

January 25, 2022

NEX-2018197.03

Mr. John Shalbey  
Rojo Co. Inc.  
69 Providence Highway  
Norwood, Massachusetts 02062

SUBJECT: Trip Generation Letter  
Proposed Car Wash Development  
Tow Road (Map 108 Lot 3A)  
Wareham, Massachusetts

Dear Mr. Shalbey:

**Greenman-Pedersen, Inc.** (GPI) has prepared this letter to evaluate the expected trips associated with the proposed car wash to be located on Tow Road in Wareham, Massachusetts. The site is currently vacant. The project consists of constructing a ±5,400 square foot (SF) automatic tunnel car wash with associated parking. Access and egress is proposed to the site via two driveways; one full access/egress driveway on Tow Road and one right-in/right-out only driveway on Cranberry Highway (Route 28).

Although Tow Road is under the jurisdiction of the Town of Wareham, Cranberry Highway is under the Massachusetts Department of Transportation (MassDOT) jurisdiction. The development project does not include any work to be performed within the State Highway Layout. The site is bounded by Cape Cod Gas to the northeast, Nouria gas station to the southwest, vacant land to the northwest, and Tow Road to the southeast.

### **Trip Generation**

To estimate the volume of traffic to be generated by the proposed development, trip-generation rates published by the ITE *Trip Generation Manual*<sup>1</sup> were researched. Land Use Code (LUC) 948 (Automated Car Wash) based on 5,400 SF was used to estimate the proposed trip generation. Table 1 summarizes the results of the peak hour trip-generation estimates. No daily data or weekday AM peak hour data is provided in the *Trip Generation Manual*, however, the weekday PM peak hour trip rates were assumed for the weekday AM peak hour estimates.

Since the car wash shares access with the Nouria gas station, it is realistic to assume that there will be some multi-use trips within the site itself. For example, someone fueling their vehicle may also stop at the car wash. Therefore, a reduction in the overall trips experienced at the site driveways can be anticipated as a result of multi-use trips that include stops at more than one use on the two sites. Based on information published in the ITE *Trip Generation Handbook*<sup>2</sup>, it is estimated that the internal capture rate between retail uses during a weekday is between 20 percent and 31 percent, with the weekday PM peak hour at 20 percent. Accordingly, a 20 percent trip reduction was applied to the peak hours to account for the shared trips between the car wash and the gas station. It is estimated that multi-use trips account for 8 percent of weekday AM peak hour trips, 9 percent of weekday PM peak hour trips, and 14 percent of Saturday midday peak hour trips generated by the gas station and car wash sites. The Multi-Use Development Trip Generation and Internal Capture Worksheets are provided in the Appendix.

<sup>1</sup> *Trip Generation, 11<sup>th</sup> Edition*. Institute of Transportation Engineers; Washington, DC; 2021.

<sup>2</sup> *Trip Generation Handbook, 2<sup>nd</sup> Edition*; Institute of Transportation Engineers; Washington, DC; August 2004.

**TABLE 1**  
**Peak Hour Trip Generation Summary**

Time Period/Direction	Car Wash Trips	
	Total <sup>a</sup>	External <sup>b</sup>
<b>Weekday AM Peak Hour:</b>		
<i>Enter</i>	38	30
<i>Exit</i>	<u>38</u>	<u>30</u>
<i>Total</i>	76	60
<b>Weekday PM Peak Hour:</b>		
<i>Enter</i>	38	30
<i>Exit</i>	<u>38</u>	<u>30</u>
<i>Total</i>	76	60
<b>Saturday Midday Peak Hour:</b>		
<i>Enter</i>	82	66
<i>Exit</i>	<u>82</u>	<u>66</u>
<i>Total</i>	164	132

<sup>a</sup> ITE LUC 948 (Automated Car Wash) for 5,400 SF.

<sup>b</sup> 20 percent internal capture applied to total trips.

As shown in Table 1, the proposed car wash is expected to generate 60 *external* vehicle trips (30 entering and 30 exiting) during the weekday AM peak hour, 60 *external* vehicle trips (30 entering and 30 exiting) during the weekday PM peak hour, and 132 *external* vehicle trips (66 entering and 66 exiting) during the Saturday midday peak hour.

The proposed car wash will result in increases in traffic on the surrounding roadways. Based on the trip distribution provided in the Supplemental Traffic Memorandum<sup>3</sup> prepared for the Nouria gas station adjacent to the proposed car wash, 45 percent of the site traffic is expected to travel to/from the north on Cranberry Highway, 40 percent are expected to/from the south on Cranberry Highway, and 15 percent are expected to/from Tobey Road. Accordingly, traffic-volume increases beyond the adjacent intersection of Cranberry Highway/Tow Road/Tobey Road during the peak hours are expected to be in the range of 10 to 60 vehicle trips. These increases represent, on average, one additional vehicle trip approximately every 1 to 6 minutes during the peak hours. It is expected that these traffic-volume increases can be accommodated on the existing transportation infrastructure.

<sup>3</sup> Greenman-Pedersen, Inc. (GPI); Supplemental Traffic Memorandum, Retail Motor Fuel Outlet, Wareham, Massachusetts; April 2020.

Should you have any questions, require additional information, or if I can be of any assistance during the review process, please feel free contact me at (978) 570-2968.

Sincerely,

**GREENMAN-PEDERSEN, INC.**

A handwritten signature in cursive script that reads "Heather Monticup".

Heather L. Monticup, P.E.  
Assistant Vice President / Director of Traffic Engineering - Land Development

Attachments:

1. Trip Generation Data

**Institute of Transportation Engineers (ITE)**  
**Land Use Code (LUC) 948 - Automated Car Wash**  
**General Urban/Suburban**

Average Vehicle Trips Ends vs: 1,000 Sq. Ft. Gross Floor Area  
Independent Variable (X): 5.400

**WEEKDAY MORNING PEAK HOUR OF ADJACENT STREET TRAFFIC**

$$T = 14.20 * (X)$$

$$T = 14.20 * 5.400$$

$$T = 76.68$$

$$T = 76 \text{ vehicle trips}$$

with 50% ( 38 vpd) entering and 50% ( 38 vpd) exiting.

*\* No weekday morning peak hour data available, weekday evening trips were assumed.*

**WEEKDAY EVENING PEAK HOUR OF ADJACENT STREET TRAFFIC**

$$T = 14.20 * (X)$$

$$T = 14.20 * 5.400$$

$$T = 76.68$$

$$T = 76 \text{ vehicle trips}$$

with 50% ( 38 vpd) entering and 50% ( 38 vpd) exiting.

**SATURDAY PEAK HOUR OF GENERATOR**

$$T = 30.40 * (X)$$

$$T = 30.40 * 5.400$$

$$T = 164.16$$

$$T = 164 \text{ vehicle trips}$$

with 50% ( 82 vph) entering and 50% ( 82 vph) exiting.

*Institute of Transportation Engineers (ITE)*

**Land Use Code (LUC) 960 - Super Convenience Market/Gas Station**

**General Urban/Suburban**

Average Vehicle Trips Ends vs: Vehicle Fueling Positions

Independent Variable (X): 12

**WEEKDAY MORNING PEAK HOUR OF ADJACENT STREET TRAFFIC**

$$T = 28.08 * (X)$$

$$T = 28.08 * 12$$

$$T = 336.96$$

T = 337 vehicle trips

with 50% ( 169 vph) entering and 50% ( 168 vph) exiting.

**WEEKDAY EVENING PEAK HOUR OF ADJACENT STREET TRAFFIC**

$$T = 22.96 * (X)$$

$$T = 22.96 * 12$$

$$T = 275.52$$

T = 276 vehicle trips

with 50% ( 138 vph) entering and 50% ( 138 vph) exiting.

**SATURDAY PEAK HOUR OF GENERATOR**

$$T = 23.26 * (X)$$

$$T = 23.26 * 12$$

$$T = 279.12$$

T = 279 vehicle trips

with 50% ( 140 vph) entering and 50% ( 139 vph) exiting.

Analyst: Susannah E. Theriault  
 Date: January 18, 2022

### MULTI-USE DEVELOPMENT TRIP GENERATION AND INTERNAL CAPTURE SUMMARY

Name of Dvlpt: Car Wash  
 Time Period: Weekday AM

**LAND USE A**      Retail

ITE LUC <u>960</u>			
Size <u>12</u> VFPS			
	Total	Internal	External
Exit to External	169	8	161
160	168	8	160
Enter from External	337	16	321
161	100%	5%	95%

Demand	Balanced	Demand	
20%   34	8	20%   8	
Demand	Balanced	Demand	
20%   34	8	20%   8	
Demand	Balanced	Demand	

**LAND USE B**      Retail

ITE LUC <u>948</u>			
Size <u>5,400</u> SF			
	Total	Internal	External
Enter from External	38	8	30
30	38	8	30
Exit to External	76	16	60
30	100%	21%	79%

Net External Trips for Multi-Use Development					
	Enter	Exit	Total	Single-Use Trip Gen Est.	
Land Use A	161	160	321	337	
Land Use B	30	30	60	76	<i>Internal Capture</i>
<b>TOTAL</b>	<b>191</b>	<b>190</b>	<b>381</b>	<b>413</b>	<b>8%</b>

Based on ITE Trip Generation Handbook, 3rd Edition, August 2014.

Analyst: Susannah E. Theriault  
 Date: January 18, 2022

### MULTI-USE DEVELOPMENT TRIP GENERATION AND INTERNAL CAPTURE SUMMARY

Name of Dvlpt: Car Wash  
 Time Period: Weekday PM

**LAND USE A**      Retail

ITE LUC <u>960</u>			
Size <u>12</u> VFPS			
	Total	Internal	External
Enter	138	8	130
Exit	138	8	130
Total	276	16	260
Percent	100%	6%	94%

Exit to External: 130

Enter from External: 130

Demand		Balanced	Demand	
20%	28	8	20%	8
Demand		Balanced	Demand	
20%	28	8	20%	8
Demand		Balanced	Demand	

**LAND USE B**      Retail

ITE LUC <u>948</u>			
Size <u>5,400</u> SF			
	Total	Internal	External
Enter	38	8	30
Exit	38	8	30
Total	76	16	60
Percent	100%	21%	79%

Enter from External: 30

Exit to External: 30

Net External Trips for Multi-Use Development				
	Enter	Exit	Total	Single-Use Trip Gen Est.
Land Use A	130	130	260	276
Land Use B	30	30	60	76
<b>TOTAL</b>	<b>160</b>	<b>160</b>	<b>320</b>	<b>352</b>
				<b>9%</b>

*Internal Capture*

Based on ITE Trip Generation Handbook, 3rd Edition, August 2014.

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### MULTI-USE DEVELOPMENT TRIP GENERATION AND INTERNAL CAPTURE SUMMARY

Name of Dvlpt: Car Wash  
 Time Period: Saturday Midday

**LAND USE A**      Retail

ITE LUC <u>960</u>			
Size <u>12</u> VFPS			
	Total	Internal	External
Enter	140	16	124
Exit	139	16	123
Total	279	32	247
Percent	100%	11%	89%

Exit to External: 123

Enter from External: 124

Demand	Balanced	Demand
<span style="border: 1px solid black; padding: 2px;">20%</span> <span style="border: 1px solid black; padding: 2px;">28</span>	<span style="border: 1px solid black; padding: 2px;">16</span>	<span style="border: 1px solid black; padding: 2px;">20%</span> <span style="border: 1px solid black; padding: 2px;">16</span>
Demand	Balanced	Demand
<span style="border: 1px solid black; padding: 2px;">20%</span> <span style="border: 1px solid black; padding: 2px;">28</span>	<span style="border: 1px solid black; padding: 2px;">16</span>	<span style="border: 1px solid black; padding: 2px;">20%</span> <span style="border: 1px solid black; padding: 2px;">16</span>
Demand	Balanced	Demand

**LAND USE B**      Retail

ITE LUC <u>948</u>			
Size <u>5,400</u> SF			
	Total	Internal	External
Enter	82	16	66
Exit	82	16	66
Total	164	32	132
Percent	100%	20%	80%

Enter from External: 66

Exit to External: 66

Net External Trips for Multi-Use Development					
	Enter	Exit	Total	Single-Use Trip Gen Est.	
Land Use A	124	123	247	279	
Land Use B	66	66	132	164	<i>Internal Capture</i>
<b>TOTAL</b>	<b>190</b>	<b>189</b>	<b>379</b>	<b>443</b>	<b>14%</b>

Based on ITE Trip Generation Handbook, 3rd Edition, August 2014.