

Submitted to:

Massachusetts Department of Conservation and Recreation



Nantasket Beach Reservation Traffic Analysis Report

Hull, MA



Submitted by:



THE Louis Berger Group, INC.

April 2014

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Executive Summary

This report assesses traffic flow and pedestrian/bicycle interaction at and around the Nantasket Beach Reservation in Hull, Massachusetts, during the summer months. The study area was analyzed for base year 2013 and forecasted year 2033.

Key findings consist of the following:

- **Stop-controlled Intersections:** The intersection of Nantasket Avenue, Phipps Street and Mountford Road is currently operating at a failing level of service during the Saturday peak hour. Calculated delay during this time period approaches two minutes for travelers on Phipps Street. Based on accounts from the Massachusetts Department of Conservation and Recreation's (DCR) staff, this delay is due to circulating traffic that travels west on Hull Shore Drive in search of parking. When no empty spaces are found, cars circle back east on Nantasket Avenue. Recommended mitigation is to improve the signing system for parking at DCR parking lots. In recent years DCR has utilized four variable message signs (VMS) at select parking lots to alert drivers when lots are full. Adding VMS boards at other parking lot entrances and updating the signs regularly will allow drivers to be aware of empty spaces and spend less time circulating.

All other stop-controlled intersections are currently operating at Level of Service (LOS) "B" or better. A LOS "B" is classified as 'reasonably free flow'.¹

- **Signalized Intersections:** All signalized intersections are currently operating at a LOS "C" or better during the Saturday peak hour. A LOS "C" is classified as stable flow and considered a passing level of service. If signalized intersections are found to be a bottleneck in future years updated fixed timing may decrease delays. Actuated signal timing systems are another option if acceptable levels of service are not achieved in the field. Actuated signal timing allows sensors to notify the controller of waiting vehicles to decrease unnecessary stop delay.
- **Pedestrian Crossings:** Crosswalk 17, located on Hull Shore Drive near several restaurants (Hull's Kitchen, Dry Dock, and Daddy's Dogs), was the most heavily used crosswalk with 151 pedestrians crossing during the Saturday peak hour. This crosswalk is a viable candidate for a pedestrian signal. Installing a push button activated flashing beacon and warning sign at this location would encourage safe crossing over the two-lane Hull Shore Drive and allow larger groups of people to gather and cross at the same time.

Crosswalks 7 to 10 (located near the arcades on Nantasket Avenue) were well utilized during the Saturday peak hour with a total of 286 pedestrians accessing the beach and amenities in this area. This location may benefit from combining Crosswalks 8 and 9 which both lead to the arcade buildings. A total of 175 pedestrians would be expected to

¹ See Appendix A for a complete definition of all LOSs.





use this proposed combined crossing during the Saturday peak hour. A push button activated flashing beacon and warning sign at this location will encourage safe crossing and allow larger groups of people to gather and cross at the same time.

- **Bicycle Traffic at Crosswalks:** The number of bicyclists crossing the street was much lower than the number of pedestrians. The highest bicycle volumes crossing a roadway were seen at Crosswalks 16 to 21, which are all located on Hull Shore Drive. In the Reservation Master Plan (currently in preparation) a bicycle route will be signed and striped in the area. This change is expected to focus bicycle crossings at a few key crosswalks.
- **Traffic Alternatives for Improvements to the Maintenance Yard:** Aside from the existing conditions, two alternatives were examined to re-configure traffic in the vicinity of the yard and thereby increase yard space². Specifically, the traffic alternatives being considered at the intersection(s) of Hull Shore Drive, Nantasket Avenue and George Washington Boulevard are as follows:
 - *Alternative A:* The existing condition remains. (Estimated cost: \$0)
 - *Alternative B:* Realignment of the cut-through portion of roadway from George Washington Boulevard westbound. (Estimated cost: \$320,000)
 - *Alternative C:* Relocation of the cut-through portion of roadway from George Washington Boulevard westbound to the current intersection of George Washington Boulevard and Nantasket Avenue. The southeastern terminus of Hull Shore Drive is also shifted to align with this proposed intersection. (Estimated cost: \$1,000,000)

From a traffic capacity perspective all three of the intersection alternatives will operate at LOS “B” during the current year and at LOS “C” in year 2033. Alternative C will provide the largest amount of yard space for maintenance operations. The decision to move forward with any of the alternatives will need to consider factors such as property ownership, concerns of local residents, and long-term plans for the community.

² See “Facilities Utilization Report” for further details, The Louis Berger Group, Inc., April 2014.





1.0 Introduction

This traffic analysis report assesses traffic flow and pedestrian/bicycle interaction at and around the Nantasket Beach Reservation (Reservation) during the summer months. Additionally, two proposed roadway alignment alternatives were analyzed to increase space at DCR's maintenance yard for the Reservation. The proposed roadway alignments focus on the intersection of George Washington Boulevard, Nantasket Avenue and Hull Shore Drive.

2.0 Traffic, Bicycle and Pedestrian Volumes

2.1 Current Conditions

Traffic conditions at the Reservation were counted in 2006 and in 2013; the full traffic count data packages are provided in Appendix B:

- **2006 Traffic Counts:** In 2006 traffic volumes and truck classifications were counted on Thursday, August 3rd from 4 pm to 6 pm and Saturday, August 5th from 11 am to 2 pm at the following intersections:
 1. Manomet Avenue, Beach Avenue, and Phipps Street
 2. Nantasket Avenue, Mountford Road, and Phipps Street
 3. Nantasket Avenue, Water Street, and Bay Street
 4. Nantasket Avenue and George Washington Boulevard
 5. Nantasket Avenue and Bay Street
 6. George Washington Boulevard and Bay Street
 7. Cut-through portion of roadway from George Washington Boulevard (referred to herein as 'Cut-through Road') and Nantasket Avenue
 8. Nantasket Avenue and Wharf Avenue
 9. Nantasket Avenue and Park Avenue

The Saturday counts occurred during low tide on a seasonably warm day. The 2006 Saturday and evening weekday peak hour counts and truck percentages are shown in Figures 1 and 2.

- **2013 Traffic Counts:** To supplement the 2006 counts in the area of the maintenance yard, additional counts were performed at the intersection of George Washington Boulevard and Bay Street on Wednesday, September 4th, 2013 from 4 pm to 6 pm and Saturday, September 7th from 11 am to 2 pm. The 2006 counts were found to be significantly higher than the corresponding 2013 counts presumably due to the time of year, weather conditions, and the economic climate. The 2013 counts are included in Figures 1 and 2.

Traffic volumes counted in 2006 were used to analyze 2013 conditions, also referred to as 'existing conditions' throughout this report. This conservatively assumes that traffic has remained constant rather than decreased in the area.



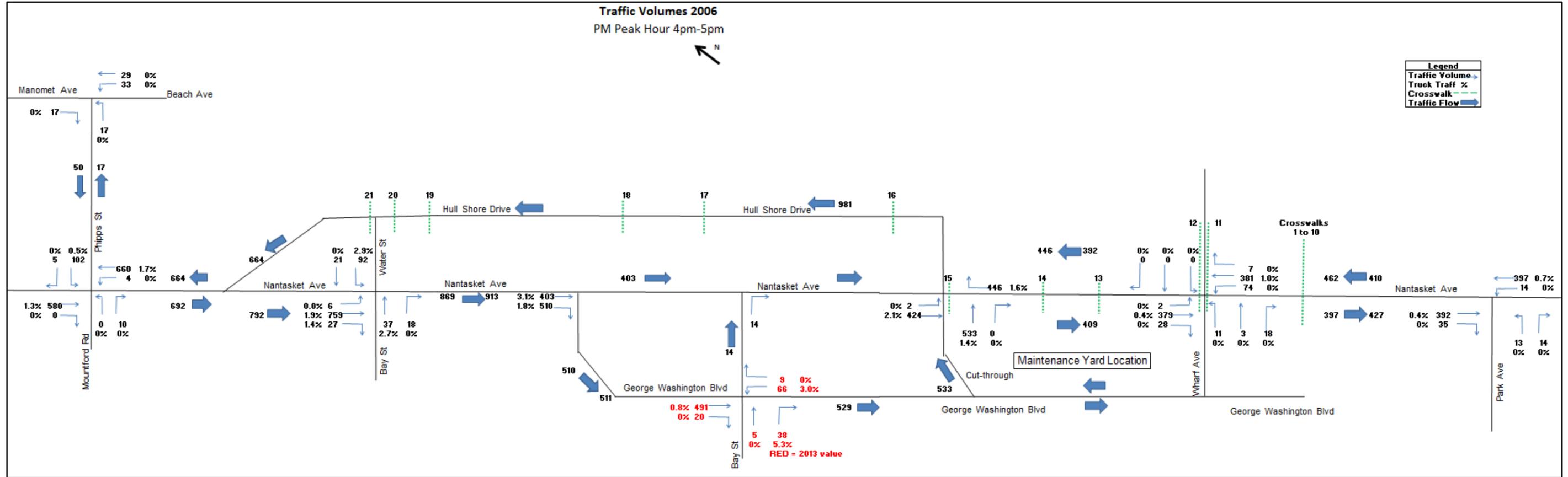


Figure 1: Weekday Evening Peak Hour Traffic Counts, Truck Percentages and Crosswalk Locations, for years 2006 (in black) and 2013 (in red)

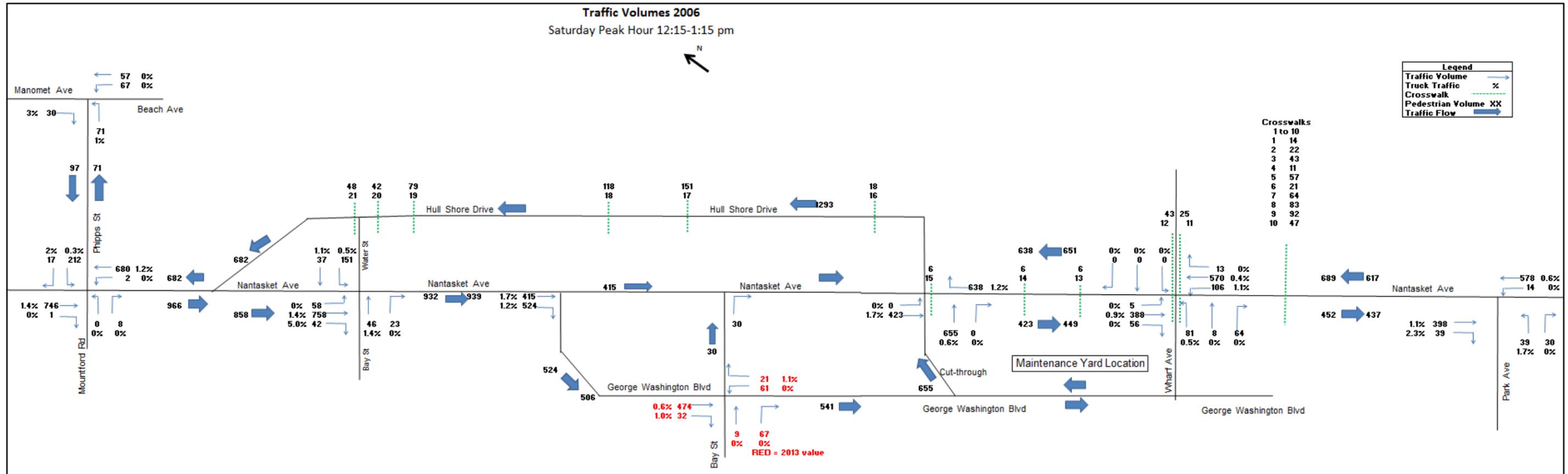


Figure 2: Saturday Peak Hour Traffic Counts, Truck Percentages and Crosswalk Locations, for years 2006 (in black) and 2013 (in red)



Pedestrians and bicyclists using selected crosswalks in the area were counted on Saturday, August 5th, 2006 from 11 am to 2 pm. The crosswalk numbering system and approximate locations are shown in Figure 3. Crosswalk 3 is located on the southern end of Nantasket Avenue, just north of the intersection with Berkley Road. Crosswalk 15 is located at the signalized intersection of Nantasket Avenue and the Cut-through Road. Crosswalk 21 is located on Hull Shore Drive just north of Water Street. The remaining crosswalks increase numerically between these locations.

Pedestrians and bicycle counts (Tables 1 and 2) were completed in hourly increments. They cannot be directly compared to the traffic counts completed in 15-minute increments. Thus, the pedestrian and bicycle volumes counted between 12 pm and 1 pm were used as the peak hour volumes in this report since this peak hour was the closest to the traffic volume peak hour.

The pedestrian counts are very high with a total of 996 pedestrians using a crosswalk during the 12 pm to 1 pm hour. The most heavily used crosswalk counted was number 17 with 151 pedestrians crossing during the peak hour. Crosswalk 17 is located on Hull Shore Drive near several restaurants including Hull's Kitchen, Dry Dock, and Daddy's Dogs.

Overall, the bicycle counts produced much lower volumes than the pedestrian counts. The highest bicycle volumes were seen at Crosswalks 16 through 21 which are all located on Hull Shore Drive. As part of the Reservation Master Plan currently being drafted a bicycle route will be signed and striped in the area. This change is expected to focus bicycle crossings at a few key crosswalks.

2.2 Growth Rate Calculations

To estimate annual growth rate historic changes in traffic volumes and population were researched for Hull and similar Massachusetts beach communities. The average annual traffic growth for all roadway locations researched from 2000 to 2009 was -1.53% (see Appendix C, Growth Rate Calculations). Four towns were considered in the roadway locations and, when averaged by town, the only municipality with a positive vehicle growth rate was Beverly, MA with an average rate of 0.75%.

Separately, the 10-year population growth rate, starting in 1900, for the Town of Hull was analyzed (Appendix C). Since 1970, the highest decadal population growth rate was recorded from 1980 to 1990 as 0.75%.

Based on these regionally specific numbers, and considering the well-developed conditions of the town's land, a conservative annual growth rate of 0.75% per year was chosen to project the 2033 conditions.

2.3 Forecasted Conditions

As stated previously, volumes counted in 2006 were used to analyze 2013 conditions, also referred to as 'existing conditions' throughout this report. This conservatively assumes that traffic volumes have remained constant rather than decreased in the area.

A future year condition was also analyzed as a planning tool to ensure that changes made will accommodate traffic for years to come. The future year analyzed was 2033 and the growth rate of 0.75% per year was used to inflate 2013 volumes to 2033 volumes. The 2033 volumes for the PM evening peak hour and Saturday peak hour are shown in Figures 4 and 5, respectively.





Figure 3: Location and Numbering of Crosswalks





Table 1: Saturday Pedestrian Counts		
Crosswalk #	Crossing Location	Pedestrian Volume
1	Ocean Place	14
2	Atherton Road	22
3	Berkley Road	43
4	Park Avenue	11
5	Condominium Building	57
6	Condominium Parking Lot	21
7	Carousels and Ships Gift Shop	64
8	Dream Machine Arcade	83
9	Miniature Golf Course	92
10	Carousel	47
11	Wharf Avenue – East Side	25
12	Wharf Avenue – West Side	43
13	Dormitory Building	6
14	Maintenance Garages	6
15	Hull Shore Drive – East Side	6
16	Parking Lot – 1	18
17	Parking Lot – 2	151
18	Dry Dock Restaurant	118
19	Nantasket Beach Resort	79
20	Water Street – East Side	42
21	Water Street – West Side	48

Table 2: Saturday Bicycle Counts	
Crosswalk #	Pedestrian Volume
1 and 2	7
3 and 4	12
5 and 6	8
7 and 8	7
9, 10 and 11	9
12 and 13	9
14 and 15	10
16 and 17	20
18 and 19	20
20 and 21	19



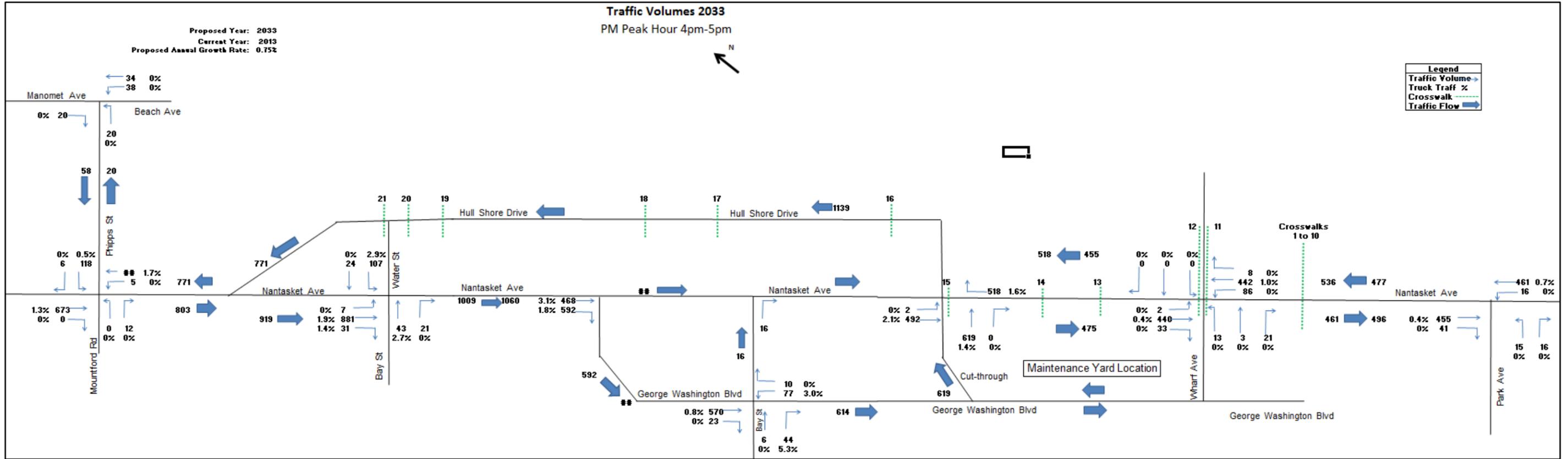


Figure 4: Weekday Evening Peak Hour Traffic Counts and Truck Percentages for year 2033

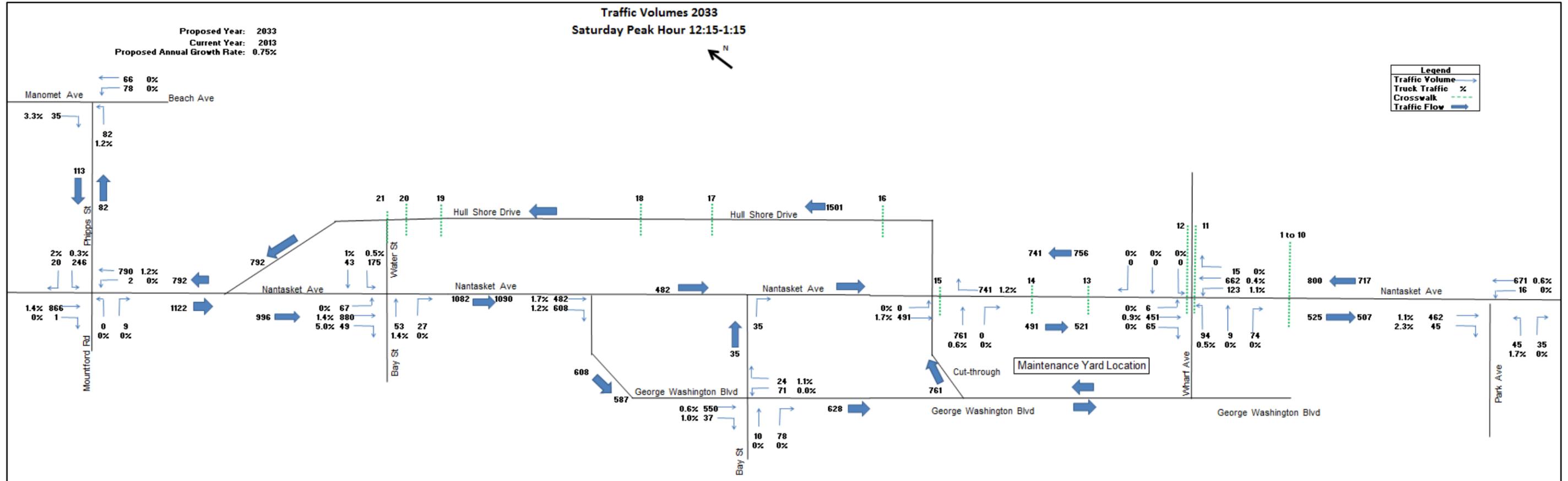


Figure 5: Saturday Peak Hour Traffic Counts and Truck Percentages for year 2033



3.0 Traffic Analysis

3.1 Assumptions

A number of assumptions based on input from local DCR staff and traffic engineering principles were made to complete the analysis. These assumptions are stated below.

1. A uniform truck percentage of 0.5% was used for the study area.
2. A speed limit of 30 miles per hour (mph) with an actual desired speed of travel ranging from 27 mph to 33 mph was implemented for the study area.
3. If a pedestrian is waiting in a crosswalk zone, vehicles approaching the crosswalk will yield to the pedestrian. This is true unless the crosswalk is at a signal-controlled intersection, in which case the pedestrian must wait until the walk signal flashes to cross.
4. Pedestrians approach each crosswalk as individuals rather than in a group. This is a worst-case scenario.
5. Pedestrian and bicyclist directions of travel were randomly assigned at each crosswalk.
6. All traffic signals within the system were programmed with 'fixed timing.'
7. All signal timings were optimized.
8. The traffic volumes between intersections were not balanced due to a high number of entrances and exits for both parking lots and businesses.
9. The intersection of George Washington Boulevard and Wharf Avenue was not counted. The traffic movement percentages applied at this location are based on known volumes on adjacent legs.

All assumptions were intended to be both conservative and reasonable in order to accurately reflect summer conditions at and around the Reservation.

3.2 Signal Timing and Lane Configurations

Each intersection was analyzed based on the geometric layout and control type (i.e., stop sign or traffic signal) shown in the following figures. The letter "S" in a circle indicates that the intersection is controlled by a traffic signal. For signal controlled intersections, the signal timing assumptions are stated as well.

The geometry and traffic control locations at the intersection of Manomet Avenue, Beach Avenue and Phipps Street are shown in Figure 6; at the intersection of Nantasket Avenue, Phipps Street and Mountford Road in Figure 7; and at the intersection of Nantasket Avenue, Water Street and Bay Street in Figure 8.

The fixed signal timing for the Nantasket Avenue, Water Street and Bay Street signal (Figure 9) was assumed to be identical during both the weekday evening peak hour and Saturday afternoon peak hours. Water Street represents the north-south roadway in the signal timings.

The geometry and traffic control locations at the intersection of Hull Shore Drive and Water Street are shown in Figure 10; at the intersections of Nantasket Avenue, George Washington Boulevard and Bay Street in Figure 11; and the intersection of Nantasket Avenue, Hull Shore Drive, and the Cut-through Road from George Washington Boulevard in Figure 12.





The fixed signal timing assumed for the Nantasket Avenue, Hull Shore Drive and Cut-through Road signal is shown in Figure 13 during the weekday evening peak hour and in Figure 14 during the Saturday peak hour. Nantasket Avenue represents the east-west roadway in the signal timings.

The geometry and traffic control locations at the intersection of Nantasket Avenue, Wharf Avenue, and a parking lot entrance are shown in Figure 15.

The fixed signal timing assumed for the Nantasket Avenue, Wharf Avenue, and parking lot entrance signal during the Saturday peak hour is shown in Figure 16 during the weekday evening peak hour and in Figure 17 during the Saturday peak hour. Nantasket Avenue represents the east-west roadway in the signal timings.

The geometry and traffic control location at the intersection of Nantasket Avenue and Park Avenue is shown in Figure 18.

The traffic analysis was completed based on the volumes, assumptions, lane use configurations, traffic control devices, signal timings and layouts stated in this report.

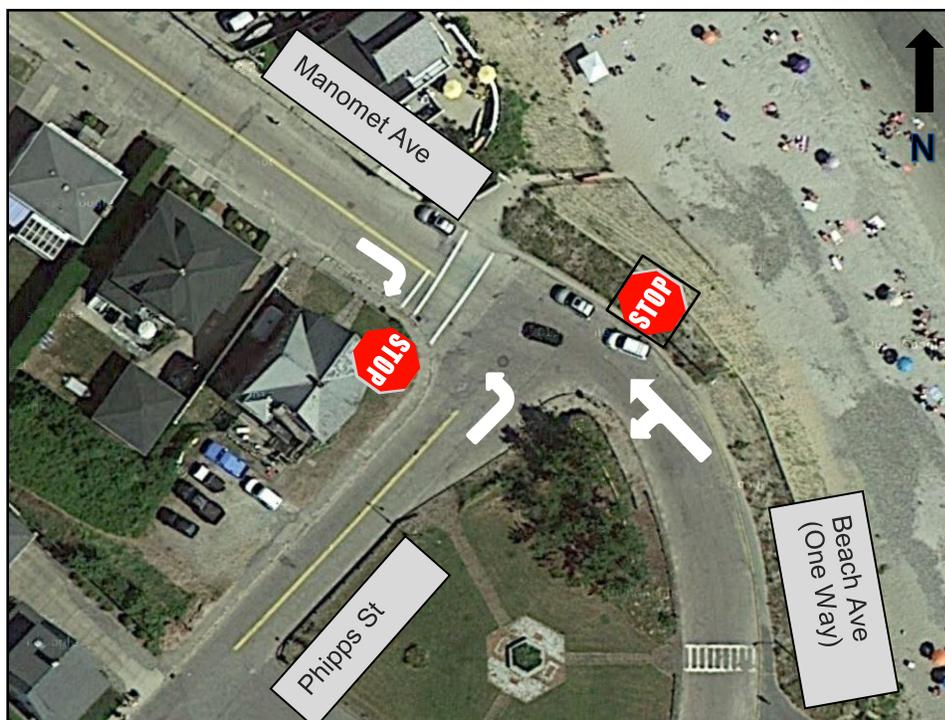


Figure 6: Manomet Avenue, Beach Avenue, and Phipps Street

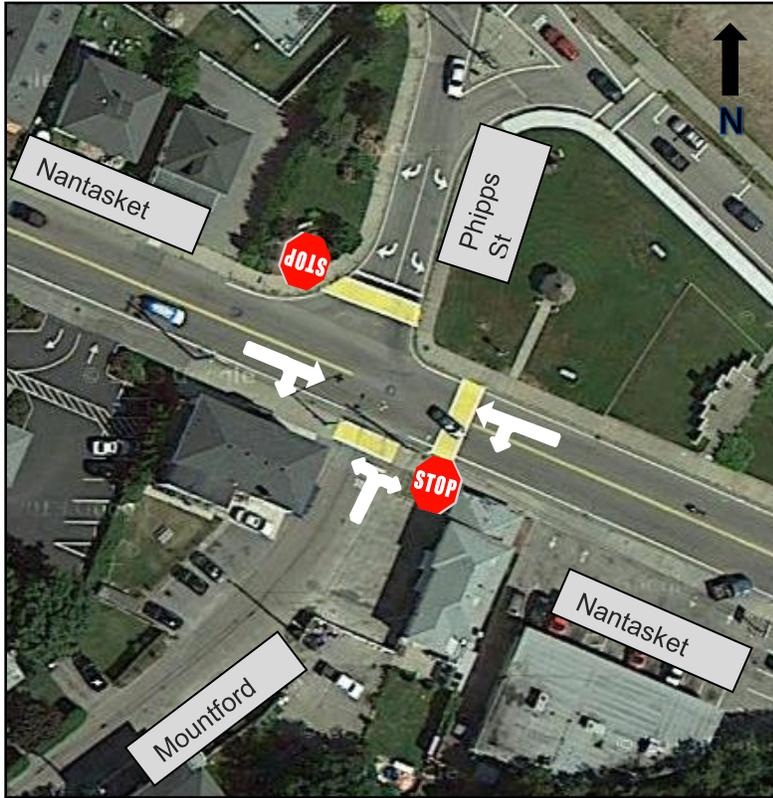


Figure 7: Nantasket Avenue, Phipps Street, and Mountford Road

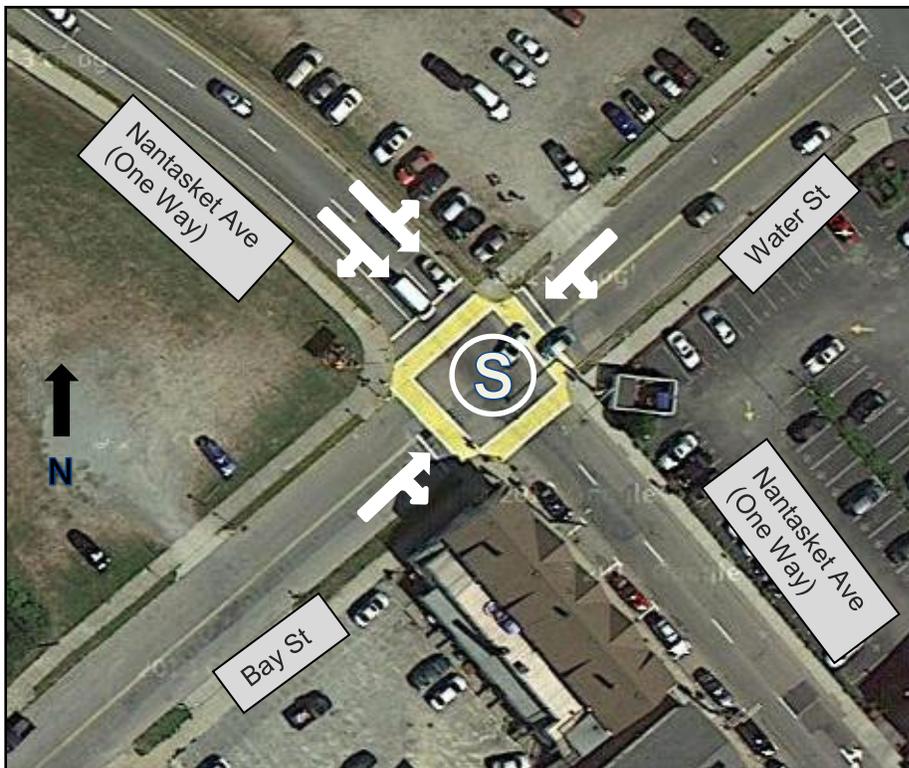


Figure 8: Nantasket Avenue, Water Street, and Bay Street. 'S' = signalized.



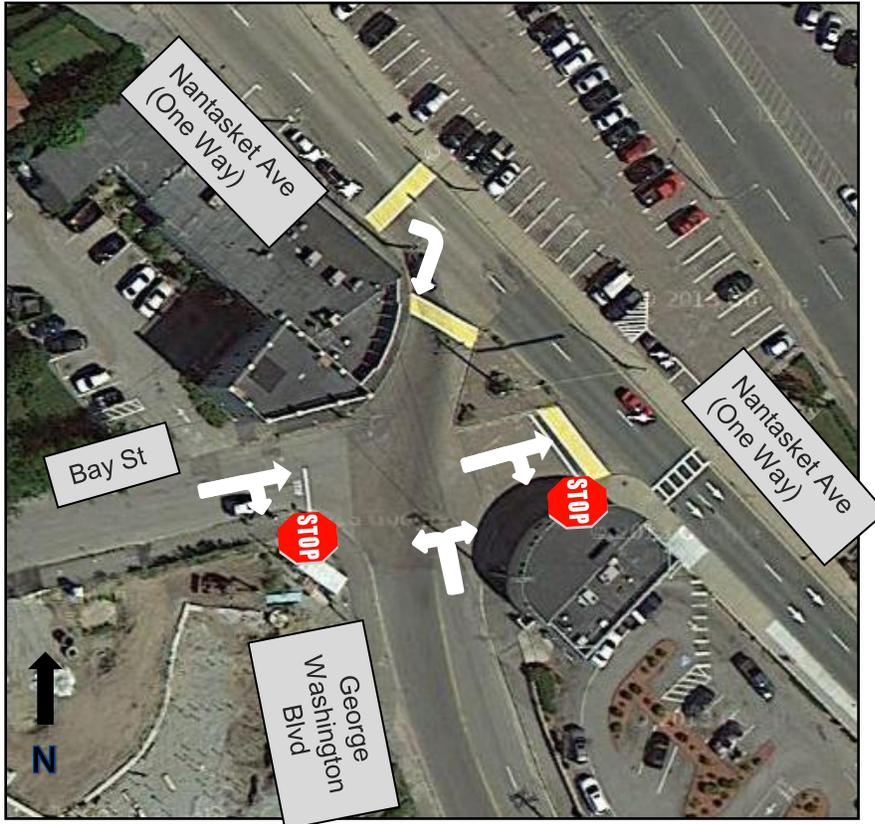


Figure 11: Intersections of Nantasket Avenue, George Washington Boulevard, and Bay Street

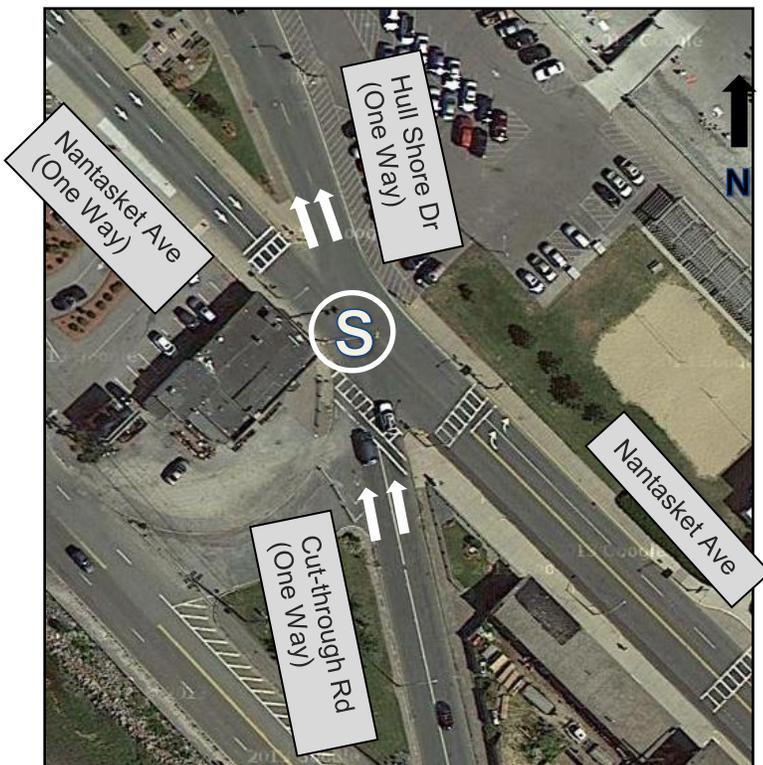


Figure 12: Intersection of Nantasket Avenue, Hull Shore Drive, and Cut-through Road. 'S' = signalized.



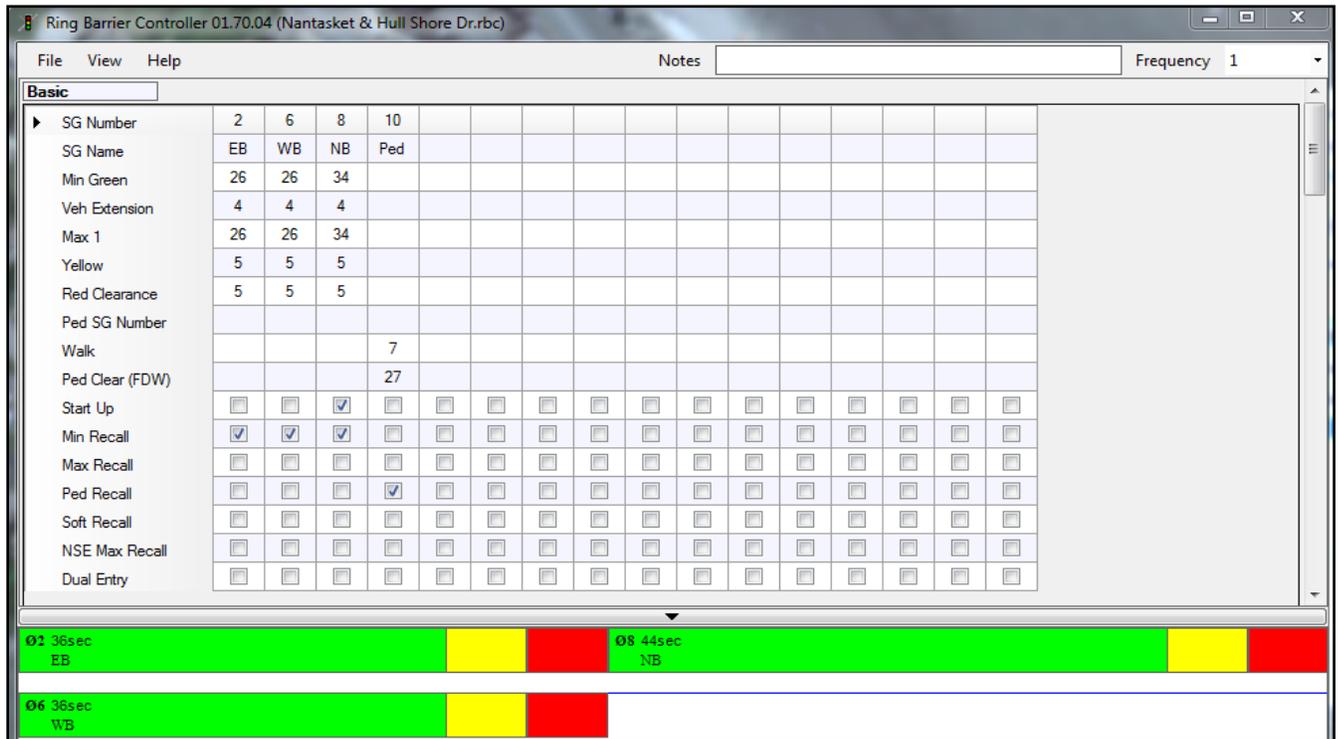


Figure 13: Nantasket Avenue, Hull Shore Drive, and Cut-through Road (PM signal timing)

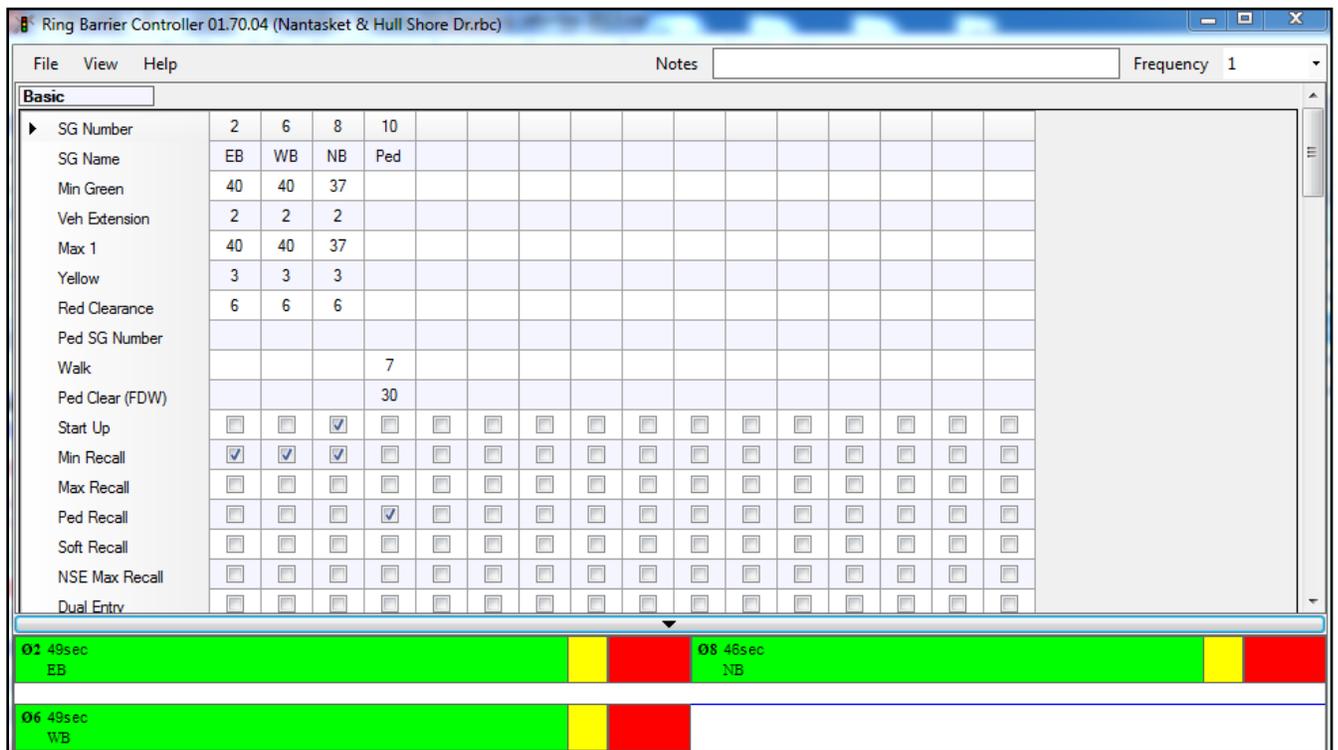


Figure 14: Nantasket Avenue, Hull Shore Drive, and Cut-through Road (Saturday signal timing)



3.3 2013 and 2033 Traffic Results

The traffic analysis program VISSIM, manufactured by PTVAmerica, was used to analyze vehicle movements and pedestrian interaction throughout the study area. Traffic operations at all intersections are reported based on methods outlined in the Highway Capacity Manual (HCM). Results are reported in three ways: average delay experienced by a vehicle, 95th percentile queue length and Level of Service (LOS), which is based on delay. LOS is reported as letter grades with a rating system of A through F with A being the best and F being the worst. The HCM lists the following definitions for each grade (see Appendix A for a complete definition):

- A = Free flow
- B = Reasonably free flow
- C = Stable flow
- D = Approaching unstable flow
- E = Unstable flow
- F = Forced or breakdown flow

LOS delay values are slightly different for signalized and unsignalized intersections. This is because drivers are more willing to accept a slightly longer delay at signalized intersections, realizing that they will inevitably 'get their turn.' The LOS criteria for signalized intersections are shown in Table 3 with corresponding delay values. The LOS criteria for stop-controlled (unsignalized) intersections are shown in Table 4 with corresponding delay values.

Table 3: LOS Criteria for Signalized Intersections	
Level of Service	Delay per Vehicle (sec)
A	0.0 to 10.0
B	10.1 to 20.0
C	20.1 to 35.0
D	35.1 to 55.0
E	55.1 to 80.0
F	Greater than 80.0

Table 4: LOS Criteria for Stop-controlled Intersections	
Level of Service	Delay per Vehicle (sec)
A	0.0 to 10.0
B	10.1 to 15.0
C	15.1 to 25.0
D	25.1 to 35.0
E	35.1 to 50.0
F	Greater than 50.0





The following pages document the results of the 2013 and 2033 weekday PM peak hour and Saturday afternoon peak hour analysis. The results are reported in queue length (by number of cars), delay (seconds per vehicle), and LOS with existing conditions.

Table 5 summarizes the delay and LOS results for the stop-controlled intersections. When calculating delay for unsignalized intersections, the free-flowing movements are disregarded. Delay reported applies to the stopped movements only. Table 6 summarizes the delay and LOS results for the signalized intersections.

Table 5: Stop-Controlled Intersections Delay (in seconds per vehicle) and LOS					
Intersection	Year	Weekday PM		Saturday Afternoon	
		Delay	LOS	Delay	LOS
Manomet Ave, Beach Ave, and Phipps St	2013	5.9	A	6.7	A
	2033	6.7	A	9.2	A
Nantasket Ave, Phipps St, and Mountford Rd	2013	15.8	C	107	F
	2033	20.6	C	504	F
Nantasket Ave, George Washington Blvd, and Bay St	2013	8.5	A	8.8	A
	2033	8.4	A	8.9	A
Hull Shore Dr and Water St	2013	6.5	A	8.9	A
	2033	7.7	A	10.1	B
Nantasket Ave and Park Ave	2013	7.9	A	9.4	A
	2033	8.8	A	11.7	B

Table 6: Signalized Intersections Delay (in seconds per vehicle) and LOS					
Intersection	Year	Weekday PM		Saturday Afternoon	
		Delay	LOS	Delay	LOS
Nantasket Ave, Water St, and Bay St	2013	12.8	B	14.7	B
	2033	14.1	B	17.3	B
Nantasket Avenue, Hull Shore Dr, and Cut-through Rd	2013	18.8	B	24.2	C
	2033	19.7	B	30.5	C
Nantasket Ave and Wharf Ave	2013	10.6	B	11.1	B
	2033	11.1	B	12.3	B

The delays and levels of service in Tables 5 and 6 indicate a number of trends:

1. Traffic flow during the Saturday peak hour operates at a lower LOS with higher delays than during the weekday evening peak hour. This is due to the higher volumes counted during the Saturday peak hour.





2. The 2033 peak hours operate at a lower LOS and higher delays than the 2013 peak hours. This is based on the higher volumes forecasted for the future year.
3. All signalized intersections within the study area are operating at acceptable levels of service and are expected to continue to do so through the year 2033.
4. The intersection of Nantasket Avenue, Phipps Street and Mountford Road is currently operating at a LOS "C" during the weekday evening peak hour and a LOS "F" during the Saturday peak hour. The analysis shows that the stop-controlled Phipps Street approach is the cause of these extended delays of almost 2 minutes in the 2013 analysis. Based on accounts from the local DCR staff these high volumes and low levels of service are due to circulating traffic that travels west on Hull Shore Drive looking for parking; finding no empty spaces, cars circle back east on Nantasket Avenue.

In addition to delay, the 95th percentile queue length was measured at each approach leg impacted by a traffic control device. The 95th percentile queue length measures 95% of the maximum queue (i.e., 95% of the time the queue will be this length or shorter).

The following figures illustrate the number of vehicles in each 95th percentile queue resulting from the 2013 Saturday analysis. These results were verified by local DCR staff. The figures are not drawn to scale and are approximations only.





Intersection of Manomet Avenue, Beach Avenue and Phipps Street: The calculated 2013 Saturday peak hour 95th percentile queue lengths at this intersection are shown in Figure 19. The queue at the Beach Avenue stop sign during the 2013 Saturday peak hour is 2 car lengths. Also shown in Figure 19 is the 2-car queue at the Manomet Avenue stop sign during the 2013 Saturday peak hour. The remaining calculated queues are displayed in Table 7. The queues recorded for both stop-controlled approaches are minimal in all four scenarios analyzed.

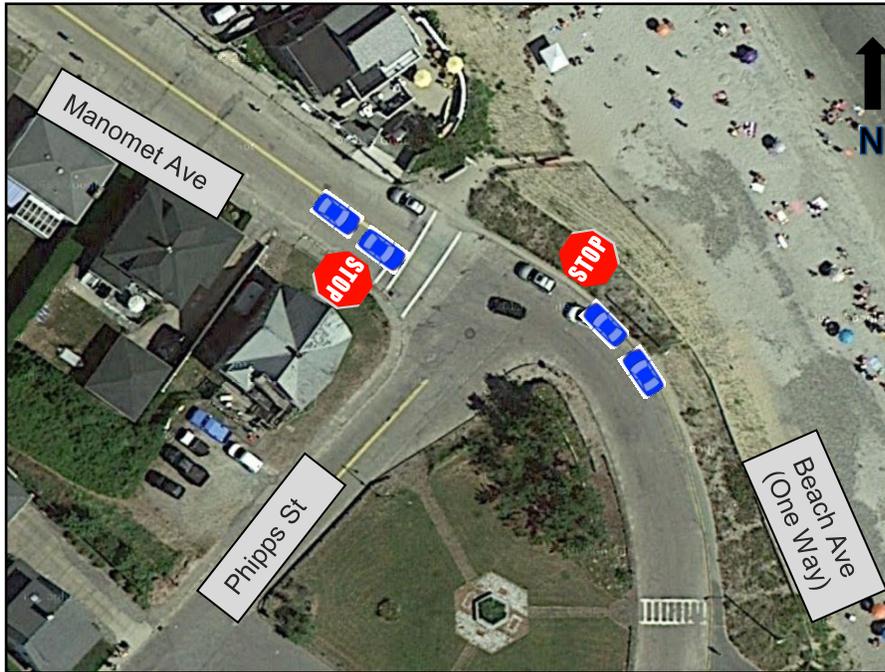


Figure 19: Manomet Avenue, Beach Avenue, and Phipps Street; 2013 Saturday Queue Lengths

Table 7: Manomet Ave, Beach Ave, and Phipps Street Intersection 95 th Percentile Queue Lengths*				
Approach	Weekday PM		Saturday Afternoon	
	2013	2033	2013	2033
Beach Avenue	1	2	2	2
Manomet Avenue	1	1	2	2

*Measured in number of cars





Intersection of Nantasket Avenue, Phipps Street and Mountford Road: The calculated 2013 Saturday peak hour 95th percentile queue lengths at this intersection are shown in Figure 20. The queue at the Phipps Street stop sign during the 2013 Saturday peak hour is 26 car lengths. Also shown in Figure 20 is the 1 car queue at the Mountford Road stop sign during the 2013 Saturday peak hour. The remaining calculated queues are displayed in Table 8.

The 26 car queue on Phipps Street during the 2013 Saturday peak hour coincides with a LOS “F”. As stated previously, based on accounts from local DCR staff, this is due to circulating traffic that travels west on Hull Shore Drive looking for parking and then circles back after not finding empty spaces.

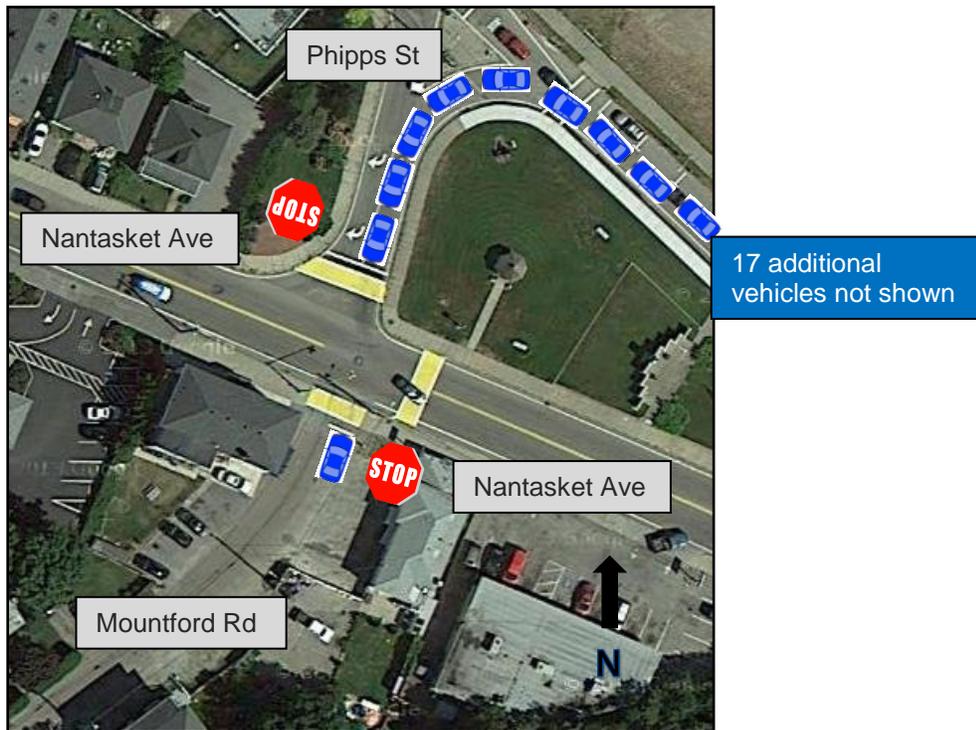


Figure 20: Nantasket Avenue, Phipps Street, and Mountford Road; 2013 Saturday Queue Lengths

Table 8: Nantasket Avenue, Phipps Street, and Mountford Road Intersection 95 th Percentile Queue Lengths*				
Approach	Weekday PM		Saturday Afternoon	
	2013	2033	2013	2033
Phipps Street	3	6	26	38
Mountford Road	1	1	1	1

*Measured in number of cars



Intersection of Nantasket Avenue, Water Street and Bay Street: The calculated 2013 Saturday peak hour 95th percentile queue lengths at this intersection are shown in Figure 21. The remaining calculated queues are displayed in Table 9. The queues recorded are the 95th percentile length and will not occur during every signal cycle. Slightly shorter queues and delays may be achieved by installing an actuated signal system if deemed necessary in the future.

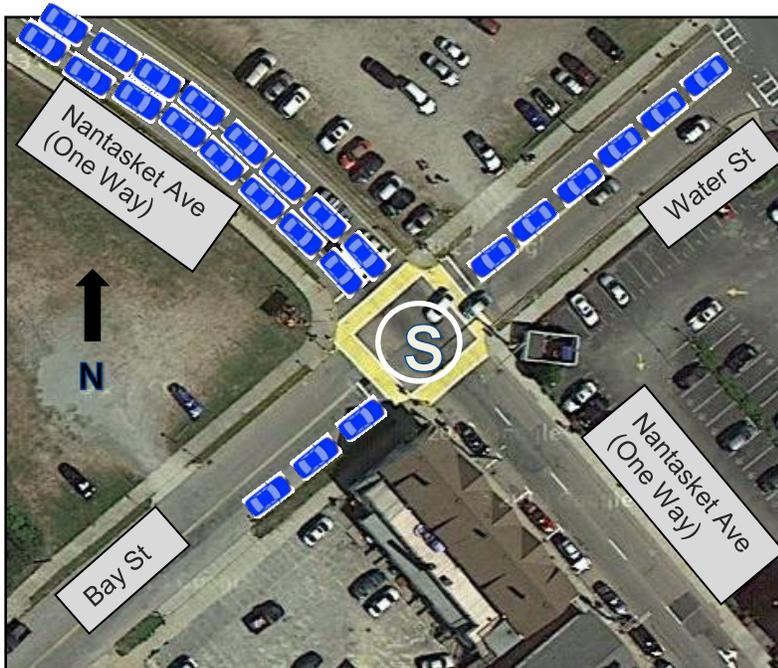


Figure 21: Nantasket Avenue, Water Street, and Bay Street; 2013 Saturday Queue Lengths

Table 9: Nantasket Avenue, Water Street and Bay Street Intersection 95 th Percentile Queue Lengths*				
Approach	Weekday PM		Saturday Afternoon	
	2013	2033	2013	2033
Bay Street	3	3	3	4
Nantasket Avenue	7	11	8	12
Water Street	4	4	6	7

*Measured in number of cars





Intersection of Water Street and Hull Shore Drive: The calculated 2013 Saturday peak hour 95th percentile queue length at this intersection is shown in Figure 22. The remaining calculated queues are displayed in Table 10. The queues recorded for the stop-controlled approach are minimal in all four scenarios analyzed.



Figure 22: Water Street and Hull Shore Drive; 2013 Saturday Queue Lengths

Table 10: Water Street and Hull Shore Drive Intersection 95 th Percentile Queue Lengths*				
Approach	Weekday PM		Saturday Afternoon	
	2013	2033	2013	2033
Water Street	2	2	2	4

*Measured in number of cars





Intersections of Nantasket Avenue, George Washington Boulevard and Bay Street: The calculated 2013 Saturday peak hour 95th percentile queue lengths at this intersection are shown in Figure 23. The remaining calculated queues are displayed in Table 11. The queues recorded for both stop-controlled approaches are minimal in all four scenarios analyzed.



Figure 23: Intersections of Nantasket Avenue, George Washington Boulevard, and Bay Street; 2013 Saturday Queue Lengths

Table 11: Nantasket Avenue, George Washington Boulevard, and Bay Street Intersections 95 th Percentile Queue Lengths*				
Approach	Weekday PM		Saturday Afternoon	
	2013	2033	2013	2033
Bay Street at George Washington	1	1	1	1
Bay Street at Nantasket Avenue	1	1	1	1

*Measured in number of cars





Intersection of Nantasket Avenue, Hull Shore Drive, and the Cut-through Road from George Washington Boulevard: The calculated 2013 Saturday peak hour 95th percentile queue lengths at this intersection are shown in Figure 24. The remaining calculated queues are displayed in Table 12. The queues recorded are the 95th percentile length and will not occur during every signal cycle. Slightly shorter queues and delays may be achieved by installing an actuated signal system if deemed necessary in the future.

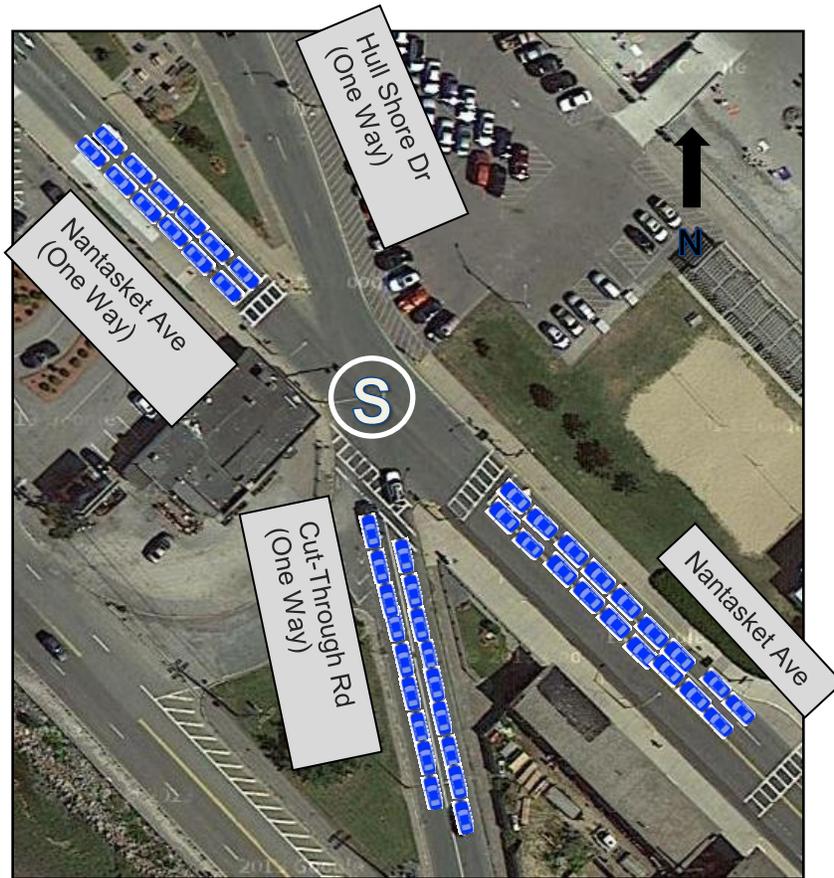


Figure 24: Intersection of Nantasket Avenue, Hull Shore Drive, and the Cut-through Road; 2013 Saturday Queue Lengths. 'S' indicates a signalized intersection.

Table 12: Nantasket Avenue, Hull Shore Drive and the Cut-through Road Intersection 95 th Percentile Queue Lengths*				
Approach	Weekday PM		Saturday Afternoon	
	2013	2033	2013	2033
Nantasket Avenue Eastbound	6	6	6	8
Nantasket Avenue Westbound	7	8	9	11
Cut-through Road	6	9	9	10

*Measured in number of cars





Intersection of Nantasket Avenue, Wharf Avenue, and a parking lot entrance: The calculated 2013 Saturday peak hour 95th percentile queue lengths at this intersection are shown in Figure 25. The remaining calculated queues are displayed in Table 13. The queues recorded are the 95th percentile length and will not occur during every signal cycle. Slightly shorter queues and delays may be achieved by installing an actuated signal system if deemed necessary in the future.



Figure 25: Intersection of Nantasket Avenue and Wharf Avenue; 2013 Saturday Queue Lengths. ‘S’ indicates signalized intersection.

Table 13: Nantasket Avenue and Wharf Avenue Intersection 95 th Percentile Queue Lengths*				
Approach	Weekday PM		Saturday Afternoon	
	2013	2033	2013	2033
Nantasket Avenue Eastbound	9	9	9	9
Nantasket Avenue Westbound	5	5	5	5
Wharf Avenue	2	2	4	5

*Measured in number of cars





Intersection of Nantasket Avenue and Park Avenue: The calculated 2013 Saturday peak hour 95th percentile queue length at this intersection is shown in Figure 26. The remaining calculated queues are displayed in Table 14. The queue lengths recorded for the Park Avenue approach are minimal in all four scenarios analyzed.

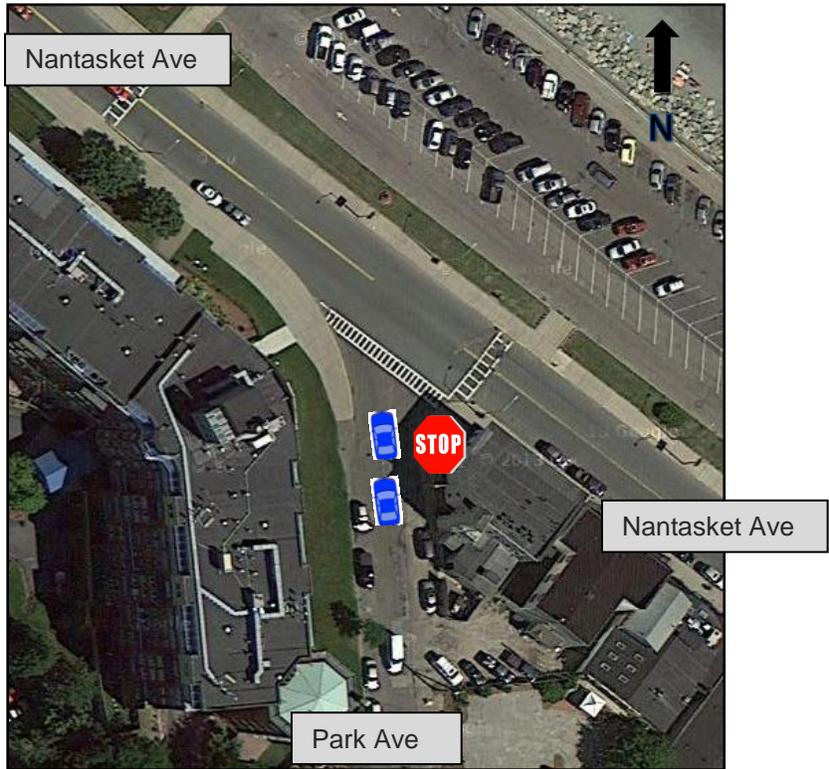


Figure 26: Intersection of Nantasket Avenue and Park Avenue; 2013 Saturday Queue Lengths

Table 14: Nantasket Avenue and Park Avenue Intersection 95 th Percentile Queue Lengths*				
Approach	Weekday PM		Saturday Afternoon	
	2013	2033	2013	2033
Park Avenue	1	1	2	2

*Measured in number of cars





3.4 Recommendations

Based on the results of the traffic analysis presented, improvements are recommended for one stop-controlled location. Specifically, the intersection of Nantasket Avenue, Phipps Street and Mountford Road is currently operating at a failing level of service during the Saturday peak hour. Calculated delays during this time period approach 2 minutes for travelers on Phipps Street under the 2013 existing conditions due to circulating traffic in search of parking. Recommended mitigation for this location is to improve the signing system for parking at DCR lots. In recent years DCR has utilized four variable message signs (VMS) at select parking lots to alert drivers when lots are full. Adding VMS boards at other parking lot entrances and updating the signs regularly would allow drivers to be aware of full lots and empty spaces allowing them to spend less time circulating.

All other stop-controlled locations are currently operating at LOS "B" or better.

All signalized intersections analyzed are currently operating at a LOS "C" or better during the Saturday peak hour. A LOS "C" is classified as stable flow and considered a passing level of service. If signalized intersections are found to be a bottleneck in future years, updating the fixed signal timing may decrease delays. Actuated signal timing systems are another option if an acceptable LOS is not achieved in the field. Actuated signal timing allows sensors to notify the controller of waiting vehicles to decrease unnecessary stop delay.





4.0 Bicycle and Pedestrian Analysis

The effects of bicyclists and pedestrians using crosswalks throughout the study area were analyzed and recorded using the VISSIM software.

4.1 2013 Saturday Crosswalk Results

The 95th percentile vehicle queue lengths calculated at Crosswalks 3 through 21 were analyzed as part of the traffic analysis for this report. The results are based on the 2006 pedestrian and bicycle counts. The queue length results of the 2013 Saturday analysis (Table 15) allow for the following observations:

- Pedestrian activity at Crosswalks 3 to 6 causes short queues ranging from 3 to 5 vehicles. At these locations visitors do not need to cross the roadway to reach the beach from a parking lot.
- Pedestrian activity at Crosswalks 7 to 10 causes longer queues, particularly in the eastbound direction where queue lengths range from 9 to 12 vehicles.
- At signalized intersections crosswalk activity is likely not the cause of queues or delays.
- Pedestrian activity at Crosswalks 13 and 14 causes short queues ranging from 1 to 4 vehicles. These crosswalks are situated around the DCR property and are used less often than crosswalks used to access the beach from parking lots.
- Pedestrian activity at Crosswalks 16 to 18 causes longer queues due to pedestrians accessing the local amenities from the beach. This area is home to a number of restaurants and a resort.
- Towards the western edge of the study area at Crosswalks 19 to 21, queues again diminish, likely due to parking along Franklin Street and on the waterfront side of Hull Shore Drive. At these locations visitors do not need to cross the roadway to reach the beach from a parking lot.

4.2 Recommendations

Crosswalks 7 to 10 were heavily utilized during the 2006 Saturday peak hour with a total of 286 pedestrians accessing the beach and amenities in this area. This location may benefit from combining Crosswalks 8 and 9 which both lead to the arcade buildings. A total of 175 pedestrians would be expected to use this proposed combined crossing during the Saturday peak hour. A push-button activated flashing beacon and warning sign would be appropriate at this combined location.

Crosswalks 17 and 18 may also be viable candidates for a mid-block pedestrian hybrid signal. These locations service 151 and 118 pedestrians during the Saturday 2006 peak hour, respectively. Creating a push-button controlled crosswalk at one or both of these locations would encourage safe crossing over the two-lane Hull Shore Drive and allow larger groups of people to gather and cross at the same time.





All crosswalks at intersections should remain. Drivers generally proceed more cautiously at intersections creating a safer environment for pedestrians as compared to mid-block crosswalks.

Table 15: Queue Lengths at Crosswalks						
Street Crossed	Crosswalk Number	Crossing Location	Signal Controlled?	Queue Lengths*		
				EB	WB	
Nantasket Avenue	3	Berkley Road	No	5	5	
	4	Park Avenue	No	3	5	
	5	Condominium Building	No	5	5	
	6	Condominium Parking Lot	No	4	3	
	7	Carousels and Ships Gift Shop	No	12	5	
	8	Dream Machine Arcade	No	9	4	
	9	Miniature Golf Course	No	10	8	
	10	Carousel	No	9	7	
	11	Wharf Avenue – East Side	Yes	N/A	5	
	12	Wharf Avenue – West Side	Yes	9	N/A	
	13	Dormitory Building	No	1	4	
	14	Maintenance Garages	No	4	1	
	15	Hull Shore Drive – East Side	Yes	N/A	9	
	Hull Shore Drive	16	Parking Lot - 1	No	8	N/A
		17	Parking Lot - 2	No	6	N/A
18		Dry Dock Restaurant	No	9	N/A	
19		Nantasket Beach Resort	No	4	N/A	
20		Water Street - East Side	No	3	N/A	
21		Water Street – West Side	No	3	N/A	

* Measured in number of vehicles

EB = Eastbound

WB = Westbound





5.0 Traffic Alternatives at the George Washington Boulevard, Nantasket Avenue, and Hull Shore Drive Intersection

Two alternatives to re-configure traffic in the area of the DCR maintenance yard were examined to increase usable yard space. Currently, space in the yard is limited and vehicle movements for larger vehicles are hindered. In addition, due to the limited covered storage space, a significant amount of machinery, equipment, and materials are stored in the yard. DCR staff has indicated that both safety and efficiency could be improved with an updated yard layout and a larger space to work in. Additional details concerning space restraints on the DCR maintenance site are provided in the "Facilities Utilization Report."³

The traffic alternatives being considered are:

- *Alternative A:* The existing condition remains.
- *Alternative B:* The Cut-through portion of roadway from George Washington Boulevard westbound ('Cut-through Road') is re-aligned to increase yard space.
- *Alternative C:* The Cut-through Road is removed. Traffic is instead re-routed from George Washington Boulevard westbound to the current intersection of George Washington Boulevard and Nantasket Avenue. The southeastern terminus of Hull Shore Drive is also shifted to align with this proposed intersection.

It is noted that not all of the roadways being considered are owned by DCR so any changes would need to be coordinated between DCR, the Town of Hull, and the Massachusetts Department of Transportation (MassDOT). Specifically, George Washington Boulevard (including the Cut-through Road) belongs to MassDOT. Nantasket Avenue to the intersection with George Washington Boulevard belongs to DCR. Hull Shore Drive and Bay Street belong to the Town of Hull.

Another concern is the historical relevance of the roadways affected. Care must be taken to be historically sympathetic when proposing any changes.

³ The Louis Berger Group, Inc., April 2014





Figure 27: Roadway ownership in the area of the Reservation maintenance yard (red – MassDOT; green – DCR; white – Town of Hull). Source: MassDOT



5.1 Traffic Alternative A: Existing Condition

Traffic Alternative A is the 'no-build' condition (Figure 28). This alternative will not affect traffic flow around the maintenance yard nor increase the yard area for maintenance services. It serves as the baseline for comparison of the two build alternatives (B and C).



Figure 28: Traffic Alternative A, including existing traffic layout.





The results of the no-build analysis for the 2013 and 2033 weekday PM peak hour and Saturday afternoon peak hour are presented in Tables 16 and 17.

Table 16: Alternative A - Delay (in seconds per vehicle) and LOS					
Intersection	Year	Weekday PM		Saturday Afternoon	
		Delay	LOS	Delay	LOS
Hull Shore Drive, Nantasket Avenue, and Cut-through Road	2013	18.8	B	24.2	C
	2033	19.7	B	30.5	C

Table 17: Alternative A - Queue*					
Intersection	Approach	Weekday PM		Saturday Afternoon	
		2013	2033	2013	2033
Hull Shore Drive, Nantasket Avenue, and Cut-through Road	Nantasket, Westbound	7	8	9	11
	Nantasket, Eastbound	6	6	6	8
	Cut-through, Northbound	6	9	9	10

*Queue is documented in number of vehicles

The signalized intersection of Hull Shore Drive, Nantasket Avenue and the Cut-through Road from George Washington Boulevard currently operates at an acceptable LOS and is expected to continue to do so in year 2033. The queues documented are minimal on each approach leg ranging from 6 to 9 vehicles (150 to 225 feet) in 2013 to 6 to 11 vehicles (150 to 275 feet) in 2033.





5.2 Traffic Alternative B: Adjust Cut-through Road

Traffic Alternative B adjusts the alignment of the Cut-through Road from George Washington Boulevard to Nantasket Avenue to create a larger yard area for maintenance activities. Figure 29 shows the proposed roadway alignment.



Figure 29: Traffic Alternative B, including proposed roadway alignment. Space becoming available is marked in orange.





The results of the Alternative B traffic analysis for the 2013 and 2033 weekday PM peak hour and Saturday afternoon peak hour are presented in Tables 18 and 19.

Intersection	Year	Weekday PM		Saturday Afternoon	
		Delay	LOS	Delay	LOS
Hull Shore Drive, Nantasket Avenue, and Cut-through Road	2013	18.2	B	18.4	C
	2033	18.6	B	22.3	C

Intersection	Approach	Weekday PM		Saturday Afternoon	
		2013	2033	2013	2033
		Hull Shore Drive, Nantasket Avenue, and Cut-through Road	Nantasket, Westbound	7	8
Nantasket, Eastbound	5		5	5	5
Cut-through, Northbound	9		10	11	14

*Queue is documented in number of vehicles

Results for Alternative B are similar to results for Alternative A, because traffic volumes or lane configurations remain unchanged from existing conditions. The only change is to the roadway alignment of George Washington Boulevard approaching the intersection. The small discrepancies in the traffic analysis results are due to the randomness of the analysis program and the volume of vehicles approaching the intersection during any given minute. Based on Alternative B results, the intersection would operate at an acceptable LOS, very similar to the existing conditions. The queues would be minimal on each approach leg ranging from 5 to 10 vehicles (125 to 250 feet) in 2013 to 5 to 14 vehicles (125 to 350 feet) in 2033.





5.3 Traffic Alternative C: Remove Cut-through Road

Traffic Alternative C closes off the Cut-through Road and routes the George Washington Boulevard traffic to an expanded intersection at Nantasket Avenue. The Hull Shore Drive approach is also realigned through the existing parking lot. This creates the largest yard area for maintenance activities. Figure 30 shows the proposed roadway alignment.



Figure 30: Traffic Alternative C, including proposed roadway alignment. Space becoming available is marked in orange.





The results of the Alternative C traffic analysis for the 2013 and 2033 weekday PM peak hour and Saturday afternoon peak hour are presented in Tables 20 and 21.

Table 20: Alternative C - Delay (in seconds per vehicle) and LOS					
Intersection	Year	Weekday PM		Saturday Afternoon	
		Delay	LOS	Delay	LOS
Hull Shore Drive, Nantasket Avenue, and George Washington Boulevard (Proposed)	2013	17.1	B	19.0	C
	2033	17.8	B	22.0	C

Table 21: Alternative C - Queue*					
Intersection	Approach	Weekday PM		Saturday Afternoon	
		2013	2033	2013	2033
Hull Shore Drive, Nantasket Avenue, and George Washington Boulevard (Proposed)	Nantasket Westbound	6	7	9	11
	Nantasket Eastbound	10	11	10	13
	George Washington Northbound	7	9	9	11

*Queue is documented in number of vehicles

Alternative C eliminates one intersection and installs a signal at a previously stop-controlled intersection. The proposed signalized intersection analyzed in Alternative C is expected to continue to operate at the existing levels of service once the additional re-routed traffic is applied. During the Weekday PM peak hour the proposed signalized intersection will operate at LOS “B”, as it does currently during the same time period. During the Saturday peak hour the proposed signalized intersection will operate at LOS “C”, as it does currently during the same time period. Queues would be slightly longer than under existing conditions due to higher traffic volumes. Specifically, queues range from 6 to 11 vehicles (150 to 275 feet) in 2013 to 9 to 13 vehicles (225 to 325 feet) in 2033.

5.4 Cost Estimates

Construction costs for each traffic alternative are as follows (first-order estimate in 2013 dollars):

- Alternative A (No-build): \$ 0
- Alternative B (Squaring off the Cut-through Road): \$ 320,000
- Alternative C (Closing the Cut-through Road): \$1,000,000

These cost estimates are based on preliminary layout designs and approximate quantities of select materials. Refined construction documents, quantity calculations and engineer’s estimate would need to be completed for the chosen alternative. The preliminary quantity and cost estimate are provided in Appendix D.





5.5 Comparison of the Three Alternatives - Summary

From a traffic capacity perspective all three of the alternatives discussed will operate at LOS "B" during the year 2013 and at LOS "C" in year 2033. Alternative C has the highest construction cost and would provide the largest additional maintenance yard space. The decision to move forward with any of the alternatives will need to include a number of factors including cost, property ownership, concerns by local residents, and long-term plans for the community.





6.0 Summary and Recommendations

This traffic study assessed traffic flow and pedestrian/bicycle interaction at and around the Nantasket Beach Reservation during the summer months and recommended modifications to improve circulation, as appropriate.

Traffic, pedestrian, and bicycle flow were counted in 2006 and analyzed for year 2013 (existing conditions) and forecasted year 2033 for the following intersections:

1. Manomet Avenue, Beach Avenue, and Phipps Street
2. Nantasket Avenue, Mountford Road, and Phipps Street
3. Nantasket Avenue, Water Street, and Bay Street
4. Nantasket Avenue and George Washington Boulevard
5. Nantasket Avenue and Bay Street
6. George Washington Boulevard and Bay Street
7. Cut-through Road and Nantasket Avenue
8. Nantasket Avenue and Wharf Avenue
9. Nantasket Avenue and Park Avenue

Findings from the analysis and recommendations are as follows:

- **Stop-controlled Intersections:** Based on the traffic analysis of the roadway network, improvements are recommended for the intersection of Nantasket Avenue, Phipps Street and Mountford Road due to failing LOS during the Saturday peak hours caused by circulating traffic in search for parking. Recommended mitigation consists of improvements of the signing system for DCR parking lots. Specifically, adding VMS boards at all parking lot entrances and update the signs regularly to make drivers better aware of empty spaces.

All other stop-controlled locations are currently operating at LOS "B" or better.

- **Signalized Intersections:** The signalized intersections are currently operating at a LOS "C" or better during the Saturday peak hour. A LOS "C" is classified as stable flow and considered a passing level of service. If signalized intersections are found to be a bottleneck in future years updated fixed signal timing or actuated signal timing systems may improve flow.
- **Pedestrian Crossings:** The pedestrian counts at crosswalks within the study area were high with a total of 996 pedestrians using crosswalks during the 12 pm to 1 pm hour on a Saturday. The most heavily used crosswalk was number 17 with 151 pedestrians; the crosswalk is located on Hull Shore Drive near a number of restaurants (i.e., Hull's Kitchen, Dry Dock, Daddy's Dogs).

Crosswalk 4 was utilized by only 11 pedestrians during the Saturday peak hour. This crosswalk does not have a clear destination from the beach and could be removed to reduce the number of locations where vehicles yield to pedestrians.





Crosswalks 7 to 10 were well utilized during the Saturday peak hour with a total of 286 pedestrians accessing the beach and amenities in this area. This location may benefit from combining Crosswalks 8 and 9 which both lead to the arcade buildings. A total of 175 pedestrians would be expected to use this proposed crossing during the Saturday peak hour. A push-button activated flashing beacon and warning sign would be appropriate at this combined location.

Crosswalks 17 to 18 may also be viable candidates for a pedestrian signal. These crosswalks service 151 and 118 pedestrians during the peak hour, respectively. Creating a push-button activated flashing beacon and warning sign at one or both of these locations would encourage safe crossing over the two-lane Hull Shore Drive and allow larger groups of people to gather and cross at the same time.

All crosswalks at intersections should remain. Drivers generally proceed more cautiously at intersections creating a safer environment for pedestrians when compared to mid-block crosswalks.

- **Bicycle Traffic at Crosswalks:** The bicycle counts were much lower than the pedestrian counts. The highest bicycle volumes were seen at Crosswalks 16 through 21 which are all located on Hull Shore Drive.

- **Traffic Alternatives for Improvements to the Maintenance Yard:** Aside from the existing conditions, two alternatives were examined to re-configure traffic in the vicinity of the yard and thereby increase yard space⁴. Specifically, the traffic alternatives being considered at the intersection(s) of Hull Shore Drive, Nantasket Avenue and George Washington Boulevard are as follows:
 - *Alternative A:* The existing condition remains. (Estimated Cost: \$0)
 - *Alternative B:* Realignment of the cut-through portion of roadway from George Washington Boulevard westbound. (Estimated Cost: \$320,000)
 - *Alternative C:* Relocation of the cut-through portion of roadway from George Washington Boulevard westbound to the current intersection of George Washington Boulevard and Nantasket Avenue. The southeastern terminus of Hull Shore Drive is also shifted to align with this proposed intersection. (Estimated Cost: \$1,000,000)

From a traffic capacity perspective all three of the intersection alternatives will operate at LOS "B" during the current year and at LOS "C" in the year 2033. Alternative C will provide the largest amount of yard space for maintenance operations. The decision to move forward with any of the alternatives will need to consider factors such as property ownership, concerns of local residents, and long-term plans for the community.

⁴ See "Facilities Utilization Report" for further details, The Louis Berger Group, Inc., April 2014.



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Appendix A

Definitions for Level of Service (LOS)

Level of Service – Definition*

The Level of Service (LOS) used for traffic analyses pertains to North American highway LOS standards as in the Highway Capacity Manual (HCM) and AASHTO Geometric Design of Highways and Streets ("Green Book"), using letters A through F, with A being the best and F being the worst.

A: Free flow. Traffic flows at or above the posted speed limit and motorists have complete mobility between lanes. The average spacing between vehicles is about 550 ft (167 m) or 27 car lengths. Motorists have a high level of physical and psychological comfort. The effects of incidents or point breakdowns are easily absorbed. LOS "A" occurs late at night in urban areas, frequently in rural areas, and generally in car advertisements.

B: Reasonably free flow. LOS "A" speeds are maintained, maneuverability within the traffic stream is slightly restricted. The lowest average vehicle spacing is about 330 ft (100 m) or 16 car lengths. Motorists still have a high level of physical and psychological comfort.

C: Stable flow, at or near free flow. Ability to maneuver through lanes is noticeably restricted and lane changes require more driver awareness. Minimum vehicle spacing is about 220 ft (67 m) or 11 car lengths. Most experienced drivers are comfortable, roads remain safely below but efficiently close to capacity, and posted speed is maintained. Minor incidents may still have no effect but localized service will have noticeable effects and traffic delays will form behind the incident. This is the target LOS for some urban and most rural highways.

D: Approaching unstable flow. Speeds slightly decrease as traffic volume slightly increases. Freedom to maneuver within the traffic stream is much more limited and driver comfort levels decrease. Vehicles are spaced about 160 ft (50m) or 8 car lengths. Minor incidents are expected to create delays. Examples are a busy shopping corridor in the middle of a weekday, or a functional urban highway during commuting hours. It is a common goal for urban streets during peak hours, as attaining LOS "C" would require prohibitive cost and societal impact in bypass roads and lane additions.

E: Unstable flow, operating at capacity. Flow becomes irregular and speed varies rapidly because there are virtually no usable gaps to maneuver in the traffic stream and speeds rarely reach the posted limit. Vehicle spacing is about 6 car lengths, but speeds are still at or above 50 mi/h(80 km/h). Any disruption to traffic flow, such as merging ramp traffic or lane changes, will create a shock wave affecting traffic upstream. Any incident will create serious delays. Drivers' level of comfort becomes poor. This is a common standard in larger urban areas, where some roadway congestion is inevitable.

F: Forced or breakdown flow. Every vehicle moves in lockstep with the vehicle in front of it, with frequent slowing required. Travel time cannot be predicted, with generally more demand than capacity. A road in a constant traffic jam is at this LOS, because LOS is an average or typical service rather than a constant state. For example, a highway might be at LOS "D" for the AM peak hour, but have traffic consistent with LOS "C" some days, LOS "E" or "F" others, and come to a halt once every few weeks.

* Source: Highway Capacity Manual, as listed in Wikipedia (http://en.wikipedia.org/wiki/Level_of_service)

Appendix B
Traffic Counts

a. 2006 Counts

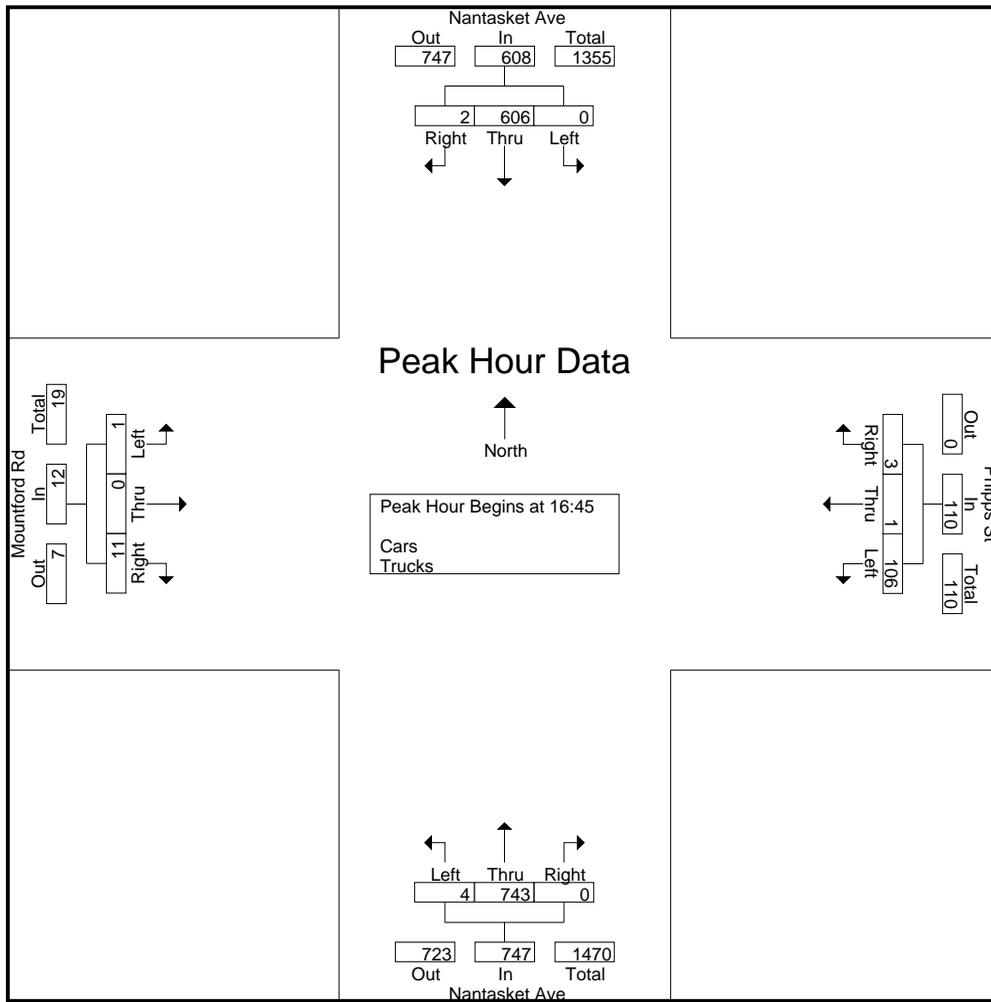
N/S Street : Nantasket Avenue
E/W Street: Mountford Rd / Phipps St
City/State : Hull, MA
Weather : Clear

File Name : 14640001
Site Code : 14640001
Start Date : 8/3/2006
Page No : 1

Groups Printed- Cars - Trucks

Start Time	Nantasket Ave From North				Phipps St From East				Nantasket Ave From South				Mountford Rd From West				Exclu. Total	Inclu. Total	Int. Total
	Left	Thru	Right	Peds	Left	Thru	Right	Peds	Left	Thru	Right	Peds	Left	Thru	Right	Peds			
16:00	0	123	0	1	21	0	2	1	1	149	1	0	0	0	3	1	3	300	303
16:15	0	123	0	2	25	0	2	2	1	172	1	0	0	0	4	2	6	328	334
16:30	0	151	0	0	29	0	1	5	1	148	0	0	0	0	1	2	7	331	338
16:45	0	183	0	2	27	0	0	5	1	191	0	0	0	0	2	5	12	404	416
Total	0	580	0	5	102	0	5	13	4	660	2	0	0	0	10	10	28	1363	1391
17:00	0	133	1	1	35	0	0	4	0	191	0	0	0	0	2	3	8	362	370
17:15	0	152	1	3	25	0	1	3	1	169	0	0	1	0	0	2	8	350	358
17:30	0	138	0	4	19	1	2	2	2	192	0	0	0	0	7	1	7	361	368
17:45	0	145	2	2	19	2	5	1	1	161	0	0	1	0	2	2	5	338	343
Total	0	568	4	10	98	3	8	10	4	713	0	0	2	0	11	8	28	1411	1439
Grand Total	0	1148	4	15	200	3	13	23	8	1373	2	0	2	0	21	18	56	2774	2830
Apprch %	0	99.7	0.3		92.6	1.4	6		0.6	99.3	0.1		8.7	0	91.3				
Total %	0	41.4	0.1		7.2	0.1	0.5		0.3	49.5	0.1		0.1	0	0.8		2	98	
Cars	0	1133	4		199	3	13		8	1349	2		2	0	21		0	0	2790
% Cars	0	98.7	100	100	99.5	100	100	100	100	98.3	100	0	100	0	100	100	0	0	98.6
Trucks	0	15	0		1	0	0		0	24	0		0	0	0		0	0	40
% Trucks	0	1.3	0	0	0.5	0	0	0	0	1.7	0	0	0	0	0	0	0	0	1.4

Start Time	Nantasket Ave From North				Phipps St From East				Nantasket Ave From South				Mountford Rd From West				Int. Total
	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	
Peak Hour Analysis From 16:00 to 17:45 - Peak 1 of 1																	
Peak Hour for Entire Intersection Begins at 16:45																	
16:45	0	183	0	183	27	0	0	27	1	191	0	192	0	0	2	2	404
17:00	0	133	1	134	35	0	0	35	0	191	0	191	0	0	2	2	362
17:15	0	152	1	153	25	0	1	26	1	169	0	170	1	0	0	1	350
17:30	0	138	0	138	19	1	2	22	2	192	0	194	0	0	7	7	361
Total Volume	0	606	2	608	106	1	3	110	4	743	0	747	1	0	11	12	1477
% App. Total	0	99.7	0.3		96.4	0.9	2.7		0.5	99.5	0		8.3	0	91.7		
PHF	.000	.828	.500	.831	.757	.250	.375	.786	.500	.967	.000	.963	.250	.000	.393	.429	.914



Accurate Counts
978-664-2565

N/S Street : Nantasket Avenue
E/W Street: Mountford Rd / Phipps St
City/State : Hull, MA
Weather : Clear

File Name : 146400A1
Site Code : 14640001
Start Date : 8/5/2006
Page No : 1

Groups Printed- Cars - Trucks

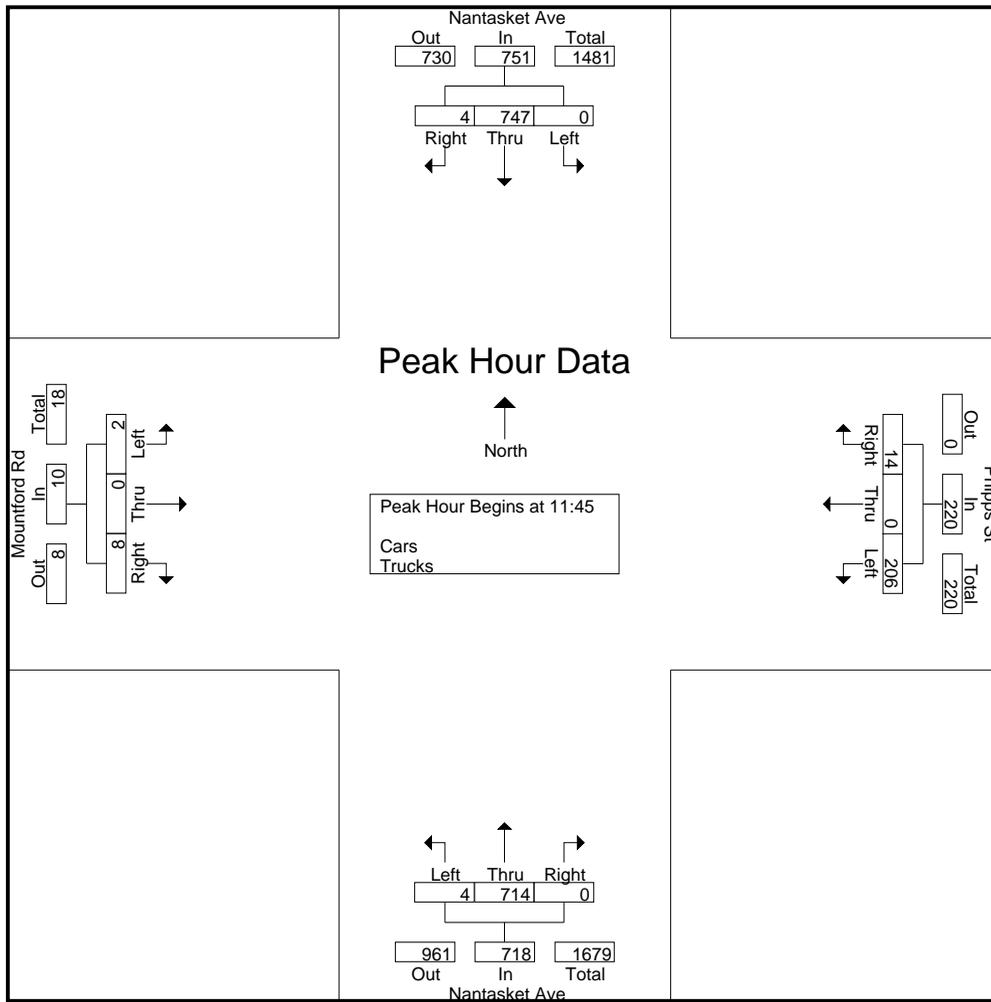
Start Time	Nantasket Ave From North				Phipps St From East				Nantasket Ave From South				Mountford Rd From West				Exclu. Total	Inclu. Total	Int. Total	
	Left	Thru	Right	Peds	Left	Thru	Right	Peds	Left	Thru	Right	Peds	Left	Thru	Right	Peds				
11:00	0	202	1	0	34	0	5	0	0	162	0	0	0	0	0	2	0	0	406	406
11:15	0	197	2	0	34	0	4	0	3	180	0	0	2	0	5	0	0	0	427	427
11:30	0	171	1	0	28	0	7	0	3	173	0	0	1	0	2	0	0	0	386	386
11:45	0	194	3	0	41	0	6	0	0	200	0	0	0	0	2	0	0	0	446	446
Total	0	764	7	0	137	0	22	0	6	715	0	0	3	0	11	0	0	0	1665	1665
12:00	0	162	1	0	60	0	4	0	2	168	0	0	2	0	3	0	0	0	402	402
12:15	0	201	0	0	54	0	2	0	1	185	0	0	0	0	0	0	0	0	443	443
12:30	0	190	0	0	51	0	2	0	1	161	0	0	0	0	3	0	0	0	408	408
12:45	0	215	0	0	53	0	9	0	0	161	0	0	0	0	1	0	0	0	439	439
Total	0	768	1	0	218	0	17	0	4	675	0	0	2	0	7	0	0	0	1692	1692
13:00	0	140	1	0	54	1	4	0	0	173	0	0	0	0	4	0	0	0	377	377
13:15	0	150	1	0	56	0	10	0	0	175	0	0	1	0	2	0	0	0	395	395
13:30	0	157	1	0	65	0	4	0	3	189	0	0	1	0	2	0	0	0	422	422
13:45	0	156	1	0	77	0	8	0	2	159	0	0	0	0	6	0	0	0	409	409
Total	0	603	4	0	252	1	26	0	5	696	0	0	2	0	14	0	0	0	1603	1603
Grand Total	0	2135	12	0	607	1	65	0	15	2086	0	0	7	0	32	0	0	0	4960	4960
Apprch %	0	99.4	0.6		90.2	0.1	9.7		0.7	99.3	0		17.9	0	82.1					
Total %	0	43	0.2		12.2	0	1.3		0.3	42.1	0		0.1	0	0.6			0	100	
Cars	0	2105	12		605	1	64		15	2062	0		7	0	32			0	0	4903
% Cars	0	98.6	100	0	99.7	100	98.5	0	100	98.8	0	0	100	0	100	0	0	0	0	98.9
Trucks	0	30	0		2	0	1		0	24	0		0	0	0			0	0	57
% Trucks	0	1.4	0	0	0.3	0	1.5	0	0	1.2	0	0	0	0	0	0	0	0	0	1.1

Start Time	Nantasket Ave From North				Phipps St From East				Nantasket Ave From South				Mountford Rd From West				Int. Total
	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	

Peak Hour Analysis From 11:00 to 13:45 - Peak 1 of 1

Peak Hour for Entire Intersection Begins at 11:45

11:45	0	194	3	197	41	0	6	47	0	200	0	200	0	0	2	2	446
12:00	0	162	1	163	60	0	4	64	2	168	0	170	2	0	3	5	402
12:15	0	201	0	201	54	0	2	56	1	185	0	186	0	0	0	0	443
12:30	0	190	0	190	51	0	2	53	1	161	0	162	0	0	3	3	408
Total Volume	0	747	4	751	206	0	14	220	4	714	0	718	2	0	8	10	1699
% App. Total	0	99.5	0.5		93.6	0	6.4		0.6	99.4	0		20	0	80		
PHF	.000	.929	.333	.934	.858	.000	.583	.859	.500	.893	.000	.898	.250	.000	.667	.500	.952



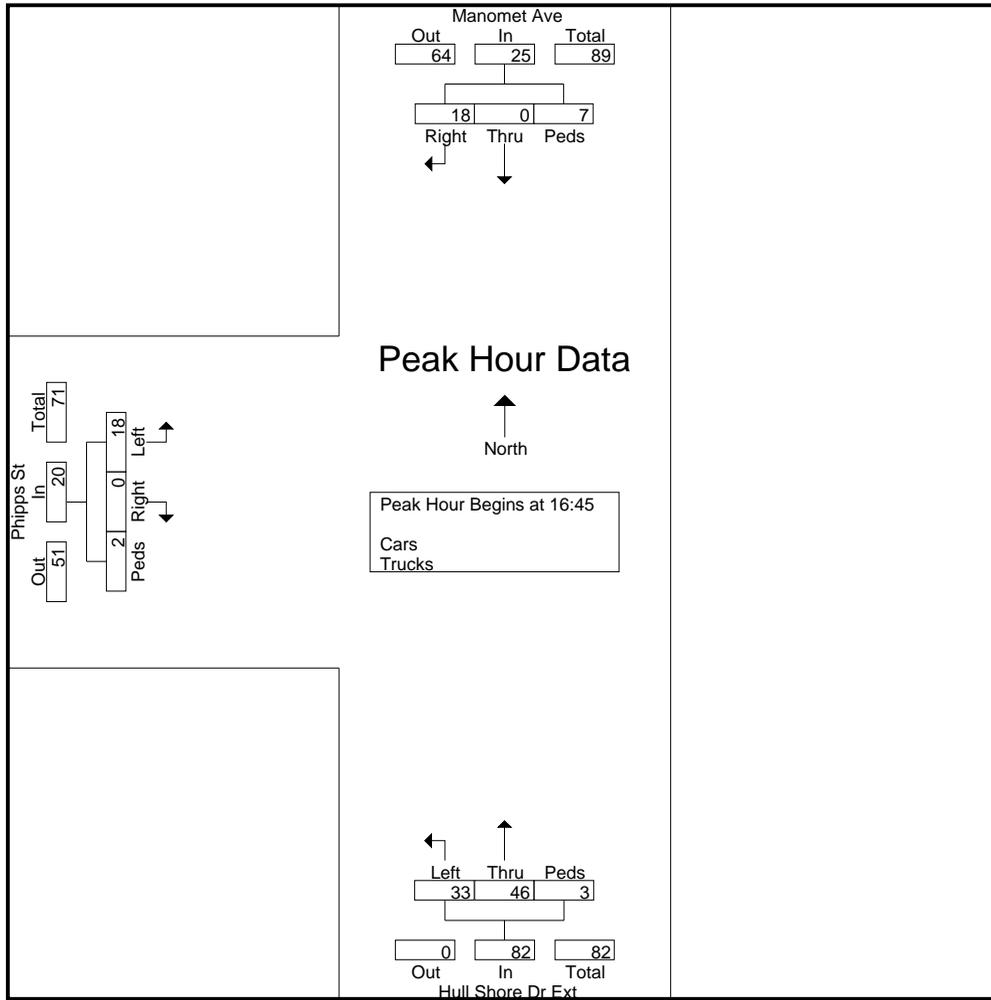
Groups Printed- Cars - Trucks

Start Time	Manomet Ave From North			Hull Shore Dr Ext From South			Phipps St From West			Int. Total
	Thru	Right	Peds	Left	Thru	Peds	Left	Right	Peds	
16:00	0	5	3	8	7	0	2	0	1	26
16:15	0	7	0	9	4	0	5	0	1	26
16:30	0	3	1	9	6	0	6	0	0	25
16:45	0	2	4	7	12	1	4	0	0	30
Total	0	17	8	33	29	1	17	0	2	107
17:00	0	5	1	7	14	0	7	0	0	34
17:15	0	5	1	11	10	0	4	0	0	31
17:30	0	6	1	8	10	2	3	0	2	32
17:45	0	3	0	3	7	0	5	0	0	18
Total	0	19	3	29	41	2	19	0	2	115
Grand Total	0	36	11	62	70	3	36	0	4	222
Apprch %	0	76.6	23.4	45.9	51.9	2.2	90	0	10	
Total %	0	16.2	5	27.9	31.5	1.4	16.2	0	1.8	
Cars	0	36	11	62	70	3	36	0	4	222
% Cars	0	100	100	100	100	100	100	0	100	100
Trucks	0	0	0	0	0	0	0	0	0	0
% Trucks	0	0	0	0	0	0	0	0	0	0

Start Time	Manomet Ave From North				Hull Shore Dr Ext From South				Phipps St From West				Int. Total
	Thru	Right	Peds	App. Total	Left	Thru	Peds	App. Total	Left	Right	Peds	App. Total	
16:45	0	2	4	6	7	12	1	20	4	0	0	4	30
17:00	0	5	1	6	7	14	0	21	7	0	0	7	34
17:15	0	5	1	6	11	10	0	21	4	0	0	4	31
17:30	0	6	1	7	8	10	2	20	3	0	2	5	32
Total Volume	0	18	7	25	33	46	3	82	18	0	2	20	127
% App. Total	0	72	28		40.2	56.1	3.7		90	0	10		
PHF	.000	.750	.438	.893	.750	.821	.375	.976	.643	.000	.250	.714	.934

Peak Hour Analysis From 07:00 to 17:45 - Peak 1 of 1

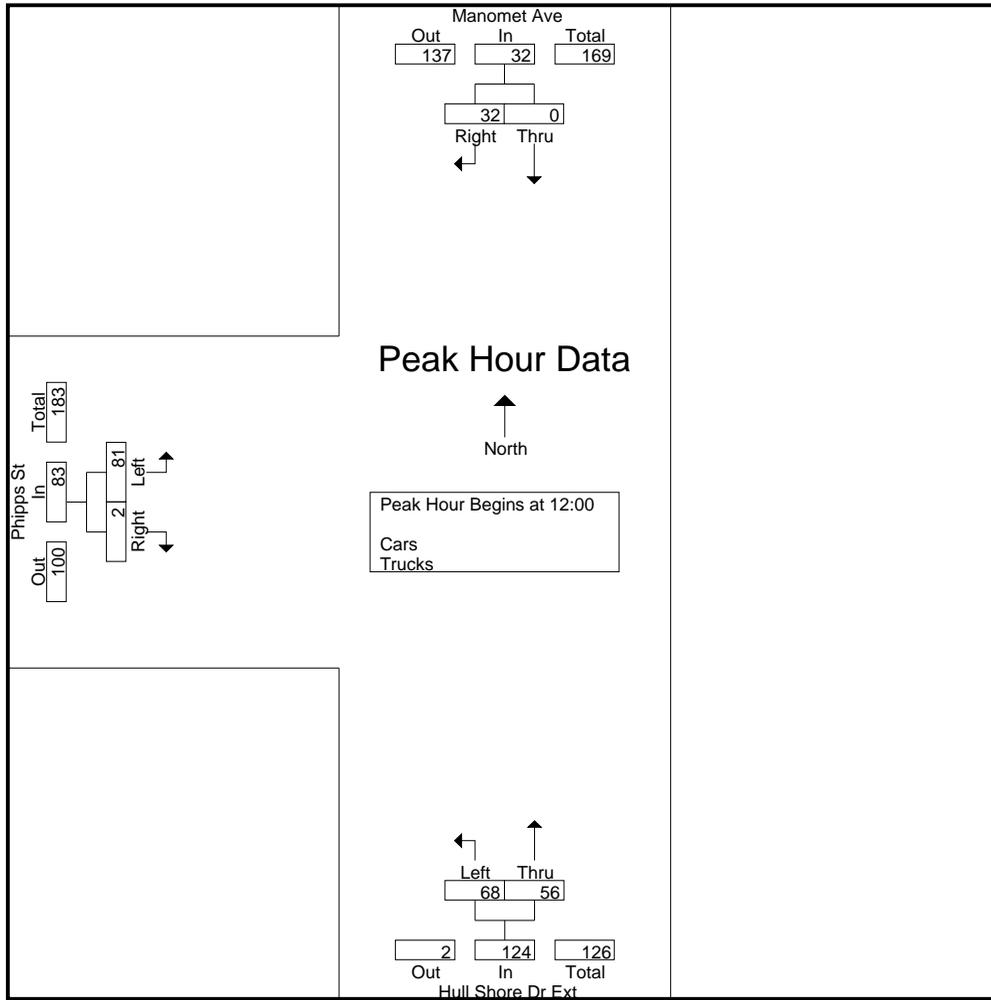
Peak Hour for Entire Intersection Begins at 16:45



Groups Printed- Cars - Trucks

Start Time	Manomet Ave From North			Hull Shore Dr Ext From South			Phipps St From West			Exclu. Total	Inclu. Total	Int. Total
	Thru	Right	Peds	Left	Thru	Peds	Left	Right	Peds			
11:00	0	4	0	3	21	0	5	0	0	0	33	33
11:15	0	10	0	4	18	0	7	0	0	0	39	39
11:30	0	8	0	7	21	0	13	0	0	0	49	49
11:45	0	2	0	10	11	0	16	0	0	0	39	39
Total	0	24	0	24	71	0	41	0	0	0	160	160
12:00	0	8	0	15	13	0	23	0	0	0	59	59
12:15	0	10	0	22	12	0	23	1	0	0	68	68
12:30	0	5	0	14	13	0	16	1	0	0	49	49
12:45	0	9	0	17	18	0	19	0	0	0	63	63
Total	0	32	0	68	56	0	81	2	0	0	239	239
13:00	0	6	0	14	14	0	13	0	0	0	47	47
13:15	0	7	0	16	24	0	16	0	0	0	63	63
13:30	0	10	0	19	21	0	8	0	0	0	58	58
13:45	0	12	0	14	12	0	12	0	0	0	50	50
Total	0	35	0	63	71	0	49	0	0	0	218	218
Grand Total	0	91	0	155	198	0	171	2	0	0	617	617
Apprch %	0	100		43.9	56.1		98.8	1.2				
Total %	0	14.7		25.1	32.1		27.7	0.3		0	100	
Cars	0	88		155	198		169	2		0	0	612
% Cars	0	96.7	0	100	100	0	98.8	100	0	0	0	99.2
Trucks	0	3		0	0		2	0		0	0	5
% Trucks	0	3.3	0	0	0	0	1.2	0	0	0	0	0.8

Start Time	Manomet Ave From North			Hull Shore Dr Ext From South			Phipps St From West			Int. Total
	Thru	Right	App. Total	Left	Thru	App. Total	Left	Right	App. Total	
Peak Hour Analysis From 11:00 to 13:45 - Peak 1 of 1										
Peak Hour for Entire Intersection Begins at 12:00										
12:00	0	8	8	15	13	28	23	0	23	59
12:15	0	10	10	22	12	34	23	1	24	68
12:30	0	5	5	14	13	27	16	1	17	49
12:45	0	9	9	17	18	35	19	0	19	63
Total Volume	0	32	32	68	56	124	81	2	83	239
% App. Total	0	100		54.8	45.2		97.6	2.4		
PHF	.000	.800	.800	.773	.778	.886	.880	.500	.865	.879



Groups Printed- Cars - Trucks

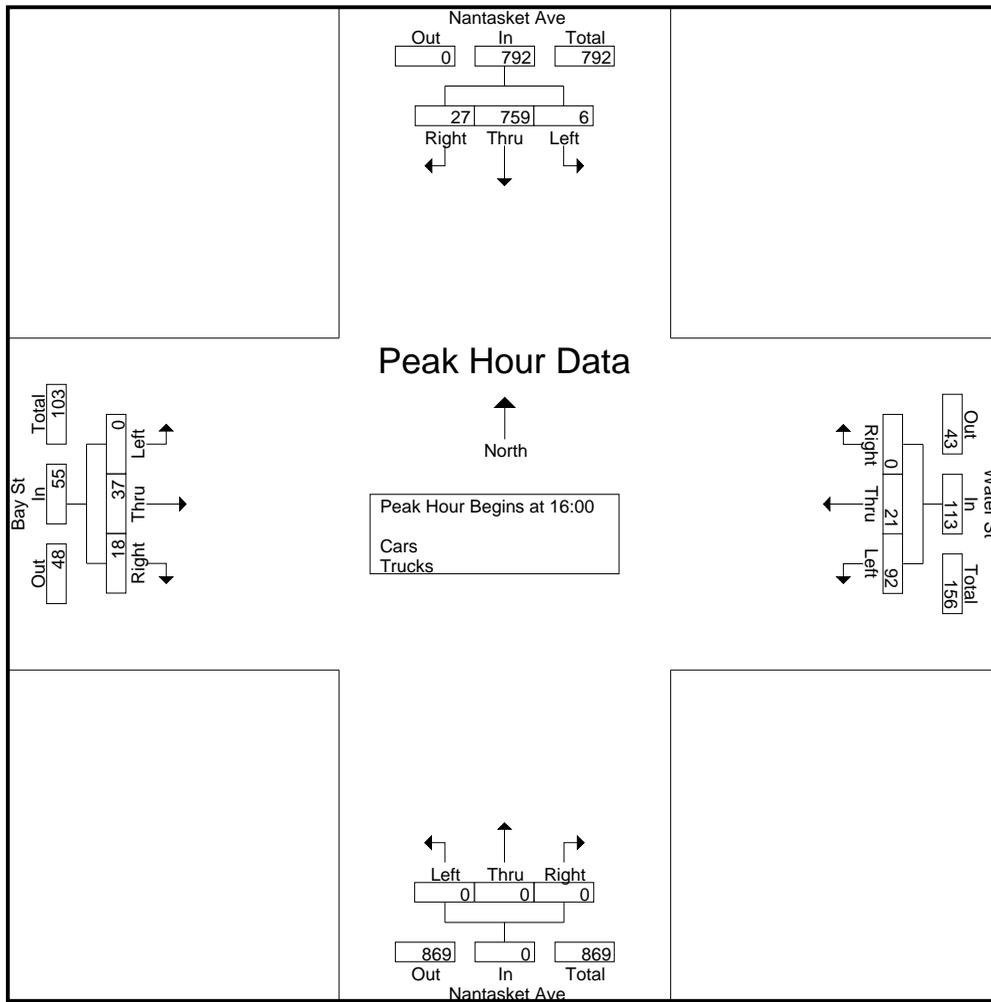
Start Time	Nantasket Ave From North			Water St From East			Nantasket Ave From South			Bay St From West			Int. Total
	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	
16:00	2	204	8	24	1	0	0	0	0	0	11	6	256
16:15	0	184	8	21	8	0	0	0	0	0	9	3	233
16:30	2	182	8	24	7	0	0	0	0	0	9	7	239
16:45	2	189	3	23	5	0	0	0	0	0	8	2	232
Total	6	759	27	92	21	0	0	0	0	0	37	18	960
17:00	1	157	15	19	8	0	0	0	0	0	14	3	217
17:15	0	165	10	23	6	0	0	0	0	0	3	1	208
17:30	0	171	8	16	8	0	0	0	0	0	10	1	214
17:45	2	166	14	21	7	0	0	0	0	0	11	8	229
Total	3	659	47	79	29	0	0	0	0	0	38	13	868
Grand Total	9	1418	74	171	50	0	0	0	0	0	75	31	1828
Apprch %	0.6	94.5	4.9	77.4	22.6	0	0	0	0	0	70.8	29.2	
Total %	0.5	77.6	4	9.4	2.7	0	0	0	0	0	4.1	1.7	
Cars	9	1391	73	166	50	0	0	0	0	0	73	31	1793
% Cars	100	98.1	98.6	97.1	100	0	0	0	0	0	97.3	100	98.1
Trucks	0	27	1	5	0	0	0	0	0	0	2	0	35
% Trucks	0	1.9	1.4	2.9	0	0	0	0	0	0	2.7	0	1.9

Start Time	Nantasket Ave From North				Water St From East				Nantasket Ave From South				Bay St From West				Int. Total
	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	

Peak Hour Analysis From 16:00 to 17:45 - Peak 1 of 1

Peak Hour for Entire Intersection Begins at 16:00

16:00	2	204	8	214	24	1	0	25	0	0	0	0	0	11	6	17	256
16:15	0	184	8	192	21	8	0	29	0	0	0	0	0	9	3	12	233
16:30	2	182	8	192	24	7	0	31	0	0	0	0	0	9	7	16	239
16:45	2	189	3	194	23	5	0	28	0	0	0	0	0	8	2	10	232
Total Volume	6	759	27	792	92	21	0	113	0	0	0	0	0	37	18	55	960
% App. Total	0.8	95.8	3.4		81.4	18.6	0		0	0	0	0	0	67.3	32.7		
PHF	.750	.930	.844	.925	.958	.656	.000	.911	.000	.000	.000	.000	.000	.841	.643	.809	.938



Accurate Counts
978-664-2565

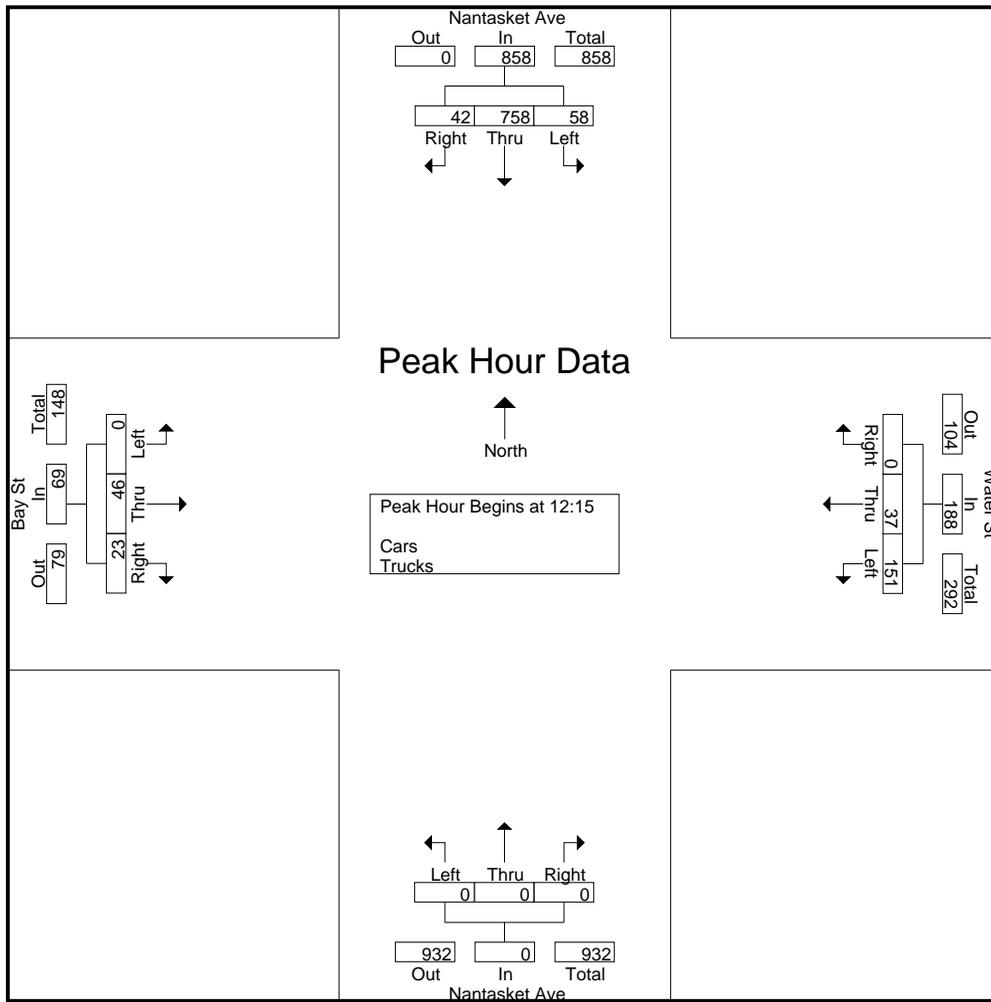
N/S Street : Nantasket Avenue
E/W Street: Water St / Bay St
City/State : Hull, MA
Weather : Clear

File Name : 146400A4
Site Code : 14640004
Start Date : 8/5/2006
Page No : 1

Groups Printed- Cars - Trucks

Start Time	Nantasket Ave From North			Water St From East			Nantasket Ave From South			Bay St From West			Int. Total
	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	
11:00	1	178	10	25	4	0	0	0	0	0	10	3	231
11:15	2	182	13	31	9	0	0	0	0	0	9	2	248
11:30	2	181	14	29	11	0	0	0	0	0	13	3	253
11:45	11	209	17	36	4	0	0	0	0	0	13	11	301
Total	16	750	54	121	28	0	0	0	0	0	45	19	1033
12:00	13	159	10	22	3	0	0	0	0	0	14	5	226
12:15	18	176	12	41	9	0	0	0	0	0	14	4	274
12:30	11	201	9	43	6	0	0	0	0	0	9	7	286
12:45	15	201	14	24	10	0	0	0	0	0	14	7	285
Total	57	737	45	130	28	0	0	0	0	0	51	23	1071
13:00	14	180	7	43	12	0	0	0	0	0	9	5	270
13:15	6	153	12	31	8	0	0	0	0	0	11	3	224
13:30	19	157	7	37	8	0	0	0	0	0	11	1	240
13:45	4	196	16	32	9	0	0	0	0	0	13	2	272
Total	43	686	42	143	37	0	0	0	0	0	44	11	1006
Grand Total	116	2173	141	394	93	0	0	0	0	0	140	53	3110
Apprch %	4.8	89.4	5.8	80.9	19.1	0	0	0	0	0	72.5	27.5	
Total %	3.7	69.9	4.5	12.7	3	0	0	0	0	0	4.5	1.7	
Cars	116	2143	134	392	92	0	0	0	0	0	138	53	3068
% Cars	100	98.6	95	99.5	98.9	0	0	0	0	0	98.6	100	98.6
Trucks	0	30	7	2	1	0	0	0	0	0	2	0	42
% Trucks	0	1.4	5	0.5	1.1	0	0	0	0	0	1.4	0	1.4

Start Time	Nantasket Ave From North				Water St From East				Nantasket Ave From South				Bay St From West				Int. Total
	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	
Peak Hour Analysis From 11:00 to 13:45 - Peak 1 of 1																	
Peak Hour for Entire Intersection Begins at 12:15																	
12:15	18	176	12	206	41	9	0	50	0	0	0	0	0	14	4	18	274
12:30	11	201	9	221	43	6	0	49	0	0	0	0	0	9	7	16	286
12:45	15	201	14	230	24	10	0	34	0	0	0	0	0	14	7	21	285
13:00	14	180	7	201	43	12	0	55	0	0	0	0	0	9	5	14	270
Total Volume	58	758	42	858	151	37	0	188	0	0	0	0	0	46	23	69	1115
% App. Total	6.8	88.3	4.9		80.3	19.7	0		0	0	0		0	66.7	33.3		
PHF	.806	.943	.750	.933	.878	.771	.000	.855	.000	.000	.000	.000	.000	.821	.821	.821	.975



N/S Street : Nantasket Avenue
E/W Street: George Washington Blvd
City/State : Hull, MA
Weather : Clear

File Name : 14640005
Site Code : 14640005
Start Date : 8/3/2006
Page No : 1

Groups Printed- Cars - Trucks

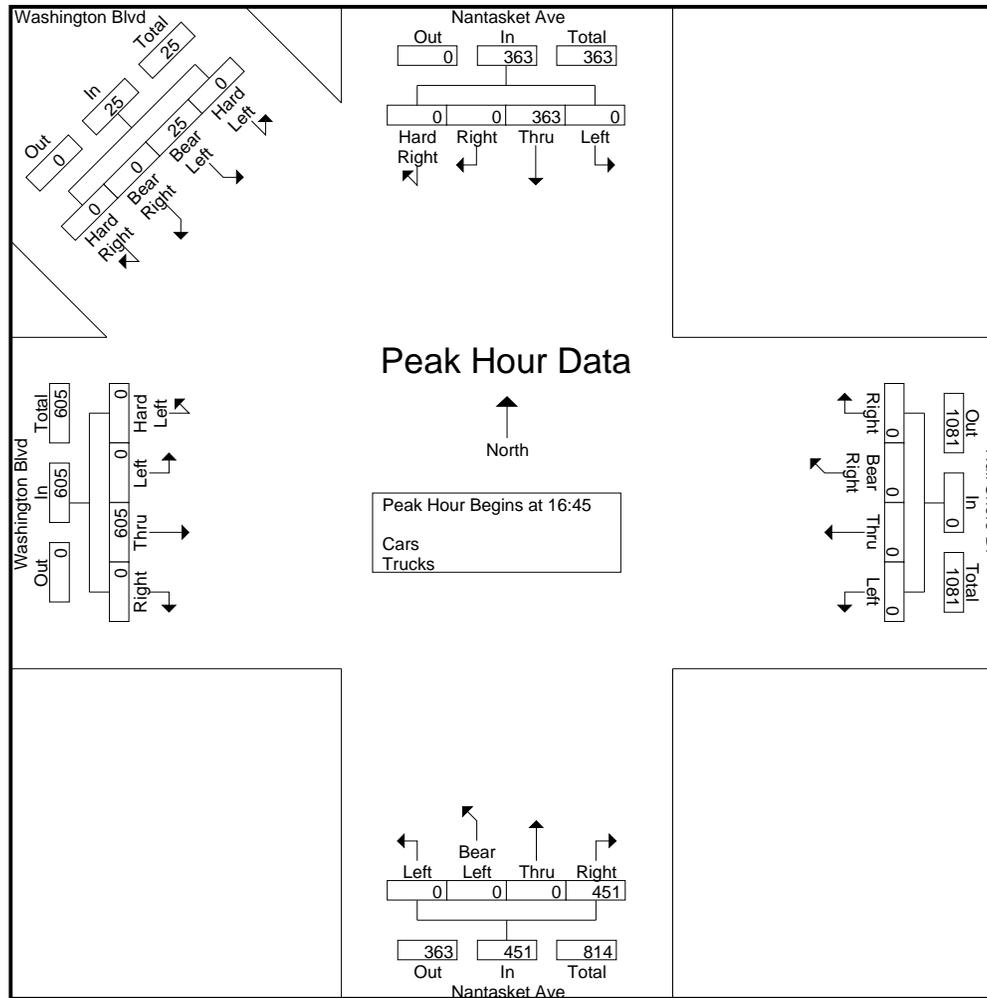
Start Time	Nantasket Ave From North					Hull Shore Dr From East					Nantasket Ave From South					Washington Blvd From West					Washington Blvd From Northwest					Exclu. Total	Inclu. Total	Int. Total
	Left	Thru	Right	Hard Right	Peds	Left	Thru	Bear Right	Right	Peds	Left	Bear Left	Thru	Right	Peds	Hard Left	Left	Thru	Right	Peds	Hard Left	Bear Left	Bear Right	Hard Right	Peds			
16:00	1	104	0	0	1	0	0	0	0	0	0	0	0	117	2	0	0	132	0	10	0	7	0	0	0	13	361	374
16:15	0	122	0	0	0	0	0	0	0	0	0	0	0	106	1	0	0	129	0	4	0	9	0	0	0	5	366	371
16:30	1	89	0	0	3	0	0	0	0	0	0	0	0	98	0	0	0	116	0	10	0	10	0	0	0	13	314	327
16:45	0	109	0	0	0	0	0	0	0	0	0	0	0	125	6	0	0	156	0	7	0	5	0	0	0	13	395	408
Total	2	424	0	0	4	0	0	0	0	0	0	0	0	446	9	0	0	533	0	31	0	31	0	0	0	44	1436	1480
17:00	0	80	0	0	0	0	0	0	0	0	0	0	0	113	2	0	0	130	0	8	0	10	0	0	0	10	333	343
17:15	0	77	0	0	0	0	0	0	0	0	0	0	0	93	0	0	0	152	0	16	0	3	0	0	0	16	325	341
17:30	0	97	0	0	0	0	0	0	0	0	0	0	0	120	0	0	0	167	0	5	0	7	0	0	0	5	391	396
17:45	0	87	0	0	0	0	0	0	0	0	0	0	0	107	0	0	0	139	0	4	0	9	0	0	0	4	342	346
Total	0	341	0	0	0	0	0	0	0	0	0	0	0	433	2	0	0	588	0	33	0	29	0	0	0	35	1391	1426
Grand Total	2	765	0	0	4	0	0	0	0	0	0	0	0	879	11	0	0	1121	0	64	0	60	0	0	0	79	2827	2906
Apprch %	0.3	99.7	0	0		0	0	0	0		0	0	0	100		0	0	100	0		0	100	0	0				
Total %	0.1	27.1	0	0		0	0	0	0		0	0	0	31.1		0	0	39.7	0		0	2.1	0	0		2.7	97.3	
Cars	2	749	0	0		0	0	0	0		0	0	0	865		0	0	1105	0		0	58	0	0		0	0	2858
% Cars	100	97.9	0	0	100	0	0	0	0	0	0	0	0	98.4	100	0	0	98.6	0	100	0	96.7	0	0	0	0	0	98.3
Trucks	0	16	0	0		0	0	0	0		0	0	0	14		0	0	16	0		0	2	0	0		0	0	48
% Trucks	0	2.1	0	0	0	0	0	0	0	0	0	0	0	1.6	0	0	0	1.4	0	0	0	3.3	0	0	0	0	0	1.7

Start Time	Nantasket Ave From North					Hull Shore Dr From East					Nantasket Ave From South					Washington Blvd From West					Washington Blvd From Northwest					Int. Total
	Left	Thru	Right	Hard Right	App. Total	Left	Thru	Bear Right	Right	App. Total	Left	Bear Left	Thru	Right	App. Total	Hard Left	Left	Thru	Right	App. Total	Hard Left	Bear Left	Bear Right	Hard Right	App. Total	

Peak Hour Analysis From 16:00 to 17:45 - Peak 1 of 1

Peak Hour for Entire Intersection Begins at 16:45

16:45	0	109	0	0	109	0	0	0	0	0	0	0	0	125	125	0	0	156	0	156	0	5	0	0	5	395		
17:00	0	80	0	0	80	0	0	0	0	0	0	0	0	113	113	0	0	130	0	130	0	10	0	0	10	333		
17:15	0	77	0	0	77	0	0	0	0	0	0	0	0	93	93	0	0	152	0	152	0	3	0	0	3	325		
17:30	0	97	0	0	97	0	0	0	0	0	0	0	0	120	120	0	0	167	0	167	0	7	0	0	7	391		
Total Volume	0	363	0	0	363	0	0	0	0	0	0	0	0	451	451	0	0	605	0	605	0	25	0	0	25	1444		
% App. Total	0	100	0	0		0	0	0	0		0	0	0	100		0	0	100	0		0	100	0	0				
PHF	.000	.833	.000	.000	.833	.000	.000	.000	.000	.000	.000	.000	.000	.902	.902	.000	.000	.906	.000	.906	.000	.625	.000	.000	.625	.914		



N/S Street : Nantasket Avenue
E/W Street: George Washington Blvd
City/State : Hull, MA
Weather : Clear

File Name : 146400A5
Site Code : 14640005
Start Date : 8/5/2006
Page No : 1

Groups Printed- Cars - Trucks

Start Time	Nantasket Ave From North					Hull Shore Dr From East					Nantasket Ave From South					Washington Blvd From West					Washington Blvd From Northwest					Exclu. Total	Inclu. Total	Int. Total
	Left	Thru	Right	Hard Right	Peds	Left	Thru	Bear Right	Right	Peds	Left	Bear Left	Thru	Right	Peds	Hard Left	Left	Thru	Right	Peds	Hard Left	Bear Left	Bear Right	Hard Right	Peds			
11:00	0	117	0	0	0	0	0	0	0	0	0	0	0	136	2	0	0	154	0	3	0	19	0	0	0	5	426	431
11:15	0	102	0	0	0	0	0	0	0	0	0	0	0	141	1	0	0	147	0	2	0	24	0	0	0	3	414	417
11:30	0	80	0	0	0	0	0	0	0	0	0	0	0	146	0	0	0	175	0	3	0	21	0	0	0	3	422	425
11:45	0	104	0	0	0	0	0	0	0	0	0	0	0	142	4	0	0	194	0	11	0	17	0	0	0	15	457	472
Total	0	403	0	0	0	0	0	0	0	0	0	0	0	565	7	0	0	670	0	19	0	81	0	0	0	26	1719	1745
12:00	0	89	0	0	0	0	0	0	0	0	0	0	0	149	0	0	0	178	0	4	0	19	0	0	0	4	435	439
12:15	0	106	0	0	0	0	0	0	0	0	0	0	0	172	0	0	0	148	0	11	0	23	0	0	0	11	449	460
12:30	0	108	0	0	0	0	0	0	0	0	0	0	0	154	4	0	0	170	0	4	0	10	0	0	0	8	442	450
12:45	0	98	0	0	0	0	0	0	0	0	0	0	0	157	3	0	0	168	0	5	0	24	0	0	0	8	447	455
Total	0	401	0	0	0	0	0	0	0	0	0	0	0	632	7	0	0	664	0	24	0	76	0	0	0	31	1773	1804
13:00	0	111	0	0	3	0	0	0	0	0	0	0	0	155	3	0	0	169	0	13	0	12	0	0	0	19	447	466
13:15	0	101	0	0	0	0	0	0	0	0	0	0	0	174	0	0	0	172	0	29	0	12	0	0	0	29	459	488
13:30	0	114	0	0	0	0	0	0	0	0	0	0	0	166	9	0	0	168	0	33	0	13	0	0	0	42	461	503
13:45	0	101	0	0	0	0	0	0	0	0	0	0	0	134	1	0	0	156	0	21	0	15	0	0	0	22	406	428
Total	0	427	0	0	3	0	0	0	0	0	0	0	0	629	13	0	0	665	0	96	0	52	0	0	0	112	1773	1885
Grand Total	0	1231	0	0	3	0	0	0	0	0	0	0	0	1826	27	0	0	1999	0	139	0	209	0	0	0	169	5265	5434
Apprch % Total %	0	100	0	0		0	0	0	0		0	0	0	100		0	0	100	0		0	100	0	0		3.1	96.9	
Cars	0	1210	0	0		0	0	0	0		0	0	0	1805		0	0	1987	0		0	206	0	0		0	0	5377
% Cars	0	98.3	0	0	100	0	0	0	0	0	0	0	0	98.8	100	0	0	99.4	0	100	0	98.6	0	0	0	0	0	99
Trucks	0	21	0	0		0	0	0	0		0	0	0	21		0	0	12	0		0	3	0	0		0	0	57
% Trucks	0	1.7	0	0	0	0	0	0	0	0	0	0	0	1.2	0	0	0	0.6	0	0	0	1.4	0	0	0	0	0	1

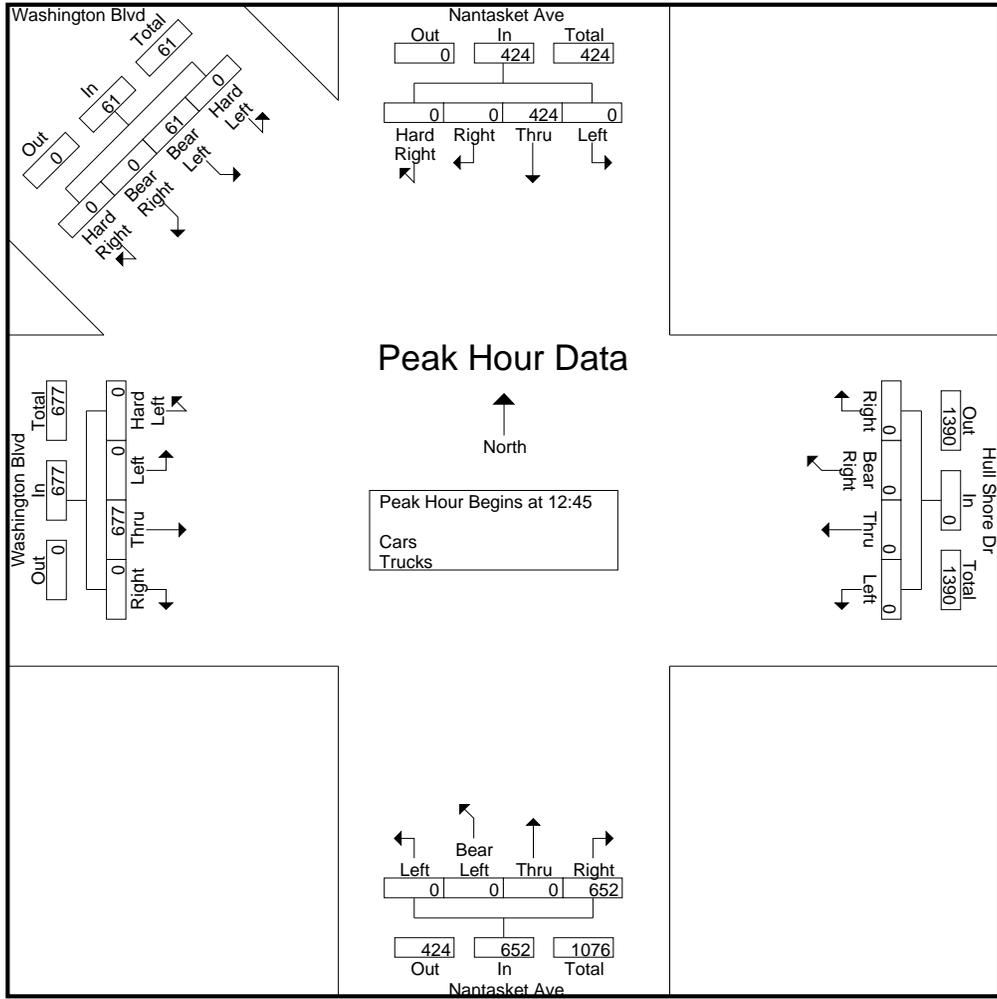
Start Time	Nantasket Ave From North					Hull Shore Dr From East					Nantasket Ave From South					Washington Blvd From West					Washington Blvd From Northwest					Int. Total
	Left	Thru	Right	Hard Right	App. Total	Left	Thru	Bear Right	Right	App. Total	Left	Bear Left	Thru	Right	App. Total	Hard Left	Left	Thru	Right	App. Total	Hard Left	Bear Left	Bear Right	Hard Right	App. Total	

Peak Hour Analysis From 11:00 to 13:45 - Peak 1 of 1

Peak Hour for Entire Intersection Begins at 12:45

12:45	0	98	0	0	98	0	0	0	0	0	0	0	0	157	157	0	0	168	0	168	0	24	0	0	24	447
13:00	0	111	0	0	111	0	0	0	0	0	0	0	0	155	155	0	0	169	0	169	0	12	0	0	12	447
13:15	0	101	0	0	101	0	0	0	0	0	0	0	0	174	174	0	0	172	0	172	0	12	0	0	12	459
13:30	0	114	0	0	114	0	0	0	0	0	0	0	0	166	166	0	0	168	0	168	0	13	0	0	13	461
Total Volume	0	424	0	0	424	0	0	0	0	0	0	0	0	652	652	0	0	677	0	677	0	61	0	0	61	1814

% App. Total	0	100	0	0	0	0	0	0	0	0	0	0	100	0	0	100	0	0	0	0				
PHF	.000	.930	.000	.000	.930	.000	.000	.000	.000	.000	.000	.937	.937	.000	.000	.984	.000	.984	.000	.635	.000	.000	.635	.984



N/S Street : Nantasket Avenue
E/W Street: Wharf Avenue
City/State : Hull, MA
Weather : Clear

File Name : 14640006
Site Code : 14640006
Start Date : 8/3/2006
Page No : 1

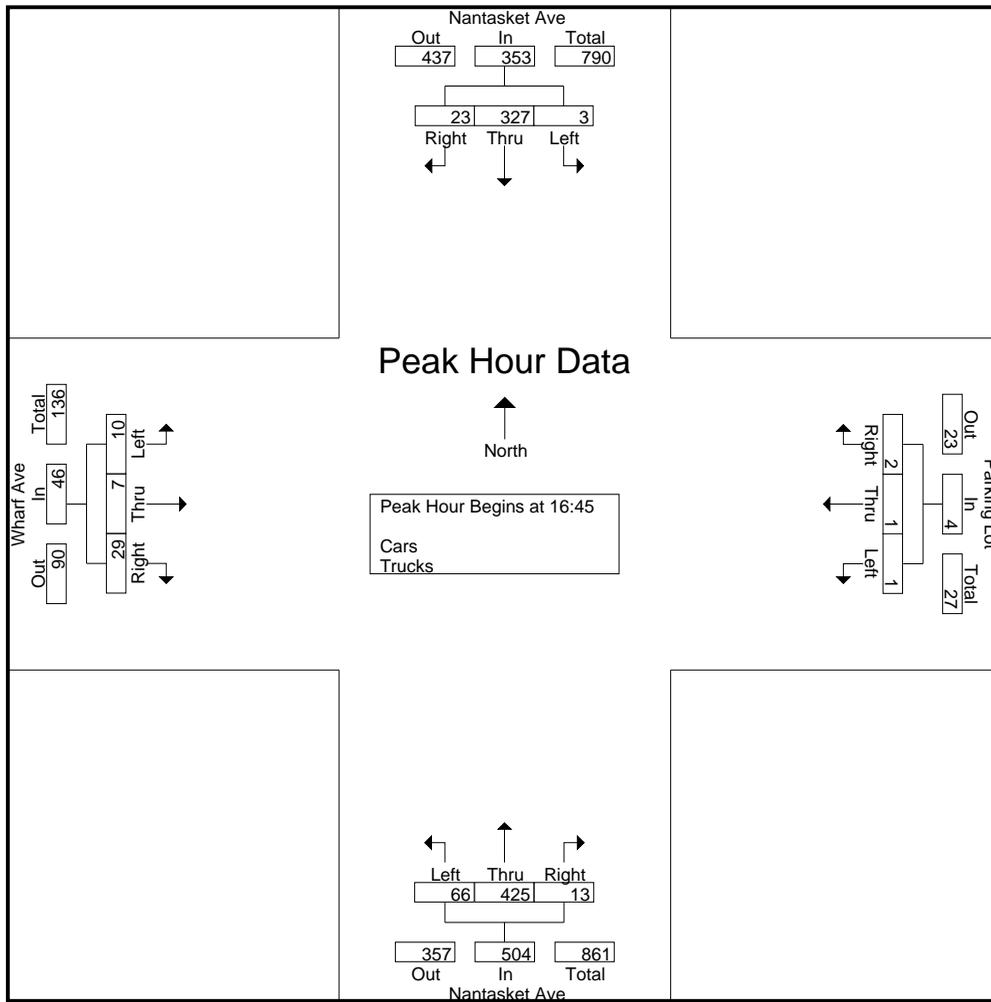
Groups Printed- Cars - Trucks

Start Time	Nantasket Ave From North				Parking Lot From East				Nantasket Ave From South				Wharf Ave From West				Exclu. Total	Inclu. Total	Int. Total
	Left	Thru	Right	Peds	Left	Thru	Right	Peds	Left	Thru	Right	Peds	Left	Thru	Right	Peds			
16:00	1	91	2	1	0	0	0	3	15	91	2	1	3	2	1	4	9	208	217
16:15	1	99	17	0	0	0	10	12	93	2	2	2	2	0	4	4	16	230	246
16:30	0	91	1	0	0	0	3	28	76	2	0	4	1	7	7	10	210	220	220
16:45	0	98	8	5	0	0	0	19	121	1	6	2	0	6	16	27	255	282	282
Total	2	379	28	6	0	0	16	74	381	7	9	11	3	18	31	62	903	965	965
17:00	0	71	1	0	0	1	2	2	15	105	1	10	1	3	10	4	16	210	226
17:15	2	76	7	0	1	0	0	0	12	84	6	12	1	2	7	15	27	198	225
17:30	1	82	7	0	0	0	3	20	115	5	7	6	2	6	7	17	244	261	261
17:45	0	93	3	0	0	0	0	16	98	4	2	2	2	9	1	3	227	230	230
Total	3	322	18	0	1	1	2	5	63	402	16	31	10	9	32	27	63	879	942
Grand Total	5	701	46	6	1	1	2	21	137	783	23	40	21	12	50	58	125	1782	1907
Apprch %	0.7	93.2	6.1		25	25	50		14.5	83	2.4		25.3	14.5	60.2				
Total %	0.3	39.3	2.6		0.1	0.1	0.1		7.7	43.9	1.3		1.2	0.7	2.8		6.6	93.4	
Cars	5	698	46		1	1	2		137	775	23		21	12	50		0	0	1896
% Cars	100	99.6	100	100	100	100	100		100	99	100	100	100	100	100	100	0	0	99.4
Trucks	0	3	0		0	0	0		0	8	0		0	0	0		0	0	11
% Trucks	0	0.4	0	0	0	0	0		0	1	0	0	0	0	0	0	0	0	0.6

Start Time	Nantasket Ave From North				Parking Lot From East				Nantasket Ave From South				Wharf Ave From West				Int. Total
	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	
16:45	0	98	8	106	0	0	0	0	19	121	1	141	2	0	6	8	255
17:00	0	71	1	72	0	1	2	3	15	105	1	121	1	3	10	14	210
17:15	2	76	7	85	1	0	0	1	12	84	6	102	1	2	7	10	198
17:30	1	82	7	90	0	0	0	0	20	115	5	140	6	2	6	14	244
Total Volume	3	327	23	353	1	1	2	4	66	425	13	504	10	7	29	46	907
% App. Total	0.8	92.6	6.5		25	25	50		13.1	84.3	2.6		21.7	15.2	63		
PHF	.375	.834	.719	.833	.250	.250	.250	.333	.825	.878	.542	.894	.417	.583	.725	.821	.889

Peak Hour Analysis From 16:00 to 17:45 - Peak 1 of 1

Peak Hour for Entire Intersection Begins at 16:45



Accurate Counts
978-664-2565

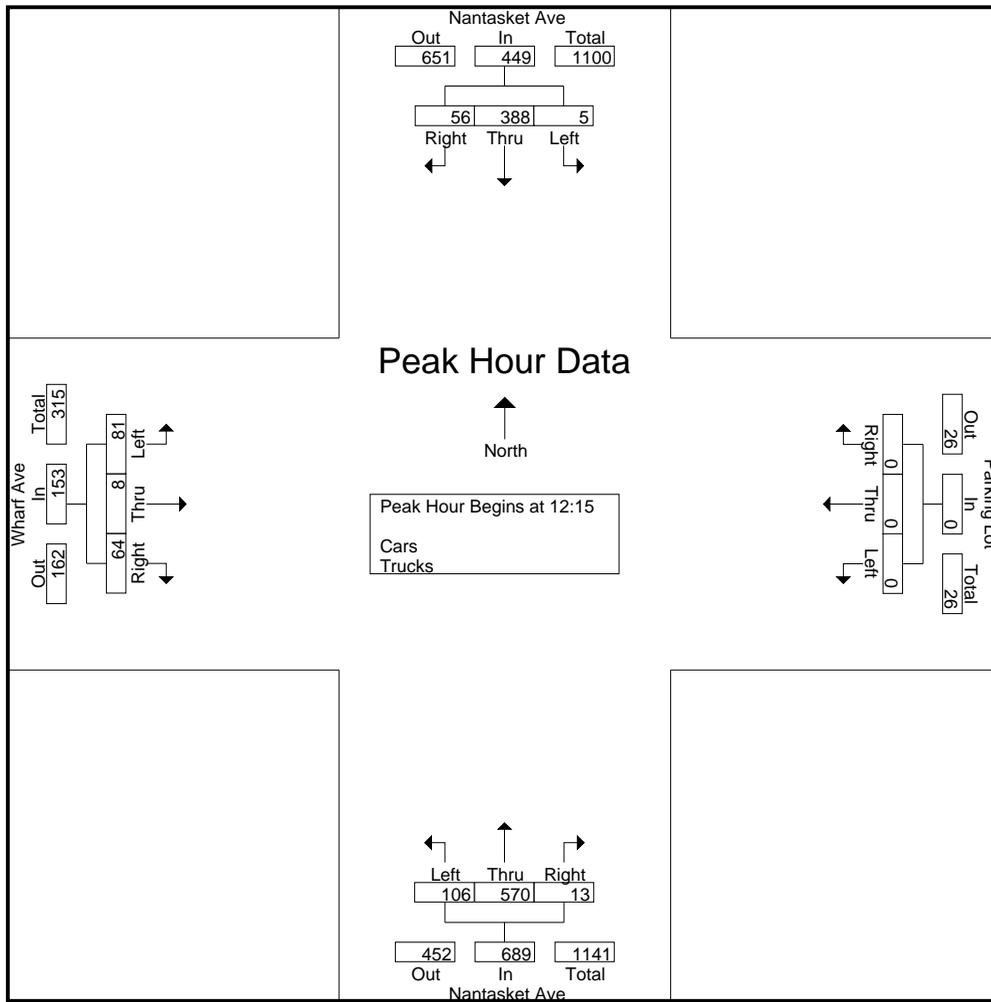
N/S Street : Nantasket Avenue
E/W Street: Wharf Avenue
City/State : Hull, MA
Weather : Clear

File Name : 146400A6
Site Code : 14640006
Start Date : 8/5/2006
Page No : 1

Groups Printed- Cars - Trucks

Start Time	Nantasket Ave From North				Parking Lot From East				Nantasket Ave From South				Wharf Ave From West				Exclu. Total	Inclu. Total	Int. Total
	Left	Thru	Right	Peds	Left	Thru	Right	Peds	Left	Thru	Right	Peds	Left	Thru	Right	Peds			
11:00	1	92	3	1	0	0	0	4	12	122	1	10	12	3	10	4	19	256	275
11:15	2	97	8	0	1	0	0	9	8	117	1	12	14	5	13	7	28	266	294
11:30	0	76	8	5	0	0	0	3	14	132	5	6	16	4	10	4	18	265	283
11:45	0	97	18	8	0	0	1	0	18	132	3	9	15	0	14	15	32	298	330
Total	3	362	37	14	1	0	1	16	52	503	10	37	57	12	47	30	97	1085	1182
12:00	0	85	9	19	0	0	0	0	23	123	3	2	17	1	19	8	29	280	309
12:15	2	100	10	6	0	0	0	0	21	141	4	3	30	2	15	7	16	325	341
12:30	2	105	18	35	0	0	0	4	25	150	3	6	19	1	15	21	66	338	404
12:45	1	80	16	4	0	0	0	0	25	130	3	15	18	4	15	2	21	292	313
Total	5	370	53	64	0	0	0	4	94	544	13	26	84	8	64	38	132	1235	1367
13:00	0	103	12	8	0	0	0	0	35	149	3	8	14	1	19	16	32	336	368
13:15	1	81	20	4	0	0	0	5	25	149	2	4	18	3	12	23	36	311	347
13:30	0	90	19	14	0	1	0	0	37	138	1	12	18	2	17	23	49	323	372
13:45	0	97	12	7	0	0	0	2	22	118	3	7	18	2	15	16	32	287	319
Total	1	371	63	33	0	1	0	7	119	554	9	31	68	8	63	78	149	1257	1406
Grand Total	9	1103	153	111	1	1	1	27	265	1601	32	94	209	28	174	146	378	3577	3955
Apprch %	0.7	87.2	12.1		33.3	33.3	33.3		14	84.4	1.7		50.9	6.8	42.3				
Total %	0.3	30.8	4.3		0	0	0		7.4	44.8	0.9		5.8	0.8	4.9		9.6	90.4	
Cars	9	1093	153		1	1	1		262	1594	32		208	28	174		0	0	3934
% Cars	100	99.1	100	100	100	100	100	100	98.9	99.6	100	100	99.5	100	100	100	0	0	99.5
Trucks	0	10	0		0	0	0		3	7	0		1	0	0		0	0	21
% Trucks	0	0.9	0	0	0	0	0	0	1.1	0.4	0	0	0.5	0	0	0	0	0	0.5

Start Time	Nantasket Ave From North				Parking Lot From East				Nantasket Ave From South				Wharf Ave From West				Int. Total		
	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total			
Peak Hour Analysis From 11:00 to 13:45 - Peak 1 of 1																			
Peak Hour for Entire Intersection Begins at 12:15																			
12:15	2	100	10	112	0	0	0	0	21	141	4	166	30	2	15	47			325
12:30	2	105	18	125	0	0	0	0	25	150	3	178	19	1	15	35			338
12:45	1	80	16	97	0	0	0	0	25	130	3	158	18	4	15	37			292
13:00	0	103	12	115	0	0	0	0	35	149	3	187	14	1	19	34			336
Total Volume	5	388	56	449	0	0	0	0	106	570	13	689	81	8	64	153			1291
% App. Total	1.1	86.4	12.5		0	0	0		15.4	82.7	1.9		52.9	5.2	41.8				
PHF	.625	.924	.778	.898	.000	.000	.000	.000	.757	.950	.813	.921	.675	.500	.842	.814			.955



N/S Street : Nantasket Avenue
E/W Street: Park Avenue
City/State : Hull, MA
Weather : Clear

File Name : 14640007
Site Code : 14640007
Start Date : 8/3/2006
Page No : 1

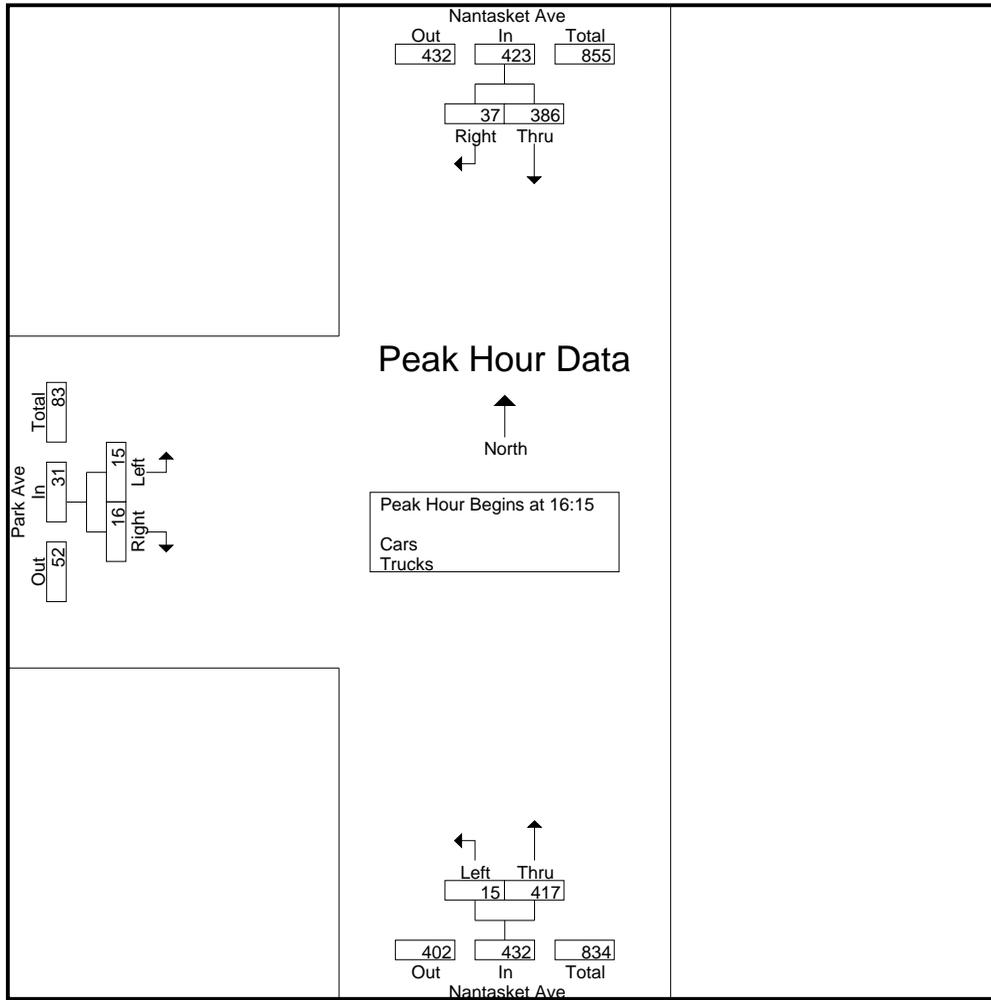
Groups Printed- Cars - Trucks

Start Time	Nantasket Ave From North			Nantasket Ave From South			Park Ave From West			Exclu. Total	Inclu. Total	Int. Total
	Thru	Right	Peds	Left	Thru	Peds	Left	Right	Peds			
16:00	89	7	0	1	90	10	3	2	1	11	192	203
16:15	102	10	0	1	98	15	2	4	1	16	217	233
16:30	96	10	0	7	84	2	5	6	0	2	208	210
16:45	105	8	0	5	125	12	3	2	0	12	248	260
Total	392	35	0	14	397	39	13	14	2	41	865	906
17:00	83	9	1	2	110	8	5	4	8	17	213	230
17:15	74	9	5	0	83	3	3	7	9	17	176	193
17:30	74	9	0	2	116	8	2	9	3	11	212	223
17:45	86	9	0	4	96	7	6	9	3	10	210	220
Total	317	36	6	8	405	26	16	29	23	55	811	866
Grand Total	709	71	6	22	802	65	29	43	25	96	1676	1772
Apprch %	90.9	9.1		2.7	97.3		40.3	59.7				
Total %	42.3	4.2		1.3	47.9		1.7	2.6		5.4	94.6	
Cars	706	71		22	796		29	43		0	0	1763
% Cars	99.6	100	100	100	99.3	100	100	100	100	0	0	99.5
Trucks	3	0		0	6		0	0		0	0	9
% Trucks	0.4	0	0	0	0.7	0	0	0	0	0	0	0.5

Start Time	Nantasket Ave From North			Nantasket Ave From South			Park Ave From West			Int. Total
	Thru	Right	App. Total	Left	Thru	App. Total	Left	Right	App. Total	
16:15	102	10	112	1	98	99	2	4	6	217
16:30	96	10	106	7	84	91	5	6	11	208
16:45	105	8	113	5	125	130	3	2	5	248
17:00	83	9	92	2	110	112	5	4	9	213
Total Volume	386	37	423	15	417	432	15	16	31	886
% App. Total	91.3	8.7		3.5	96.5		48.4	51.6		
PHF	.919	.925	.936	.536	.834	.831	.750	.667	.705	.893

Peak Hour Analysis From 16:00 to 17:45 - Peak 1 of 1

Peak Hour for Entire Intersection Begins at 16:15



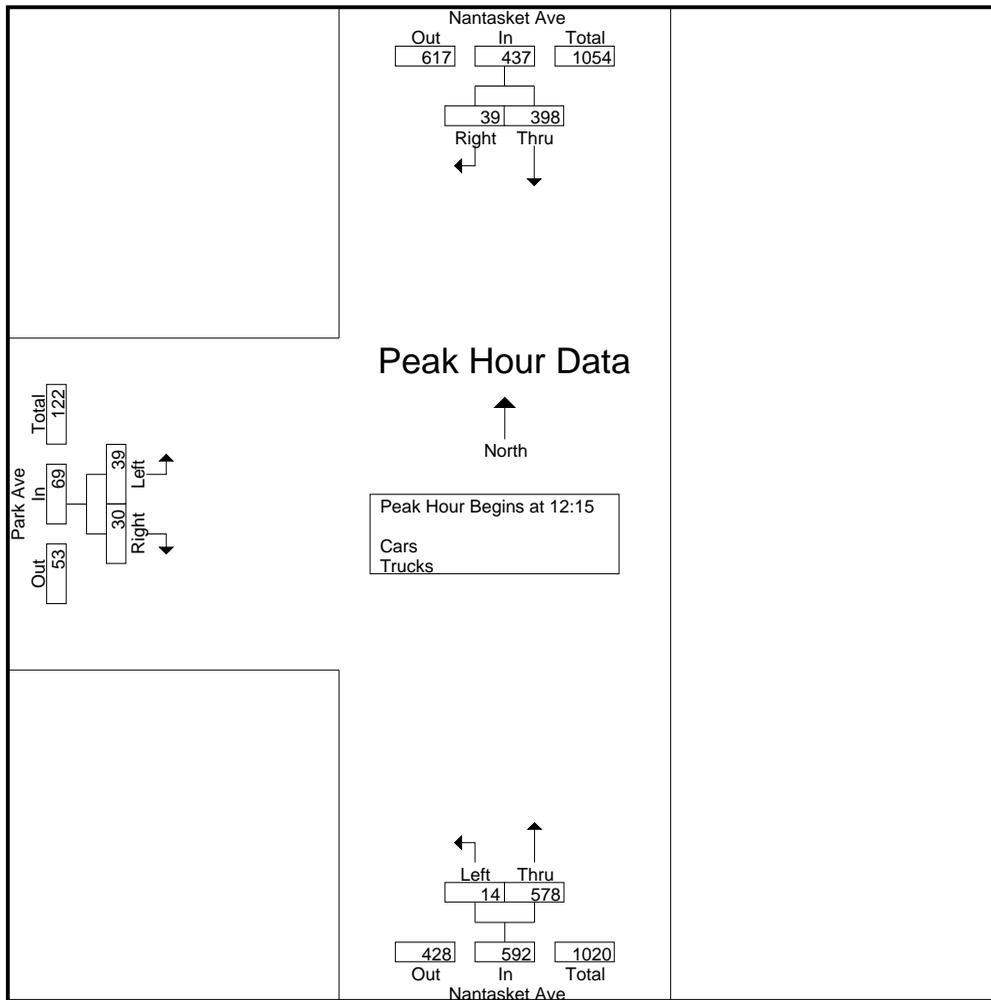
N/S Street : Nantasket Avenue
E/W Street: Park Avenue
City/State : Hull, MA
Weather : Clear

File Name : 146400A7
Site Code : 14640007
Start Date : 8/5/2006
Page No : 1

Groups Printed- Cars - Trucks

Start Time	Nantasket Ave From North			Nantasket Ave From South			Park Ave From West			Exclu. Total	Inclu. Total	Int. Total
	Thru	Right	Peds	Left	Thru	Peds	Left	Right	Peds			
11:00	86	4	0	3	113	2	8	7	6	8	221	229
11:15	88	6	0	3	110	3	11	11	9	12	229	241
11:30	73	13	0	4	133	8	10	8	15	23	241	264
11:45	84	17	0	12	131	15	9	9	13	28	262	290
Total	331	40	0	22	487	28	38	35	43	71	953	1024
12:00	91	20	0	4	126	32	11	2	8	40	254	294
12:15	92	8	0	3	152	3	6	7	6	9	268	277
12:30	114	18	0	4	143	11	11	7	8	19	297	316
12:45	83	5	0	2	128	8	7	7	7	15	232	247
Total	380	51	0	13	549	54	35	23	29	83	1051	1134
13:00	109	8	0	5	155	20	15	9	12	32	301	333
13:15	80	12	0	3	145	9	10	13	21	30	263	293
13:30	109	10	0	3	122	9	6	3	18	27	253	280
13:45	94	9	2	5	115	8	12	5	19	29	240	269
Total	392	39	2	16	537	46	43	30	70	118	1057	1175
Grand Total	1103	130	2	51	1573	128	116	88	142	272	3061	3333
Apprch %	89.5	10.5		3.1	96.9		56.9	43.1				
Total %	36	4.2		1.7	51.4		3.8	2.9		8.2	91.8	
Cars	1091	127		51	1563		114	88		0	0	3306
% Cars	98.9	97.7	100	100	99.4	100	98.3	100	100	0	0	99.2
Trucks	12	3		0	10		2	0		0	0	27
% Trucks	1.1	2.3	0	0	0.6	0	1.7	0	0	0	0	0.8

Start Time	Nantasket Ave From North			Nantasket Ave From South			Park Ave From West			Int. Total
	Thru	Right	App. Total	Left	Thru	App. Total	Left	Right	App. Total	
Peak Hour Analysis From 11:00 to 13:45 - Peak 1 of 1										
Peak Hour for Entire Intersection Begins at 12:15										
12:15	92	8	100	3	152	155	6	7	13	268
12:30	114	18	132	4	143	147	11	7	18	297
12:45	83	5	88	2	128	130	7	7	14	232
13:00	109	8	117	5	155	160	15	9	24	301
Total Volume	398	39	437	14	578	592	39	30	69	1098
% App. Total	91.1	8.9		2.4	97.6		56.5	43.5		
PHF	.873	.542	.828	.700	.932	.925	.650	.833	.719	.912



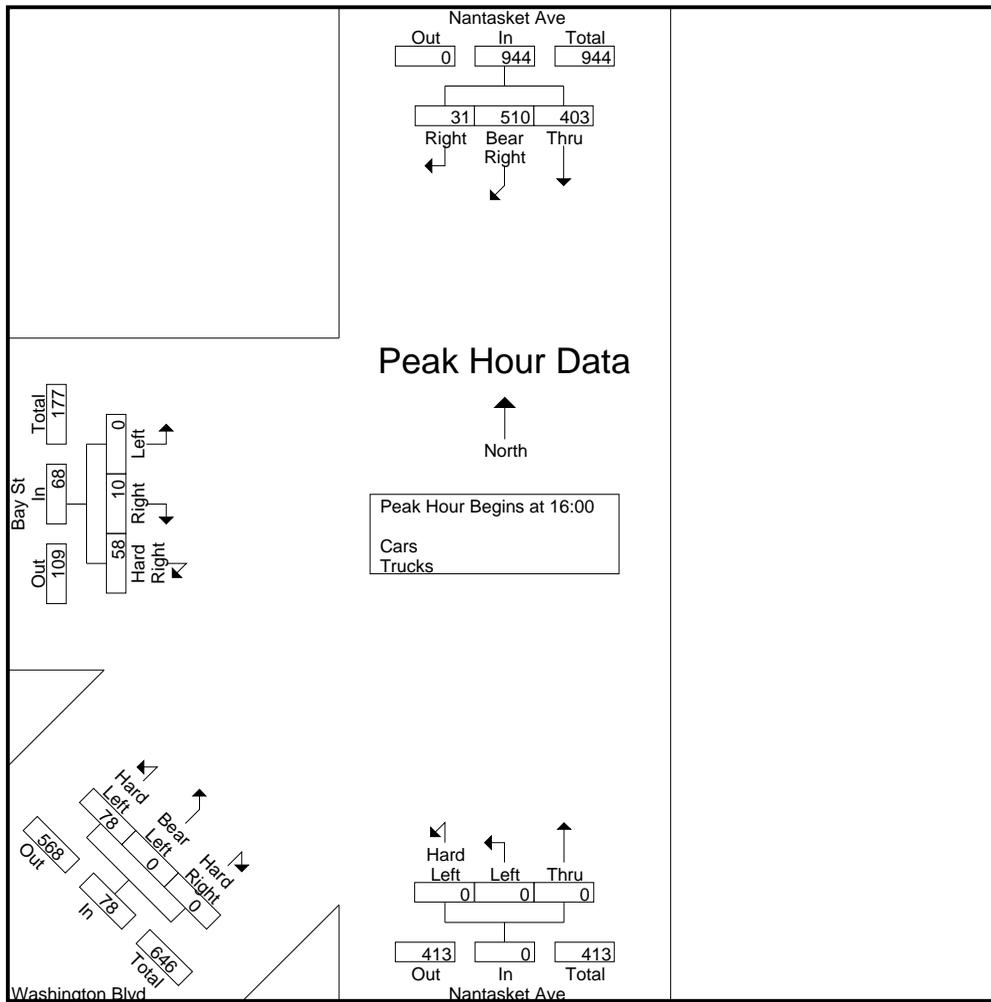
Groups Printed- Cars - Trucks

Start Time	Nantasket Ave From North				Nantasket Ave From South				Washington Blvd From Southwest				Bay St From West				Exclu. Total	Inclu. Total	Int. Total
	Thru	Bear Right	Right	Peds	Hard Left	Left	Thru	Peds	Hard Left	Bear Left	Hard Right	Peds	Left	Right	Hard Right	Peds			
16:00	121	128	5	21	0	0	0	16	16	0	0	1	0	3	15	9	47	288	335
16:15	93	113	8	3	0	0	0	2	19	0	0	0	0	6	16	5	10	255	265
16:30	97	131	11	8	0	0	0	4	15	0	0	0	0	0	13	5	17	267	284
16:45	92	138	7	14	0	0	0	13	28	0	0	1	0	1	14	4	32	280	312
Total	403	510	31	46	0	0	0	35	78	0	0	2	0	10	58	23	106	1090	1196
17:00	66	92	5	10	0	0	0	9	29	0	0	1	0	1	16	9	29	209	238
17:15	82	104	4	22	0	0	0	10	18	0	0	2	0	1	5	7	41	214	255
17:30	78	126	4	9	0	0	0	4	27	0	0	0	0	6	7	4	17	248	265
17:45	87	108	8	8	0	0	0	4	22	0	0	1	0	2	17	2	15	244	259
Total	313	430	21	49	0	0	0	27	96	0	0	4	0	10	45	22	102	915	1017
Grand Total	716	940	52	95	0	0	0	62	174	0	0	6	0	20	103	45	208	2005	2213
Apprch %	41.9	55	3		0	0	0		100	0	0		0	16.3	83.7				
Total %	35.7	46.9	2.6		0	0	0		8.7	0	0		0	1	5.1		9.4	90.6	
Cars	694	923	52		0	0	0		174	0	0		0	17	103		0	0	2171
% Cars	96.9	98.2	100	100	0	0	0	100	100	0	0	100	0	85	100	100	0	0	98.1
Trucks	22	17	0		0	0	0		0	0	0		0	3	0		0	0	42
% Trucks	3.1	1.8	0	0	0	0	0	0	0	0	0	0	0	15	0	0	0	0	1.9

Start Time	Nantasket Ave From North				Nantasket Ave From South				Washington Blvd From Southwest				Bay St From West				Int. Total
	Thru	Bear Right	Right	App. Total	Hard Left	Left	Thru	App. Total	Hard Left	Bear Left	Hard Right	App. Total	Left	Right	Hard Right	App. Total	

Peak Hour Analysis From 16:00 to 17:45 - Peak 1 of 1
Peak Hour for Entire Intersection Begins at 16:00

16:00	121	128	5	254	0	0	0	0	16	0	0	16	0	3	15	18	288
16:15	93	113	8	214	0	0	0	0	19	0	0	19	0	6	16	22	255
16:30	97	131	11	239	0	0	0	0	15	0	0	15	0	0	13	13	267
16:45	92	138	7	237	0	0	0	0	28	0	0	28	0	1	14	15	280
Total Volume	403	510	31	944	0	0	0	0	78	0	0	78	0	10	58	68	1090
% App. Total	42.7	54	3.3		0	0	0		100	0	0		0	14.7	85.3		
PHF	.833	.924	.705	.929	.000	.000	.000	.000	.696	.000	.000	.696	.000	.417	.906	.773	.946



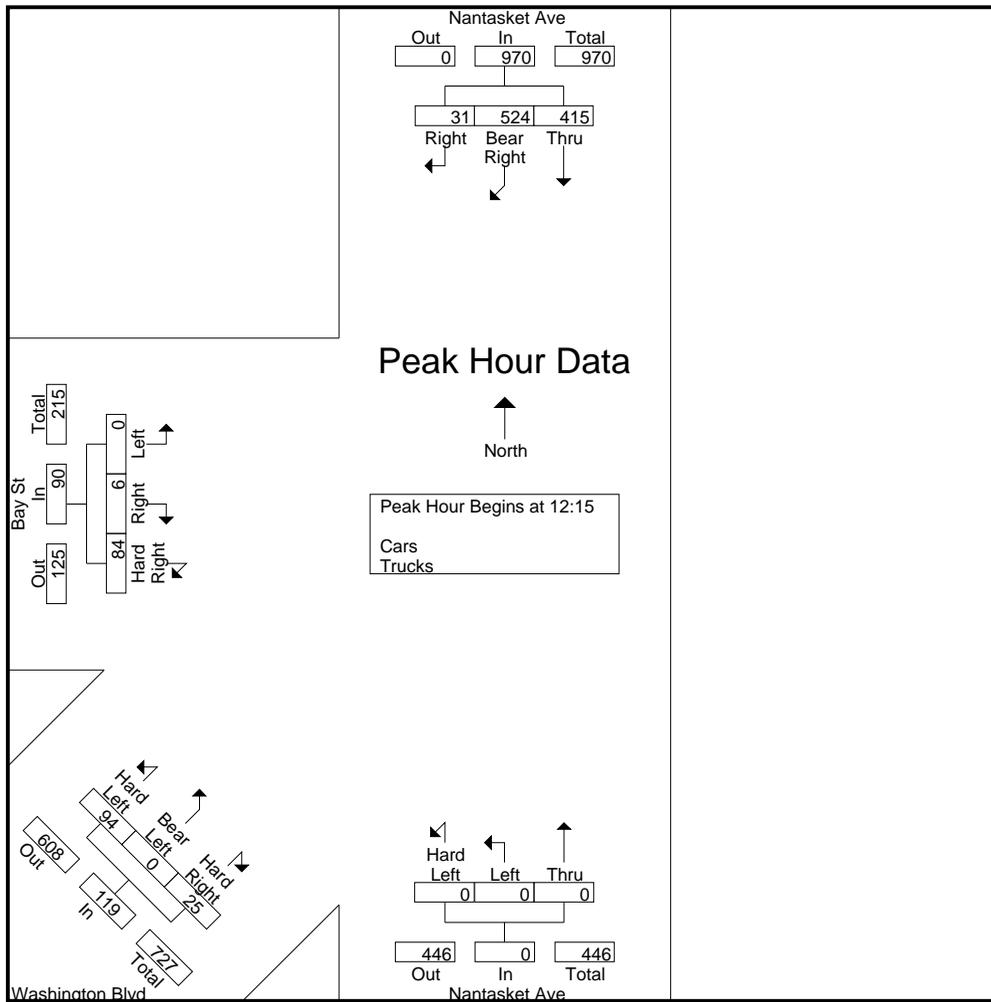
Groups Printed- Cars - Trucks

Start Time	Nantasket Ave From North				Nantasket Ave From South				Washington Blvd From Southwest				Bay St From West				Exclu. Total	Inclu. Total	Int. Total
	Thru	Bear Right	Right	Peds	Hard Left	Left	Thru	Peds	Hard Left	Bear Left	Hard Right	Peds	Left	Right	Hard Right	Peds			
11:00	104	140	4	10	0	0	0	6	21	0	12	1	0	1	24	3	20	306	326
11:15	93	149	8	13	0	0	0	31	10	0	6	0	0	3	13	10	54	282	336
11:30	79	139	5	20	0	0	0	16	14	0	3	0	0	0	24	1	37	264	301
11:45	90	137	12	12	0	0	0	19	20	0	7	0	0	5	16	2	33	287	320
Total	366	565	29	55	0	0	0	72	65	0	28	1	0	9	77	16	144	1139	1283
12:00	84	112	4	20	0	0	0	14	16	0	7	0	0	0	16	3	37	239	276
12:15	106	126	11	10	0	0	0	21	26	0	7	0	0	3	22	6	37	301	338
12:30	108	136	7	17	0	0	0	12	16	0	7	0	0	2	17	4	33	293	326
12:45	91	135	6	6	0	0	0	26	28	0	6	0	0	0	25	3	35	291	326
Total	389	509	28	53	0	0	0	73	86	0	27	0	0	5	80	16	142	1124	1266
13:00	110	127	7	12	0	0	0	10	24	0	5	6	0	1	20	3	31	294	325
13:15	85	114	4	13	0	0	0	13	17	0	9	0	0	2	21	10	36	252	288
13:30	100	140	10	9	0	0	0	16	15	0	7	0	0	2	14	6	31	288	319
13:45	102	150	7	21	0	0	0	20	16	0	3	1	0	3	17	11	53	298	351
Total	397	531	28	55	0	0	0	59	72	0	24	7	0	8	72	30	151	1132	1283
Grand Total	1152	1605	85	163	0	0	0	204	223	0	79	8	0	22	229	62	437	3395	3832
Apprch %	40.5	56.5	3		0	0	0		73.8	0	26.2		0	8.8	91.2				
Total %	33.9	47.3	2.5		0	0	0		6.6	0	2.3		0	0.6	6.7		11.4	88.6	
Cars	1132	1586	84		0	0	0		218	0	78		0	19	224		0	0	3778
% Cars	98.3	98.8	98.8	100	0	0	0	100	97.8	0	98.7	100	0	86.4	97.8	100	0	0	98.6
Trucks	20	19	1		0	0	0		5	0	1		0	3	5		0	0	54
% Trucks	1.7	1.2	1.2	0	0	0	0	0	2.2	0	1.3	0	0	13.6	2.2	0	0	0	1.4

Start Time	Nantasket Ave From North				Nantasket Ave From South				Washington Blvd From Southwest				Bay St From West				Int. Total	
	Thru	Bear Right	Right	App. Total	Hard Left	Left	Thru	App. Total	Hard Left	Bear Left	Hard Right	App. Total	Left	Right	Hard Right	App. Total		
12:15	106	126	11	243	0	0	0	0	26	0	7	33	0	3	22	25	301	
12:30	108	136	7	251	0	0	0	0	16	0	7	23	0	2	17	19	293	
12:45	91	135	6	232	0	0	0	0	28	0	6	34	0	0	25	25	291	
13:00	110	127	7	244	0	0	0	0	24	0	5	29	0	1	20	21	294	
Total Volume	415	524	31	970	0	0	0	0	94	0	25	119	0	6	84	90	1179	
% App. Total	42.8	54	3.2		0	0	0		79	0	21		0	6.7	93.3			
PHF	.943	.963	.705	.966	.000	.000	.000	.000	.839	.000	.893	.875	.000	.500	.840	.900	.979	

Peak Hour Analysis From 11:00 to 13:45 - Peak 1 of 1

Peak Hour for Entire Intersection Begins at 12:15



N/S Street : George Washington Blvd
E/W Street: Nantasket Avenue
City/State : Hull, MA
Weather : Clear

File Name : 14640009
Site Code : 14640009
Start Date : 8/3/2006
Page No : 1

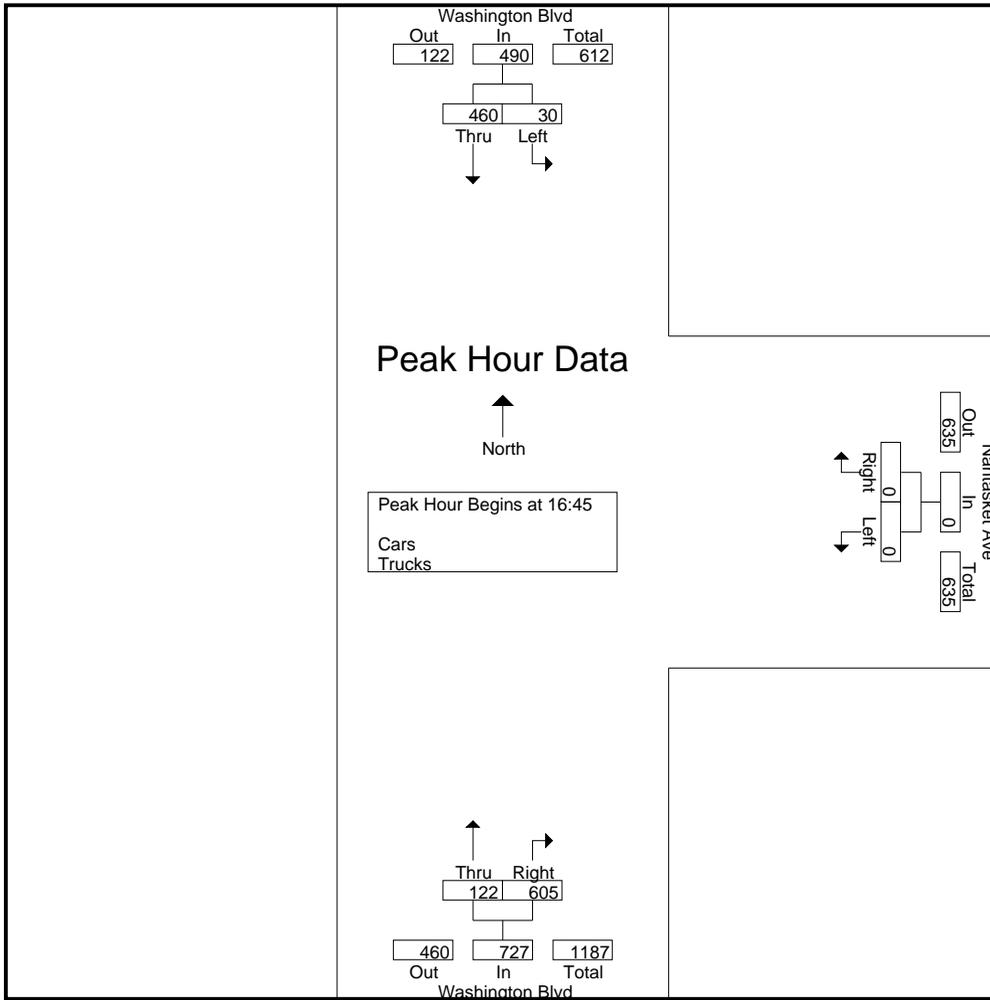
Groups Printed- Cars - Trucks

Start Time	Washington Blvd From North			Nantasket Ave From East			Washington Blvd From South			Exclu. Total	Inclu. Total	Int. Total
	Left	Thru	Peds	Left	Right	Peds	Thru	Right	Peds			
16:00	10	88	0	0	0	0	26	138	0	0	262	262
16:15	8	125	0	0	0	0	31	130	0	0	294	294
16:30	10	134	0	0	0	0	31	113	0	0	288	288
16:45	9	126	0	0	0	0	26	152	0	0	313	313
Total	37	473	0	0	0	0	114	533	0	0	1157	1157
17:00	5	119	0	0	0	0	37	139	0	0	300	300
17:15	4	100	0	0	0	0	28	161	0	0	293	293
17:30	12	115	0	0	0	0	31	153	1	1	311	312
17:45	7	118	0	0	0	0	24	152	0	0	301	301
Total	28	452	0	0	0	0	120	605	1	1	1205	1206
Grand Total	65	925	0	0	0	0	234	1138	1	1	2362	2363
Apprch %	6.6	93.4		0	0		17.1	82.9				
Total %	2.8	39.2		0	0		9.9	48.2		0	100	
Cars	64	916		0	0		234	1125		0	0	2340
% Cars	98.5	99	0	0	0	0	100	98.9	100	0	0	99
Trucks	1	9		0	0		0	13		0	0	23
% Trucks	1.5	1	0	0	0	0	0	1.1	0	0	0	1

Start Time	Washington Blvd From North			Nantasket Ave From East			Washington Blvd From South			Int. Total
	Left	Thru	App. Total	Left	Right	App. Total	Thru	Right	App. Total	
16:45	9	126	135	0	0	0	26	152	178	313
17:00	5	119	124	0	0	0	37	139	176	300
17:15	4	100	104	0	0	0	28	161	189	293
17:30	12	115	127	0	0	0	31	153	184	311
Total Volume	30	460	490	0	0	0	122	605	727	1217
% App. Total	6.1	93.9		0	0		16.8	83.2		
PHF	.625	.913	.907	.000	.000	.000	.824	.939	.962	.972

Peak Hour Analysis From 16:00 to 17:45 - Peak 1 of 1

Peak Hour for Entire Intersection Begins at 16:45



Accurate Counts
978-664-2565

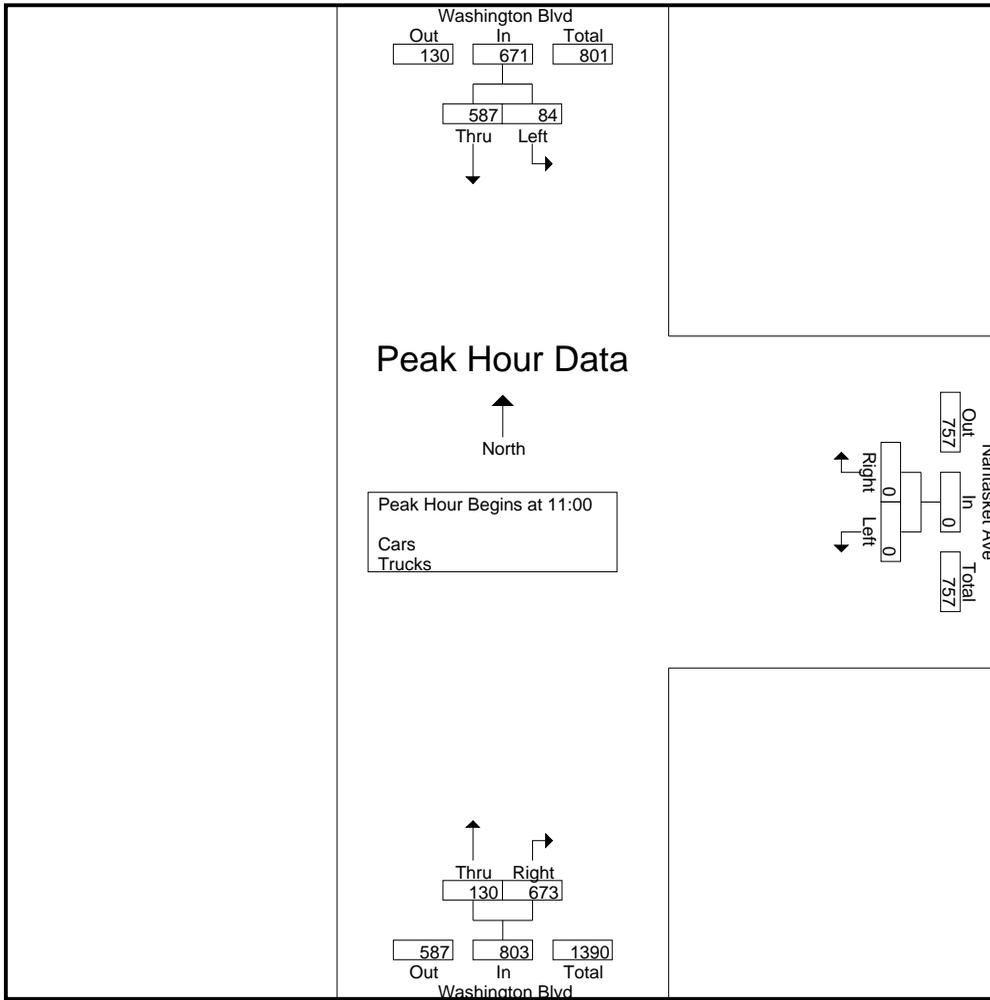
N/S Street : George Washington Blvd
E/W Street: Nantasket Avenue
City/State : Hull, MA
Weather : Clear

File Name : 146400A9
Site Code : 14640009
Start Date : 8/5/2006
Page No : 1

Groups Printed- Cars - Trucks

Start Time	Washington Blvd From North			Nantasket Ave From East			Washington Blvd From South			Exclu. Total	Inclu. Total	Int. Total
	Left	Thru	Peds	Left	Right	Peds	Thru	Right	Peds			
11:00	19	140	0	0	0	0	40	154	0	0	353	353
11:15	24	154	0	0	0	0	30	151	0	0	359	359
11:30	23	143	0	0	0	0	28	177	0	0	371	371
11:45	18	150	0	0	0	0	32	191	4	4	391	395
Total	84	587	0	0	0	0	130	673	4	4	1474	1478
12:00	15	119	0	0	0	0	28	172	0	0	334	334
12:15	23	145	0	0	0	0	41	146	0	0	355	355
12:30	10	140	0	0	0	0	34	164	0	0	348	348
12:45	27	143	0	0	0	0	38	175	0	0	383	383
Total	75	547	0	0	0	0	141	657	0	0	1420	1420
13:00	15	139	0	0	0	0	37	168	0	0	359	359
13:15	11	136	0	0	0	2	32	170	0	2	349	351
13:30	12	154	0	0	0	2	25	168	0	2	359	361
13:45	13	152	2	0	0	0	25	152	0	2	342	344
Total	51	581	2	0	0	4	119	658	0	6	1409	1415
Grand Total	210	1715	2	0	0	4	390	1988	4	10	4303	4313
Apprch %	10.9	89.1		0	0		16.4	83.6				
Total %	4.9	39.9		0	0		9.1	46.2		0.2	99.8	
Cars	209	1697		0	0		384	1977		0	0	4277
% Cars	99.5	99	100	0	0	100	98.5	99.4	100	0	0	99.2
Trucks	1	18		0	0		6	11		0	0	36
% Trucks	0.5	1	0	0	0	0	1.5	0.6	0	0	0	0.8

Start Time	Washington Blvd From North			Nantasket Ave From East			Washington Blvd From South			Int. Total
	Left	Thru	App. Total	Left	Right	App. Total	Thru	Right	App. Total	
Peak Hour Analysis From 11:00 to 13:45 - Peak 1 of 1										
Peak Hour for Entire Intersection Begins at 11:00										
11:00	19	140	159	0	0	0	40	154	194	353
11:15	24	154	178	0	0	0	30	151	181	359
11:30	23	143	166	0	0	0	28	177	205	371
11:45	18	150	168	0	0	0	32	191	223	391
Total Volume	84	587	671	0	0	0	130	673	803	1474
% App. Total	12.5	87.5		0	0		16.2	83.8		
PHF	.875	.953	.942	.000	.000	.000	.813	.881	.900	.942



b. 2013 Counts

Accurate Counts
978-664-2565

N/S Street : George Washington Boulevard
E/W Street: Bay Road
City/State : Hull, MA
Weather : Clear

File Name : 16170001
Site Code : 16170001
Start Date : 9/4/2013
Page No : 1

Groups Printed- Cars - Trucks

Start Time	Geo Washington Blvd From North			Bay Rd From East			Geo Washington Blvd From South			Bay Rd From West			Int. Total
	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	
04:00 PM	0	138	5	0	0	0	17	0	3	0	1	14	178
04:15 PM	0	111	5	0	0	0	10	0	2	0	0	10	138
04:30 PM	1	116	6	0	0	0	26	0	3	0	2	6	160
04:45 PM	0	126	4	0	0	0	13	0	1	0	2	8	154
Total	1	491	20	0	0	0	66	0	9	0	5	38	630
05:00 PM	0	136	7	0	0	0	8	0	0	0	2	7	160
05:15 PM	0	110	3	0	0	0	21	0	3	0	1	9	147
05:30 PM	0	91	5	0	0	0	16	0	0	0	1	5	118
05:45 PM	0	67	4	0	0	0	9	0	1	0	1	7	89
Total	0	404	19	0	0	0	54	0	4	0	5	28	514
Grand Total	1	895	39	0	0	0	120	0	13	0	10	66	1144
Apprch %	0.1	95.7	4.2	0	0	0	90.2	0	9.8	0	13.2	86.8	
Total %	0.1	78.2	3.4	0	0	0	10.5	0	1.1	0	0.9	5.8	
Cars	1	891	39	0	0	0	118	0	13	0	8	64	1134
% Cars	100	99.6	100	0	0	0	98.3	0	100	0	80	97	99.1
Trucks	0	4	0	0	0	0	2	0	0	0	2	2	10
% Trucks	0	0.4	0	0	0	0	1.7	0	0	0	20	3	0.9

Start Time	Geo Washington Blvd From North				Bay Rd From East				Geo Washington Blvd From South				Bay Rd From West				Int. Total
	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	
04:00 PM	0	138	5	143	0	0	0	0	17	0	3	20	0	1	14	15	178
04:15 PM	0	111	5	116	0	0	0	0	10	0	2	12	0	0	10	10	138
04:30 PM	1	116	6	123	0	0	0	0	26	0	3	29	0	2	6	8	160
04:45 PM	0	126	4	130	0	0	0	0	13	0	1	14	0	2	8	10	154
Total Volume	1	491	20	512	0	0	0	0	66	0	9	75	0	5	38	43	630
% App. Total	0.2	95.9	3.9		0	0	0		88	0	12		0	11.6	88.4		
PHF	.250	.889	.833	.895	.000	.000	.000	.000	.635	.000	.750	.647	.000	.625	.679	.717	.885
Cars	1	487	20	508	0	0	0	0	64	0	9	73	0	5	36	41	622
% Cars	100	99.2	100	99.2	0	0	0	0	97.0	0	100	97.3	0	100	94.7	95.3	98.7
Trucks	0	4	0	4	0	0	0	0	2	0	0	2	0	0	2	2	8
% Trucks	0	0.8	0	0.8	0	0	0	0	3.0	0	0	2.7	0	0	5.3	4.7	1.3

Peak Hour Analysis From 04:00 PM to 05:45 PM - Peak 1 of 1

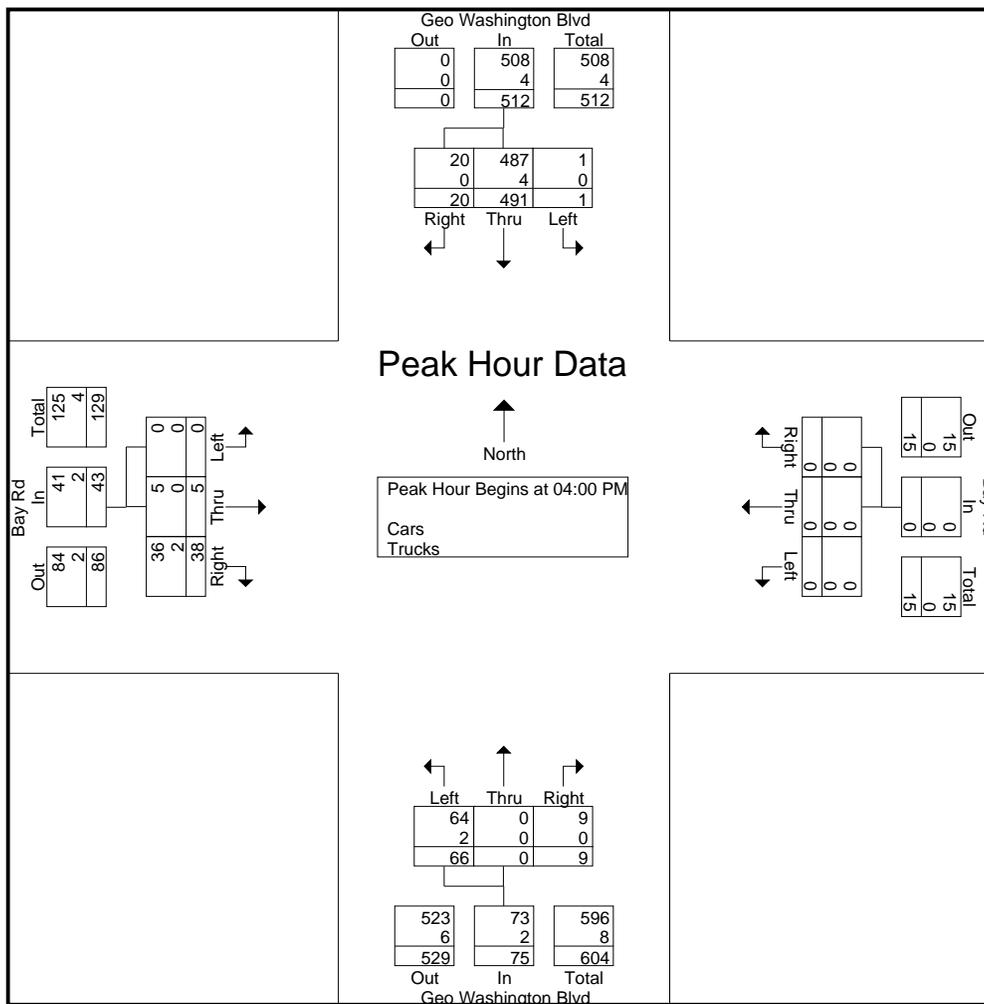
Peak Hour for Entire Intersection Begins at 04:00 PM

Accurate Counts

978-664-2565

N/S Street : George Washington Boulevard
 E/W Street: Bay Road
 City/State : Hull, MA
 Weather : Clear

File Name : 16170001
 Site Code : 16170001
 Start Date : 9/4/2013
 Page No : 2

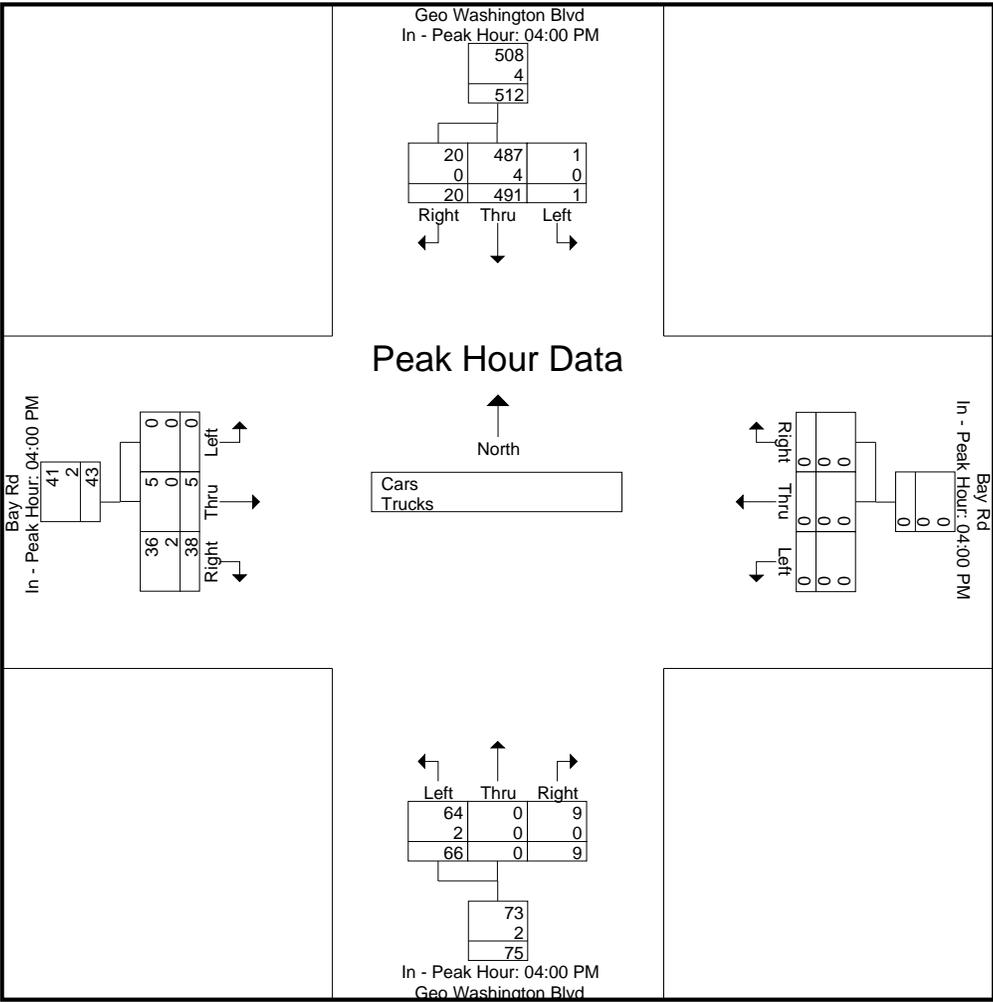


Peak Hour Analysis From 04:00 PM to 05:45 PM - Peak 1 of 1

Peak Hour for Each Approach Begins at:

	04:00 PM				04:00 PM				04:00 PM				04:00 PM			
+0 mins.	0	138	5	143	0	0	0	0	17	0	3	20	0	1	14	15
+15 mins.	0	111	5	116	0	0	0	0	10	0	2	12	0	0	10	10
+30 mins.	1	116	6	123	0	0	0	0	26	0	3	29	0	2	6	8
+45 mins.	0	126	4	130	0	0	0	0	13	0	1	14	0	2	8	10
Total Volume	1	491	20	512	0	0	0	0	66	0	9	75	0	5	38	43
% App. Total	0.2	95.9	3.9		0	0	0		88	0	12		0	11.6	88.4	
PHF	.250	.889	.833	.895	.000	.000	.000	.000	.635	.000	.750	.647	.000	.625	.679	.717
Cars	1	487	20	508	0	0	0	0	64	0	9	73	0	5	36	41
% Cars	100	99.2	100	99.2	0	0	0	0	97	0	100	97.3	0	100	94.7	95.3
Trucks	0	4	0	4	0	0	0	0	2	0	0	2	0	0	2	2

Accurate Counts
978-664-2565



Accurate Counts
978-664-2565

N/S Street : George Washington Boulevard
E/W Street: Bay Road
City/State : Hull, MA
Weather : Clear

File Name : 16170001
Site Code : 16170001
Start Date : 9/4/2013
Page No : 1

Groups Printed- Cars

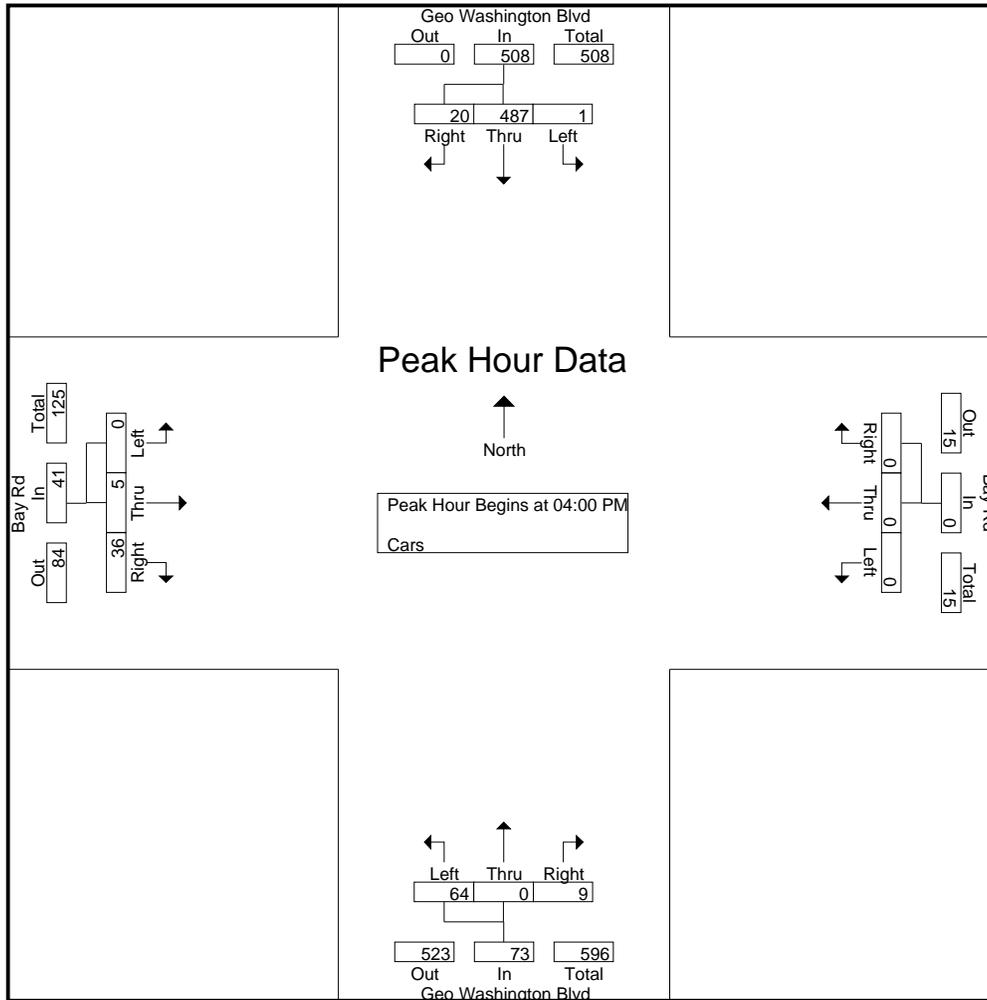
Start Time	Geo Washington Blvd From North			Bay Rd From East			Geo Washington Blvd From South			Bay Rd From West			Int. Total
	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	
04:00 PM	0	136	5	0	0	0	16	0	3	0	1	13	174
04:15 PM	0	110	5	0	0	0	9	0	2	0	0	10	136
04:30 PM	1	116	6	0	0	0	26	0	3	0	2	5	159
04:45 PM	0	125	4	0	0	0	13	0	1	0	2	8	153
Total	1	487	20	0	0	0	64	0	9	0	5	36	622
05:00 PM	0	136	7	0	0	0	8	0	0	0	1	7	159
05:15 PM	0	110	3	0	0	0	21	0	3	0	1	9	147
05:30 PM	0	91	5	0	0	0	16	0	0	0	0	5	117
05:45 PM	0	67	4	0	0	0	9	0	1	0	1	7	89
Total	0	404	19	0	0	0	54	0	4	0	3	28	512
Grand Total	1	891	39	0	0	0	118	0	13	0	8	64	1134
Apprch %	0.1	95.7	4.2	0	0	0	90.1	0	9.9	0	11.1	88.9	
Total %	0.1	78.6	3.4	0	0	0	10.4	0	1.1	0	0.7	5.6	

Start Time	Geo Washington Blvd From North				Bay Rd From East				Geo Washington Blvd From South				Bay Rd From West				Int. Total
	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	
Peak Hour Analysis From 04:00 PM to 05:45 PM - Peak 1 of 1																	
Peak Hour for Entire Intersection Begins at 04:00 PM																	
04:00 PM	0	136	5	141	0	0	0	0	16	0	3	19	0	1	13	14	174
04:15 PM	0	110	5	115	0	0	0	0	9	0	2	11	0	0	10	10	136
04:30 PM	1	116	6	123	0	0	0	0	26	0	3	29	0	2	5	7	159
04:45 PM	0	125	4	129	0	0	0	0	13	0	1	14	0	2	8	10	153
Total Volume	1	487	20	508	0	0	0	0	64	0	9	73	0	5	36	41	622
% App. Total	0.2	95.9	3.9		0	0	0		87.7	0	12.3		0	12.2	87.8		
PHF	.250	.895	.833	.901	.000	.000	.000	.000	.615	.000	.750	.629	.000	.625	.692	.732	.894

Accurate Counts
978-664-2565

N/S Street : George Washington Boulevard
E/W Street: Bay Road
City/State : Hull, MA
Weather : Clear

File Name : 16170001
Site Code : 16170001
Start Date : 9/4/2013
Page No : 2



Peak Hour Analysis From 04:00 PM to 05:45 PM - Peak 1 of 1

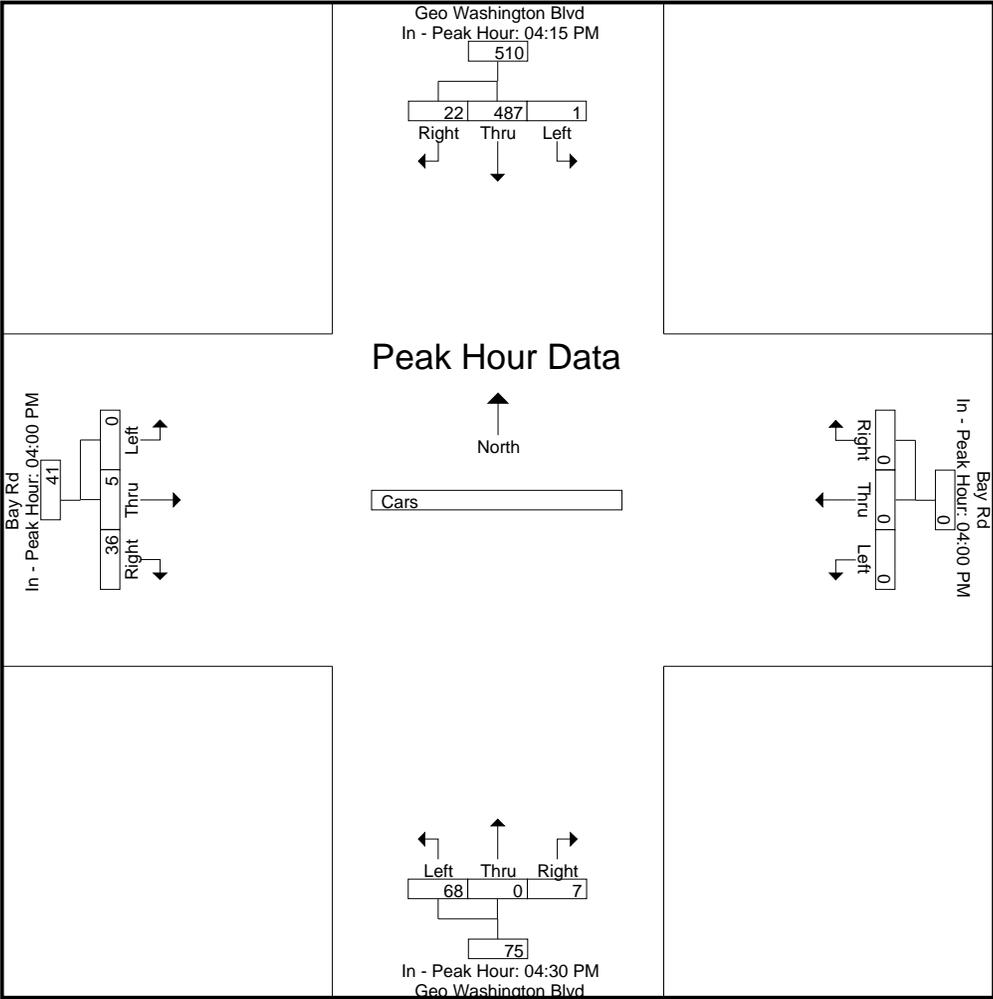
Peak Hour for Each Approach Begins at:

	04:15 PM				04:00 PM				04:30 PM				04:00 PM			
+0 mins.	0	110	5	115	0	0	0	0	26	0	3	29	0	1	13	14
+15 mins.	1	116	6	123	0	0	0	0	13	0	1	14	0	0	10	10
+30 mins.	0	125	4	129	0	0	0	0	8	0	0	8	0	2	5	7
+45 mins.	0	136	7	143	0	0	0	0	21	0	3	24	0	2	8	10
Total Volume	1	487	22	510	0	0	0	0	68	0	7	75	0	5	36	41
% App. Total	0.2	95.5	4.3		0	0	0	0	90.7	0	9.3		0	12.2	87.8	
PHF	.250	.895	.786	.892	.000	.000	.000	.000	.654	.000	.583	.647	.000	.625	.692	.732

Accurate Counts
978-664-2565

N/S Street : George Washington Boulevard
 E/W Street: Bay Road
 City/State : Hull, MA
 Weather : Clear

File Name : 16170001
 Site Code : 16170001
 Start Date : 9/4/2013
 Page No : 3



Accurate Counts
978-664-2565

N/S Street : George Washington Boulevard
E/W Street: Bay Road
City/State : Hull, MA
Weather : Clear

File Name : 16170001
Site Code : 16170001
Start Date : 9/4/2013
Page No : 1

Groups Printed- Trucks

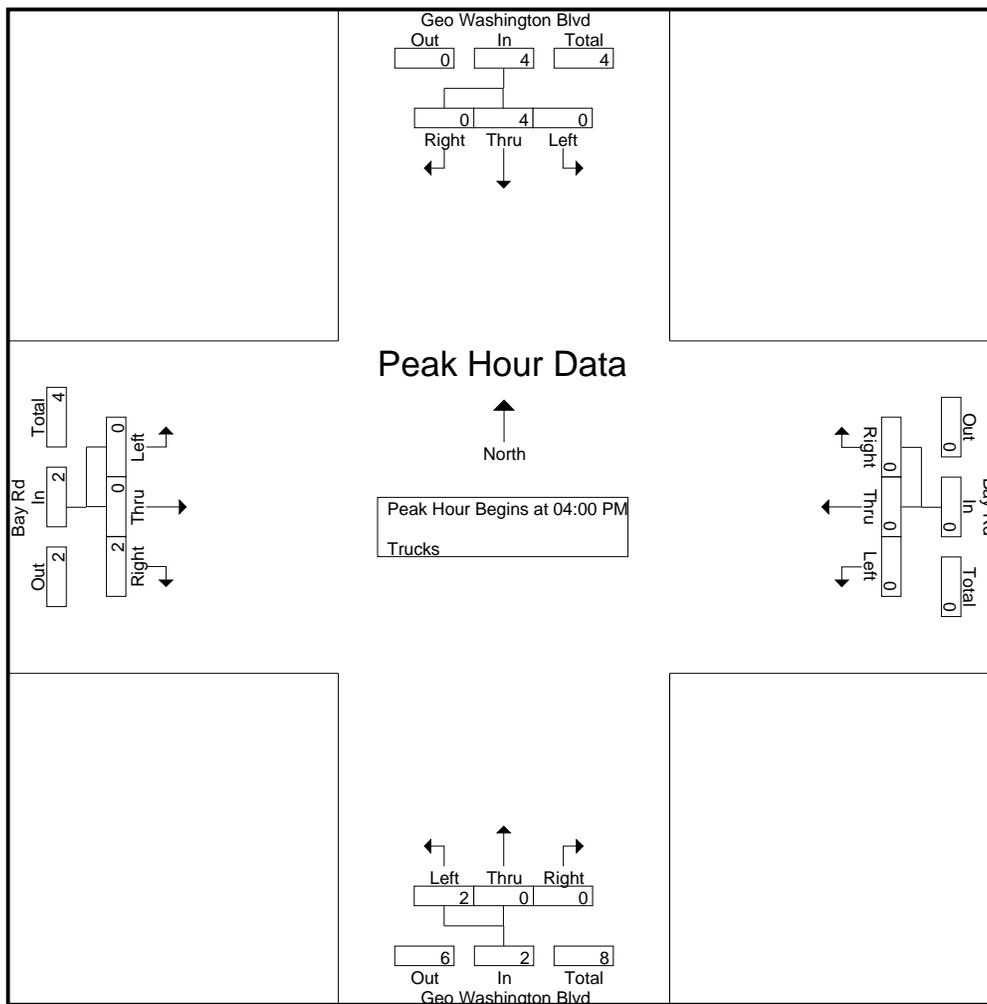
Start Time	Geo Washington Blvd From North			Bay Rd From East			Geo Washington Blvd From South			Bay Rd From West			Int. Total	
	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right		
04:00 PM	0	2	0	0	0	0	1	0	0	0	0	0	1	4
04:15 PM	0	1	0	0	0	0	1	0	0	0	0	0	0	2
04:30 PM	0	0	0	0	0	0	0	0	0	0	0	0	1	1
04:45 PM	0	1	0	0	0	0	0	0	0	0	0	0	0	1
Total	0	4	0	0	0	0	2	0	0	0	0	0	2	8
05:00 PM	0	0	0	0	0	0	0	0	0	0	0	1	0	1
05:15 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0
05:30 PM	0	0	0	0	0	0	0	0	0	0	0	1	0	1
05:45 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Total	0	0	0	0	0	0	0	0	0	0	0	2	0	2
Grand Total	0	4	0	0	0	0	2	0	0	0	0	2	2	10
Apprch %	0	100	0	0	0	0	100	0	0	0	0	50	50	
Total %	0	40	0	0	0	0	20	0	0	0	0	20	20	

Start Time	Geo Washington Blvd From North				Bay Rd From East				Geo Washington Blvd From South				Bay Rd From West				Int. Total
	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	
Peak Hour Analysis From 04:00 PM to 05:45 PM - Peak 1 of 1																	
Peak Hour for Entire Intersection Begins at 04:00 PM																	
04:00 PM	0	2	0	2	0	0	0	0	1	0	0	1	0	0	1	1	4
04:15 PM	0	1	0	1	0	0	0	0	1	0	0	1	0	0	0	0	2
04:30 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1	1
04:45 PM	0	1	0	1	0	0	0	0	0	0	0	0	0	0	0	0	1
Total Volume	0	4	0	4	0	0	0	0	2	0	0	2	0	0	2	2	8
% App. Total	0	100	0		0	0	0		100	0	0		0	0	100		
PHF	.000	.500	.000	.500	.000	.000	.000	.000	.500	.000	.000	.500	.000	.000	.500	.500	.500

Accurate Counts
978-664-2565

N/S Street : George Washington Boulevard
E/W Street: Bay Road
City/State : Hull, MA
Weather : Clear

File Name : 16170001
Site Code : 16170001
Start Date : 9/4/2013
Page No : 2



Peak Hour Analysis From 04:00 PM to 05:45 PM - Peak 1 of 1

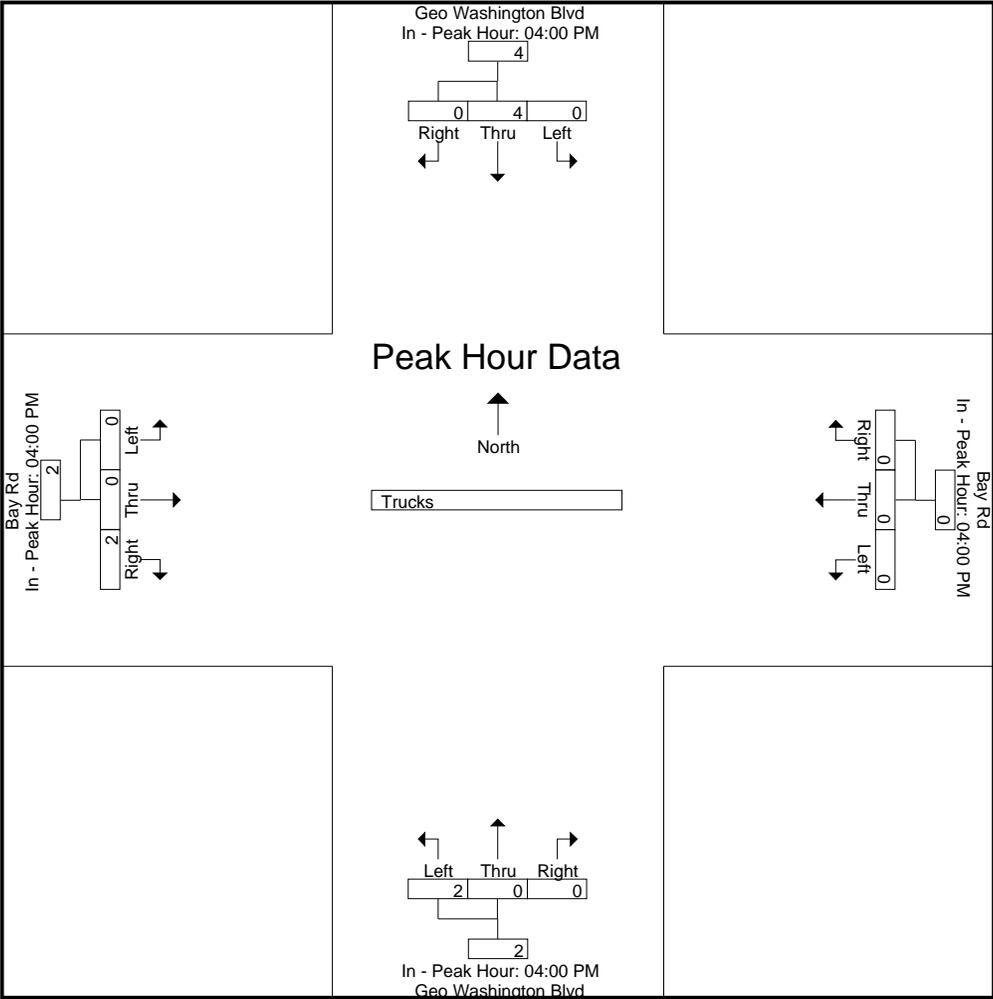
Peak Hour for Each Approach Begins at:

	04:00 PM				04:00 PM				04:00 PM				04:00 PM			
+0 mins.	0	2	0	2	0	0	0	0	1	0	0	1	0	0	1	1
+15 mins.	0	1	0	1	0	0	0	0	1	0	0	1	0	0	0	0
+30 mins.	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1
+45 mins.	0	1	0	1	0	0	0	0	0	0	0	0	0	0	0	0
Total Volume	0	4	0	4	0	0	0	0	2	0	0	2	0	0	2	2
% App. Total	0	100	0		0	0	0		100	0	0		0	0	100	
PHF	.000	.500	.000	.500	.000	.000	.000	.000	.500	.000	.000	.500	.000	.000	.500	.500

Accurate Counts
978-664-2565

N/S Street : George Washington Boulevard
 E/W Street: Bay Road
 City/State : Hull, MA
 Weather : Clear

File Name : 16170001
 Site Code : 16170001
 Start Date : 9/4/2013
 Page No : 3



Accurate Counts
978-664-2565

N/S Street : George Washington Boulevard
E/W Street: Bay Road
City/State : Hull, MA
Weather : Clear

File Name : 16170001
Site Code : 16170001
Start Date : 9/4/2013
Page No : 1

Groups Printed- Bikes Peds

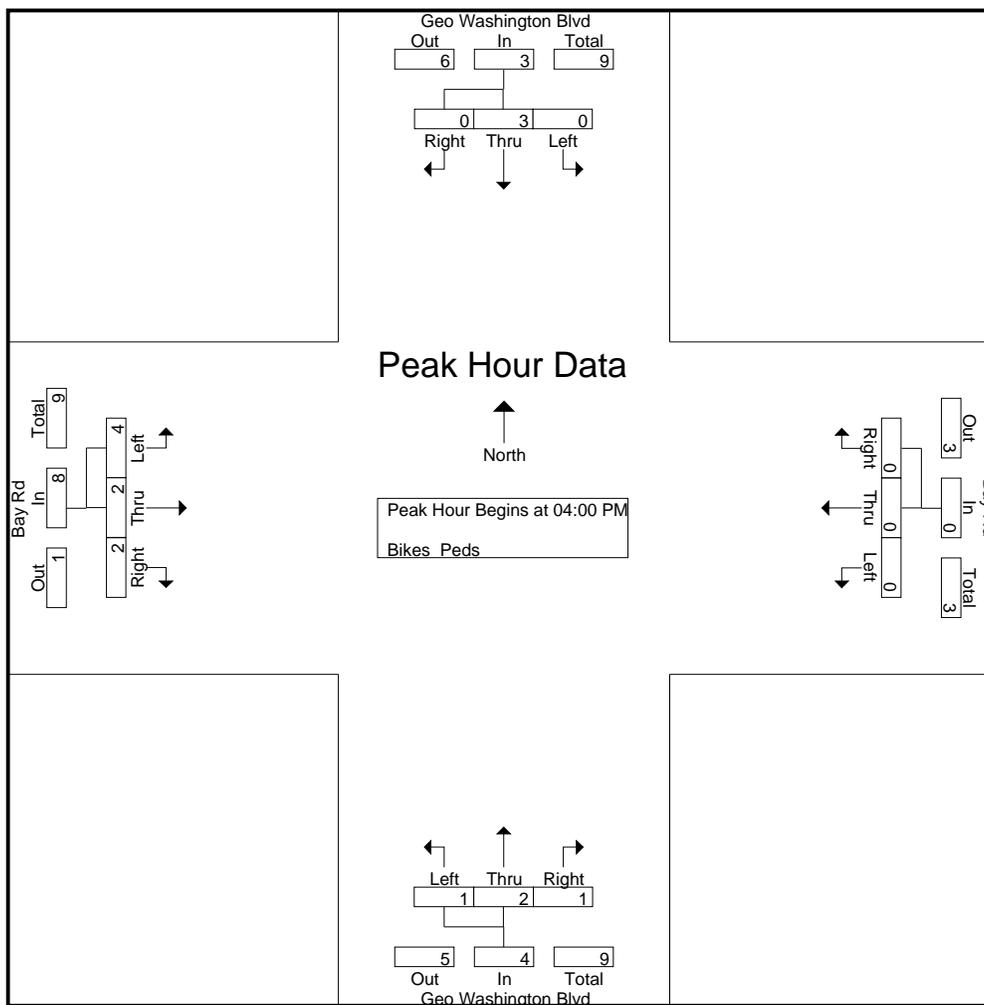
Start Time	Geo Washington Blvd From North				Bay Rd From East				Geo Washington Blvd From South				Bay Rd From West				Exclu. Total	Inclu. Total	Int. Total
	Left	Thru	Right	Peds	Left	Thru	Right	Peds	Left	Thru	Right	Peds	Left	Thru	Right	Peds			
04:00 PM	0	2	0	0	0	0	0	4	1	1	0	0	0	2	0	0	4	6	10
04:15 PM	0	1	0	0	0	0	0	8	0	0	0	0	3	0	0	0	8	4	12
04:30 PM	0	0	0	3	0	0	0	4	0	0	1	0	1	0	2	1	8	4	12
04:45 PM	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	1	1
Total	0	3	0	3	0	0	0	16	1	2	1	0	4	2	2	1	20	15	35
05:00 PM	0	1	0	4	0	2	0	4	1	0	0	2	1	0	0	0	10	5	15
05:15 PM	0	0	1	2	0	0	0	3	0	0	0	0	0	0	0	2	7	1	8
05:30 PM	0	0	0	2	0	0	0	3	0	0	0	0	0	1	0	3	8	1	9
05:45 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	5	5	0	5
Total	0	1	1	8	0	2	0	10	1	0	0	2	1	1	0	10	30	7	37
Grand Total	0	4	1	11	0	2	0	26	2	2	1	2	5	3	2	11	50	22	72
Apprch %	0	80	20		0	100	0		40	40	20		50	30	20				
Total %	0	18.2	4.5		0	9.1	0		9.1	9.1	4.5		22.7	13.6	9.1		69.4	30.6	

Start Time	Geo Washington Blvd From North				Bay Rd From East				Geo Washington Blvd From South				Bay Rd From West				Int. Total
	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	
Peak Hour Analysis From 04:00 PM to 05:45 PM - Peak 1 of 1																	
Peak Hour for Entire Intersection Begins at 04:00 PM																	
04:00 PM	0	2	0	2	0	0	0	0	1	1	0	2	0	2	0	2	6
04:15 PM	0	1	0	1	0	0	0	0	0	0	0	0	3	0	0	3	4
04:30 PM	0	0	0	0	0	0	0	0	0	0	1	1	1	0	2	3	4
04:45 PM	0	0	0	0	0	0	0	0	0	1	0	1	0	0	0	0	1
Total Volume	0	3	0	3	0	0	0	0	1	2	1	4	4	2	2	8	15
% App. Total	0	100	0		0	0	0		25	50	25		50	25	25		
PHF	.000	.375	.000	.375	.000	.000	.000	.000	.250	.500	.250	.500	.333	.250	.250	.667	.625

Accurate Counts
978-664-2565

File Name : 16170001
Site Code : 16170001
Start Date : 9/4/2013
Page No : 2

N/S Street : George Washington Boulevard
E/W Street: Bay Road
City/State : Hull, MA
Weather : Clear



Peak Hour Analysis From 04:00 PM to 05:45 PM - Peak 1 of 1

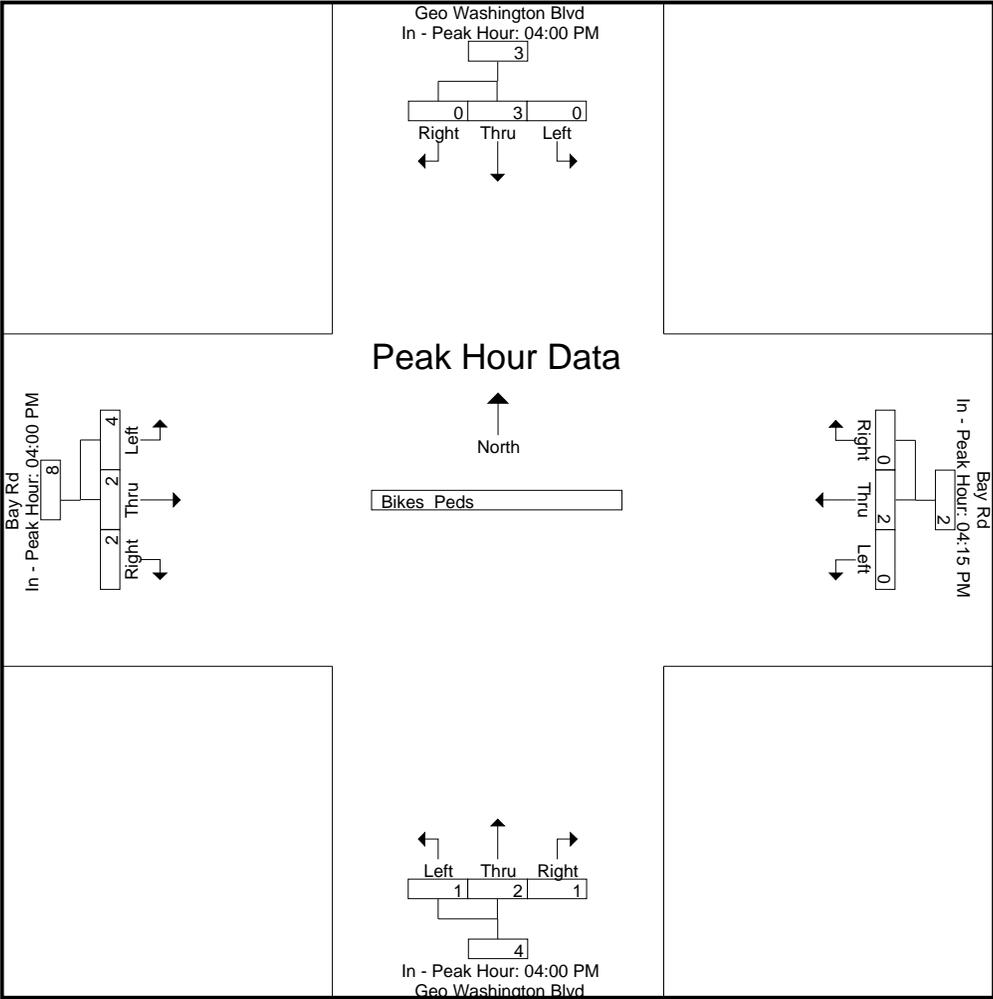
Peak Hour for Each Approach Begins at:

	04:00 PM				04:15 PM				04:00 PM				04:00 PM			
+0 mins.	0	2	0	2	0	0	0	0	1	0	0	2	0	2	0	2
+15 mins.	0	1	0	1	0	0	0	0	0	0	0	0	3	0	0	3
+30 mins.	0	0	0	0	0	0	0	0	0	0	1	1	1	0	2	3
+45 mins.	0	0	0	0	0	2	0	2	0	1	0	1	0	0	0	0
Total Volume	0	3	0	3	0	2	0	2	1	2	1	4	4	2	2	8
% App. Total	0	100	0		0	100	0		25	50	25		50	25	25	
PHF	.000	.375	.000	.375	.000	.250	.000	.250	.250	.500	.250	.500	.333	.250	.250	.667

Accurate Counts
978-664-2565

N/S Street : George Washington Boulevard
 E/W Street: Bay Road
 City/State : Hull, MA
 Weather : Clear

File Name : 16170001
 Site Code : 16170001
 Start Date : 9/4/2013
 Page No : 3



Accurate Counts
978-664-2565

N/S Street : George Washington Boulevard
E/W Street: Bay Road
City/State : Hull, MA
Weather : Clear

File Name : 161700S1
Site Code : 16170001
Start Date : 9/7/2013
Page No : 1

Groups Printed- Cars - Trucks

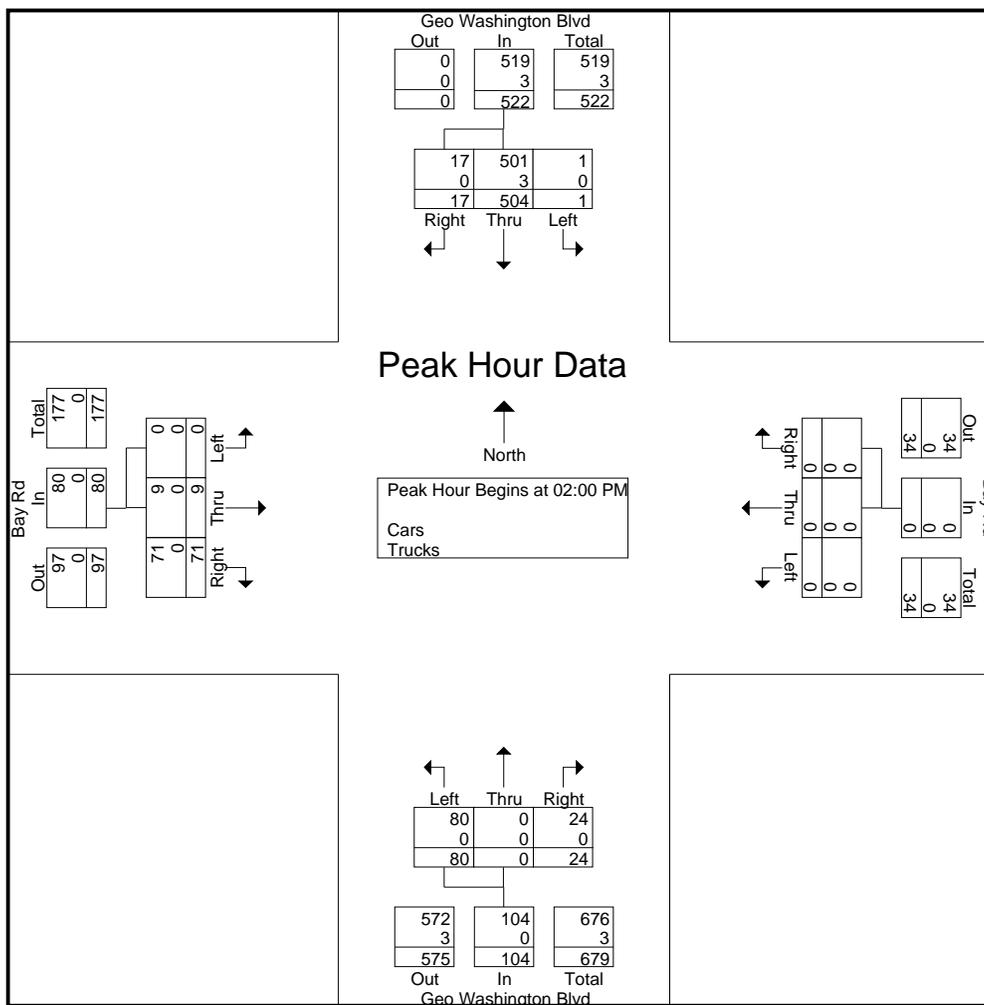
Start Time	Geo Washington Blvd From North			Bay Rd From East			Geo Washington Blvd From South			Bay Rd From West			Int. Total
	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	
11:00 AM	0	121	6	0	0	0	20	0	4	0	0	19	170
11:15 AM	0	120	9	0	0	0	18	0	10	0	3	13	173
11:30 AM	0	92	2	0	0	0	12	0	9	0	1	20	136
11:45 AM	0	126	13	0	0	0	14	0	6	0	3	17	179
Total	0	459	30	0	0	0	64	0	29	0	7	69	658
12:00 PM	0	122	11	0	0	0	12	0	4	0	3	15	167
12:15 PM	0	111	8	0	0	0	16	0	3	0	1	17	156
12:30 PM	0	108	5	0	0	0	17	0	4	0	2	16	152
12:45 PM	0	126	10	0	0	0	16	0	9	0	1	18	180
Total	0	467	34	0	0	0	61	0	20	0	7	66	655
01:00 PM	0	129	9	0	0	0	12	0	5	0	5	16	176
01:15 PM	0	126	1	0	0	0	10	0	5	0	1	14	157
01:30 PM	0	124	7	0	0	0	15	0	8	0	0	11	165
01:45 PM	0	125	5	0	0	0	21	0	4	0	1	14	170
Total	0	504	22	0	0	0	58	0	22	0	7	55	668
02:00 PM	0	126	3	0	0	0	18	0	5	0	2	19	173
02:15 PM	0	125	1	0	0	0	19	0	6	0	1	14	166
02:30 PM	0	119	8	0	0	0	23	0	6	0	5	17	178
02:45 PM	1	134	5	0	0	0	20	0	7	0	1	21	189
Total	1	504	17	0	0	0	80	0	24	0	9	71	706
Grand Total	1	1934	103	0	0	0	263	0	95	0	30	261	2687
Apprch %	0	94.9	5.1	0	0	0	73.5	0	26.5	0	10.3	89.7	
Total %	0	72	3.8	0	0	0	9.8	0	3.5	0	1.1	9.7	
Cars	1	1922	102	0	0	0	263	0	94	0	30	261	2673
% Cars	100	99.4	99	0	0	0	100	0	98.9	0	100	100	99.5
Trucks	0	12	1	0	0	0	0	0	1	0	0	0	14
% Trucks	0	0.6	1	0	0	0	0	0	1.1	0	0	0	0.5

Accurate Counts

978-664-2565

File Name : 161700S1
 Site Code : 16170001
 Start Date : 9/7/2013
 Page No : 3

N/S Street : George Washington Boulevard
 E/W Street: Bay Road
 City/State : Hull, MA
 Weather : Clear

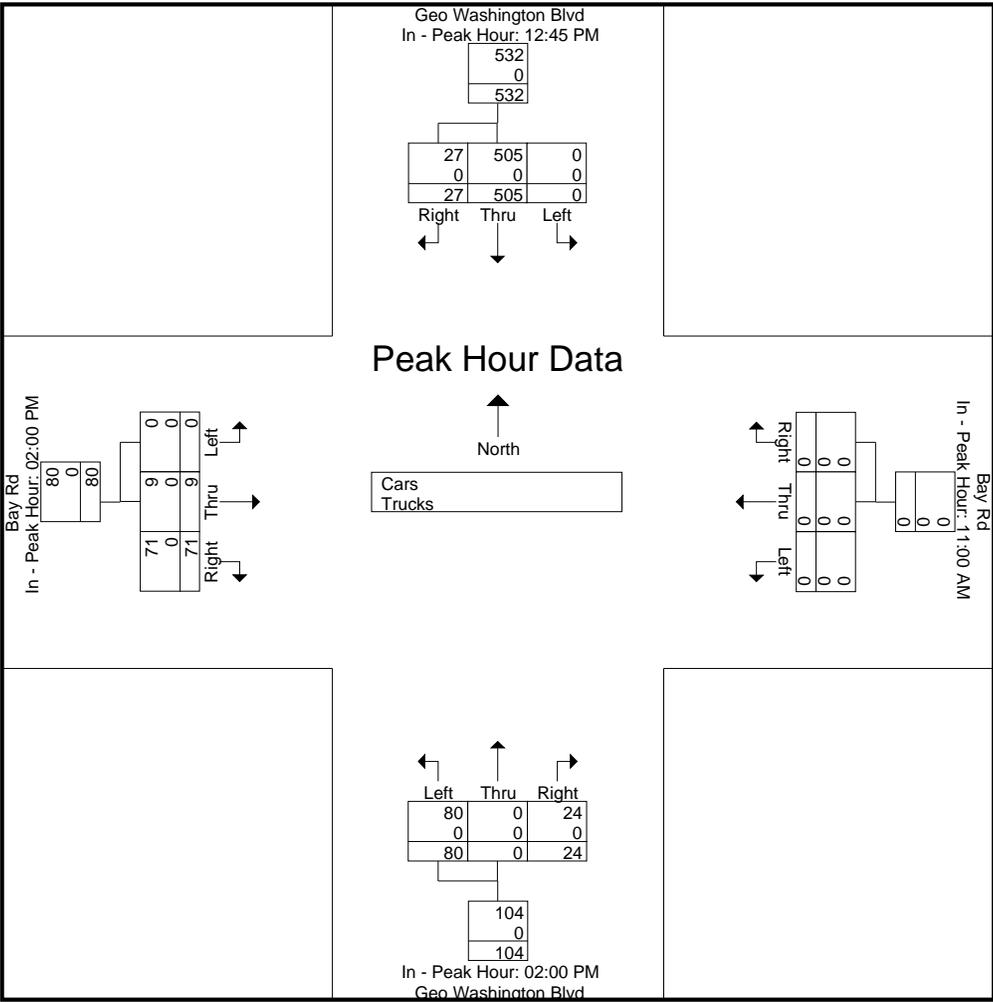


Peak Hour Analysis From 11:00 AM to 02:45 PM - Peak 1 of 1

Peak Hour for Each Approach Begins at:

	12:45 PM				11:00 AM				02:00 PM				02:00 PM			
+0 mins.	0	126	10	136	0	0	0	0	18	0	5	23	0	2	19	21
+15 mins.	0	129	9	138	0	0	0	0	19	0	6	25	0	1	14	15
+30 mins.	0	126	1	127	0	0	0	0	23	0	6	29	0	5	17	22
+45 mins.	0	124	7	131	0	0	0	0	20	0	7	27	0	1	21	22
Total Volume	0	505	27	532	0	0	0	0	80	0	24	104	0	9	71	80
% App. Total	0	94.9	5.1		0	0	0	0	76.9	0	23.1		0	11.2	88.8	
PHF	.000	.979	.675	.964	.000	.000	.000	.000	.870	.000	.857	.897	.000	.450	.845	.909
Cars	0	505	27	532	0	0	0	0	80	0	24	104	0	9	71	80
% Cars	0	100	100	100	0	0	0	0	100	0	100	100	0	100	100	100
Trucks	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0

Accurate Counts
978-664-2565



Accurate Counts 978-664-2565

N/S Street : George Washington Boulevard
 E/W Street: Bay Road
 City/State : Hull, MA
 Weather : Clear

File Name : 161700S1
 Site Code : 16170001
 Start Date : 9/7/2013
 Page No : 1

Groups Printed- Cars

Start Time	Geo Washington Blvd From North			Bay Rd From East			Geo Washington Blvd From South			Bay Rd From West			Int. Total
	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	
11:00 AM	0	121	6	0	0	0	20	0	4	0	0	19	170
11:15 AM	0	119	9	0	0	0	18	0	10	0	3	13	172
11:30 AM	0	92	1	0	0	0	12	0	8	0	1	20	134
11:45 AM	0	125	13	0	0	0	14	0	6	0	3	17	178
Total	0	457	29	0	0	0	64	0	28	0	7	69	654
12:00 PM	0	120	11	0	0	0	12	0	4	0	3	15	165
12:15 PM	0	110	8	0	0	0	16	0	3	0	1	17	155
12:30 PM	0	107	5	0	0	0	17	0	4	0	2	16	151
12:45 PM	0	126	10	0	0	0	16	0	9	0	1	18	180
Total	0	463	34	0	0	0	61	0	20	0	7	66	651
01:00 PM	0	129	9	0	0	0	12	0	5	0	5	16	176
01:15 PM	0	126	1	0	0	0	10	0	5	0	1	14	157
01:30 PM	0	124	7	0	0	0	15	0	8	0	0	11	165
01:45 PM	0	122	5	0	0	0	21	0	4	0	1	14	167
Total	0	501	22	0	0	0	58	0	22	0	7	55	665
02:00 PM	0	126	3	0	0	0	18	0	5	0	2	19	173
02:15 PM	0	124	1	0	0	0	19	0	6	0	1	14	165
02:30 PM	0	118	8	0	0	0	23	0	6	0	5	17	177
02:45 PM	1	133	5	0	0	0	20	0	7	0	1	21	188
Total	1	501	17	0	0	0	80	0	24	0	9	71	703
Grand Total	1	1922	102	0	0	0	263	0	94	0	30	261	2673
Apprch %	0	94.9	5	0	0	0	73.7	0	26.3	0	10.3	89.7	
Total %	0	71.9	3.8	0	0	0	9.8	0	3.5	0	1.1	9.8	

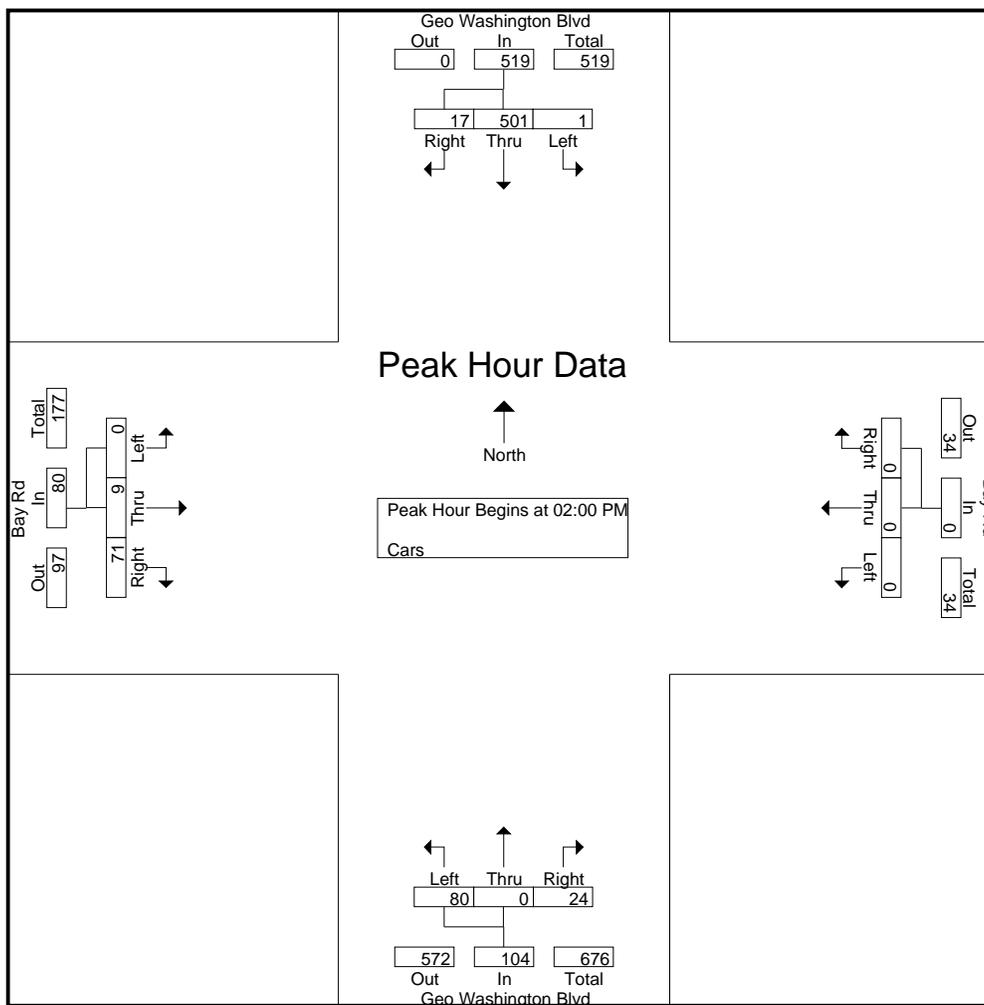
Start Time	Geo Washington Blvd From North				Bay Rd From East				Geo Washington Blvd From South				Bay Rd From West				Int. Total
	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	
Peak Hour Analysis From 11:00 AM to 02:45 PM - Peak 1 of 1																	
Peak Hour for Entire Intersection Begins at 02:00 PM																	
02:00 PM	0	126	3	129	0	0	0	0	18	0	5	23	0	2	19	21	173
02:15 PM	0	124	1	125	0	0	0	0	19	0	6	25	0	1	14	15	165
02:30 PM	0	118	8	126	0	0	0	0	23	0	6	29	0	5	17	22	177
02:45 PM	1	133	5	139	0	0	0	0	20	0	7	27	0	1	21	22	188
Total Volume	1	501	17	519	0	0	0	0	80	0	24	104	0	9	71	80	703
% App. Total	0.2	96.5	3.3		0	0	0		76.9	0	23.1		0	11.2	88.8		
PHF	.250	.942	.531	.933	.000	.000	.000	.000	.870	.000	.857	.897	.000	.450	.845	.909	.935

Accurate Counts

978-664-2565

File Name : 161700S1
 Site Code : 16170001
 Start Date : 9/7/2013
 Page No : 2

N/S Street : George Washington Boulevard
 E/W Street: Bay Road
 City/State : Hull, MA
 Weather : Clear



Peak Hour Analysis From 11:00 AM to 02:45 PM - Peak 1 of 1

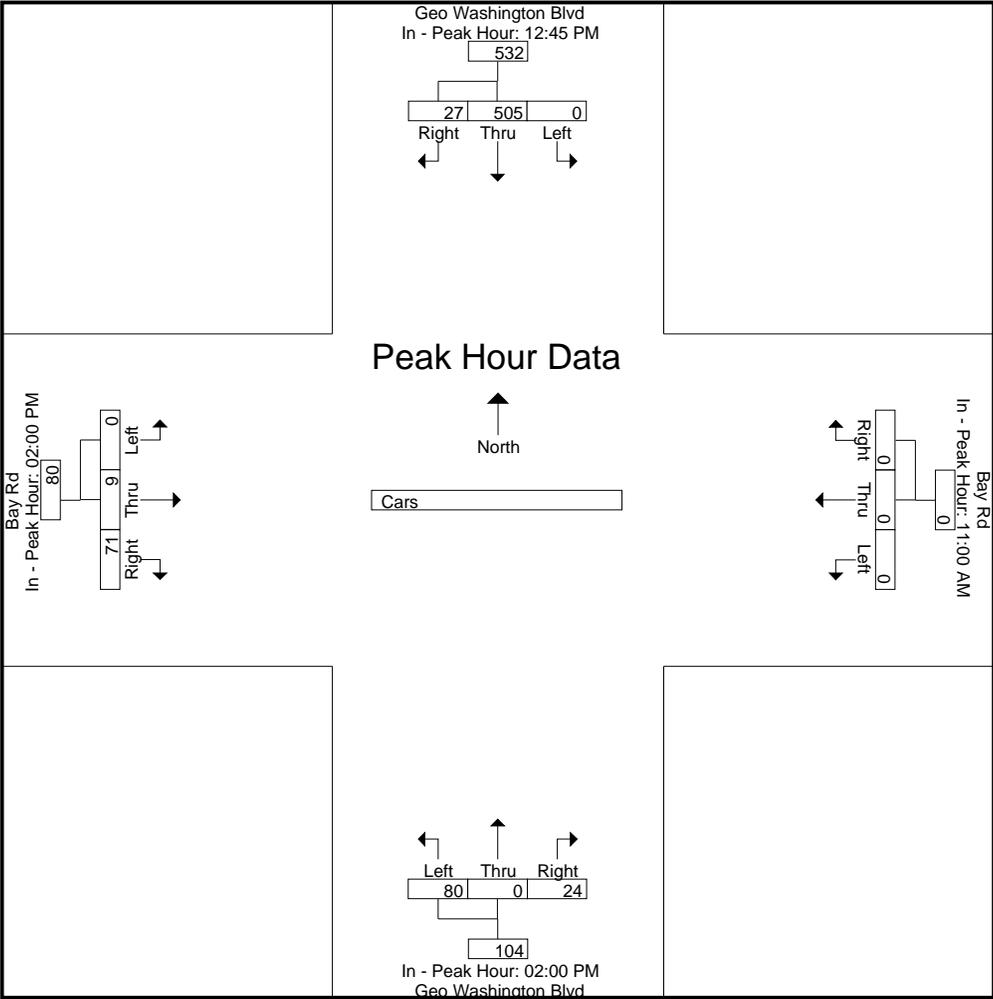
Peak Hour for Each Approach Begins at:

	12:45 PM				11:00 AM				02:00 PM				02:00 PM			
+0 mins.	0	126	10	136	0	0	0	0	18	0	5	23	0	2	19	21
+15 mins.	0	129	9	138	0	0	0	0	19	0	6	25	0	1	14	15
+30 mins.	0	126	1	127	0	0	0	0	23	0	6	29	0	5	17	22
+45 mins.	0	124	7	131	0	0	0	0	20	0	7	27	0	1	21	22
Total Volume	0	505	27	532	0	0	0	0	80	0	24	104	0	9	71	80
% App. Total	0	94.9	5.1		0	0	0	0	76.9	0	23.1		0	11.2	88.8	
PHF	.000	.979	.675	.964	.000	.000	.000	.000	.870	.000	.857	.897	.000	.450	.845	.909

Accurate Counts
978-664-2565

N/S Street : George Washington Boulevard
 E/W Street: Bay Road
 City/State : Hull, MA
 Weather : Clear

File Name : 161700S1
 Site Code : 16170001
 Start Date : 9/7/2013
 Page No : 3



Accurate Counts
978-664-2565

N/S Street : George Washington Boulevard
E/W Street: Bay Road
City/State : Hull, MA
Weather : Clear

File Name : 161700S1
Site Code : 16170001
Start Date : 9/7/2013
Page No : 1

Groups Printed- Trucks

Start Time	Geo Washington Blvd From North			Bay Rd From East			Geo Washington Blvd From South			Bay Rd From West			Int. Total
	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	
11:00 AM	0	0	0	0	0	0	0	0	0	0	0	0	0
11:15 AM	0	1	0	0	0	0	0	0	0	0	0	0	1
11:30 AM	0	0	1	0	0	0	0	0	1	0	0	0	2
11:45 AM	0	1	0	0	0	0	0	0	0	0	0	0	1
Total	0	2	1	0	0	0	0	0	1	0	0	0	4
12:00 PM	0	2	0	0	0	0	0	0	0	0	0	0	2
12:15 PM	0	1	0	0	0	0	0	0	0	0	0	0	1
12:30 PM	0	1	0	0	0	0	0	0	0	0	0	0	1
12:45 PM	0	0	0	0	0	0	0	0	0	0	0	0	0
Total	0	4	0	0	0	0	0	0	0	0	0	0	4
01:00 PM	0	0	0	0	0	0	0	0	0	0	0	0	0
01:15 PM	0	0	0	0	0	0	0	0	0	0	0	0	0
01:30 PM	0	0	0	0	0	0	0	0	0	0	0	0	0
01:45 PM	0	3	0	0	0	0	0	0	0	0	0	0	3
Total	0	3	0	0	0	0	0	0	0	0	0	0	3
02:00 PM	0	0	0	0	0	0	0	0	0	0	0	0	0
02:15 PM	0	1	0	0	0	0	0	0	0	0	0	0	1
02:30 PM	0	1	0	0	0	0	0	0	0	0	0	0	1
02:45 PM	0	1	0	0	0	0	0	0	0	0	0	0	1
Total	0	3	0	0	0	0	0	0	0	0	0	0	3
Grand Total	0	12	1	0	0	0	0	0	1	0	0	0	14
Apprch %	0	92.3	7.7	0	0	0	0	0	100	0	0	0	
Total %	0	85.7	7.1	0	0	0	0	0	7.1	0	0	0	

Start Time	Geo Washington Blvd From North				Bay Rd From East				Geo Washington Blvd From South				Bay Rd From West				Int. Total
	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	
11:15 AM	0	1	0	1	0	0	0	0	0	0	0	0	0	0	0	0	1
11:30 AM	0	0	1	1	0	0	0	0	0	0	1	1	0	0	0	0	2
11:45 AM	0	1	0	1	0	0	0	0	0	0	0	0	0	0	0	0	1
12:00 PM	0	2	0	2	0	0	0	0	0	0	0	0	0	0	0	0	2
Total Volume	0	4	1	5	0	0	0	0	0	0	1	1	0	0	0	0	6
% App. Total	0	80	20		0	0	0		0	0	100		0	0	0		
PHF	.000	.500	.250	.625	.000	.000	.000	.000	.000	.000	.250	.250	.000	.000	.000	.000	.750

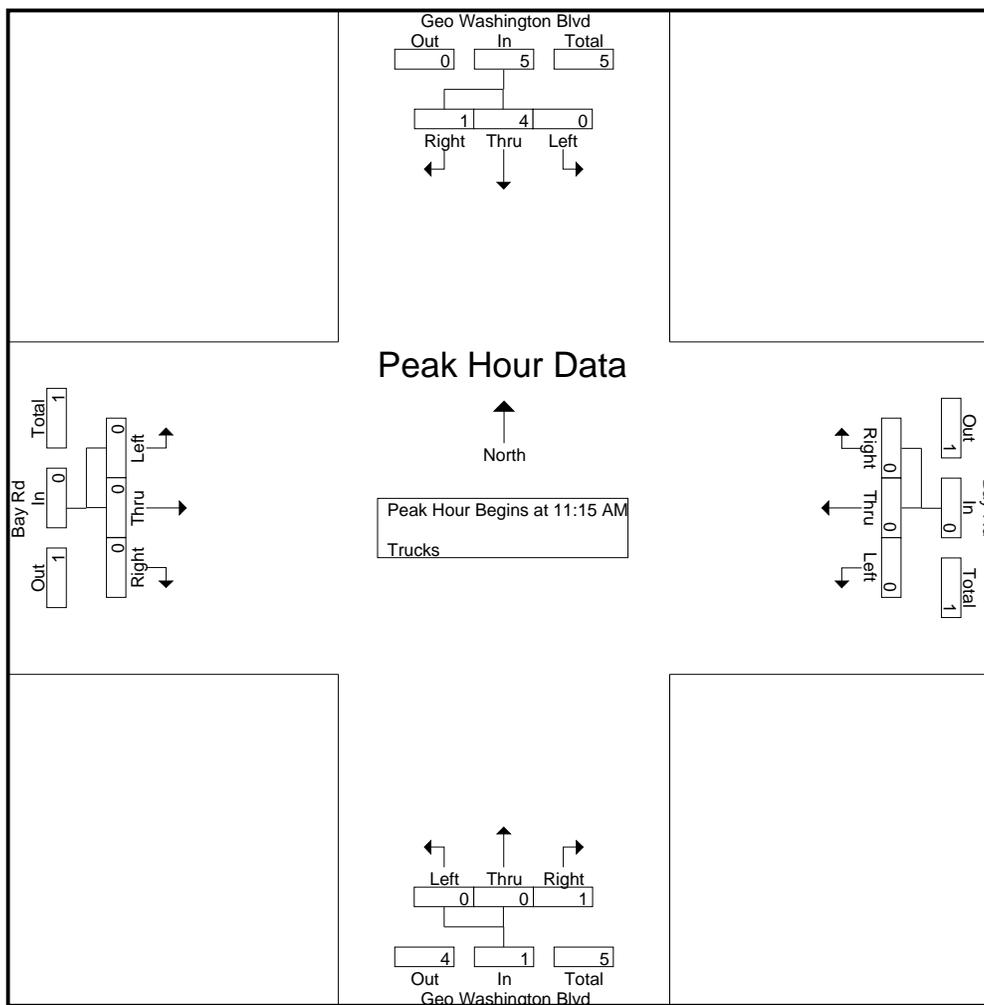
Peak Hour Analysis From 11:00 AM to 02:45 PM - Peak 1 of 1

Peak Hour for Entire Intersection Begins at 11:15 AM

Accurate Counts
978-664-2565

File Name : 161700S1
Site Code : 16170001
Start Date : 9/7/2013
Page No : 2

N/S Street : George Washington Boulevard
E/W Street: Bay Road
City/State : Hull, MA
Weather : Clear



Peak Hour Analysis From 11:00 AM to 02:45 PM - Peak 1 of 1

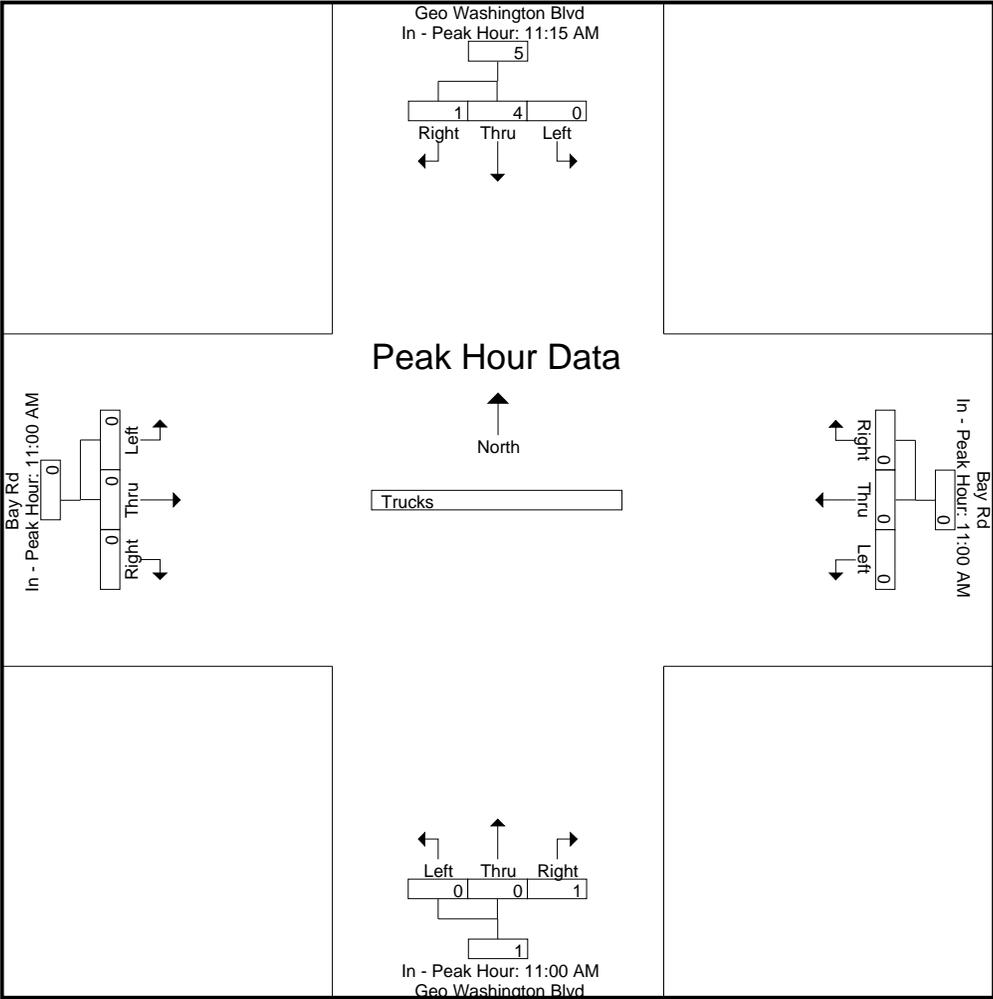
Peak Hour for Each Approach Begins at:

	11:15 AM				11:00 AM				11:00 AM				11:00 AM			
+0 mins.	0	1	0	1	0	0	0	0	0	0	0	0	0	0	0	0
+15 mins.	0	0	1	1	0	0	0	0	0	0	0	0	0	0	0	0
+30 mins.	0	1	0	1	0	0	0	0	0	0	1	1	0	0	0	0
+45 mins.	0	2	0	2	0	0	0	0	0	0	0	0	0	0	0	0
Total Volume	0	4	1	5	0	0	0	0	0	0	1	1	0	0	0	0
% App. Total	0	80	20		0	0	0		0	0	100		0	0	0	
PHF	.000	.500	.250	.625	.000	.000	.000	.000	.000	.000	.250	.250	.000	.000	.000	.000

Accurate Counts
978-664-2565

N/S Street : George Washington Boulevard
 E/W Street: Bay Road
 City/State : Hull, MA
 Weather : Clear

File Name : 161700S1
 Site Code : 16170001
 Start Date : 9/7/2013
 Page No : 3



Accurate Counts
978-664-2565

N/S Street : George Washington Boulevard
E/W Street: Bay Road
City/State : Hull, MA
Weather : Clear

File Name : 161700S1
Site Code : 16170001
Start Date : 9/7/2013
Page No : 1

Groups Printed- Bikes Peds

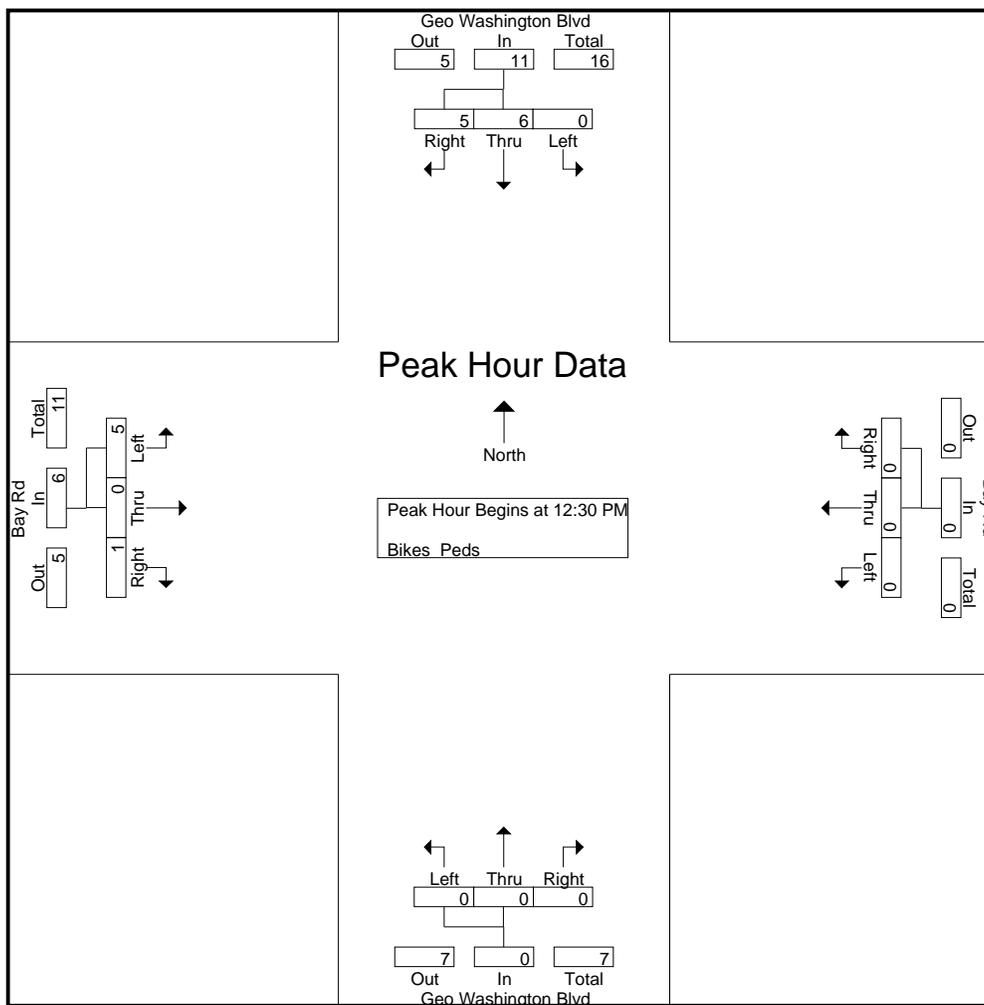
Start Time	Geo Washington Blvd From North				Bay Rd From East				Geo Washington Blvd From South				Bay Rd From West				Exclu. Total	Inclu. Total	Int. Total
	Left	Thru	Right	Peds	Left	Thru	Right	Peds	Left	Thru	Right	Peds	Left	Thru	Right	Peds			
11:00 AM	0	0	0	0	0	0	0	13	1	0	0	0	1	0	0	0	13	2	15
11:15 AM	0	0	0	7	0	2	0	16	0	0	0	0	2	0	0	2	25	4	29
11:30 AM	0	0	2	10	0	2	0	14	0	0	0	0	1	1	0	3	27	6	33
11:45 AM	2	0	0	4	0	0	0	5	0	0	0	0	0	0	0	2	11	2	13
Total	2	0	2	21	0	4	0	48	1	0	0	0	4	1	0	7	76	14	90
12:00 PM	0	0	0	6	0	0	0	6	0	0	0	0	0	0	0	0	12	0	12
12:15 PM	0	1	1	6	0	0	0	8	0	0	0	2	0	3	0	1	17	5	22
12:30 PM	0	1	1	12	0	0	0	12	0	0	0	1	0	0	0	1	26	2	28
12:45 PM	0	2	2	8	0	0	0	11	0	0	0	2	2	0	0	0	21	6	27
Total	0	4	4	32	0	0	0	37	0	0	0	5	2	3	0	2	76	13	89
01:00 PM	0	0	0	22	0	0	0	23	0	0	0	0	2	0	1	0	45	3	48
01:15 PM	0	3	2	12	0	0	0	12	0	0	0	0	1	0	0	1	25	6	31
01:30 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
01:45 PM	0	2	0	0	0	0	0	0	0	0	0	3	0	0	1	0	3	3	6
Total	0	5	2	34	0	0	0	35	0	0	0	3	3	0	2	1	73	12	85
02:00 PM	0	0	0	2	0	0	0	3	0	0	0	0	0	0	0	0	5	0	5
02:15 PM	0	0	0	4	0	0	0	3	0	0	0	0	0	0	0	0	7	0	7
02:30 PM	0	1	0	8	0	0	0	8	1	0	0	0	0	0	0	0	16	2	18
02:45 PM	0	0	0	11	0	0	0	12	0	0	0	0	2	0	1	0	23	3	26
Total	0	1	0	25	0	0	0	26	1	0	0	0	2	0	1	0	51	5	56
Grand Total	2	10	8	112	0	4	0	146	2	0	0	8	11	4	3	10	276	44	320
Apprch %	10	50	40		0	100	0		100	0	0		61.1	22.2	16.7				
Total %	4.5	22.7	18.2		0	9.1	0		4.5	0	0		25	9.1	6.8		86.2	13.8	

Start Time	Geo Washington Blvd From North				Bay Rd From East				Geo Washington Blvd From South				Bay Rd From West				Int. Total	
	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total		
Peak Hour Analysis From 11:00 AM to 02:45 PM - Peak 1 of 1																		
Peak Hour for Entire Intersection Begins at 12:30 PM																		
12:30 PM	0	1	1	2	0	0	0	0	0	0	0	0	0	0	0	0	0	2
12:45 PM	0	2	2	4	0	0	0	0	0	0	0	0	2	0	0	2	6	
01:00 PM	0	0	0	0	0	0	0	0	0	0	0	0	2	0	1	3	3	
01:15 PM	0	3	2	5	0	0	0	0	0	0	0	0	1	0	0	1	6	
Total Volume	0	6	5	11	0	0	0	0	0	0	0	0	5	0	1	6	17	
% App. Total	0	54.5	45.5		0	0	0		0	0	0		83.3	0	16.7			
PHF	.000	.500	.625	.550	.000	.000	.000	.000	.000	.000	.000	.000	.625	.000	.250	.500	.708	

Accurate Counts
978-664-2565

File Name : 161700S1
Site Code : 16170001
Start Date : 9/7/2013
Page No : 2

N/S Street : George Washington Boulevard
E/W Street: Bay Road
City/State : Hull, MA
Weather : Clear



Peak Hour Analysis From 11:00 AM to 02:45 PM - Peak 1 of 1

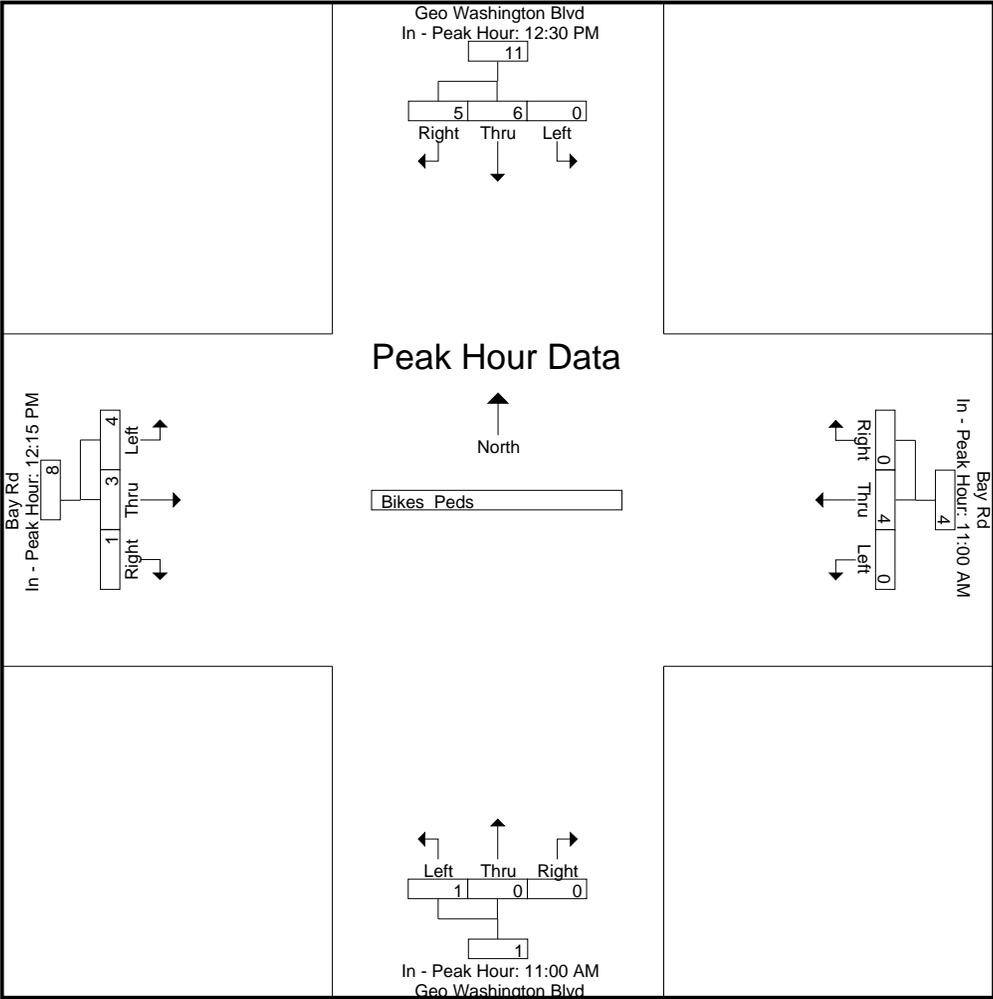
Peak Hour for Each Approach Begins at:

	12:30 PM				11:00 AM				11:00 AM				12:15 PM			
+0 mins.	0	1	1	2	0	0	0	0	1	0	0	1	0	3	0	3
+15 mins.	0	2	2	4	0	2	0	2	0	0	0	0	0	0	0	0
+30 mins.	0	0	0	0	0	2	0	2	0	0	0	0	2	0	0	2
+45 mins.	0	3	2	5	0	0	0	0	0	0	0	0	2	0	1	3
Total Volume	0	6	5	11	0	4	0	4	1	0	0	1	4	3	1	8
% App. Total	0	54.5	45.5		0	100	0		100	0	0		50	37.5	12.5	
PHF	.000	.500	.625	.550	.000	.500	.000	.500	.250	.000	.000	.250	.500	.250	.250	.667

Accurate Counts
978-664-2565

N/S Street : George Washington Boulevard
E/W Street: Bay Road
City/State : Hull, MA
Weather : Clear

File Name : 161700S1
Site Code : 16170001
Start Date : 9/7/2013
Page No : 3



Appendix C

Growth Rate Calculations

Table C-1: AADT (Annual Average Daily Traffic) Volume Trends in coastal communities similar to Hull, MA

Stn #	City/Town	Route/Street	Location Description	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	Annual Growth
7169	Hull	Nantasket Ave	At Hingham TL	9,500						5,500			8,200	-1.76%
7151	Provincetown	Conwell St	North of Rte 6A							5,800			4,800	-6.94%
7149	Provincetown	Province Land Rd	South of Racepoint Rd			990		890	880	660	750	690		-9.18%
7233	Provincetown	Rte 6A	Btwn. Johnson & Center Sts			12,000			13,600					
7150	Provincetown	Rte 6A	North of Bradford St						2,400		2,000		2,500	1.00%
5076	Beverly	Rte 127	East of Haskell St			5,300			4,400			4,800		2.78%
0035L	Beverly	Rte 128	North of Brimbal Ave	48,343		48,245		49,159	47,786	47,605	47,467	44,960	45,859	-1.05%
5079	Beverly	Rte 128	At Wenham TL						43,900	41,200	41,000	44,600		0.52%
7231	Yarmouth	Abells Rd	East of Higgins Crowell Rd	1,300				1,400		1,300	1,500		1,300	0.00%
7232	Yarmouth	Buck Island Road	Betw. Pumphouse Ln & Jannor Way	11,200						11,700			10,900	-2.45%
7230	Yarmouth	Captain Small Rd	Btwn Station Ave & Witchwood Rd			640			550			580		1.72%
7140	Yarmouth	Great Western Rd	Over Rte 6	4,800		5,400			5,300	4,900	4,700	4,400	4,400	-5.11%
7229	Yarmouth	Old Church St	Btwn. Center St & Playground St					1,200			960			
7139	Yarmouth	Rte 6	West of Union St	44,400				50,200				43,700	45,500	3.96%
0709L	Yarmouth	Rte 28	East of Higgins Crowell Rd	21,394		21,597		20,710	20,396	19,513	19,051	18,587	18,480	-2.59%
7226	Yarmouth	Strawberry Ln	South of Rte 6A	1,900		2,200		2,800	2,300	2,300	2,200	2,000	2,100	-2.38%

Average: -1.53%

*Traffic peaked around 2005 then tapered off

*Due to the drop from 2005-2009 and what we're assuming is a slow recovery mimicking the economy through 2013 we recommend using the assumption that 2006 volumes = 2013 volumes

City/Town AADT Averages	Annual Growth
Hull	-1.8%
Provincetown	-5.04%
Beverly	0.75%
Yarmouth	-0.98%

*As a conservative approach the only positive traffic growth rate of 0.75% annually was assumed for the study area.

Table C-2: Population Growth - Town of Hull, 1990 to 2033

Year	Population	10-year Growth Rate	Annual Growth Rate	Source
1900	1,703			United States Census records and Population Estimates Program data, as listed in Wikipedia: http://en.wikipedia.org/wiki/Hull,_Massachusetts
1910	2,103	23.5%	2.13%	
1920	1,771	-15.8%	-1.70%	
1930	2,047	15.6%	1.46%	
1940	2,167	5.9%	0.57%	
1950	3,379	55.9%	4.54%	
1960	7,055	108.8%	7.64%	
1970	9,961	41.2%	3.51%	
1980	9,714	-2.5%	-0.25%	
1990	10,466	7.7%	0.75%	
2000	11,050	5.6%	0.54%	
2010	10,293	-6.9%	-0.71%	
2013	11,300		0.75%	
2020	11,092	7.8%	0.75%	
2030	11,952	7.8%	0.75%	
2033	12,223		0.75%	

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Appendix D

Cost Estimates for Traffic Alternatives B and C



THE LOUIS BERGER GROUP, INC.

PRELIMINARY DESIGN ESTIMATE COST SUMMARY FOR INTERSECTION IMPROVEMENT:

PROJECT: DCR Maintenance Facility
 TOWN: Hull, MA
 ROAD: GEORGE WASHINGTON BLVD, NANTASKET AVE, AND HULL SHORE DR
 TRAFFIC ALTERNATIVE: B

DATE: 1/14/2014

LBG PROJECT #: 2000952.05

ITEM NO.	ITEM DESCRIPTION	UNIT	QUANTITY	PRICE	AMOUNT
120.1	UNCLASSIFIED EXCAVATION	CY	280	\$ 25.00	\$ 7,000.00
129	PAVEMENT MILLING	SY	450	\$ 20.00	\$ 9,000.00
129.2	OLD PAVEMENT EXCAVATION	SY	700	\$ 15.00	\$ 10,500.00
145	DRAINAGE STRUCTURE ABANDONED	EA	4	\$ 400.00	\$ 1,600.00
201.5	CATCH BASIN - MUNICIPAL STANDARD	EA	3	\$ 3,000.00	\$ 9,000.00
220	DRAINAGE STRUCTURE ADJUSTED	EA	1	\$ 300.00	\$ 300.00
241.12	12 INCH REINFORCED CONCRETE PIPE	FT	125	\$ 60.00	\$ 7,500.00
402	DENSE GRADED CRUSHED STONE FOR SUB-BASE	CY	250	\$ 60.00	\$ 15,000.00
455.22	SUPERPAVE SURFACE COURSE - 9.5 (SSC-9.5)	T	60	\$ 110.00	\$ 6,600.00
455.32	SUPERPAVE INTERMEDIATE COURSE - 19.0 (SIC-19.0)	T	120	\$ 100.00	\$ 12,000.00
501	GRANITE CURB TYPE VA1 - STRAIGHT	LF	750	\$ 50.00	\$ 37,500.00
501.1	GRANITE CURB TYPE VA1 - CURVED	LF	250	\$ 65.00	\$ 16,250.00
594	CURB REMOVED AND DISCARDED	LF	400	\$ 5.00	\$ 2,000.00
701	CEMENT CONCRETE SIDEWALK	SY	150	\$ 50.00	\$ 7,500.00
751	LOAM BORROW	CY	60	\$ 45.00	\$ 2,700.00
765	SEEDING	SY	360	\$ 2.00	\$ 720.00
823.7	HIGHWAY LIGHTING POLE & LUMINAIRE REMOVE & REPLACE	EA	2	\$ 2,350.00	\$ 4,700.00
860.04	4 INCH REFLECTORIZED WHITE LINE (PAINTED)	FT	730	\$ 1.00	\$ 730.00
861.04	4 INCH REFLECTORIZED YELLOW LINE (PAINTED)	FT	150	\$ 1.00	\$ 150.00
865	CROSS WALKS AND STOP LINES REFLECTORIZED WHITE (PAINTED)	SF	765	\$ 2.00	\$ 1,530.00
XXX	MAST ARM ADJUSTMENT	LS	1	\$ 30,000.00	\$ 30,000.00
HIGHWAY ITEM SUB-TOTAL =					\$ 182,280.00
XXX	TRAFFIC CONTROL	10%	1	\$ 18,228.00	\$ 18,228.00
748.00	MOBILIZATION	10%	1	\$ 18,228.00	\$ 18,228.00
XXX	MISC. ITEMS & CONTINGENCY	20%	1	\$ 36,456.00	\$ 36,456.00

CONSTRUCTION SUB-TOTAL = \$ 255,192.00

PRELIMINARY ENGINEERING (12%) \$ 30,623.04
 CONSTRUCTION ADMINISTRATION (10%) \$ 25,519.20

SUB-TOTAL = \$ 56,142.24

TOTAL = \$ 311,334.24

ROUNDED TOTAL = \$320,000

*Note:

This Estimate does not include costs for Right-Of-Way Acquisitions - Required easements have not yet been determined.



THE LOUIS BERGER GROUP, INC.

PRELIMINARY DESIGN ESTIMATE COST SUMMARY FOR INTERSECTION IMPROVEMENT:

PROJECT: DCR Maintenance Facility
 TOWN: Hull, MA
 ROAD: GEORGE WASHINGTON BLVD, NANTASKET AVE, AND HULL SHORE DR
TRAFFIC ALTERNATIVE: C

DATE: 1/16/2014

LBG PROJECT #: 2000952.05

ITEM NO.	ITEM DESCRIPTION	UNIT	QUANTITY	PRICE	AMOUNT
120.100	UNCLASSIFIED EXCAVATION	CY	1150	\$ 25.00	\$ 28,750.00
129	PAVEMENT MILLING	SY	2520	\$ 20.00	\$ 50,400.00
145	DRAINAGE STRUCTURE ABANDONED	EA	4	\$ 400.00	\$ 1,600.00
201.5	CATCH BASIN - MUNICIPAL STANDARD	EA	1	\$ 3,000.00	\$ 3,000.00
220	DRAINAGE STRUCTURE ADJUSTED	EA	4	\$ 300.00	\$ 1,200.00
220.3	DRAINAGE STRUCTURE CHANGE IN TYPE	EA	1	\$ 700.00	\$ 700.00
220.7	SANITARY STRUCTURE ADJUSTED	EA	2	\$ 300.00	\$ 600.00
241.12	12 INCH REINFORCED CONCRETE PIPE	FT	20	\$ 60.00	\$ 1,200.00
358	GATE BOX ADJUSTED	EA	4	\$ 150.00	\$ 600.00
402.00	DENSE GRADED CRUSHED STONE FOR SUB-BASE	CY	650	\$ 60.00	\$ 39,000.00
455.22	SUPERPAVE SURFACE COURSE - 9.5 (SSC-9.5)	T	850	\$ 110.00	\$ 93,500.00
455.32	SUPERPAVE INTERMEDIATE COURSE - 19.0 (SIC-19.0)	T	1500	\$ 100.00	\$ 150,000.00
501	GRANITE CURB TYPE VA1 - STRAIGHT	FT	500	\$ 50.00	\$ 25,000.00
501.1	GRANITE CURB TYPE VA1 - CURVED	FT	500	\$ 65.00	\$ 32,500.00
594	CURB REMOVED AND DISCARDED	FT	865	\$ 5.00	\$ 4,325.00
701	CEMENT CONCRETE SIDEWALK	FT	1000	\$ 50.00	\$ 50,000.00
811.36	ELECTRIC MANHOLE ADJUSTED	EA	2	\$ 350.00	\$ 700.00
811.37	ELECTRIC HANDHOLE ADJUSTED	EA	6	\$ 275.00	\$ 1,650.00
816.01	TRAFFIC SIGNAL RECONSTRUCTION LOCATION NO. 1	LS	1	\$ 80,000.00	\$ 80,000.00
823.71	HIGHWAY LIGHTING POLE AND LUMINAIRE REMOVED & STACKED	EA	2	\$ 2,350.00	\$ 4,700.00
860.04	4 INCH REFLECTORIZED WHITE LINE (PAINTED)	FT	3000	\$ 1.00	\$ 3,000.00
861.04	4 INCH REFLECTORIZED YELLOW LINE (PAINTED)	FT	1000	\$ 1.00	\$ 1,000.00
865	CROSS WALKS AND STOP LINES REFLECTORIZED WHITE (PAINTED)	SF	765	\$ 2.00	\$ 1,530.00
XXX	REMOVE AND RELOCATE TRAFFIC CONTROL CABINET	EA	1	\$ 7,000.00	\$ 7,000.00
HIGHWAY ITEM SUB-TOTAL =					\$ 581,955.00
XXX	TRAFFIC CONTROL	10%	1	\$ 58,195.50	\$ 58,195.50
748.00	MOBILIZATION	10%	1	\$ 58,195.50	\$ 58,195.50
XXX	MISC. ITEMS & CONTINGENCY	20%	1	\$ 116,391.00	\$ 116,391.00

CONSTRUCTION SUB-TOTAL = \$ 814,737.00

PRELIMINARY ENGINEERING (12%) \$ 97,768.44
 CONSTRUCTION ADMINISTRATION (10%) \$ 81,473.70

SUB-TOTAL = \$ 179,242.14

TOTAL = \$ 993,979.14

ROUNDED TOTAL = \$1,000,000

*Note:

This Estimate does not include costs for Right-Of-Way Acquisitions - Required easements have not yet been determined.

