

MEMORANDUM

TO: Dalina Boryszewski, Cumberland Farms
FROM: Jeffrey T. Bandini, P.E., PTOE
DATE: April 15, 2022
RE: Proposed Car Wash Addition
Cumberland Farms
87 West Natick Road
Warwick, RI

McMahon Associates (McMahon) has completed a traffic assessment for the proposed addition of a car wash facility to the existing Cumberland Farms gas station and convenience store located at 87 West Natick Road in Warwick, Rhode Island. This assessment is based on the Site Plan prepared by Civil Design Group, LLC dated December 8, 2021. A Traffic Impact Study was completed for the Cumberland Farms gas station and convenience store by McMahon in July of 2016, and the site was constructed in November 2018.

The following traffic assessment examines existing and projected traffic operations (both with and without the proposed car wash), reviews estimated project trip generation and site access and circulation associated with the proposed car wash.

Project Description

The existing Cumberland Farms is located at 87 West Natick Road in Warwick, Rhode Island at the northwest corner of the signalized intersection of Lambert Highway (Route 5) and West Natick Road. As shown in Figure 1, the proposed car wash would be located on the north side of the existing convenience store. The proposed addition would include the construction of a 3,218 square foot car wash with one bay and six parking spaces with self-service vacuums.

Access to the site would continue to be provided via the two existing full-access driveways, including one on the west side Lambert Lind Highway (Route 5) and one on the north side of West Natick Road at the signalized intersection with the Warwick Mall egress. The full-access driveway on Lambert Lind Highway (Route 5) contains an exclusive northbound left-turn lane for entering vehicles. The entrance to the car wash would be located on the northeast side of the site and circulate in a counterclockwise direction behind the existing convenience store. Vehicles would exit the car wash in the northwest corner of the site. The Site Plan is provided as an attachment.

Figure 1: Site Location Map



Existing Traffic Volumes

To assess peak hour traffic conditions, traffic count data was collected at the existing Cumberland Farms driveways during the weekday afternoon and Saturday midday peak periods. Manual turning movement counts were conducted on Tuesday, March 15, 2022, from 4:00 PM to 6:00 PM and Saturday, March 19 from 11:00 AM to 2:00 PM. The results of the turning movement counts are tabulated by 15-minute periods and are provided in as an attachment. The four highest consecutive 15-minute intervals during each of these count periods constitute the peak hours that are the basis of the traffic analysis provided in this memo. To present a conservative analysis, the individual peak hour of each of the two site driveways was utilized.

According to RIDOT’s 2017 Monthly Average Daily Traffic Factors, traffic volumes for an urban principal arterial roadway collected during the month of March are shown to be slightly lower than traffic volumes for the average month. Therefore, the existing peak hour through traffic volumes on Lambert Lind Highway (Route 5) were increased by four percent to represent an average month. Traffic volumes for an urban minor arterial roadway collected during the month of March are shown to be slightly higher than traffic volumes for the average month. To present a conservative analysis, the traffic volumes on West Natick Road were not adjusted downwards to an average month.

No Build Traffic Volumes

To be consistent with the TIS completed for the Cumberland Farms gas station and convenience store, an annual growth rate of 1.0 percent per year was applied to the 2022 Existing traffic volumes, compounded annually, over the seven-year study horizon (2022 to 2029) to develop the 2029 No Build peak hour traffic volumes. This growth rate was provided by the City of Warwick Planning Department and is anticipated to capture traffic growth associated with general changes in population and other developments that are not known at this time.

Project Trip Generation

To estimate the number of vehicle trips associated with the proposed car wash addition, the Institute of Transportation Engineers' (ITE) publication, *Trip Generation Manual, 11th Edition*, was referenced. ITE is a national research organization of transportation professionals, and the *Trip Generation Manual* provides traffic generation information for various land uses compiled from studies conducted by members nationwide. Vehicle trip estimates for the proposed car wash addition were developed based on data presented in this publication for Land Use Code 948 (Automated Car Wash). This reference establishes vehicle trip rates (in this case expressed in trips per square foot) based on actual traffic counts conducted at similar types of existing land uses. Table 1 presents the projected trip generation for the proposed car wash addition for the weekday afternoon and Saturday midday peak hours.

Table 1: Project Trip Generation

Description	Size	Weekday PM			Saturday		
		In	Out	Total	In	Out	Total
Proposed Car Wash ¹	3,218 sf	23	23	46	49	49	98

1 ITE Land Use Code 948 (Automated Car Wash), based on 3,218 sf.

As shown in Table 1, the proposed car wash addition is estimated to generate approximately 46 new vehicle trips during the weekday afternoon peak hour (23 entering vehicles and 23 exiting vehicles), and approximately 98 new vehicle trips during the Saturday midday peak hour (49 entering vehicles and 49 exiting vehicles). The estimated trip generation associated with the proposed car wash addition is considered to be conservative, as a portion of vehicles utilizing the car wash would be anticipated to already be using the existing Cumberland Farms convenience store and gas station. These shared trips between the car wash and the existing convenience store and gas station would reduce the overall increase in vehicle trips traveling to and from the project site. No credit was taken for shared trips between the proposed car wash and existing Cumberland Farms in the capacity analysis.

The traffic anticipated to be generated by the proposed car wash was assigned to enter the site based on the existing traffic patterns for vehicles accessing the existing Cumberland Farms driveways. The car wash trips were assigned to exit the site based on the proposed layout of the car wash and the logical internal circulation. The entrance to the car wash is proposed to be located on the east side of the site, while the exit of the car wash would be located on the west side of the site, closest to the signalized site driveway on West Natick Road.

Capacity Analysis Results

Intersection capacity analysis was conducted using Synchro capacity analysis software for the site driveways on West Natick Road and Lambert Lind Highway (Route 5) to evaluate the 2022 Existing, 2029 No Build and 2029 Build traffic conditions during the weekday afternoon and Saturday midday peak hours.

A summary of the capacity analysis results are presented in Table 2 below. A more detailed summary of the capacity analysis for each site driveway intersection is attached.

Table 2: Capacity Analysis Results

Intersection	Movement	Period	Existing 2022				No Build 2029				Build 2029				
			LOS ¹	Delay ²	V/C ³	95th Q ⁴	LOS	Delay	V/C	95th Q	LOS	Delay	V/C	95th Q	
Lambert Lind Highway (Route 5) at Site Driveway/Soule Street	EB	LTR	PM	D	29.9	0.41	48	E	35.5	0.46	55	E	41.0	0.54	63
			SAT	D	27.1	0.30	30	D	31.6	0.34	35	D	33.9	0.42	48
West Natick Road at Site Driveway/Warwick Mall egress	SB	LR	PM	B	12.0	0.33	25	B	12.0	0.33	25	B	14.7	0.39	36
			SAT	B	11.5	0.32	32	B	11.5	0.32	32	B	17.1	0.45	53
	Overall	PM	B	19.0	0.54	-	B	18.7	0.54	-	B	18.9	0.54	-	
		SAT	C	23.0	0.61	-	C	22.8	0.61	-	C	23.1	0.61	-	

- 1 Level-of-Service
- 2 Average vehicle delay in seconds
- 3 Volume to capacity ratio
- 4 95th percentile queue length (ft)

As shown in Table 2, the delay at the critical stop-controlled eastbound Cumberland Farms driveway at Lambert Lind Highway (Route 5) approach is shown to operate under capacity during both the weekday afternoon and Saturday midday peak hours under 2029 Build conditions.

The signalized intersection of West Natick Road at the Cumberland Farms Driveway/Warwick Mall egress would continue to operate at overall LOS B during the weekday afternoon peak hour and at overall LOS C during the Saturday midday peak hour under 2029 Build conditions.

Since the shared trips between the car wash and the existing convenience store and gas station would reduce the overall increase in vehicle trips traveling to and from the project site, the 2029 Build conditions results presented in Table 2 are anticipated to be conservative.

Field Observations

McMahon conducted field observations to establish the existing delay and vehicle queues experienced by drivers exiting the Site Driveway onto Lambert Lind Highway (Route 5). The field observations were conducted on Saturday, March 19, 2022, during the Saturday midday peak period. The number of queued vehicles waiting to turn left or right onto Lambert Lind Highway (Route 5) was recorded every 15 seconds from 12:00 PM to 12:30 PM. A review of the vehicle delay and queue data recorded at the site driveway eastbound approach to Lambert Lind Highway (Route 5) determined that the average delay for the approach was 17.3 seconds (LOS C) during the period analyzed with a 95th percentile queue of 27 feet. Based on the field data collected, the measured vehicle delay and queue length is slightly lower than the capacity analysis results for the Saturday midday peak hour under the 2022 Existing conditions.

Site Access and Circulation

Access to the site would continue to be provided via the two existing full-access driveways, including one on the west side Lambert Lind Highway (Route 5) and one on the north side of West Natick Road at the signalized intersection with the Warwick Mall egress. The proposed car wash addition would be located on the north side

of the site, between the existing convenience store building and Fessenden Street. The entrance to the car wash would be located on the northeast corner of the site, circulating counterclockwise with the car wash exit located in the northwest corner. The self-service vacuum spaces would be located in between the proposed car wash and the existing convenience store building. The internal site circulation with the addition of the proposed car wash is anticipated to have a minimal impact on the existing gas station and convenience store.

Findings

The proposed project includes the addition of a car wash facility to the existing Cumberland Farms gas station and convenience store located at 87 West Natick Road in Warwick, Rhode Island. Below is a summary of findings for the traffic assessment completed for the proposed car wash addition:

- Access to the project site would continue to be provided via the existing full-access driveways on West Natick Road and Lambert Lind Highway (Route 5).
- The proposed car wash is estimated to generate approximately 46 vehicle trips during the weekday afternoon peak hour (23 entering vehicles and 23 exiting vehicles), and approximately 98 vehicle trips during the Saturday midday peak hour (49 entering vehicles and 49 exiting vehicles). The estimated increase in vehicle trips associated with the proposed car wash addition is considered conservative, as a portion of vehicles utilizing the car wash would be anticipated to already be using the existing convenience store and gas station, decreasing the overall increase in new vehicle trips to the project site.
- The internal access and circulation for the proposed car wash would be anticipated to have minimal impacts on the existing circulation of the site.
- A field observation conducted on Saturday, March 19, 2022, indicated that the average delay and queuing exiting the site onto Lambert Lind Highway (Route 5) is comparable to what is presented using Synchro software.
- The capacity analysis results show that with the addition of the car wash trips, the Lambert Lind Highway (Route 5) and West Natick Road site driveways would continue to operate under capacity during both the weekday afternoon and Saturday midday peak hours.

Attachments

- Site Plan
- Traffic Count Data
- Traffic Projection Model
- Field Study Data
- Capacity/Level-of-Service Analysis