



## Memorandum

To: Mr. Sean Kavanagh  
First Hartford Realty Corporation  
149 Colonial Road  
Manchester, CT 06042

Date: June 22, 2021

Project #: 73170.00

From: Matthew Kealey, PE, PTOE  
Ashley Domogala, EIT

Re: Proposed Car Wash  
Wareham, Massachusetts

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### Introduction

On behalf of First Hartford Realty Corporation, Vanasse Hangen Brustlin, Inc. (VHB) has evaluated the traffic impacts associated with the proposed car wash at the site of a former 99 Restaurant at 3013 Cranberry Highway (Route 6/28) in Wareham, Massachusetts. The proposed Project involves the demolition of the existing restaurant and the construction of an automatic car wash with one wash tunnel. The Site will be accessed via the existing site driveway located on Cranberry Highway (Route 6/28) and potentially via the Ocean State plaza driveway.

This memorandum includes an evaluation of the existing traffic operations and safety; an assessment of future conditions without and with the Project; and an estimate of projected traffic volumes for the Project and its potential impact on future traffic operations in the area. As detailed herein, the proposed Project is not expected to have a significant impact on local traffic operations.

### Existing Conditions

The existing condition analysis consists of an inventory of the traffic control, roadway, driveway, and intersection geometry in the study area, the collection of daily and peak hour traffic volumes, a summary of public transit options in the area, and a review of recent crash history.

### Study Area

Based on VHB's knowledge of the area and the development of typical traffic impact and access evaluations, the following intersections were included in this assessment:

- Cranberry Highway (Route 6/28) at Ocean State Plaza Driveway (signalized)
- Cranberry Highway (Route 6/28) at Site Driveway (unsignalized)

Figures 1 and 2 show the study area as well as the lane geometry and traffic control at the study area intersections.

101 Walnut Street  
PO Box 9151  
Watertown, MA 02472-4026  
P 617.924.1770



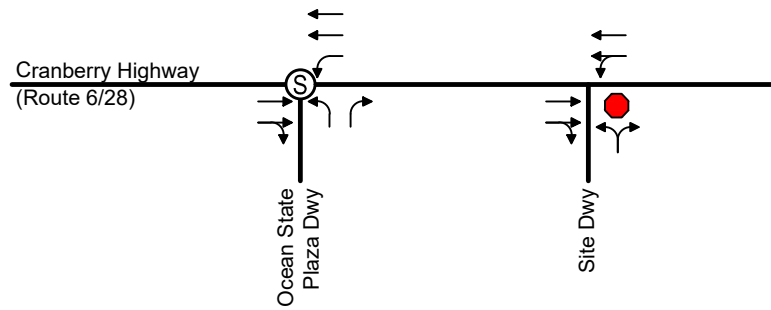
**Figure 1**  
Study Area



0 100 200 Feet

Proposed Car Wash  
Wareham, Massachusetts

- Ⓢ Signalized Intersection
- Stop-Controlled



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Not to Scale



**Figure 2**  
Existing Lane Geometry and Traffic Control

Proposed Car Wash  
Wareham, Massachusetts

## Study Area Roadways

### Cranberry Highway (Route 6/28)

Cranberry Highway is part of Massachusetts Route 28 in addition to being part of US Route 6 in the study area. It is classified as an urban minor arterial under MassDOT jurisdiction in the study area and generally runs in an east-west direction. To the west, Route 6 runs along I-195 from Providence to I-195's eastern terminus at I-495 while Route 28 runs along I-495 from Middleborough. Route 6 continues farther west, while Route 28 continues north. To the east, Route 6 becomes the Mid-Cape Highway to Provincetown while Route 28 runs along the south side of the Cape. Cranberry Highway is generally a four-lane roadway (two lanes per direction) in the study area, with turn lanes added at some intersections. The speed limit is 35 mph. No bicycle facilities are provided along the road in the study area. In the study area, a sidewalk is provided on the north side of the road to the west of the Ocean State plaza driveway. Sidewalks are provided on both sides of the road to the west of the Home Depot driveway. No sidewalks are provided to the east of the Ocean State plaza driveway.

### Ocean State Plaza Driveway

The Ocean State plaza driveway acts as a driveway for multiple businesses and connects to Cranberry Highway (Route 6/28). The driveway provides access to Cranberry Plaza to the west including Ocean State Job Lot and Cardi's Furniture & Mattresses as well as the Site to the east. In addition, it connects to the main Cranberry Plaza driveway to the west and the Tractor Supply Co driveway to the east. No pedestrian or bicycle facilities are provided along the driveway.

## Study Area Intersections

### Cranberry Highway (Route 6/28) at Ocean State Plaza Driveway

Cranberry Highway (Route 6/28) generally runs in an east-west direction and is intersected by the Ocean State plaza driveway from the south to form a three-legged signalized intersection. The Route 6/28 eastbound approach consists of one through lane and one shared through/right-turn lane. The Route 6/28 westbound approach consists of one left-turn lane and two through lanes. The plaza driveway northbound approach consists of one left-turn lane and one right-turn lane. No pedestrian or bicycle accommodations are provided within the intersection. A sidewalk starts on the north side of Route 6 shortly to the west of the intersection. Land use around the intersection is mainly commercial, and Dicks Pond is located to the north.

### Cranberry Highway (Route 6/28) at Site Driveway

Cranberry Highway (Route 6/28) generally runs in an east-west direction and is intersected by the site driveway from the south to form a three-legged unsignalized intersection. The Route 6/28 eastbound approach consists of one through lane and one shared through/right-turn lane. The Route 6/28 westbound approach consists of one left-turn lane for the signalized intersection to the west and two through lanes. The site driveway northbound approach consists of one all-purpose lane. The Site is currently vacant, so no volumes would be expected entering or exiting the current Site driveway. No pedestrian or bicycle accommodations are provided at the intersection. Land use around the intersection is mainly commercial, and Dicks Pond is located to the north.

## Traffic Volumes

Manual turning movement counts (TMCs) to collect peak hour data were conducted at the signalized study area intersection on Thursday, May 20, 2021 from 4:00 PM to 6:00 PM and Saturday, May 22, 2021 from 11:00 AM to 1:00 PM. The weekday evening peak period occurred from 4:00 PM to 5:00 PM, and the Saturday midday peak period occurred from 12:00 PM to 1:00 PM.

In addition, to provide comparison to pre-COVID count data, a TMC was conducted at the signalized intersection of Cranberry Highway (Route 6/28) at Cranberry Plaza Driveway/Home Depot Driveway on Thursday, May 20, 2021 from 4:00 PM to 6:00 PM and a 24-hour automatic traffic recorder (ATR) count was conducted on Cranberry Highway (Route 6/28) west of Main Street on Thursday, May 20, 2021.

Historic TMC data was available on the MassDOT MS2 Transportation Data Management System for the intersection of Cranberry Highway (Route 6/28) at Cranberry Plaza Driveway/Home Depot Driveway, conducted on Wednesday, June 7, 2017 from 3:30 PM to 5:30 PM, where the weekday evening peak period occurred from 4:30 PM to 5:30 PM. Historic ATR data was also available on the MassDOT MS2 Transportation Data Management System for Cranberry Highway (Route 6/28) west of Main Street, conducted for 72 hours on April 9-12, 2018.

Methodology outlined by MassDOT<sup>1</sup> was used to grow historic counts conducted at the same locations to compare to 2021 counts. For comparison purposes, the 2017 TMC volumes were grown by a total of 0.3% and the 2018 ATR volumes did not have to be adjusted due to a negative yearly growth rate based on the MassDOT methodology. Historic MassDOT data shows that April, May, and June volumes are historically higher than average month volumes for urban minor arterials such as Route 6. The comparison of the grown 2017 TMC to the 2021 TMC showed that the total volume of the intersection of Cranberry Highway (Route 6/28) at Cranberry Plaza Driveway/Home Depot Driveway was approximately 2.4% higher than the adjusted 2017 TMC volumes. The comparison of the 2018 ATR counts to the 2021 ATR counts showed that the volumes were roughly the same, with overall higher daily volume and overall 1.5% lower evening peak hour volume, which is within standard day-to-day variability. Therefore, no adjustments were made to the 2021 TMC and ATR counts. All traffic count data, as well the historic count comparisons, are included in the Attachments.

Figure 3 shows the resulting 2021 Existing traffic volumes.

## Public Transportation

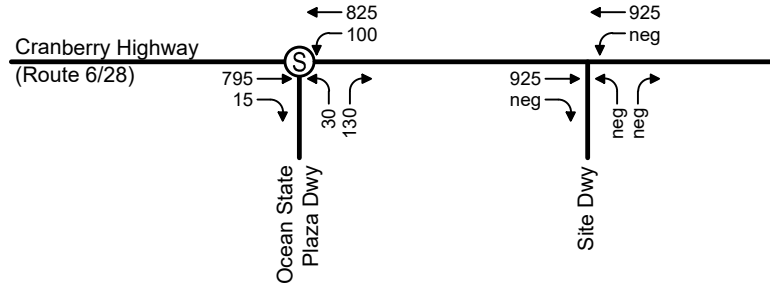
Greater Attleboro and Taunton Regional Transit Authority (GATRA) provides bus service to Cranberry Plaza via Link 1, Link 2, Link 4, and Wareham/Middleborough/Lakeville Train Connector. Southeastern Regional Transit Authority (SRTA) also provides bus service to Cranberry Plaza via its Wareham-New Bedford Connection route.

Because the proposed use is a car wash, all customers would arrive at the site by car. Employees could travel by public transportation, but it was assumed that all trips to the Site would arrive by car for the analysis.

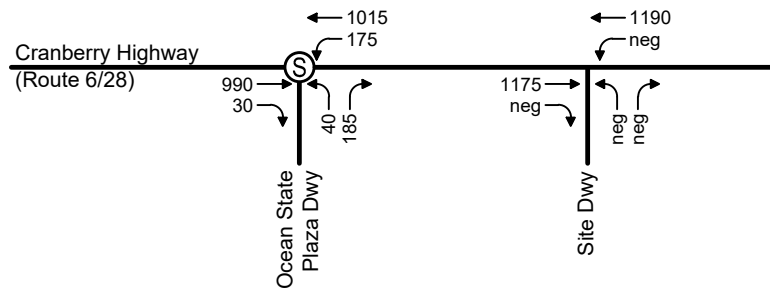
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<sup>1</sup> *Guidance on Traffic Count Data*, MassDOT, April 2021.

Weekday Evening Peak Hour  
 Neg = Negligible  
 Ⓢ Signalized Intersection



Saturday Midday Peak Hour  
 Neg = Negligible  
 Ⓢ Signalized Intersection



↑  
 Not to Scale



**Figure 3**  
 2021 Existing Conditions Traffic Volumes

Proposed Car Wash  
 Wareham, Massachusetts

## Vehicular Crash History

To identify potential vehicle crash trends in the study area, reported vehicular crash data for the study area was obtained from MassDOT for the years 2014 through 2018, the most recent five-year history available. A summary of the MassDOT vehicle crash history is presented in Table 1 and included in the Attachments. It should be noted that due to the geolocating methodology of MassDOT's Crash Portal, some crashes that occurred in a parking lot may be included in the crash data for intersections. This is especially prevalent in the areas of shopping plazas such as Cranberry Plaza. In addition, some crashes may be reported at an address instead of the intersection at which they occurred. To calculate a conservative crash rate, crashes reported at 3003, 3005, 3013, and 3014 Cranberry Highway were included in the evaluation for Cranberry Highway (Route 6/28) at Ocean State plaza driveway, some of which specify that they occurred at a signalized intersection.

Crash rates are calculated based on the number of crashes at an intersection and the volume of traffic traveling through that intersection on a daily basis. The 2018 MassDOT average crash rates for District 5 are 0.75 crashes per million entering vehicles (MEV) at signalized intersections and 0.57 crashes per MEV at unsignalized intersections. The 2018 MassDOT statewide average crash rates are 0.78 crashes per MEV at signalized intersections and 0.57 crashes per MEV at unsignalized intersections. The crash rate worksheet is included in the Attachments.

As shown in Table 1, the intersection was calculated to have a crash rate below the district and statewide averages. The 30 crashes at the intersection from 2014 through 2018 included a variety of crash types, but the most common were rear-end (8), angle (7), and single vehicle (7) crashes. Most resulted in property damage only, with only five resulting in injury. No fatal crashes or crashes involving a non-motorist (a pedestrian or bicyclist) were reported in the study area.

## Highway Safety Improvement Program

In addition to calculating the crash rate, study area intersections should also be reviewed in the MassDOT's Highway Safety Improvement Program (HSIP) database. An HSIP-eligible cluster is one in which the total number of "equivalent property damage only"<sup>2</sup> crashes in the area is within the top 5% of all clusters in that region. Being HSIP-eligible makes the location eligible for FHWA and MassDOT funds to address the identified safety issues at these locations. As part of this effort, VHB reviewed this database and found that there are no HSIP-eligible clusters in the study area.

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<sup>2</sup> Equivalent property damage only" is a method of combining the number of crashes with the severity of the crashes based on a weighted scale. Crashes involving property damage only are reported at a minimal level of importance, while collisions involving personal injury (or fatalities) are weighted more heavily.

**Table 1 Vehicular Crash Data (2014 - 2018)**

Cranberry Highway (Route 6/28) at Ocean State Plaza Driveway	
Signalized?	Yes
MassDOT Statewide Average Crash	0.78
MassDOT District 5 Average Crash Rate	0.75
Calculated Crash Rate	0.66
Exceeds Average?	No
<b>Year</b>	
2014	9
2015	10
2016	5
2017	4
<u>2018</u>	<u>2</u>
<b>Total</b>	<b>30</b>
Yearly Average	
<b>Collision Type</b>	
Angle	7
Head-on	0
Rear-end	8
Sideswipe, opposite direction	3
Sideswipe, same direction	5
Single Vehicle Crash	7
Not reported	0
<b>Severity</b>	
Fatal Injury	0
Non-Fatal Injury	5
Property Damage Only	25
Not Reported	0
<b>Time of day</b>	
Weekday ,7:00 AM - 9:00 AM	0
Weekday, 4:00 – 6:00 PM	3
Saturday 11:00 AM – 2:00 PM	0
Weekday, other time	16
Weekend, other time	11
<b>Pavement Conditions</b>	
Dry	24
Wet	6
Snow	0
Ice	0
Not reported	0
<b>Non-Motorist (Bike, Ped)</b>	<b>0</b>

Source: Crash data was obtained from MassDOT Crash Portal, accessed June 1, 2021.



## Future Conditions

To determine the impacts of the site-generated traffic volumes in the vicinity of the site, future traffic conditions were evaluated. A seven-year horizon (2028) was used for the evaluation consistent with MassDOT TIA requirements.

Traffic growth on area roadways is a function of the expected land development, environmental activity, and changes in demographics. A frequently used procedure is to identify estimated traffic generated by planned developments that would be expected to affect the project study area roadways. An alternative procedure is to estimate an annual percentage increase and apply that increase to study area traffic volumes. For this evaluation, both procedures were used. The following summarizes this traffic forecasting process.

### Historic Growth

Historic data was reviewed from MassDOT's MS2 Transportation Data Management System for an ATR located on Cranberry Highway (Route 6/28) east of Depot Street, which is located approximately one-half mile to the west of the study area. Based on a comparison of July 2008 and July 2017 counts, Cranberry Highway (Route 6/28) had an average growth rate of 0.05% per year over the ten-year period near the study area. The calculations are included in the Attachments. To provide a conservative analysis, a background growth rate of 1% per year was used to establish future traffic volumes.

### Planned Developments

In addition to accounting for background growth, the traffic associated with other planned and/or approved developments near the Site was considered. Based on communications with the Town of Wareham, it was determined that there are no planned development projects in the vicinity of the site that are likely to influence traffic conditions.

### Intersection or Roadway Improvement Projects

In assessing future traffic conditions, proposed intersection or roadway improvements within the study area were considered. Based on communications with the Town of Wareham, there is one planned transportation project that would impact the Project study area within the seven-year horizon. Figure 4 shows the future lane geometry and traffic control.

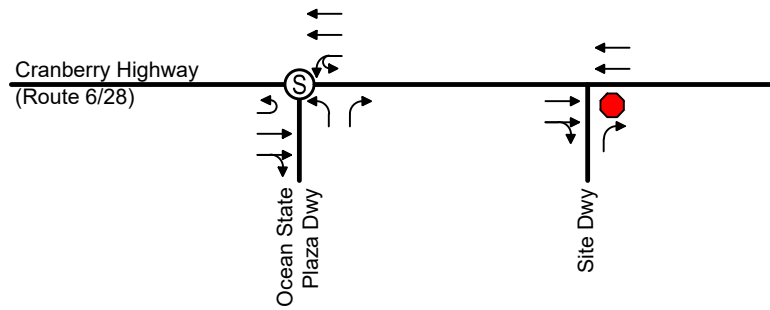
#### Cranberry Highway (Route 6/28) Reconstruction

The Cranberry Highway (Route 6/28) reconstruction project spans 1.65 miles from 500 feet east of Tyler Avenue to Red Brook Road, which includes the study area. The reconstruction will retain the four travel lanes (two lanes per direction) while adding a median, shoulders that can accommodate bicycles, and sidewalks along both sides of the roadway. It also includes traffic signal upgrades as well as new signage and pavement markings. The median will add u-turn movements to the signalized study area intersection. The 2028 u-turn volumes were assumed to be the same as the predicted u-turn volumes included in the project's Functional Design Report. The volumes and signal timings from the reconstruction project are included in the Attachments. This project is currently under construction. As such, the future geometry within the study area was assumed to be in place for all 2028 analysis.

### No-Build Traffic Volumes

The 2028 No-Build traffic volumes were generated by consideration of the above described factors. Figure 5 shows the resulting 2028 No-Build peak hour traffic volumes.

- Ⓢ Signalized Intersection
- Stop-Controlled



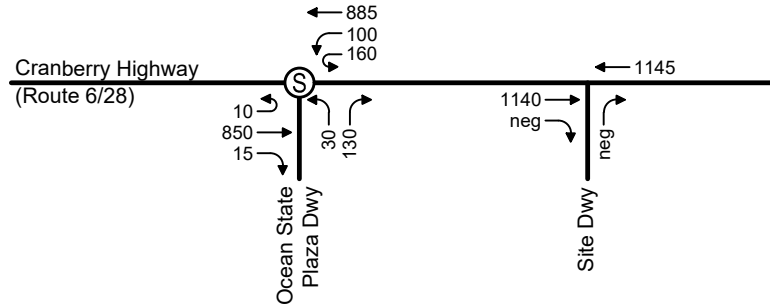
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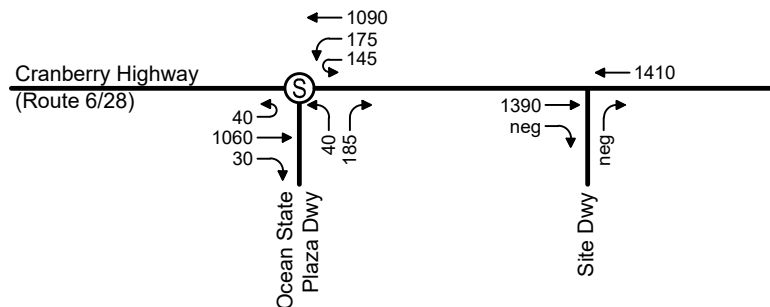
**Figure 4**  
Future Lane Geometry and Traffic Control

Proposed Car Wash  
Wareham, Massachusetts

Weekday Evening Peak Hour  
 Neg = Negligible  
 (S) Signalized Intersection



Saturday Midday Peak Hour  
 Neg = Negligible  
 (S) Signalized Intersection



↑ Not to Scale



**Figure 5**  
 2028 No Build Conditions Traffic Volumes

Proposed Car Wash  
 Wareham, Massachusetts

### Trip Generation

The rate at which any development generates traffic is dependent upon a number of factors such as size, location and concentration of surrounding developments. For a conservative analysis, no credit was taken for pass-by trips and all trips were assumed to be vehicular.

Based on communications with the Proponent, it is expected that the car wash will generate 100 trips (50 entering, 50 exiting) in the peak hours. For comparison, trip generation was also estimated using trip generation rates published in the Institute of Transportation Engineers' (ITE) *Trip Generation Manual, 10th Edition* for land use code (LUC) 948, Automated Car Wash. The ITE trip generation estimates were much lower at 78 trips (39 entering, 39 exiting) in the weekday evening peak hour and 41 trips (19 entering, 22 exiting) in the Saturday midday peak hour. Therefore, the empirical trip generation was used for both peak hours to present a conservative analysis. It should be noted that a substantial portion of the site-generated traffic could be pass-by traffic, which is traffic that is already on Cranberry Highway and chooses to enter and exit the site on the way to their primary destination. To provide a conservative assessment of new traffic, no credit was taken for pass-by trips.

Table 2 summarizes the projected trip generation associated with the proposed development. The ITE trip generation worksheet is included in the Attachments.

**Table 2 Trip Generation**

Time Period	Movement	ITE Trip Generation <sup>a</sup>	Empirical Trip Generation <sup>b</sup>
Weekday Evening Peak Hour	Enter`	39	50
	<u>Exit</u>	<u>39</u>	<u>50</u>
	Total	78	100
Saturday Midday Peak Hour	Enter	19	50
	<u>Exit</u>	<u>22</u>	<u>50</u>
	Total	41	100

Source: VHB; ITE

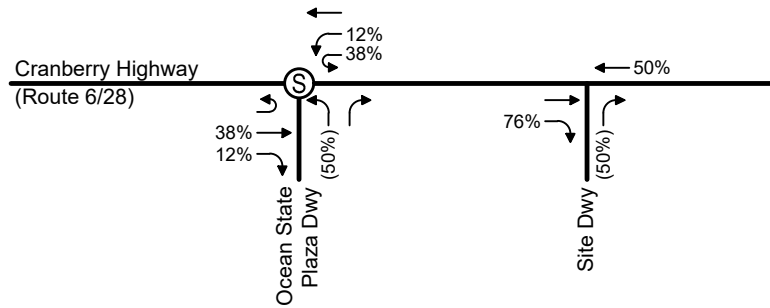
a Based on ITE LUC 948 (Automated Car Wash) for one wash tunnel, using average rates.

b Based on communications with the Proponent.

### Trip Distribution

The directional distribution of the vehicular traffic approaching and departing the site is a function of population densities, the location of employment, existing travel patterns, and the efficiency of the existing roadway system. Due to the retail nature of this Project, the trip distribution was determined using existing traffic patterns on Cranberry Highway (Route 6/28). Table 3 summarizes the trip distribution. Figure 6 shows the trip distribution.

Ⓢ Signalized Intersection  
XX = Entering Traffic  
(XX) = Exiting Traffic



↑ Not to Scale



**Figure 6**  
Trip Distribution

Proposed Car Wash  
Wareham, Massachusetts

**Table 3 Trip Distribution**

<b>Travel Route</b>	<b>Direction (from/to)</b>	<b>Percent Site Traffic</b>
Cranberry Highway (Route 6/28)	East	50%
	West	50%
Total		100%

**Build Traffic Volumes**

The empirical trip generation shown in Table 3 was assigned to the study area roadway network based on the trip distribution shown in Table 4 and added to the 2028 No-Build peak hour traffic volumes to develop the 2028 Build peak hour traffic volumes. Figures 7 and 8 show the Site generated traffic volumes and 2028 Build peak hour traffic volumes respectively.

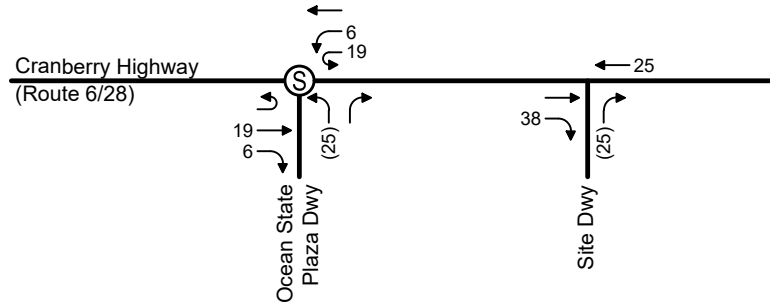
**Site Access and Circulation**

The Site will be accessed via a right-in, right-out driveway located on Cranberry Highway (Route 6/28) as well as the Ocean State plaza driveway. It was assumed that most (~75%) traffic would enter via the Site driveway on Cranberry Highway (Route 6/28), which would involve a u-turn for vehicles entering the study area from the east. The remaining traffic would enter via the Ocean State plaza driveway. To exit the Site, all left-turning vehicles would exit via the Ocean State plaza driveway, while all right-turning vehicles would exit via the Site driveway.

As shown on the site plan (provided in the Attachments), the single wash tunnel is served by three lanes, which allow for stacking of approximately 24 vehicles. There is a pay station at the front of each lane, and cars proceed to the wash tunnel after completing payment. Based on discussions with the Proponent, the proposed site layout should be able to accommodate the anticipated queues. However, the Proponent will implement standard queue management procedures to ensure that no vehicle queues extend back onto Cranberry Highway (Route 6/28). This procedure will include placement of attendants on the site to monitor vehicle queue lengths. If the queue reaches the Route 6/28 entrance, any vehicles entering the site will be directed to the parking area where they will wait briefly until the queueing area can accommodate additional vehicles.

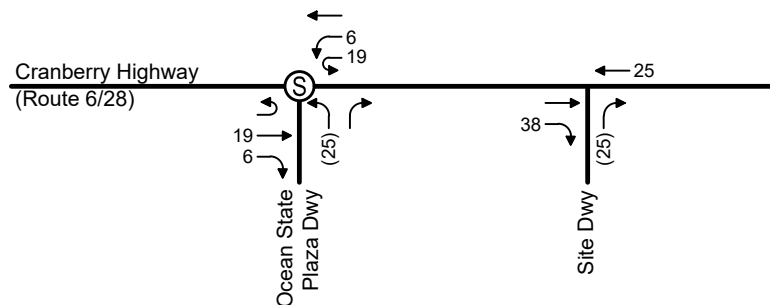
Weekday Evening Peak Hour

- Ⓢ Signalized Intersection
- XX = Entering Traffic
- (XX) = Exiting Traffic



Saturday Midday Peak Hour

- Ⓢ Signalized Intersection
- XX = Entering Traffic
- (XX) = Exiting Traffic



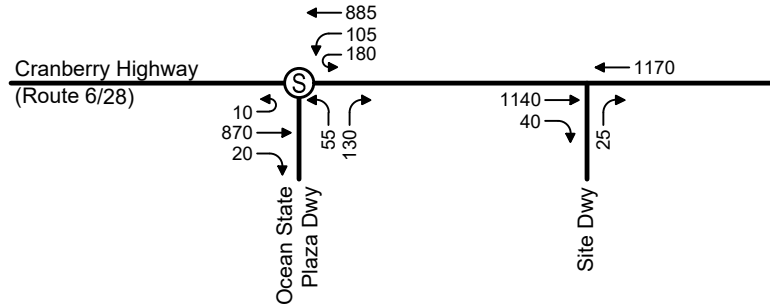
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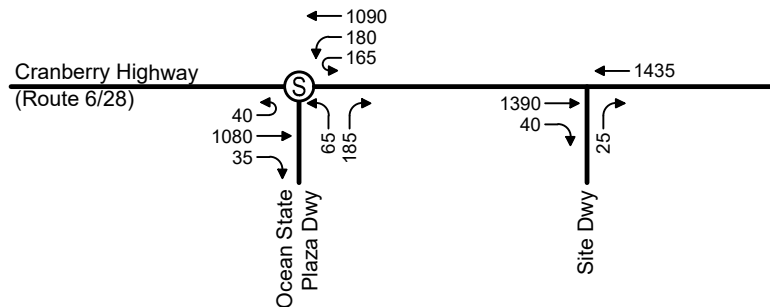
**Figure 7**  
Trip Generation

Proposed Car Wash  
Wareham, Massachusetts

Weekday Evening Peak Hour  
 Neg = Negligible  
 (S) Signalized Intersection



Saturday Midday Peak Hour  
 Neg = Negligible  
 (S) Signalized Intersection



↑ Not to Scale



**Figure 8**  
 2028 Build Conditions Traffic Volumes

Proposed Car Wash  
 Wareham, Massachusetts



## Traffic Operations Analysis

To assess quality of flow, intersection capacity analyses were conducted with respect to 2021 Existing, 2028 No-Build, and 2028 Build traffic volume conditions. Capacity analyses provide an indication of how well the roadway facilities serve the traffic demands placed upon them. Roadway operating conditions are classified by calculated levels-of-service.

### Level of Service Criteria

The evaluation criteria used to analyze area intersections in this traffic study are based on the percentile delay method for signalized intersections and the Highway Capacity Manual (HCM), 6th Edition<sup>3</sup> for unsignalized intersections. The term 'Level of Service' (LOS) is used to denote the different operating conditions that occur on a given roadway segment under various traffic volume loads. It is a qualitative measure that considers a number of factors including roadway geometry, speed, travel delay and freedom to maneuver. LOS provides an index to the operational qualities of a roadway segment or an intersection. LOS designations range from A to F, with LOS A representing the best operating conditions and LOS F representing the worst operating conditions.

In addition to LOS, two other measures of effectiveness (MOEs) are typically used to quantify the traffic operations at intersections; volume-to-capacity ratio (v/c) and delay (expressed in seconds per vehicle). For example, an existing v/c ratio of 0.90 for an intersection indicates that the intersection is operating at 90-percent of its available capacity. A delay of 15 seconds for a particular vehicular movement or approach indicates that vehicles on the movement or approach will experience an average additional travel time of 15 seconds. For a given LOS letter designation there may be a wide range of values for both v/c ratios and delay. Comparison of intersection capacity results therefore requires that, in addition to the LOS, the other MOEs should also be considered.

The LOS designations, which are based on delay, are reported differently for signalized and unsignalized intersections. For signalized intersections, the analysis considers the operation of all traffic entering the intersection and the LOS designation is for overall conditions at the intersection. For unsignalized intersections, however, the analysis assumes that traffic on the mainline is not affected by traffic on the side streets. Thus, the LOS designation is for the critical movement exiting the side street, which is generally the left turn out of the side street or site driveway. Table 4 shows the LOS criteria for both signalized intersections and unsignalized intersections.

**Table 4 Level of Service Criteria**

<b>Level of Service</b>	<b>Delay – Signalized Intersection</b>	<b>Delay – Unsignalized Intersection</b>
A	0 to 10 seconds	0 to 10 seconds
B	10 to 20 seconds	10 to 15 seconds
C	20 to 35 seconds	15 to 25 seconds
D	35 to 55 seconds	25 to 35 seconds
E	55 to 80 seconds	35 to 50 seconds
F	Greater than 80 seconds	Greater than 50 seconds

Source: 2016 Highway Capacity Manual.

<sup>3</sup> [Highway Capacity Manual, 6th Edition, Transportation Research Board, Washington, D.C., 2016.](#)

It should be noted that the analytical methodologies typically used for the analysis of unsignalized intersections use conservative analysis parameters, such as long critical gaps<sup>4</sup>. Actual field observations indicate that drivers on minor streets generally accept shorter gaps in traffic than those used in the analysis procedures and therefore experience less delay than reported by the analysis software. The analysis methodologies also do not fully take into account the beneficial grouping effects caused by nearby signalized intersections. The net effect of these analysis procedures is the over-estimation of calculated delays at unsignalized intersections in the study area. Cautious judgment should therefore be exercised when interpreting the capacity analysis results at unsignalized intersections.

### Signalized Intersection Capacity Analysis

Capacity analyses conducted by VHB for the signalized intersection are summarized in Table 5. The capacity analyses were conducted for the 2021 Existing, 2028 No-Build and 2028 Build conditions and the detailed results are included in the Attachments.

**Table 5 Signalized Intersection Capacity Analysis**

Location / Movement	2021 Existing Conditions					2028 No-Build Conditions					2028 Build Conditions				
	v/c <sup>a</sup>	Del <sup>b</sup>	LOS <sup>c</sup>	50 Q <sup>d</sup>	95 Q <sup>e</sup>	v/c	Del	LOS	50 Q	95 Q	v/c	Del	LOS	50 Q	95 Q
<b>Cranberry Highway (Route 6/28) at Ocean State Plaza Driveway</b>															
<i>Weekday Evening</i>															
EB U	n/a	n/a	n/a	n/a	n/a	0.10	34	C	7	m11	0.10	35	D	7	m11
EB T/R	0.39	14	B	95	270	0.47	16	B	177	175	0.50	15	B	167	172
WB U/L	0.24	4	A	13	29	0.80	55	D	172	247	0.83	56	E	189	273
WB T	0.33	4	A	68	110	0.34	4	A	50	155	0.34	4	A	57	158
NB L	0.21	44	D	20	47	0.26	48	D	21	49	0.42	52	D	37	75
NB R	0.37	19	B	40	85	0.58	17	B	0	56	0.55	16	B	0	55
<b>Overall</b>		<b>10</b>	<b>A</b>				<b>16</b>	<b>B</b>				<b>17</b>	<b>B</b>		
<i>Saturday Midday</i>															
EB U	n/a	n/a	n/a	n/a	n/a	0.35	35	D	23	m37	0.35	36	D	25	m36
EB T/R	0.52	18	B	270	234	0.59	24	C	304	258	0.63	24	C	285	266
WB U/L	0.49	8	A	29	48	0.85	58	E	206	#309	0.88	60	E	220	#359
WB T	0.40	5	A	113	143	0.42	6	A	132	218	0.43	7	A	141	227
NB L	0.22	41	D	27	57	0.31	48	D	27	58	0.45	51	D	43	84
NB R	0.48	28	C	95	139	0.66	18	B	4	68	0.66	20	C	15	81
<b>Overall</b>		<b>13</b>	<b>B</b>				<b>21</b>	<b>C</b>				<b>23</b>	<b>C</b>		

- a Volume to capacity ratio.
- b Average total delay, in seconds per vehicle.
- c Level-of-service.
- d 50th percentile queue, in feet.
- e 95th percentile queue, in feet.
- m Volume for 95<sup>th</sup> percentile queue is metered by upstream signal.
- # 95th percentile volume exceeds capacity, queue may be longer.

As shown in Table 5, the overall LOS at the signalized study area intersection is expected to degrade by one letter in both peak hours between 2021 Existing and 2028 No-Build conditions due to the addition of eastbound and westbound u-turn movements necessitated by a new median on Cranberry Highway (Route 6/28). The intersection degrades from LOS A to B while overall delay increases from 10 to 16 seconds in the weekday evening peak hour, and degrades from LOS B to C while overall delay increases from 13 to 21 seconds in the Saturday midday peak hour. The

<sup>4</sup> 'Critical gap' is defined as the minimum time, in seconds, between successive major-stream vehicles, 0.64 in which a minor-street vehicle can make a maneuver. 0.90

LOS remains the same and delay increases by just one to two seconds between 2028 No-Build and 2028 Build conditions during the peak hours, demonstrating that the project has only minor impacts and the intersection will continue to operate sufficiently.

### Unsignalized Intersection Capacity Analysis

Capacity analyses conducted by VHB for the unsignalized intersection are summarized in Table 6. The capacity analyses were conducted for the 2028 Build conditions and the detailed results are included in the Attachments. 2021 Existing and 2028 No-Build conditions were not analyzed as the Site is currently vacant.

**Table 6 Unsignalized Intersection Capacity Analysis**

Location / Movement	2028 Build Conditions				
	D	v/c	Del	LOS	95 Q
<b>Cranberry Highway (Route 6/28) at Site Driveway</b>					
<i>Weekday Evening</i>					
NB R	25	0.06	14	B	5
<i>Saturday Midday</i>					
NB R	25	0.08	16	C	8

- a Demand
- b Volume to capacity ratio.
- c Average total delay, in seconds per vehicle.
- d Level-of-service.
- e 95th percentile queue, in feet.

As shown in Table 6, the unsignalized right-in, right-out site driveway is expected to operate at LOS C or better during both peak hours. In the peak hours, the average delay is expected to be 14-16 seconds while the 95<sup>th</sup> percentile queue is expected to be less than one vehicle long.

As previously noted, the analytical methodologies typically used for the analysis of unsignalized intersections use conservative analysis parameters and typically result in the over-estimation of calculated delays.

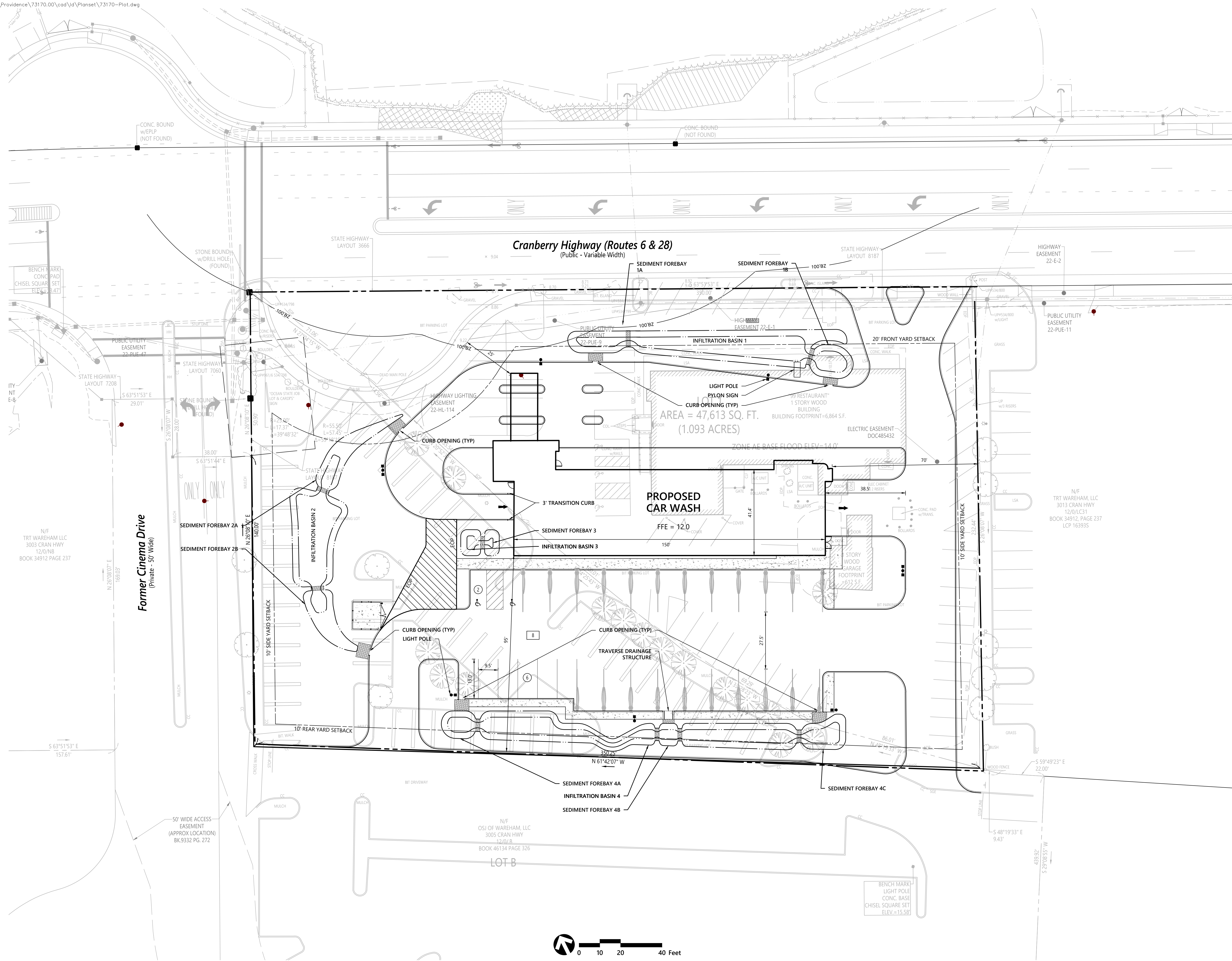
### Conclusion

VHB has conducted a traffic impact and access study to assess the potential traffic impacts associated with the proposed car wash located on Cranberry Highway (Route 6/28) in Wareham, Massachusetts. The proposed development involves the construction of an automatic car wash with one wash tunnel. The Site will be accessed via a right-in, right-out driveway located on Cranberry Highway (Route 6/28) as well as the Ocean State plaza driveway. The Project is expected to generate a total of 100 new vehicle trips (50 entering/50 exiting) during the peak hours. Based on the intersection capacity analysis, it was determined that the Project will have minimal impact on intersection operations at the signalized study area intersection, and the Site driveway will operate with little delay and negligible queues. In addition, while the proposed site layout should be able to accommodate the anticipated queues, the Proponent will implement standard queue management procedures to ensure that no vehicle queues extend back onto Cranberry Highway (Route 6/28).

# Attachments

- Site Plan
- May 2021 Traffic Count Data
- Historic Traffic Count Data
- Historic Traffic Count Data Adjustments
  - › MassDOT Guidance on Traffic Count Data
  - › MassDOT Weekday Seasonal Correction Factors
  - › MassDOT Yearly Growth Rates
- Count Comparisons
- Crash Data
- Background Growth Rate
- Cranberry Highway (Route 6/28) Reconstruction Project Traffic Volumes
- Cranberry Highway (Route 6/28) Reconstruction Project Signal Plans
- ITE Trip Generation
- Synchro Capacity Analyses





**Reign Car Wash,  
Wareham**  
3013 Cranberry Highway  
East Wareham, Massachusetts

No.	Revision	Date	Appr.

Designed by: \_\_\_\_\_ Checked by: \_\_\_\_\_  
 Issued for: \_\_\_\_\_ Date: \_\_\_\_\_  
**Permits** June 28, 2021

Not Approved for Construction  
Drawing Title  
**Layout and  
Materials Plan**  
Drawing Number

**C2.01**

Sheet of  
2 of 6

Project Number  
73170.00



Client: Matthew J. Kealey, PE, PTOE  
 Project #: 713\_099\_VHB  
 BTD #: Location 1  
 Location: Wareham, MA  
 Street 1: Route 6  
 Street 2: Home Depot Access Road  
 Count Date: 5/20/2021  
 Day of Week: Thursday  
 Weather: Clouds & Sun, 70°F

# BOSTON TRAFFIC DATA

PO BOX 1723, Framingham, MA 01701  
 Office: 978-746-1259  
 DataRequest@BostonTrafficData.com  
 www.BostonTrafficData.com

## PASSENGER CARS & HEAVY VEHICLES COMBINED

Start Time	Cranberry Plaza Shopping Mall Drive Northbound				Home Depot Access Road Southbound				Route 6 Eastbound				Route 6 Westbound			
	U-Turn	Left	Thru	Right	U-Turn	Left	Thru	Right	U-Turn	Left	Thru	Right	U-Turn	Left	Thru	Right
4:00 PM	0	55	6	9	0	31	5	33	0	34	181	26	0	8	203	9
4:15 PM	0	61	8	10	0	23	6	35	0	25	156	22	0	12	217	4
4:30 PM	0	66	5	12	0	31	7	23	0	32	161	27	0	7	166	8
4:45 PM	0	58	3	11	0	26	12	26	0	31	149	33	0	11	153	5
5:00 PM	0	58	4	20	0	20	10	23	0	26	184	27	0	5	191	7
5:15 PM	0	56	7	8	0	27	6	25	0	26	180	24	0	10	168	3
5:30 PM	0	45	8	16	0	26	5	19	0	25	179	28	0	10	179	5
5:45 PM	0	55	2	9	0	21	9	30	0	25	164	33	0	7	159	7

PM PEAK HOUR 4:00 PM to 5:00 PM	Cranberry Plaza Shopping Mall Drive Northbound				Home Depot Access Road Southbound				Route 6 Eastbound				Route 6 Westbound			
	U-Turn	Left	Thru	Right	U-Turn	Left	Thru	Right	U-Turn	Left	Thru	Right	U-Turn	Left	Thru	Right
	<b>0</b>	<b>240</b>	<b>22</b>	<b>42</b>	<b>0</b>	<b>111</b>	<b>30</b>	<b>117</b>	<b>0</b>	<b>122</b>	<b>647</b>	<b>108</b>	<b>0</b>	<b>38</b>	<b>739</b>	<b>26</b>
<b>PHF</b>	<b>0.92</b>				<b>0.93</b>				<b>0.91</b>				<b>0.86</b>			
<b>HV %</b>	<b>0.0%</b>	<b>0.4%</b>	<b>0.0%</b>	<b>0.0%</b>	<b>0.0%</b>	<b>0.0%</b>	<b>0.0%</b>	<b>1.7%</b>	<b>0.0%</b>	<b>0.0%</b>	<b>0.8%</b>	<b>0.0%</b>	<b>0.0%</b>	<b>5.3%</b>	<b>1.6%</b>	<b>0.0%</b>



Client: Matthew J. Kealey, PE, PTOE  
 Project #: 713\_099\_VHB  
 BTD #: Location 1  
 Location: Wareham, MA  
 Street 1: Route 6  
 Street 2: Home Depot Access Road  
 Count Date: 5/20/2021  
 Day of Week: Thursday  
 Weather: Clouds & Sun, 70°F

# BOSTON TRAFFIC DATA

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 Office: 978-746-1259  
 DataRequest@BostonTrafficData.com  
 www.BostonTrafficData.com

## HEAVY VEHICLES

Start Time	Cranberry Plaza Shopping Mall Drive Northbound				Home Depot Access Road Southbound				Route 6 Eastbound			Route 6 Westbound				
	U-Turn	Left	Thru	Right	U-Turn	Left	Thru	Right	U-Turn	Left	Thru	Right	U-Turn	Left	Thru	Right
4:00 PM	0	0	0	0	0	0	0	0	0	0	2	0	0	0	4	0
4:15 PM	0	0	0	0	0	0	0	1	0	0	1	0	0	0	1	0
4:30 PM	0	1	0	0	0	0	0	1	0	0	1	0	0	1	2	0
4:45 PM	0	0	0	0	0	0	0	0	0	0	1	0	0	1	5	0
5:00 PM	0	0	0	0	0	0	0	0	0	0	2	0	0	0	5	1
5:15 PM	0	2	0	0	0	0	0	0	0	0	2	0	0	0	2	0
5:30 PM	0	0	0	0	0	0	0	0	0	1	0	0	0	0	2	0
5:45 PM	0	1	0	0	0	0	0	1	0	0	3	0	0	1	1	0

PM PEAK HOUR 4:30 PM to 5:30 PM <i>PHF</i>	Cranberry Plaza Shopping Mall Drive Northbound				Home Depot Access Road Southbound				Route 6 Eastbound			Route 6 Westbound				
	U-Turn	Left	Thru	Right	U-Turn	Left	Thru	Right	U-Turn	Left	Thru	Right	U-Turn	Left	Thru	Right
	<b>0</b>	<b>3</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>1</b>	<b>0</b>	<b>0</b>	<b>6</b>	<b>0</b>	<b>0</b>	<b>2</b>	<b>14</b>	<b>1</b>
	<b>0.38</b>				<b>0.25</b>				<b>0.75</b>			<b>0.71</b>				

Client: Matthew J. Kealey, PE, PTOE  
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## PEDESTRIANS & BICYCLES

Start Time	Cranberry Plaza Shopping Mall Drive Northbound				Home Depot Access Road Southbound				Route 6 Eastbound				Route 6 Westbound			
	Left	Thru	Right	PED	Left	Thru	Right	PED	Left	Thru	Right	PED	Left	Thru	Right	PED
4:00 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
4:15 PM	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0
4:30 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
4:45 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
5:00 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
5:15 PM	0	0	0	1	0	0	0	1	0	0	0	0	0	0	0	0
5:30 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
5:45 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0

PM PEAK HOUR <sup>1</sup> 4:00 PM to 5:00 PM	Cranberry Plaza Shopping Mall Drive Northbound				Home Depot Access Road Southbound				Route 6 Eastbound				Route 6 Westbound			
	Left	Thru	Right	PED	Left	Thru	Right	PED	Left	Thru	Right	PED	Left	Thru	Right	PED
	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0

<sup>1</sup> NOTE: Peak hour summaries here correspond to peak hours identified for passenger cars and heavy vehicles combined.

Client: Matthew J. Kealey, PE, PTOE  
 Project #: 713\_099\_VHB  
 BTD #: Location 2  
 Location: Wareham, MA  
 Street 1: Route 6  
 Street 2: Ocean State Access Driveway  
 Count Date: 5/20/2021  
 Day of Week: Thursday  
 Weather: Clouds & Sun, 70°F

# BOSTON TRAFFIC DATA

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 Office: 978-746-1259  
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## PASSENGER CARS & HEAVY VEHICLES COMBINED

Start Time	Ocean State Access Driveway Northbound				Southbound				Route 6 Eastbound				Route 6 Westbound			
	U-Turn	Left	Thru	Right	U-Turn	Left	Thru	Right	U-Turn	Left	Thru	Right	U-Turn	Left	Thru	Right
4:00 PM	0	4	0	30	0	0	0	0	0	0	222	4	0	30	215	0
4:15 PM	0	8	0	37	0	0	0	0	0	0	184	3	0	23	233	0
4:30 PM	0	6	0	31	0	0	0	0	0	0	204	3	0	26	190	0
4:45 PM	0	10	0	31	0	0	0	0	0	0	185	3	0	21	187	0
5:00 PM	0	8	0	30	0	0	0	0	0	0	205	3	0	29	189	0
5:15 PM	0	2	0	40	0	0	0	0	0	0	233	3	0	30	184	0
5:30 PM	0	3	0	33	0	0	0	0	0	0	212	1	0	32	191	0
5:45 PM	0	8	0	22	0	0	0	0	0	0	195	2	0	25	165	0

PM PEAK HOUR 4:00 PM to 5:00 PM	Ocean State Access Driveway Northbound				Southbound				Route 6 Eastbound				Route 6 Westbound			
	U-Turn	Left	Thru	Right	U-Turn	Left	Thru	Right	U-Turn	Left	Thru	Right	U-Turn	Left	Thru	Right
	<b>0</b>	<b>28</b>	<b>0</b>	<b>129</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>795</b>	<b>13</b>	<b>0</b>	<b>100</b>	<b>825</b>	<b>0</b>
<b>PHF</b>	<b>0.87</b>				<b>0.00</b>				<b>0.89</b>				<b>0.90</b>			
<b>HV %</b>	<b>0.0%</b>	<b>3.6%</b>	<b>0.0%</b>	<b>1.6%</b>	<b>0.0%</b>	<b>0.0%</b>	<b>0.0%</b>	<b>0.0%</b>	<b>0.0%</b>	<b>0.0%</b>	<b>0.8%</b>	<b>0.0%</b>	<b>0.0%</b>	<b>2.0%</b>	<b>1.7%</b>	<b>0.0%</b>

Client: Matthew J. Kealey, PE, PTOE  
 Project #: 713\_099\_VHB  
 BTD #: Location 2  
 Location: Wareham, MA  
 Street 1: Route 6  
 Street 2: Ocean State Access Driveway  
 Count Date: 5/20/2021  
 Day of Week: Thursday  
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## HEAVY VEHICLES

Start Time	Ocean State Access Driveway Northbound				Southbound				Route 6 Eastbound				Route 6 Westbound			
	U-Turn	Left	Thru	Right	U-Turn	Left	Thru	Right	U-Turn	Left	Thru	Right	U-Turn	Left	Thru	Right
4:00 PM	0	0	0	0	0	0	0	0	0	0	3	0	0	0	3	0
4:15 PM	0	0	0	0	0	0	0	0	0	0	1	0	0	1	2	0
4:30 PM	0	0	0	2	0	0	0	0	0	0	1	0	0	0	3	0
4:45 PM	0	1	0	0	0	0	0	0	0	0	1	0	0	1	6	0
5:00 PM	0	1	0	0	0	0	0	0	0	0	1	0	0	0	5	0
5:15 PM	0	0	0	1	0	0	0	0	0	0	3	0	0	1	2	0
5:30 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2	0
5:45 PM	0	0	0	0	0	0	0	0	0	0	3	0	0	0	2	0

PM PEAK HOUR 4:30 PM to 5:30 PM <i>PHF</i>	Ocean State Access Driveway Northbound				Southbound				Route 6 Eastbound				Route 6 Westbound			
	U-Turn	Left	Thru	Right	U-Turn	Left	Thru	Right	U-Turn	Left	Thru	Right	U-Turn	Left	Thru	Right
	<b>0</b>	<b>2</b>	<b>0</b>	<b>3</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>6</b>	<b>0</b>	<b>0</b>	<b>2</b>	<b>16</b>	<b>0</b>
	<b>0.63</b>				<b>0.00</b>				<b>0.50</b>				<b>0.64</b>			

Client: Matthew J. Kealey, PE, PTOE  
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Office: 978-746-1259

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## PEDESTRIANS & BICYCLES

Start Time	Ocean State Access Driveway Northbound				Southbound				Route 6 Eastbound				Route 6 Westbound			
	Left	Thru	Right	PED	Left	Thru	Right	PED	Left	Thru	Right	PED	Left	Thru	Right	PED
4:00 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
4:15 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
4:30 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
4:45 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
5:00 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
5:15 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
5:30 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
5:45 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0

PM PEAK HOUR <sup>1</sup> 4:00 PM to 5:00 PM	Ocean State Access Driveway Northbound				Southbound				Route 6 Eastbound				Route 6 Westbound			
	Left	Thru	Right	PED	Left	Thru	Right	PED	Left	Thru	Right	PED	Left	Thru	Right	PED
	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0

<sup>1</sup> NOTE: Peak hour summaries here correspond to peak hours identified for passenger cars and heavy vehicles combined.

Client: Matthew J. Kealey, PE, PTOE  
 Project #: 713\_099\_VHB  
 BTD #: Location 2  
 Location: Wareham, MA  
 Street 1: Route 6  
 Street 2: Ocean State Access Driveway  
 Count Date: 5/22/2021  
 Day of Week: Saturday  
 Weather: Clouds & Sun, 70°F

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## PASSENGER CARS & HEAVY VEHICLES COMBINED

Start Time	Ocean State Access Driveway Northbound				Southbound				Route 6 Eastbound				Route 6 Westbound			
	U-Turn	Left	Thru	Right	U-Turn	Left	Thru	Right	U-Turn	Left	Thru	Right	U-Turn	Left	Thru	Right
11:00 AM	0	11	0	45	0	0	0	0	0	0	208	11	0	46	226	0
11:15 AM	0	12	0	41	0	0	0	0	0	0	227	7	0	40	232	0
11:30 AM	0	8	0	50	0	0	0	0	0	0	239	13	0	49	216	0
11:45 AM	0	7	0	59	0	0	0	0	0	0	243	8	0	39	213	0
12:00 PM	0	6	0	43	0	0	0	0	0	0	237	10	0	37	240	0
12:15 PM	0	12	0	54	0	0	0	0	0	0	260	5	0	39	245	0
12:30 PM	0	12	0	55	0	0	0	0	0	0	220	9	0	58	254	0
12:45 PM	0	8	0	34	0	0	0	0	0	0	275	8	0	40	276	0

MID PEAK HOUR 12:00 PM to 1:00 PM	Ocean State Access Driveway Northbound				Southbound				Route 6 Eastbound				Route 6 Westbound			
	U-Turn	Left	Thru	Right	U-Turn	Left	Thru	Right	U-Turn	Left	Thru	Right	U-Turn	Left	Thru	Right
	<b>0</b>	<b>38</b>	<b>0</b>	<b>186</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>992</b>	<b>32</b>	<b>0</b>	<b>174</b>	<b>1015</b>	<b>0</b>
<i>PHF</i>	<b>0.84</b>				<b>0.00</b>				<b>0.90</b>				<b>0.94</b>			
<i>HV %</i>	<b>0.0%</b>	<b>2.6%</b>	<b>0.0%</b>	<b>1.1%</b>	<b>0.0%</b>	<b>0.0%</b>	<b>0.0%</b>	<b>0.0%</b>	<b>0.0%</b>	<b>0.0%</b>	<b>0.3%</b>	<b>0.0%</b>	<b>0.0%</b>	<b>0.6%</b>	<b>0.7%</b>	<b>0.0%</b>

Client: Matthew J. Kealey, PE, PTOE  
 Project #: 713\_099\_VHB  
 BTD #: Location 2  
 Location: Wareham, MA  
 Street 1: Route 6  
 Street 2: Ocean State Access Driveway  
 Count Date: 5/22/2021  
 Day of Week: Saturday  
 Weather: Clouds & Sun, 70°F



**HEAVY VEHICLES**

Start Time	Ocean State Access Driveway Northbound				Southbound				Route 6 Eastbound				Route 6 Westbound			
	U-Turn	Left	Thru	Right	U-Turn	Left	Thru	Right	U-Turn	Left	Thru	Right	U-Turn	Left	Thru	Right
11:00 AM	0	0	0	1	0	0	0	0	0	0	2	0	0	1	0	0
11:15 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1	0
11:30 AM	0	0	0	1	0	0	0	0	0	0	0	0	0	0	1	0
11:45 AM	0	1	0	0	0	0	0	0	0	0	1	0	0	0	1	0
12:00 PM	0	0	0	0	0	0	0	0	0	0	1	0	0	1	1	0
12:15 PM	0	1	0	0	0	0	0	0	0	0	0	0	0	0	5	0
12:30 PM	0	0	0	2	0	0	0	0	0	0	1	0	0	0	0	0
12:45 PM	0	0	0	0	0	0	0	0	0	0	1	0	0	0	1	0

MID PEAK HOUR 11:45 AM to 12:45 PM <i>PHF</i>	Ocean State Access Driveway Northbound				Southbound				Route 6 Eastbound				Route 6 Westbound			
	U-Turn	Left	Thru	Right	U-Turn	Left	Thru	Right	U-Turn	Left	Thru	Right	U-Turn	Left	Thru	Right
	<b>0</b>	<b>2</b>	<b>0</b>	<b>2</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>3</b>	<b>0</b>	<b>0</b>	<b>1</b>	<b>7</b>	<b>0</b>
	<b>0.50</b>				<b>0.00</b>				<b>0.75</b>				<b>0.40</b>			

Client: Matthew J. Kealey, PE, PTOE  
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# BOSTON TRAFFIC DATA

PO BOX 1723, Framingham, MA 01701  
 Office: 978-746-1259  
 DataRequest@BostonTrafficData.com  
 www.BostonTrafficData.com

## PEDESTRIANS & BICYCLES

Start Time	Ocean State Access Driveway Northbound				Southbound				Route 6 Eastbound				Route 6 Westbound			
	Left	Thru	Right	PED	Left	Thru	Right	PED	Left	Thru	Right	PED	Left	Thru	Right	PED
11:00 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
11:15 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
11:30 AM	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0
11:45 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
12:00 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
12:15 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
12:30 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
12:45 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0

MID PEAK HOUR 12:00 PM to 1:00 PM	Ocean State Access Driveway Northbound				Southbound				Route 6 Eastbound				Route 6 Westbound			
	Left	Thru	Right	PED	Left	Thru	Right	PED	Left	Thru	Right	PED	Left	Thru	Right	PED
	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0

NOTE: Peak hour summaries here correspond to peak hours identified for passenger car and heavy vehicles combined.



# Volume Report

**Job** 713\_099\_VHB\_ATR 1  
**Area** Wareham, MA  
**Location** Route 6 EB, west of Main Avenue

# BOSTON TRAFFIC DATA

PO BOX 1723, Framingham, MA 01701  
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**Thursday, May 20, 2021**

Time	Total	EB				Time	Total	EB					
0000	10	10		0		1200	192	192		0			
0015	7	7		0		1215	199	199		0			
0030	7	7		0		1230	206	206		0			
0045	3	27	3	27	0	0	1245	209	806	209	806	0	0
0100	5		5		0		1300	206		206		0	
0115	6		6		0		1315	202		202		0	
0130	6		6		0		1330	199		199		0	
0145	5	22	5	22	0	0	1345	197	804	197	804	0	0
0200	3		3		0		1400	199		199		0	
0215	3		3		0		1415	213		213		0	
0230	6		6		0		1430	214		214		0	
0245	3	15	3	15	0	0	1445	238	864	238	864	0	0
0300	2		2		0		1500	181		181		0	
0315	1		1		0		1515	226		226		0	
0330	4		4		0		1530	243		243		0	
0345	4	11	4	11	0	0	1545	236	886	236	886	0	0
0400	6		6		0		1600	239		239		0	
0415	5		5		0		1615	211		211		0	
0430	8		8		0		1630	208		208		0	
0445	24	43	24	43	0	0	1645	218	876	218	876	0	0
0500	17		17		0		1700	230		230		0	
0515	36		36		0		1715	230		230		0	
0530	49		49		0		1730	221		221		0	
0545	70	172	70	172	0	0	1745	217	898	217	898	0	0
0600	83		83		0		1800	204		204		0	
0615	119		119		0		1815	198		198		0	
0630	135		135		0		1830	163		163		0	
0645	149	486	149	486	0	0	1845	165	730	165	730	0	0
0700	128		128		0		1900	163		163		0	
0715	133		133		0		1915	122		122		0	
0730	161		161		0		1930	136		136		0	
0745	172	594	172	594	0	0	1945	119	540	119	540	0	0
0800	162		162		0		2000	128		128		0	
0815	183		183		0		2015	120		120		0	
0830	172		172		0		2030	91		91		0	
0845	166	683	166	683	0	0	2045	115	454	115	454	0	0
0900	161		161		0		2100	64		64		0	
0915	175		175		0		2115	70		70		0	
0930	201		201		0		2130	54		54		0	
0945	206	743	206	743	0	0	2145	54	242	54	242	0	0
1000	190		190		0		2200	31		31		0	
1015	191		191		0		2215	36		36		0	
1030	198		198		0		2230	24		24		0	
1045	141	720	141	720	0	0	2245	29	120	29	120	0	0
1100	197		197		0		2300	23		23		0	
1115	194		194		0		2315	20		20		0	
1130	179		179		0		2330	23		23		0	
1145	235	805	235	805	0	0	2345	13	79	13	79	0	0
<b>Total</b>	<b>11620</b>	<b>11620</b>	<b>11620</b>	<b>11620</b>	<b>0</b>	<b>0</b>	<b>11620</b>	<b>11620</b>	<b>11620</b>	<b>11620</b>	<b>11620</b>	<b>0</b>	<b>0</b>

# Volume Report

**Job** 713\_099\_VHB\_ATR 2  
**Area** Wareham, MA  
**Location** Route 6 WB, west of Main Avenue

# BOSTON TRAFFIC DATA

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**Thursday, May 20, 2021**

Time	Total	WB				Time	Total	WB					
0000	10	10		0		1200	198	198		0			
0015	11	11		0		1215	189	189		0			
0030	6	6		0		1230	182	182		0			
0045	5	32	5	32	0	0	1245	198	767	198	767	0	0
0100	5	5		0		1300	228	228		0			
0115	4	4		0		1315	217	217		0			
0130	5	5		0		1330	179	179		0			
0145	5	19	5	19	0	0	1345	228	852	228	852	0	0
0200	0	0		0		1400	225	225		0			
0215	3	3		0		1415	212	212		0			
0230	4	4		0		1430	199	199		0			
0245	3	10	3	10	0	0	1445	187	823	187	823	0	0
0300	5	5		0		1500	202	202		0			
0315	2	2		0		1515	229	229		0			
0330	8	8		0		1530	232	232		0			
0345	8	23	8	23	0	0	1545	236	899	236	899	0	0
0400	13	13		0		1600	230	230		0			
0415	15	15		0		1615	244	244		0			
0430	18	18		0		1630	214	214		0			
0445	48	94	48	94	0	0	1645	192	880	192	880	0	0
0500	33	33		0		1700	222	222		0			
0515	51	51		0		1715	204	204		0			
0530	51	51		0		1730	209	209		0			
0545	75	210	75	210	0	0	1745	164	799	164	799	0	0
0600	68	68		0		1800	173	173		0			
0615	98	98		0		1815	199	199		0			
0630	141	141		0		1830	161	161		0			
0645	119	426	119	426	0	0	1845	164	697	164	697	0	0
0700	135	135		0		1900	148	148		0			
0715	145	145		0		1915	133	133		0			
0730	147	147		0		1930	123	123		0			
0745	144	571	144	571	0	0	1945	134	538	134	538	0	0
0800	151	151		0		2000	118	118		0			
0815	160	160		0		2015	117	117		0			
0830	175	175		0		2030	116	116		0			
0845	189	675	189	675	0	0	2045	93	444	93	444	0	0
0900	161	161		0		2100	64	64		0			
0915	182	182		0		2115	67	67		0			
0930	186	186		0		2130	64	64		0			
0945	171	700	171	700	0	0	2145	45	240	45	240	0	0
1000	169	169		0		2200	39	39		0			
1015	198	198		0		2215	43	43		0			
1030	181	181		0		2230	34	34		0			
1045	173	721	173	721	0	0	2245	29	145	29	145	0	0
1100	235	235		0		2300	23	23		0			
1115	170	170		0		2315	7	7		0			
1130	213	213		0		2330	16	16		0			
1145	206	824	206	824	0	0	2345	18	64	18	64	0	0
<b>Total</b>	<b>11453</b>	<b>11453</b>	<b>11453</b>	<b>11453</b>	<b>0</b>	<b>0</b>	<b>11453</b>	<b>11453</b>	<b>11453</b>	<b>11453</b>	<b>11453</b>	<b>0</b>	<b>0</b>

# Classification Report

**Job #** 713\_099\_VHB\_ATR 1  
**Area** Wareham, MA  
**Location** Route 6 EB, west of Main Avenue  
**Direction** Eastbound  
**Thursday, May 20, 2021**



Time	Total	Class 1 Motorcycle	Class 2 Passenger Car	Class 3 Vans, Pick up Trucks	Class 4 Bus	Class 5 2 Axle 6 Tires	Class 6 3 Axle Unit	Class 7 4 Axles or more Unit	Class 8 3 or 4 Axle Trailer	Class 9 5 Axle Trailer	Class 10 6 Axle or more Trailer	Class 11 5 Axle or less Multi-Trailer	Class 12 6 Axle Multi-Trailer	Class 13 7 Axle or more Multi-Trailer
0000	27	0	19	6	2	0	0	0	0	0	0	0	0	0
0100	22	0	20	2	0	0	0	0	0	0	0	0	0	0
0200	15	0	14	1	0	0	0	0	0	0	0	0	0	0
0300	11	0	9	0	0	1	0	0	0	1	0	0	0	0
0400	43	0	33	9	1	0	0	0	0	0	0	0	0	0
0500	172	0	127	43	0	1	0	0	0	1	0	0	0	0
0600	486	2	356	112	2	4	3	3	3	1	0	0	0	0
0700	594	2	447	129	7	3	4	2	0	0	0	0	0	0
0800	683	7	525	137	5	2	5	1	0	1	0	0	0	0
0900	743	3	575	142	6	9	7	0	0	0	0	0	0	1
1000	720	8	593	111	2	5	1	0	0	0	0	0	0	0
1100	805	6	659	122	5	5	2	4	0	1	0	0	0	1
1200	806	6	673	112	1	8	4	1	0	1	0	0	0	0
1300	804	11	670	110	1	7	4	0	0	0	0	0	0	1
1400	864	4	710	139	1	7	2	1	0	0	0	0	0	0
1500	886	10	711	147	2	6	2	4	1	2	0	0	0	1
1600	876	7	718	139	2	3	0	6	1	0	0	0	0	0
1700	898	5	736	142	1	2	0	6	4	0	0	1	0	1
1800	730	1	619	95	2	1	2	4	2	0	1	1	0	2
1900	540	5	445	80	1	3	0	3	1	0	0	0	0	2
2000	454	5	374	67	1	3	1	2	1	0	0	0	0	0
2100	242	1	198	40	1	1	0	1	0	0	0	0	0	0
2200	120	0	98	21	0	1	0	0	0	0	0	0	0	0
2300	79	0	71	8	0	0	0	0	0	0	0	0	0	0
<b>Total</b>	<b>11620</b>	<b>83</b>	<b>9400</b>	<b>1914</b>	<b>43</b>	<b>72</b>	<b>37</b>	<b>38</b>	<b>13</b>	<b>8</b>	<b>1</b>	<b>2</b>	<b>0</b>	<b>9</b>
	100.00%	0.71%	80.90%	16.47%	0.37%	0.62%	0.32%	0.33%	0.11%	0.07%	0.01%	0.02%	0.00%	0.08%

# Classification Report

**Job #** 713\_099\_VHB\_ATR 2  
**Area** Wareham, MA  
**Location** Route 6 WB, west of Main Avenue  
**Direction** Westbound  
**Thursday, May 20, 2021**



Time	Total	Class 1 Motorcycle	Class 2 Passenger Car	Class 3 Vans, Pick up Trucks	Class 4 Bus	Class 5 2 Axle 6 Tires	Class 6 3 Axle Unit	Class 7 4 Axles or more Unit	Class 8 3 or 4 Axle Trailer	Class 9 5 Axle Trailer	Class 10 6 Axle or more Trailer	Class 11 5 Axle or less Multi-Trailer	Class 12 6 Axle Multi-Trailer	Class 13 7 Axle or more Multi-Trailer
0000	32	0	29	3	0	0	0	0	0	0	0	0	0	0
0100	19	0	14	4	0	0	0	0	0	1	0	0	0	0
0200	10	0	9	0	0	0	1	0	0	0	0	0	0	0
0300	23	1	20	1	0	1	0	0	0	0	0	0	0	0
0400	94	2	66	24	0	2	0	0	0	0	0	0	0	0
0500	210	1	146	58	1	3	0	0	0	1	0	0	0	0
0600	426	3	333	85	1	2	0	2	0	0	0	0	0	0
0700	571	0	470	92	5	3	0	0	0	1	0	0	0	0
0800	675	1	561	97	3	7	3	0	0	3	0	0	0	0
0900	700	3	578	110	3	3	2	1	0	0	0	0	0	0
1000	721	4	608	98	1	3	3	3	0	1	0	0	0	0
1100	824	7	704	93	5	5	3	5	0	1	0	0	0	1
1200	767	6	660	85	6	4	2	1	0	2	0	0	0	1
1300	852	7	724	102	4	9	4	2	0	0	0	0	0	0
1400	823	7	684	118	0	9	4	1	0	0	0	0	0	0
1500	899	5	739	134	6	1	3	1	3	1	2	1	0	3
1600	880	4	735	116	3	5	2	7	3	0	1	0	0	4
1700	799	5	675	105	3	3	1	5	2	0	0	0	0	0
1800	697	6	585	90	0	3	4	5	0	1	0	0	0	3
1900	538	5	449	76	0	0	1	1	4	1	0	0	0	1
2000	444	1	376	59	1	4	2	1	0	0	0	0	0	0
2100	240	0	207	28	0	1	1	1	1	1	0	0	0	0
2200	145	1	129	15	0	0	0	0	0	0	0	0	0	0
2300	64	1	55	8	0	0	0	0	0	0	0	0	0	0
<b>Total</b>	<b>11453</b>	<b>70</b>	<b>9556</b>	<b>1601</b>	<b>42</b>	<b>68</b>	<b>36</b>	<b>36</b>	<b>13</b>	<b>14</b>	<b>3</b>	<b>1</b>	<b>0</b>	<b>13</b>
	100.00%	0.61%	83.44%	13.98%	0.37%	0.59%	0.31%	0.31%	0.11%	0.12%	0.03%	0.01%	0.00%	0.11%

# Speed Report

Job 713\_099\_VHB\_ATR 1  
 Area Wareham, MA  
 Location Route 6 EB, west of Main Avenue  
 Dir Eastbound  
**Thursday, May 20, 2021**

**BOSTON**  
**TRAFFIC DATA**  
 PO BOX 1723, Framingham, MA 01701  
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Time	Total	Speed Bins (mph)															
		0-5	5-10	10-15	15-20	20-25	25-30	30-35	35-40	40-45	45-50	50-55	55-60	60-65	65-70	70-75	75-80
0000	27	0	0	0	0	0	2	12	10	3	0	0	0	0	0	0	0
0100	22	0	0	0	0	0	2	6	7	5	1	0	1	0	0	0	0
0200	15	0	0	0	0	0	2	5	6	1	1	0	0	0	0	0	0
0300	11	0	0	0	0	0	2	2	5	1	1	0	0	0	0	0	0
0400	43	0	0	2	3	4	2	10	12	7	3	0	0	0	0	0	0
0500	172	0	0	5	18	9	12	30	60	36	2	0	0	0	0	0	0
0600	486	0	3	12	25	21	51	80	163	101	25	4	1	0	0	0	0
0700	594	0	1	13	137	293	137	12	1	0	0	0	0	0	0	0	0
0800	683	1	0	18	166	389	101	8	0	0	0	0	0	0	0	0	0
0900	743	0	5	22	180	439	94	3	0	0	0	0	0	0	0	0	0
1000	720	0	1	9	170	422	111	6	1	0	0	0	0	0	0	0	0
1100	805	1	5	62	167	484	84	2	0	0	0	0	0	0	0	0	0
1200	806	0	2	9	91	447	228	29	0	0	0	0	0	0	0	0	0
1300	804	1	0	10	77	483	217	15	1	0	0	0	0	0	0	0	0
1400	864	0	2	10	88	434	254	60	9	6	1	0	0	0	0	0	0
1500	886	0	0	1	14	30	158	315	280	68	17	3	0	0	0	0	0
1600	876	0	0	0	17	23	86	295	287	139	23	5	1	0	0	0	0
1700	898	0	0	1	13	18	105	264	303	156	36	2	0	0	0	0	0
1800	730	0	0	0	7	13	65	210	287	112	31	5	0	0	0	0	0
1900	540	0	0	1	8	18	58	168	176	91	18	1	1	0	0	0	0
2000	454	0	0	0	3	8	54	167	160	52	8	1	1	0	0	0	0
2100	242	0	0	0	0	3	23	80	87	33	14	2	0	0	0	0	0
2200	120	0	0	1	1	6	4	26	48	27	4	2	1	0	0	0	0
2300	79	0	0	0	1	0	4	19	34	18	2	1	0	0	0	0	0
<b>Total</b>	<b>11620</b>	<b>3</b>	<b>19</b>	<b>176</b>	<b>1186</b>	<b>3544</b>	<b>1856</b>	<b>1824</b>	<b>1937</b>	<b>856</b>	<b>187</b>	<b>26</b>	<b>6</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>

100.00% 0.03% 0.16% 1.51% 10.21% 30.50% 15.97% 15.70% 16.67% 7.37% 1.61% 0.22% 0.05% 0.00% 0.00% 0.00% 0.00%

Maximum = 59.6 mph, Minimum = 3.8 mph, Mean = 28.6 mph  
 85% Speed = 38.03 mph, 95% Speed = 42.17 mph, Median = 26.79 mph  
 10 mph Pace = 19 - 29, Number in Pace = 5575 (47.98%)  
 Variance = 64.11, Standard Deviation = 8.01 mph

# Speed Report

Job 713\_099\_VHB\_ATR 2  
 Area Wareham, MA  
 Location Route 6 WB, west of Main Avenue  
 Dir Westbound  
**Thursday, May 20, 2021**

**BOSTON**  
**TRAFFIC DATA**  
PO BOX 1723, Framingham, MA 01701  
 Office: 978-746-1259  
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Time	Total	Speed Bins (mph)															
		0 5	5 10	10 15	15 20	20 25	25 30	30 35	35 40	40 45	45 50	50 55	55 60	60 65	65 70	70 75	75 80
0000	32	0	0	0	0	4	4	15	5	4	0	0	0	0	0	0	
0100	19	0	0	0	0	0	1	6	5	5	2	0	0	0	0	0	
0200	10	0	0	0	0	0	0	1	6	2	1	0	0	0	0	0	
0300	23	0	0	0	0	1	2	9	8	3	0	0	0	0	0	0	
0400	94	0	1	1	9	3	3	28	36	12	1	0	0	0	0	0	
0500	210	0	0	22	9	3	12	39	79	40	6	0	0	0	0	0	
0600	426	0	1	20	24	15	31	101	152	69	13	0	0	0	0	0	
0700	571	0	6	55	99	165	166	73	7	0	0	0	0	0	0	0	
0800	675	0	2	57	127	236	206	45	2	0	0	0	0	0	0	0	
0900	700	0	19	83	147	232	192	24	3	0	0	0	0	0	0	0	
1000	721	0	11	93	139	257	189	29	3	0	0	0	0	0	0	0	
1100	824	1	26	167	268	220	125	17	0	0	0	0	0	0	0	0	
1200	767	0	8	41	138	319	209	44	8	0	0	0	0	0	0	0	
1300	852	0	7	77	184	312	212	55	5	0	0	0	0	0	0	0	
1400	823	0	10	98	352	207	74	44	27	10	0	1	0	0	0	0	
1500	899	0	0	7	10	24	86	307	324	120	19	2	0	0	0	0	
1600	880	0	1	13	9	26	83	308	315	106	18	0	1	0	0	0	
1700	799	0	0	7	10	20	67	285	299	98	12	1	0	0	0	0	
1800	697	0	0	12	8	19	68	242	244	78	20	4	2	0	0	0	
1900	538	0	0	9	10	6	57	181	181	80	11	3	0	0	0	0	
2000	444	0	0	3	5	6	22	140	143	80	37	6	2	0	0	0	
2100	240	0	0	7	3	2	19	53	84	58	12	1	1	0	0	0	
2200	145	0	0	3	0	1	12	38	60	25	5	1	0	0	0	0	
2300	64	0	0	0	0	0	2	17	27	16	2	0	0	0	0	0	
<b>Total</b>	<b>11453</b>	<b>1</b>	<b>92</b>	<b>775</b>	<b>1551</b>	<b>2078</b>	<b>1842</b>	<b>2101</b>	<b>2023</b>	<b>806</b>	<b>159</b>	<b>19</b>	<b>6</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>

100.00%
0.01%
0.80%
6.77%
13.54%
18.14%
16.08%
18.34%
17.66%
7.04%
1.39%
0.17%
0.05%
0.00%
0.00%
0.00%
0.00%

Maximum = 57.0 mph, Minimum = 4.9 mph, Mean = 28.1 mph  
 85% Speed = 37.92 mph, 95% Speed = 41.83 mph, Median = 28.24 mph  
 10 mph Pace = 29 - 39, Number in Pace = 4183 (36.56%)  
 Variance = 80.56, Standard Deviation = 8.98 mph

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## Historic Traffic Count Data

From MassDOT MS2 Transportation Data Management System

Peak Hour Data for Intersection

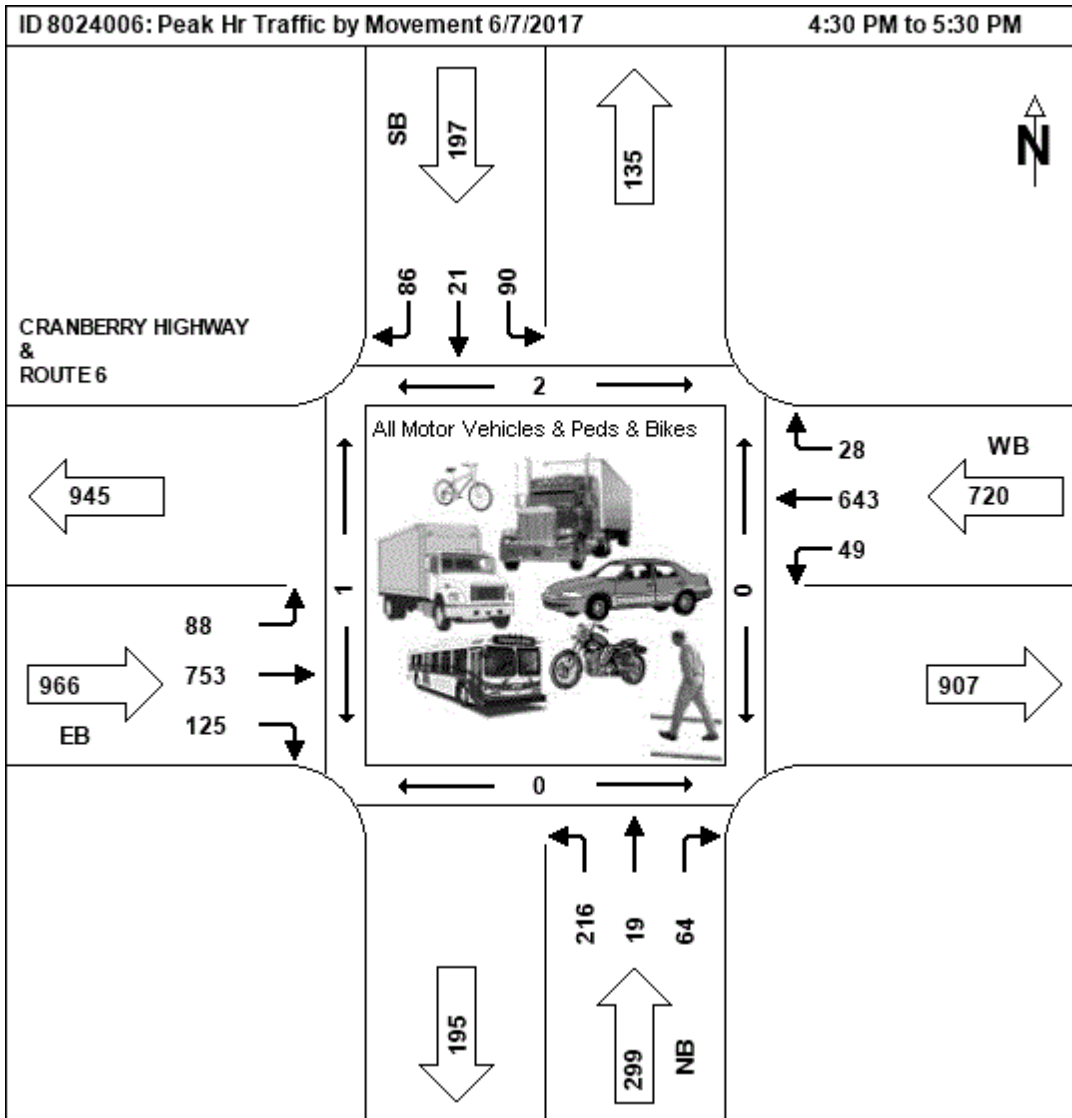
Int ID: 8024006  
 Community: WAREHAM  
 Road 1: CRANBERRY HIGHWAY  
 Road 2: ROUTE 6

Corridor:  
 Road 3:  
 Road 4:

PM Peak Hour  
 06/07/2017

Start Time	NB				App Total	EB				App Total	SB				App Total	WB				App Total	Int Total
	Left	Thru	Right	Ped		Left	Thru	Right	Ped		Left	Thru	Right	Ped		Left	Thru	Right	Ped		
4:30 PM	58	8	15	0	81	30	168	31	0	229	16	7	18	0	41	10	140	13	1	163	514
4:45 PM	54	4	17	0	75	17	196	30	0	243	29	5	19	0	53	13	189	6	0	208	579
5:00 PM	61	2	19	0	82	21	173	25	0	219	20	6	24	0	50	12	152	6	0	170	521
5:15 PM	43	5	13	0	61	20	216	39	0	275	25	3	25	1	53	14	162	3	1	179	568
Total	216	19	64	0	299	88	753	125	0	966	90	21	86	1	197	49	643	28	2	720	2182
PHF	0.89	0.59	0.84		0.91	0.73	0.87	0.80		0.88	0.78	0.75	0.86		0.93	0.88	0.85	0.54		0.87	
HV %	0	0	0		0	0	0	0		0	0	0	0		0	0	0	0		0	

- Cars  Trucks  Pedestrians  Bikes





**Volume By Hour By Week for 4/8/2018 - 4/14/2018**  
**Criteria: From 1/1/1900 To 12/31/2049 12:00:00 AM**

District : **Location ID :** S18-010-310-02 **County :** PLYMOUTH **Factor Group :** U4-7  
**Located On :** ROUTE 6/28 **Functional Class :** (5) Major Collector **Area Type :** Urban

YEAR	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	
AA DT																					21455

Start Time	Monday	Tuesday	Wednesday	Thursday	Avg	Avg Volume Graph	Pct. of Total
	4/9/2018	4/10/2018	4/11/2018	4/12/2018			
12:00 AM		99	94	92	95		0.4%
1:00 AM		54	55	61	57		0.3%
2:00 AM		40	45	41	42		0.2%
3:00 AM		63	49	43	52		0.2%
4:00 AM		144	128	118	130		0.6%
5:00 AM		328	285	315	309		1.4%
6:00 AM		858	865	845	856		3.8%
7:00 AM		1234	1312	1309	1,285		5.7%
8:00 AM		1277	1408	1496	1,394		6.2%
9:00 AM		1245	1288	1352	1,295		5.7%
10:00 AM		1284	1385	1390	1,353		6.0%
11:00 AM		1422	1521	1513	1,485		6.6%
12:00 PM		1469	1628	1648	1,582		7.0%
1:00 PM		1494	1615	1696	1,602		7.1%
2:00 PM	1695	1567	1648		1,637		7.3%
3:00 PM	1788	1641	1816		1,748		7.7%
4:00 PM	1767	1839	1757		1,788		7.9%
5:00 PM	1758	1696	1724		1,726		7.7%
6:00 PM	1398	1358	1417		1,391		6.2%
7:00 PM	1046	945	1117		1,036		4.6%
8:00 PM	700	690	829		740		3.3%
9:00 PM	444	480	529		484		2.1%
10:00 PM	302	284	316		301		1.3%
11:00 PM	168	155	199		174		0.8%
<b>Total</b>	<b>11066</b>	<b>21666</b>	<b>23030</b>	<b>11919</b>	<b>Avg</b>		
AM Pk Hr		11:00 AM	11:00 AM	11:00 AM			
AM Peak		1422	1521	1513	1485		
PM Pk Hr		4:00 PM	3:00 PM				
PM Peak		1839	1816		1828		
Peak %		8.49%	7.89%		8.19%		

**Volume By Hour By Week for 4/8/2018 - 4/14/2018**  
**Criteria: From 1/1/1900 To 12/31/2049 12:00:00 AM**

<b>Count Start:</b>	<b>14:00:00</b>	<b>14:00:00</b>	<b>14:00:00</b>
<b>Start</b>	<b>4/9/2018</b>	<b>4/10/2018</b>	<b>4/11/2018</b>
<b>End</b>	<b>4/10/2018</b>	<b>4/11/2018</b>	<b>4/12/2018</b>
<b>24h Total</b>	22077	22333	23271

**Volume By Hour By Week for 4/8/2018 - 4/14/2018**  
**Criteria: From 1/1/1900 To 12/31/2049 12:00:00 AM**

District : Location ID : S18-010-310-02\_EB County : PLYMOUTH Factor Group : U4-7  
 Located On : ROUTE 6/28 Functional Class : (5) Major Collector Area Type : Urban

YEAR	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	
AADT																					10906

Start Time	Monday	Tuesday	Wednesday	Thursday	Avg	Avg Volume Graph	Pct. of Total
	4/9/2018	4/10/2018	4/11/2018	4/12/2018			
12:00 AM		57	58	57	57		0.5%
1:00 AM		24	30	29	28		0.2%
2:00 AM		22	24	11	19		0.2%
3:00 AM		26	17	24	22		0.2%
4:00 AM		43	44	38	42		0.4%
5:00 AM		136	113	115	121		1.1%
6:00 AM		371	390	372	378		3.3%
7:00 AM		555	577	562	565		4.9%
8:00 AM		566	694	790	683		6.0%
9:00 AM		571	596	653	607		5.3%
10:00 AM		620	667	683	657		5.7%
11:00 AM		719	737	713	723		6.3%
12:00 PM		756	812	832	800		7.0%
1:00 PM		757	779	819	785		6.9%
2:00 PM	874	796	850		840		7.3%
3:00 PM	966	878	952		932		8.1%
4:00 PM	936	1028	953		972		8.5%
5:00 PM	948	926	920		931		8.1%
6:00 PM	766	772	784		774		6.8%
7:00 PM	579	510	617		569		5.0%
8:00 PM	382	388	487		419		3.7%
9:00 PM	231	270	273		258		2.3%
10:00 PM	184	174	177		178		1.6%
11:00 PM	88	88	109		95		0.8%
<b>Total</b>	<b>5954</b>	<b>11053</b>	<b>11660</b>	<b>5698</b>	<b>Avg</b>		
AM Pk Hr		11:00 AM	11:00 AM	8:00 AM			
AM Peak		719	737	790	749		
PM Pk Hr		4:00 PM	4:00 PM				
PM Peak		1028	953		991		
Peak %		9.30%	8.17%		8.74%		

**Volume By Hour By Week for 4/8/2018 - 4/14/2018**  
**Criteria: From 1/1/1900 To 12/31/2049 12:00:00 AM**

<b>Count Start:</b>	<b>14:00:00</b>	<b>14:00:00</b>	<b>14:00:00</b>
<b>Start</b>	<b>4/9/2018</b>	<b>4/10/2018</b>	<b>4/11/2018</b>
<b>End</b>	<b>4/10/2018</b>	<b>4/11/2018</b>	<b>4/12/2018</b>
<b>24h Total</b>	11177	11368	11820

**Volume By Hour By Week for 4/8/2018 - 4/14/2018**  
**Criteria: From 1/1/1900 To 12/31/2049 12:00:00 AM**

District : **Location ID :** S18-010-310-02\_WB **County :** PLYMOUTH **Factor Group :** U4-7  
**Located On :** ROUTE 6/28 **Functional Class :** (5) Major Collector **Area Type :** Urban

YEAR	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	
AADT																					10549

Start Time	Monday	Tuesday	Wednesday	Thursday	Avg	Avg Volume Graph	Pct. of Total
	4/9/2018	4/10/2018	4/11/2018	4/12/2018			
12:00 AM		42	36	35	38		0.3%
1:00 AM		30	25	32	29		0.3%
2:00 AM		18	21	30	23		0.2%
3:00 AM		37	32	19	29		0.3%
4:00 AM		101	84	80	88		0.8%
5:00 AM		192	172	200	188		1.7%
6:00 AM		487	475	473	478		4.3%
7:00 AM		679	735	747	720		6.5%
8:00 AM		711	714	706	710		6.4%
9:00 AM		674	692	699	688		6.2%
10:00 AM		664	718	707	696		6.3%
11:00 AM		703	784	800	762		6.9%
12:00 PM		713	816	816	782		7.0%
1:00 PM		737	836	877	817		7.4%
2:00 PM	821	771	798		797		7.2%
3:00 PM	822	763	864		816		7.4%
4:00 PM	831	811	804		815		7.3%
5:00 PM	810	770	804		795		7.2%
6:00 PM	632	586	633		617		5.6%
7:00 PM	467	435	500		467		4.2%
8:00 PM	318	302	342		321		2.9%
9:00 PM	213	210	256		226		2.0%
10:00 PM	118	110	139		122		1.1%
11:00 PM	80	67	90		79		0.7%
<b>Total</b>	<b>5112</b>	<b>10613</b>	<b>11370</b>	<b>6221</b>	<b>Avg</b>		
AM Pk Hr		8:00 AM	11:00 AM	11:00 AM			
AM Peak		711	784	800	765		
PM Pk Hr		4:00 PM	3:00 PM				
PM Peak		811	864		838		
Peak %		7.64%	7.60%		7.62%		

**Volume By Hour By Week for 4/8/2018 - 4/14/2018**  
**Criteria: From 1/1/1900 To 12/31/2049 12:00:00 AM**

<b>Count Start:</b>	<b>14:00:00</b>	<b>14:00:00</b>	<b>14:00:00</b>
<b>Start</b>	<b>4/9/2018</b>	<b>4/10/2018</b>	<b>4/11/2018</b>
<b>End</b>	<b>4/10/2018</b>	<b>4/11/2018</b>	<b>4/12/2018</b>
<b>24h Total</b>	10900	10965	11451

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## Historic Traffic Count Data Adjustments

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# GUIDANCE ON TRAFFIC COUNT DATA

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Revised: April, 2020





## Introduction

Traffic counts are currently at historic lows and may underrepresent a realistic existing condition. Current MassDOT guidelines, however, require the use of existing count data for the purposes of planning and designing projects. The purpose of this document is to provide guidance for alternative methods that may be used to supplement or replace existing traffic count data.

## Use of Historical Counts

MassDOT will accept the use of historical count data in lieu of new traffic counts taken after March 13, 2020. As long as the procedures found in this document are followed, counts taken between January 1, 2014 and March 13, 2020 will be accepted without any additional approval required. Counts taken prior to January 1, 2014 will need to be approved by the State Traffic Engineer prior to submitting the functional design report or other traffic engineering study.

## How MassDOT Determines Growth Rates

MassDOT oversees approximately 500 permanent counting stations across the Commonwealth that are constantly taking volume data. In addition, MassDOT supplements these permanent count stations with spot counts taken at various locations. All of the count data is geolocated and, when processed, has the following metadata tagged to it:

- Geographic Area Type
  - U = Urban
  - R = Rural
- Functional Class
  - 1 = Interstate
  - 2 = Freeways & Expressways
  - 3 = Other Principal Arterial
  - 4 = Minor Arterial
  - 5 = Major Collector
  - 6 = Minor Collector
  - 7 = Local Road or Street
- Region
  - Boston = Middlesex, Suffolk, and Norfolk Counties
  - Essex = Essex County
  - \*Southeast = Bristol, Plymouth, Barnstable, Nantucket, and Dukes Counties
  - \*West = Berkshire, Franklin, Hampshire, and Hampden Counties
  - Worcester = Worcester County

This combination of Geographic Area Type, Functional Class, and Region is referred to as Factor Group. Based upon the aggregated count data for each Factor Group, MassDOT establishes day of week, monthly, yearly, and axle correction adjustment factors. These factors are published into reports that can be used to determine historical growth rates.

\*Note that beginning in 2016, MassDOT has further refined some of the Factor Groups for portions of the Commonwealth that experience significant seasonal fluctuations in traffic. These Factor Groups supersede Geographic Area Type, Functional Class, and Region and may be applied to



counts taken in 2016 or later anywhere within their boundaries. These Factor Groups are defined as:

- REC East: all towns on Cape Cod, the Town of Plymouth south of Route 3A, all towns on Martha's Vineyard, and Nantucket.
- REC West: roadways with a Functional Class of 3-5 in the towns of Becket, Great Barrington, Lee, Lenox, Stockbridge, and West Stockbridge.

## Procedures for Estimating Average Annual Daily Traffic (AADT)

To estimate existing AADT from an historical count, the count location should be classified by Geographic Area Type, Functional Class, and Region per the descriptions from the previous section. Once the classification has been completed, the following steps are required.

### 1. Axle Correction

**(Please note this step is required only if the original count did not include vehicle classification data, typically a single pneumatic tube. If classification data has been included, please proceed directly to Step 2.)**

- Identify the year the count was taken.
- Open the Weekday Seasonal Axle Correction file for the year that corresponds to the raw count data.
- Multiply the average daily traffic (ADT) taken from the raw count data by the Axle Factor for the corresponding Factor Group.

### 2. Seasonal Factor

- Identify the month and year the count was taken.
- Open the Weekday Seasonal Axle Correction file for the year that corresponds to the raw count data.
- Multiply the number obtained in Step 1 (or the raw count data if it contains vehicle classification data) by the Monthly Factor for the corresponding Factor Group.

### 3. Yearly Growth

- Identify the year the count was taken.
- Open the Yearly Growth Rate file. Note that MassDOT considers 2019 data to be existing.
- The Growth Factors are set up to factor count data to the year shown in the header column from the previous year. Therefore, using the appropriate Factor Group, multiply the number obtained in Step 2 by the growth factor for the year after it was taken. Repeat the factoring until it is grown to 2019.
  - A count taken in 2018 will only need the 2019 factor applied to it.
  - A count taken in 2015 will need to go through four steps of factoring: the 2016 factor, then the 2017 factor, then the 2018 factor, and finally the 2019 factor.

Once these steps have been completed, the existing AADT may be estimated.



## Procedures for Estimating Turning Movement Counts (TMCs)

In cases where historic TMCs are available for an intersection, those volumes may be adjusted based upon these procedures in order to estimate existing traffic volumes.

### 1. Seasonal Factor

- Identify the day, month, and year the count was taken.
- Open the Seasonal Factors Report file for the corresponding year.
- Using the appropriate Factor Group, identify the Seasonal Factor by month and day. If that number is equal to or less than 1, then no Seasonal Factor needs to be applied. If that number is greater than one then the TMC should be multiplied by that number.

### 2. Yearly Growth

- Using the seasonally factored count data, follow the steps found in Part 3 of Procedures for Estimating AADT.

If no historic TMC can be obtained, consultation with MassDOT's Traffic and Safety Engineering Section is strongly encouraged prior to estimating existing volumes. Failure to do so may result in rejection of the submittal to MassDOT.

## Non-Motorized Users

MassDOT does not currently have any methodologies for estimating non-motorized users from historical count data. Based upon mode share and employment data, it can be assumed that non-motorized volumes have increased on a yearly basis. However, without access to data from permanent count stations, it is difficult to provide any type of regional growth or seasonal factors compared to what is available for motorized traffic.

Capturing bicycle and pedestrian data in 2020 in areas that are typically designed to accommodate peaked volumes that are associated with commuting may not be realistic. However, there are many third-party sensor and/or probe data aggregators that may provide good baseline information from 2019. This data is acceptable for use in design and operational analysis.

For recreational facilities, taking new bicycle and pedestrian counts after March 13, 2020 will likely be acceptable, though any adjacent generators of bicycle and pedestrian traffic that are temporarily closed should be taken into consideration prior to taking new counts. Comparing historic third-party sensor or probe data to 2020 data may add additional confidence and, in addition, provide practical future growth rates.

## Future Growth Rates

MassDOT recommends that 2019 counts be grown to the build year using growth rates obtained from the Regional Planning Agency (RPA), if available. If specific, known future traffic generators are identified, they may be added to the count either in addition to the growth rate or while partially discounting the growth rate. In all cases, the methodology used for growing the traffic to the build year shall be documented and shall conform to planning and engineering principles.



## Traffic Signal Warrant Analysis

Traffic Signal Warrants may be estimated using historic TMC count data that is factored to 2019 using the methodology presented in this document. It is understood that many TMCs will not have 8 hours of data, so it will be acceptable to use Warrant 2 (Four-Hour Vehicular Volume) in place of the typical Warrant 1 (Eight-Hour Vehicular Volume) that MassDOT typically recommends as justification. Warrant 3 (Peak Hour) alone is still not recommended as justification for installation of a traffic signal unless very unusual circumstances exist, per MUTCD standards.

Where no TMCs exist, Traffic Signal Warrants may be estimated using third-party sensor or probe data, estimates based upon ATRs, or combinations thereof, upon authorization from the State Traffic Engineer. The methodology for estimating TMCs shall be presented to MassDOT as part of any request for approval.

Massachusetts Highway Department  
Statewide Traffic Data Collection  
2017 Weekday Seasonal Factors

Factor Group	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC	Axle Factor
R1	1.30	1.23	1.21	1.04	0.98	0.92	0.86	0.81	0.95	0.99	1.03	1.10	0.80
R2	0.95	0.96	0.98	0.97	0.97	0.93	0.97	0.94	0.96	0.90	0.92	0.93	0.96
R3	1.05	1.01	1.04	0.99	0.94	0.93	0.91	0.92	0.96	0.94	1.01	1.03	0.97
R4-R7	1.10	1.07	1.09	1.00	0.95	0.89	0.88	0.87	0.92	0.95	1.04	1.09	0.93
U1-Boston	1.01	1.04	0.99	0.94	0.93	0.92	0.96	0.93	0.94	0.93	0.95	0.98	0.95
U1-Essex	1.04	1.05	1.00	0.96	0.93	0.89	0.90	0.90	0.93	0.93	0.98	1.03	0.90
U1-Southeast	1.07	1.05	1.02	0.97	0.95	0.90	0.89	0.88	0.92	0.94	0.98	1.01	0.97
U1-West	1.00	0.96	0.94	0.92	0.93	0.92	0.95	0.93	0.92	0.92	0.97	0.97	0.89
U1-Worcester	1.10	1.10	1.04	0.97	0.95	0.94	0.93	0.91	0.95	0.96	0.98	1.04	0.89
U2	1.01	1.03	0.98	0.95	0.93	0.91	0.94	0.92	0.95	0.95	0.95	0.97	0.98
U3	1.03	1.05	1.01	0.95	0.92	0.90	0.94	0.93	0.93	0.92	0.96	0.99	0.96
U4-U7	1.06	1.05	1.02	0.96	0.92	0.89	0.95	0.95	0.92	0.92	0.98	1.03	0.98
Rec - East	1.18	1.17	1.08	1.03	0.95	0.87	0.83	0.83	0.97	0.98	1.19	1.19	0.98
Rec - West	1.30	1.23	1.32	1.18	0.95	0.82	0.70	0.69	0.97	0.96	1.16	1.15	0.95

Round off:

0-999 = 10

>1000 = 100

U = Urban

R = Rural

1 - Interstate

2 - Freeway and Expressway

3 - Other Principal Arterial

4 - Minor Arterial

5 - Major Collector

6 - Minor Collector

7 - Local Road and Street

<p><b>Recreational - East Group</b> - Cape Cod (all towns) including the town of Plymouth south of Route 3A (stations 7014,7079,7080,7090,7091,7092,7093,7094,7095,7096,7097,7108 and 7178), Martha's Vineyard and Nantucket.</p>
<p><b>Recreational - West Group</b> - Continuous Stations 2 and 189 including stations 1066,1067,1083,1084,1085,1086,1087,1088,1089,1090,1091,1092,1093,1094,1095,1096,1097,1098,1099,1100,1101,1102,1103,1104,1105,1106,1107,1108,1113,1114,1116,2196,2197 and 2198.</p>

Massachusetts Highway Department  
 Statewide Traffic Data Collection  
 2018 Weekday Seasonal Factors

Factor Group	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC	Axle Factor
R1	1.37	1.26	1.30	1.08	0.97	0.93	0.87	0.83	0.96	0.98	1.05	1.13	0.78
R2	0.95	0.96	0.98	0.97	0.97	0.93	0.97	0.94	0.96	0.90	0.92	0.93	0.96
R3	1.15	1.06	1.07	1.00	0.89	0.88	0.89	0.89	0.95	0.92	1.02	1.01	0.98
R4-R7	1.10	1.07	1.03	1.00	0.90	0.92	0.94	0.94	0.96	0.94	1.03	1.02	0.93
U1-Boston	1.05	0.98	1.01	0.93	0.92	0.91	0.95	0.93	0.94	0.92	0.96	0.99	0.96
U1-Essex	1.05	1.01	1.04	0.93	0.92	0.89	0.90	0.90	0.94	0.93	0.98	1.01	0.91
U1-Southeast	1.11	1.05	1.07	0.99	0.93	0.89	0.88	0.87	0.93	0.95	1.01	1.05	0.98
U1-West	1.15	1.08	1.07	0.98	0.94	0.92	0.92	0.88	0.92	0.91	1.00	1.06	0.83
U1-Worcester	1.18	1.11	1.09	0.99	0.95	0.94	0.95	0.91	0.97	0.97	1.01	1.05	0.87
U2	1.04	0.99	0.99	0.94	0.92	0.90	0.93	0.91	0.94	0.92	0.96	0.98	0.99
U3	0.99	1.00	1.02	0.96	0.91	0.89	0.92	0.90	0.95	0.92	1.01	0.97	0.97
U4-U7	1.03	1.02	0.97	0.95	0.88	0.89	0.96	0.93	0.94	0.93	1.00	1.00	0.99
Rec - East	1.22	1.15	1.09	1.12	0.90	0.89	0.82	0.83	0.92	0.98	1.06	1.08	0.99
Rec - West	1.30	1.23	1.32	1.18	0.95	0.82	0.70	0.69	0.97	0.96	1.16	1.15	0.97

Round off:

0-999 = 10

>1000 = 100

U = Urban

R = Rural

1 - Interstate

2 - Freeway and Expressway

3 - Other Principal Arterial

4 - Minor Arterial

5 - Major Collector

6 - Minor Collector

7 - Local Road and Street

**Recreational - East Group** - Cape Cod (all towns) including the town of Plymouth south of Route 3A (stations 7014,7079,7080,7090,7091,7092,7093,7094,7095,7096,7097,7108 and 7178), Martha's Vineyard and Nantucket.

**Recreational - West Group** - Continuous Stations 2 and 189 including stations 1066,1067,1083,1084,1085,1086,1087,1088,1089,1090,1091,1092,1093,1094,1095,1096,1097,1098,1099,1100,1101,1102,1103,1104,1105,1106,1107,1108,1113,1114,1116,2196,2197 and 2198.

Massachusetts Highway Department  
Statewide Traffic Data Collection  
2019 Weekday Seasonal Factors

Factor Group	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC	Axle Factor
R1	1.22	1.14	1.12	1.06	1.00	0.96	0.87	0.85	0.96	0.99	1.04	1.12	0.85
R2	0.95	0.96	0.98	0.97	0.97	0.93	0.97	0.94	0.96	0.90	0.92	0.93	0.96
R3	1.15	1.06	1.07	1.00	0.89	0.88	0.89	0.89	0.95	0.92	1.02	1.01	0.97
R4-R7	1.09	1.09	1.11	1.02	0.96	0.92	0.89	0.89	0.99	0.98	1.09	1.13	0.98
U1-Boston	1.03	1.01	0.98	0.94	0.94	0.92	0.95	0.93	0.94	0.94	0.97	1.04	0.96
U1-Essex	1.09	1.06	1.03	0.99	0.94	0.90	0.88	0.86	0.93	0.94	0.99	1.06	0.93
U1-Southeast	1.06	1.05	1.01	0.97	0.95	0.93	0.93	0.90	0.94	0.94	0.98	1.04	0.98
U1-West	1.19	1.14	1.09	0.95	0.92	0.89	0.89	0.86	0.91	0.95	0.97	1.07	0.84
U1-Worcester	1.02	1.04	0.97	0.94	0.93	0.91	0.95	0.91	0.93	0.92	0.95	1.10	0.88
U2	1.01	1.00	0.94	0.93	0.91	0.89	0.93	0.90	0.90	0.91	0.94	1.02	0.99
U3	1.06	1.03	0.98	0.94	0.93	0.91	0.95	0.91	0.92	0.93	0.97	1.00	0.98
U4-U7	1.01	1.00	0.95	0.92	0.88	0.86	0.92	0.91	0.92	0.94	0.99	1.04	0.99
Rec - East	1.04	1.16	1.12	0.98	0.92	0.88	0.77	0.81	0.94	1.02	1.08	1.12	0.99
Rec - West	1.30	1.23	1.32	1.18	0.95	0.82	0.70	0.69	0.97	0.96	1.16	1.15	0.98

Round off:

0-999 = 10

>1000 = 100

U = Urban

R = Rural

1 - Interstate

2 - Freeway and Expressway

3 - Other Principal Arterial

4 - Minor Arterial

5 - Major Collector

6 - Minor Collector

7 - Local Road and Street

**Recreational - East Group** - Cape Cod (all towns) including the town of Plymouth south of Route 3A (stations 7014,7079,7080,7090,7091,7092,7093,7094,7095,7096,7097,7108 and 7178), Martha's Vineyard and Nantucket.

**Recreational - West Group** - Continuous Stations 2 and 189 including stations 1066,1067,1083,1084,1085,1086,1087,1088,1089,1090,1091,1092,1093,1094,1095,1096,1097,1098,1099,1100,1101,1102,1103,1104,1105,1106,1107,1108,1113,1114,1116,2196,2197 and 2198.

# MassDOT Yearly Growth Rates

for data from 2014 to 2018

Growth					
Group	Grow 2014 to 2015	Grow 2015 to 2016	Grow 2016 to 2017	Grow 2017 to 2018	Grow 2018 to 2019
R1	0	0.023	0.004	0.018	0.016
R2	0.05	0.068	0.004	0.014	0.014
R3	-0.038	0.002	0.008	0.011	0.06
R4-7	-0.01	0.003	0.001	0.011	0.012
Rec - East		0.032	0.02	0.041	0.025
Rec - West		0.051	-0.008	0.029	0
U1-Boston	0.061	0.07	-0.003	0.012	0.006
U1-Essex	0.024	0.025	0.007	0.014	0.011
U1-Southeast	0.05	0.062	0.021	0.014	0
U1-West	0.03	-0.027	0.02	0.028	0.013
U1-Worcester	0.042	0.005	0.018	0.01	0.01
U2	0.04	0.048	0.008	0.01	0.02
U3	0.011	0.013	0.011	0.014	0.004
U4-7	0.023	0.062	0.017	0.003	-0.004

updated 5/1/2020





### TMC COMPARISON

Project Name: Wareham Car Wash  
 Project No: 73170.00  
 Location: Wareham, MA  
 Date: June 2021  
 Calc. By: AD

Growth by Year	
2017 to 2018	1.003
2018 to 2019	1.000

INTERSECTION	MOVEMENT	6/7/2017	Factor Group: U4-7		5/20/2021 & 5/22/2021		DIFFERENCE FROM GROWN 2017 TO 2021	
		2017 VOLUMES - RAW	2017 VOLUMES GROWN TO EXISTING		MAY 2021 VOLUMES - RAW			
		4:30 PM WED	PM	SAT	4:00 PM THURS	12:00 PM SAT	PM	SAT
REF. ROUTE 6 AT MAIN PLAZA DWY								
Route 6	EB L	88	88		122		34	
	EB T	753	755		647		-108	
	EB R	125	125		108		-17	
Route 6	WB L	49	49		38		-11	
	WB T	643	645		739		94	
	WB R	28	28		26		-2	
Main Plaza Driveway	NB L	216	217		240		23	
	NB T	19	19		22		3	
	NB R	64	64		42		-22	
Home Depot Driveway	SB L	90	90		111		21	
	SB T	21	21		30		9	
	SB R	86	86		117		31	
		<b>2182</b>	<b>2189</b>		<b>2242</b>		<b>53</b>	

# ATR Comparison

Route 6  
west of Main Avenue

MassDOT Adjustment  
1.00

Start Time:	Tuesday			Wednesday			2018 Average			"2019" <sup>a</sup>			Thursday			Comparison		
	4/10/2018			4/11/2018									5/20/2021					
	EB	WB	Combined	EB	WB	Combined	EB	WB	Combined	EB	WB	Combined	EB	WB	Combined	EB	WB	Combined
12:00 AM	57	42	99	58	36	94	58	39	97	58	39	97	27	32	59	47%	82%	61%
1:00 AM	24	30	54	30	25	55	27	28	55	27	28	55	22	19	41	81%	69%	75%
2:00 AM	22	18	40	24	21	45	23	20	43	23	20	43	15	10	25	65%	51%	59%
3:00 AM	26	37	63	17	32	49	22	35	56	22	35	56	11	23	34	51%	67%	61%
4:00 AM	43	101	144	44	84	128	44	93	136	44	93	136	43	94	137	99%	102%	101%
5:00 AM	136	192	328	113	172	285	125	182	307	125	182	307	172	210	382	138%	115%	125%
6:00 AM	371	487	858	390	475	865	381	481	862	381	481	862	486	426	912	128%	89%	106%
7:00 AM	555	679	1234	577	735	1312	566	707	1273	566	707	1273	594	571	1165	105%	81%	92%
8:00 AM	566	711	1277	694	714	1408	630	713	1343	630	713	1343	683	675	1358	108%	95%	101%
9:00 AM	571	674	1245	596	692	1288	584	683	1267	584	683	1267	743	700	1443	127%	102%	114%
10:00 AM	620	664	1284	667	718	1385	644	691	1335	644	691	1335	720	721	1441	112%	104%	108%
11:00 AM	719	703	1422	737	784	1521	728	744	1472	728	744	1472	805	824	1629	111%	111%	111%
12:00 PM	756	713	1469	812	816	1628	784	765	1549	784	765	1549	806	767	1573	103%	100%	102%
1:00 PM	757	737	1494	779	836	1615	768	787	1555	768	787	1555	804	852	1656	105%	108%	107%
2:00 PM	796	771	1567	850	798	1648	823	785	1608	823	785	1608	864	823	1687	105%	105%	105%
3:00 PM	878	763	1641	952	864	1816	915	814	1729	915	814	1729	886	899	1785	97%	111%	103%
4:00 PM	1028	811	1839	953	804	1757	991	808	1798	991	808	1798	876	880	1756	88%	109%	98%
5:00 PM	926	770	1696	920	804	1724	923	787	1710	923	787	1710	898	799	1697	97%	102%	99%
6:00 PM	772	586	1358	784	633	1417	778	610	1388	778	610	1388	730	697	1427	94%	114%	103%
7:00 PM	510	435	945	617	500	1117	564	468	1031	564	468	1031	540	538	1078	96%	115%	105%
8:00 PM	388	302	690	487	342	829	438	322	760	438	322	760	454	444	898	104%	138%	118%
9:00 PM	270	210	480	273	256	529	272	233	505	272	233	505	242	240	482	89%	103%	96%
10:00 PM	174	110	284	177	139	316	176	125	300	176	125	300	120	145	265	68%	116%	88%
11:00 PM	88	67	155	109	90	199	99	79	177	99	79	177	79	64	143	80%	82%	81%
TOTAL	11053	10613	21666	11660	11370	23030	11357	10992	22348	11357	10992	22348	11620	11453	23073	102%	104%	103%



## INTERSECTION CRASH RATE WORKSHEET

CITY/TOWN : Wareham

COUNT DATE : May 2021

DISTRICT : 5

UNSIGNALIZED :

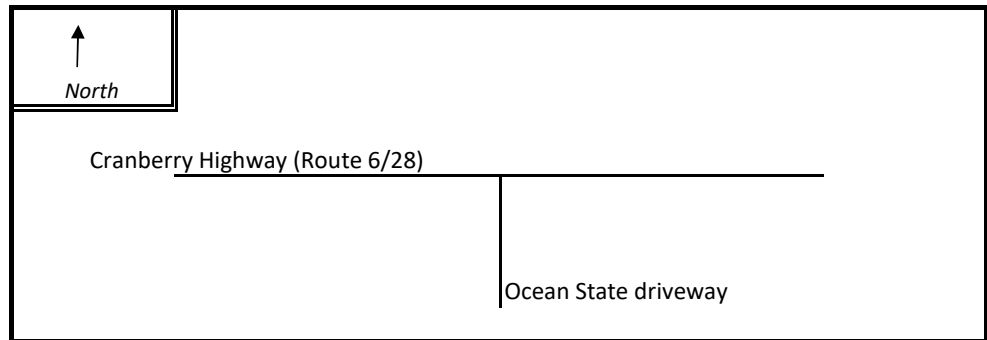
SIGNALIZED :  0.75

~ INTERSECTION DATA ~

MAJOR STREET : Cranberry Highway (Route 6/28)

MINOR STREET(S) : Ocean State Plaza Driveway

**INTERSECTION  
 DIAGRAM**  
 (Label Approaches)



**PEAK HOUR VOLUMES**

APPROACH :	1	2	3	4	5	Total Peak Hourly Approach Volume
DIRECTION :	EB	WB	NB			
PEAK HOURLY VOLUMES (AM/PM) :	810	925	160			1,895

" K " FACTOR :

INTERSECTION ADT ( V ) =  
 TOTAL DAILY APPROACH VOLUME :

TOTAL # OF CRASHES :

# OF YEARS :

AVERAGE # OF CRASHES PER YEAR ( A ) :

CRASH RATE CALCULATION :

$$\text{RATE} = \frac{(A * 1,000,000)}{(V * 365)}$$

Comments : MassDOT Crash Data (2014-2018)  
 Project Title & Date: 73170.00 Wareham Car Wash, June 2021

### Route 6 at Ocean State Plaza Driveway Crash Data 2014-2018

Crash Number	City/Town Name	Crash Date	Crash Severity	Crash Time	Max Injury Severity Reported	Number of Vehicles	Police Agency Type	Age of Driver - Youngest Known	Age of Driver - Oldest Known	Driver Contributing Circumstances (All Drivers)	Light Conditions	Manner of Collision	Non-Motorist Type (All Persons)	Road Surface Condition	Total Fatalities	Total Non-Fatal Injuries	Vehicle Actions Prior to Crash (All Vehicles)	Vehicle Configuration (All Vehicles)	Vehicle Travel Directions (All Vehicles)	Weather Conditions	Crash Report ID(s)	Most Harmful Event (All Vehicles)	Street Number	Roadway
373265	WARHAM	02/04/2014	Property damage only (none injured)	9:11 PM	No injury	2	Local police	35-34	45-54	D1: (Other improper action) / D2: (No improper driving)	Dark - roadway not lit/night	Side-swipe, opposite direction		Wet	0	0	V1: Travelling straight ahead / V2: Turning left	V1: (Passenger car) / V2: (Passenger car)	V1: S / V2: N	Clear/Unknown	14-46-AC	V1: (Collision with motor vehicle in traffic) / V2: (Collision with motor vehicle in traffic)	3011	CRANBERRY HWY
373940	WARHAM	02/05/2014	Property damage only (none injured)	11:02 AM	No injury	2	Local police	35-44	65-74	D1: (No improper driving) / D2: (Distracted)	Daylight	Angle		Wet	0	0	V1: Travelling straight ahead / V2: Backing	V1: (Passenger car) / V2: (Passenger car)	V1: W / V2: W	Clear	14-47-AC	V1: (Collision with motor vehicle in traffic) / V2: (Collision with motor vehicle in traffic)	3005	CRANBERRY HWY
373773	WARHAM	02/06/2014	Property damage only (none injured)	2:47 PM	No injury	2	Local police	35-34	45-54	D1: (No improper driving) / D2: (Wrong side or wrong way)	Daylight	Angle		Dry	0	0	V1: Turning right / V2: Travelling straight ahead	V1: (Passenger car) / V2: (Passenger car)	V1: S / V2: N	Clear	14-52-AC	V1: (Collision with motor vehicle in traffic) / V2: (Collision with motor vehicle in traffic)	3005	CRANBERRY HWY
373663	WARHAM	02/16/2014	Property damage only (none injured)	11:49 AM	No injury	2	Local police	36-37	55-64	D1: (Disregarded traffic signs, signals, road markings) / D2: (No improper driving)	Daylight	Angle		Dry	0	0	V1: Turning left / V2: Travelling straight ahead	V1: (Passenger car) / V2: (Passenger car)	V1: W / V2: S	Cloudy/Unknown	14-65-AC	V1: (Collision with motor vehicle in traffic) / V2: (Collision with motor vehicle in traffic)	3013	CRANBERRY HWY
380451	WARHAM	05/18/2014	Property damage only (none injured)	5:54 PM	No injury	1	Local police	45-54	45-54	D1: (Distracted)	Daylight	Single vehicle crash		Dry	0	0	V1: Turning left	V1: (Passenger car)	V1: E	Clear/Unknown	14-196-AC	V1: (Collision with other fixed object (wall, building, tunnel, etc.))	3005	CRANBERRY HWY
387560	WARHAM	07/07/2014	Property damage only (none injured)	5:18 PM	No injury	1	Local police	48-20	48-20	D1: (Distracted)	Daylight	Rear-end		Dry	0	0	V1: Backing	V1: (Passenger car)	V1: W	Clear	14-243-AC	V1: (Collision with motor vehicle in traffic)	3011	CRANBERRY HWY
387894	WARHAM	07/13/2014	Property damage only (none injured)	9:25 PM	No injury	2	Local police	45-54	55-64	D1: (Operating vehicle in erratic, reckless, careless, negligent or aggressive manner) / D2: (No improper driving)	Dark - lighted roadway	Rear-end		Dry	0	0	V1: Travelling straight ahead / V2: Slowing or stopped in traffic	V1: (Passenger car) / V2: (Passenger car)	V1: E / V2: E	Clear	14-253-AC	V1: (Collision with motor vehicle in traffic) / V2: (Collision with motor vehicle in traffic)	3013	CRANBERRY HWY
394718	WARHAM	08/16/2014	Property damage only (none injured)	12:42 PM	No injury	2	Local police	45-54	65-74	D1: (No improper driving) / D2: (Distracted)	Daylight	Angle		Dry	0	0	V1: Travelling straight ahead / V2: Entering traffic lane	V1: (Passenger car) / V2: (Passenger car)	V1: S / V2: W	Cloudy/Unknown	14-364-AC	V1: (Collision with motor vehicle in traffic) / V2: (Collision with motor vehicle in traffic)	3005	CRANBERRY HWY
394790	WARHAM	09/17/2014	Property damage only (none injured)	11:23 AM	No injury	2	Local police	55-64	55-64	D1: (No improper driving) / D2: (Distracted)	Daylight	Angle		Dry	0	0	V1: Travelling straight ahead / V2: Turning left	V1: (Passenger car) / V2: (Passenger car)	V1: E / V2: S	Clear	14-365-AC	V1: (Collision with motor vehicle in traffic) / V2: (Collision with motor vehicle in traffic)	3005	CRANBERRY HWY
389731	WARHAM	4202	Non-fatal injury (none injured)	9:09 AM	Non-fatal injury - Non-inoperating	1	Local police	45-54	45-54	D1: (Drows)	Daylight	Single vehicle crash		Dry	0	0	V1: Turning left	V1: (Passenger car)	V1: N	Clear	15-25-AC	V1: (Collision with other fixed object (wall, building, tunnel, etc.))	3005	CRANBERRY HWY
400044	WARHAM	4203	Property damage only (none injured)	9:49 PM	No injury	2	Local police	35-44	55-64	D1: (No improper driving) / D2: (No improper driving)	Daylight	Angle		Dry	0	0	V1: Travelling straight ahead / V2: Turning right	V1: (Passenger car) / V2: (Passenger car)	V1: E / V2: N	Clear/Unknown	15-34-AC	V1: (Collision with motor vehicle in traffic) / V2: (Collision with motor vehicle in traffic)	3011	CRANBERRY HWY
401603	WARHAM	4206	Property damage only (none injured)	8:16 PM	No injury	2	Local police	21-24	25-34	D1: (Failure to keep in proper lane or running off road) / D2: (No improper driving)	Dark - lighted roadway	Side-swipe, same direction		Dry	0	0	V1: Turning right / V2: Travelling straight ahead	V1: (Passenger car) / V2: (Passenger car)	V1: E / V2: E	Clear/Unknown	15-127-AC	V1: (Collision with motor vehicle in traffic) / V2: (Collision with motor vehicle in traffic)	3013	CRANBERRY HWY
402844	WARHAM	4202	Property damage only (none injured)	5:53 PM	No injury	4	Local police	45-54	75-84	D1: (Other improper action) / D4: (No improper driving)	Daylight	Side-swipe, opposite direction		Dry	0	0	V1: Travelling straight ahead / V2: Parked / V3: Parked / V4: Travelling straight ahead	V1: (Passenger car) / V2: (Passenger car) / V3: (Passenger car) / V4: (Passenger car)	V1: S / V2: Not Reported / V3: Not Reported / V4: N	Clear	15-186-AC	V1: (Collision with motor vehicle in traffic) / V2: (Collision with motor vehicle in traffic) / V3: (Collision with motor vehicle in traffic)	3005	CRANBERRY HWY
404070	WARHAM	4234	Non-fatal injury	7:55 PM	Non-fatal injury - Possible	1	Local police	25-34	25-34	D1: (Distracted)	Daylight	Single vehicle crash		Dry	0	0	V1: Travelling straight ahead	V1: (Passenger car)	V1: E	Clear/Other	15-237-AC / 15-237-AC / 15-237-AC	V1: (Collision with highway traffic sign post)	3005	CRANBERRY HWY
405060	WARHAM	4216	Property damage only (none injured)	7:32 PM	No injury	2	Local police	18-20	35-64	D1: (Failed to yield right of way) / D2: (No improper driving)	Daylight	Side-swipe, same direction		Dry	0	0	V1: Travelling straight ahead / V2: Turning left	V1: (Passenger car) / V2: (Passenger car)	V1: E / V2: S	Clear	15-277-AC	V1: (Collision with motor vehicle in traffic) / V2: (Collision with motor vehicle in traffic)	3005	CRANBERRY HWY
406300	WARHAM	4298	Property damage only (none injured)	9:43 PM	No injury	2	Local police	21-24	25-34	D1: (No improper driving) / D2: (Distracted)	Daylight	Side-swipe, same direction		Dry	0	0	V1: Travelling straight ahead / V2: Turning left	V1: (Passenger car) / V2: (Passenger car)	V1: E / V2: W	Clear/Unknown	15-333-AC	V1: (Collision with motor vehicle in traffic) / V2: (Collision with motor vehicle in traffic)	3013	CRANBERRY HWY
406603	WARHAM	4220	Non-fatal injury	6:31 PM	Non-fatal injury - Possible	2	Local police	18-20	45-54	D1: (Distracted) / D2: (No improper driving)	Daylight	Rear-end		Dry	0	0	V1: Travelling straight ahead / V2: Slowing or stopped in traffic	V1: (Passenger car) / V2: (Passenger car)	V1: E / V2: E	Clear	15-348-AC	V1: (Collision with motor vehicle in traffic) / V2: (Collision with motor vehicle in traffic)	3005	CRANBERRY HWY
410901	WARHAM	4234	Property damage only (none injured)	10:08 AM	No injury	2	Local police	45-54	65-74	D1: (Other improper action) / D2: (Distracted)	Daylight	Rear-end		Wet	0	0	V1: Slowing or stopped in traffic / V2: Travelling straight ahead	V1: (Passenger car) / V2: (Passenger car)	V1: N / V2: N	Cloudy/Other	15-550-AC	V1: (Collision with motor vehicle in traffic) / V2: (Collision with motor vehicle in traffic)	3011	CRANBERRY HWY
411223	WARHAM	4237	Property damage only (none injured)	8:39 PM	No injury	2	Local police	21-24	65-74	D1: (No improper driving) / D2: (No improper driving)	Dark - unknown roadway lighting	Rear-end		Dry	0	0	V1: Changing lanes / V2: Travelling straight ahead	V1: (Passenger car) / V2: (Passenger car)	V1: E / V2: E	Clear/Cloudy	15-566-AC	V1: (Collision with motor vehicle in traffic) / V2: (Collision with motor vehicle in traffic)	3013	CRANBERRY HWY
415410	WARHAM	4245	Property damage only (none injured)	10:25 AM	No injury	2	Local police	21-24	45-54	D1: (No improper driving) / D2: (Distracted)	Daylight	Angle		Dry	0	0	V1: Slowing or stopped in traffic / V2: Changing lanes	V1: (Passenger car) / V2: (Passenger car)	V1: E / V2: E	Clear/Unknown	16-72-AC	V1: (Collision with motor vehicle in traffic) / V2: (Collision with motor vehicle in traffic)	3005	CRANBERRY HWY

416944	WARDHAM	42454	Property damage only (none injured)	5:09 PM	No injury	2	Local police	35-64	35-64	D1 (Unknown) / D2 (Disregarded traffic signs, signals, and markings)	Daylight	Sideways, opposite direction	Wet	0	0	V1: Turning left / V2: Travelling straight ahead	V1 (Passenger car) / V2 (Passenger car)	V1: N / V2: S	Cloudy	16-115-AC	V1: Collision with motor vehicle in traffic / V2: Collision with motor vehicle in traffic			CRANBERRY HIGHWAY Rte 6 S
416973	WARDHAM	42453	Property damage only (none injured)	8:53 AM	No injury	2	Local police	45-54	65-74	D1: (No improper driving) / D2: (No improper driving)	Daylight	Rear-end	Dry	0	0	V1: Slowing or stopped in traffic / V2: Travelling straight ahead	V1 (Passenger car) / V2 (Passenger car)	V1: N / V2: N	Cloudy/Unknown	16-112-AC	V1: Collision with motor vehicle in traffic / V2: Collision with motor vehicle in traffic	3013		CRANBERRY HWY
421447	WARDHAM	42358	Property damage only (none injured)	10:59 AM	No injury	3	Local police	21-24	84	D1: (No improper driving) / D2: (No improper driving) / D3: (Destruction)	Daylight	Rear-end	Dry	0	0	V1: Slowing or stopped in traffic / V2: Slowing or stopped in traffic	V1 (Passenger car) / V2 (Passenger car) / V3 (Passenger car)	V1: W / V2: W / V3: W	Clear	16-276-AC	V1: Collision with motor vehicle in traffic / V2: Collision with motor vehicle in traffic / V3: Collision with motor vehicle in traffic	3005		CRANBERRY HWY
427245	WARDHAM	42873	Non-fatal injury	9:36 PM	Non-fatal injury - Possible	1	Local police	6-17	8-17	D1: (Driving too fast for conditions)	Dark - lighted roadway	Single vehicle crash	Wet	0	0	V1: Travelling straight ahead	V1 (Passenger car)	V1: W	Rain	16-486-AC	V1: Collision with light pole or other post/support	3044		CRANBERRY HWY
431859	WARDHAM	42782	Property damage only (none injured)	2:41 PM	No injury	2	Local police	45-54	75-84	D1: (No improper driving) / D2: (No improper driving)	Daylight	Sideways, same direction	Dry	0	0	V1: Travelling straight ahead / V2: Travelling straight ahead	V1 (Passenger car) / V2 (Passenger car)	V1: S / V2: E	Clear	17-34-AC	V1: Collision with motor vehicle in traffic / V2: Collision with motor vehicle in traffic	3005		CRANBERRY HWY
438863	WARDHAM	42907	Non-fatal injury	1:57 PM	Non-fatal injury - Possible	2	Local police	35-44	45-54	D1: (No improper driving)/swerving or swerving due to wind, slippery surface, vehicle, object, non-motorist in roadway, etc. / D2: (Operating vehicle in erratic, reckless, careless, negligent or aggressive manner (intentional))	Daylight	Single vehicle crash	Dry	0	0	V1: Travelling straight ahead / V2: Turning left	V1 (Passenger car) / V2 (Passenger car)	V1: N / V2: N	Clear/Cloudy	17-273-AC	V1: Collision with motor vehicle in traffic / V2: Collision with motor vehicle in traffic	3005		CRANBERRY HWY
439874	WARDHAM	42943	Property damage only (none injured)	12:39 PM	No injury	1	Local police	25-34	25-34	D1: (No improper driving)	Daylight	Single vehicle crash	Dry	0	0	V1: Turning left	V1 (Passenger car)	V1: S	Clear/Unknown	17-299-AC	V1: Collision with highway traffic sign post	3005		CRANBERRY HWY
445702	WARDHAM	43047	Property damage only (none injured)	7:02 PM	No injury	2	Local police	21-24	25-34	D1: (No improper driving) / D2: (No improper driving)	Dark - lighted roadway	Rear-end	Dry	0	0	V1: Travelling straight ahead / V2: Travelling straight ahead	V1 (Passenger car) / V2 (Passenger car)	V1: S / V2: S	Clear/Unknown	17-469-AC	V1: Collision with motor vehicle in traffic / V2: Collision with motor vehicle in traffic	3003		CRANBERRY HWY
460677	WARDHAM	43180	Property damage only (none injured)	6:57 PM	No injury	1	Local police	25-34	25-34	D1: (Failure to keep in proper lane or running off road)	Dark - lighted roadway	Single vehicle crash	Dry	0	0	V1: Travelling straight ahead	V1 (Passenger car)	V1: S	Clear/Unknown	18-384-AC	V1: Collision with utility pole	3013		CRANBERRY HWY
463876	WARDHAM	43450	Property damage only (none injured)	7:16 PM	No injury	2	Local police	18-20	35-44	D1: (No improper driving) / D2: (No improper driving)	Dark - lighted roadway	Sideways, same direction	Wet	0	0	V1: Turning left / V2: Turning left	V1 (Passenger car) / V2 (Passenger car)	V1: E / V2: E	Cloudy/Rain	18-520-AC / 18-530-AC	V1: Collision with motor vehicle in traffic / V2: Collision with motor vehicle in traffic	3003		CRANBERRY HWY

Not included due to vehicle sequence of events mentioning collision with parked motor vehicle

332854	WARDHAM	41883	Unknown	1:30 PM	Not Applicable	1	Local police	65-74	66-74	D2: (Over correcting/over-steering)	Daylight	Angle	Dry	0	0	V1: Parked / V2: Other	V1 (Passenger car) / V2 (Passenger car)	V1: S / V2: S	Clear/Unknown	14-330-AC	V1: Collision with parked motor vehicle / V2: Collision with parked motor vehicle	3005		CRANBERRY HWY
427429	WARDHAM	42871	Property damage only (none injured)	1:48 PM	No injury	2	Local police	21-24	25-34	D1: (Destruction)	Daylight	Angle	Dry	0	0	V1: Entering traffic lane / V2: Parked	V1 (Passenger car) / V2 (Passenger car)	V1: W / V2: Not Reported	Clear	16-466-AC	V1: Collision with parked motor vehicle / V2: Collision with parked motor vehicle	3005		CRANBERRY HWY





## Background Growth Rate Calculations

### Cranberry Highway east of Depot St

Count Month	Avg ADT
Jul-2017	30075
Oct-2014	24666
Aug-2011	30604
Jul-2008	29916

Note: this volume is substantially lower than others, not used for analysis.

Years	Yearly Growth Rate
2011 TO 2017	-0.29%
2008 TO 2017	0.05%

From MassDOT's MS2 Transportation Data Management System:

Record		1 of 1		Goto Record		go	
Location ID	7173	MPO ID					
Type	SPOT	HPMS ID	310021400490				
On NHS		On HPMS	Yes				
LRS ID	US6 EB	LRS Loc Pt.	46.67216				
SF Group	U4-7	Route Type	US				
AF Group	U4-7	Route	6				
GF Group	U4-7	Active	Yes				
Class Dist Grp	U4-7	Category	HPMS				
Seas Class Grp	MHD Statewide						
WIM Group							
QC Group	Default						
Funct'l Class	(4) Minor Arterial	Milepost					
Located On	CRANBERRY HIGHWAY						
Loc On Alias							
EAST OF	DEPOT ST.						

#### STATION DATA

Directions: **2-WAY** EB WB ?

AADT								
Year	AADT	DHV-30	K %	D %	PA	BC	Src	
2020	24,066 <sup>3</sup>				22,502 (94%)	1,564 (6%)	Grown from 2019	
2019	29,171 <sup>3</sup>	2,586	9	51	28,035 (96%)	1,136 (4%)	Grown from 2018	
2018	29,288 <sup>3</sup>		9	51	27,678 (95%)	1,610 (5%)	Grown from 2017	
2017	29,200	2,589	9	51	27,857 (95%)	1,343 (5%)		
2016	25,010 <sup>3</sup>		10	52	23,635 (95%)	1,375 (5%)	Grown from 2015	

Travel Demand Model									
Model Year	Model AADT	AM PHV	AM PPV	MD PHV	MD PPV	PM PHV	PM PPV	NT PHV	NT PPV

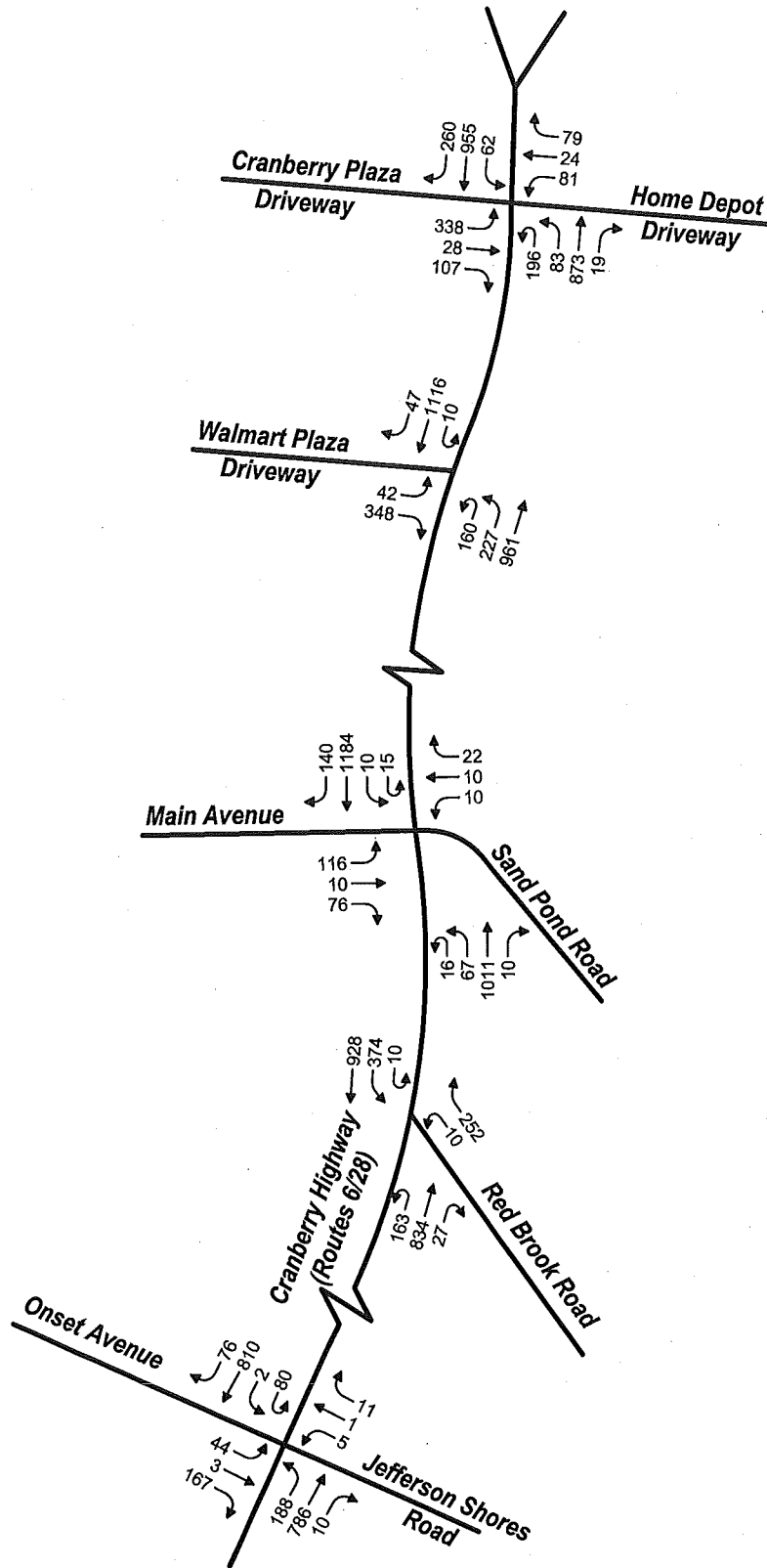
VOLUME COUNT			
Date	Int	Total	
Tue 7/18/2017	15	29,680	
Mon 7/17/2017	15	30,470	
Wed 10/22/2014	15	23,591	
Tue 10/21/2014	15	25,016	
Mon 10/20/2014	15	25,390	
Wed 8/24/2011	15	31,121	
Tue 8/23/2011	15	30,087	
Tue 7/15/2008	60	30,269	
Mon 7/14/2008	60	29,563	
Wed 7/27/2005	15	32,971	

VOLUME TREND	
Year	Annual Growth
2020	-18%
2019	0%
2018	0%
2017	17%
2016	6%
2015	2%
2014	-16%
2013	1%
2012	-2%
2011	15%

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## **Cranberry Highway (Route 6/28) Reconstruction Project Traffic Volumes**

From Cranberry Highway (Route 6/28) Reconstruction Project Functional Design Report  
*Cranberry Highway (Routes 6 and 28) Five Locations Transportation Improvements, VHB, June 2010.*



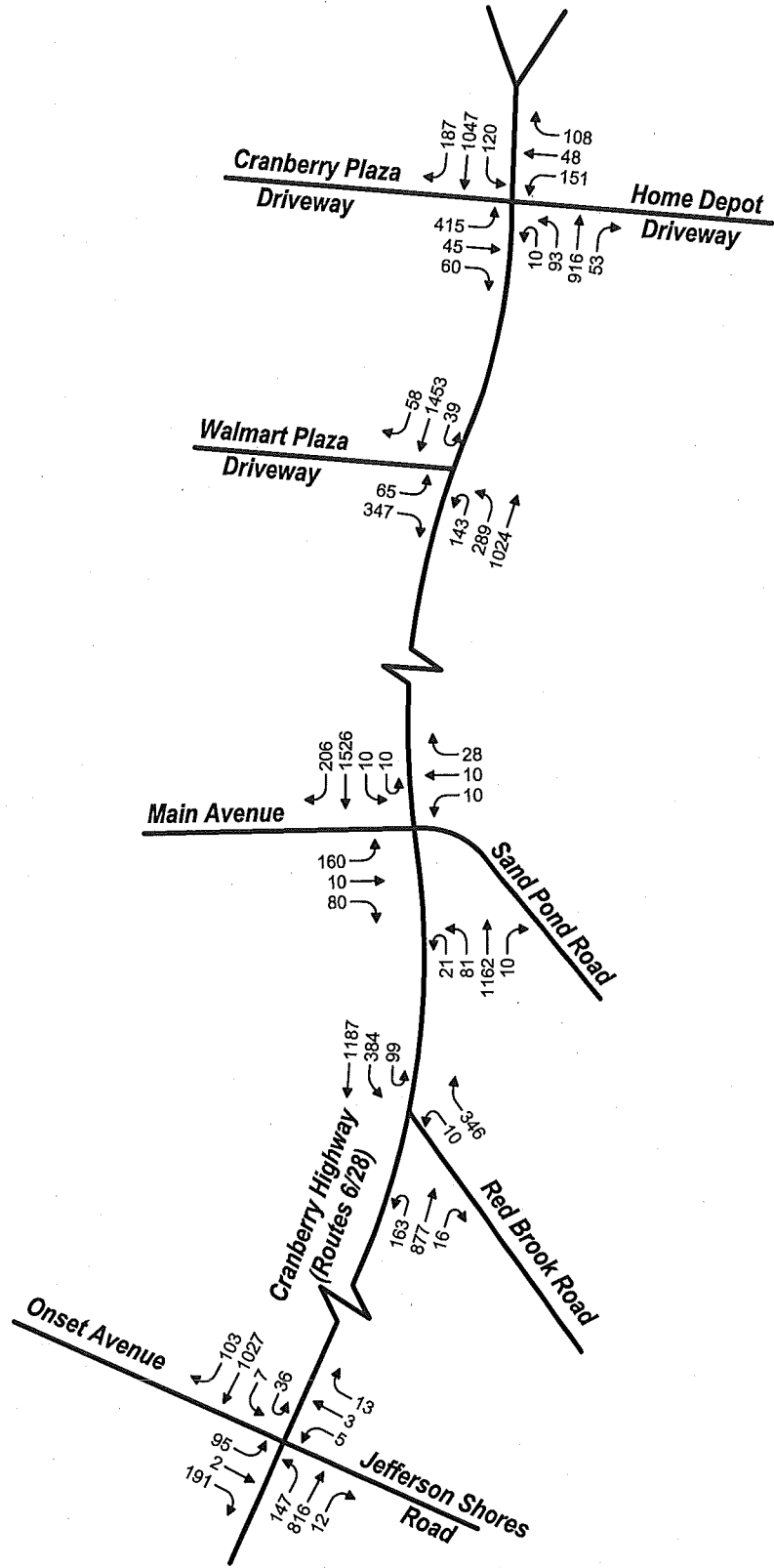
Not to Scale

Vanasse Hangen Brustlin, Inc.

2019 Weekday Evening  
Build Condition  
Peak Hour Traffic Volumes

Figure 9

Routes 6 & 28  
Wareham, Massachusetts



➔ Not to Scale

**Vanasse Hangen Brustlin, Inc.**

2019 Saturday Midday  
 Build Condition  
 Peak Hour Traffic Volumes

Figure 10

Routes 6 & 28  
 Wareham, Massachusetts

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## **Cranberry Highway (Route 6/28) Reconstruction Project Signal Plans**

From Cranberry Highway (Route 6/28) Reconstruction Project PS&E Submission  
*Plan and Profile of Cranberry Highway (U.S. Route 6, State Route 28), VHB, November 2018.*

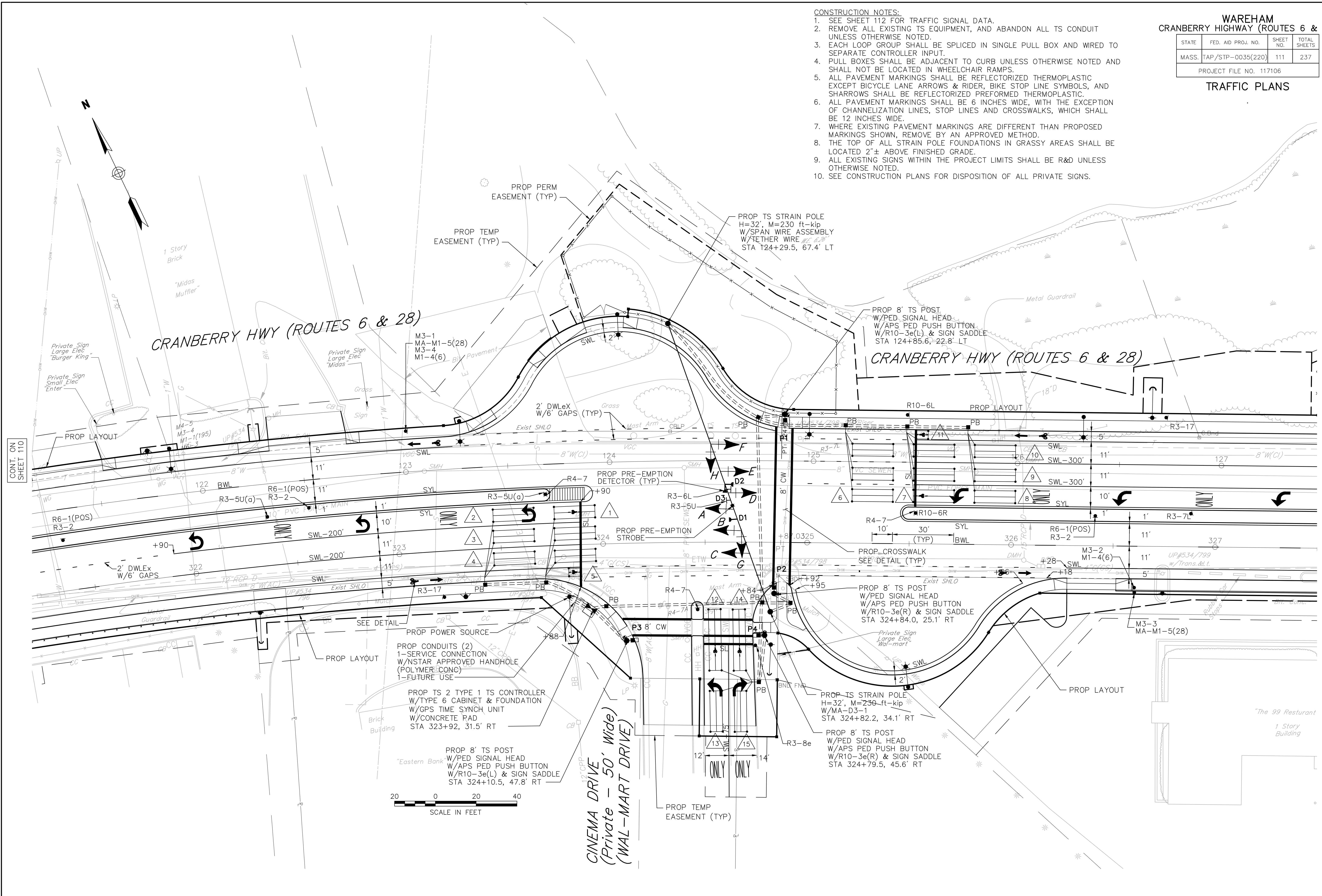
WAREHAM  
CRANBERRY HIGHWAY (ROUTES 6 & 28)

STATE	FED. AID PROJ. NO.	SHEET NO.	TOTAL SHEETS
MASS.	TAP/STP-0035(220)	111	237

PROJECT FILE NO. 117106

TRAFFIC PLANS

- CONSTRUCTION NOTES:
1. SEE SHEET 112 FOR TRAFFIC SIGNAL DATA.
  2. REMOVE ALL EXISTING TS EQUIPMENT, AND ABANDON ALL TS CONDUIT UNLESS OTHERWISE NOTED.
  3. EACH LOOP GROUP SHALL BE SPLICED IN SINGLE PULL BOX AND WIRED TO SEPARATE CONTROLLER INPUT.
  4. PULL BOXES SHALL BE ADJACENT TO CURB UNLESS OTHERWISE NOTED AND SHALL NOT BE LOCATED IN WHEELCHAIR RAMPS.
  5. ALL PAVEMENT MARKINGS SHALL BE REFLECTORIZED THERMOPLASTIC EXCEPT BICYCLE LANE ARROWS & RIDER, BIKE STOP LINE SYMBOLS, AND SHARROWS SHALL BE REFLECTORIZED PREFORMED THERMOPLASTIC.
  6. ALL PAVEMENT MARKINGS SHALL BE 6 INCHES WIDE, WITH THE EXCEPTION OF CHANNELIZATION LINES, STOP LINES AND CROSSWALKS, WHICH SHALL BE 12 INCHES WIDE.
  7. WHERE EXISTING PAVEMENT MARKINGS ARE DIFFERENT THAN PROPOSED MARKINGS SHOWN, REMOVE BY AN APPROVED METHOD.
  8. THE TOP OF ALL STRAIN POLE FOUNDATIONS IN GRASSY AREAS SHALL BE LOCATED 2"± ABOVE FINISHED GRADE.
  9. ALL EXISTING SIGNS WITHIN THE PROJECT LIMITS SHALL BE R&D UNLESS OTHERWISE NOTED.
  10. SEE CONSTRUCTION PLANS FOR DISPOSITION OF ALL PRIVATE SIGNS.



CONT. ON SHEET 110

CONT. ON SHEET 113

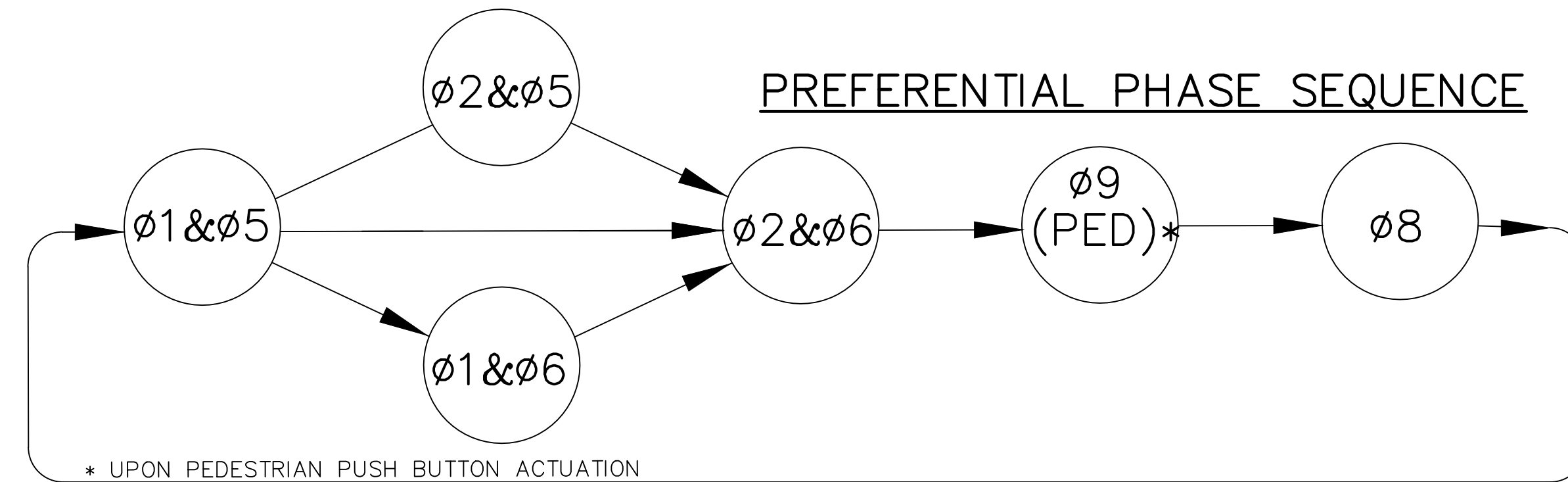
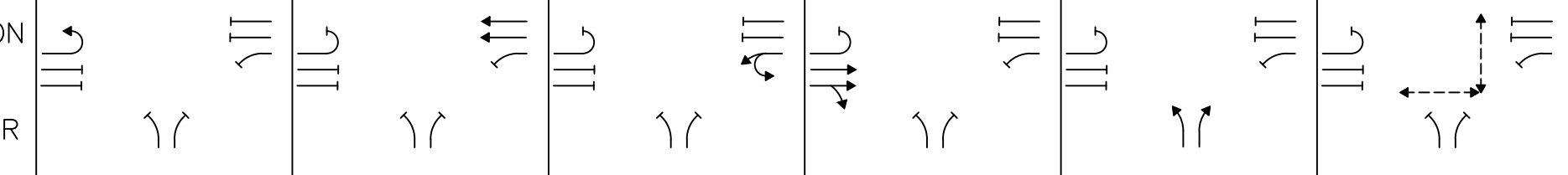
STATE	FED. AID PROJ. NO.	SHEET NO.	TOTAL SHEETS
MASS.	TAP/STP-0035(220)	112	237
PROJECT FILE NO. 117106			

TRAFFIC PLANS

		SEQUENCE AND TIMING																		FLASHING OPERATION
APPROACH	DIRECTION	HOUSING	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	
MINIMUM INTERVAL			6			10			6			10			6			-		
VEHICLE EXTENSION			2			2			2			2			2			-		
MAXIMUM 1			15			60			30			45			20			-		
MAXIMUM 2			15			60			30			45			20			-		
YELLOW CLEARANCE				3			4,5			3,5			4			3,5			3	
RED CLEARANCE					1			1			2,5			2			1			1
PEDESTRIAN INTERVAL																		7/19		
CRANBERRY HWY	EB	A	√G	√Y	√R	√R	√R	√R	√R	√R	√R	√R	√R	√R	√R	√R	√R	√R	√R	√R
CRANBERRY HWY	EB	B,C	R	R	R	R	R	R	R	R	R	G	Y	R	R	R	R	R	R	R
CRANBERRY HWY	WB	D	←R	←R	←R	←R	←R	←R	←G	←Y	←R	←R	←R	←R	←R	←R	←R	←R	←R	←FR
CRANBERRY HWY	WB	E,F	R	R	R	G	Y	R	R	R	R	R	R	R	R	R	R	R	R	R
CINEMA DRIVE	NB	G,H	R	R	R	R	R	R	R	R	R	R	R	G	Y	R	R	R	R	R
PEDESTRIAN X-ING	ALL	P1-P4	DW	DW	DW	DW	DW	DW	DW	DW	DW	DW	DW	DW	DW	DW	W/FDW	DW	DW	OUT
DETECTOR			NON-LOCK			NON-LOCK			NON-LOCK			NON-LOCK			NON-LOCK			-		
RECALL			OFF			SOFT			OFF			SOFT			OFF			-		
			ø1			ø2			ø5			ø6			ø8			ø9(PED)		

NOTES:

- AUTOMATIC FLASHING OPERATION PER 2009 M.U.T.C.D., AS AMENDED.
- \* UPON PEDESTRIAN PUSH BUTTON ACTUATION
- MAXIMUM 1 = NORMAL OPERATION
- MAXIMUM 2 = NOT USED
- STOP AND GO OPERATION FOR 24 HOURS PER DAY. FLASHING OPERATION FOR EMERGENCY ONLY.
- DURING PEDESTRIAN INTERVAL, FDW THROUGH YELLOW OPERATION SHALL NOT BE IN EFFECT.
- INHIBIT MAX TERMINATION SHALL BE IN EFFECT DURING COORDINATION.
- SEE SHEETS 130 FOR COORDINATION DATA.



SIGNAL HEAD DATA			
B,C,E,F,G,H	D	A	P1-P4
ALL 12" LENS			

- NOTES:
- ALL SIGNAL HEADS SHALL BE RIGID MOUNTED AND EQUIPPED WITH 5"± NON-LOUVERED BACKPLATES AND TUNNEL VISORS
  - ALL SIGNAL DISPLAYS SHALL BE EQUIPPED W/L.E.D. MODULES.
  - ALL BACKPLATES SHALL INCLUDE 3" WIDE, YELLOW REFLECTIVE MICRO-PRISMATIC RETROREFLECTIVE SHEETING ON THE EDGE OF THE BACKPLATE.

ITEM 816.02  
TRAFFIC SIGNAL RECONSTRUCTION  
CRANBERRY HWY (ROUTES 6 & 28) AT CINEMA DRIVE  
LIST OF MAJOR ITEMS REQUIRED

QUANTITY	DESCRIPTION
1	8ø TS 2 TYPE 1 CONTROLLER IN A TYPE 6 BASE MOUNTED CABINET INCL. FOUNDATION AND CONCRETE PAD
1	GPS TIME SYNCH UNIT
2	TS STRAIN POLE, STEEL (H=32', M=230 ft-kip), INCL. FOUNDATION
1	SPAN WIRE ASSEMBLY (INCLUDING TETHER WIRE)
4	TS POST 8' STANDARD INCL. FOUNDATION
8	SIGNAL HEAD, 3-SECTION
4	PEDESTRIAN SIGNAL HEAD
2	APS PEDESTRIAN PUSH BUTTON W/R10-3e(L) AND SIGN SADDLE
2	APS PEDESTRIAN PUSH BUTTON W/R10-3e(R) AND SIGN SADDLE
10	PULL BOX-12"x12"
8	TYPE C, 2-CHANNEL CARD RACK LOOP DETECTOR AMPLIFIER
21	WIRE LOOP DETECTOR
3	EMERGENCY PRE-EMPTION OPTICAL DETECTORS & DETECTOR CABLE
1	EMERGENCY PRE-EMPTION 4 CHANNEL PHASE SELECTOR
1	EMERGENCY PRE-EMPTION SYSTEM CHASSIS
1	EMERGENCY PRE-EMPTION STROBE (WHITE LENS)
1	SERVICE CONNECTION (OVERHEAD)

PLUS NECESSARY DUCT, CABLE, LABOR, MISCELLANEOUS MATERIAL AND EQUIPMENT TO COMPLETE THE INSTALLATION AND PROVIDE AN OPERATING TRAFFIC CONTROL SIGNAL.

PRE-EMPTION PHASING & PRIORITY			
DETECTOR & PRIORITY	PRE-EMPT PHASE ASSIGNMENT	MOVEMENT	VEHICLE PHASE ASSIGNMENT
D1	1		ø1&ø6
D2	2		ø2&ø5
D3	3		ø8

EMERGENCY VEHICLE PRE-EMPTION OPERATION.

- EMERGENCY VEHICLE PRE-EMPTION SIGNALS SHALL BE OPTICALLY TRANSMITTED BY OPTICAL EMITTERS MOUNTED IN EMERGENCY VEHICLES AND RECEIVED BY OPTICAL DETECTORS LOCATED AT EACH INTERSECTION.
- PRE-EMPTION SIGNALS SHALL BE SERVICED ON A PRIORITY BASIS WITH DETECTORS D1, D2, OR D3 ASSIGNED DESCENDING PRIORITIES AS FOLLOWS: (D1 HIGHEST AND D3 LOWEST)
- IN RESPONSE TO A PRE-EMPTION SIGNAL RECEIVED AT AN INTERSECTION BY OPTICAL DETECTOR D1 (OR D2, D3) THE CONTROLLER SHALL HOLD OR ADVANCE TO AND HOLD IN EMERGENCY VEHICLE PRE-EMPTION PHASE #1 (OR #2, #3) GREEN FOR A MINIMUM OF TEN (10) SECONDS OR UNTIL PRE-EMPTION SIGNAL CEASES. THE CONTROLLER SHALL THEN TIME PRE-EMPTION PHASE CLEARANCES FOR THE ASSOCIATED PHASE(S) AS SHOWN IN THE SEQUENCE AND TIMING CHART AND SERVICE SUBSEQUENT EMERGENCY VEHICLE PRE-EMPTION PHASES AS NECESSARY.
- MINIMUM GREEN AND NORMAL VEHICLE CLEARANCE SHALL BE PROVIDED ON PHASES THAT ARE TO BE TERMINATED BY PRE-EMPTION DEMAND.
- PRE-EMPTION STROBE SHALL BE ILLUMINATED WHENEVER ANY EMERGENCY VEHICLE PRE-EMPTION IS ACTIVE.
- EMERGENCY VEHICLE PRE-EMPTION SHALL OVERRIDE COORDINATION.
- THE CABLE FOR THE PRE-EMPTION SYSTEM SHALL BE SEPARATE FROM THE CABLE ASSOCIATED WITH THE TRAFFIC SIGNAL SYSTEM.

DETECTOR DATA						
DETECTOR NO.	NO. SECTION / SIZE	NO. OF TURNS	OPERATIONS	DELAY /EXT	CALL PHASE	LOOP CONNECTION
1	1-6'X20' QUADRUPOLE	2-4-2	PRESENCE	0	ø1	SINGLE
2	1-6'X20' QUADRUPOLE	2-4-2	PRESENCE	0	ø1	SINGLE
3	2-6'X20' QUADRUPOLE	2-4-2	PRESENCE	0	ø6	SERIES
4	2-6'X20' QUADRUPOLE	2-4-2	PRESENCE	0	ø6	SERIES
5	1-4'X6' QUADRUPOLE	2-4-2	PRESENCE	0	ø6	SINGLE BICYCLE
6	1-6'X20' QUADRUPOLE	2-4-2	PRESENCE	0	ø5	SINGLE
7	1-6'X20' QUADRUPOLE	2-4-2	PRESENCE	0	ø5	SINGLE
8	1-6'X20' QUADRUPOLE	2-4-2	PRESENCE	0	ø5	SINGLE
9	3-6'X20' QUADRUPOLE	2-4-2	PRESENCE	0	ø2	SERIES
10	3-6'X20' QUADRUPOLE	2-4-2	PRESENCE	0	ø2	SERIES
11	1-4'X6' QUADRUPOLE	2-4-2	PRESENCE	0	ø2	SINGLE BICYCLE
12	1-6x30' QUADRUPOLE	2-4-2	PRESENCE	0	ø8	SINGLE
13	1-6'X20' QUADRUPOLE	2-4-2	PRESENCE	0	ø8	SINGLE
14	1-6x30' QUADRUPOLE	2-4-2	PRESENCE	0	ø8	SINGLE
15	1-6'X20' QUADRUPOLE	2-4-2	PRESENCE	0	ø8	SINGLE

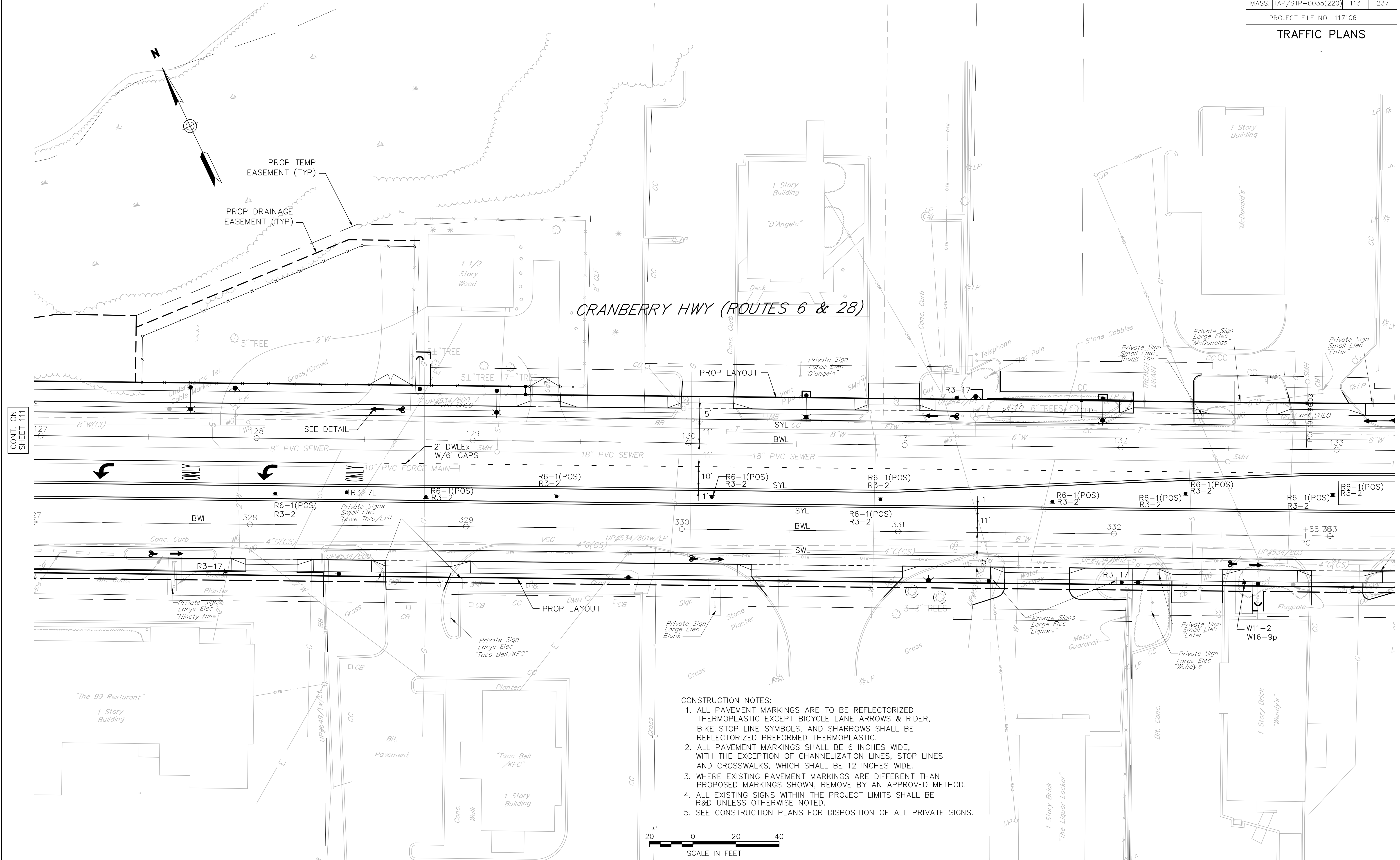
NOTE: DELAY AND EXTENSION TIMINGS SHALL BE PROGRAMMED IN THE CONTROLLER ONLY

WAREHAM  
CRANBERRY HIGHWAY (ROUTES 6 & 28)

STATE	FED. AID PROJ. NO.	SHEET NO.	TOTAL SHEETS
MASS.	TAP/STP-0035(220)	113	237

PROJECT FILE NO. 117106

TRAFFIC PLANS



CONSTRUCTION NOTES:

1. ALL PAVEMENT MARKINGS ARE TO BE REFLECTORIZED THERMOPLASTIC EXCEPT BICYCLE LANE ARROWS & RIDER, BIKE STOP LINE SYMBOLS, AND SHARROWS SHALL BE REFLECTORIZED PREFORMED THERMOPLASTIC.
2. ALL PAVEMENT MARKINGS SHALL BE 6 INCHES WIDE, WITH THE EXCEPTION OF CHANNELIZATION LINES, STOP LINES AND CROSSWALKS, WHICH SHALL BE 12 INCHES WIDE.
3. WHERE EXISTING PAVEMENT MARKINGS ARE DIFFERENT THAN PROPOSED MARKINGS SHOWN, REMOVE BY AN APPROVED METHOD.
4. ALL EXISTING SIGNS WITHIN THE PROJECT LIMITS SHALL BE R&D UNLESS OTHERWISE NOTED.
5. SEE CONSTRUCTION PLANS FOR DISPOSITION OF ALL PRIVATE SIGNS.



CONT. ON SHEET 111

CONT. ON SHEET 114



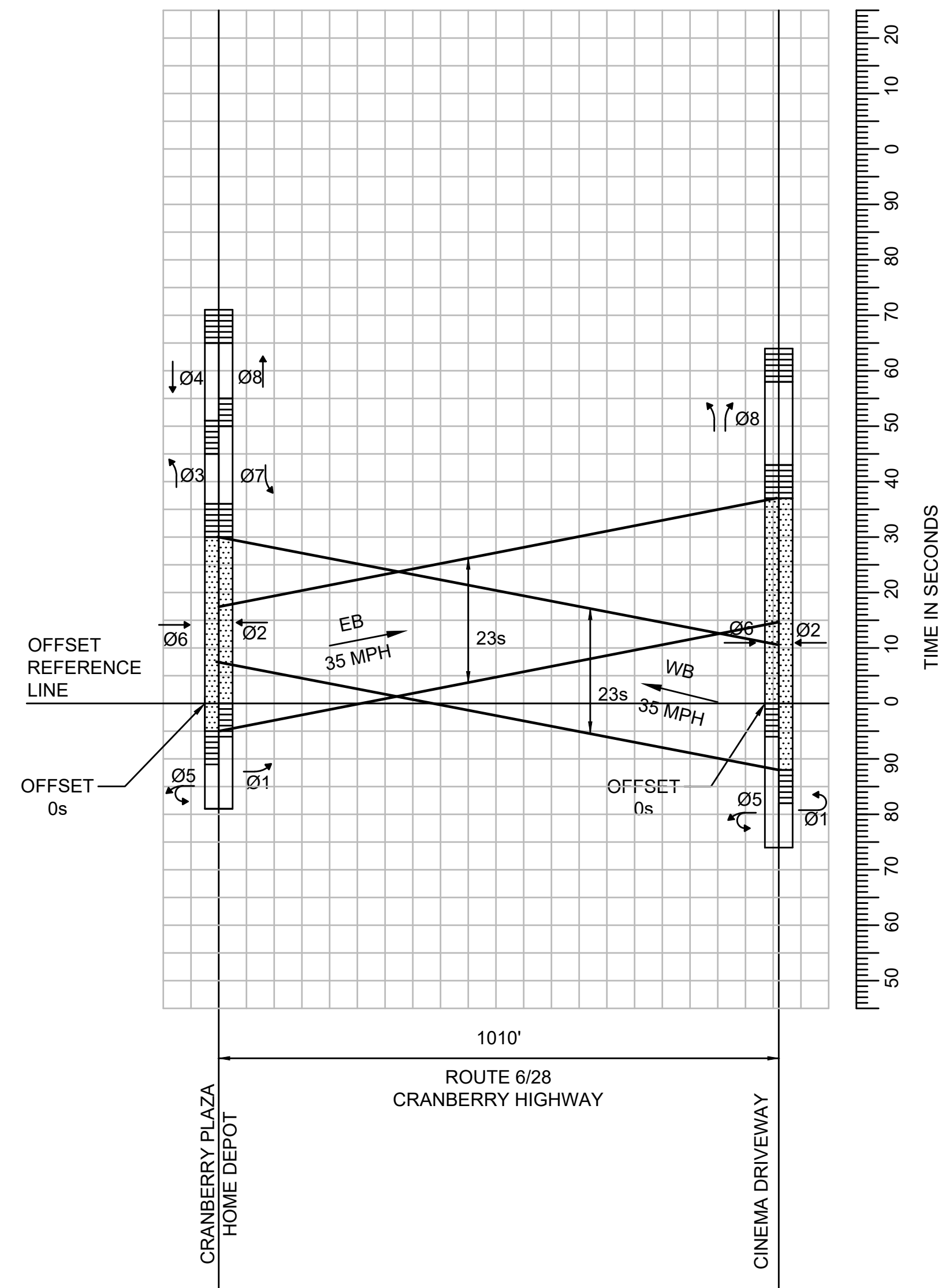
STATE	FED. AID PROJ. NO.	SHEET NO.	TOTAL SHEETS
MASS.	TAP/STP-0035(220)	130	237
PROJECT FILE NO. 117106			

COORDINATION DATA

PLAN 1 WEEKDAY MORNING PEAK HOURS

ROUTE 6/28 CRANBERRY HIGHWAY

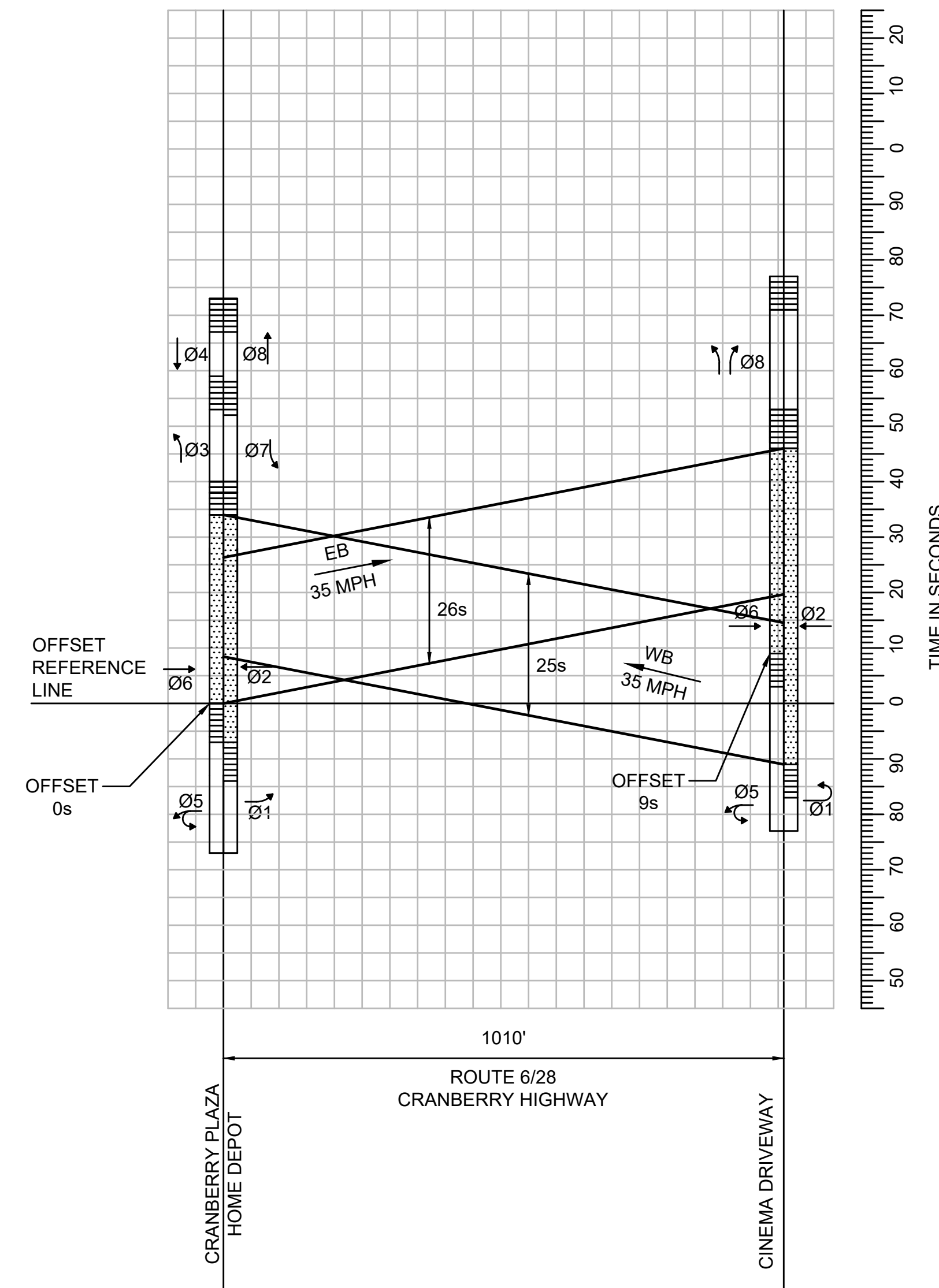
90 SECOND CYCLE



PLAN 2 WEEKDAY EVENING PEAK HOURS

ROUTE 6/28 CRANBERRY HIGHWAY

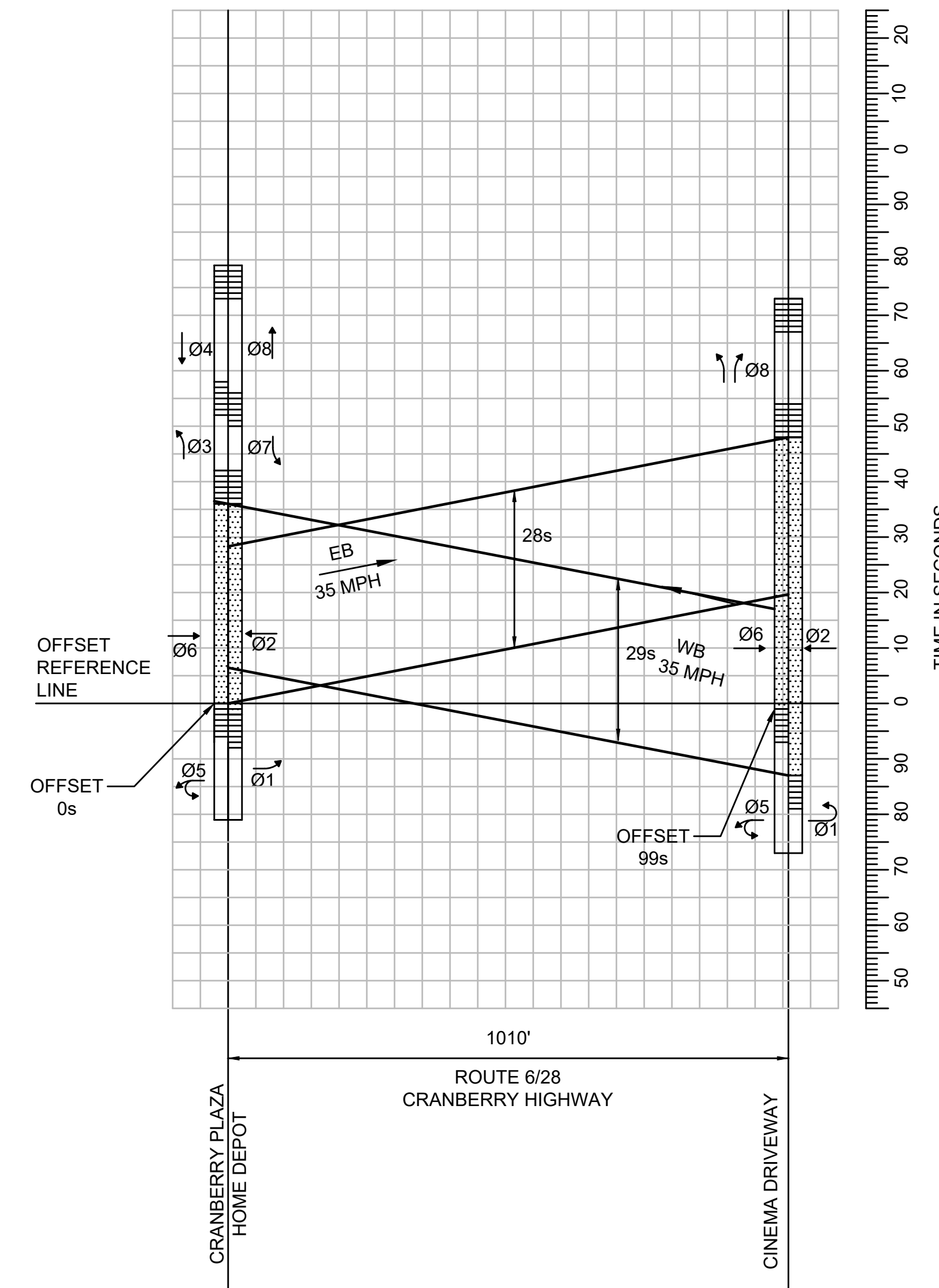
100 SECOND CYCLE



PLAN 3 SATURDAY PEAK HOURS

ROUTE 6/28 CRANBERRY HIGHWAY

100 SECOND CYCLE



ROUTE 6/28 CRANBERRY HIGHWAY AT  
CRANBERRY PLAZA DRIVEWAY / HOME DEPOT DRIVEWAY  
COORDINATION DATA

	PLAN 1	PLAN 2	PLAN 3
CYCLE LENGTH	90 SEC	100 SEC	100 SEC
OFFSET	0	0	0
SPLIT Ø1	19	14	16
SPLIT Ø2	26	43	37
SPLIT Ø3	15	19	22
SPLIT Ø4	20	14	15
SPLIT Ø5	14	27	21
SPLIT Ø6	31	30	32
SPLIT Ø7	19	18	20
SPLIT Ø8	16	15	17
SPLIT Ø9 (PED)	10	10	10
COORDINATED PHASE	Ø2&Ø6	Ø2&Ø6	Ø2&Ø6

- NOTES:
- Ø2&Ø6 "CALL NOT ACTUATED" DURING COORDINATION.
  - OFFSET: BEGINNING OF Ø2&Ø6 GREEN.
  - PLAN FORCE OFF SHALL BE IN EFFECT.
  - INHIBIT MAX TERMINATION SHALL BE IN EFFECT DURING COORDINATION.
  - WHEN PEDESTRIAN PHASE IS ACTUATED, CONTROLLER SHALL DROP OUT OF COORDINATION TO SERVICE THE PEDESTRIAN PHASE.

ROUTE 6/28 CRANBERRY HIGHWAY  
AT CINEMA DRIVEWAY  
COORDINATION DATA

	PLAN 1	PLAN 2	PLAN 3
CYCLE LENGTH	90 SEC	100 SEC	100 SEC
OFFSET	0	9	99
SPLIT Ø1	14	12	12
SPLIT Ø2	45	54	59
SPLIT Ø5	26	32	32
SPLIT Ø6	33	34	39
SPLIT Ø8	21	24	19
SPLIT Ø9 (PED)	10	10	10
COORDINATED PHASE	Ø2&Ø6	Ø2&Ø6	Ø2&Ø6

- NOTES:
- Ø2&Ø6 "CALL NOT ACTUATED" DURING COORDINATION.
  - OFFSET: BEGINNING OF Ø2&Ø6 GREEN.
  - PLAN FORCE OFF SHALL BE IN EFFECT.
  - INHIBIT MAX TERMINATION SHALL BE IN EFFECT DURING COORDINATION.
  - WHEN PEDESTRIAN PHASE IS ACTUATED, CONTROLLER SHALL DROP OUT OF COORDINATION TO SERVICE THE PEDESTRIAN PHASE.

DAILY & WEEKLY COORDINATION PROGRAM

	MONDAY THRU FRIDAY	SATURDAY	SUNDAY
PLAN 1 90" CYCLE	0600-1000	-	-
PLAN 2 100" CYCLE	1500-1900	-	-
PLAN 3 100" CYCLE	-	1000-1400	-
FREE OPERATION	0000-0600 1000-1500 1900-2400	0000-1000 1400-2400	0000-2400
FLASH OPERATION	-	-	-

LEGEND

- COORDINATED PHASE(S) GREEN TIME
- NON-COORDINATED PHASE(S) GREEN TIME
- CLEARANCE TIME (YELLOW + RED)
- PHASE MOVEMENT
- INTERSECTION-INTERSECTION COORDINATION BAND





**ITE TRIP GENERATION WORKSHEET**  
 (10th Edition, Updated 2017)

**LANDUSE:** Automatic Car Wash  
**LANDUSE CODE:** 948  
**SETTING/LOCATION:** General Urban/Suburban  
**JOB NAME:** Wareham Car Wash  
**JOB NUMBER:** 73170

Independent Variable --- Number of Units

1 Car Wash Tunnels

**WEEKDAY**

RATES:	# Studies	R^2	Total Trip Ends			Independent Variable Range			Directional Distribution	
			Average	Low	High	Average	Low	High	Enter	Exit
DAILY	--	--	--	--	--	--	--	--	--	--
AM PEAK OF GENERATOR	--	--	--	--	--	--	--	--	--	--
PM PEAK OF GENERATOR	--	--	--	--	--	--	--	--	--	--
AM PEAK (ADJACENT ST)	--	--	--	--	--	--	--	--	--	--
PM PEAK (ADJACENT ST)	3	--	77.50	50.00	104.50	1	1	2	50%	50%

TRIPS:

	BY AVERAGE			BY REGRESSION			
	Total	Enter	Exit	Total	Enter	Exit	
DAILY	n/a	n/a	n/a	n/a	n/a	n/a	Caution - Small Sample Size
AM PEAK OF GENERATOR	n/a	n/a	n/a	n/a	n/a	n/a	Caution - Small Sample Size
PM PEAK OF GENERATOR	n/a	n/a	n/a	n/a	n/a	n/a	Caution - Small Sample Size
AM PEAK (ADJACENT ST)	n/a	n/a	n/a	n/a	n/a	n/a	Caution - Small Sample Size
PM PEAK (ADJACENT ST)	78	39	39	n/a	n/a	n/a	Caution - Small Sample Size

**SATURDAY**

RATES:	# Studies	R^2	Total Trip Ends			Independent Variable Range			Directional Distribution	
			Average	Low	High	Average	Low	High	Enter	Exit
DAILY	--	--	--	--	--	--	--	--	--	--
PEAK OF GENERATOR	1	--	41.00	41.00	41.00	1	1	1	46%	54%

TRIPS:

	BY AVERAGE			BY REGRESSION			
	Total	Enter	Exit	Total	Enter	Exit	
DAILY	n/a	n/a	n/a	n/a	n/a	n/a	Caution - Small Sample Size
PEAK OF GENERATOR	41	19	22	n/a	n/a	n/a	Caution - Small Sample Size

**SUNDAY**

RATES:	# Studies	R^2	Total Trip Ends			Independent Variable Range			Directional Distribution	
			Average	Low	High	Average	Low	High	Enter	Exit
DAILY	--	--	--	--	--	--	--	--	--	--
PEAK OF GENERATOR	--	--	--	--	--	--	--	--	--	--

TRIPS:

	BY AVERAGE			BY REGRESSION			
	Total	Enter	Exit	Total	Enter	Exit	
DAILY	n/a	n/a	n/a	n/a	n/a	n/a	Caution - Small Sample Size
PEAK OF GENERATOR	n/a	n/a	n/a	n/a	n/a	n/a	Caution - Small Sample Size

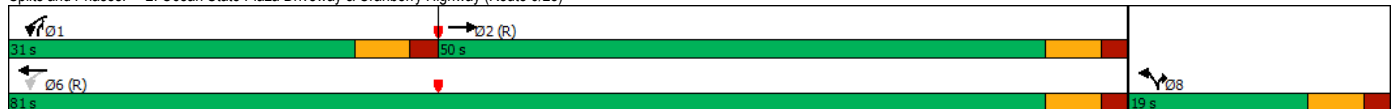


Lane Group	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations	↑↑		↓	↑↑	↓	↑
Traffic Volume (vph)	795	15	100	825	30	130
Future Volume (vph)	795	15	100	825	30	130
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Storage Length (ft)		0	260		0	0
Storage Lanes		0	1		1	1
Taper Length (ft)			25		25	
Satd. Flow (prot)	3564	0	1770	3539	1736	1583
Flt Permitted			0.260		0.950	
Satd. Flow (perm)	3564	0	484	3539	1736	1583
Right Turn on Red		Yes				Yes
Satd. Flow (RTOR)	2					73
Link Speed (mph)	30			30	30	
Link Distance (ft)	950			3513	318	
Travel Time (s)	21.6			79.8	7.2	
Peak Hour Factor	0.89	0.89	0.90	0.90	0.87	0.87
Heavy Vehicles (%)	1%	0%	2%	2%	4%	2%
Shared Lane Traffic (%)						
Lane Group Flow (vph)	910	0	111	917	34	149
Turn Type	NA		pm+pt	NA	Prot	pt+ov
Protected Phases	2		1	6	8	8 1
Permitted Phases			6			
Detector Phase	2		1	6	8	8 1
Switch Phase						
Minimum Initial (s)	15.0		6.0	15.0	6.0	
Minimum Split (s)	21.0		12.0	21.0	12.0	
Total Split (s)	50.0		31.0	81.0	19.0	
Total Split (%)	50.0%		31.0%	81.0%	19.0%	
Yellow Time (s)	4.0		4.0	4.0	4.0	
All-Red Time (s)	2.0		2.0	2.0	2.0	
Lost Time Adjust (s)	0.0		0.0	0.0	0.0	
Total Lost Time (s)	6.0		6.0	6.0	6.0	
Lead/Lag	Lag		Lead			
Lead-Lag Optimize?	Yes		Yes			
Recall Mode	C-Min		None	C-Min	None	
Act Effct Green (s)	66.2		78.6	78.6	9.4	21.8
Actuated g/C Ratio	0.66		0.79	0.79	0.09	0.22
v/c Ratio	0.39		0.24	0.33	0.21	0.37
Control Delay	13.6		4.0	3.7	43.6	19.4
Queue Delay	0.0		0.0	0.0	0.0	0.0
Total Delay	13.6		4.0	3.7	43.6	19.4
LOS	B		A	A	D	B
Approach Delay	13.6			3.7	23.9	
Approach LOS	B			A	C	
Queue Length 50th (ft)	95		13	68	20	40
Queue Length 95th (ft)	270		29	110	47	85
Internal Link Dist (ft)	870			3433	238	
Turn Bay Length (ft)			260			
Base Capacity (vph)	2361		702	2782	225	661
Starvation Cap Reductn	0		0	0	0	0
Spillback Cap Reductn	0		0	0	0	0
Storage Cap Reductn	0		0	0	0	0
Reduced v/c Ratio	0.39		0.16	0.33	0.15	0.23

**Intersection Summary**

Area Type: Other  
 Cycle Length: 100  
 Actuated Cycle Length: 100  
 Offset: 0 (0%), Referenced to phase 2:EBT and 6:WBTL, Start of Green  
 Natural Cycle: 45  
 Control Type: Actuated-Coordinated  
 Maximum v/c Ratio: 0.39  
 Intersection Signal Delay: 9.7  
 Intersection LOS: A  
 Intersection Capacity Utilization 48.0%  
 ICU Level of Service A  
 Analysis Period (min) 15

Splits and Phases: 2: Ocean State Plaza Driveway & Cranberry Highway (Route 6/28)



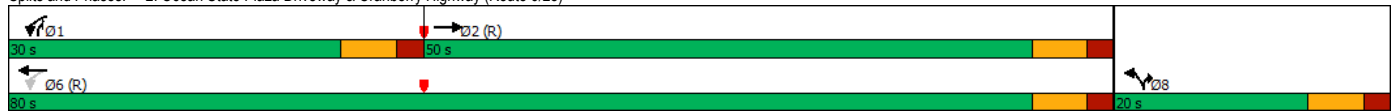


Lane Group	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations	↑↑		↓	↑↑	↓	↑
Traffic Volume (vph)	990	30	175	1015	40	185
Future Volume (vph)	990	30	175	1015	40	185
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Storage Length (ft)		0	260		0	0
Storage Lanes		0	1		1	1
Taper Length (ft)			25		25	
Satd. Flow (prot)	3596	0	1787	3574	1752	1599
Flt Permitted			0.179		0.950	
Satd. Flow (perm)	3596	0	337	3574	1752	1599
Right Turn on Red		Yes				Yes
Satd. Flow (RTOR)	4					38
Link Speed (mph)	30			30	30	
Link Distance (ft)	950			3513	318	
Travel Time (s)	21.6			79.8	7.2	
Peak Hour Factor	0.90	0.90	0.94	0.94	0.84	0.84
Heavy Vehicles (%)	0%	0%	1%	1%	3%	1%
<b>Shared Lane Traffic (%)</b>						
Lane Group Flow (vph)	1133	0	186	1080	48	220
Turn Type	NA		pm+pt	NA	Prot	pt+ov
Protected Phases	2		1	6	8	8 1
Permitted Phases			6			
Detector Phase	2		1	6	8	8 1
<b>Switch Phase</b>						
Minimum Initial (s)	15.0		6.0	15.0	6.0	
Minimum Split (s)	21.0		12.0	21.0	12.0	
Total Split (s)	50.0		30.0	80.0	20.0	
Total Split (%)	50.0%		30.0%	80.0%	20.0%	
Yellow Time (s)	4.0		4.0	4.0	4.0	
All-Red Time (s)	2.0		2.0	2.0	2.0	
Lost Time Adjust (s)	0.0		0.0	0.0	0.0	
Total Lost Time (s)	6.0		6.0	6.0	6.0	
Lead/Lag	Lag		Lead			
Lead-Lag Optimize?	Yes		Yes			
Recall Mode	C-Min		None	C-Min	None	
Act Effct Green (s)	60.9		75.5	75.5	12.5	27.1
Actuated g/C Ratio	0.61		0.76	0.76	0.12	0.27
v/c Ratio	0.52		0.49	0.40	0.22	0.48
Control Delay	17.6		8.2	5.0	41.1	27.8
Queue Delay	0.0		0.0	0.0	0.0	0.0
Total Delay	17.6		8.2	5.0	41.1	27.8
LOS	B		A	A	D	C
Approach Delay	17.6			5.5	30.2	
Approach LOS	B			A	C	
Queue Length 50th (ft)	270		29	113	27	95
Queue Length 95th (ft)	234		48	143	57	139
Internal Link Dist (ft)	870			3433	238	
Turn Bay Length (ft)			260			
Base Capacity (vph)	2192		602	2696	245	687
Starvation Cap Reductn	0		0	0	0	0
Spillback Cap Reductn	0		0	0	0	0
Storage Cap Reductn	0		0	0	0	0
Reduced v/c Ratio	0.52		0.31	0.40	0.20	0.32

**Intersection Summary**

Area Type: Other  
 Cycle Length: 100  
 Actuated Cycle Length: 100  
 Offset: 0 (0%), Referenced to phase 2:EBT and 6:WBTL, Start of Green  
 Natural Cycle: 55  
 Control Type: Actuated-Coordinated  
 Maximum v/c Ratio: 0.52  
 Intersection Signal Delay: 13.1 Intersection LOS: B  
 Intersection Capacity Utilization 58.0% ICU Level of Service B  
 Analysis Period (min) 15

Splits and Phases: 2: Ocean State Plaza Driveway & Cranberry Highway (Route 6/28)



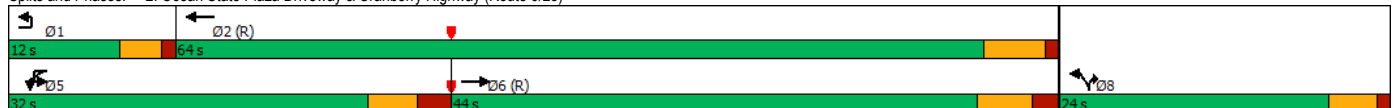


Lane Group	EBU	EBT	EBR	WBU	WBL	WBT	NBL	NBR
Lane Configurations	↓	↑↑			↑	↑↑	↑	↑
Traffic Volume (vph)	10	850	15	160	100	885	30	130
Future Volume (vph)	10	850	15	160	100	885	30	130
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900
Storage Length (ft)	300		0		0		0	0
Storage Lanes	1		0		1		1	1
Taper Length (ft)	25				25		25	
Satd. Flow (prot)	1770	3564	0	0	1770	3539	1736	1583
Flt Permitted	0.950				0.950		0.950	
Satd. Flow (perm)	1770	3564	0	0	1770	3539	1736	1583
Right Turn on Red			Yes					Yes
Satd. Flow (RTOR)		2						141
Link Speed (mph)		30				30		30
Link Distance (ft)		950				374		318
Travel Time (s)		21.6				8.5		7.2
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Heavy Vehicles (%)	2%	1%	0%	2%	2%	2%	4%	2%
Shared Lane Traffic (%)								
Lane Group Flow (vph)	11	940	0	0	283	962	33	141
Turn Type	Prot	NA		Prot	Prot	NA	Prot	Prot
Protected Phases	1	6		5	5	2	8	8
Permitted Phases								
Detector Phase	1	6		5	5	2	8	8
Switch Phase								
Minimum Initial (s)	6.0	10.0		6.0	6.0	10.0	6.0	6.0
Minimum Split (s)	10.0	16.0		12.0	12.0	15.5	10.5	10.5
Total Split (s)	12.0	44.0		32.0	32.0	64.0	24.0	24.0
Total Split (%)	12.0%	44.0%		32.0%	32.0%	64.0%	24.0%	24.0%
Yellow Time (s)	3.0	4.0		3.5	3.5	4.5	3.5	3.5
All-Red Time (s)	1.0	2.0		2.5	2.5	1.0	1.0	1.0
Lost Time Adjust (s)	0.0	0.0		0.0	0.0	0.0	0.0	0.0
Total Lost Time (s)	4.0	6.0		6.0	5.5	4.5	4.5	4.5
Lead/Lag	Lead	Lag		Lead	Lead	Lag		
Lead-Lag Optimize?								
Recall Mode	None	C-Min		None	None	C-Min	None	None
Act Effct Green (s)	6.1	56.2			20.0	80.6	7.3	7.3
Actuated g/C Ratio	0.06	0.56			0.20	0.81	0.07	0.07
v/c Ratio	0.10	0.47			0.80	0.34	0.26	0.58
Control Delay	33.7	15.7			54.6	3.5	48.3	17.3
Queue Delay	0.0	0.0			0.0	0.0	0.0	0.0
Total Delay	33.7	15.7			54.6	3.5	48.3	17.3
LOS	C	B			D	A	D	B
Approach Delay								
		15.9				15.1		23.1
Approach LOS								
		B				B		C
Queue Length 50th (ft)								
	7	177			172	50		21
Queue Length 95th (ft)								
	m11	175			247	155		49
Internal Link Dist (ft)								
		870				294		238
Turn Bay Length (ft)								
	300							
Base Capacity (vph)								
	141	2005			460	2853		338
Starvation Cap Reductn								
	0	0			0	0		0
Spillback Cap Reductn								
	0	0			0	0		0
Storage Cap Reductn								
	0	0			0	0		0
Reduced v/c Ratio								
	0.08	0.47			0.62	0.34		0.10

**Intersection Summary**

Area Type: Other  
 Cycle Length: 100  
 Actuated Cycle Length: 100  
 Offset: 9 (9%), Referenced to phase 2:WBT and 6:EBT, Start of Green  
 Natural Cycle: 60  
 Control Type: Actuated-Coordinated  
 Maximum v/c Ratio: 0.80  
 Intersection Signal Delay: 16.0 Intersection LOS: B  
 Intersection Capacity Utilization 60.2% ICU Level of Service B  
 Analysis Period (min) 15  
 m Volume for 95th percentile queue is metered by upstream signal.

**Splits and Phases: 2: Ocean State Plaza Driveway & Cranberry Highway (Route 6/28)**



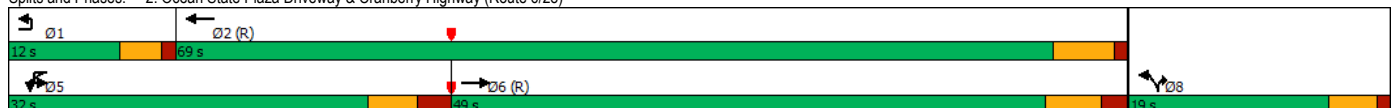


Lane Group	EBU	EBT	EBR	WBU	WBL	WBT	NBL	NBR
Lane Configurations	↔	↕			↕	↕	↕	↕
Traffic Volume (vph)	40	1060	30	145	175	1090	40	185
Future Volume (vph)	40	1060	30	145	175	1090	40	185
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900
Storage Length (ft)	300		0		0		0	0
Storage Lanes	1		0		1		1	1
Taper Length (ft)	25				25		25	
Satd. Flow (prot)	1770	3596	0	0	1779	3574	1752	1599
Flt Permitted	0.950				0.950		0.950	
Satd. Flow (perm)	1770	3596	0	0	1779	3574	1752	1599
Right Turn on Red			Yes					Yes
Satd. Flow (RTOR)		3						192
Link Speed (mph)		30				30		30
Link Distance (ft)		950				374		318
Travel Time (s)		21.6				8.5		7.2
Peak Hour Factor	0.92	0.97	0.97	0.92	0.96	0.96	0.93	0.93
Heavy Vehicles (%)	2%	0%	0%	2%	1%	1%	3%	1%
Shared Lane Traffic (%)								
Lane Group Flow (vph)	43	1124	0	0	340	1135	43	199
Turn Type	Prot	NA		Prot	Prot	NA	Prot	Prot
Protected Phases	1	6		5	5	2	8	8
Permitted Phases								
Detector Phase	1	6		5	5	2	8	8
Switch Phase								
Minimum Initial (s)	6.0	10.0		6.0	6.0	10.0	6.0	6.0
Minimum Split (s)	10.0	16.0		12.0	12.0	15.5	10.5	10.5
Total Split (s)	12.0	49.0		32.0	32.0	69.0	19.0	19.0
Total Split (%)	12.0%	49.0%		32.0%	32.0%	69.0%	19.0%	19.0%
Yellow Time (s)	3.0	4.0		3.5	3.5	4.5	3.5	3.5
All-Red Time (s)	1.0	2.0		2.5	2.5	1.0	1.0	1.0
Lost Time Adjust (s)	0.0	0.0		0.0	0.0	0.0	0.0	0.0
Total Lost Time (s)	4.0	6.0		6.0	5.5	4.5	4.5	4.5
Lead/Lag	Lead	Lag		Lead	Lead	Lag		
Lead-Lag Optimize?								
Recall Mode	None	C-Min		None	None	C-Min	None	None
Act Effct Green (s)	7.0	53.2			22.4	75.2	7.9	7.9
Actuated g/C Ratio	0.07	0.53			0.22	0.75	0.08	0.08
v/c Ratio	0.35	0.59			0.85	0.42	0.31	0.66
Control Delay	35.3	24.3			57.5	6.1	48.4	18.1
Queue Delay	0.0	0.0			0.0	0.0	0.0	0.0
Total Delay	35.3	24.3			57.5	6.1	48.4	18.1
LOS	D	C			E	A	D	B
Approach Delay		24.7				17.9		23.5
Approach LOS		C				B		C
Queue Length 50th (ft)	23	304			206	132	27	4
Queue Length 95th (ft)	m37	258			#309	218	58	68
Internal Link Dist (ft)		870				294		238
Turn Bay Length (ft)	300							
Base Capacity (vph)	141	1915			462	2686	254	396
Starvation Cap Reductn	0	0			0	0	0	0
Spillback Cap Reductn	0	0			0	0	0	0
Storage Cap Reductn	0	0			0	0	0	0
Reduced v/c Ratio	0.30	0.59			0.74	0.42	0.17	0.50

Intersection Summary

Area Type: Other  
 Cycle Length: 100  
 Actuated Cycle Length: 100  
 Offset: 99 (99%), Referenced to phase 2:WBT and 6:EBT, Start of Green  
 Natural Cycle: 60  
 Control Type: Actuated-Coordinated  
 Maximum v/c Ratio: 0.85  
 Intersection Signal Delay: 21.1 Intersection LOS: C  
 Intersection Capacity Utilization 73.2% ICU Level of Service D  
 Analysis Period (min) 15  
 # 95th percentile volume exceeds capacity, queue may be longer.  
 Queue shown is maximum after two cycles.  
 m Volume for 95th percentile queue is metered by upstream signal.

Splits and Phases: 2: Ocean State Plaza Driveway & Cranberry Highway (Route 6/28)





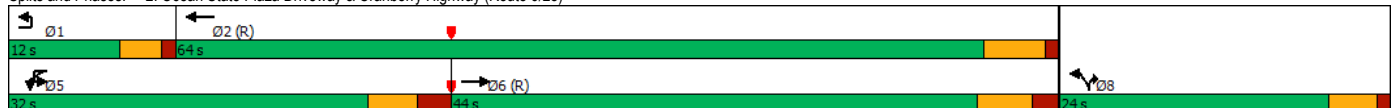


Lane Group	EBU	EBT	EBR	WBU	WBL	WBT	NBL	NBR
Lane Configurations	↓	↑↑			↑	↑↑	↑	↑
Traffic Volume (vph)	10	870	20	180	105	885	55	130
Future Volume (vph)	10	870	20	180	105	885	55	130
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900
Storage Length (ft)	300		0		0		0	0
Storage Lanes	1		0		1		1	1
Taper Length (ft)	25				25		25	
Satd. Flow (prot)	1770	3564	0	0	1770	3539	1736	1583
Flt Permitted	0.950				0.950		0.950	
Satd. Flow (perm)	1770	3564	0	0	1770	3539	1736	1583
Right Turn on Red			Yes					Yes
Satd. Flow (RTOR)		3						141
Link Speed (mph)		30				30		30
Link Distance (ft)		950				374		318
Travel Time (s)		21.6				8.5		7.2
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Heavy Vehicles (%)	2%	1%	0%	2%	2%	2%	4%	2%
Shared Lane Traffic (%)								
Lane Group Flow (vph)	11	968	0	0	310	962	60	141
Turn Type	Prot	NA		Prot	Prot	NA	Prot	Prot
Protected Phases	1	6		5	5	2	8	8
Permitted Phases								
Detector Phase	1	6		5	5	2	8	8
Switch Phase								
Minimum Initial (s)	6.0	10.0		6.0	6.0	10.0	6.0	6.0
Minimum Split (s)	10.0	16.0		12.0	12.0	15.5	10.5	10.5
Total Split (s)	12.0	44.0		32.0	32.0	64.0	24.0	24.0
Total Split (%)	12.0%	44.0%		32.0%	32.0%	64.0%	24.0%	24.0%
Yellow Time (s)	3.0	4.0		3.5	3.5	4.5	3.5	3.5
All-Red Time (s)	1.0	2.0		2.5	2.5	1.0	1.0	1.0
Lost Time Adjust (s)	0.0	0.0		0.0	0.0	0.0	0.0	0.0
Total Lost Time (s)	4.0	6.0		6.0	5.5	4.5	4.5	4.5
Lead/Lag	Lead	Lag		Lead	Lead	Lag		
Lead-Lag Optimize?								
Recall Mode	None	C-Min		None	None	C-Min	None	None
Act Effct Green (s)	6.1	54.2			21.1	79.7	8.2	8.2
Actuated g/C Ratio	0.06	0.54			0.21	0.80	0.08	0.08
v/c Ratio	0.10	0.50			0.83	0.34	0.42	0.55
Control Delay	35.4	15.4			56.1	3.8	52.2	15.7
Queue Delay	0.0	0.0			0.0	0.0	0.0	0.0
Total Delay	35.4	15.4			56.1	3.8	52.2	15.7
LOS	D	B			E	A	D	B
Approach Delay		15.7				16.6	26.6	
Approach LOS		B				B	C	
Queue Length 50th (ft)	7	167			189	57	37	0
Queue Length 95th (ft)	m11	172			273	158	75	55
Internal Link Dist (ft)		870				294	238	
Turn Bay Length (ft)	300							
Base Capacity (vph)	141	1932			460	2821	338	422
Starvation Cap Reductn	0	0			0	0	0	0
Spillback Cap Reductn	0	0			0	0	0	0
Storage Cap Reductn	0	0			0	0	0	0
Reduced v/c Ratio	0.08	0.50			0.67	0.34	0.18	0.33

Intersection Summary

Area Type: Other  
 Cycle Length: 100  
 Actuated Cycle Length: 100  
 Offset: 9 (9%), Referenced to phase 2:WBT and 6:EBT, Start of Green  
 Natural Cycle: 60  
 Control Type: Actuated-Coordinated  
 Maximum v/c Ratio: 0.83  
 Intersection Signal Delay: 17.0 Intersection LOS: B  
 Intersection Capacity Utilization 62.3% ICU Level of Service B  
 Analysis Period (min) 15  
 m Volume for 95th percentile queue is metered by upstream signal.

Splits and Phases: 2: Ocean State Plaza Driveway & Cranberry Highway (Route 6/28)



Intersection						
Int Delay, s/veh	0.1					
Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations	↑↑			↑↑↑		↑
Traffic Vol, veh/h	1140	40	0	1170	0	25
Future Vol, veh/h	1140	40	0	1170	0	25
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	-	-	-	-	-	0
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	92	92	92	92	92	92
Heavy Vehicles, %	1	1	2	2	0	0
Mvmt Flow	1239	43	0	1272	0	27
Major/Minor	Major1	Major2	Minor1			
Conflicting Flow All	0	0	-	-	-	641
Stage 1	-	-	-	-	-	-
Stage 2	-	-	-	-	-	-
Critical Hdwy	-	-	-	-	-	6.9
Critical Hdwy Stg 1	-	-	-	-	-	-
Critical Hdwy Stg 2	-	-	-	-	-	-
Follow-up Hdwy	-	-	-	-	-	3.3
Pot Cap-1 Maneuver	-	-	0	-	0	422
Stage 1	-	-	0	-	0	-
Stage 2	-	-	0	-	0	-
Platoon blocked, %	-	-	-	-	-	-
Mov Cap-1 Maneuver	-	-	-	-	-	422
Mov Cap-2 Maneuver	-	-	-	-	-	-
Stage 1	-	-	-	-	-	-
Stage 2	-	-	-	-	-	-
Approach	EB	WB	NB			
HCM Control Delay, s	0	0	14.1			
HCM LOS						B
Minor Lane/Major Mvmt	NBLn1	EBT	EBR	WBT		
Capacity (veh/h)	422	-	-	-		
HCM Lane V/C Ratio	0.064	-	-	-		
HCM Control Delay (s)	14.1	-	-	-		
HCM Lane LOS	B	-	-	-		
HCM 95th %tile Q(veh)	0.2	-	-	-		

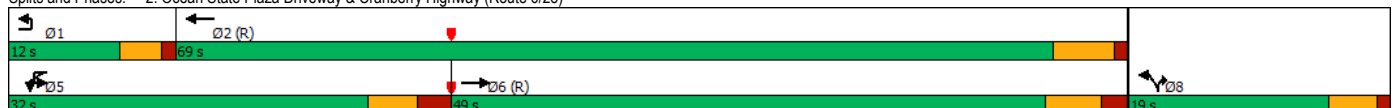


Lane Group	EBU	EBT	EBR	WBU	WBL	WBT	NBL	NBR
Lane Configurations	↔	↕	↕		↕	↕	↕	↕
Traffic Volume (vph)	40	1080	35	165	180	1090	65	185
Future Volume (vph)	40	1080	35	165	180	1090	65	185
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900
Storage Length (ft)	300		0		0		0	0
Storage Lanes	1		0		1		1	1
Taper Length (ft)	25				25		25	
Satd. Flow (prot)	1770	3592	0	0	1779	3574	1752	1599
Flt Permitted	0.950				0.950		0.950	
Satd. Flow (perm)	1770	3592	0	0	1779	3574	1752	1599
Right Turn on Red			Yes					Yes
Satd. Flow (RTOR)		4						174
Link Speed (mph)		30				30		30
Link Distance (ft)		950				374		318
Travel Time (s)		21.6				8.5		7.2
Peak Hour Factor	0.92	0.97	0.97	0.92	0.96	0.96	0.93	0.93
Heavy Vehicles (%)	2%	0%	0%	2%	1%	1%	3%	1%
Shared Lane Traffic (%)								
Lane Group Flow (vph)	43	1149	0	0	367	1135	70	199
Turn Type	Prot	NA		Prot	Prot	NA	Prot	Prot
Protected Phases	1	6		5	5	2	8	8
Permitted Phases								
Detector Phase	1	6		5	5	2	8	8
Switch Phase								
Minimum Initial (s)	6.0	10.0		6.0	6.0	10.0	6.0	6.0
Minimum Split (s)	10.0	16.0		12.0	12.0	15.5	10.5	10.5
Total Split (s)	12.0	49.0		32.0	32.0	69.0	19.0	19.0
Total Split (%)	12.0%	49.0%		32.0%	32.0%	69.0%	19.0%	19.0%
Yellow Time (s)	3.0	4.0		3.5	3.5	4.5	3.5	3.5
All-Red Time (s)	1.0	2.0		2.5	2.5	1.0	1.0	1.0
Lost Time Adjust (s)	0.0	0.0		0.0	0.0	0.0	0.0	0.0
Total Lost Time (s)	4.0	6.0		6.0	5.5	4.5	4.5	4.5
Lead/Lag	Lead	Lag		Lead	Lead	Lag		
Lead-Lag Optimize?								
Recall Mode	None	C-Min		None	None	C-Min	None	None
Act Effct Green (s)	7.0	51.1			23.4	74.1	9.0	9.0
Actuated g/C Ratio	0.07	0.51			0.23	0.74	0.09	0.09
v/c Ratio	0.35	0.63			0.88	0.43	0.45	0.66
Control Delay	36.1	24.4			59.7	6.6	51.3	20.4
Queue Delay	0.0	0.0			0.0	0.0	0.0	0.0
Total Delay	36.1	24.4			59.7	6.6	51.3	20.4
LOS	D	C			E	A	D	C
Approach Delay		24.8				19.6		28.5
Approach LOS		C				B		C
Queue Length 50th (ft)	25	285			220	141	43	15
Queue Length 95th (ft)	m36	266			#359	227	84	81
Internal Link Dist (ft)		870				294		238
Turn Bay Length (ft)	300							
Base Capacity (vph)	141	1837			462	2647	254	380
Starvation Cap Reductn	0	0			0	0	0	0
Spillback Cap Reductn	0	0			0	0	0	0
Storage Cap Reductn	0	0			0	0	0	0
Reduced v/c Ratio	0.30	0.63			0.79	0.43	0.28	0.52

Intersection Summary

Area Type: Other  
 Cycle Length: 100  
 Actuated Cycle Length: 100  
 Offset: 99 (99%), Referenced to phase 2:WBT and 6:EBT, Start of Green  
 Natural Cycle: 60  
 Control Type: Actuated-Coordinated  
 Maximum v/c Ratio: 0.88  
 Intersection Signal Delay: 22.5 Intersection LOS: C  
 Intersection Capacity Utilization 75.3% ICU Level of Service D  
 Analysis Period (min) 15  
 # 95th percentile volume exceeds capacity, queue may be longer.  
 Queue shown is maximum after two cycles.  
 m Volume for 95th percentile queue is metered by upstream signal.

Splits and Phases: 2: Ocean State Plaza Driveway & Cranberry Highway (Route 6/28)



Intersection						
Int Delay, s/veh	0.1					
Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations	↑↑			↑↑↑		↑
Traffic Vol, veh/h	1390	40	0	1435	0	25
Future Vol, veh/h	1390	40	0	1435	0	25
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	-	-	-	-	-	0
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	92	92	92	92	92	92
Heavy Vehicles, %	1	1	1	1	0	0
Mvmt Flow	1511	43	0	1560	0	27
Major/Minor	Major1	Major2	Minor1			
Conflicting Flow All	0	0	-	-	-	777
Stage 1	-	-	-	-	-	-
Stage 2	-	-	-	-	-	-
Critical Hdwy	-	-	-	-	-	6.9
Critical Hdwy Stg 1	-	-	-	-	-	-
Critical Hdwy Stg 2	-	-	-	-	-	-
Follow-up Hdwy	-	-	-	-	-	3.3
Pot Cap-1 Maneuver	-	-	0	-	0	344
Stage 1	-	-	0	-	0	-
Stage 2	-	-	0	-	0	-
Platoon blocked, %	-	-	-	-	-	-
Mov Cap-1 Maneuver	-	-	-	-	-	344
Mov Cap-2 Maneuver	-	-	-	-	-	-
Stage 1	-	-	-	-	-	-
Stage 2	-	-	-	-	-	-
Approach	EB	WB	NB			
HCM Control Delay, s	0	0	16.4			
HCM LOS						C
Minor Lane/Major Mvmt	NBLn1	EBT	EBR	WBT		
Capacity (veh/h)	344	-	-	-		
HCM Lane V/C Ratio	0.079	-	-	-		
HCM Control Delay (s)	16.4	-	-	-		
HCM Lane LOS	C	-	-	-		
HCM 95th %tile Q(veh)	0.3	-	-	-		