-WH201 RECOMMENDATIONS.
5. SUBMIT FOR APPROVAL; MANUFACTURERS DATA, SIZE AND LOCATIONS.

ZURN SHOKTROL Z-1700 SERIES OR APPROVED EQUAL.	100	200	300	400
P.D.I. UNITS	A	B	C	D
W.S.F.U.'S	1-11	12-32	33-60	61-113

8 SHOCK/HAMMER ARRESTOR DETAIL NTS



NOTE:
REFER TO PLANS FOR VTR PIPE SIZES AND LOCATIONS. LOCATE VENT THRU ROOF MINIMUM TEN FEET HORIZONTAL OR THREE FEET VERTICAL ABOVE ANY BUILDING OPENING OR FRESH AIR INTAKE, AND ONE FOOT FROM ANY VERTICAL SURFACE. PROVIDE 1" FIBERGLASS INSULATION WITH ALL-SERVICE JACKET ON VENT PIPE INSIDE BUILDING WITHIN SIX FEET OF VENT THRU ROOF LOCATION. VERIFY FLASHING AND COUNTER FLASHING WITH ROOFING CONTRACTOR.

9 VENT THRU ROOF DETAIL NTS

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PLUMBING DETAILS

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BETA JOB NO.:	10694

SCALE

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Bid Set

SHEET NO.

P2.1

LEGEND

	EXISTING	PROPOSED
CENTER LINE		
FLOW ARROW		
BURIED / COVERED		
FENCE	x	x
RISER		
EXISTING MATERIALS TO BE REMOVED		
SECTION		ICE 105
OIL COOLER LINE	OCL	OCL
OIL RETURN LINE	ORL	ORL
HIGH PRESSURE LIQUID REFRIGERANT	HPLR	HPLR
LOW PRESSURE LIQUID REFRIGERANT	LPLR	LPLR
HIGH PRESSURE GAS/VAPOR REFRIGERANT	HPVR	HPVR
LOW PRESSURE GAS/VAPOR REFRIGERANT	LPVR	LPVR
EQUALIZATION LINE	EL	EL
VENT LINE	ATV	ATV
COLD GLYCOL SUPPLY	CGS	CGS
COLD GLYCOL RETURN	CGR	CGR
WARM GLYCOL SUPPLY	WGS	WGS
WARM GLYCOL RETURN	WGR	WGR
CONDENSER WATER SUPPLY	CS	CS
CONDENSER WATER RETURN	CR	CR
KEYNOTE		1
CONTINUATION - SAME SHEET		1
CONTINUATION - SEPARATE SHEET		1

EQUIPMENT TAGS

P1

B	BOILER	P	PUMP
C	COMPRESSOR	PU	PUMPER DRUM
CP	CHEMICAL FEED PUMP	SP	SUMP PUMP
CU	CONDENSING UNIT	T	TANK
EH	ELECTRIC UNIT HEATER	V	VESSEL
EF	EXHAUST FAN	WH	WATER HEATER
H	HEAT EXCHANGER	WS	WATER SOFTNER
L	LOUVER		

SYMBOLS

- AIR LINE
- AIR SEPARATOR (INLINE)
- AIR VENT, MANUAL
- AUTOMATIC VENT
- BALL VALVE
- BUCKET TRAP
- BUTTERFLY VALVE
- CHECK VALVE
- CHECK , SPRING VALVE
- CONT. NOTE (SAME SHEET)
- CONT. NOTE (SEPERATE SHEET)
- CONTROL SYSTEM NOTE
- EQUIPMENT TAG
- BACK PRESSURE REGULATING VALVE
- EXPANSION VALVE, HAND
- EXPANSION VALVE, AUTOMATIC
- EXPANSION VALVE, THERMOSTATIC
- FILTER AND DRIER
- FLANGE
- FLEXIBLE CONNECTOR
- FLOAT SWITCH
- FLOAT SWITCH (PILOT TYPE)
- FLOAT VALVE, HIGH SIDE
- FLOAT VALVE, LOW SIDE
- FLOW ARROW
- FLOW CONTROL VALVE
- FLOW SWITCH
- FLOW SENSOR
- GAS DETECTOR
- GATE VALVE
- GLOBE VALVE W/ SEAL CAP
- GLOBE VALVE W/ SEAL CAP, ANGLE
- LEVEL EYE
- LIQUID DRAINER
- LONG RADIUS ELBOW
- NEEDLE VALVE
- OIL SEPARATOR
- PITCH OF PIPE, RISE (R) DROP (D)
- PRESSURE GAGE AND COCK
- PRESSURE REGULATING VALVE
- PRESSURE SWITCH
- REDUCER
- RELIEF VALVE
- REVISION NOTE
- RUPTURE DISK
- SHORT RADIUS ELBOW
- SIGHT GLASS (IN-LINE)
- SIGHT GLASS (EXTERNAL)
- SOLENOID VALVE
- STRAINER (BRINE/GLYCOL)
- STRAINER (REFRIGERANT)
- SUCTION DIFFUSER
- THREE-WAY VALVE
- THERMAL BULB
- THERMOMETER
- THERMOMETER WELL, ONLY
- THERMOSTAT, ELECTRIC
- THERMOSTAT, SELF-CONTAINED
- THERMOSTAT, REMOTE BULB
- TRIPLE DUTY VALVE
- UNION
- VIBRATION ABSORBER
- WATER METER

ABBREVIATIONS

ALT	ALTERNATE	INV	INVERT
AMP	AMPERE	KW	KILOWATT
APPROX	APPROXIMATE	KWH	KILOWATT HOUR
ARCH	ARCHITECT / ARCHITECTURAL	LBS	POUNDS
BHP	BREAK HORSEPOWER	LF	LINEAR FEET
BLDG	BUILDING	MAX	MAXIMUM
BTU	BRITISH THERMAL UNIT	MBH	THOUSAND BTU'S/HOUR
C	CELSIUS	MCC	MOTOR CONTROL CENTER
CFM	CUBIC FEET PER MINUTE	MIL	MIL
CO	CLEANOUT	MIN.	MINIMUM
CONN	CONNECTION	MECH	MECHANICAL
CW	COLD WATER	NA	NOT APPLICABLE
DEMO	DEMOLITION	NC	NORMALLY CLOSED
DIA	DIAMETER	NO	NORMALLY OPEN
DWG	DRAWING	NTS	NOT TO SCALE
DX	DIRECT EXPANSION	OC	ON CENTER
EA	EACH	OD	OUTSIDE DIAMETER
ELEC	ELECTRIC	PH	PHASE (ELECTRIC)
ELEV	ELEVATION	POLY	POLYETHYLENE PIPE
EQUIP	EQUIPMENT	PSI	POUNDS PER SQUARE INCH
EX	EXISTING	PVC	POLYVINYL PIPE
EXH	EXHAUST EXPANSION	REBAR	REINFORCEMENT
F	FAHRENHEIT	REQ'D	REQUIRED
FD	FLOOR DRAIN	RH	RELATIVE HUMIDITY
FFE	FINISHED FLOOR ELEVATION	RM	ROOM
FT	FOOT OR FEET	RPM	REVOLUTIONS PER MINUTE
GAL	GALLONS	SF	SQUARE FEET
GPM	GALLONS PER MINUTE	SPEC	SPECIFICATION
HDR	HEADER	SS	STAINLESS STEEL
HDPE	HIGH DENSITY POLYETHYLENE	STD	STANDARD
HT	HEIGHT	TEMO	TEMPERATURE
HR	HOURS	TP	TEMPERATURE
HP	HORSEPOWER	TYP.	TYPICAL
HVAC	HEATING, VENTING, AIR CONDITIONING	U.G.	UNDERGROUND
HX	HEAT EXCHANGER	V	VOLTS
HZ	HERTZ	VFD	VARIABLE FREQUENCY DRIVE
ID	INSIDE DIAMETER	W/	WITH
		W/O	WITHOUT

PREPARED BY

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PROJECT

City Hall Plaza

Warwick, RI

TITLE

ICE RINK LEGEND AND SYMBOLS

NO.	REVISIONS	DATE

DRAWN BY: SMH

DESIGNED BY: SAW

CHECKED BY: SAW

ISSUE DATE: 01/31/24

BETA JOB NO.: 10694

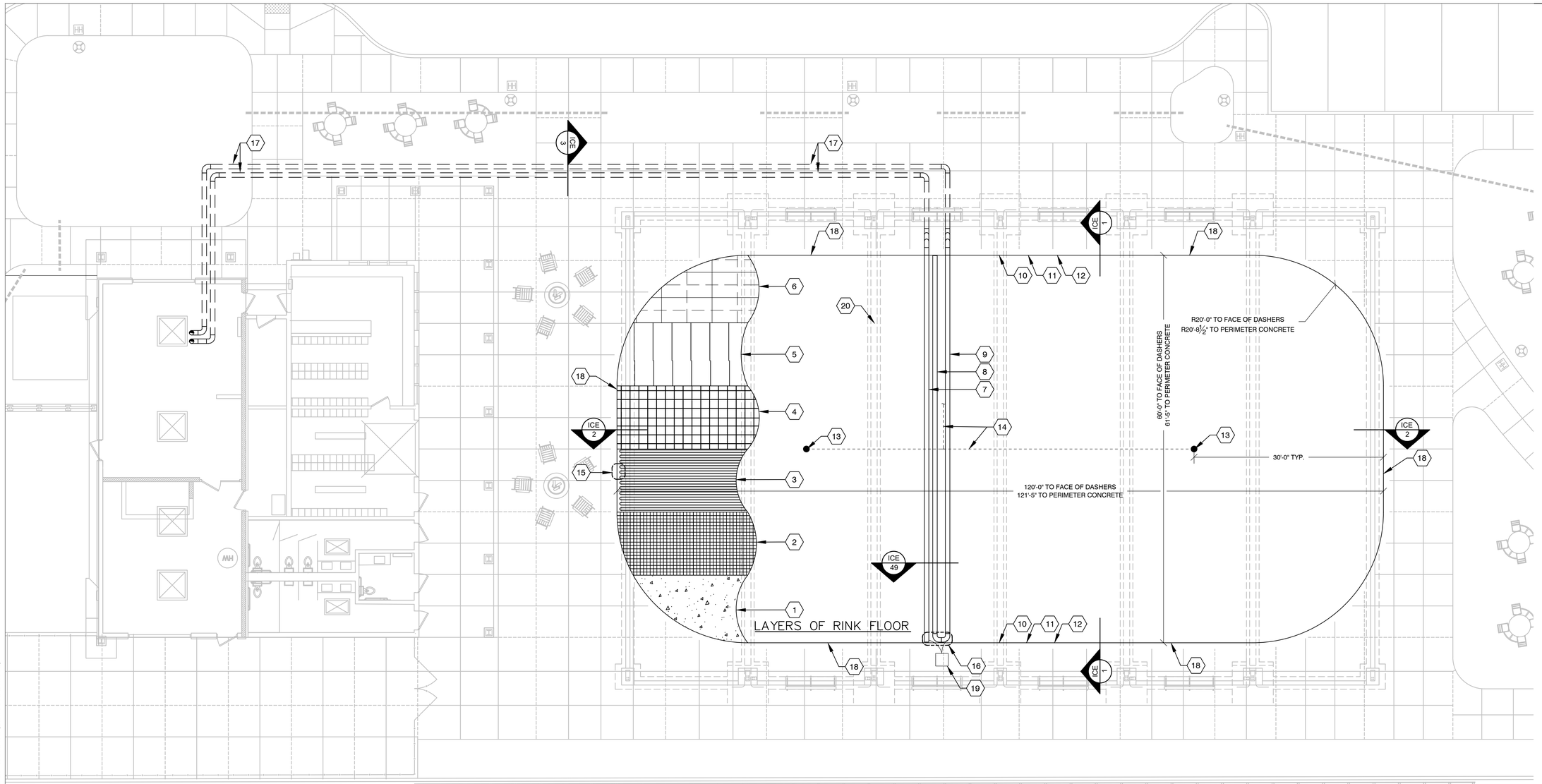
SCALE

AS SHOWN

BID SET

SHEET NO.

R001



1 OUTDOOR ICE RINK FLOOR PLAN

SCALE: 1/8" = 1'-0"

GENERAL NOTES:

1. FIELD VERIFY ALL DIMENSIONS.
2. PIPING SHOWN IN SCHEMATIC FORM.
3. PROVIDE EXTRUDED POLYSTYRENE INSULATION BARRIER BETWEEN ALL STORM, WATER AND SANITARY SEWER CROSSINGS WITH 1 ½" THICK, 4'-0" X 8'-0" SHEETS, 25 PSI.
4. BUILD THE FIRST ICE SHEET BY ICE RINK CONTRACTOR AS SPECIFIED.

(X) KEY NOTES:

1. CONCRETE: 6" THICK
2. EPOXY COATED WIRE MESH: 6" X 6" X W2.9 X W2.9. 6" MINIMUM OVERLAP BETWEEN SHEETS. TIE TO REBAR EVERY 24". TERMINATE 2" FROM RINK EDGE.
3. RINK PIPING: 1" SDR 11 POLYETHYLENE PIPE @ 3" O.C. FUSION WELDED CONNECTIONS.
4. REINFORCEMENT: #4 BARS @ 12" O.C. PARALLEL WITH RINK PIPING AND 12" O.C. PERPENDICULAR WITH RINK PIPING. MINIMUM LAP OF 25".
5. PIPE AND REBAR SUPPORT CHAIRS @ 2'-0" O.C. THE ENTIRE LENGTH OF THE RINK. SUPPORT CHAIR SECTIONS SHALL OVERLAP A MINIMUM OF TWO RINK PIPES. SEE DETAIL ICE-74.
6. FLOOR INSULATION: TWO (2) LAYERS OF EXTRUDED POLYSTYRENE 2" THICK, 4'-0" X 8'-0" SHEETS, 40 PSI - STAGGER JOINTS. FINISHED INSULATION THICKNESS SHALL BE 4". COVER INSULATION WITH VAPOR BARRIER.
7. 8" SDR 11 POLYETHYLENE SUPPLY HEADER. FUSION WELDED CONNECTIONS.
8. 8" SDR 11 POLYETHYLENE REVERSE RETURN HEADER. FUSION WELDED CONNECTIONS.
9. 8" SDR 11 POLYETHYLENE RETURN HEADER. FUSION WELDED CONNECTIONS.
10. EXPANSION JOINT AROUND ENTIRE PERIMETER OF RINK FLOOR. SEE DETAIL ICE-81.
11. 1" SDR 11 POLYETHYLENE PERIMETER PIPE AROUND ENTIRE PERIMETER OF RINK FLOOR.
12. DASHER BOARD SYSTEM. SEE DASHER DRAWINGS. COORDINATE INSTALLATION OF ANCHOR INSERTS WITH ICE RINK CONTRACTOR.
13. RINK SLAB TEMPERATURE SENSOR, BOX AND CONDUIT. SEE DETAIL ICE-83. (TYP. OF 2)
14. 3/4" SCH. 80 PVC CONDUIT AND WIRING TO/FROM REFRIGERATION ROOM.
15. SEE DETAIL ICE-76 @ ENDS AND ICE-162 @ RADII.
16. SEE DETAIL ICE-49.
17. 8" BURIED INSULATED SDR 17 POLYETHYLENE TRANSMISSION MAINS TO/FROM ICE REFRIGERATION ROOM (TYP. 2).
18. PERIMETER CONCRETE HAUNCH. SEE CIVIL.
19. ICE RINK HEADER VENT ACCESS BOX. SEE DETAIL ICE-131. COORDINATE EXACT LOCATION WITH LANDSCAPE.
20. CONCRETE TIE-BAR ENCASEMENT +/-2'-9" DEEP (TYP. 7). DO NOT DISTURB. SEE STRUCTURAL.

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PROJECT

City Hall Plaza

Warwick, RI

TITLE

ICE RINK FLOOR PLAN

NO.	REVISIONS	DATE

DRAWN BY: SMH

DESIGNED BY: SAW

CHECKED BY: SAW

ISSUE DATE: 01/31/24

BETA JOB NO.: 10694

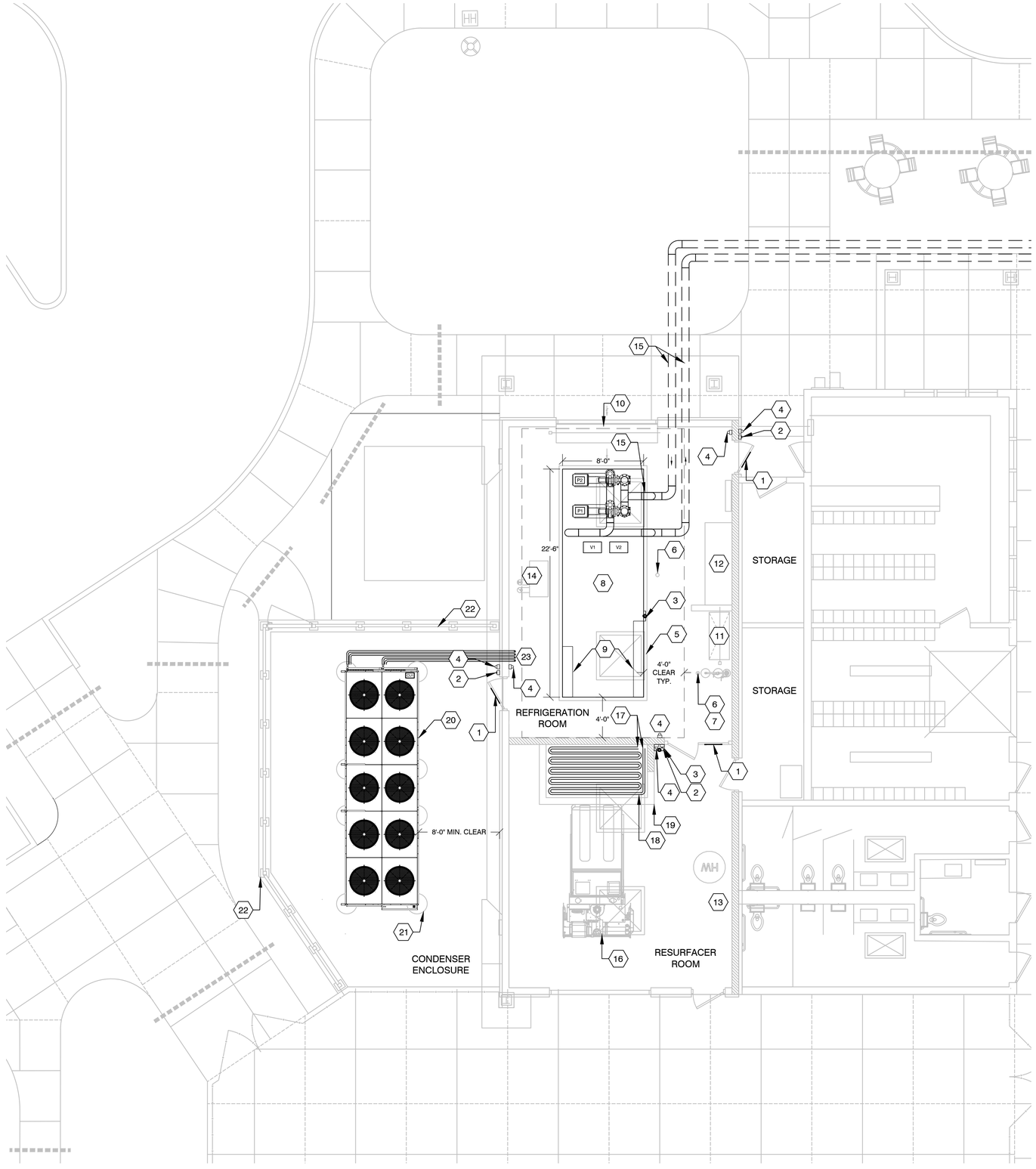
SCALE

AS SHOWN

BID SET

SHEET NO.

R100



1 REFRIGERATION ROOM PLAN
SCALE: 3/16" = 1'-0"

GENERAL NOTES:

1. VERIFY DIMENSIONS OF ALL CONCRETE EQUIPMENT PADS WITH EQUIPMENT MANUFACTURERS. ALL CONCRETE EQUIPMENT PADS FOR ICE SYSTEM BY ICE RINK CONTRACTOR.
2. PIPES SHOWN WITHOUT INSULATION AND VALVES FOR CLARITY.
3. COORDINATE LOCATION OF FLOOR DRAINS IN ICE MECHANICAL ROOM WITH MECHANICAL.
4. ALL OVERHEAD PIPE SHALL BE INSTALLED WITH A MINIMUM CLEARANCE OF 7'-6" BETWEEN FLOOR AND BOTTOM OF PIPE INSULATION.
5. SEE PIPING SCHEMATICS ON SHEETS R600.
6. PROVIDE ELECTRICAL AND CONTROLS FOR ALL ICE RINK EQUIPMENT AS SPECIFIED. WORK SHALL BE COMPLETED IN ACCORDANCE TO ALL APPLICABLE ELECTRICAL CODES.
7. VERIFY LOCATION OF ALL UTILITIES PRIOR TO EXCAVATION.
8. VERIFY EQUIPMENT DIMENSIONS AND LAYOUT IS ACCURATE PRIOR TO INSTALLATION. INSTALL EQUIPMENT AND VESSELS TO MAXIMIZE ACCESSIBILITY AND SERVICEABILITY.
9. CEILING HEIGHT IN REFRIGERATION ROOM IS +/- 13'-8" TO BOTTOM OF BAR JOIST. SEE ARCHITECTURAL DRAWINGS.
10. CONTRACTOR SHALL COORDINATE WITH ALL OTHER TRADE CONTRACTORS FOR OVERHEAD ROUTING OF PIPES, DUCTS, ETC.
11. EXPANSION TANKS NOT SHOWN FOR CLARITY. FIELD LOCATE ALL EXPANSION TANKS IN LOCATION WITH THE BEST ACCESSIBILITY AND GROUND SUPPORT SYSTEM. MOUNT EXPANSION TANKS SO SITE GLASS CAN BE EASILY READ.
12. PROVIDE EXTRUDED POLYSTYRENE INSULATION BARRIER BETWEEN ALL STORM, WATER AND SANITARY SEWER CROSSINGS WITH 1 ½" THICK, 4'-0" X 8'-0" SHEETS, 25 PSI.

KEY NOTES:

1. DOOR SIGNAGE. (TYP. OF 3) SEE DETAIL ICE-125.
2. EMERGENCY SHUT OFF SWITCH FOR REFRIGERATION SYSTEM. (TYP. OF 3)
3. REFRIGERANT LEAK DETECTION SYSTEM CONTROL PANEL W/ DISPLAY AND REMOTE DISPLAY OUTSIDE OF PRIMARY ENTRANCE.
4. STROBE LIGHT AND AUDIBLE ALARM FOR REFRIGERANT LEAK DETECTION SYSTEM. (TYP. OF 6)
5. 12" THICK CONCRETE ISOLATION PAD. SEE STRUCTURAL. COORDINATE WITH STRUCTURAL CONTRACTOR.
6. FLOOR DRAIN. SEE MECHANICAL. COORDINATE EXACT LOCATION OF NEW FLOOR DRAINS WITH PLUMBING CONTRACTOR.
7. COMBINATION EYEWASH/SHOWER. SEE MECHANICAL.
8. REFRIGERATION SKID PACKAGE (270"L X 96"W X 80"H) INCLUDING BUT NOT LIMITED TO STEEL FRAMING SUPPORT SYSTEM, COMPRESSORS, RINK PUMPS, EXPANSION TANKS, PLATE AND FRAME HEAT EXCHANGERS, VESSELS, STEEL PIPING, VALVES AND FITTINGS, ELECTRICAL, CONTROLS, VFDS, ETC.
9. REFRIGERATION SYSTEM MAIN ELECTRICAL PANEL AND CONTROL PANEL. ELECTRICAL FEEDER TO SINGLE POINT CONNECTION BY ELECTRICAL.
10. MAKE-UP AIR LOUVER IN WALL OPENING. SEE MECHANICAL. COORDINATE REFRIGERATION PACKAGE INSTALL BEFORE INFILL.
11. REFRIGERATION EXHAUST SYSTEM. SEE MECHANICAL.
12. BUILDING ELECTRICAL PANELS. SEE ELECTRICAL.
13. SNOW MELT PIT BOILER SYSTEM. SEE MECHANICAL.
14. GAS UNIT HEATER. SEE MECHANICAL.
15. 8" INSULATED STEEL PIPE TO/FROM HEADER CONNECTIONS AND REFRIGERATION PACKAGE. COORDINATE EXACT CONNECTION LOCATION AND PIPE ROUTING WITH FINAL REFRIGERATION PACKAGE LAYOUT.
16. ICE RESURFACER BY OWNER.
17. COORDINATE COIL CONNECTION LOCATION TO SUPPLY AND RETURN MAINS WITH MECHANICAL CONTRACTOR.
18. 2" STAINLESS STEEL SNOWMELT COIL WITH LONG RADIUS ELBOWS @ 6" O.C. MOUNT ON 3" HIGH STAINLESS STEEL SUPPORTS @ 24" O.C. MAX. COORDINATE DRAIN LOCATION WITH COIL LAYOUT AND MECHANICAL.
19. SNOW MELT PIT WALLS. SEE STRUCTURAL. COORDINATE DRAIN LOCATION WITH PLUMBING AND MODIFY COIL AS NECESSARY FOR ACCESS TO STAND PIPE.
20. AIR COOLED CONDENSER.
21. CONCRETE CONDENSER SUPPORTS COLUMNS BY STRUCTURAL (TOP OF COLUMNS SHALL BE 5'-6" ABOVE FFE).
22. 10' HIGH CONDENSER SCREENED WALL. SEE ARCHITECTURAL.
23. REFRIGERANT PIPING TO/FROM REFRIGERATION PACKAGE.

GENERAL CODE REQUIREMENTS:

PRIMARY REFRIGERANT: R455A

SECONDARY REFRIGERANT: 45% ETHYLENE GLYCOL

SECONDARY REFRIGERANT FOR WASTE HEATING: 45% ETHYLENE GLYCOL

REFRIGERATION SYSTEM SHALL BE CONSTRUCTED IN ACCORDANCE TO RHODE ISLAND STATE MECHANICAL, ELECTRICAL, FIRE, AND LIFE SAFETY CODES, RHODE ISLAND HIGH PRESSURE PIPING CODE, AND ALL OTHER APPLICABLE LOCAL, STATE, AND FEDERAL CODE REQUIREMENTS.

A REFRIGERATION ROOM IS BEING PROVIDED.

CHARGING OF SYSTEMS AND START-UP OF THE REFRIGERATION SYSTEM SHALL NOT PROCEED UNTIL ALL CODE RELATED REQUIREMENTS FOR THE REFRIGERATION SYSTEM, ROOM, MECHANICAL SYSTEMS, AND SAFETY SYSTEMS ARE INSPECTED AND APPROVED BY ALL LOCAL GOVERNING AUTHORITIES AND CONTROL AND NOTIFICATION SYSTEMS HAVE BEEN TESTED.

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PROJECT

City Hall Plaza

Warwick, RI

TITLE

REFRIGERATION ROOM PLAN

NO.	REVISIONS	DATE

DRAWN BY: SMH

DESIGNED BY: SAW

CHECKED BY: SAW

ISSUE DATE: 01/31/24

BETA JOB NO.: 10694

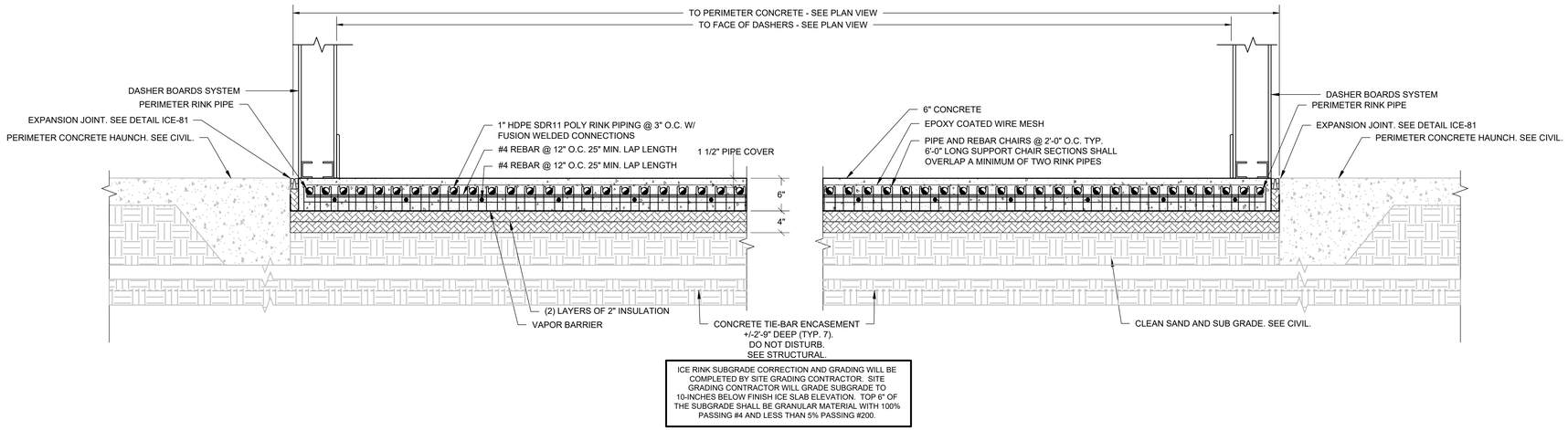
SCALE

AS SHOWN

BID SET

SHEET NO.

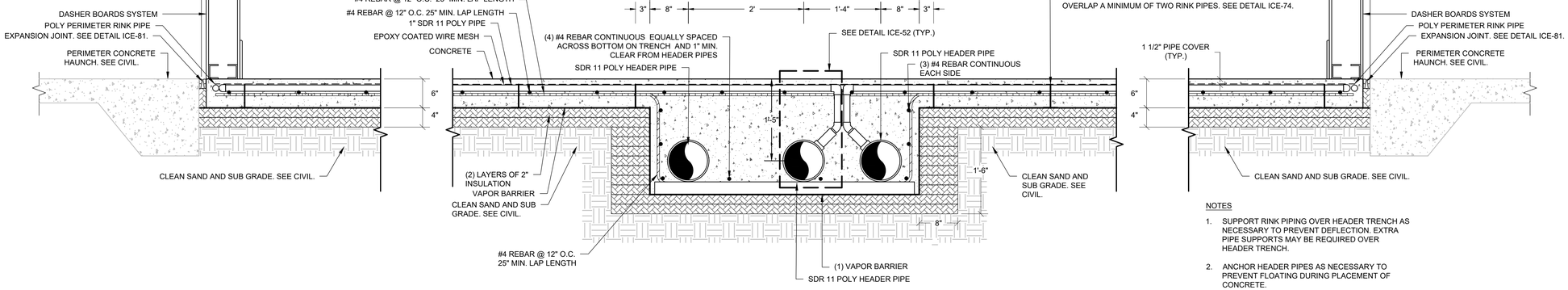
R200



ICE RINK SUBGRADE CORRECTION AND GRADING WILL BE COMPLETED BY SITE GRADING CONTRACTOR. SITE GRADING CONTRACTOR WILL GRADE SUBGRADE TO 10-INCHES BELOW FINISH ICE SLAB ELEVATION. TOP 6" OF THE SUBGRADE SHALL BE GRANULAR MATERIAL WITH 100% PASSING #4 AND LESS THAN 5% PASSING #200.

ICE 1 ICE RINK FLOOR TYPICAL SECTION

SCALE: N.T.S.



NOTES

1. SUPPORT RINK PIPING OVER HEADER TRENCH AS NECESSARY TO PREVENT DEFLECTION. EXTRA PIPE SUPPORTS MAY BE REQUIRED OVER HEADER TRENCH.
2. ANCHOR HEADER PIPES AS NECESSARY TO PREVENT FLOATING DURING PLACEMENT OF CONCRETE.
3. PREPARE SUBGRADE AS SPECIFIED PRIOR TO INSTALLING RINK FLOOR MATERIALS. PROVIDE ADDITIONAL SAND FILL AS NECESSARY TO BRING TO SUBGRADE TO REQUIRED ELEVATION FOR NEW RINK FLOOR.

ICE 2 ICE RINK HEADER TRENCH SECTION

SCALE: N.T.S.

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SCALE

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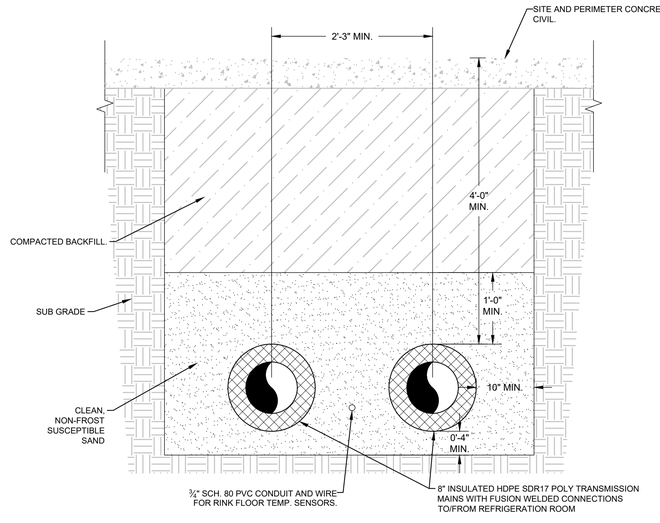
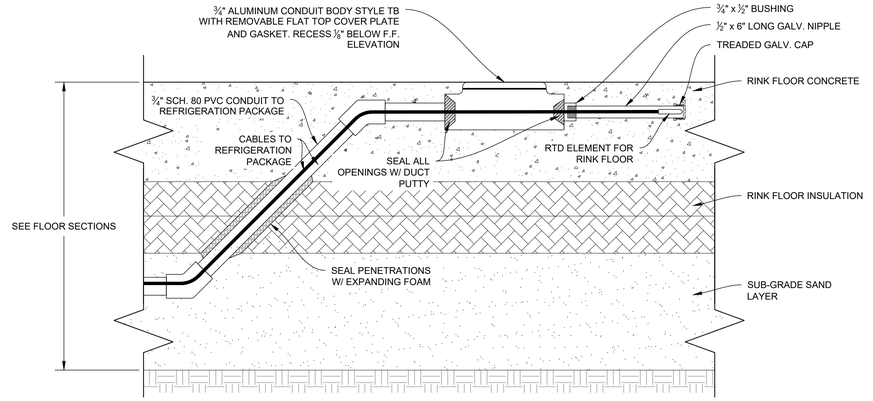
BID SET

SHEET NO.

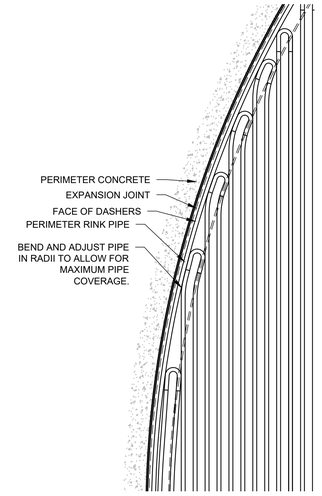
R500



ICE 3 MAINS TRENCH SECTION
SCALE: N.T.S.



ICE 83 ICE RINK TEMPERATURE SENSOR DETAIL
SCALE: N.T.S.



ICE 162 TYPICAL RINK PIPING DETAIL @ RADIUS
SCALE: N.T.S.

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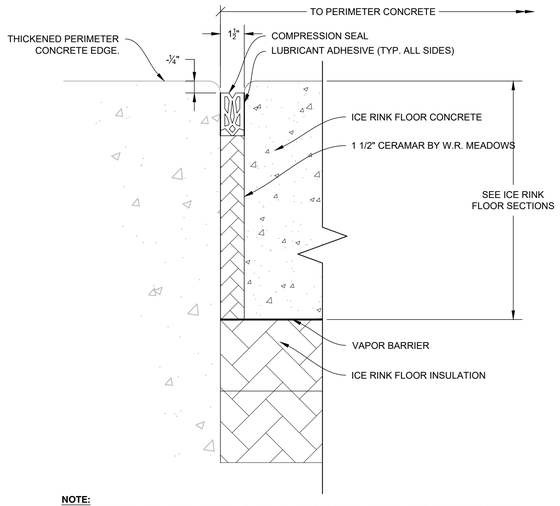
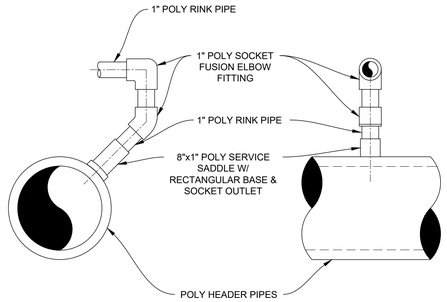
SHEET NO.

R501



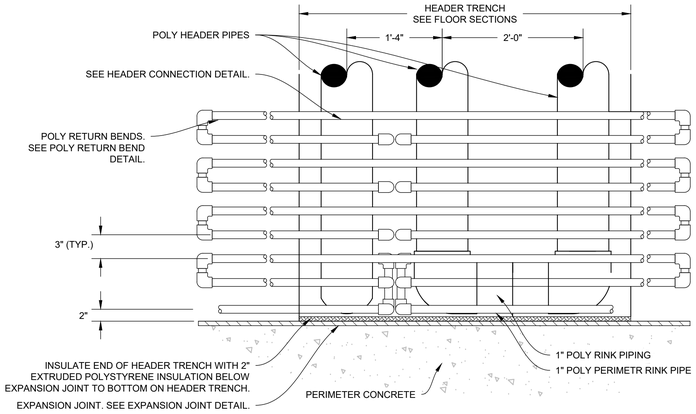
NOTE:
1. EXPANSION JOINT SYSTEM SHALL BE INSTALLED PER MANUFACTURERS RECOMMENDATIONS.
2. CONTRACTOR SHALL FIELD VERIFY WIDTH OF JOINT PRIOR TO ORDERING MATERIALS.

ICE 81 ICE RINK EXPANSION JOINT DETAIL (OUTDOOR)
SCALE: N.T.S.



SECTION **ELEVATION**

ICE 52 ICE RINK HEADER PIPE CONNECTION DETAIL
SCALE: N.T.S.

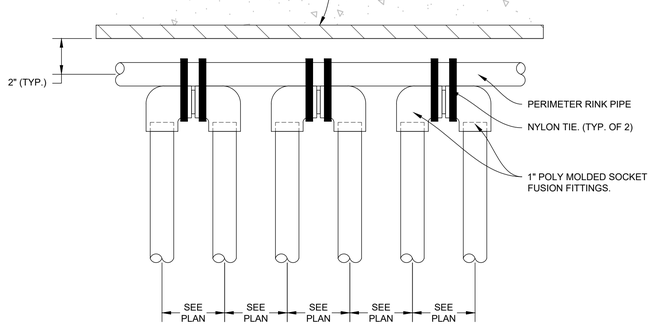


ICE 49 ICE RINK HEADER PIPE DETAIL
SCALE: N.T.S.

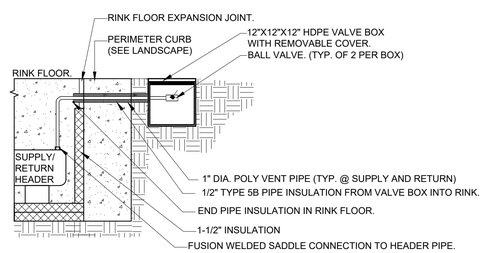
ELEVATION **SECTION**

NOTE:
1. PIPE AND REBAR SUPPORT CHAIRS SHALL OVERLAP A MINIMUM OF (2) RINK PIPES.
2. PIPE AND REBAR SUPPORT CHAIRS SHALL BE IN 6'-0" LONG SECTIONS.
3. PLACE PIPE AND REBAR SUPPORT CHAIRS AT MAXIMUM 2'-0" O.C.

ICE 74 ICE RINK PIPE AND REBAR SUPPORT DETAIL
SCALE: N.T.S.



ICE 76 ICE RINK PIPING DETAIL
SCALE: N.T.S.



ICE 131 VENT DETAIL
SCALE: N.T.S.

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PROJECT

City Hall Plaza

Warwick, RI

TITLE

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NO.	REVISIONS	DATE

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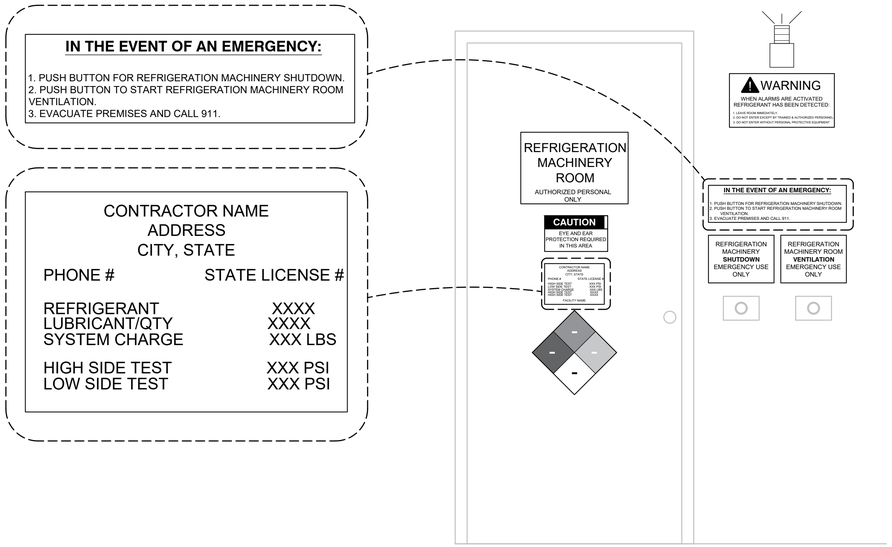
SCALE

AS SHOWN

BID SET

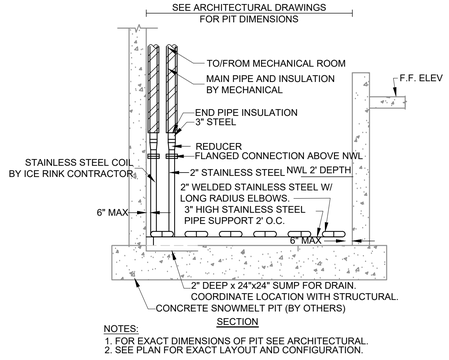
SHEET NO.

R502



NOTES:
1. THIS DETAIL APPLIES TO ALL REFRIGERATION ROOM DOORS.
2. ALL SIGNAGE SHALL BE PER ANSI/IIAR, IMC, ASHRAE, NFPA 704 AND ANSI Z535.2 GUIDELINES.
3. SEE ALSO ARCHITECTURAL SIGNAGE REQUIREMENTS.
4. FURNISH AND INSTALL "WARNING" SIGNAGE NEXT TO EACH STROBE/AUDIBLE ALARM FOR LEAK DETECTION SYSTEM

ICE 125 TYPICAL SIGNAGE DETAIL
SCALE: N.T.S.



NOTES:
1. FOR EXACT DIMENSIONS OF PIT SEE ARCHITECTURAL.
2. SEE PLAN FOR EXACT LAYOUT AND CONFIGURATION.

ICE 134 NEW SNOW MELT PIT DETAIL
SCALE: N.T.S.

EQUIPMENT SCHEDULE: R-455A PACKAGED SYSTEM

CHILLER SCHEDULE - PLATE AND FRAME DX

NO.	MODEL	CAP (TN)	NO. CIRCUITS	NO. PLATES	HOT						COLD					
					REF.	TEMP IN	TEMP OUT	LBS/HR	GASKET	PLATE	FLUID	GPM	TEMP IN	TEMP OUT	FPS	PSI
V-1	ALFA LAVAL	41.5	1	208	R-455A	-5 F	95 F	6,167	WELDED	BRAZED	45% E.G.	475	7.4 F	5 F	16.17	12.0
V-2	ALFA LAVAL	41.5	1	208	R-455A	-5 F	95 F	6,167	WELDED	BRAZED	45% E.G.	475	7.4 F	5 F	16.17	12.0

COMPRESSORS

NO.	TYPE	MANUF.	MODEL	REF.	NO. CYL.	CAPACITY TONS	SUCTION TEMP	COND TEMP	MOTOR HP	MOTOR RPM	V/P/HZ	CONTROLS	REMARKS
C-1	RECIP	BITZER	6FE-34Y-2NU	R-455A	6	13.5	-5 F	95 F	34	1175	460/3/60	SEE SPEC	**TOTAL POWER REQUIRED FOR PACKAGE IS** 431 MCA, 500 MOPD 480/3/60
C-2	RECIP	BITZER	6FE-44Y-2NU	R-455A	6	16.2	-5 F	95 F	44	1175	460/3/60	SEE SPEC	
C-3	RECIP	BITZER	6FE-44Y-2NU	R-455A	6	16.2	-5 F	95 F	44	1175	460/3/60	SEE SPEC	**CONTROL POWER** 12 MCA, 20 MOPD 120/1/60
C-4	RECIP	BITZER	6FE-34Y-2NU	R-455A	6	13.5	-5 F	95 F	34	1175	460/3/60	SEE SPEC	
C-5	RECIP	BITZER	6FE-44Y-2NU	R-455A	6	16.2	-5 F	95 F	44	1175	460/3/60	SEE SPEC	**POWER SOURCES** COMPRESSORS CONDENSER PUMPS
C-6	RECIP	BITZER	6FE-44Y-2NU	R-455A	6	16.2	-5 F	95 F	44	1175	460/3/60	SEE SPEC	

CONDENSER

N0.	TYPE	MANUF.	MODEL	REF	THR (MBH)	EVAP TEMP	COND TEMP	DRY BULB	FANS QTY	FANS HP/FAN	FAN RPM	V/P/HZ	FAN MOTOR	REMARKS
CU1	AIR	KEEPRITE	KCL158-T4A-C-V	R-455A	1,834	-5 F	95 F	70F	10	2	1140	460/3/60	EC	

REMARKS:
1. PROVIDE EC MOTOR SPEED CONTROL FOR ALL FANS.
2. PROVIDE 50/50 SPLIT.

PUMP SCHEDULE

N0.	DESCRIPTION	MANUF.	MODEL	FLUID	GPM	TDH (FT)	MOTOR	RPM	V/P/HZ	MIN. EFF.	REMARKS
P-1	RINK PUMP	BELL&GOSSET	e-1510 5EB	45% E.G.	950	80	30 HP	1750	460/3/60	81.2%	PROVIDE VFD
P-2	RINK PUMP	BELL&GOSSET	e-1510 5EB	45% E.G.	950	80	30 HP	1750	460/3/60	81.2%	BACK-UP, PROVIDE VFD

EXPANSION, COMPRESSION AND OTHER TANKS

N0.	DESCRIPTION	MANUF.	CAP. (GAL)	SIZE	ACCESSORIES		REMARKS
					TANK FITTING	SITE GLASS	
T-1	ICE RINK	BELL&GOSSETT	175	-	AFTL	YES	EXPANSION

EXPOSED ITEM	TYPE	THICKNESS	JACKET TYPE	JACKET COLOR
PIPE UP TO 1 1/4" DIA.	5	1 1/2"	2	WHITE
PIPE 1 1/2" TO 4" DIA. COLD BRINE, GLYCOL AND REF.	5	2"	2	WHITE
PIPE 1 1/2" TO 4" DIA. WARM BRINE, GLYCOL	5	2"	2	RED
PIPE 5" TO 8" DIA. COLD BRINE, GLYCOL	5	2 1/2"	2	WHITE
PIPE 10" AND UP DIA. COLD BRINE, GLYCOL	5	3"	2	WHITE
VALVES (WHERE PIPE IS INSULATED)	5	SAME AS PIPE	2	WHITE
RINK PUMPS	3	2"	NONE	-
CHILLER AND SURGE DRUM	5	3"	2	WHITE
HEAT EXCHANGERS	5	2"	2	RED
WATER PIPING	5	1"	NONE	-
BURIED ITEM				
SNOW MELT PIT SYSTEM PIPING	5A/5B	2"	SEE SPEC	SEE SPEC
BRINE/GLYCOL PIPING TO/FROM RINK FLOOR	5A/5B	3"	SEE SPEC	SEE SPEC

REMARKS:
CHECK SPECIFICATIONS FOR REQUIRED COATING ON BURIED STEEL, NON-INSULATED PIPE.

ICE 163 INSULATION SCHEDULE
SCALE: N.T.S.

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PROJECT
City Hall Plaza
Warwick, RI

TITLE
ICE RINK DETAILS AND SCHEDULES

NO.	REVISIONS	DATE

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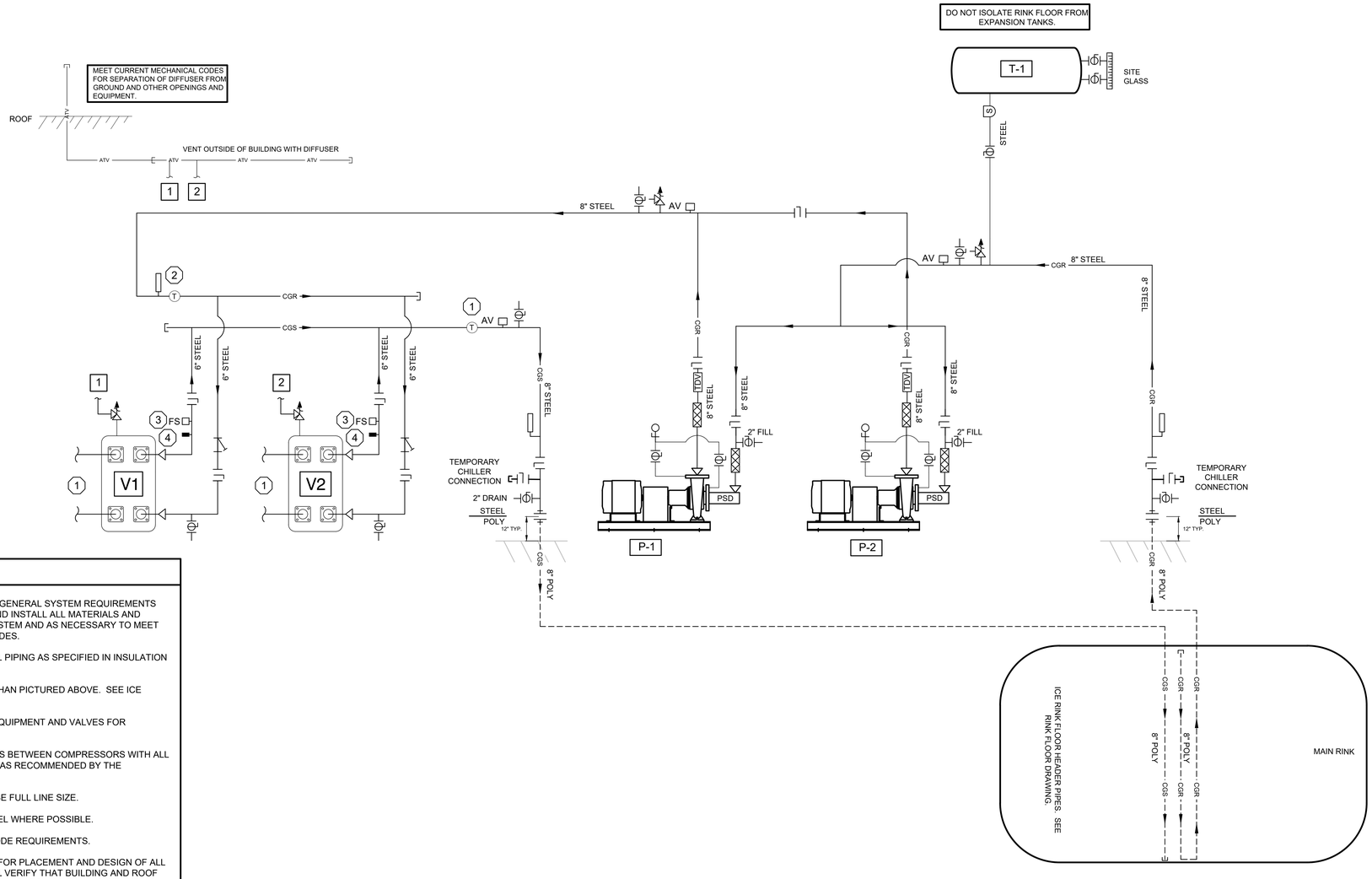
BETA JOB NO.: 10694
SCALE
AS SHOWN

BID SET

SHEET NO.
R503



GENERAL NOTES

1. THE REFRIGERATION FLOW DIAGRAM SHOWS GENERAL SYSTEM REQUIREMENTS ONLY. ICE RINK CONTRACTOR TO FURNISH AND INSTALL ALL MATERIALS AND EQUIPMENT FOR A COMPLETE OPERATING SYSTEM AND AS NECESSARY TO MEET CURRENT STATE AND LOCAL MECHANICAL CODES.
2. PIPING MATERIAL AS SPECIFIED. INSULATE ALL PIPING AS SPECIFIED IN INSULATION SCHEDULE. SEE DETAIL ICE-163
3. CHILLER ARRANGEMENT MAYBE DIFFERENT THAN PICTURED ABOVE. SEE ICE EQUIPMENT SCHEDULE.
4. INSTALL PIPE UNIONS ON EACH SIDE OF ALL EQUIPMENT AND VALVES FOR MAINTENANCE.
5. PROVIDE CRANKCASE OIL EQUALIZATION LINES BETWEEN COMPRESSORS WITH ALL ASSOCIATED VALVES, FLOATS, GAUGES, ETC. AS RECOMMENDED BY THE MANUFACTURER.
6. ALL VALVES AND PIPING SPECIALTIES SHALL BE FULL LINE SIZE.
7. ALL GAUGES SHALL BE MOUNTED AT EYE LEVEL WHERE POSSIBLE.
8. LENGTH OF DRIP LEGS SHALL MEET LOCAL CODE REQUIREMENTS.
9. THE ICE RINK CONTRACTOR IS RESPONSIBLE FOR PLACEMENT AND DESIGN OF ALL HANGERS AND SUPPORT SYSTEMS AND SHALL VERIFY THAT BUILDING AND ROOF STRUCTURE IS DESIGNED TO SUPPORT SYSTEM LOADS. **ALL EQUIPMENT, PIPING, TANKS, ETC. SHALL BE GROUND SUPPORTED.**
10. PROVIDE ALL CONTROL VALVES REQUIRED BY IMC, ASHRAE 15 AND ALL OTHER LOCAL, STATE AND FEDERAL CODES.

○ KEY NOTES (SEE SPECIFICATIONS FOR CONTROL REQUIREMENTS)

1. GLYCOL SUPPLY TEMPERATURE.
2. GLYCOL RETURN TEMPERATURE.
3. FLOW SWITCH. CONNECT TO CONTROL SYSTEM FOR MONITORING AND DISPLAY.
4. FREEZE STATS. CONNECT TO CONTROL SYSTEM FOR MONITORING AND DISPLAY.

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PROJECT

City Hall Plaza

Warwick, RI

TITLE

REFRIGERATION FLOW DIAGRAMS

NO.	REVISIONS	DATE

DRAWN BY: SMH
DESIGNED BY: SAW
CHECKED BY: SAW
ISSUE DATE: 01/31/24
BETA JOB NO.: 10694

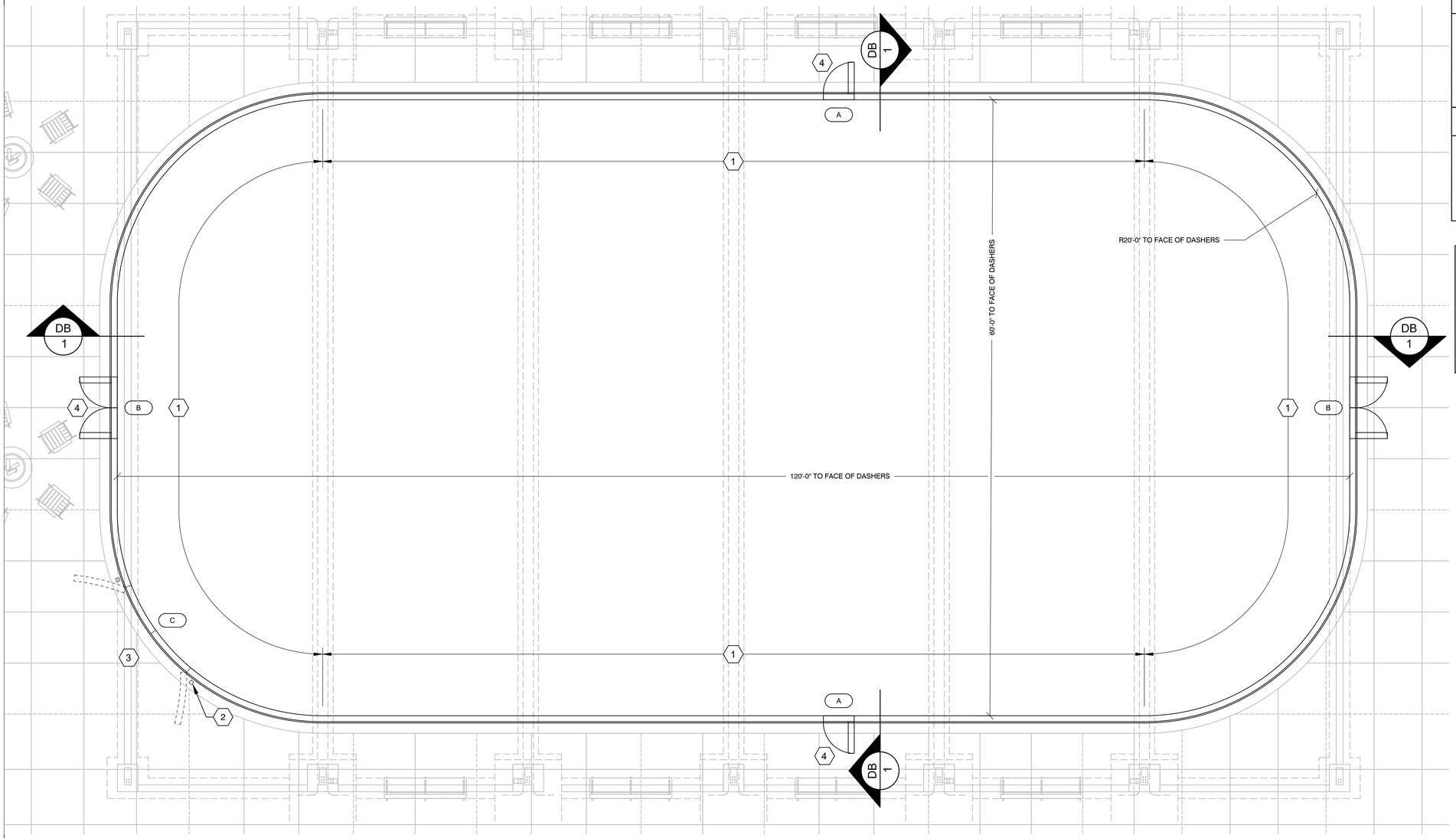
SCALE

AS SHOWN

BID SET

SHEET NO.

R600



1 ICE RINK DASHERBOARD PLAN
SCALE: 3/16" = 1'-0"

GENERAL NOTES:

1. FIELD VERIFY ALL DIMENSIONS AND EXISTING CONDITIONS PRIOR TO MANUFACTURING.
2. FIELD VERIFY ALL GATE LOCATIONS TO PROVIDE FULL GATE SWING CLEARANCE.
3. FIELD VERIFY EQUIPMENT GATE LOCATIONS TO ALIGN WITH DOOR OPENINGS.
4. COORDINATE INSTALLATION OF NEW DASHER ANCHOR INSERTS WITH ICE RINK CONTRACTOR.

KEY NOTES:

1. NO SHIELDING ON FRONT WALL. SEE DETAIL DB-2.
2. EXTERNAL 4X4 POST ON EACH SIDE OF GATE. (TYP. OF 2).
3. SKATE RINK RESURFACER RAMP (TYP 2). SEE DETAIL DB-4
4. SKATE RINK ACCESS RAMP. GATE A (TYP 1.) GATE B (TYP 2). SEE DETAIL DB-3.

DASHER BOARD GATE SCHEDULE:

GATE MARK	QTY.	GATE WIDTH	THRESHOLD HEIGHT (FROM F.F. ELEV.)	POLY THICKNESS
A	2	3'-0"	2 1/2"	1"
B	2	6'-0"	2 1/2"	1"
C	1	10'-0"	3"	1"

PREPARED BY

BETA
www.BETA-Inc.com

REGISTERED PROFESSIONAL

SCOTT A WARD
No. 13977
REGISTERED PROFESSIONAL ENGINEER
CIVIL

SUBCONSULTANT

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Engineering Group
2211 O' Neil Road - Hudson, WI 54016
Phone: (651) 256-3090
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PROJECT

City Hall Plaza

Warwick, RI

TITLE

ICE RINK DASHER BOARD PLAN

NO.	REVISIONS	DATE

DRAWN BY: SMH
DESIGNED BY: SAW
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ISSUE DATE: 01/31/24
BETA JOB NO.: 10694

SCALE

AS SHOWN

BID SET

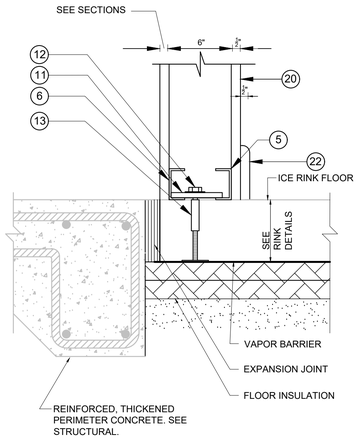
SHEET NO.

DB100

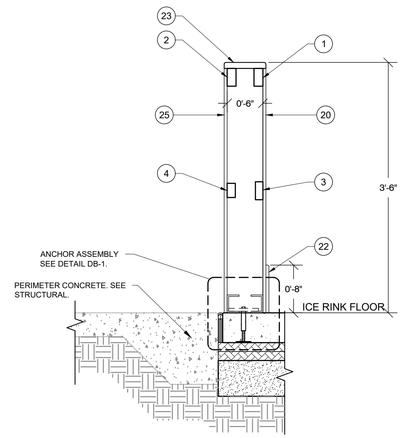
DASHER BOARD MATERIAL SCHEDULE

KEY NOTE	COMPONENT	ALUMINUM FRAME SYSTEM	
		DIMENSIONS (INCHES) -MIN. REQ.	SHAPE
①	TOP FRONT STRINGER, STRAIGHT SECTION (HORIZONTAL)	1 1/2 x 3 x 1/8	TUBE
①	TOP FRONT STRINGER, CURVED SECTION (HORIZONTAL.)	1 x 3 x 1/8	TUBE
②	TOP BACK STRINGER (HORIZONTAL)	1 1/2 x 3 x 1/8	TUBE
③	MIDDLE FRONT STRINGER, STRAIGHT SECTION (HORIZONTAL)	1 1/2 x 3 x 1/8	TUBE
④	MIDDLE BACK STRINGER, STRAIGHT SECTION (HORIZONTAL)	1 1/2 x 3 x 1/8	TUBE
⑤	BOTTOM FRONT STRINGER (HORIZONTAL)	1 1/2 x 3 x 3/16	CHANNEL
⑥	BOTTOM BACK STRINGER (HORIZONTAL)	1 1/2 x 3 x 3/16	CHANNEL
NOT SHOWN	END PLATES (VERTICAL)	1/4 x 6 WITH 1 1/2 FLANGE FOR FRONT SIDE AND 3" FLANGE FOR GATE HARDWARE ON BACK. REINFORCED CORNERS, SLOTTED FOR SHIELDING.	ONE PIECE EXTRUSION
NOT SHOWN	INTERMEDIATE POSTS (VERTICAL)-PANELS OVER 48" IN LENGTH	1 1/2 x 3 x 1/8	TUBE
NOT SHOWN	INTERMEDIATE POSTS (VERTICAL)-PANELS OVER 60" IN LENGTH	1 1/2 x 3 x 1/8	TUBE
⑩	INTERMEDIATE POST FOR BACKER PANELS	1 1/2 x 3 x 1/8	TUBE
⑪	ANCHOR PLATES (2 PER PANEL)	5 1/4 x 4 1/2 WITH 3/4 HOLE IN CENTER	PLATE
⑫	ANCHOR BOLTS AND WASHER (2 PER PANEL)	5/8 x 2	BOLT
⑬	ANCHOR INSERT - THREADED	3	BOLT
⑭	PRECAST ANCHOR INSERTS - THREADED	FULL DEPTH OF FLOOR	BOLT

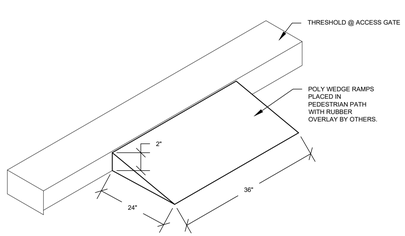
UV STABILIZED POLYETHYLENE AND UV STABILIZED FIBERGLASS MATERIAL						
KEY NOTE	ITEM	THICKNESS (IN.)	WIDTH/HEIGHT (IN.)	LENGTH (IN.)	ROUTED EDGE (IN.)	COLOR *
⑳	FACING (UV STABILIZED FIBERGLASS)	1/4	FULL PANEL	FULL PANEL	1/4 TOP EDGE	WHITE
㉒	KICKPLATE (UV STABILIZED FIBERGLASS)	1/4	8 CONCRETE FLOOR, 10 SAND FLOOR	FULL PANEL	1/4 TOP EDGE	YELLOW
㉓	TOP SILL (UV STABILIZED POLYETHYLENE)	3/4	FULL PANEL INCL. FACE AND BACKER	FULL PANEL	1/4 FRONT AND BACK	BLACK
㉕	BACKER (UV STABILIZED FIBERGLASS)	1/4	FULL PANEL	FULL PANEL	NONE	WHITE



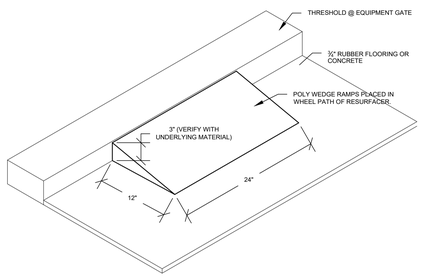
DB 1 DASHER BOARD ANCHOR DETAIL
SCALE: N.T.S.



DB 2 DASHER BOARD SECTION
SCALE: N.T.S.



DB 3 SKATE RINK ACCESS RAMP
SCALE: N.T.S.



DB 4 SKATE RINK RESURFACER RAMP
SCALE: N.T.S.

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PROJECT

City Hall Plaza

Warwick, RI

TITLE

ICE RINK DASHER BOARD DETAILS AND SECTIONS

NO.	REVISIONS	DATE

DRAWN BY: SMH
DESIGNED BY: SAW
CHECKED BY: SAW
ISSUE DATE: 01/31/24
BETA JOB NO.: 10694

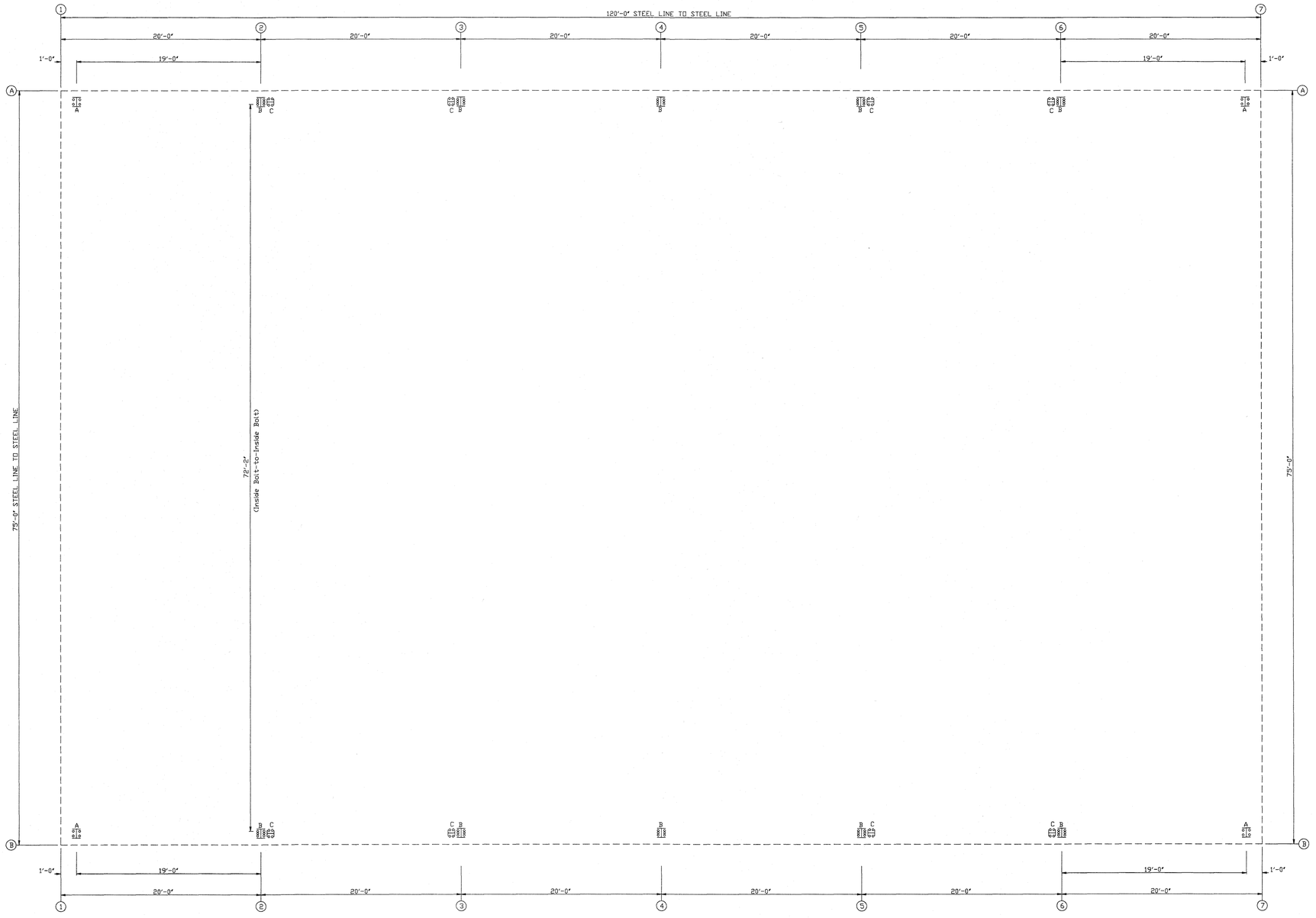
SCALE

AS SHOWN

BID SET

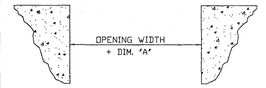
SHEET NO.

DB500



ANCHOR BOLT PLAN
NOTE: All Base Plates @ 100'-0" (U.N.)

ELEVATION VIEW OF SUGGESTED DETAIL FOR OPENINGS WITH JAMBS TO FINISH FLOOR IN THE PRESENCE OF A RAISED FOUNDATION WALL.



'A' = 4 1/2" FOR PRE-ASSEMBLED PERSONNEL DOORS
= 5 1/2" FOR KNOCK-DOWN PERSONNEL DOORS
= 7 1/2" FOR OPENINGS WITH COLD-ROLLED JAMBS
= 8" FOR OPENINGS WITH STRUCTURAL JAMBS

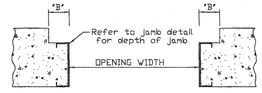
ROUGH OPENING SIZES ABOVE ARE FOR PASS DOORS AND FRAMED OPENINGS FURNISHED BY PSS.

FOUNDATION ENGINEER TO VERIFY WITH BUILDER ALL DOOR TYPES AND ASSOCIATED ROUGH OPENING SIZES.

FOR DOORS NOT FURNISHED BY PSS, CONSULT DOOR SUPPLIER FOR OPENING DETAILS.

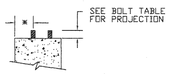
CLEARANCES SHOWN ARE MINIMUM REQUIRED FOR BASE CLIP. THERE MAY BE SMALL VOIDS BETWEEN JAMB FLANGES AND FOUNDATION WALL.

PLAN VIEW OF SUGGESTED DETAIL FOR FRAMED OPENINGS WITH JAMBS TO THE TOP OF A RAISED FOUNDATION WALL.



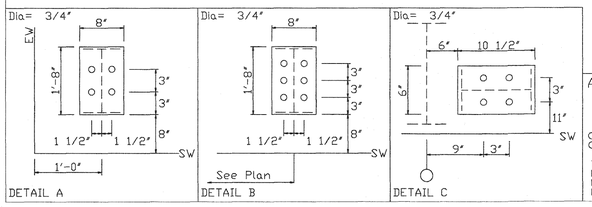
'B' = NOTCH FOR DOOR TRACK NOT BY PACKAGE STEEL SYSTEMS, INC.
SEE MANUFACTURER RECOMMENDATIONS

* SEE COLUMN BASE DETAILS



GENERAL NOTES

1. PACKAGE STEEL SYSTEMS, INC. / NORTHERN BUILDING SYSTEMS, INC. IS THE METAL BUILDING MANUFACTURER FOR THIS PROJECT, HEREIN AFTER REFERRED TO IN THE NOTES AS THE 'MBM'.
2. THE ANCHOR ROD SETTINGS SHOWN ON MBM'S DRAWINGS NOT ONLY INDICATE WHERE THE ANCHOR RODS ARE TO BE PLACED, BUT ALSO THE FOOTPRINT OF THE BUILDING. THESE DRAWINGS ARE TO BE CLOSELY COORDINATED WITH THE FOUNDATION DESIGNER AND/OR ARCHITECTURAL PLANS. IT IS ESSENTIAL THAT THESE BOLT PATTERNS BE FOLLOWED. HOWEVER, IN THE EVENT THAT THESE SETTINGS DIFFER FROM THE FOUNDATION DESIGNER AND/OR ARCHITECTURAL PLANS, MBM MUST BE CONTACTED IMMEDIATELY, BEFORE CONCRETE IS PLACED.
3. UNLESS OTHERWISE SPECIFIED ON THE BUILDING PURCHASE ORDER, ANCHOR RODS, NUTS, PLATE WASHERS AND ANY OTHER EMBEDDED ITEMS ARE TO BE FURNISHED BY THE CONTRACTOR. IF THIS IS NOT THE CASE, FOUNDATION ENGINEER MUST PROVIDE MBM WITH THE LENGTH OF EMBEDMENT (MINIMUM AND MAXIMUM), END CONDITION (HEADED BOLT, SINGLE NUT, NUT WITH PLATE, ETC.), THREAD LENGTH, AND MATERIAL SPECIFICATION FOR EACH COLUMN LOCATION. MBM WILL NOT ORDER ANCHOR RODS WITHOUT WRITTEN APPROVAL FROM THE OWNER'S FOUNDATION ENGINEER.
4. WHEN SHOWN, VALUES GIVEN FOR BENDS AND ANCHOR BOLT TOTAL LENGTHS ARE SUGGESTED LENGTHS ONLY. IT IS THE RESPONSIBILITY OF THE FOUNDATION ENGINEER TO DETERMINE THESE VALUES SINCE THEY ARE A FUNCTION OF CONCRETE STRENGTH AS WELL AS OTHER FACTORS.
5. THE ANCHOR ROD LOCATIONS SHOWN ON MBM'S DRAWINGS SATISFY PERTINENT REQUIREMENTS FOR THE DESIGN OF THE MATERIALS SUPPLIED BY MBM. PLEASE NOTE THAT THESE REQUIREMENTS MAY NOT SATISFY ALL ANCHOR ROD CONCRETE EDGE DISTANCE REQUIREMENTS DEPENDING ON THE DETAILS OF THE FOUNDATION DESIGN. IT IS THE RESPONSIBILITY OF THE QUALIFIED DESIGN PROFESSIONAL DESIGNING THE FOUNDATION TO MAKE CERTAIN THAT SUFFICIENT CONCRETE EDGE DISTANCE IS PROVIDED FOR THE ANCHOR RODS IN THE DETAILS OF THE FOUNDATION DESIGN.
6. THIS DRAWING IS NOT TO SCALE. USE DIMENSIONS SHOWN ON PLAN AND IN DETAILS. COLUMN LOCATIONS AND ORIENTATION ARE BASED ON STANDARD MBM'S SPECIFICATIONS AND ARE BASED ON INFORMATION FURNISHED.
7. UNLESS NOTED OTHERWISE, MBM FINISHED FLOOR GRADE/ELEVATION= 100'-0". CONTRACTOR IS RESPONSIBLE FOR CONVERTING MBM'S GRADE / ELEVATION INDICATED TO OTHER CONTRACT DOCUMENT REFERENCE ELEVATIONS.
8. FOUNDATION MUST BE SMOOTH AND LEVEL WITH ANCHORS ACCURATELY LOCATED AND PLACED AS SHOWN ON THIS DRAWING. THE USE OF TEMPLATES ARE RECOMMENDED. TEMPLATE POSITION FOR EACH ANCHOR ROD SETTING PATTERN SHOULD BE VERIFIED PRIOR TO CONCRETE PLACEMENT. ALL ANCHOR RODS SHALL BE SET PLUMB WITH NUTS LEVEL. THE BUILDER IS RESPONSIBLE FOR ANCHOR ROD PLACEMENT PER AISC 'CODE OF STANDARD PRACTICE', SECTION 7.5. VARIATIONS IN PLACEMENT ARE SUMMARIZED BELOW:
   a. CENTERS OF ANY TWO A.R.'S WITHIN A COLUMN BASE GROUP: +/- 1/8"
   b. CENTERS OF ADJACENT ANCHOR ROD GROUPS: +/- 1/4"
   c. VERTICAL VARIATION OF TOPS OF A.R.'S: +/- 1/2"
   d. HORIZONTAL VARIATION IN LOCATION OF EACH A.R. CENTERLINE AT ANY LOCATION ALONG ITS PROJECTION ABOVE CONCRETE:
      i. <= 1/4" FOR AR'S 3/4" AND 7/8"
      ii. <= 3/8" FOR AR'S 1", 1-1/4" AND 1-1/2"
   e. ACCUMULATED DIMENSION BETWEEN CENTERS OF A.R. GROUPS ALONG COLUMN LINE: +/- 1/4" PER 100 FEET, NOT TO EXCEED 1" TOTAL
   f. DIM. FROM C.L. OF ANY A.R. GROUP FROM COLUMN LINE: +/- 1/4"
9. THE MINIMUM ANCHOR ROD PROJECTION SHOWN IS FROM THE TOP OF THE CONCRETE FOUNDATION. THIS DIM. INCLUDES THE BASE PLATE THICKNESS, ONE FLAT WASHER AND ONE NUT. WHEN INDICATED, ADDITIONAL SPACE BETWEEN THE TOP OF FOUNDATION AND COLUMN BASE PLATE FOR LEVELING PLATE AND GROUT (FURNISHED BY OTHERS) HAS BEEN INCLUDED IN DETERMINING THE ANCHOR ROD PROJECTION SHOWN.
10. BUILDING HAS BEEN DESIGNED FOR FRAMED OPENING LOCATIONS (JAMBS TO FOUNDATION) AS SHOWN. OVERHEAD DOOR OPENINGS IN RAISED FOUNDATION WALL SHOWN ARE FOR JAMBS ATTACHED TO THE TOP OF WALL. FOR JAMBS EXTENDING TO FLOOR GRADE, ADD DIMENSION SHOWN TO O.H. DOOR SIZE.
11. BUILDING COLUMN BASE PLATES ARE ASSUMED TO REST DIRECTLY ON THE CONCRETE SLAB OR CONCRETE PEDESTAL. THE USE OF GROUT PADS BETWEEN THE SLAB (OR PEDESTAL) IS NOT A COMMON PRACTICE IN THE METAL BUILDING INDUSTRY. HOWEVER, IF THE BASE PLATE CANNOT SIT FLUSH ON TOP OF THE CONCRETE, THEN GROUTING MAY BE REQUIRED.
12. PRIOR TO GROUTING, COLUMN BASES MAY BE ELEVATED BY UTILIZING NUTS ON THE ANCHOR RODS ON THE UNDERSIDE OF THE COLUMN BASE OR USING SHIMS / LEVELING PLATES TO HOLD THE BASE AT THE PROPER ELEVATION. IN EITHER CASE THE COLUMN BASE MUST BE FULLY GROUTED UTILIZING NON-SHRINK GROUT, HAVING A MINIMUM COMPRESSIVE STRENGTH OF NOT LESS THAN 5,000 PSI. GROUT SHALL BE FORCED COMPLETELY UNDER THE BASE PLATE TO ELIMINATE ANY VOIDS AND PROVIDE THE COLUMN UNIFORM BEARING ON THE ENTIRE GROUT BED. GROUTING AND / OR INSPECTION IS NOT THE RESPONSIBILITY OF MBM.
13. UNLESS OTHERWISE SPECIFIED IN THE BUILDING ORDER, LEVELING PLATES / NUTS ARE NOT BY MBM.
14. UNLESS OTHERWISE SPECIFIED, ANCHOR RODS ARE DESIGNED AND DETAILED AS 'CAST-IN-PLACE' ANCHOR RODS WITH 'SNUG-TIGHT' CONDITIONS. ALL COLUMNS ARE TO BE POSITIVELY ATTACHED TO THE SUPPORTING CONCRETE FOUNDATION WITH NUTS TIGHTENED SNUGLY TO THE BASE PLATE. THE METHOD NEEDED FOR A SNUG-TIGHTENED JOINT SHALL BE DETERMINED BY OTHERS. ANCHOR ROD NUTS MAY LOOSEN WHILE THE BUILDING IS BEING ERECTED. ANCHOR RODS SHALL BE CHECKED AND RETIGHTENED IN ACCORDANCE WITH THE SELECTED TIGHTENING METHOD AFTER THE BUILDING HAS BEEN ERECTED.



ANCHOR BOLT SUMMARY

Qty	Locate	Dia (in)	Grade	Proj (in)
O 76	Frame	3/4"	36	2.50
O 32	WindCol	3/4"	36	2.50

THE PROJECTION ABOVE IS A SUGGESTED MINIMUM TO ENSURE ADEQUATE ANCHOR ROD LENGTH. A DIFFERENT PROJECTION MAY BE REQUIRED BY THE FOUNDATION DESIGNER.

8/7/23
JOSEPH ELIJAH BERGER
No. 14366
REGISTERED PROFESSIONAL ENGINEER
CIVIL

REV.	DESCRIPTION:	DATE:	DRAFT	ENG.
3				
2				
1				
⚠	INITIAL DRAWING RELEASED FOR CONSTRUCTION	CURRENT REVISION: 0		

PACKAGE STEEL SYSTEMS, INC.		Beta Group Inc	
PROJECT	City Hall Rink Shelter	ANCHOR BOLT PLAN & DETAILS	
ID	2305-038	DESIGN: LPB	DESIGN CHECK: JEB
PROJECT	3275 Post Road	DRAFT: LPB	DRAFT CHECK: JEB
ADDRESS	Warwick, RI 02886	DATE: 08/07/2023	DRAWING: ABLT-1

PACKAGE

NOTES FOR REACTIONS

Package Steel Systems, Inc. / Northern Building Systems, Inc. is the Metal Building Manufacturer for this project, herein after referred to in the notes as the 'MBM'. The following design data is per MBM's standard design practices and established procedures and recommendations of the following Organizations and/or Specifications.

American Institute of Steel Construction (AISC)
American Welding Society Structural Welding Code (AWS D1.1)
North American Specification for the Design of Cold Formed Steel Structural Members (AISI)
MBMA Low Rise Building Systems Manual (2018)

1. The building reaction data reports the loads which this building places on the foundation. For maximum reactions tables, all stated loading conditions are examined and only the maximum / minimum horizontal or vertical reactions along with the corresponding horizontal or vertical reactions for those load IDs are reported.

1a. Unless noted otherwise in the tables or below, all reactions shown are in kips (1000lbs.= 1klp) and are based on applied unfactored loads (i.e. service level loads). Dead load reactions shown include the estimated weights of structural steel, miscellaneous steel, and roof cladding.

2. Positive reactions are shown in the sketch. Foundation loads are in the opposite directions. For loads to foundations, positive vertical loads act down and positive horizontal loads act in the opposite direction shown.

3. Bracing reactions are in the plane of the brace with the horizontal pointing away from the braced bay. The vertical reaction can be downward or upward.

4. Reactions given are based on the design data below. Reactions are not furnished for loads not listed.

4a. For the Rigid Frame/Endwall Column 'Basic Column Reactions' tables, and the 'Building Bracing Reactions' table, the wind loads are determined using the 'Low-Rise Buildings' structures Envelope Procedures of ASCE7, Chapter 28, and are based on V basic design wind speed and do NOT include the 0.6 Factor for ASD. This design assumes that the building is located on a site that is not subject to wind channeling effects nor wind buffeting conditions. Also see Buildings Reactions Footnote (4).

4b. Reduction in velocity pressure due to apparent shielding afforded by adjacent independent buildings and other structures or terrain features is not considered or reflected in the reactions shown.

5. The endwall column reaction tables include wind and seismic vertical reactions from the endwall bracing. Horizontal reactions shown in the tables, except for 'Wind Press', 'Wind Suct', and 'Seis_Long' are in the plane of the wall.

6. The Rigid Frame 'Maximum Reactions, Anchor Bolts, & Base Plates' summary reactions tables include the vertical component of the wind and seismic reactions from the sidewall bracing. The horizontal component of the sidewall bracing, reported in the Bracing Reactions Table from wind and seismic is in the plane of the wall, perpendicular to the web of the columns and should be combined with the appropriate basic column reactions to determine the maximum reactions for the foundation designs.

6a. For the Rigid Frame/Endwall Column 'Basic Column Reactions' tables, and the 'Building Bracing Reactions' table, seismic loads are per ASCE7, Chapter 12, seismic design requirements for building structures and are Ultimate Strength loads and do NOT include the 0.7 factor for ASD nor do they include the redundancy factor 'Rho' or the system overstrength factor(s) 'Omega'.

6b. Seismic horizontal loads represent Qe= Effects of horizontal seismic forces from V or Fp and do NOT include the redundancy factor 'Rho' nor the system overstrength factor 'Omega'. (Also see ASCE7, Sections 12.3.4.1, 12.3.4.2 AND 12.4.2.1.)

6c. Seismic vertical loads, unless shown and noted separately, do not include the 'Vertical seismic load effect'= ±0.2QaSxCD). Foundation engineer to add or subtract this value as appropriate to determine the maximum vertical seismic reactions to be considered (Also see ASCE 7, Sections 12.4.2.3 and 12.4.3.2).

7. Foundation construction and design is not the responsibility of MBM. The embedment of the anchor rods in concrete is the responsibility of the foundation designer.

7a. Anchor rod length, effects of concrete edge dimensions, and method of transferring forces from anchor rods to footings / piers are to be determined by the foundation designer.

7b. Anchor rod diameters were determined by allowable shear and tension per AISC specifications utilizing ASTM F1554 Grade 36 (Fy= 36ksi) or equal material and based on threads included in the shear planes. Unless otherwise specified, anchor rods are designed and detailed as cast-in-place anchor rods with snug-tight conditions.

7c. Suggested anchor rod diameter, quantity, minimum projection and placement are shown. Anchor rods (not by MBM) shall be set to a tolerance of ±1/8" in both elevation and location.

8. Concrete foundations shall have a minimum compressive strength (F'c) of 3000 psi at 28 days. MBM assumes no liability nor responsibility for foundation design / supporting soil conditions.

8a. For the design of the column base plate a minimum allowable bearing strength of the concrete equal to 0.52F'c= 1560 psi is assumed, and unless indicated otherwise on the drawings and on the MBM building order, all column base plates are designed as pinned connections.

9. Design wind pressures are furnished for exterior components and cladding not specifically designed and / or furnished by MBM. Values shown are based on tributary areas of 100 sq. ft. For members and 10 sq. ft. for panels, but not less than 16 psf and shall be increased based on lessor tributary areas and / or location. Confirmation of the design loads and adequacy to resist such loads shall be the responsibility of a licensed design professional by others.

10. Foundations and / or base supports for all door/window jambs shall be designed for a minimum lateral load (wind or seismic), acting in either direction perpendicular to the jamb/wall as indicated below, unless noted otherwise on the construction documents. This minimum load (wind or seismic) shall be applied per jamb and shall not be reduced.
    Cold-formed jambs: 5 kips
    Hot-rolled (channel) jambs: 8 kips
    Tube (square/rectangular): 12 kips

Building Reactions are based on the following information:

Governing Building Code: SBC-1 2021 RI State Building Code w/ IBC 18
Building Occupancy / Risk Category: III- High
Occupancy Classification: Group A-4 - Assembly

Building Size:

Width (ft.):	75'-0"
Length (ft.):	120'-0"
Back Side Eave Height (ft.):	17'-4 1/2"
Front Side Eave Height (ft.):	17'-4 1/2"
Back Side Roof Slope:	5.0:12
Front Side Roof Slope:	5.0:12

Rain Loads: (Footnote 1)

Rain Intensity, (I):	3.20 in/hr

Floor Dead, Collat.& Live Loads: (Footnote 2)

Floor Dead Load:	N/A
Floor Partition Dead:	N/A
Floor Collat. Load Above/Below:	N/A
Floor Live Load:	N/A
Floor Live Load Reduction Taken:	No

Roof Dead, Collat. & Live Loads: (Footnote 3)

Roof Dead Load:	4.50	psf
Roof Collateral Load:	10.0	psf
Roof Live Load:	20.00	psf
Roof Live Load Reduction Taken:	No	

Wind Loads: (Footnote 4)

Ult./Basic Design Wind Speed,Vult(3-sec gust), or V:	136 mph
Nom./Allow. Stress Wind Speed,Vasd=	105.35 mph
Serviceability Wind Speed:	76 mph (10yr MRI)
Wind Risk Category:	III- High
Wind Exposure:	C
Topographic Factor (Kzt):	1.00
Elevation Factor (Ke):	1.00
Building Enclosure (E/C/P):	Open (Footnote 5)
Internal Pressure Coeff. (GCpi):	± 0.00
Design Wind Press.Ext. C&C - Ref. React. Note 9 & Footnote 5	

Auxiliary/Special/Photovoltaic Load(s):

None

Seismic Loads: (Footnote 6)

Seismic Risk Category:	III- High	Seismic Response Coeff.(Cs) MF:		0.0774
Seismic Importance (Ie):	1.25	Seismic Response Coeff.(Cs) BF:		0.0774
Seismic Response Coeff. (Ss):	0.174	Response Modif. Coeff. (R) MF:		3.00
Seismic Response Coeff. (S1):	0.060	Response Modif. Coeff. (R) BF:		3.00
Soil Site Class:	d			
Seismic Response Coeff. (Sds):	0.186			
Seismic Response Coeff. (Sd1):	0.096			
Seismic Design Category (SDC):	B			
Seismic Force Resisting System(s)	(Footnote 7)			
Design Base Shear (V) = Longit.:	13.32 kips (Footnote 8)			
Design Base Shear (V) = Transv.:	13.32 kips (Footnote 8)			
Analysis Procedure: Equivalent Lateral Force				

Geotechnical / Flood Data: (Footnote 9)

Flood Load(s) Assumed: NONE

Acronyms:

MF= Moment Frame
BF= Braced Frame
CL= Collateral Load
DL= Dead Load
FxUNB_SL= Unbalanced Snow Load for Frame IDx
ExUNB_SL= Unbalanced Snow Load for Endwall IDx
Wind_LongxL= Longitudinal Wind Load - Left
Wind_LongxR= Longitudinal Wind Load - Right
ExPAT_SL_x= Pattern Snow Loading Condition

SEIS= Seismic
mph= miles per hour
psf= pounds per square foot
RF= Rigid Frame
Floor= Floor Live Load
Ult= Ultimate
Nom.= Nominal
MRI= Mean Return Interval
Coeff.= Coefficient

DESIGN NOTES:

1. When multiple building sections are involved, specific load factors for differing building plan dimensions, heights, framing systems, roof slopes, roof exposures, building enclosures, etc. may result in different load application factors than listed. Wind loads are applied to the overall building envelope. Common walls between connected shapes are not subject to external wind loads.

2. This building system design is based on uniformly applying the contract-specified live load and roof snow load. In addition, the design is based on applying a code-defined live and a code-defined snow load (based on contract-specified ground snow, exposures, thermal factors, etc.) for all partial loading and unbalanced snow load conditions.

3. This building design is based on loads stated on the stamped Letter of Certification. MBM is not responsible for any loads not stated on the Letter of Certification nor for verifying actual weights of any HVAC, plumbing, or other equipment, furnished by others.

4. Unless noted otherwise, this project includes no provision for dynamic load criterion (vibrations) and their effects on the structure. MBM assumes no responsibility for the presence of dynamic loads. It shall be the responsibility of the Project Engineer of Record to determine the impact of vibrations on the structure. It shall be the responsibility of the equipment installer to provide/install adequate dampening/devices to minimize vibrations to an acceptable level as determined and approved by the project E.O.R.

DEFLECTION CRITERIA:

This structure has been designed using the following Deflection Criterions (as applicable), unless noted otherwise on the design drawings:

Location:	Loading:	Limit:	Location:	Loading:	Limit:
Endwall Column:	(Hor. - Wind)	H/ 180	Roof Purlin:	(Vert.- Live)	L/ 180
Endwall Rafter:	(Vert.- Live)	L/ 240	Roof Purlin:	(Vert.- Wind)	L/ 180
Endwall Rafter:	(Vert.- Wind)	L/ 240	Roof Panel:	(Vert.- Live)	L/ 180
Wall Girt:	(Hor. - Wind)	L/ 180	Roof Panel:	(Vert.- Wind)	L/ 180
Wall Panel:	(Hor. - Wind)	L/ 180			
Partial Wall Girt:	(Hor. - Wind)	L/ 240			
Rigid Frame:	(Hor. - Wind)	H/ 60	Wind Bent:	(Hor. - Wind)	H/ 60
Rigid Frame:	(Hor.- Seis)	H/ 67	Wind Bent:	(Hor. - Seis)	H/ 67
Rigid Frame:	(Vert.- Live)	L/ 240			

For Risk Category I and II buildings, IBC/ASCE7 Table 12.12-1, note 'c' allows for single-story structures to have no drift limit for seismic story drift, provided interior walls, partitions, ceilings, and exterior wall systems are designed to accommodate the story drifts. Unless otherwise noted, this building has been designed with no code prescribed horizontal seismic story drift limit. The maximum amplified elastic displacement, computed under strength-level design seismic forces (no reduction for ASD) can be found on the MBM building drawings. All walls, ceilings, miscellaneous appurtenances, and MEP (by others) shall be designed to accommodate the amplified displacements indicated.

BUILDING REACTIONS FOOTNOTES:

Footnote 1:
Rain intensity, (I) is based on a NOAA's National Weather Service's 100-year hourly rainfall rate (greatest hour). MBM takes no reponsibility for the design or adequacy of the roof drain system to evacuate the required water volume for the prescribed rain intensity shown.

Footnote 2: Unless otherwise indicated, this structure does not include any floor or mezzanine systems furnished as part of the MBM design and scope of supply.

Footnote 3: The primary and secondary roof framing of this building includes an evenly distributed collateral load, as specified, for suspended items such as sprinklers, HVAC, lights, ceiling tile, etc. Additional material and/or member strengthening may be required for heavy concentrated loads, not identified herein.

Footnote 4:
Wind load for IBC 2015/2012/ASCE7-10 is provided as Vult, Ultimate Design Wind Speed (3-second gust). Vasd refers to Nominal Design Wind Speed (3-second gust).

Wind load for IBC 2018/ASCE7-16 is provided as V, Basic Design Wind Speed. Vasd refers to Allowable Stress Design Wind Speed.

Serviceability wind load is taken at the 10-year MRI wind speed in accordance with ASCE 7, Appendix C and has been reduced to working (service) level wind speed. No further reduction in wind speed shall be taken.

Gust effect factor(G) has been taken as 0.85.

Footnote 5:
For stuctures designed as 'Closed', where GCpi= ±0.18, all components and cladding not furnished by the contractor should be designed for minimum wind pressures listed in the Building Design Wind Loads Table and all glazed openings located below 60 feet above ground level for structures located in hurricane-prone regions shall be protected with either an impact-protective system or impact-resistant glazing in accordance with the code.

For stuctures designed as 'Partially Closed', where GCpi= ±0.55, all components and cladding not furnished by the contractor will be designed for the minimum wind pressures listed in the Building Design Wind Loads Table.

For stuctures designed as 'Open', where GCpi= ±0.00, the structure is intended to remain open for the life of the structure. Enclosing a portion of, or in its entirety in the future will require re-analysis and design of the building structure. Re-analysis shall be performed by a licensed professional engineer.

Footnote 6:
This project has been designed without a Site-Specific Seismic Hazard Analysis (SSSHA) performed, thus Sds and Sd1 were determined using the design response spectrum found in ASCE7, Figure 11.4-1 or state/local climatic load data tables, as required by the governing building code in effect.

Calculation of the seismic response coefficient(s), Cs were determined based on ASCE7 Eq. 12.8-2 without considering the structure's fundamental period(s), thus no reduction in Cs has been taken.

Footnote 7. (As applicable)
Unless otherwise noted, Seismic R, Cd and Omega are per ASCE7-10, Table 12.2-1 Seismic Force-Resisting System H, 'Steel Systems Not Specifically Detailed For Seismic'.

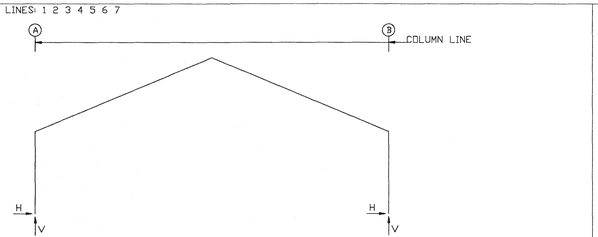
For Seismic Design Category (SDC) equal to D and above, Seismic R, Cd and Omega are per ASCE7, Table 12.2-1 Seismic Force-Resisting System B.3 'Ordinary Steel Concentrically Braced Frames' and C.4 'Steel Ordinary Moment Frames', as applicable.

Footnote 8:
Calculation of the effective seismic weights 'W' and resulting Base Shear(s) 'V' includes those loads directly carried by the building's structure. For loads directly supported along the foundation (i.e. wall sheeting, CMU, brick, or wall systems by others, etc.) the seismic shear shall be calculated and added to the base shear(s) shown. For MBM wall sheeting, a minimum dead weight of 3 psf can be assumed with the Cs values stated. For wall systems not by MBM, the effective weights and the determination(s) of 'Cs' to be used shall be determined by others.

Footnote 9:
Geotechnical information and flood design data, as required by IBC Section 1603 is not in MBM's design scope. Refer to Civil Drawings (not by MBM) for Geotechnical Soil Design Load-Bearing Values and Flood Design Data, as applicable. It is the responsibility of the Project E.O.R. to notify MBM of any flood loads that must be considered.

Loading Conditions are as follows:
1 Dead+Collateral+Snow+Slide_Snow
2 0.6Dead+0.6Wind_Left2
3 0.6Dead+0.6Wind_Right2
4 Dead+Collateral+MIN_SNOW

FRAME LINES: 1 2 3 4 5 6 7



RIGID FRAME: MAXIMUM REACTIONS, ANCHOR BOLTS, & BASE PLATES

Frm Line	Col Line	Load Id	Hmax H	V Vmax	Load Id	Hmin H	V Vmin	Bolt(in) Qty	Bolt(in) Dia	Base_Plate(in) Width	Base_Plate(in) Length	Base_Plate(in) Thick	Base EL. (ft-in)
1×	A	1	10.2	21.6	2	-5.2	-7.2	4	0.750	8.000	20.00	0.375	100'-0"
					3	-2.0	-8.9						
1×	B	3	5.2	-7.2	1	-10.2	21.6	4	0.750	8.000	20.00	0.375	100'-0"
		1	-10.2	21.6	2	2.0	-8.9						

1× Frame lines: 1 7

RIGID FRAME: MAXIMUM REACTIONS, ANCHOR BOLTS, & BASE PLATES

Frm Line	Col Line	Load Id	Hmax H	V Vmax	Load Id	Hmin H	V Vmin	Bolt(in) Qty	Bolt(in) Dia	Base_Plate(in) Width	Base_Plate(in) Length	Base_Plate(in) Thick	Base EL. (ft-in)
2×	A	4	19.6	40.3	2	-10.2	-14.2	6	0.750	8.000	20.00	0.625	100'-0"
		1	19.6	40.3	3	-4.2	-17.5						
2×	B	3	10.2	-14.2	4	-19.6	40.3	6	0.750	8.000	20.00	0.625	100'-0"
		1	-19.6	40.3	2	4.2	-17.5						

2× Frame lines: 2 3 4 5 6

BUILDING WIND DESIGN LOADS

Components & Cladding

Zone	Pressure (psf) Member	Pressure (psf) Panel	Suction (psf) Member	Suction (psf) Panel
Roof Surface @ Interior	25.74	25.74	-67.43	-67.43
Roof Surface @ Gable Edge	25.74	32.18	-67.43	-89.90
Roof Surface @ Eave/Ridge Edge	25.74	32.18	-67.43	-89.90
Roof Surface @ Eave/Ridge Corner	25.74	32.18	-67.43	-89.90

(+) wind towards surface
(-) wind away from surface

BUILDING BRACING REACTIONS

Loc	Wall Line	Col Line	± Reactions(k) Wind Horz	Wind Vert	Seismic Horz	Seismic Vert	Panel_Shear (lb/ft) Wind	Seis	Note
L_EW	1								(b)
F_SW	B	2,3							(a)
		5,6							(a)
R_EW	7								(b)
B_SW	A	5,6							(a)
		2,3							(a)

(a)Wind bent in bay
(b)Rigid frame at endwall

Reactions for seismic represent shear force, Eh

RIGID FRAME: BASIC COLUMN REACTIONS (k)

Frame Line	Column Line	Dead Horiz	Dead Vert	Collateral Horiz	Collateral Vert	Live Horiz	Live Vert	Snow Horiz	Snow Vert	Wind_Left1 Horiz	Wind_Left1 Vert	Wind_Right1 Horiz	Wind_Right1 Vert
1×	A	1.6	3.9	2.3	4.7	4.2	8.7	6.3	13.0	-7.3	-16.6	-7.3	-16.6
1×	B	-1.6	3.9	-2.3	4.7	-4.2	8.7	-6.3	13.0	7.3	-16.6	7.3	-16.6

Frame Line	Column Line	Wind_Left2 Horiz	Wind_Left2 Vert	Wind_Right2 Horiz	Wind_Right2 Vert	Wind_Long1 Horiz	Wind_Long1 Vert	Wind_Long2 Horiz	Wind_Long2 Vert	Seismic_Left Horiz	Seismic_Left Vert	Seismic_Right Horiz	Seismic_Right Vert
1×	A	-10.2	-15.9	-5.0	-18.7	7.4	-16.7	3.1	7.1	-0.6	-0.3	0.6	0.3
1×	B	5.0	-18.7	10.2	-15.9	7.4	-16.7	-3.1	7.1	-0.6	0.3	0.6	-0.3

Frame Line	Column Line	-MIN_SNOW- Horiz	-MIN_SNOW- Vert	F1UNB_SL_L- Horiz	F1UNB_SL_L- Vert	F1UNB_SL_R- Horiz	F1UNB_SL_R- Vert
1×	A	6.3	13.0	5.1	12.2	5.1	7.4
1×	B	-6.3	13.0	-5.1	7.4	-5.1	12.2

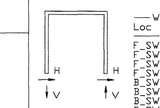
Frame Line	Column Line	Dead Horiz	Dead Vert	Collateral Horiz	Collateral Vert	Live Horiz	Live Vert	Snow Horiz	Snow Vert	Wind_Left1 Horiz	Wind_Left1 Vert	Wind_Right1 Horiz	Wind_Right1 Vert
2×	A	2.8	6.6	4.4	8.9	8.2	16.5	12.3	24.8	-14.2	-31.5	-14.2	-31.5
2×	B	-2.8	6.6	-4.4	8.9	-8.2	16.5	-12.3	24.7	14.2	-31.5	14.2	-31.5

Frame Line	Column Line	Wind_Left2 Horiz	Wind_Left2 Vert	Wind_Right2 Horiz	Wind_Right2 Vert	Wind_Long1 Horiz	Wind_Long1 Vert	Wind_Long2 Horiz	Wind_Long2 Vert	Seismic_Left Horiz	Seismic_Left Vert	Seismic_Right Horiz	Seismic_Right Vert
2×	A	-19.8	-30.2	-9.8	-35.7	-13.5	-30.0	6.0	13.4	-1.2	-0.5	1.2	0.5
2×	B	9.8	-35.7	19.8	-30.2	13.5	-30.0	-6.0	13.4	-1.2	0.5	1.2	-0.5

Frame Line	Column Line	-MIN_SNOW- Horiz	-MIN_SNOW- Vert	F2UNB_SL_L- Horiz	F2UNB_SL_L- Vert	F2UNB_SL_R- Horiz	F2UNB_SL_R- Vert
2×	A	12.3	24.7	10.0	14.1	10.0	14.1
2×	B	-12.3	24.7	-10.0	14.1	-10.0	23.3

1× Frame lines: 1 7
2× Frame lines: 2 3 4 5 6

WIND BENT REACTIONS



Loc	Wall Line	Col Line	± Reactions Wind(k) Horz	Wind(k) Vert	Seismic(k) Horz	Seismic(k) Vert	Bolt(in) Qty	Bolt(in) Dia	Base_Plate(in) Width	Base_Plate(in) Length	Base_Plate(in) Thick	Base EL. (ft-in)
F_SW	B	2	5.4	9.4	1.8	3.2	4	0.750	6.000	10.500	0.375	100'-0"
F_SW	B	3	5.4	9.4	1.8	3.2	4	0.750	6.000	10.500	0.375	100'-0"
F_SW	B	5	5.4	9.4	1.8	3.2	4	0.750	6.000	10.500	0.375	100'-0"
F_SW	B	6	5.4	9.4	1.8	3.2	4	0.750	6.000	10.500	0.375	100'-0"
B_SW	A	6	5.4	9.4	1.8	3.2	4	0.750	6.000	10.500	0.375	100'-0"
B_SW	A	5	5.4	9.4	1.8	3.2	4	0.750	6.000	10.500	0.375	100'-0"
B_SW	A	3	5.4	9.4	1.8	3.2	4	0.750	6.000	10.500	0.375	100'-0"
B_SW	A	2	5.4	9.4	1.8	3.2	4	0.750	6.000	10.500	0.375	100'-0"

8/7/23
JOSEPH ELIJAH BERGER
No. 14366
REGISTERED PROFESSIONAL ENGINEER CIVIL

REV.	DESCRIPTION:	DATE:	DRAFT	ENG.
3				
2				
1				
⚠	INITIAL DRAWING RELEASED FOR CONSTRUCTION	CURRENT REVISION: 0		

PACKAGE STEEL SYSTEMS, INC.		Beta Group Inc	
PROJECT	City Hall Rink Shelter	ANCHOR BOLT REACTIONS & NOTES	
ID	2305-038	DESIGN: LPB	DESIGN CHECK: JEB
PROJECT	3275 Post Road	DRAFT: LPB	DRAFT CHECK: JEB
ADDRESS	Warwick, RI 02886	DATE: 08/07/2023	DRAWING: ABLT-2

PACKAGE

PACKAGE STEEL SYSTEMS, INC. / NORTHERN BUILDING SYSTEMS, INC. IS THE METAL BUILDING MANUFACTURER FOR THIS PROJECT, HEREIN AFTER REFERRED TO IN THE NOTES AS THE 'MBM'.

THE FOLLOWING ARE GENERAL NOTES ONLY. IF A DISCREPANCY EXISTS BETWEEN THE FINAL 'RELEASED FOR CONSTRUCTION' PLANS FOR FIELD USE AND THESE NOTES, THEN THE FINAL PLANS SHALL TAKE PRECEDENCE.

DEFINITIONS/GENERAL NOTES:

THE DESIGN PROFESSIONAL IS DEFINED AS AN ARCHITECT OR ENGINEER RETAINED BY THE OWNER, GENERAL CONTRACTOR OR THE BUILDER TO ASSIST IN THE PREPARATION OF DESIGN SPECIFICATIONS FOR THE CONSTRUCTION PROJECT INCLUDING THE METAL BUILDING SYSTEM AND ITS ERECTION, AND WHERE APPROPRIATE, TO ASSIST IN SUPERVISING THE CONSTRUCTION PROCESS FOR COMPLIANCE WITH THE CONTRACT DOCUMENTS.

1. THE MANUFACTURER'S ENGINEER IS EMPLOYED BY A MANUFACTURER (WHO MAY ALSO BE KNOWN AS A SPECIALTY ENGINEER) WHO IS IN RESPONSIBLE CHARGE OF THE STRUCTURAL DESIGN OF A METAL BUILDING SYSTEM FABRICATED BY THE MANUFACTURER. THE MANUFACTURER'S ENGINEER IS NOT THE ENGINEER OF RECORD.
2. THE ENGINEER/ARCHITECT OF RECORD IS THE ENTITY RESPONSIBLE FOR THE OVERALL DESIGN OF THE BUILDING PROJECT. THIS MAY ALSO INCLUDE THE FOUNDATION ENGINEER WHO ACTS AS A DESIGN PROFESSIONAL OR ENGINEER OF RECORD TO ENSURE ADEQUATE PROVISIONS ARE MADE FOR THE DESIGN OF THE FOUNDATION SYSTEM.

RAINWATER DISCHARGE NOTES:

1. BUILDINGS WITH PARAPET WALLS AND INTERNAL GUTTERS MUST BE FURNISHED WITH RAINWATER OVERFLOW MECHANISMS (SUCH AS SCUPPERS, DOWN PIPING, ETC.) TO PREVENT THE ACCUMULATION OF WATER IN THE EVENT OF A GUTTER BLOCKAGE. IT IS THE RESPONSIBILITY OF THE BUILDER TO MAKE SURE THAT THE SCUPPERS ARE OF THE APPROPRIATE SIZE, QUANTITY, LOCATION AND DESIGN TO PREVENT WATER ACCUMULATION ON THE ROOF. FAILURE TO DO SO CAN RESULT IN BUILDING COLLAPSE. MBM ACCEPTS NO RESPONSIBILITY FOR THE DESIGN AND INSTALLATION OF OVERFLOW MECHANISMS OR DRAINAGE SYSTEMS.
2. DRAINAGE SYSTEMS MUST BE DESIGNED BY THE PROJECT PROFESSIONAL TO COMPLY WITH CODE REQUIREMENTS. THE PROJECT PROFESSIONAL AND CIVIL CONTRACTOR ARE RESPONSIBLE TO ENSURE THAT PRIMARY DRAINS AND OVERFLOW DEVICES/AUXILIARY DRAINS ARE PROVIDED AS REQUIRED TO EVACUATE THE REQUIRED RAINFALL INTENSITY AT THE BUILDING PERIMETER AND AT VALLEY CONDITIONS TO PREVENT PONDING.

EXISTING / CLOSE PROXIMITY STRUCTURES NOTES:

1. MBM MUST BE ADVISED OF ANY EXISTING STRUCTURES LOCATED WITHIN 20 FEET OF MBM'S BUILDING OR UNUSUAL TOPOGRAPHIC FEATURES. LOADING OF BOTH BUILDINGS MAY BE AFFECTED WHEN ADJACENT BUILDINGS ARE WITHIN THIS DISTANCE. ADJACENT BUILDING OWNER(S) MUST PROVIDE MBM WRITTEN CONFIRMATION THAT EITHER THE EXISTING ADJACENT LOWER ROOF(S) HAVE BEEN EVALUATED FOR THE INCREASED SNOW LOADS OR ACKNOWLEDGEMENT THAT THEY HAVE BEEN ADVISED OF THE POTENTIAL FOR INCREASED SNOW LOADS AS REQUIRED BY SECTION 7.12 OF ASCE 7. MBM ACCEPTS NO RESPONSIBILITY FOR INSPECTION OR DETERMINATION OF EXISTING'S BUILDING CAPACITY TO SUSTAIN ADDITIONAL IMPOSED SNOW DRIFT LOAD.
2. MBM IS NOT RESPONSIBLE FOR LOADS (SEISMIC, SNOW, ETC.) IMPOSED ON EXISTING STRUCTURE(S) ATTACHED TO OR IN CLOSE PROXIMITY TO THE NEW STRUCTURE OR FIELD MODIFICATIONS REQUIRED TO THE EXISTING STRUCTURE(S). IT IS THE BUYER'S RESPONSIBILITY TO VERIFY THAT CLOSE PROXIMITY STRUCTURES, TOGETHER WITH THEIR FOUNDATIONS, ARE CAPABLE OF RESISTING ALL ADDITIONAL LOADS THAT MAY RESULT FROM THE ADDITION OF THE BUILDING STRUCTURE.

CONCENTRATED/COLLATERAL AND ADDITIONAL LOADS NOTES:

1. WHEN ROOF COLLATERAL LOADS ARE SPECIFIED (SEE CODES AND LOADS NOTES), LOADS ARE TO BE EVENLY DISTRIBUTED AND APPLIED TO THE ROOF SECONDARY AND/OR RAFTERS FOR SUSPENDED ITEMS SUCH AS SPRINKLERS, HVAC, LIGHTS, CEILING TILE, ETC. ADDITIONAL MATERIAL AND/OR MEMBER STRENGTHENING MAY BE REQUIRED FOR HEAVY CONCENTRATED LOADS (GREATER THAN 250 LBS.) OR IF INDIVIDUAL MEMBERS ARE LOADED SIGNIFICANTLY MORE THAN OTHERS, WHICH IN THIS CASE, ARE NOT CONSIDERED COLLATERAL LOADS. BUILDER MUST EXERCISE CARE TO PREVENT LOCAL OVERSTRESS OF LIGHT GAGE SECONDARY MEMBERS SUPPORTING THE COLLATERAL CONCENTRATED LOADS.
2. THE BUILDER IS RESPONSIBLE FOR PROVIDING INFORMATION PERTAINING TO ALL COLLATERAL AND CONCENTRATED LOADS. ADDITIONALLY, ALL CONNECTION ATTACHMENT DETAILS, COMPLETE WITH REQUIRED DIMENSIONS, ELEVATIONS, CONNECTION MATERIAL SIZES, LOADS, AND FASTENING METHOD SHALL BE PROVIDED TO MBM FOR APPROVAL, PRIOR TO INSTALLATION INTO THE METAL BUILDING.

INDEPENDENT MEZZANINES NOTES:

1. INDEPENDENT MEZZANINES MUST BE DESIGNED BY A REGISTERED PROFESSIONAL ENGINEER. THE ENGINEER MUST ENSURE THAT PROPER ISOLATION FROM MBM'S BUILDING STRUCTURE HAS BEEN PROVIDED TO AVOID STRUCTURAL DAMAGE DUE TO DIFFERENTIAL MOVEMENTS, OR INADVERTENTLY APPLIED LOADS TO MBM'S BUILDING. MBM ACCEPTS NO RESPONSIBILITY FOR THE DESIGN OF THE INDEPENDENT MEZZANINE.

PHOTOVOLTAIC (PV)/SOLAR PANEL SYSTEMS NOTES:

1. UNLESS OTHERWISE INDICATED ON THE CONSTRUCTION DOCUMENTS, THIS BUILDINGS ROOF SYSTEM HAS NOT BEEN DESIGNED FOR ANY ADDITIONAL LOADS FOR FUTURE PHOTOVOLTAIC (PV)/SOLAR PANEL SYSTEMS. APPLICABILITY OF THE INTERNATIONAL ENERGY CONSERVATION CODE (IECC) SECTION C402.3 (ROOFTOP SOLAR READINESS) IS THE RESPONSIBILITY OF THE PROJECT ENGINEER OF RECORD OR OWNER TO SPECIFY.
2. IF THIS BUILDINGS ROOF STRUCTURE IS TO BE DESIGNED FOR ADDITIONAL PV/SOLAR PANEL SYSTEM LOADS, THE ADDITIONAL LOADS AND/OR UNIFORMLY DISTRIBUTED DEAD LOAD ALLOWANCE(S) SHALL BE SPECIFIED IN THE MBM'S ORDER DOCUMENTS. THE PURCHASER IS RESPONSIBLE FOR SPECIFYING ALL LOADS AND/OR DEAD LOAD ALLOWANCES TO BE INCLUDED, THE AFFECTED ROOF AREAS (ZONES) PER C402.3.1 AND PERTINENT DESIGN CRITERIA AND ATTACHMENT DETAILS TO MBM PRIOR TO DESIGN. UNLESS NOTED OTHERWISE, LOADS SPECIFIED SHALL BE CONSIDERED A 'UNIFORMLY DISTRIBUTED COLLATERAL DEAD LOAD' FOR DETERMINING THE ROOF SUPPORT SYSTEM DESIGN.
3. UNLESS SPECIFIED BY THE CUSTOMER PRIOR TO DESIGN, THE SOLAR/PV SYSTEM IS ASSUMED TO BE INSTALLED AT A MINIMAL ELEVATION (<18 INCHES) ABOVE THE ROOF SYSTEM, SO AS NOT TO IMPOSE ADDITIONAL DRIFT LOADS (IBC 1607.13.5.2).

MATERIALS BY OTHERS NOTES:

1. BRICK VENEER (WITH STEEL STUD BACKING), EIFS, & RIGID BOARD INSULATION USED IN WALL OR ROOF ASSEMBLES SHALL BE DESIGNED BY OTHERS. THE DESIGNER IS RESPONSIBLE FOR PROVIDING MBM WITH ALL PERTINENT INFORMATION NECESSARY TO COORDINATE THE DESIGN OF THE INTERFACE OF MATERIALS WHERE THERE IS SHARED DESIGN RESPONSIBILITY. THIS INCLUDES BUT IS NOT LIMITED TO THE BRICK VENEER/STEEL STUD TRACK BEARING LOCATION(S) SUCH AS ON THE GROUND FLOOR SLAB, FOOTING, OR AN ELEVATED LINTEL/BEAM.

PANEL MATERIAL FINISH AND PERFORMANCE NOTES:

1. OIL CANNING IS AN INHERENT CHARACTERISTIC OF COLD FORMED STEEL ROOF AND WALL PANELS. IT IS A RESULT OF SEVERAL FACTORS THAT INCLUDE, BUT ARE NOT LIMITED TO, INDUCED STRESSES IN THE RAW COIL MATERIAL, FABRICATION METHODS, INSTALLATION PROCEDURES, AND POST INSTALLATION THERMAL RESTRAINT FORCES.
2. PANEL DIMPLING IS MOST COMMON WITH THROUGH-FASTENED PANELS WHEN INSTALLED, ESPECIALLY WHEN INSULATION IS INSTALLED BETWEEN PANELS AND SECONDARY SUPPORT MEMBERS. BUILDER TO TAKE CARE NOT TO OVERDRIVE FASTENERS DURING INSTALLATION TO MINIMIZE DIMPLING.
3. ROOF PANELS EXPERIENCE RUMBLING CAUSED BY WIND GUSTS. TO SOME DEGREE, THE ACTION OF THE PANEL LIFTING UP AND SPRINGING BACK WILL RESULT IN THIS NOISE. THE NOISE MAY BE MINIMIZED BY PROVIDING A LAYER OF BLANKET INSULATION BETWEEN THE PANELS AND ANY HARD SUPPORT (USUALLY SECONDARY STEEL MEMBERS, PLYWOOD, STEEL DECKING, OR RIGID BOARD INSULATION).
4. OIL CANNING, PANEL DIMPLING AND ROOF RUMBLE (NOISE) DO NOT AFFECT THE STRUCTURAL INTEGRITY, OVERALL PERFORMANCE OR WEATHER TIGHTNESS OF THE PANELS. OIL CANNING AND PANEL DIMPLING ARE AESTHETIC ISSUES ONLY AND DO NOT CONSTITUTE GROUNDS FOR REJECTION OF THE PANELS.

STRUCTURAL STEEL NOTES:

1. UNLESS NOTED OTHERWISE, STRUCTURAL AND MISCELLANEOUS STEEL SHALL BE FURNISHED, FABRICATED AND ERECTED IN ACCORDANCE WITH THE APPLICABLE REQUIREMENTS OF THE REFERENCED EDITIONS OF THE AISC-360 'SPECIFICATION FOR STRUCTURAL STEEL BUILDINGS', THE AISC 'MANUAL OF STEEL CONSTRUCTION' AND THE AISC-303 'CODE OF STANDARD PRACTICE FOR STEEL BUILDINGS AND BRIDGES'.

MATERIALS:	ASTM DESIGNATIONS:	YIELD STRENGTH:
STRUCTURAL STEEL PLATE (BUILT-UP SECTIONS)	A529 GRADES 50 & 55	50 KSI
	A572 GRADES 50 & 55	50 KSI
	A1011 (HSLAS) GRADES 50 & 55	50 KSI
	A1018 GRADES 50, CLASS 1 & 2	50 KSI
HOT ROLLED MILL SHAPES (WF, CHANNELS, ANGLES)	A572 GRADE 50	50 KSI
	A992 GRADE 50	50 KSI MIN.
ROUND STRUCT. HSS - PIPE	A500 GRADE C	46 KSI
SHAPED STRUCT. HSS - TUBE	A500 GRADE C	50 KSI
STEEL PIPE (RAILINGS)	A53 GRADE B, TYPE E, S	35 KSI
	A500 GRADE C (ROUND HSS)	50 KSI
COLD FORMED SHAPES (PURLINS, GIRTS, EAVE STRUTS)	A653 (SS) GRADE 55, CLASS 1, 2, 3	55 KSI MIN.
	A653 (HSLAS) GRADE 55, TYPE A, B	55 KSI MIN.
BRACE RODS & BRACE ANGLES	A529	50 KSI
STRUCTURAL CABLES (CABLE BRACING)	A475 7-WIRE EHS GRADE	
CABLE HARDWARE	A536 GRADE 65-45-12	45 KSI
BOLTS	A307 GRADE A	60 KSI (TENSILE STRENGTH)
	SAE-J429 GRADE 5	
	A325 TYPE 1	120 KSI, 105 KSI
NUTS	A307 GRADE A	
	SAE-J995 GRADE 5	
	A563 GRADE C, D or DH (A325)	
WASHERS (HARDENED)	F436 TYPE 1	
WASHERS (PLAIN)	F844	
ANCHOR BOLTS	F1554 GRADE 36	36 KSI
WELD FILLER MATERIAL	E70XX LOW HYDROGEN ROD MEETING AWS D1.1 REQUIREMENTS	
ROOF AND WALL SHEETS	REFER TO MANUFACTURER'S SPECIFICATIONS/PRODUCT DATA SHEETS	

ERECTION NOTES:

1. COLUMNS SHALL BE ERECTED PLUMB TO A TOLERANCE NOT EXCEEDING 1 TO 500 WITH A MAXIMUM OF 1" AT THE COLUMN CENTERLINE.
2. ZEE-SHAPED PURLIN AND GIRT MEMBERS ARE DESIGNED TO LAP AT THE RAFTER/COLUMN TO DEVELOP CONTINUITY FOR INCREASED STRENGTH AND STIFFNESS. MBM'S ZEE-SHAPES ARE MANUFACTURED WITH ONE FLANGE SLIGHTLY WIDER THAN THE OTHER AND WHEN LAPPED WITH ANOTHER ZEE-SHAPE THE WIDER FLANGE SHALL BE ALIGNED WITH THE NARROW FLANGE. THIS IS PROVIDED TO AID IN ERECTION AND ENSURE A TIGHT CONTACT FOR THE FULL LENGTH OF THE LAP.
3. DUE TO THEIR SHAPE AND ORIENTATION, GIRTS MAY SAG BETWEEN COLUMNS. IF REQUIRED, THE ERECTOR SHALL INSTALL TEMPORARY BLOCKING TO HOLD THE GIRTS IN ALIGNMENT UNTIL THE WALL SHEETING IS INSTALLED. ONCE THE SHEETING IS INSTALLED TO PROVIDE VERTICAL SUPPORT TO THE GIRTS, THE TEMPORARY BLOCKING MAY BE REMOVED. WHERE REQUIRED BY DESIGN TO PROVIDE INCREASED GIRT STRENGTH, SAG RODS OR DISCRETE BRACING IN THE SHAPE OF ANGLES OR STRAPS WILL BE PROVIDED IN THE WALL AND WILL AID IN THE VERTICAL ALIGNMENT OF THE SAG RODS OR DISCRETE BRACING SPACING WILL VARY BY PROJECT AND POSSIBLY BY LOCATION WITHIN THE BUILDING BASED ON THE GIRT SPAN, SIZE, WIND LOADING AND SHALL NOT BE REMOVED OR RE-LOCATED WITHOUT PRIOR WRITTEN PERMISSION OF MBM'S ENGINEERS.
4. PURLINS MAY SAG DOWNSLOPE, PARTICULARLY ON STEEPER ROOF PITCHES, BETWEEN THE RAFTERS. THE ERECTOR SHALL INSTALL TEMPORARY BLOCKING TO HOLD THE PURLIN'S HORIZONTAL SPACING UNTIL THE ROOF SHEETING IS INSTALLED. MBM MAY PROVIDE DISCRETE BRACING IN THE SHAPE OF ANGLES, THREADED ROD, STRAPS, CHANNELS, ETC. TO AID IN THE HORIZONTAL ALIGNMENT OF THE ROOF PURLINS AND PROVIDE INCREASED PURLIN STRENGTH AND OVERALL STABILITY OF THE STRUCTURE. THE DESIGN OF THE ROOF PURLIN 'ANTI-ROLL' SYSTEM VARIES BASED ON PURLIN SPAN, PURLIN GEOMETRY, ROOF SLOPE AND THE ROOF LOADING. ANCHORAGE IS PROVIDED AT THE RAFTERS WITH THE USE OF SHOP-WELDED CLIPS AND/OR ADDITIONAL FIELD BOLTED CLIPS/STRUCTURAL FRAMING. ANY TEMPORARY ANCHORAGE DUE TO INCOMPLETE OR PARTIAL CONSTRUCTION OF THE ROOF SYSTEM SHALL BE PROVIDED BY THE ERECTOR. FINAL INSTALLATION OF ALL COMPONENTS REQUIRED TO PREVENT PURLINS FROM TRANSLATION OR 'ROLLING' IS THE RESPONSIBILITY OF THE ERECTOR.
5. DUE TO THEIR SHAPE AND ORIENTATION, EAVE STRUTS MAY SAG BETWEEN COLUMNS. IF REQUIRED, THE ERECTOR SHALL INSTALL TEMPORARY BLOCKING TO HOLD THE EAVE STRUTS IN ALIGNMENT UNTIL THE WALL SHEETING IS INSTALLED. EAVE STRUTS ARE ALSO AN INTEGRAL PART OF THE MAIN FORCE RESISTING SYSTEM THAT TRANSFERS WIND AND SEISMIC FORCES FROM THE ROOF TO THE WALL. UNDER NO CIRCUMSTANCES SHALL STRUCTURAL FRAMING BE FIELD ATTACHED TO THE BOTTOM FLANGE OF THE EAVE STRUT, WITHOUT PRIOR WRITTEN PERMISSION FROM MBM'S ENGINEERS.
6. FIELD ADDED FRAMED OPENINGS WHICH DISRUPT PURLIN OR GIRT CONTINUITY ARE NOT ALLOWED EXCEPT AS SHOWN ON ERECTION DRAWINGS. ADDING AN OPENING WITHOUT CONSULTING MBM'S ENGINEERS MAY RESULT IN A LOSS OF CAPACITY AND THE ABILITY OF THE BUILDING TO RESIST DESIGN LOADS.

BRACING NOTES:

1. METAL BUILDING TENSION ROD/CABLE BRACING WORK IN PAIRS TO BALANCE FORCES CAUSED BY INITIAL TENSIONING. CARE MUST BE TAKEN WHEN TIGHTENING BRACE RODS OR CABLES SO AS NOT TO CAUSE ACCIDENTAL OR MISALIGNMENT OF BUILDING COMPONENTS. ALL RODS/CABLES MUST BE INSTALLED LOOSE AND THEN TIGHTENED SEQUENTIALLY AND EQUALLY TO MAINTAIN PROPER ALIGNMENT OF COMPONENTS. WHEN PROPERLY TIGHTENED, RODS AND CABLES SHOULD NOT EXHIBIT EXCESSIVE SAG. FOR LONG OR HEAVY RODS, CABLES OR ANGLES, IT MAY BE NECESSARY TO SUPPORT THESE BRACE COMPONENTS AT MID-BAY BY SUSPENDING THEM FROM A PURLIN AT THE APPROPRIATE ELEVATION.
2. BUILDING BRACING SHALL BE INSTALLED AT THE LOCATIONS SHOWN ON MBM'S ERECTION DRAWINGS. PERMANENT REMOVAL OR RELOCATION OF ANY BRACING IS NOT PERMITTED WITHOUT THE WRITTEN APPROVAL OF MBM'S ENGINEER OR ANOTHER REGISTERED DESIGN PROFESSIONAL, WHO BY AUTHORIZATION OF THE MODIFICATION, WILL ASSUME FULL RESPONSIBILITY FOR ANY AND ALL CONSEQUENCES RESULTING FROM THE RELOCATION OR REMOVAL OF SAID BRACING. THIS INCLUDES RAISING OR LOWERING TERMINATION POINTS IN COLUMNS TO CLEAR DOORS OR WINDOWS, OR RELOCATING THE ENDPOINTS IN THE ROOF TO ACCOMMODATE ROOF OPENINGS OR SKYLIGHTS. UNLESS OTHERWISE SHOWN ON THE 'RELEASED FOR CONSTRUCTION' DRAWINGS', FASTENING OF BRACING TO THE PURLINS OR GIRTS WITH ONE OR MORE SELF-DRILLING SCREWS SHALL NOT BE PERMITTED. IT IS ALSO PROHIBITED TO DRILL AND BOLT TO THE BOTTOM OF THE FLANGE OF ANY PRIMARY OR SECONDARY FRAMING MEMBERS.
3. FLANGE BRACING ARE ESSENTIAL FOR THE STRUCTURAL STRENGTH AND STABILITY OF THE METAL BUILDING SYSTEM. FLANGE BRACING MAY BE LOCATED ON ONE SIDE OR BOTH SIDES OF THE COLUMN OR RAFTER. ALL FLANGE BRACES MUST BE INSTALLED IN STRICT ACCORDANCE WITH THE ERECTION DRAWINGS AND SHALL NOT BE REMOVED, RELOCATED OR MODIFIED WITHOUT PRIOR WRITTEN APPROVAL OF MBM'S ENGINEERS.
4. WHERE X-BRACING IS INSTALLED IN THE PLANE OF THE GIRTS, THE ERECTOR SHALL ACCURATELY FIELD LOCATE AND CAREFULLY CUT SLOTS IN THE WEBS OF THE GIRTS FOR THE BRACING MEMBER TO PASS THROUGH. THE SLOTS SHALL BE OF THE MINIMAL SIZE NECESSARY TO ALLOW THE PASSAGE OF THE MEMBER, BUT NOT MORE THAN 1.5 TO 2 TIMES THE MEMBER DIAMETER. IT IS NOT ACCEPTABLE FOR THE FLANGE OF THE GIRT TO BE NOTCHED FOR BRACING INSTALLATION. SLOTS SHOULD BE CONFINED TO THE MIDDLE THIRD OF GIRT DEPTH.
5. WHEN DIAPHRAGM ACTION OR PANEL SHEAR IS UTILIZED (INDICATED ON THE CONSTRUCTION DRAWINGS), THE WALL AND ROOF PANELS PROVIDE BRACING TO RESIST IN-PLANE FORCES FROM WIND OR SEISMIC AND PROVIDE STABILITY TO THE BUILDING STRUCTURE. THE AMOUNT OF DIAPHRAGM ACTION WILL VARY BASED UPON THE DESIGN, NUMBER OF OPENINGS, AND THE RELATIVE DISTANCE BETWEEN OPENINGS AND THE WALL HEIGHT. WHEN DIAPHRAGM ACTION OR PANEL SHEAR IS USED, ADDITIONAL OPENINGS FOR MAN DOORS, OVERHEAD DOORS, OR OTHER CONSTRUCTION SHALL NOT BE ADDED NOR SHALL ANY DESIGNED OPENINGS BE MODIFIED IN SIZE OR LOCATION, WITHOUT CONSIDERING THEIR EFFECT ON THE OVERALL STRUCTURE. THE CONTRACTOR SHALL ENSURE THE PROPER INSTALLATION OF FASTENERS ON METAL PANELS THAT ARE FUNCTIONING AS DIAPHRAGM BRACING SINCE ADDITIONAL FASTENERS MAY BE REQUIRED ABOVE AND BEYOND THE NORMAL FASTENER PATTERNS FOR NON-DIAPHRAGM INSTALLATION.

FIELD CONNECTION NOTES:

1. ALL BOLTED FIELD CONNECTIONS FOR PRIMARY FRAMING AND BRACING SHALL BE HIGH STRENGTH 'SNUG-TIGHTENED' BOLTED CONNECTIONS, UNLESS NOTED OTHERWISE TO BE PRE-TENSIONED BOLTED CONNECTIONS. TYPICAL CONNECTIONS SHALL USE GRADE A325 TYPE 1 HIGH STRENGTH BOLTS DESIGNED AS BEARING TYPE N CONNECTIONS WITH THREADS INCLUDED IN THE SHEAR PLANE, UNLESS OTHERWISE NOTED OR APPROVED BY MBM.
2. STANDARD SIZE HOLES SHALL BE USED, UNLESS OTHERWISE NOTED OR APPROVED BY MBM.
3. CONNECTIONS NOTED AS SLIP-CRITICAL (SC) CONNECTION DESIGNS ARE BASED ON CLASS 'B' FAYING SURFACE. STEEL SHALL BE CLEANED BY POWER TOOL AND A CLASS 'B' PRIMER COATING APPLIED AS THE FINAL SHOP COAT, UNLESS NOTED OTHERWISE.
4. BOLTS, NUTS AND WASHERS SHALL BE INSTALLED IN ACCORDANCE WITH THE RCSC 'SPECIFICATION FOR STRUCTURAL JOINTS USING HIGH-STRENGTH BOLTS' AND THE AISC 'MANUAL OF STEEL CONSTRUCTION'.
5. WHEN REQUIRED BY RCSC SECTION 6, PLACE ONE (1) HARDENED ROUND STEEL WASHER UNDER THE ELEMENT TURNED (NUT OR BOLT HEAD) DURING TIGHTENING.
6. BOLTS FOR HIGH STRENGTH CONNECTIONS AND BOLTS SUBJECTED TO TENSION SHALL BE TIGHTENED TO DEVELOP MINIMUM TENSION SPECIFIED BY AISC-360, TABLE J3.1.
7. FOR ALL PRE-TENSIONED BOLTED CONNECTIONS, ERECTOR TO PERFORM THE PRE-INSTALLATION TESTING OF THE BOLTED ASSEMBLIES AS REQUIRED BY THE RCSC, PRIOR TO ANY PRODUCTION BOLT INSTALLATION AND TIGHTENING.
8. ALL A307 GRADE A AND SAE J429 GRADE 5 SERRATED FLANGE COMMON MACHINE BOLTS ARE TO BE INSTALLED TO A 'SNUG-TIGHT' CONDITION TO ENSURE THAT THE MATERIALS IN THE JOINT ARE BROUGHT IN GOOD CONTACT WITH EACH OTHER.
9. MINIMUM FIELD FILLET WELD SIZE SHALL BE 3/16", UNLESS OTHERWISE SPECIFIED BY MBM.

FIELD WELDING NOTES:

1. FIELD WELDS TO BE PER THE AWS D1.1 'STRUCTURAL WELDING CODE' EXCEPT FOR THE PROVISIONS EXCLUDED BY THE AISC-360 SPECIFICATION PARAGRAPH J2. ALL BUTT WELDS TO BE FULL PENETRATION, UNLESS NOTED OTHERWISE.
2. FIELD CONNECTIONS, NEW STEEL TO NEW STEEL, SHALL BE BOLTED AND NEW STEEL TO EXISTING STEEL SHALL BE WELDED, UNLESS OTHERWISE SPECIFIED ON THE DESIGN DRAWINGS.
3. WELDING TO HIGH STRENGTH BOLTS IS PROHIBITED.
4. WELDS SHALL ONLY BE MADE BY OPERATORS CERTIFIED BY AWS QC1, 'STANDARD FOR AWS QUALIFICATION OF WELDING INSPECTORS' FOR THE TYPE AND POSITION OF WELD REQUIRED. ALL FIELD WELDS TO BE DONE USING E70XX ELECTRODES AND IN ACCORDANCE WITH THE AWS D1.1 'STRUCTURAL WELDING CODE'.
5. ALL FIELD WELDING SHALL BE DONE AT THE DIRECTION OF A DESIGN PROFESSIONAL AND PERFORMED IN ACCORDANCE WITH ALL GOVERNING AWS REQUIREMENTS BY WELDERS QUALIFIED TO PERFORM THE WELDING FOR THE SPECIFIED WELDING PROCEDURE SPECIFICATION (WPS). A WPS SHALL BE PREPARED BY THE CONTRACTOR FOR EACH WELDING VARIATION SPECIFIED. ALL WORK MUST BE COMPLETED AND INSPECTED IN ACCORDANCE WITH THE APPLICABLE AWS SPECIFICATIONS. THE CONTRACTOR IS RESPONSIBLE FOR ANY ADDITIONAL WELDING INSPECTION AS REQUIRED BY THE LOCAL AUTHORITY HAVING JURISDICTION. FILLER METAL USED FOR SMAW (OR STICK) WELD PROCESS SHALL BE 70 KSI MINIMUM AND LOW HYDROGEN CONTENT, UNLESS OTHERWISE SPECIFIED IN AWS TABLE 3.1.
6. FOR WELDS IN HIGH SEISMIC FORCE RESISTING SYSTEMS (SEISMIC DESIGN CATEGORY D, E OR F), MINIMUM CHARPY V-NOTCH TOUGHNESS SHALL MEET AISC-341 CRITERIA (20 FT-LBS. MIN AT 0 DEGREES F). INTERPASS TEMPERATURES SHALL NOT EXCEED 550 DEGREES F.
7. IF WELDING TO ZINC COATED STEEL, AWS D-19.0 CALLS FOR WELDS TO BE MADE ON STEEL THAT IS FREE OF ZINC IN THE AREA TO BE WELDED. FOR GALVANIZED STRUCTURAL COMPONENTS, THE ZINC COATING SHOULD BE REMOVED (GRINDING IS THE PREFERRED METHOD) AT LEAST ONE TO FOUR INCHES (1" TO 4") FROM EITHER SIDE OF THE INTENDED WELD ZONE AND ON BOTH SIDES OF THE WORK PIECE. AFTER WELDING, THE SURFACES WITH THE ZINC REMOVED SHALL BE REPAIRED, USING MATERIALS AND REPAIR METHODS IN ACCORDANCE WITH ASTM A780, 'STANDARD PRACTICE FOR DAMAGED AND UNCOATED AREAS OF HOT-DIP GALVANIZED COATINGS'. WELDING DIRECTLY ON GALVANIZED STEEL SHALL NOT BE PERMITTED WITHOUT PRIOR WRITTEN PERMISSION OF MBM.

FOUNDATIONS AND GROUT NOTES:

1. BUILDING COLUMN BASE PLATES ARE ASSUMED TO REST DIRECTLY ON THE CONCRETE SLAB OR CONCRETE PEDESTAL. THE USE OF GROUT PADS BETWEEN THE SLAB (OR PEDESTAL) IS NOT A COMMON PRACTICE IN THE METAL BUILDING INDUSTRY. HOWEVER, IF THE BASE PLATE CANNOT SIT FLUSH ON TOP OF THE CONCRETE OR IN CASES OF LOADS EXCEEDING 50 KIPS (eg. HEAVY CRANES), THEN GROUTING MAY REQUIRED.

CRANE BUILDINGS NOTES:

1. FOR BUILDINGS WITH CRANE RUNWAYS, ALL RUNWAY BEAM ERECTION TOLERANCES SHALL BE MAINTAINED. TO ACHIEVE THE REQUIRED TOLERANCE, GROUTING OF COLUMNS AND SHIMMING OF RUNWAY BEAMS MAY BE REQUIRED.
2. IF GROUTING OF COLUMN BASES IS REQUIRED, THE ERECTOR MUST PROVIDE SUCH GROUTING. THE PARTY ERECTING THE RUNWAY BEAM IS RESPONSIBLE FOR SHIMMING, PLUMBING AND LEVELING OF THE RUNWAY BEAMS. WHEN ALIGNING THE RUNWAY BEAMS, THE ALIGNMENT SHALL BE WITH RESPECT TO THE BEAM WEBS SO THAT THE CENTER OF THE ALIGNED RAIL IS OVER THE RUNWAY BEAM WEB AND WITHIN TOLERANCE.

JOISTS BUILDINGS NOTES:

1. IF JOISTS ARE INCLUDED WITH THIS PROJECT, THEY ARE SUPPLIED AS A PART OF THE SYSTEMS-ENGINEERED METAL BUILDING AND ARE FABRICATED IN ACCORDANCE WITH THE REQUIREMENTS OF THE STEEL JOIST INSTITUTE (SJI), LATEST SPECIFICATION(S).
2. ALL ROOF JOISTS SHALL BE BOLTED. ALL FLOOR JOISTS SHALL HAVE A MINIMUM ONE (1) TIE-JOIST BOLTED.

STANDARD ABBREVIATIONS:

A.F.F.	= ABOVE FINISH FLOOR
BLDG.	= BUILDING
DIA.	= DIAMETER
DWG.	= DRAWING
EXIST.	= EXISTING
E.O.D.	= EDGE OF DECK
EL.	= ELEVATION
EW	= ENDWALL
F.F.	= FINISH FLOOR
F.S.	= FAR SIDE
GALV.	= GALVANIZED
MBM	= METAL BLDG MANUFACTURER
MISC.	= MISCELLANEOUS
N.S.	= NEAR SIDE
NS/FS	= NEAR SIDE & FAR SIDE
R.O.	= ROUGH OPENING
STD.	= STANDARD
SW	= SIDEWALL
T.O.	= TOP OF
T.O.C.	= TOP OF CONCRETE
T.O.G.	= TOP OF GRATING
T.O.J.	= TOP OF JOIST
T.O.S.	= TOP OF STEEL

8/7/23

JOSEPH ELIJAH BERGER
No. 14366
REGISTERED PROFESSIONAL ENGINEER CIVIL

REV.	DESCRIPTION:	DATE:	DRAFT	ENG.
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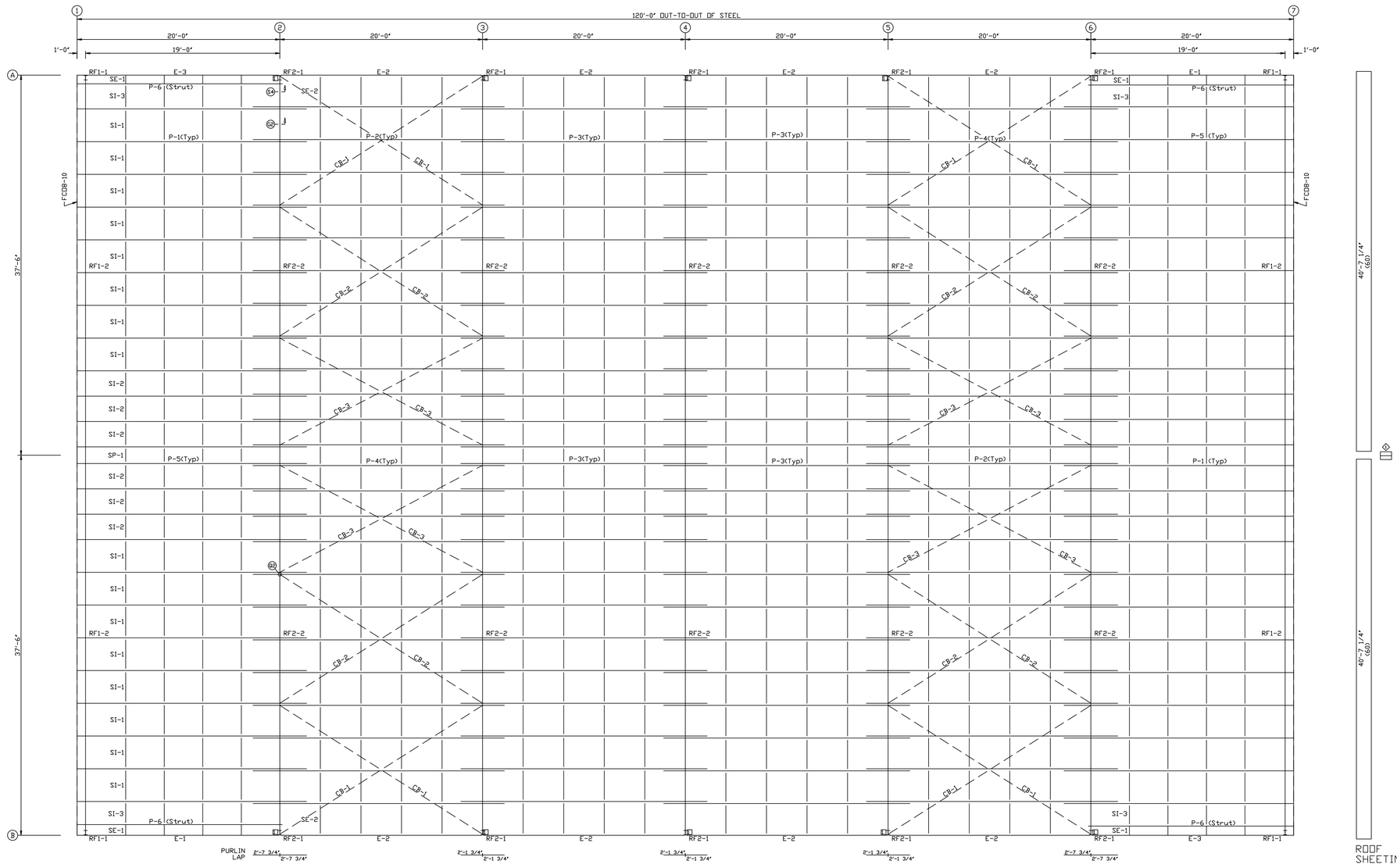
PACKAGE STEEL SYSTEMS, INC.		Beta Group Inc	
PROJECT	City Hall Rink Shelter	GENERAL NOTES	
ID	2305-038	DESIGN: LPB	DESIGN CHECK: JEB
PROJECT	3275 Post Road	DRAFT: LPB	DRAFT CHECK: JEB
ADDRESS	Warwick, RI 02886	DATE: 08/07/2023	DRAWING: ABLT-3

PACKAGE

TRIM TABLE ROOF PLAN						
⊙ID	QUAN	PART	LENGTH	DESCRIPTION	COLOR	DETAIL
1	12	FL-214-X	10'-3"	RIDGE CAP (SLOPE 5)	300 Midnight Bronze	TRIM_242

MEMBER TABLE ROOF PLAN			
QUAN	MARK	PART	LENGTH
24	P-1	8x2SZ14	22'-7 1/2"
24	P-2	8x2SZ16	24'-9 1/2"
48	P-3	8x2SZ16	24'-3 1/2"
24	P-4	8x2SZ16	24'-9 1/2"
24	P-5	8x2SZ14	22'-7 1/2"
4	P-6	8x2SZ16	19'-7 1/2"
2	E-1	8ESL416	19'-11 5/8"
8	E-2	8ESL416	19'-11 3/4"
2	E-3	8ESL416	19'-11 5/8"
8	CB-1	CB0250	24'-3"
8	CB-2	CB0250	24'-7"
8	CB-3	CB0250	23'-6"
24	SP-1	2x2x14GA	1'-9 5/16"
384	SI-1	2x2x14GA	3'-5 7/8"
144	SI-2	2x2x14GA	2'-8 3/8"
12	SI-3	2x2x14GA	TBD
16	SE-1	2x2x14GA	2'-6 7/16"
32	SE-2	2x6x14GA	2'-6 7/16"

CONNECTION PLATES ROOF PLAN		
⊙ID	QUAN	MARK/PART
1	10	TK1



ROOF FRAMING PLAN

ROOF SHEETING

PANELS: 24 Ga. DL24
300 Midnight Bronze
Standoff: 4 3/8"
Insul Bk: 3/8"

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	⚠	PRELIMINARY DRAWING: NOT FOR CONSTRUCTION / FOR PERMIT ONLY	CURRENT REVISION: 0		

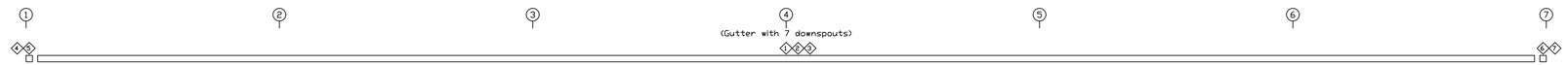
PACKAGE STEEL SYSTEMS, INC.		Beta Group Inc	
PROJECT	City Hall Rink Shelter	ROOF FRAMING & SHEETING	
ID	2305-038	DESIGN: LPB	DESIGN CHECK: JEB
PROJECT	3275 Post Road	DRAFT: BUC	DRAFT CHECK: MAD
ADDRESS	Warwick, RI 02886	DATE: 8/11/2023	DRAWING: ROOF-1

TRIM TABLE FRAME LINE B & A						
ID	QUAN	PART	LENGTH	DESCRIPTION	COLOR	DETAIL
1	12	NBSGT 20	20'-3"	SCULPTURED GUTTER	300 Midnight Bronze	TRIM_552
2	24	PSET 10	10'-3"	EAVE TRIM	300 Midnight Bronze	TRIM_552
3	24	STEL 10	10'-3"	SOFFIT TRIM ANGLE	300 Midnight Bronze	TRIM_552
4	9	FL-134-L	1'-0"	CORNER COVER	300 Midnight Bronze	
4	2	FL-245-L	6"	GUTTER END CAP	300 Midnight Bronze	
5	2	FL-134-R	1'-0"	CORNER COVER	300 Midnight Bronze	
6	2	FL-245-R	6"	GUTTER END CAP	300 Midnight Bronze	

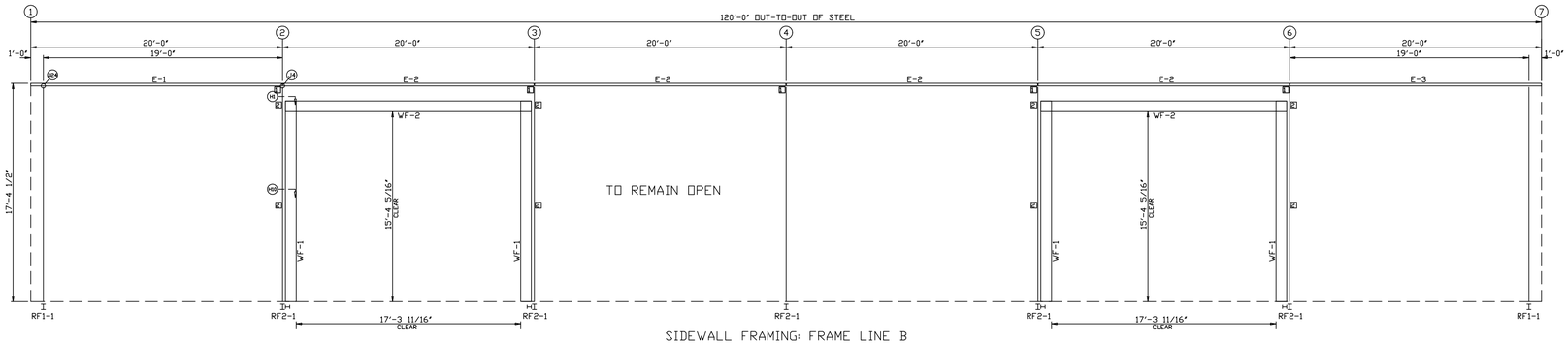
BOLT TABLE FRAME LINE B & A				
LOCATION	QUAN	TYPE	DIA	LENGTH
WF-1 - WF-2	8	A325	3/4"	2 1/4"
WF-1 - RF2-1	16	A325	1/2"	1 1/4"

MEMBER TABLE FRAME LINE B & A			
QUAN	MARK	PART	LENGTH
8	WF-1	W10X22	16'-2 1/2"
4	WF-2	W10X22	17'-3 1/8"
2	E-1	BESL416	19'-11 5/8"
8	E-2	BESL416	19'-11 3/4"
2	E-3	BESL416	19'-11 5/8"

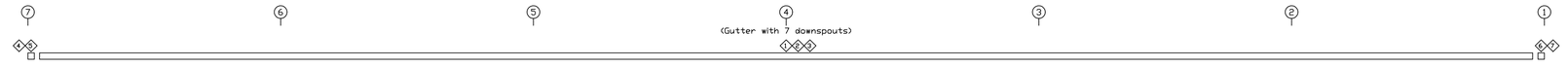
CONNECTION PLATES FRAME LINE B & A		
ID	QUAN	MARK/PART
1	10	IK1
2	16	WBS 1



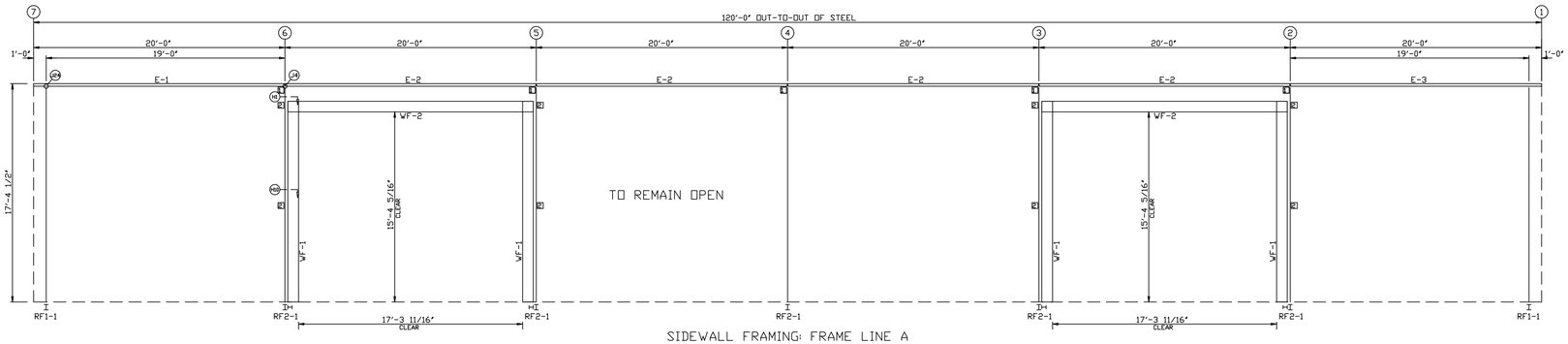
SIDEWALL TRIM: FRAME LINE B



SIDEWALL FRAMING: FRAME LINE B



SIDEWALL TRIM: FRAME LINE A



SIDEWALL FRAMING: FRAME LINE A

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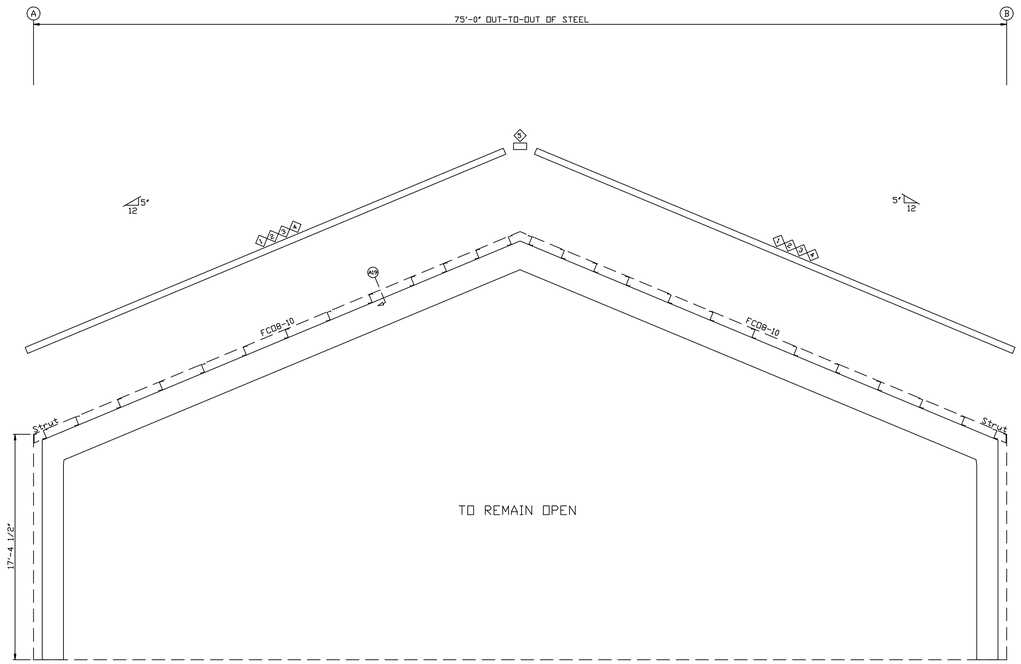
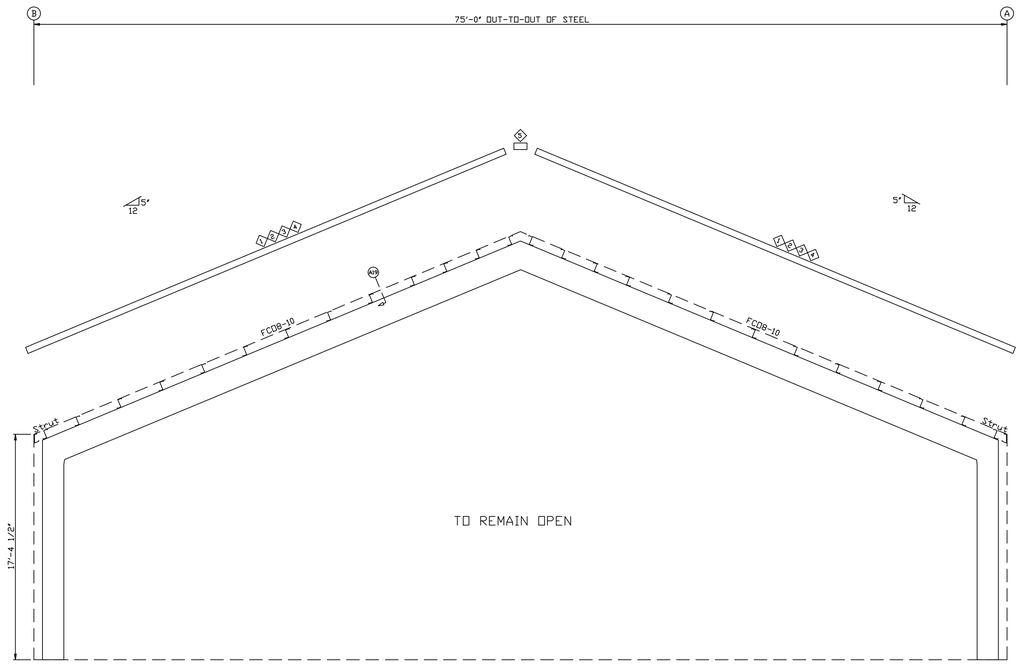
PACKAGE STEEL SYSTEMS, INC.		Beta Group Inc	
PROJECT	City Hall Rink Shelter	SIDEWALL FRAMING & SHEETING	
ID	2305-038	DESIGN:LPB	DESIGN CHECK:JEB
PROJECT	3275 Post Road	DRAFT:BUC	DRAFT CHECK:MAD
ADDRESS	Warwick, RI 02886	DATE:8/11/23	DRAWING: SWFS-1

TRIM TABLE FRAME LINE 1 & 7						
◇ID	QUAN	PART	LENGTH	DESCRIPTION	COLOR	DETAIL
1	4	NBSRT 10	10'-3"	SCULPTURED RAKE TRIM	300 Midnight Bronze	TRIM_561
2	8	NBSRT 20	20'-3"	SCULPTURED RAKE TRIM	300 Midnight Bronze	TRIM_561
3	20	SZT 10	10'-3"	SLIDER ZEE TRIM	300 Midnight Bronze	TRIM_561
4	20	STA10-10	10'-3"	TRIM ANGLE	300 Midnight Bronze	TRIM_561
5	2	FL-125	2"-1"	PEAK BOX	300 Midnight Bronze	



ENDWALL FRAMING: FRAME LINE 1



ENDWALL FRAMING: FRAME LINE 7

REV.	DESCRIPTION:	DATE:	DRAFT	ENG.
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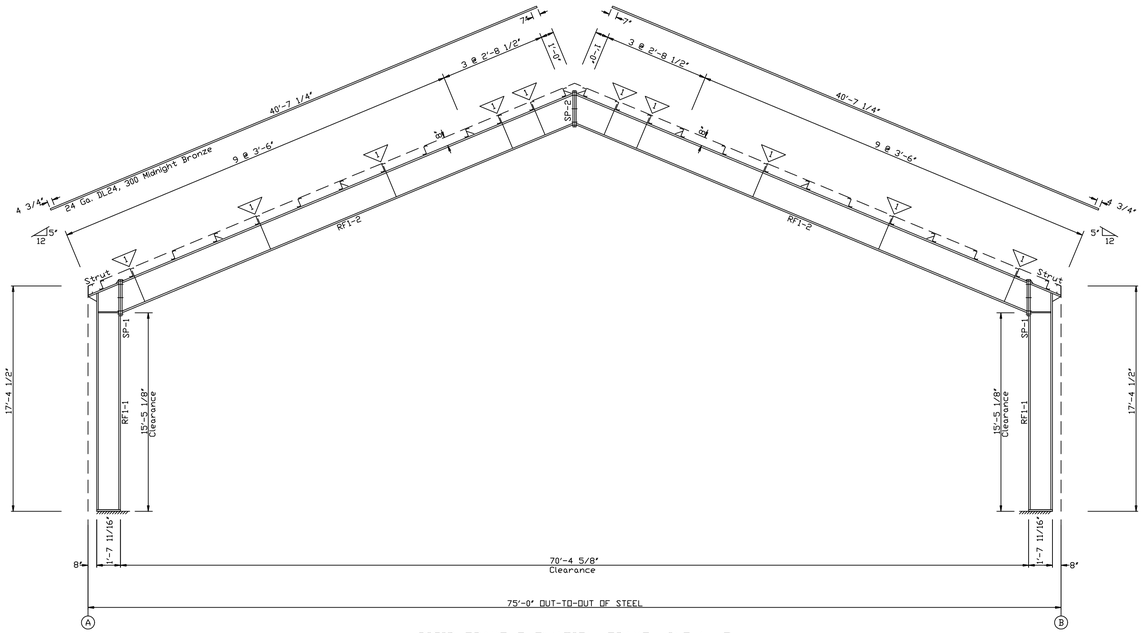
PACKAGE STEEL SYSTEMS, INC.		Beta Group Inc	
PROJECT	City Hall Rink Shelter	ENDWALL FRAMING & SHEETING	
ID	2305-038	DESIGN: LPB	DESIGN CHECK: JEB
PROJECT	3275 Post Road	DRAFT: BUC	DRAFT CHECK: MAD
ADDRESS	Warwick, RI 02886	DATE: 8/11/23	DRAWING: EWFS-1

FLANGE BRACE TABLE						
▽ ID	MARK	LENGTH	SIDES	DETAIL	CLIP1	CLIP2
1	FB39A	3'-3"	1	G29	FBP 408	-

FBxA - 1-1/2"x1-1/2"x1/8"
FBxB - 2"x2"x1/8"
FBxC - 2-1/2"x2-1/2"x3/16"

SPLICE BOLT TABLE						
Mark	Qty Top	Qty Bot	Int	Type	Dia	Length
SP-1	4	4	2	A325	3/4"	2 1/4"
SP-2	4	4	2	A325	5/8"	1 3/4"

MEMBER TABLE						
Mark	Weight	Web Depth Start/End	Web Plate Thick	Web Plate Length	Outside Flange W x Thk x Length	Inside Flange W x Thk x Length
RF1-1	619	19.0/19.0	0.188	180.1	8 x 5/16" x 208.5	8 x 3/8" x 180.1
		19.0/19.0	0.250	30.4	8 x 5/16" x 29.5	
RF1-2	1182	24.0/24.0	0.188	226.2	6 x 5/16" x 456.0	6 x 5/16" x 456.0
		24.0/24.0	0.188	240.0		



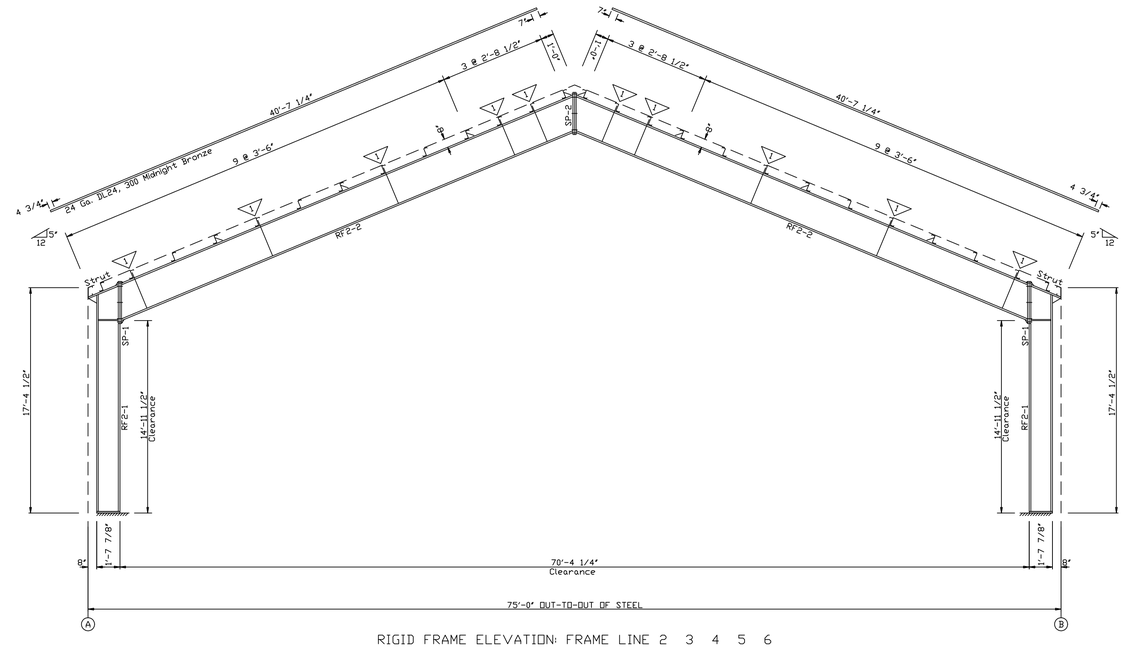
RIGID FRAME ELEVATION: FRAME LINE 1 7

FLANGE BRACE TABLE						
▽ ID	MARK	LENGTH	SIDES	DETAIL	CLIP1	CLIP2
1	FB42.1A	3'-6 1/8"	2	G29	FBP 408	-

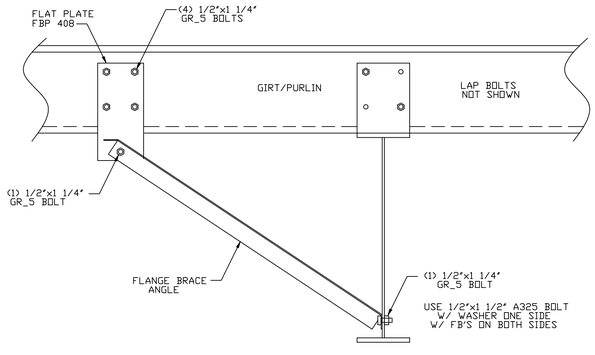
FBxA - 1-1/2"x1-1/2"x1/8"
FBxB - 2"x2"x1/8"
FBxC - 2-1/2"x2-1/2"x3/16"

SPLICE BOLT TABLE						
Mark	Qty Top	Qty Bot	Int	Type	Dia	Length
SP-1	4	4	2	A325	7/8"	2 3/4"
SP-2	4	4	2	A325	5/8"	1 3/4"

MEMBER TABLE						
Mark	Weight	Web Depth Start/End	Web Plate Thick	Web Plate Length	Outside Flange W x Thk x Length	Inside Flange W x Thk x Length
RF2-1	946	18.5/18.5	0.188	174.5	8 x 5/8" x 202.1	8 x 3/4" x 215.1
		18.5/18.5	0.313	35.9	8 x 3/8" x 29.2	
RF2-2	1637	29.0/29.0	0.250	228.2	6 x 3/8" x 455.9	6 x 1/2" x 455.9
		29.0/29.0	0.188	240.0		



RIGID FRAME ELEVATION: FRAME LINE 2 3 4 5 6



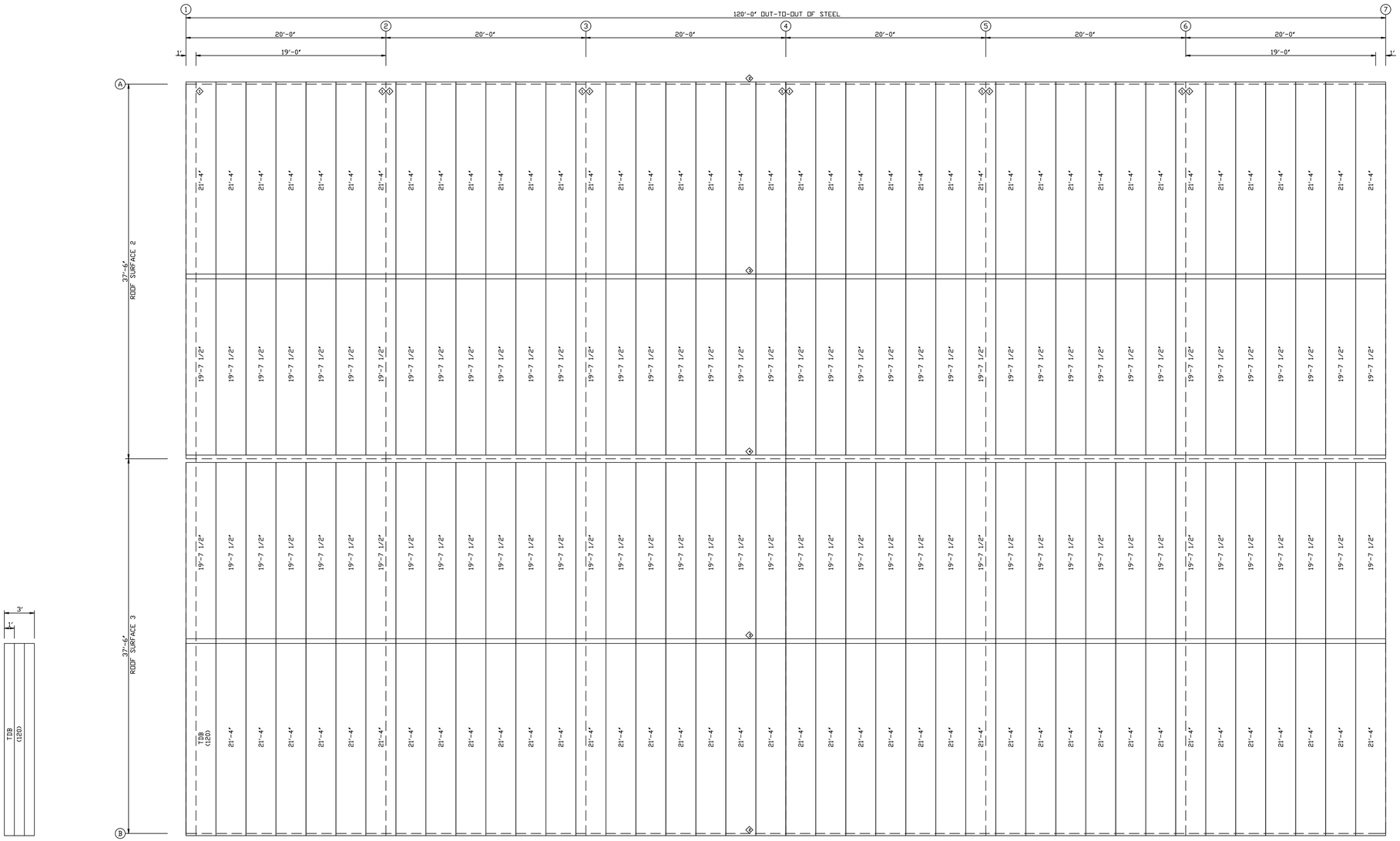
G29 PURLIN TO RIGID FRAME FLANGE BRACE ANGLE DETAIL
(USED WITH LINER PANEL)

REV.	DESCRIPTION:	DATE:	DRAFT	ENG.
3				
2				
1				
⚠	PRELIMINARY DRAWING: NOT FOR CONSTRUCTION / FOR PERMIT ONLY	CURRENT REVISION: 0		

PACKAGE STEEL SYSTEMS, INC.		Beta Group Inc	
PROJECT	City Hall Rink Shelter	RIGID FRAME X-SECTION	
ID	2305-038	DESIGN: LPB	DESIGN CHECK: JEB
PROJECT	3275 Post Road	DRAFT: BUC	DRAFT CHECK: MAD
ADDRESS	Warwick, RI 02886	DATE: 8/11/23	DRAWING: FRXS-1

PACKAGE

TRIM TABLE ROOF LINER						
◇ID	QUAN	PART	LENGTH	DESCRIPTION	COLOR	DETAIL
1	TBD	TBD	10'-3"	TBD	300 Almond	TRIM_671
2	TBD	TBD	10'-3"	TBD	300 Almond	TRIM_679
3	TBD	TBD	10'-3"	TBD	300 Almond	TRIM_680
4	TBD	TBD	10'-3"	TBD	300 Almond	TRIM_681



ROOF LINER SHEETING PLAN

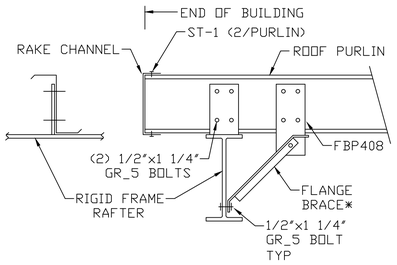
PANELS: 24 Ga. Artisan L-12 w/Beads - 300 Almond

REV.	DESCRIPTION:	DATE:	DRAFT	ENG.
3				
2				
1				
⚠	PRELIMINARY DRAWING: NOT FOR CONSTRUCTION / FOR PERMIT ONLY	CURRENT REVISION: 0		

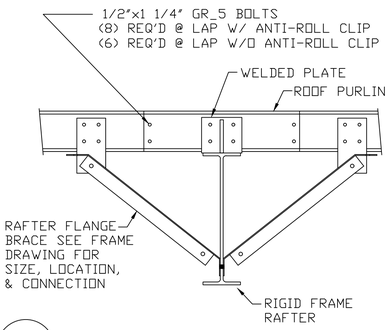
PACKAGE STEEL SYSTEMS, INC.		Beta Group Inc	
PROJECT	City Hall Rink Shelter	ROOF LINER SHEETING & TRIM	
ID	2305-038	DESIGN:LPB	DESIGN CHECK:JEB
PROJECT	3275 Post Road	DRAFT:BUC	DRAFT CHECK:MAD
ADDRESS	Warwick, RI 02886	DATE:8/11/23	DRAWING: LNRP-1

PACKAGE

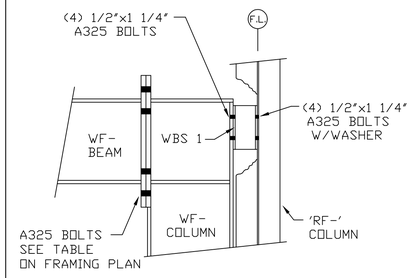
* SEE FRAME X-SECTION FOR SPECIFIC FLANGE BRACE LOCATION(S) & DETAIL.



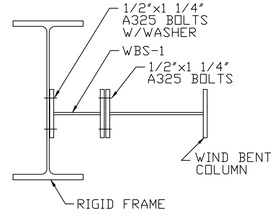
A19 SECTION THRU ENDWALL RAFTER



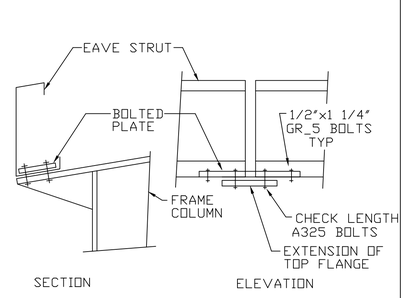
G2 ROOF PURLIN TO INTERIOR FRAME RAFTER



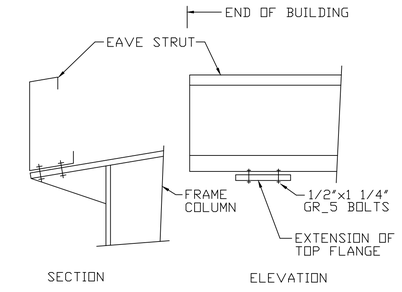
H1 PORTAL FRAME ATTACHMENT TO RIGID FRAME COLUMN



H10 WIND BENT OR WIND COLUMN TO BUILDING COLUMN

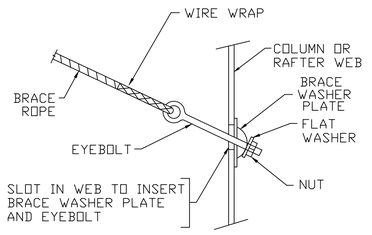


J4 EAVE STRUT TO RIGID FRAME w/SUPPORT PLATE

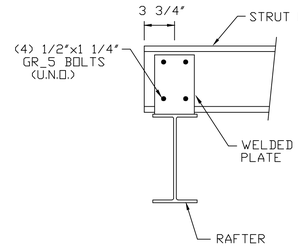


J24 EAVE STRUT TO RIGID FRAME BYPASS CONDITION

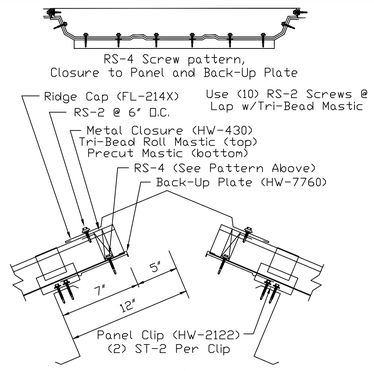
* SEE ERECTION PLAN FOR SIZES, TYPES AND LOCATION(S) FOR BRACING.



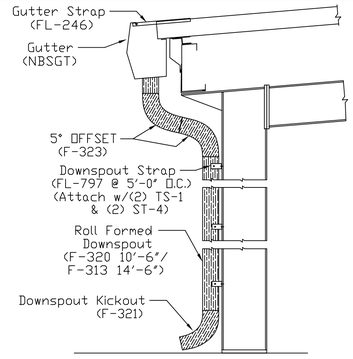
Q2 DIAGONAL CABLE, EYEBOLT END



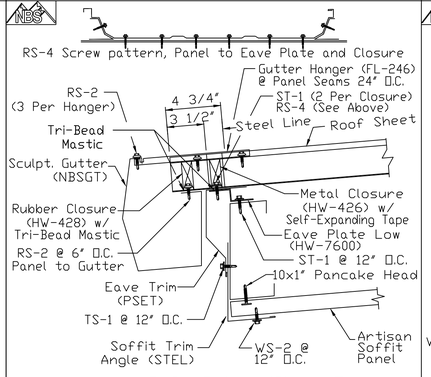
S4 STRUT PURLIN CONNECTION



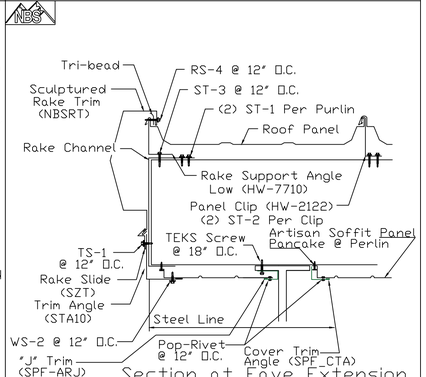
Trim 242 DL24 Ridge Closure 5:12 Slope



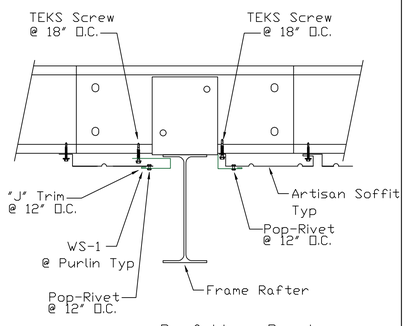
Trim 516X Downspout Detail @ Open Sidewall



Trim 552 DL24 Gutter/Simple Eave

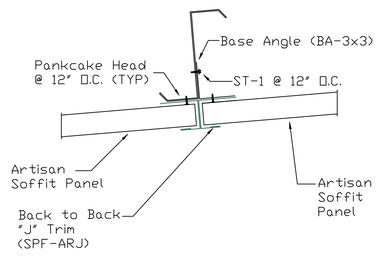


Trim 569 Section at Eave Extension High Float 4 3/8" Standoff

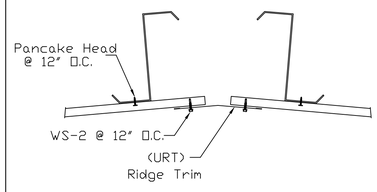


Trim 679 Roof Liner Panel @ Frame Rafter

NOTE: USE PANCAKE HEAD SCREW @ 5'-0" O.C. TO ATTACH "J" TRIM TO FRAMING



Trim 680 Roof Liner Panel Break



Trim 681 Roof Liner Panel @ Ridge

Roof Screws
- RS-1 = S4676-FL = 12-14 x 1 1/2"
- RS-2 = S5065-FM = 1/4"-14 x 7/8"
- RS-3 = S4742-FL = 12-24 x 1 1/2" TEK 5
- RS-4 = S5195-FM = 1/4"-14 x 1 1/4"

Wall Screws
- WS-1 = S4721-FG = 12-14 x 1 1/2"
- WS-2 = S5076-FF = 1/4"-14 x 7/8"
- WS-3 = S4577-ED = 12-14 x 1"

Trim Screws
- TS-1 = S2701 = 10-16 x 3/4" SD
- TS-2 = S5076-FF = 1/4"-14 x 7/8"
- TS-3 = 12 x 1" TR
- TS-4 = POP RIVET

Structural Screws
- ST-1 = S4577 = 12-14 x 1"
- ST-2 = S5251 = 1/4"-14 x 1 1/2" ST
- ST-3 = S5221 = 1/4"-14 x 1 1/4" SH
- ST-4 = S4668 = 12-24 x 1 1/4" BJ
- ST-5 = S4741 = 12-24 x 1 1/2" TEK 5
- ST-6 = S5155 = 1/4"-14 x 1"

REV.	DESCRIPTION:	DATE:	DRAFT	ENG.
3				
2				
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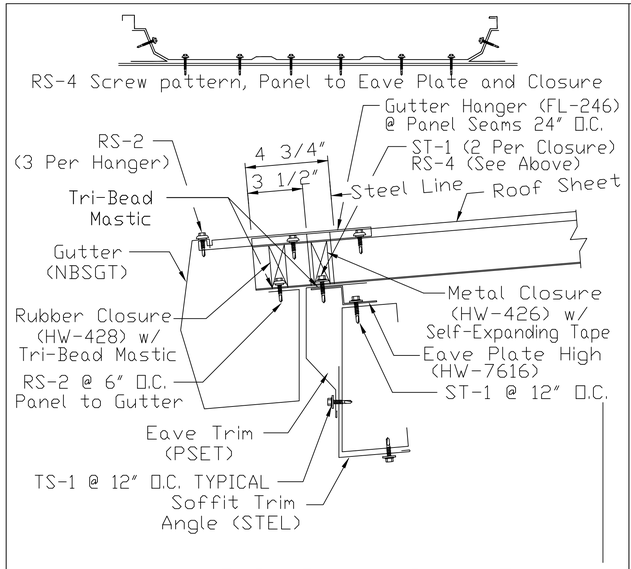
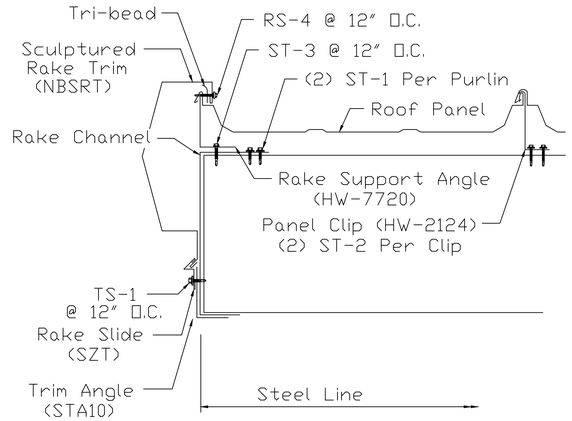
⚠	PRELIMINARY DRAWING: NOT FOR CONSTRUCTION / FOR PERMIT ONLY	CURRENT REVISION: 0		

PACKAGE STEEL SYSTEMS, INC.		Beta Group Inc	
PROJECT	City Hall Rink Shelter	FRAMING & SHEETING DETAILS	
ID	2305-038	DESIGN: LPB	DESIGN CHECK: JEB
PROJECT	3275 Post Road	DRAFT: BUC	DRAFT CHECK: MAD
ADDRESS	Warwick, RI 02886	DATE: 8/11/23	DRAWING: DTLS-1



Trim 552

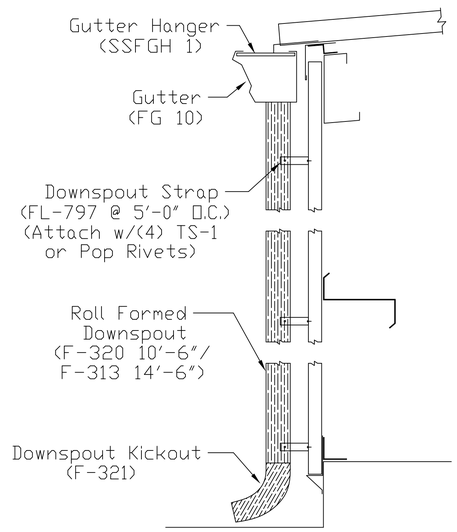
DL24 Gutter/Simple Eave



Trim 569

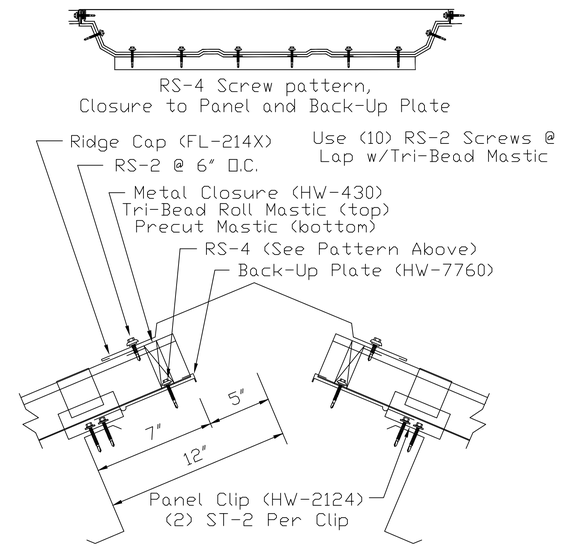
Section at Eave Extension

High Float 4 3/8" Standoff



Trim 489

Downspout Detail



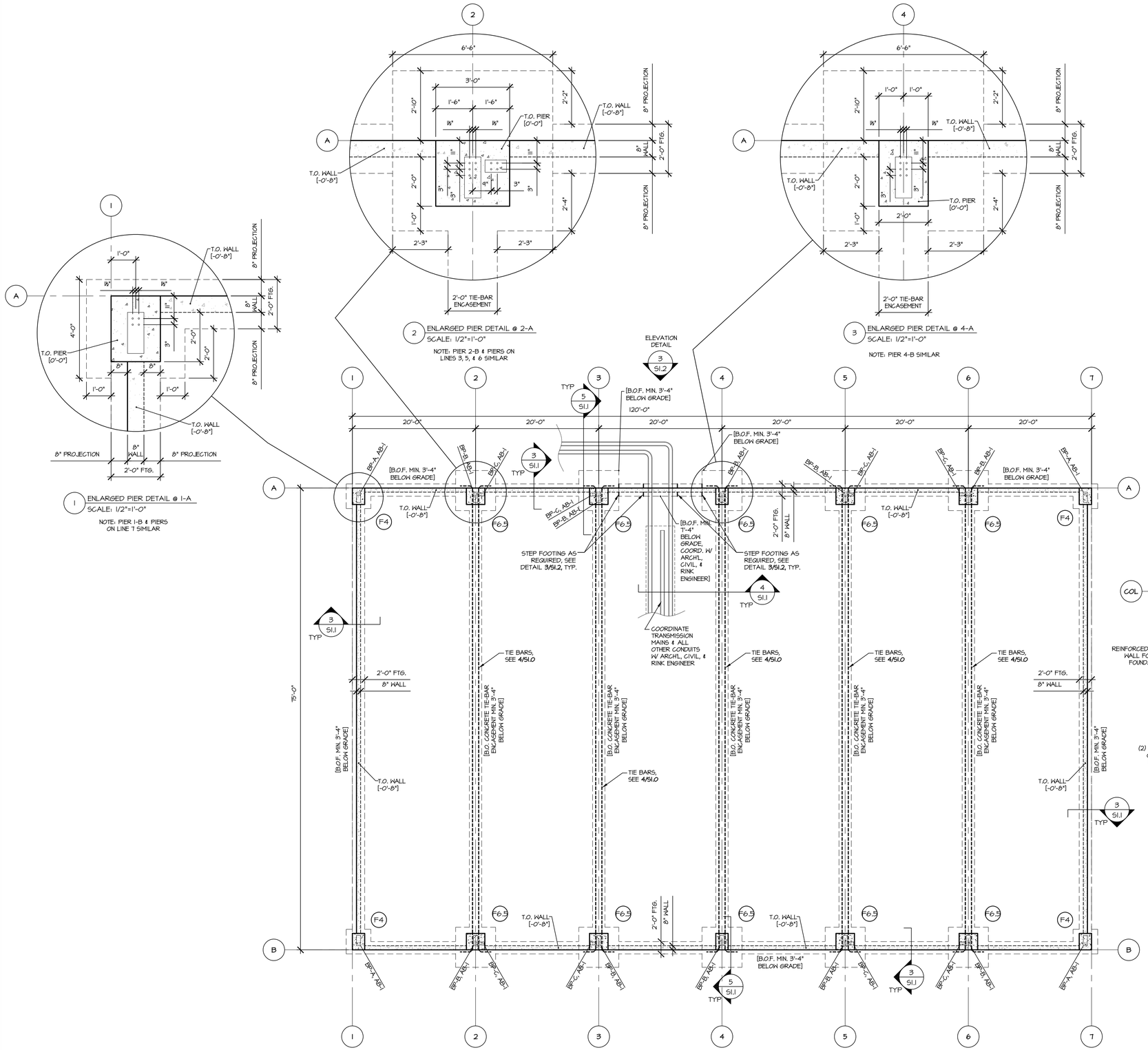
Trim 242

DL24 Ridge Closure

5:12 Slope

REV.	DESCRIPTION:	DATE:	DRAFT	ENG.
3				
2				
1				
⚠	PRELIMINARY DRAWING: NOT FOR CONSTRUCTION / FOR PERMIT ONLY	CURRENT REVISION: 0		

PACKAGE STEEL SYSTEMS, INC.		Beta Group Inc	
PROJECT	City Hall Rink Shelter	SHEETING DETAILS	
ID	2305-038	DESIGN: LPB	DESIGN CHECK: JEB
PROJECT	3275 Post Road	DRAFT: BUC	DRAFT CHECK: MAD
ADDRESS	Warwick, RI 02886	DATE: 8/11/23	DRAWING: DTLS-1



NOTES:
1. T.O. PIER ELEVATION SHALL BE CALLED 0'-0".
2. ALL DIMENSIONS AND ELEVATIONS SHALL BE COORDINATED WITH THE ARCHITECT.
3. BASEPLATE DESIGNATION ON THIS PLAN SHALL COINCIDE WITH METAL BUILDING MANUFACTURER'S DRAWINGS

FOOTING SCHEDULE

FOOTING ID TAG	FOOTING SIZE	REINFORCING
F4	4'-0"x4'-0"x12" THICK	(5) #5 E.W. BOT.
F6.5	6'-6"x6'-6"x14" THICK	(7) #6 E.W. BOT.

Camera / O'Neill
Consulting Engineers

CAMERA - O'NEILL
CONSULTING ENGINEERS
Structural Engineering - Design
201 Clock Tower Square
Portsmouth, RI 02871
888.308.7541

MICHAEL V. CAMERA
No. 9253
REGISTERED PROFESSIONAL ENGINEER (STRUCTURAL)

PREPARED BY

BETA
www.BETA-Inc.com

REGISTERED PROFESSIONAL

SUBCONSULTANT

CAMERA - O'NEILL CONSULTING ENGINEERS
Structural Engineering - Design
201 Clock Tower Square
Portsmouth, RI 02871
888.308.7541

PROJECT

City Hall Plaza

Warwick, RI

TITLE

FOUNDATION PLAN

NO.	REVISIONS	DATE

DRAWN BY:	MJB
DESIGNED BY:	MJB
CHECKED BY:	MVC
ISSUE DATE:	01/31/2024
BETA JOB NO.:	10694
SCALE	AS NOTED

BID SET

SHEET NO. S1.0

CODE INFORMATION AND DESIGN LOADS (EXCEPT AS NOTED):

BUILDING CODE: RI SBC-1 2021 (WARWICK, RI)
RELATED REFERENCE: ASCE 7-16

SNOW AND ROOF LOADS/FACTORS:
- MIN. ROOF LIVE LOAD: 20 PSF
- GROUND SNOW LOAD (Pg): 30 PSF
- FLAT ROOF SNOW LOAD (Pf): 30 PSF
- SNOW LOAD IMPORTANCE FACTOR (Is): 1.0
- SNOW EXPOSURE FACTOR (Ce): 1.0
- THERMAL FACTOR (Ct): 1.0

GEOTECHNICAL FACTORS:
- FROST DEPTH: 3'-4"
- DESIGN SOIL BEARING CAPACITY: 3000 PSF (SEE GEOTECHNICAL REPORT BY S. W. COLE ENGINEERING, INC.).

GENERAL NOTES:

1. GENERAL CONTRACTOR SHALL FULLY COORDINATE AND VERIFY ALL DIMENSIONS, ELEVATIONS, GRADES, IMPLIED LOCATIONS, AND SIZES SHOWN ON STRUCTURAL DRAWINGS WITH EXISTING FIELD CONDITIONS AND ALL CONSULTANT DRAWINGS AND REPORTS INCLUDING GEOTECHNICAL REPORT.

2. ALL SIGNIFICANT DISCREPANCIES FOUND SHALL BE REPORTED TO THE ARCHITECT OF RECORD.

3. THE ENTIRE PRE-ENGINEERED METAL BUILDING, INCLUDING ALL OF ITS COMPONENTS, CLADDING, BRACING, CONNECTIONS, ANCHOR BOLTS, ETC. ARE SPECIFICALLY NOT THE RESPONSIBILITY OF CAMERA - O'NEILL CONSULTING ENGINEERS.

FOUNDATION NOTES:

1. ALL SOIL CONTAINING ORGANIC OR UNSUITABLE BEARING MATERIAL SHALL BE CLEARED FROM THE BUILDING FOOTPRINT.

2. ALL EXTERIOR/PERIMETER FOOTINGS SHALL EXTEND AT LEAST 40" BELOW FINISHED GRADE. ALL SOIL SUPPORTED FOOTINGS SHALL BE FOUNDED UPON COMPACTED NATURAL SUB-GRADE OR COMPACTED BANK RUN GRAVEL FILL WITH A BEARING CAPACITY OF AT LEAST 3000 PSF (SEE GEOTECHNICAL REPORT BY S. W. COLE ENGINEERING, INC.). GC SHALL BE RESPONSIBLE FOR VERIFYING THE SOIL BEARING CAPACITY AND PERFORMING INDEPENDENT SOIL COMPACTION / BEARING CAPACITY TESTS. ALL TEST REPORTS SHALL BE SUBMITTED TO THE ARCHITECT OF RECORD FOR REVIEW.

3. ROCK SHALL BE EXCAVATED A MINIMUM OF 12" BELOW BOTTOM OF FOOTING ELEVATION AND COVERED WITH A LAYER OF COMPACTED GRAVEL.

4. A MODIFIED PROCTOR TEST SHALL BE PERFORMED BY A SOILS TESTING LAB ON EACH TYPE OF SOIL TO BE COMPACTED.

5. SOIL SHALL BE COMPACTED TO NOT LESS THAN 95% OF MAXIMUM DRY DENSITY PER ASTM D1557 IN LIFTS NOT TO EXCEED 6" LOOSE DEPTH.

6. FIELD DENSITY TESTS SHALL BE PERFORMED BY AN INDEPENDENT SOILS TESTING LAB TO VERIFY COMPACTION. A COPY OF ALL TEST REPORTS SHALL BE FILED WITH THE ARCHITECT OF RECORD.

7. BACKFILL SYMMETRICALLY AGAINST ALL FOUNDATION WALLS IN INCREMENTS NOT TO EXCEED 2 FEET MAXIMUM DIFFERENTIAL.

8. SEE PLUMBING AND ELECTRICAL DRAWINGS FOR UNDER FLOOR SYSTEMS AND SPECIAL GRANULAR FILL MATERIAL REQUIREMENTS.

9. NO FOOTINGS OR SLABS SHALL BE POURED INTO OR AGAINST SUBGRADE CONTAINING FREE WATER OR ICE.

10. ALL SLABS-ON-GRADE SHALL BE PLACED ON A LAYER OF COMPACTED FINE GRANULAR FILL UNDER A 10 MIL. POLY VAPOR RETARDER. COORDINATE ADDITIONAL SUBGRADE PREPARATION REQUIREMENTS WITH CIVIL AND/OR GEOTECHNICAL ENGINEERS OF RECORD.

PRE-ENGINEERED METAL BUILDING NOTES:

1. THE CONTRACTOR SHALL BE RESPONSIBLE FOR THE CONTROL OF ALL ERECTION PROCEDURES AND SEQUENCES WITH RELATION TO TEMPERATURE DIFFERENTIALS AND STABILITY.

2. THE FABRICATOR / METAL BUILDING DESIGNER SHALL FURNISH CHECKED SHOP AND ERECTION DRAWINGS AND OBTAIN APPROVAL PRIOR TO FABRICATING ANY STRUCTURAL STEEL.

3. CUTS, HOLES, OPENINGS, MODIFICATIONS, ETC. REQUIRED IN METAL BUILDING COMPONENTS SHALL BE SHOWN ON SHOP DRAWINGS FOR THE METAL BUILDING AND SHALL BE MADE IN THE SHOP AND APPROVED BY THE METAL BUILDING DESIGNER'S PROFESSIONAL ENGINEER OF RECORD. BURNING OF HOLES OR CUTS IN STRUCTURAL STEEL MEMBERS IN THE FIELD WILL NOT BE PERMITTED EXCEPT BY WRITTEN PERMISSION FROM THE METAL BUILDING'S STRUCTURAL ENGINEER OF RECORD.

4. THE DESIGN, FABRICATION, PAINTING, AND ERECTION OF THE PRE-ENGINEERED METAL BUILDING SHALL CONFORM TO THE APPLICABLE REQUIREMENTS OF THE METAL BUILDING MANUFACTURER ASSOCIATION'S SPECIFICATIONS.

5. G.C. SHALL SUBMIT SHOP DRAWINGS FOR REVIEW AND APPROVAL PRIOR TO CONSTRUCTION. ALL SHOP DRAWINGS SHALL BE THOROUGHLY CHECKED BY BOTH THE ARCHITECT AND GENERAL CONTRACTOR PRIOR TO SUBMISSION TO FOUNDATION DESIGNER.

CONCRETE NOTES:

1. ALL FOOTING AND WALL CONCRETE SHALL HAVE A COMPRESSIVE STRENGTH OF NOT LESS THAN 4000 PSI AT 28 DAYS (ENTRAINED AIR CONTENT BETWEEN 4.5% AND 7%).

2. ALL INTERIOR SLAB CONCRETE SHALL HAVE A COMPRESSIVE STRENGTH OF NOT LESS THAN 3000 PSI AT 28 DAYS AND CONTAIN NO AIR ENTRAINMENT.

3. ALL EXTERIOR SLAB CONCRETE SHALL HAVE A COMPRESSIVE STRENGTH OF NOT LESS THAN 4000 PSI AT 28 DAYS (ENTRAINED AIR CONTENT BETWEEN 4.5% AND 7%).

4. ALL CONCRETE SHALL CONTAIN AN APPROVED WATER-REDUCING ADMIXTURE.

5. A SET OF FOUR (4) CONCRETE TESTS CYLINDERS SHALL BE TAKEN BY AN INDEPENDENT CONCRETE TESTING LAB ON EACH DAY WHEN CONCRETE PLACEMENT EXCEEDS 5 CUBIC YARDS. ONE CYLINDER SHALL BE BROKEN AT 7 DAYS, TWO AT 28 DAYS, AND ONE AT 56 DAYS. A COPY OF ALL TEST REPORTS SHALL BE FILED WITH THE ARCHITECT OF RECORD.

6. NO CALCIUM CHLORIDE SHALL BE USED IN ANY CONCRETE.

7. A MIX DESIGN (5 COPIES) SHALL BE SUBMITTED FOR APPROVAL FOR EACH TYPE OF CONCRETE. MIX DESIGN SUBMITTAL SHALL INCLUDE HISTORICAL BREAK DATA FOR EACH MIX OF CONCRETE

8. ALL REINFORCING BARS SHALL BE ASTM A-615 GRADE 60 UNLESS NOTED OTHERWISE. PLACEMENT OF REBAR SHALL BE IN STRICT ACCORDANCE WITH ACI-318 (LATEST REVISION). HAIRPIN BARS SHALL BE PLACED IN THE CENTER OF THE SLAB DEPTH AND BE HELD IN POSITION WITH CHAIRS AND W.M.F.

9. CHECKED SHOP DRAWINGS SHOWING REINFORCING DETAILS, INCLUDING STEEL SIZES, SPACING AND PLACEMENT, SHALL BE SUBMITTED BY THE CONTRACTOR FOR APPROVAL PRIOR TO FABRICATION. THE GENERAL CONTRACTOR MUST REVIEW THE SHOP DRAWINGS PRIOR TO SUBMISSION TO THE ARCHITECT OF RECORD. ALL COPIES OF THE SHOP DRAWINGS SUBMITTALS SHALL BEAR A DATED AND SIGNED SHOP DRAWING STAMP WHICH DOCUMENTS THE GENERAL CONTRACTOR'S APPROVAL.

10. ALL REINFORCING BAR SPLICES SHALL CONFORM TO REQUIREMENTS OF ACI 318, BUT IN NO CASE SHALL THEY BE LESS THAN 2'-0" OR 48xDIA. LAP SPLICES IN SLAB "HAIRPIN" BARS SHALL BE MADE WITH AN APPROVED SPLICE DETAIL OR MECHANICAL SPLICE DEVICE. G.C. SHALL SUBMIT SHOP DRAWINGS FOR APPROVAL.

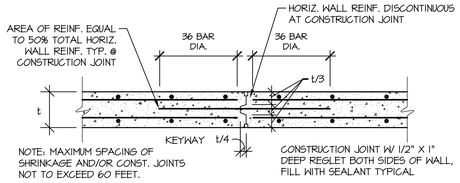
11. ALL WELDED WIRE FABRIC SHALL CONFORM TO ASTM A-185, Fy=60 KSI

12. ALL WELDED WIRE FABRIC SHALL BE LAPPED TWO (2) FULL MESH PANELS AT SIDES AND ENDS AND BE SECURELY WIRED TOGETHER. TO MAINTAIN THE TENSILE CAPACITY OF THE SLAB, ALL W.M.F. SHALL BE PLACED IN THE CENTER OF THE SLAB FOUR AND BE HELD OFF THE SUB-GRADE WITH CHAIRS.

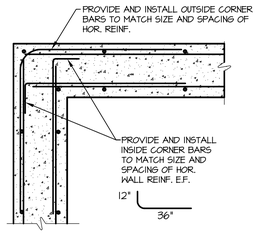
13. SEE ARCHITECTURAL DRAWINGS FOR TYPE AND LOCATION OF ALL FLOOR FINISHES, FLOOR DEPRESSIONS AND CUT OUTS.

14. COORDINATE ALL FOUNDATION PENETRATIONS WITH ARCHITECT, PLUMBING, MECHANICAL, ELECTRICAL CONTRACTORS AND LOCAL AGENCIES. CUTTINGS/INTERRUPTING OF WIRE MESH OR REBAR IS STRICTLY PROHIBITED.

15. ALL CONCRETE SHALL BE DETAILED, FORMED, HANDLED, PLACED, AND PROTECTED IN ACCORDANCE WITH PROCEDURES AND GUIDELINES PRESCRIBED IN THE LATEST EDITION OF "BUILDING CODE REQUIREMENTS FOR REINFORCED CONCRETE" ACI-318, MANUAL OF STANDARD PRACTICE FOR REINFORCED CONCRETE STRUCTURES, ACI-301, AND ACI-305/306 GUIDES FOR HOT/COLD WEATHER CONCRETING.

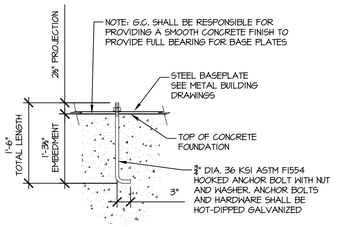


WALL SHRINKAGE/CONSTRUCTION JOINT DETAIL



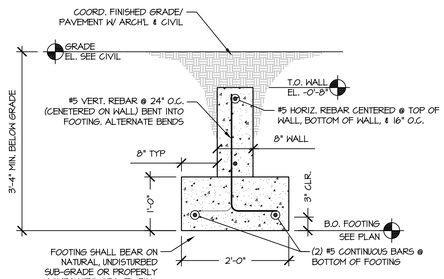
CONCRETE WALL AND FOOTING CORNERS

1 TYPICAL FOUNDATION DETAILS
SCALE: NONE

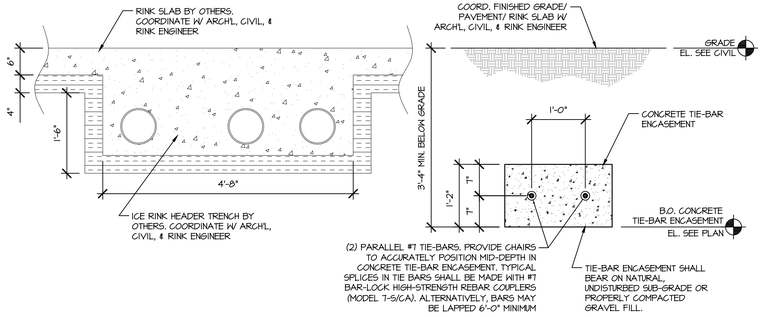


AB-1

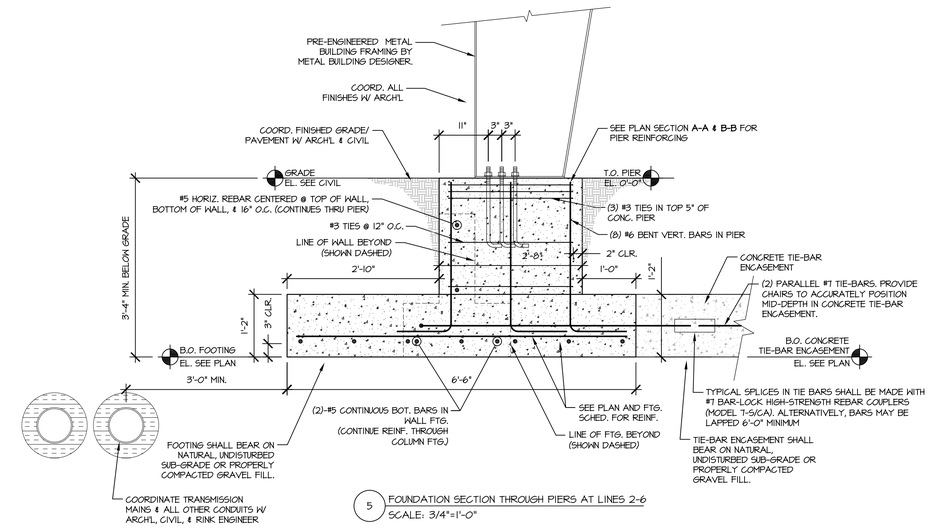
2 ANCHOR BOLT DETAILS
SCALE: 3/4"=1'-0"



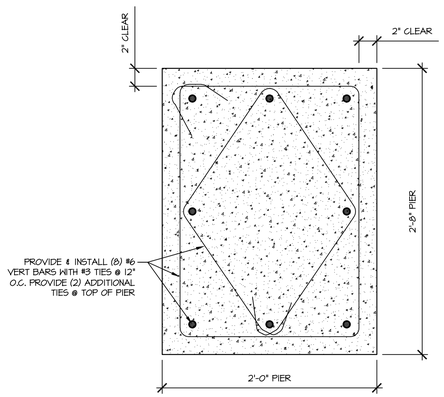
3 TYPICAL FOUNDATION WALL SECTION
SCALE: 3/4"=1'-0"



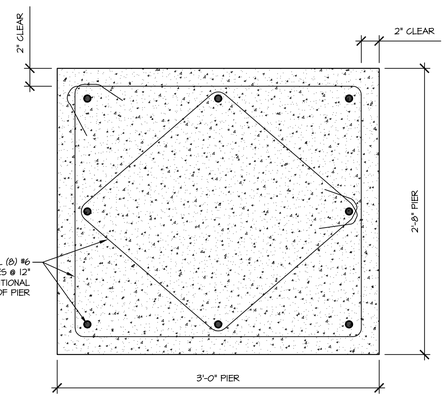
4 SECTION THROUGH CONCRETE TIE-BAR ENCASEMENT
SCALE: 3/4"=1'-0"



5 FOUNDATION SECTION THROUGH PIERS AT LINES 2-6
SCALE: 3/4"=1'-0"



A-A PLAN SECTION THRU PIERS ON LINE 4
SCALE: 1-1/2"=1'-0"



B-B PLAN SECTION THRU PIERS ON LINES 2, 3, 5, & 6
SCALE: 1-1/2"=1'-0"

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Consulting Engineers

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PROJECT

City Hall Plaza

Warwick, RI

TITLE

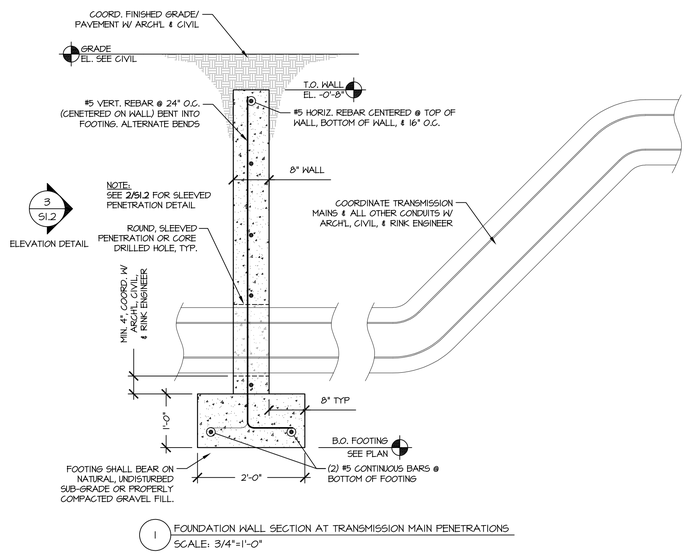
NOTES & FOUNDATION DETAILS

NO.	REVISIONS	DATE

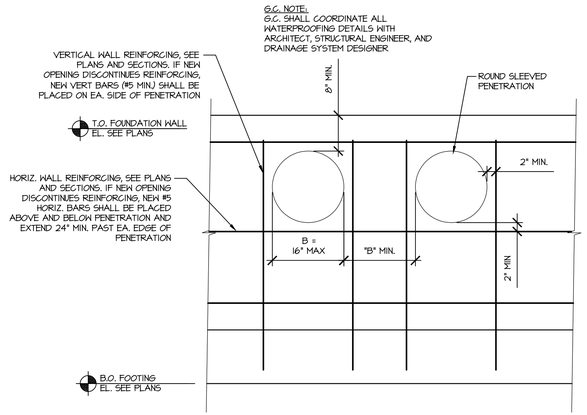
DRAWN BY:	MJB
DESIGNED BY:	MJB
CHECKED BY:	MVC
ISSUE DATE:	01/31/2024
BETA JOB NO.:	10694
SCALE	AS NOTED

BID SET

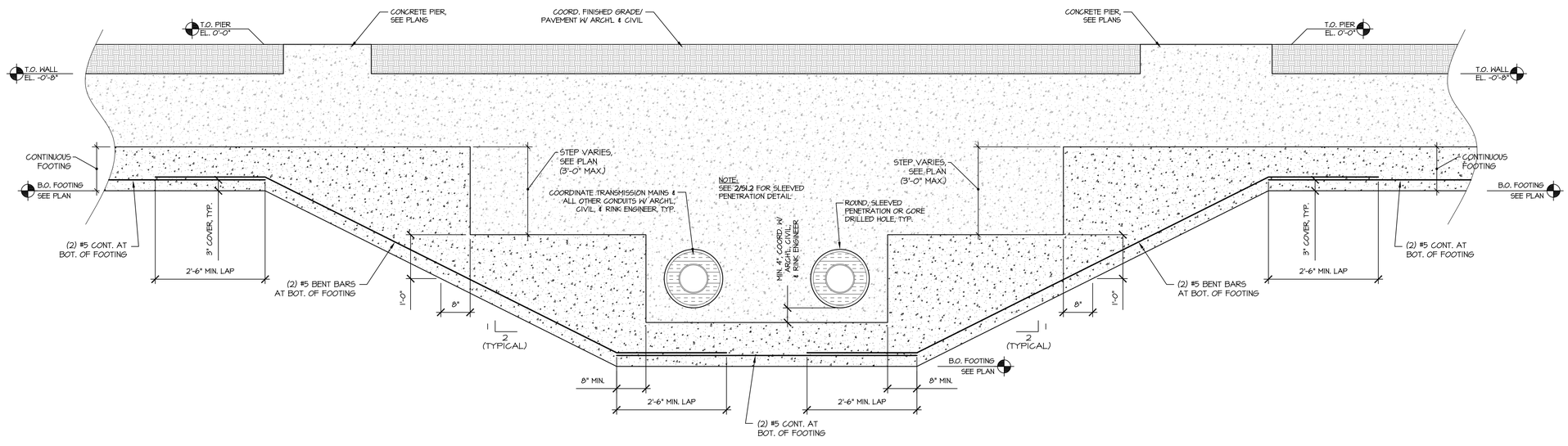
SHEET NO. S1.1



1 FOUNDATION WALL SECTION AT TRANSMISSION MAIN PENETRATIONS
SCALE: 3/4"=1'-0"



2 TYPICAL FOUNDATION WALL PIPE SLEEVE PENETRATION
SCALE: 3/4"=1'-0"



3 ELEVATION DETAIL AT STEPPED FOOTING
SCALE: 3/4"=1'-0"

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SCALE AS NOTED

BID SET

SHEET NO. S1.2