

Bulk Storage Facility Relocation Feasibility Study



PREPARED FOR **Town of Nantucket**

SUBMITTED BY
VHB *Vanasse Hangen Brustlin, Inc.*

APRIL 22, 2014

Bulk Storage Facility Relocation

Nantucket Island

Prepared for **Town of Nantucket**

Prepared by  *Vanasse Hangen Brustlin, Inc.*
Watertown, Massachusetts

Table of Contents

Executive Summary	S-1
1 Introduction	1-1
1.1 Scope of the Study.....	1-1
1.2 Contents of this Report	1-2
2 Fuel Assessment.....	2-1
2.1 Current Fuel Delivery, Storage, and Use.....	2-1
2.2 Future Fuel Needs	2-19
3 Traffic Evaluation	3-1
3.1 Existing Conditions	3-1
3.2 Recommended Intersection Improvements	3-14
4 Environmental Resources	4-1
4.1 Tank Farm Site	4-1
4.2 Transportation Route	4-2
5 Permitting Assessment	5-1
5.1 Previously Obtained Approvals.....	5-2
5.2 Federal Requirements	5-2
5.3 State Requirements	5-3
5.4 Local Requirements	5-4
6 Financial Considerations	6-1
6.1 Introduction	6-1
6.2 Inducement	6-1
6.3 Possible Terms	6-2
6.4 Return on Investment.....	6-3
6.5 Process	6-3
6.6 Estimates of Probable Cost	6-4
7 References	7-1

List of Appendices

- A Nantucket Island Fuel Farm, Design and Approach Memorandum
- B Traffic Data
 - Appendix B-1 Traffic Volume Count Data
 - Appendix B-2 Seasonal Adjustment Factors
 - Appendix B-3 Fuel Truck AutoTurn Figures
 - Appendix B-4 Public Transportation
 - Appendix B-5 Vehicle Crash Data

List of Tables

Table No.	Description	Page
2-1	Commercial Ferry Schedule	2-2
2-2	Tanker Truck Shipments to Nantucket by Company	2-3
2-3	Monthly Tanker Truck Shipments to Nantucket, 2011 to 2013	2-4
2-4	Average Monthly Tanker Truck Shipments to Nantucket by Product	2-4
2-5	Average Monthly Barge Deliveries to Nantucket by Product	2-6
2-6	Harbor Fuel Tank Farm ASTs	2-7
2-7	Other Registered ASTs and USTs	2-9
2-8	Average Monthly Gasoline Shipments	2-11
2-9	Average Monthly Fuel Oil Shipments	2-13
2-10	Average Monthly Diesel Fuel Shipments	2-14
2-11	Average Monthly Propane Shipments	2-15
2-12	Average Monthly Aviation Fuel Shipments	2-16
2-13	Gasoline Use Projections	2-21
2-14	Fuel Oil/Bioheat Use Projections	2-21
2-15	Propane Use Projections	2-22
2-17	Summary of Fuel Use Projections, Scenarios 1 and 2	2-24
2-18	Summary of Fuel Use Projection Scenarios	2-26
2-19	Projected Future Tanker Truck Requirements	2-27
2-20	Proposed Tank Dimensions	2-30
3-1	Existing Traffic Volumes	3-10
3-2	Vehicular Speeds on Washington Street	3-10
3-3	Existing Truck Percentages	3-10
3-4	Vehicle Crash Summary (2009 - 2011)	3-13
5-1	Project Permitting Requirements	5-1
6-1	Summary of Probable Cost Estimate	5-4
6-2	Cost Estimates of Intersection Improvements	5-5

This page intentionally left blank.

List of Figures

Table No.	Description	Page
2-1	Nantucket Harbor	
2-2	Selected AST and UST Locations	
2-3	Current Fuel Management System	
2-4	Future Fuel Management System (with current fuel volumes)	
2-5	Conceptual Layout, Industrial Area Tank Farm	
3-1	Roadway Jurisdiction	
3-2	Existing Lane Geometry	
3-3	2013 Existing Conditions, Weekday Midday Peak Season, Peak Hour Traffic Volumes	
3-4	2013 Existing Conditions, Weekday Evening Peak Season, Peak Hour Traffic Volumes	
3-5	Recommended Intersection Improvements	
4-1	Nantucket Industrial Park and Recreation Facility	
4-2	Water Supply Protection Areas	
4-3	Wetland Resources and Floodplains	
4-4	Priority and Estimated Habitats, and Certified Vernal Pools	
4-5	Topographic Map of Project Area	

This page intentionally left blank.

Executive Summary

A feasibility study was conducted to identify opportunities and constraints associated with locating a new bulk fuel storage facility (tank farm) at an industrially zoned site near the Nantucket Memorial Airport. Fuel is currently stored in bulk at a privately owned tank farm on the waterfront in downtown Nantucket, affecting aesthetics at the harbor and presenting safety and environmental risks. A tank farm on New South Road near the Airport would minimize these existing and potential impacts. The study concluded that eliminating the downtown bulk storage facility would bring benefits to public safety, traffic congestion, and the environment, that relocating the facility to the Industrial Area is feasible, and that the plan should be advanced by the Town.

The study evaluated the existing fuel management system on Nantucket Island and identified three components of the system that affect its efficiency: transporting fuel to the island, storing fuel on the island, and delivering fuel to customers. The proposed new bulk storage facility would eliminate one of the two methods currently used to transport fuel to the island: barge transport would be eliminated completely, in favor of tanker truck transport via commercial ferry. This would allow fuel for the proposed new tank farm to be transported there from the Steamship Wharf, but would increase tanker truck shipments on the commercial ferry service. Space availability on the ferries is currently constrained and a long term plan is needed for expanded service.

Most of the fuel stored at the downtown tank farm is delivered to customers by local delivery trucks, but some is piped directly to the Nantucket Boat Basin Marina for sale to boaters. The marina does not currently have its own storage tanks. Given that Nantucket is an island, fuel should be available in the harbor, so relocating the downtown tank farm would require installing storage tanks at the marina. Other local fuel delivery requirements would be largely unchanged, although fuel truck routes would be altered as described below.

Relocating the bulk storage facility from downtown to near the Airport would shift some truck traffic from being concentrated downtown to a broader distribution, initially following a designated truck route to the new facility and then using the island road network to deliver fuel to customers. Although some intersections along the designated truck route are constrained, the minor improvements recommended at four of the intersections are relatively inexpensive and would substantively improve public safety by managing traffic more effectively than is currently accomplished. The estimated cost for the minor improvements is \$6,000 to \$12,000. More significant improvements may also be considered at two additional intersections; these improvements are estimated to cost \$75,000 to \$150,000.

The designated truck route and the proposed tank farm site were evaluated to determine if environmental resources are present that would constrain the use or development of the roads and property. Although protected environmental resources such as wetlands, rare species habitat, and water resources are present, the project is not expected to adversely impact these resources. Further, environmental permitting requirements for the facility are not expected to be onerous.

A conceptual design for a new bulk storage facility was developed as part of this study. The estimated capital cost for the new facility is \$6.7 million. Although the site identified for the new facility is approximately 9 acres, an appropriately sized facility could be accommodated on 6 acres, leaving the balance of the site for other industrial uses.

Constructing and operating the new tank farm could be accomplished under several different scenarios. The Town owns the Industrial Area site, and would like to induce a private party to use the site for the tank farm. The Town and a private party could enter into a contractual arrangement under three possible approaches: build and lease to an operator, land lease, or land sale. Based on conversations with the Selectmen, a strong preference seems to be for sale of the land.

Once a final decision has been made on the structure of the land transfer, the Town will likely seek bids from interested parties. Expected payment to the Town would vary depending on how the transaction was structured. If a land sale, the Town may wish to impose deed restrictions to keep the land use for fuel storage, and to retain a right of first refusal on a future land sale. These restrictions would offer long term benefits to the Town but would be expected to lower the value.

Although there are a number of decisions that need to be made, the prospects for the tank farm to be relocated away from the downtown waterfront, a long time goal of the Town's, have never been better.

1

Introduction

A feasibility study was conducted to identify opportunities and constraints associated with locating a new bulk fuel storage facility (tank farm) at an industrial zone site near the Nantucket Memorial Airport. Fuel is currently stored in bulk at a privately owned tank farm on the waterfront in downtown Nantucket, affecting aesthetics at the harbor and presenting safety and environmental risks. A tank farm on New South Road near the Airport would minimize these existing and potential impacts. This study did not evaluate other alternatives for fuel delivery and storage that have been considered in previous studies. The Town of Nantucket has concluded that the best location for a new tank farm would be in the Industrial Park and Recreation Facility (hereafter, “Industrial Area”) near the Nantucket Memorial Airport.

This report provides the Town of Nantucket with a technical analysis of the transportation and storage of bulk fuel at the Industrial Area. The current transportation and storage arrangements were reviewed and the future needs projected. The safety, environmental, and aesthetic benefits of the proposed system are described, along with an estimate of probable cost of establishing the new tank farm.

1.1 Scope of the Study

The Town of Nantucket retained Vanasse Hangen Brustlin, Inc. (VHB) to:

- Assess current and project future fuel needs on the island;
- Evaluate traffic impacts from current fuel delivery practices and that may result from trucking fuel from the harbor to the proposed tank farm at the Airport;
- Identify risks to the environment from such trucking and from the proposed tank farm;
- Assess permitting issues for the proposed tank farm;
- Analyze the financial requirements of roadway improvements and tank farm alternatives; and

- Recommend a preferred alternative.

The work was conducted under contract to the Town of Nantucket in accordance with the Scope of Services provided in the *Request for Proposals for Bulk Fuel Consulting Services* (June 4, 2013). The project builds upon previous studies and plans to address the Town's concerns about downtown and the existing tank farm, including:

- *Energy Planning on Nantucket: Options for Bulk Fuel Storage* (1988)
- *Nantucket Island Bulk Fuel Master Plan* (1998)
- *Nantucket Pipeline and Bulk Fuel Storage Feasibility Study* (2005)
- *Consult to the Nantucket Bulk Fuel Committee* (2007)
- *Nantucket, Massachusetts: Implementing Downtown's Future* (2008)
- *Nantucket Master Plan* (2009)
- *Wilkes Square Economic Study* (2010)
- *Wilkes Square Redevelopment* (2010)

A work session with the Town on December 17, 2013, provided VHB with additional information about the Town's concerns regarding the existing tank farm and intentions for the new facility. Interviews with representatives from the Steamship Authority and fuel suppliers provided specific information regarding these operators.

1.2 Contents of this Report

The balance of this report is comprised of:

- Chapter 2, *Fuel Assessment*
- Chapter 3, *Traffic Evaluation*
- Chapter 4, *Environmental Risks*
- Chapter 5, *Permitting Assessment*
- Chapter 6, *Financial Considerations*
- Chapter 7, *References*

Figures follow the report text, and supporting documentation is appended.

2

Fuel Assessment

Fuel supply to and use on the island is affected by challenges associated with shipping fuel from the mainland to Nantucket Island, storing and delivering the fuel once on the island, and changes in the fuels that are used for heating homes and powering vehicles. This Chapter describes the current fuel delivery, storage, and use, and projected future needs. This information provides an overview of the current and future fuel transportation and storage requirements in order to support the design and operation of a new bulk storage facility.

2.1 Current Fuel Delivery, Storage, and Use

Petroleum-based fuels (fuel oil, diesel fuel, gasoline, propane, and aviation fuels) are shipped to the island in tanker trucks on commercial ferries or in ocean-going barges. The tanker trucks supply the bulk storage facility in downtown Nantucket or deliver directly to commercial or retail customers; the barges only supply the downtown bulk storage facility. This section describes how fuel is currently shipped to the island, how it is managed once on the island, and what fuels are used on the island.

2.1.1 Shipping Method and Primary Delivery

Shipping fuel from the mainland to the island varies between the commercial ferry and barge methods. Both methods have logistical constraints that are described below, along with primary delivery of the fuels to the main tank farm and other bulk storage facilities.

Commercial Ferry Logistics

Fuel oil (No. 2 heating oil), diesel fuel (ultra-low sulfur grade for on-road vehicles), gasoline (regular and premium), propane, and aviation fuels (AVGAS and Jet A) are regularly shipped to the island in tanker trucks via commercial ferry. Two other fuel products, kerosene and low sulfur diesel fuel (for off-road vehicles including boats),

are currently shipped via tanker trucks on ferries only on an as-needed basis. A new fuel product, “Bioheat” (a combination of fuel oil and renewable fuels expected to replace fuel oil to some degree), is also shipped via tanker trucks on ferries on a limited basis.

The tanker trucks are typically ASHTO WB-65 specification (or smaller): tractor/ trailer combinations approximately 70 feet long and 8 feet wide. The tanks have a capacity of 12,000 gallons, but the actual volume of product transported varies by the products’ density in order to meet the weight limitations of the trucks:

- Diesel fuel and fuel oil— 10,000 gallons equals 80,900 pounds;
- Gasoline— 11,600 gallons equals 85,000 pounds; and
- Propane— 12,000 gallons equals 50,400 pounds.

Tanker trucks are filled at one of the major terminals on the mainland and then travel to Hyannis where they are loaded onto a Steamship Authority commercial ferry for transport to Nantucket Harbor. The flat bed ferry runs three trips per day during the business week according to the schedule provided in Table 2-1.

Table 2-1 Commercial Ferry Schedule

Departs	At	Arrives	At
Hyannis	6:00 am	Nantucket	8:30 am
Nantucket	8:45 am	Hyannis	11:15 am
Hyannis	11:30 am	Nantucket	2:00 pm
Nantucket	2:15 pm	Hyannis	4:45 pm
Hyannis	5:00 pm	Nantucket	7:30 pm
Nantucket	7:45 pm	Hyannis	10:15 pm

Source: Steamship Authority

This schedule allows tanker trucks using the first or second ferry from Hyannis to remain on the island for over 5 hours and return to the mainland on the second or third ferry from Nantucket. This is sufficient time to allow the tanker trucks to make fuel deliveries and return to the harbor for the trip back to the mainland on the same day. A tanker truck using the third ferry from Hyannis would not have sufficient time to unload before that ferry departs Nantucket (only 15 minutes after arrival), and therefore the truck and driver would need to remain on-island overnight.

Fuel deliveries are normally completed in well under 5 hours. The tanker trucks therefore often need to park for an extended time at the Steamship Authority loading area and wait for the return ferry to the mainland, consuming additional fuel and demurrage time.

There are seven companies using commercial ferries to ship tanker trucks; the number of trucks shipped by ferry for the last 3 years is indicated in Table 2-2.

Although full-year data for 2013 are not yet available, it is likely that a similar number of tanker trucks were shipped in 2013 as in the past 2 years. These data indicate that on the order of 950 to 1,050 fuel delivery trucks are currently shipped to the island each year via commercial ferries.

Table 2-2 Tanker Truck Shipments to Nantucket by Company

Company	Shipments in:		
	2011	2012	2013
Fuel Oil Transport A	57	48	49
Fuel Oil Transport B	4	4	3
Gasoline Transport A	255	318	287
Gasoline Transport B	155	204	139
Propane Transport A	350	297	287
Propane Transport B	0	0	14
Aviation Fuel Transport	138	133	131
Annual Total	959	1,004	910

Source: Steamship Authority transport summary worksheet. For business confidentiality the names of the companies have been replaced with generic categories.

Note: 2013 shipments are indicated through October 31, 2013, the latest data available. Adding the average shipments for two additional months would bring the total for 2013 to 1,054.

The primary logistical constraint of the commercial ferry system is space availability for the tanker trucks. The Steamship Authority uses a selection system based on cargo type to be fair to all customers. For tanker truck shipments, after a company's first truck has a position on the ferry the Steamship Authority allows the other fuel delivery companies one truck each on the ferry before the first company can add a second truck on that ferry. Positions are typically scheduled 6 months or more ahead of the shipping date. The Steamship Authority is fully booked on the commercial ferry during their busy season (late spring through early fall). To assist with the startup of the tourist season in the spring, the Steamship Authority occasionally schedules an additional ferry to transport large loads.

Weather-related delays for the commercial ferries have been minimal in recent years. Severe storms or harbor freezes in either Hyannis or Nantucket occasionally cause a one- or two-day interruption in service. These brief interludes have not caused a fuel shortage on the island in many years.

Upon arriving at Nantucket Harbor, the ferries dock at Steamship Wharf and the tanker trucks disembark to make deliveries to either the tank farm or individual customers, as described in Sections 2.1.2 and 2.1.3. Figure 2-1 depicts Nantucket Harbor, specifically identifying Steamship Wharf and the tank farm.

Table 2-3 shows the typical monthly average number of tanker trucks shipped via commercial ferries during the same 2011 to 2013 period. Because a complete set of 2013 data was not available at the time of this writing, the presumed 2013 shipments in November and December have been extrapolated from the previous months, resulting in a slightly different total than in Table 2-2.

Table 2-3 Monthly Tanker Truck Shipments to Nantucket, 2011 to 2013

Month	Average Number of Trucks
January	87
February	77
March	77
April	66
May	74
June	91
July	109
August	121
September	85
October	74
November	72
December	72
Annual Total	1,005

Source: Steamship Authority transport summary worksheet

Monthly tanker truck shipments to the island by product are listed in Table 2-4 and shown in the following graph. This table is based on actual records (except for “other” fuels, as noted below) and does not include an extrapolation of shipments in November and December of 2013.

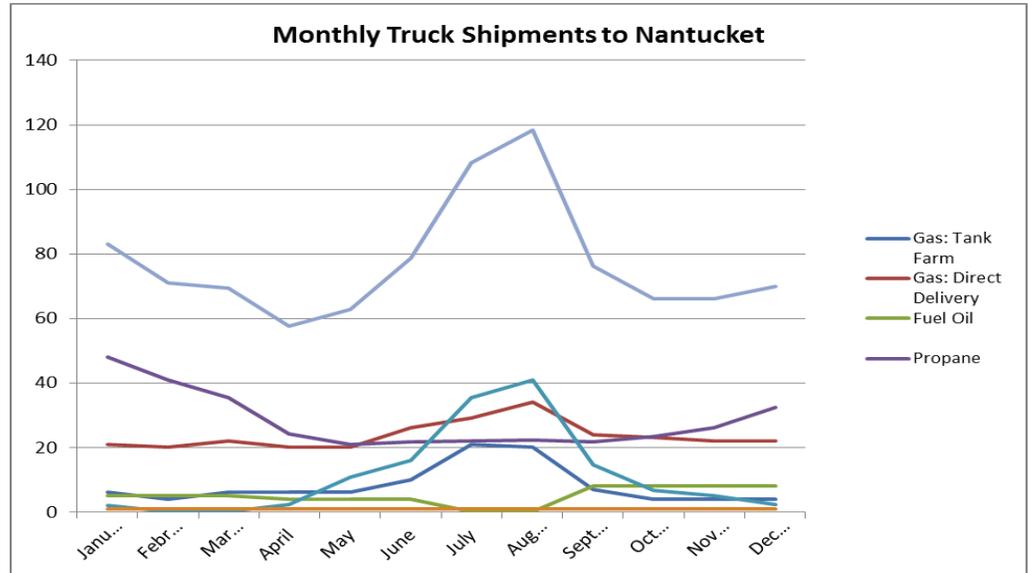
Table 2-4 Average Monthly Tanker Truck Shipments to Nantucket by Product

Month	Product					
	Gasoline		Fuel Oil	Aviation Fuels	Propane	Other
	Tank Farm	Other Bulk Storage				
January	6	21	5	2	48	3
February	4	20	5	0	41	3
March	6	22	5	0	35	3
April	6	20	4	2	24	3
May	6	20	4	11	21	3
June	10	26	4	16	22	3
July	21	29	0	35	22	3
August	20	34	0	41	22	3
September	7	24	8	15	22	3
October	4	23	8	7	23	3
November	4	22	8	5	26	3
December	4	22	8	2	33	3
Annual Total	98	283	59	136	339	36

Source: Steamship Authority transport summary worksheet

Note: For the purposes of this analysis, truck shipments of other fuels (bioheat, kerosene, and low sulfur diesel fuel) were assumed to average three times per month.

The monthly average WB-65 tanker truck trips to Nantucket Island for each product are depicted in the graph below.



Based on these data, tanker truck shipments to Nantucket Island range from two to seven per business day over the course of the year, with considerable seasonal variation for the different types of products (fuel for motor vehicles versus fuel for heating). Peak shipments average six per day in July and August, with the lowest number of shipments averaging two per day in the winter/ early spring and fall months.

Barge Logistics

Diesel fuel and fuel oil (No. 2 heating oil) are also shipped to Nantucket in barges. The barges are loaded at mainland terminals in New Bedford or Providence and are towed to the island. The average number of monthly barge deliveries of diesel fuel and fuel oil are indicated in Table 2-5.

In the past, barge shipments from New Jersey experienced winter weather delays. The last time that the harbor froze for an extended period of time, preventing barge deliveries of fuel oil, was in 2003. It is unlikely that the harbor would freeze more than a few days at a time; the currently used fuel storage capacity at the tank farm is sufficient to bridge such periods.

Table 2-5 Average Monthly Barge Deliveries to Nantucket by Product

Month	Product	
	Diesel Fuel	Fuel Oil
Number of Barge Deliveries		
January	0-1	1-2
February	0-1	1-2
March	0-1	1-2
April	0-1	1-2
May	0-1	1-2
June	0-1	1-2
July	0	0
August	0	0
September	1-2	2-3
October	1-2	2-3
November	0-1	2-3
December	0-1	2-3
Annual Total	11	14-24

Source: Consumption estimate

Upon arrival at Nantucket Harbor, the barges are moored at Swain's Wharf and connected to fuel pipes; the fuel is then pumped to the tank farm as described in Section 2.1.2. Swain's Wharf is identified on Figure 2-1.

2.1.2 Bulk Storage

Once the liquid fuels have arrived at Nantucket, they are either stored in bulk at tank farms or delivered directly to customers. This section describes the existing on-island bulk fuel storage facilities. The subsequent section describes fuel delivery to customers, either directly or after bulk storage.

Harbor Fuel Tank Farm

The primary petroleum storage facility for the island is currently located on New Whale Street in downtown Nantucket (Figure 2-1). The tank farm is owned by First Winthrop Corp. and operated by Harbor Fuel Oil Corp. (Harbor Fuel). Gasoline, fuel oil, and diesel fuel are stored in aboveground storage tanks (ASTs) that range in size from 10,000 to 205,000 gallons, as listed in Table 2-6.

Table 2-6 Harbor Fuel Tank Farm ASTs

Tank ID	Volume (gallons)	Product
M-1	48,000	Premium Gasoline
M-2	70,000	Regular Gasoline
M-3	74,000	ULS Diesel
M-4	40,000	Regular Gasoline
M-5	161,000	No. 2 Heating Oil
M-6	46,000	Premium Gasoline
S-1	205,000	No. 2 Heating Oil
S-2	198,000	Regular Gasoline
S-4	10,000	Spare/Kerosene
S-5	48,000	Spare/Bioheat
S-6	54,000	ULS Diesel

Source: Harbor Fuel

Note: "ULS" means ultra low sulfur content.

Based on this tank inventory, the total storage capacity at the Harbor Fuel tank farm for each product is:

- Regular Gasoline— 308,000 gallons
- Premium Gasoline— 94,000 gallons
- ULS Diesel— 128,000 gallons
- No. 2 Heating Oil— 366,000 gallons
- Spare (for kerosene and Bioheat)— 58,000 gallons

Given the volumes listed in Table 2-6, the total storage capacity of the Harbor Fuel tank farm is 954,000 gallons. However, Harbor Fuel currently uses only about 400,000 gallons of that capacity at any one time. The tanks' capacities can accommodate the large volumes of fuel that are received in barge shipments. Historically, the volume was considered sufficient to store enough fuel for an extended period such as may be needed if deliveries could not be made due to severe storms or a frozen harbor.

Fuel is delivered to the Harbor Fuel tank farm by trucks on commercial ferries and by barges, as described in Section 2.1.1. All gasoline for the tank farm is shipped via tanker truck on the commercial ferries. Kerosene and low sulfur diesel for the tank farm are also shipped via tanker truck on an as-needed basis. Upon disembarking from the ferry at Steamship Wharf, the trucks must loop through the downtown area on Broad, South Water/ Washington, Commercial and New Whale Streets to get to the tank farm (Figure 2-1). More direct routing is not possible due to the one way direction or narrow width of streets, and tight corners of some intersections. Once at the tank farm, the trucks park in the loading rack area and the fuel is pumped into the ASTs.

All fuel oil and diesel fuel for the tank farm is shipped via barges, as described in Section 2.1.1 and indicated in Table 2-5. The fuel brought in on barges is pumped from Swain's Wharf through a single-walled 6-inch diameter steel pipe from the pier, under New Whale Street, and into the ASTs. There is one pipe for each fuel type. The AST to be filled is selected by manually opening and closing valves in the tank farm. During filling, a Harbor Fuel employee observes the fuel level from the top of the tank being filled and remains in contact with the barge by two-way radio. The Nantucket Fire Department monitors this operation from Swain's Wharf. When the fuel transfer is complete, the pipe is blown clean of fuel.

All of the Harbor Fuel ASTs have high level alarms to prevent overfilling. However, the manual tank valve system is subject to human error. In March 2004 one of the valves connecting two ASTs was accidentally left open, allowing gasoline to overflow onto the ground. This spill was contained and recovered before entering the harbor but demonstrates that there is a risk to public safety and the environment under this system.

The products stored at the tank farm are supplied to clients throughout the island via Harbor Fuel's delivery trucks, as described in Section 2.1.3.

Other Bulk Storage

A number of commercial operators have ASTs or underground storage tanks (USTs) that are serviced by direct delivery from tanker trucks shipped via commercial ferry or after bulk storage at the tank farm. A partial list of other known tanks is provided in Table 2-7; selected tank locations are identified in Figure 2-2. This inventory does not include non-commercial fuel oil storage tanks at privately owned buildings.

Table 2-7 Other Registered ASTs and USTs

Owner	Type	Number	Volume (gallons)	Product
Airport Gas Station	UST	2	8,000 (each)	Gasoline
10 Airport Road		1	1,000	Fuel oil
			500	Kerosene
D&B Auto Service	UST	2	10,000 (each)	Gasoline
41 Sparks Avenue				
Gray Lady Boat Yard	AST	1	3-4,000 (est.)	Diesel fuel
15 Arrowhead Drive				
Hatch's Gas	UST	1	10,000	Gasoline
133 Orange Street				
Island Gas	UST	2	30,000 (each)	Propane
8 Hanabea Lane				
Madaket Marine	AST	1	4,000	Gasoline
20 N. Cambridge Street	AST	1	2,000	Diesel
Myles Ries Trucking	AST	1	9,900	Diesel
57 Surfside Road				
Nantucket Dept. of Public Works	AST	1	4,000	Gasoline
188 Madaket Road	AST	1	2,000	Diesel
Nantucket Energy	UST	4	30,000	Propane
8b Amelia Drive				
Nantucket Fire Department	AST	1	4,000	Gasoline
131 Pleasant Street	AST	1	2,000	Diesel
Nantucket High School	UST	1	20,000	Diesel fuel
10 Surfside Road		1	15,000	Fuel oil
Nantucket Memorial Airport	AST	3	1,000 (each)	Diesel fuel
30 Airport Road		1	550	Diesel fuel
		2	30,000 (each)	Jet A/Kerosene
		2	30,000 (each)	AVGAS
	UST	1	1,000	Diesel fuel
Northland Cranberries	AST	1	500	Diesel fuel
Milestone Road & Polpis Road		1	1,000	Diesel fuel
On Island Gas	UST	2	15,000 (each)	Gasoline
34 Sparks Avenue		1	20,000	Gasoline
Sun Island Fuel	AST	5	10,000 (each)	Heating Oil
5 Sun Island Road				
US Coast Guard	AST	1	2,000	Diesel fuel
10 Easton Street				
Verizon Massachusetts	UST	1	500	Diesel fuel
3 Union Street				
Yates Gas (various)	AST	Multiple	204,000	Propane

Sources: UST data from MassDEP Underground Storage Tank Query Tool, <http://public.dep.state.ma.us/UST/ustResultsPage.asp> and MassDSF database http://elicense.chs.state.ma.us/DFS_Verification/SearchResults.aspx (both sites accessed 13 December 2013). AST data also obtained from *Nantucket Island Bulk Fuel Master Plan* (1998), *Nantucket Pipeline and Bulk Fuel Storage Feasibility Study* (2005), Google Earth Maps, and anecdotal information from interviews conducted as part of this evaluation.

The Nantucket Boat Basin Marina is the largest vendor of marine fuel (gasoline and fuel oil) on the island. However, the marina currently does not have any fuel storage tanks: two direct pipelines from the Harbor Fuel tank farm meter fuel to dispensers on Commercial Wharf.

2.1.3 Secondary Delivery

Once on-island, the liquid fuels are either stored temporarily in the bulk storage facilities described above or delivered directly to customers. On average, approximately 14.7 million gallons of the top five liquid fuel products are currently shipped to—and used on—Nantucket Island each year:

- Gasoline—4,500,000 gallons;
- Fuel Oil—3,400,000 gallons;
- Diesel Fuel—525,000 gallons;
- Propane—5,000,000 gallons; and
- Aviation Fuels—1,360,000 gallons.

The current methods of secondary delivery and the monthly usage patterns of these five products, as well as less common products, are described below.

Gasoline

Gasoline is used as a motor vehicle fuel for automobiles, small trucks, and boats. Although some other vehicles use diesel fuel and a few electric vehicles exist on the island, gasoline use trends have not and are not expected to change substantively over time. Gasoline for road vehicles is sold at four gas stations on the island, and at the marinas for boats.

As described above, gasoline is shipped to the island exclusively via commercial ferry in 12,000-gallon tanker trucks carrying 11,600-gallon loads for primary delivery either to the Harbor Fuel tank farm (approximately 1,100,000 gallons annually) or to other bulk storage facilities (3,300,000 gallons annually). Secondary delivery from the Harbor Fuel tank farm to gas stations is accomplished via 5,000-gallon local delivery trucks. These trucks are typically ASHTO SU specification: single unit two-axle trucks approximately 30 feet long and 8 feet wide. Gasoline is also piped directly to the Nantucket Boat Basin Marina for dispensing to boats. The Nantucket Boat Basin Marina sells approximately 125,000 gallons of gasoline per year, leaving some 875,000 gallons to be delivered from the Harbor Fuel tank farm to other ASTs or USTs (listed in Table 2-7).

Gasoline has a relatively short storage life, especially when blended with ethanol, which attracts water and dilutes the product. Blended gasoline is not currently shipped to the island via barges because the water attracted to ethanol during barge shipment exceeds acceptable percentage standards for gasoline. This does not occur

in tanker truck shipments because the tanks are better sealed and the on-ocean transit time is shorter.

Average monthly gasoline shipments to Nantucket, all by tanker trucks via commercial ferry to either the Harbor Fuel tank farm or other bulk storage facilities, are listed in Table 2-8. In total, nearly 4,400,000 gallons of gasoline are shipped to and used on Nantucket Island each year.

Table 2-8 Average Monthly Gasoline Shipments

Month	Harbor Fuel Tank Farm	Other Bulk Storage	Total
January	69,600	243,600	313,200
February	46,400	232,000	278,400
March	69,600	255,200	324,800
April	69,600	232,000	301,600
May	69,600	232,000	301,600
June	116,000	301,600	417,600
July	243,600	336,400	580,000
August	232,000	394,400	626,400
September	81,200	278,400	359,600
October	46,400	266,800	313,200
November	46,400	255,200	301,600
December	46,400	255,200	301,600
Annual Total	1,136,800	3,282,800	4,419,600

Source: Calculated from Table 2-4

As shown in Table 2-4, each year an average of 98 tanker truck trips are required to transport gasoline from the commercial ferries to the Harbor Fuel tank farm and another 283 tanker truck trips are required for delivery to other bulk storage facilities. Approximately 175 to 200 SU-specification 5,000-gallon local delivery truck trips are required each year (on average four deliveries per week) for local gasoline delivery from the Harbor Fuel tank farm to gas stations.

The Nantucket Boat Basin Marina sells approximately 250,000 gallons of gasoline and fuel oil (as a substitute for diesel fuel) per year, piped directly from the Harbor Fuel tank farm. The Marina does not have dedicated storage tanks.

Fuel Oil

Fuel oil (also known as No. 2 heating oil) is used principally for home heating, although boats also use fuel oil in place of diesel fuel. Approximately 36 percent of the homes on Nantucket Island use fuel oil for heating (US Census Bureau, American Community Survey 2009-2013). Anecdotal information indicates that some older homes are being converted from fuel oil to propane, while most new homes are heated by propane or alternative (renewable) fuels. Fuel oil is delivered by the SU-specification 2,800-gallon local delivery trucks from the bulk storage facilities to commercial or residential buildings that have dedicated storage tanks; these tanks are not represented in the inventory provided in Table 2-7.

Fuel oil is similar to diesel fuel, the latter of which has been modified for use as an engine fuel by removing sulfur and including additives. Under normal storage conditions fuel oil can be expected to stay in a useable condition for 1 year or longer at ambient temperatures of 68° Fahrenheit or less, with storage life decreasing at increasing temperatures. Certain other conditions (contact with zinc or copper, presence of water or dust and dirt, etc.) may also accelerate the aging process.

Fuel oil is presently shipped by tanker trucks via commercial ferry and by barge. The tanker trucks deliver fuel oil to bulk storage facilities other than the Harbor Fuel tank farm. On an annual basis, WB-65-specification tanker truck shipments of fuel oil to the island average about 590,000 gallons, in 10,000-gallon loads. As indicated in Table 2-9, peak tanker truck delivery months are typically September through December, with an average of 80,000 gallons of fuel oil each month. In January through June, an average of 50,000 gallons of fuel oil is provided via tanker trucks each month. Usually, no tanker truck shipments of fuel oil are made in July or August.

All fuel oil deliveries to the Harbor Fuel tank farm are made by barges. On an annual basis, throughput at the tank farm ranges between 2,500,000 and 3,000,000 gallons, seven to eight times the storage capacity of the tank farm. During the peak delivery months of September through December, fuel oil throughput currently averages about 400,000 gallons per month. From January through June, 200,000-gallon deliveries are made each month. Typically, no barge deliveries are made in July and August.

Average monthly barge and tanker truck shipments of fuel oil are indicated in Table 2-9. In total, approximately 3,400,000 gallons of fuel oil are shipped to and used on Nantucket Island each year.

Table 2-9 Average Monthly Fuel Oil Shipments

Month	Shipment by		Total
	Barge	Tanker Truck	
	Volume (gallons)		
January	200,000	50,000	250,000
February	200,000	50,000	250,000
March	200,000	50,000	250,000
April	200,000	40,000	240,000
May	200,000	40,000	240,000
June	200,000	40,000	240,000
July	0	0	0
August	0	0	0
September	400,000	80,000	480,000
October	400,000	80,000	480,000
November	400,000	80,000	480,000
December	400,000	80,000	480,000
Annual Total	2,800,000	590,000	3,390,000

Source: Harbor Fuel & Steamship Authority

Many boats currently use fuel oil in place of diesel fuel because it is less expensive. The Nantucket Boat Basin Marina sells approximately 125,000 gallons of fuel oil per year, directly piped from the tank farm. All other fuel oil stored at the Harbor Fuel tank farm, approximately 2,675,000 gallons per year, is delivered to customers when needed via tanker trucks.

Approximately 960 2,800-gallon SU-specification local delivery truck trips are required each year for fuel oil delivery from the Harbor Fuel tank farm to customers. As shown in Table 2-4, 59 12,000-gallon WB-65-specification tanker truck trips are required each year for fuel oil delivery to other bulk storage facilities on Island. Although specific data are not available, it is likely that the local delivery truck trips are seasonally variable.

Diesel Fuel

Ultra low sulfur diesel (ULSD) fuel is the primary diesel fuel used on Nantucket, in compliance with USEPA requirements for on-road vehicle fuels. As mentioned above, some proportion of the on-island vehicles use diesel fuel, and it is also used to power some boats. Despite the availability of new clean diesel fueled automobiles, diesel fuel use trends have not and are not expected to change substantively over time.

Some low sulfur diesel may be available for use in off-road vehicles, but specific data were not available and use of low sulfur diesel fuel is assumed to be insignificant. Low sulfur diesel is therefore not considered in this evaluation. It is noted that ULSD

fuel is easily contaminated by sulfur from low sulfur diesel fuel or heating oil (which has a high sulfur content), and therefore must be piped and stored separately.

The vast majority of ULSD fuel is shipped to the island by barge; as needed, a very small volume of low sulfur diesel fuel is shipped via tanker truck on commercial ferries. ULSD fuel is similar to fuel oil, but has had the sulfur removed and been modified for use as an engine fuel by additives. Under normal storage conditions, diesel fuel can be expected to stay in a useable condition for 1 year or longer at ambient temperatures of 68° Fahrenheit or less, with storage life decreasing as increasing temperatures. Certain other conditions (deterioration of additives, contact with zinc or copper, presence of water or dust and dirt, etc.) may also accelerate the aging process to as short as 3 months.

The current bulk storage capacity for ULSD fuel at the Harbor Fuel tank farm is 128,000 gallons. On an annual basis, ULSD fuel throughput at the tank farm averages about 525,000 gallons, four to five times the storage capacity of the tank farm, all supplied by barges.

Average monthly barge shipments of diesel fuel are listed in Table 2-10. In total, approximately 525,000 gallons of diesel fuel are shipped to and used on Nantucket Island each year. During the peak barge delivery months of September and October, diesel fuel throughput at the Harbor Fuel tank farm currently averages about 100,000 gallons per month. In January, February, and March, barge deliveries average 25,000 gallons per month. In April, May, June, November, and December, 50,000-gallon deliveries are made each month. Typically, no barge deliveries of diesel fuel are made in July and August. Diesel fuel is delivered by Harbor Fuel to gas stations using the SU-specification 2,800-gallon local delivery trucks.

Table 2-10 Average Monthly Diesel Fuel Shipments

Month	Volume (gallons)
January	25,000
February	25,000
March	25,000
April	50,000
May	50,000
June	50,000
July	0
August	0
September	100,000
October	100,000
November	50,000
December	50,000
Annual Total	525,000

Source: Harbor Fuel

Propane

Propane is used to heat and cool homes, and to cook. Approximately 38 percent of the homes on Nantucket Island use propane for heating (US Census Bureau, American Community Survey 2009-2013). Although quantitative data showing trends over time are not available, several sources report that propane use for home heating is increasing as compared to fuel oil because propane heating is more efficient. Increasingly, seasonal homes are kept heated all winter by propane rather than shut down completely.

Storage life is generally not an issue with propane, as it is contained in sealed, pressurized vessels with no exposure to air or potential for contamination by water or other substances.

Propane is currently delivered to the island via tanker trucks on the commercial ferries, primarily by Suburban Gas/ Yates Gas and Island Gas. Propane is notably different from the other fuel types in that it is a gas and must be pressurized to convert it into a liquid for more efficient storage and transportation; it cannot be handled through the same equipment as liquid fuels. Propane has therefore been exempted from the evaluation of a new bulk storage facility except to the extent that increasing propane usage displaces some fuel oil usage, thus somewhat reducing the projected long-term fuel oil usage and the tanker truck delivery requirements. Propane tanker trucks must be shipped to the island on the commercial ferries and are therefore subject to the space and scheduling constraints described above.

Based on the propane truck shipment data in Table 2-4, the calculated propane volumes shipped each month are listed in Table 2-11. Actual annual propane shipments to the island reportedly range between 4,000,000 and 6,000,000 gallons per year, requiring an average of approximately 340 to 500 12,000-gallon WB-65-specification tanker trucks shipped via commercial ferries.

Table 2-11 Average Monthly Propane Shipments

Month	Volume (gallons)
January	552,000
February	492,000
March	420,000
April	288,000
May	252,000
June	264,000
July	264,000
August	264,000
September	264,000
October	276,000
November	312,000
December	396,000
Annual Total	4,044,000

Source: Calculated from propane truck shipments, Table 2-4.

Aviation Fuel

Aviation fuels, consisting of aviation gas (AVGAS) and Jet A fuel, are used exclusively to power commercial or private airplanes. All aviation fuel is transported to the island in 12,000-gallon WB-65-specification tanker trucks carrying 10,000-gallon loads and delivered to the Nantucket Municipal Airport, where it is stored in ASTs until sold directly to customers from on-airport tanker trucks.

The Airport intends to maintain a tank farm for aviation fuels independent from the proposed Industrial Area tank farm. Aviation fuels have therefore been exempted from the evaluation of a new bulk storage facility except when considering tanker truck shipments on commercial ferries and traffic impacts along the route to the existing Airport tank farm and proposed Industrial Area tank farm. Aviation fuel tanker trucks must be shipped to the island on the commercial ferries and are therefore subject to the space and scheduling constraints described above.

Aviation fuel storage is strictly regulated by the FAA, especially for commercial carriers. FAA references NFPA Standard 407, Standard for Aircraft Fuel Servicing, to specify fuel storage requirements. The Nantucket Municipal Airport is subject to these requirements. AVGAS is a high octane gasoline containing tetraethyl lead but no ethanol additives, and therefore has a longer storage life than automotive gasoline. Jet A fuel is similar to kerosene or diesel fuel and can be stored indefinitely in well-maintained tanks, but may be adversely affected by water or other contaminants.

As shown in Table 2-4, tanker truck shipments of aviation fuels vary significantly by season, from no or few truck shipments in February and March to over 40 in the month of August. Based on the aviation fuel truck data (which does not distinguish between Jet A and AVGAS shipments), the calculated aviation fuel volumes shipped each month are listed in Table 2-12.

Table 2-12 Average Monthly Aviation Fuel Shipments

Month	Volume (gallons)
January	20,000
February	0
March	0
April	20,000
May	110,000
June	160,000
July	350,000
August	410,000
September	150,000
October	70,000
November	50,000
December	20,000
Annual Total	1,360,000

Source: Calculated from aviation fuel truck shipments, Table 2-4.

Bioheat

Bioheat (or biodiesel) is a blended product (a blend of petroleum heating oil and renewable fuels) that is used for heating homes, and is expected to eventually replace fuel oil (No. 2 heating oil) for that purpose. Bioheat has had very limited use on Nantucket so far, but deliveries are expected to increase in the future. There are no records of shipping practices or usage rates. An empty 48,000-gallon tank at the Harbor Fuel tank farm is designated as the storage vessel for Bioheat when needed. Because Bioheat is not currently widely used on the island, this evaluation only took into consideration transportation and storage of this product as a future 1:1 substitute for fuel oil.

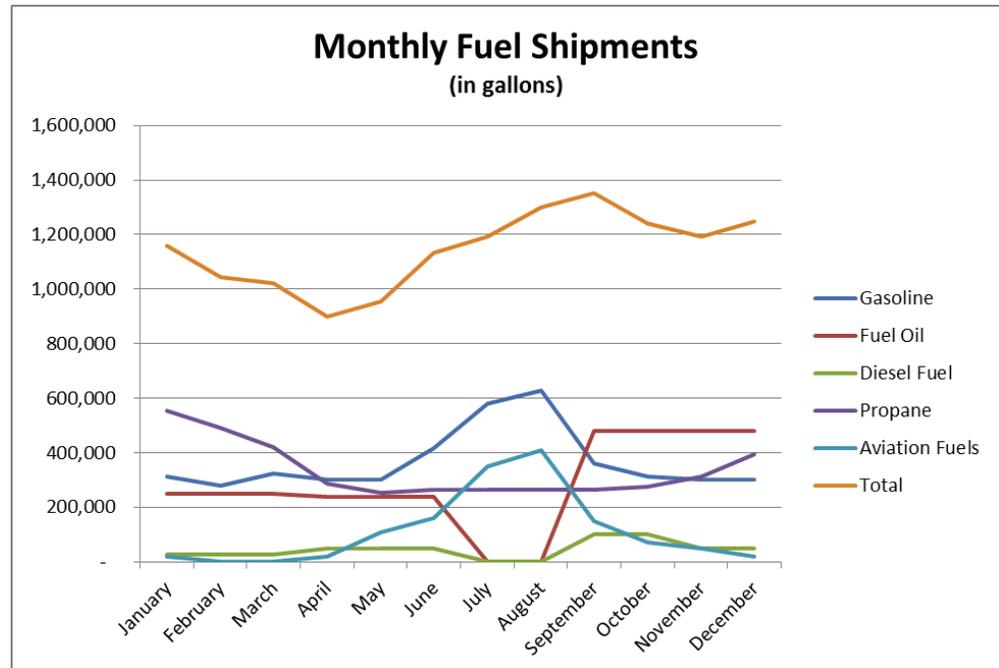
Kerosene

Kerosene is used for camping stoves, lanterns, space heating and heating homes. Kerosene is not currently stored at the Harbor Fuel tank farm, although a 10,000-gallon tank is designated for kerosene storage; deliveries are made directly to customers from tanker trucks brought over on commercial ferries on an as-needed basis. There is a 500-gallon UST for kerosene at the Airport Gas station. Because kerosene is not widely used on the island, this evaluation only took into consideration transportation of this product at an assumed rate of one tanker truck per month; kerosene storage is not considered a significant component of this study.

Summary

The graph below depicts the current average monthly shipments (as an analog of usage rates) the five major liquid fuel types, as well as the total volume of these products each month. The data indicate that approximately 900,000 to 1,200,000 gallons of these five products are shipped each month during the winter and spring seasons, with the total climbing to a maximum of nearly 1,400,000 gallons in late summer. The volume of shipments of each product varies significantly by season, with little correlation of any product with another except in late spring when shipments are at their lowest. There is some correlation of fuel types depending upon usage (as motor vehicle fuels or heating fuels), with vehicle fuel use predominant in spring and summer months but heating fuel use dominant in fall and winter months.

The monthly average WB-65 tanker truck trips to Nantucket Island for each product are depicted in the graph below. These data follow a similar pattern as the monthly tanker truck shipments graph on page 2-5, but the exclusion of barge shipments (for fuel oil and diesel fuel) from the truck graph changes the monthly distribution profile slightly.



A flow chart depicting the current fuel shipment, storage, and delivery system on Nantucket Island is provided in Figure 2-3. As discussed above and shown in the flow chart, at least some portion of all fuels is currently shipped by commercial ferry. Only two fuels are shipped by barge: fuel oil and diesel fuel. The current system provides duplication of supply streams for these two fuels between the commercial ferry and barge shipping methods. There is also duplication of bulk storage (for gasoline, fuel oil, and diesel fuel) at the Harbor Fuel tank farm and at other storage facilities. Ultimately, all liquid fuels are delivered to retailers or directly to customers by tanker trucks (either 12,000-gallon or 2,800 to 5,000-gallon capacity) except for marine fuels. Gasoline and diesel fuel (or fuel oil as a substitute) sold at the Nantucket Boat Basin Marina are piped there from the Harbor Fuel tank farm. The Marina does not have dedicated storage tanks.

The existing Harbor Fuel tank farm stores an average of approximately 4,461,800 gallons of gasoline, fuel oil, and ULSD fuel each year. This equates to approximately 54 percent of the 8,325,000 gallons of these products currently used each year on the island:

- 26 percent of the gasoline (1,136,800 gallons of the 4,400,000 gallons);
- 82 percent of the fuel oil (2,800,000 gallons of the 3,400,000 gallons); and
- 100 percent of the ULSD fuel (525,000 gallons).

2.2 Future Fuel Needs

This section describes the future fuel needs on Nantucket Island, taking into consideration the current usage rates as well as general trends in changing fuel usage. These trends include increased use of propane (in place of fuel oil) for home heating, as well as other fuels and energy sources such as Bioheat, solar, wind, and geothermal to the extent that adoption of these can be predicted.

The fuel transportation and storage requirements are based on the assumption that the existing Harbor Fuel tank farm will be replaced by a new facility at the Industrial Area with delivery to the new tank farm accomplished exclusively by tanker trucks brought to the island on commercial ferries. Barge delivery of liquid fuels would be halted and no longer occur.

2.2.1 Projected Fuel Needs

Because of the special circumstances of Nantucket Island—specifically, relatively small size with limited growth potential—liquid fuel use cannot be expected to continue to increase without limitation into the future. The island is approaching full build-out of unprotected developable land. Fuel use by residents and visitors is more likely to grow at a slow rate until some maximum value is reached. For the purposes of this study, the Town of Nantucket suggested an overall 1 percent annual growth rate to project future fuel use.

At a 1 percent per year growth rate, the total liquid fuel use on Nantucket Island would increase in 25 years from the current nearly 15,000,000 gallons per year to 19,000,000 gallons per year in 2038. As a practical matter, 19,000,000 gallons was considered to be the maximum possible total annual liquid fuel use on the island used in this evaluation. Until that maximum was reached for any one fuel type, fuel usage on Nantucket Island was projected in two 25-year increments from 2013:

- 25 years—2038
- 50 years—2063

As described in Section 2.1.3, the baseline annual fuel usage rates used in this analysis were:

- Gasoline: 4,400,000 gallons per year
- Fuel oil: 3,400,000 gallons per year
- Diesel fuel: 525,000 gallons per year
- Propane: 5,000,000 gallons per year
- Aviation fuels: 1,360,000 gallons per year

Projections for future use of individual products and issues affecting them are described below. These projections did not take into consideration economies of scale, specifically in regard to the minimum volume of any fuel. It is likely that suppliers would not ship a specific product to the island for bulk storage before sale if demand is below some profitable threshold. This would apply both to new products as they are introduced and existing products as they are replaced by other existing or new alternatives.

The certainty of these projections diminishes with increasing time into the future. Values are therefore rounded substantively for the longer term projections.

Gasoline

Gasoline use on Nantucket Island is expected to increase gradually over time as tourism continues to grow and the island is further developed. Issues that could potentially affect the future of gasoline use include:

- Personal choice by automobile owners to replace gasoline-powered vehicles with diesel, hybrid, or electric vehicles;
- A local initiative that prohibits or severely limits petroleum fuel-powered automobile use on the island;
- State or federal laws or regulations that encourage or force vehicle fuel changes due to environmental considerations (e.g., air quality, greenhouse gas emissions); and
- Global market changes in the oil industry, such as markedly increased or decreased supply, which substantively decrease or increase the cost of gasoline.

There may be other, unforeseen issues that could significantly disrupt gasoline use on the island. Given this uncertainty, increases in gasoline use from the current 4,400,000 gallons were projected in 25-year intervals at conservative 0.1 percent, 0.5 percent, and 1 percent rates, as shown in Table 2-13.

Table 2-13 Gasoline Use Projections

Growth Rate (percent)	Year	
	2038	2063
	Projected Annual Use (gallons)	
0.1	4,500,000	4,600,000
0.5	5,000,000	5,600,000
1.0	5,600,000	7,200,000

Fuel Oil and Bioheat

Fuel oil use on Nantucket Island is expected to decrease over time as propane use increases and Bioheat is substituted. In this analysis fuel oil and Bioheat are considered together, based on an assumed 1:1 ratio for Bioheat replacement of fuel oil. As mentioned above, fuel oil is currently used for heating approximately 36 percent of the homes on the island. Propane is likely to replace some of this use, but it is not possible to accurately predict the replacement rate nor if propane will ever completely replace fuel oil. It is likely that Bioheat, as a renewable fuel source, will replace some portion of the fuel oil use and therefore these fuels have been combined in this analysis. Future fuel oil/ bioheat use may also be subject to some of the issues potentially affecting gasoline use described above.

Given these uncertainties, decreases in fuel oil/ bioheat use from the current 3,400,000 gallons per year were projected in 25-year intervals at 0.5 percent, 1 percent, and 5 percent rates, as shown in Table 2-14. Bioheat use itself may increase at the further expense of fuel oil, but it is not possible to accurately predict the replacement rate.

Table 2-14 Fuel Oil/Bioheat Use Projections

Growth Rate (percent)	Year	
	2038	2063
	Projected Annual Use (gallons)	
-0.5	3,000,000	2,600,000
-1.0	2,600,000	2,000,000
-5.0	950,000	250,000

Diesel Fuel

Diesel fuel use on Nantucket Island is expected to remain steady for the foreseeable future. It is used for heavy trucks and some personal cars, light trucks, and boats. There are no currently practical substitutes for diesel fuel to power heavy trucks such as those used for commercial deliveries on the island. Although fuel oil is substituted for diesel fuel in some marine applications, this practice accounts for a small portion of the heating oil and diesel fuel used on the island and is unlikely to change substantively.

Future diesel fuel use may be subject, to a certain degree, to the same issues listed for gasoline above specifically for personal automobiles and light trucks. These negative growth factors may be offset by positive growth of delivery requirements on the island. For the purposes of this evaluation, diesel fuel use is expected to remain constant at 525,000 gallons per year indefinitely.

Propane

Propane use on Nantucket Island is expected to increase over time, both as a result of population growth and replacement of fuel oil systems, as described above. Propane may be affected by local, state, or federal laws and regulations or global market shifts but not to the degree of other fossil fuels because it is sourced in the US and generally considered to have less of an environmental impact. It is possible, though unlikely, that propane could provide all of the heating fuel needs on the island in the future.

Given these considerations, increases in propane use from the current 5,000,000 gallons per year were projected in 25-year intervals at 1 percent, 2 percent, and 5 percent, as shown in Table 2-15. The 5 percent growth rate would reach the assumed maximum fuel use limit of 19,000,000 gallons per year mentioned above in just over 27 years (in 2040); the 50-year projection is capped at that value.

Table 2-15 Propane Use Projections

Growth Rate (percent)	Year	
	2038	2063
	Projected Annual Use (gallons)	
1.0	6,400,000	8,200,000
2.0	6,500,000	10,800,000
5.0	16,900,000	19,000,000

Note: The 50-year projection at a 5 percent growth rate exceeds the maximum assumed annual fuel use rate of 19,000,000 gallons per year, and is therefore capped at that value.

Aviation Fuel

In 2007 it was projected that Jet A fuel would gradually replace AVGAS, but overall aviation fuel usage would remain flat for the foreseeable future. For the purposes of this evaluation, aviation fuel use is therefore expected to remain constant at 1,360,000 gallons per year indefinitely. Nantucket Municipal Airport may upgrade the airport and tank farm to increase usage, but it would not be integrated with the proposed Industrial Area tank farm. Aviation fuel use has been taken into consideration only in regard to tanker truck traffic along the portions of the roads that would be shared with tanker trucks accessing a new Industrial Area tank farm.

Kerosene

Kerosene use on Nantucket Island is currently minimal and not expected to change substantively in the future. This study did not further evaluate kerosene use.

Summary

The relatively small size and limited development growth potential of Nantucket Island means that liquid fuel use cannot be expected to continue to increase without limitation into the future. As a practical matter, 19,000,000 gallons was considered to be the maximum likely total annual liquid fuel use on the island, based on a 1 percent per year growth rate for 25 years from the current nearly 15,000,000 gallons per year. For the purposes of this evaluation, until that maximum was reached for any one fuel type, fuel usage on Nantucket Island was projected in 25-year increments from 2013, to 2038 and 2063.

Numerous known potential issues may affect overall and individual product use rates in the future—and there will likely be other factors in the future that are unforeseen at this time. Based on these uncertainties, a range of projections was made for each product. Most projections assumed positive growth (increases) but some (specifically, fuel oil/ Bioheat) assumed negative growth (decreases) in fuel use.

Combining these projections, two scenarios of future fuel use on Nantucket Island were made. The projections vary by the five major fuel type's proportion of the total liquid fuel use:

- Scenario 1:
 - Gasoline use would increase by 1.0 percent per year
 - Fuel oil/ Bioheat use would decrease by 5.0 percent per year
 - Diesel fuel use would remain constant
 - Propane use would increase by 2.0 percent per year
 - Aviation fuel use would remain constant

- Scenario 2:
 - Gasoline use would increase by 1.0 percent per year
 - Fuel oil/ Bioheat use would decrease by 1.0 percent per year
 - Diesel fuel use would remain constant
 - Propane use would increase by 1.0 percent per year
 - Aviation fuel use would remain constant

Table 2-17 provides the total volumes for each fuel type in the 25-year projections for these two scenarios.

Table 2-17 Summary of Fuel Use Projections, Scenarios 1 and 2

Fuel Type	Year	
	2038	2063
	Projected Annual Fuel Use (gallons)	
Scenario 1		
Gasoline	5,642,701	7,236,380
Fuel Oil/Bioheat	943,125	261,613
Diesel Fuel	525,000	525,000
Propane	8,203,030	13,457,940
Aviation Fuels	1,360,000	1,360,000
Annual Total	16,673,855	22,840,933
Scenario 2		
Gasoline	5,642,701	7,236,380
Fuel Oil/Bioheat	2,644,593	2,057,021
Diesel Fuel	525,000	525,000
Propane	6,412,160	8,223,159
Aviation Fuels	1,360,000	1,360,000
Annual Total	16,584,453	19,401,560

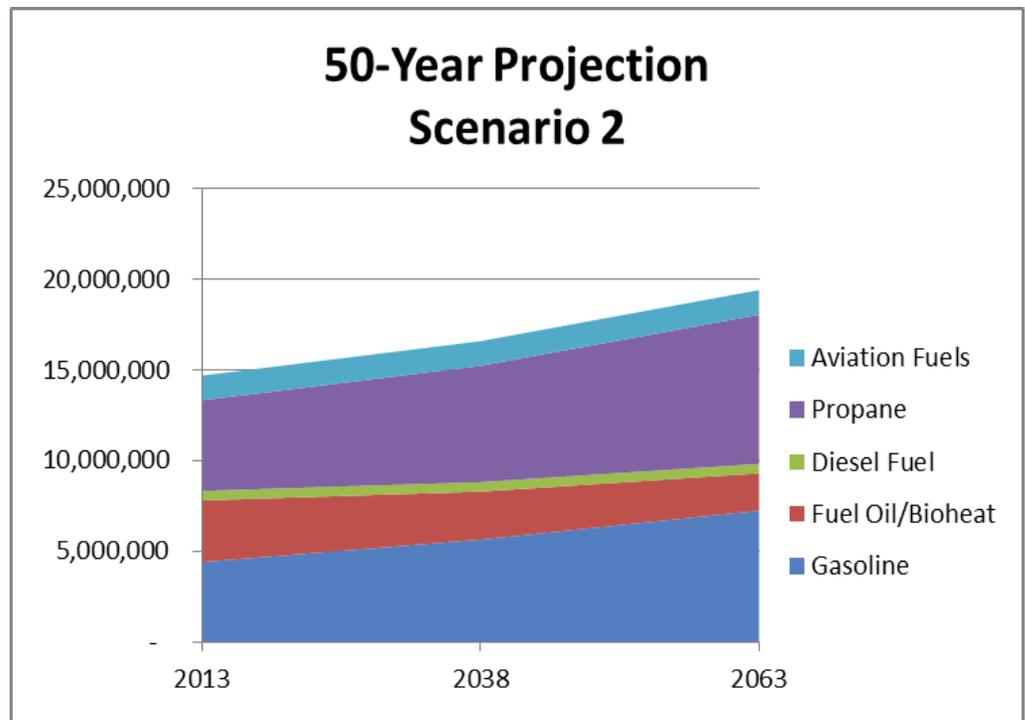
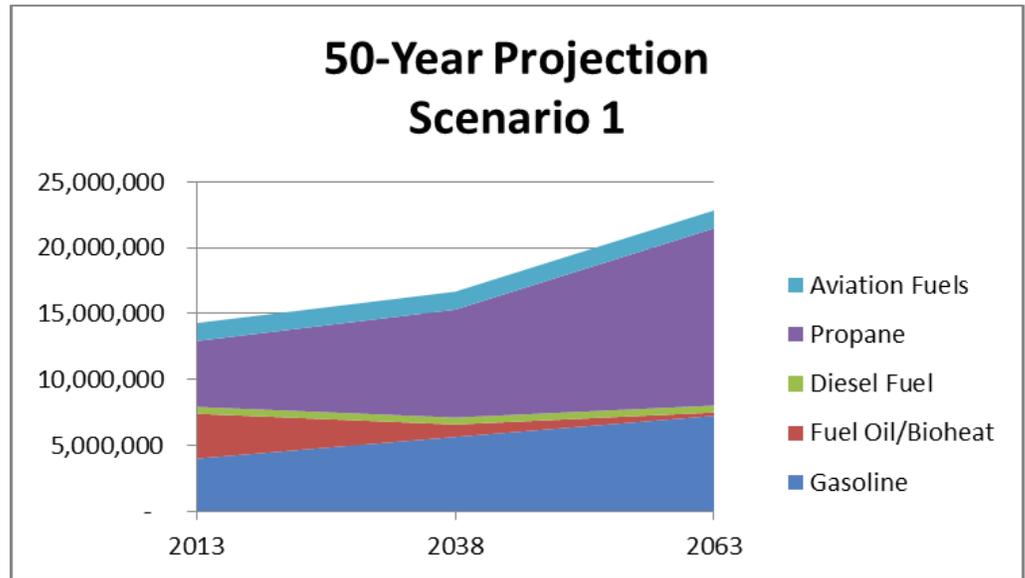


Table 2-18 presents the total annual fuel use (rounded to the nearest 100,000 gallons) for these scenarios at the 25-year increments. Both scenarios project that total fuel use would exceed the 19,000,000 gallon per year cap assumed for this evaluation before the 50-year increment.

Table 2-18 Summary of Fuel Use Projection Scenarios

Scenario	Year	
	2038	2063
	Projected Annual Total Fuel Use (gallons)	
1	16,700,000	22,800,000
2	16,600,000	19,400,000

Note: Bold values exceed the maximum assumed annual fuel use rate of 19,000,000 gallons per year, and are provided for illustrative purposes only.

The Scenario 2 values were used in determining the future fuel transportation and storage requirements below.

2.2.2 Future Fuel Transportation Requirements

A flow chart depicting the future conditions of fuel management on the island is provided in Figure 2-4. Future fuel transportation requirements are based on the following assumptions:

- The existing Harbor Fuel tank farm would be closed.
- Barge deliveries of fuel oil and diesel fuel would be halted.
- All liquid fuels would be shipped to the island in tanker trucks on commercial ferries.
- A new tank farm for gasoline (regular and premium grades), fuel oil/ Bioheat, and ULSD fuel would be constructed at the Industrial Area site, and would be used by one operator under an agreement with the Town.
- The new tank farm would include space for propane storage if needed in the future.
- Other bulk storage facilities would operate as they are currently being used.
- The total annual fuel use on Nantucket Island would be as presented in Table 2-18, Scenario 2 above.

Based on the fuel densities described in Section 2.1.1 and the fuel use projections for Scenario 2 in Table 2-18, the minimum annual number of tanker trucks needed to transport these fuels to the island is provided in Table 2-19. The number of tanker trucks that would have been required in 2013 if all fuel shipments were made by commercial ferry is also shown in Table 2-19. The 2013 values were calculated by adding the average number of tanker truck shipments listed in Table 2-5 to the number of trucks that would have been required to ship the volumes of barge-supplied fuel oil and diesel fuel listed in Tables 2-11 and 2-12, respectively. Note that

the total 50-year projections (for 2063) are theoretical in that they represent transportation of more fuel than allowed by the 19,000,000-gallon per year cap.

Table 2-19 Projected Future Tanker Truck Requirements

Fuel Type	Year		
	2013	2038	2063
	Projected Annual Minimum Number of Tanker Trucks		
Gasoline	379	486	624
Fuel Oil/Bioheat	340	264	206
Diesel Fuel	53	53	53
Propane	417	506	685
Aviation Fuels	136	136	136
Annual Total	1,325	1,446	1,703

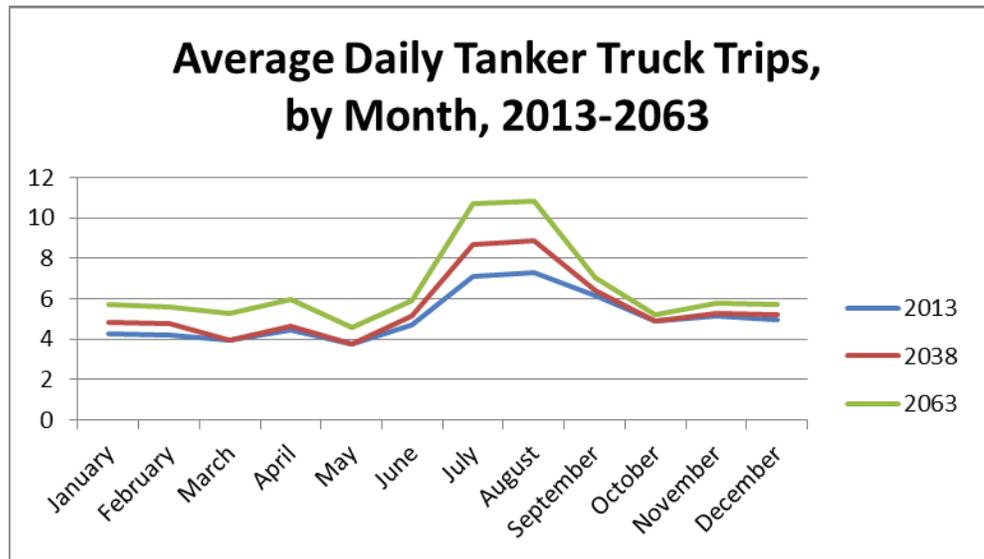
Notes: 2013 values based on average number of tanker truck trips plus calculated number of tanker trucks that would have been required to transport fuel oil and diesel fuel that is currently shipped by barge.
Future values were calculated based on the Scenario 2 fuel use projections provided in Table 2-18.

As described in Section 2.1.1, the average number of tanker trucks currently shipped via commercial ferry is approximately 1,000 each year. Halting the barge shipments and shipping all liquid fuels on the commercial ferries would have increased the number of tanker trucks in 2013 by about 325, an increase of roughly one third. The number of tanker trucks would continue to increase in future years if fuel use continues to grow as projected.

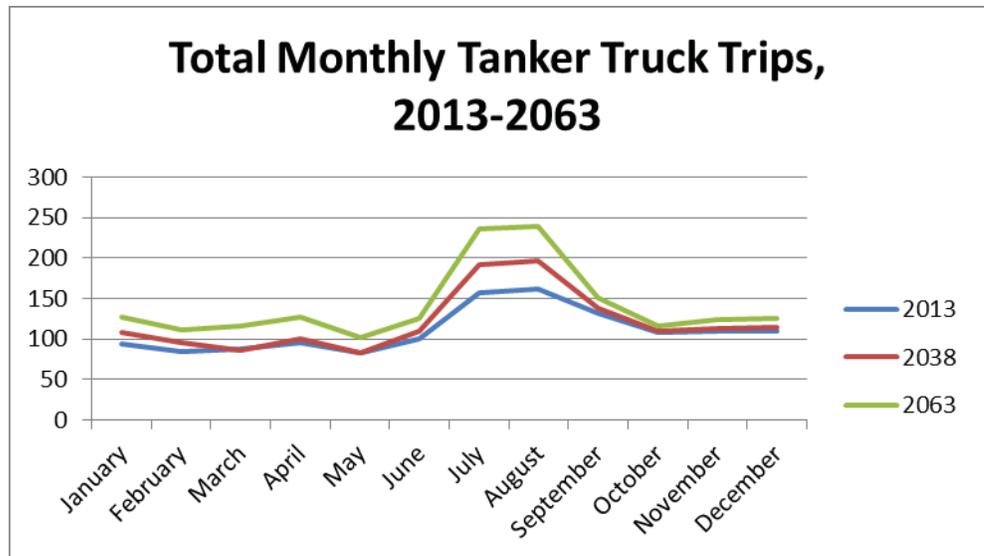
Based on the current commercial ferry weekday-only operation, these trucks would be shipped to the island 260 days out of the year. Over the course of a year (assuming equal distribution), the average number of trucks shipped to the island each day for the current and future conditions would be:

- 2013 current commercial ferry (1,000 trucks/ year) and barge shipments: average of ~4 trucks per day;
- 2013 if no barge shipments (1,325 trucks/ year): average of ~5 trucks/ day;
- 2038 (1,446 trucks/ year): average of ~6 trucks/ day; and
- 2063 (1,703 trucks/ year): average of ~7 trucks/ day.

This summary suggests that on average one additional tanker truck would have been shipped to the island each day in 2013 if the barge shipments had been diverted to tanker trucks on commercial ferries. As fuel use increases in the future, the number of trucks would essentially increase at a rate of one additional truck per day every 25 years. The actual distribution of these trucks over the year would vary by season, given the seasonal variability in fuel use. The graph below depicts the average number of truck trips that would be realized each day during each month for the three 25-year intervals under Scenario 2.



The graph below depicts the monthly totals of tanker truck trips that would have been required in 2013 and would be required in the future, under Scenario 2, for the two 25-year increments. As mentioned above, the 50-year projections (for 2063) are theoretical in that they represent transportation of more fuel than allowed by the 19,000,000-gallon per year cap.



Given the space constraints of the commercial ferries described in Section 2.1.1, it will be critical to coordinate with the Steamship Authority to ensure that the additional tanker trucks can be accommodated during busy seasons. The Steamship Authority does not presently have the capacity to transport the additional tanker trucks

required to replace the barge deliveries or future increases in liquid fuel shipping needs. Potential options to address this limitation include:

- Shipping tanker trucks on the third ferry each day, accepting that these trucks would remain on-island overnight;
- Scheduling commercial ferry service on Saturdays; and
- Adding another ferry to the fleet to increase the weekday schedule frequency.

Once on-island, the tanker trucks would haul liquid fuels to the new Industrial Area tank farm and other bulk storage facilities, or provide direct delivery of the products. The current tanker trucks that do not deliver to the Harbor Fuel tank farm would not change their traffic patterns, but trips would increase in frequency over time as fuel use increases. Several changes in on-island tanker truck traffic would result from elimination of the Harbor Fuel tank farm, regardless of any future increases in liquid fuel use:

- The tanker trucks that currently deliver gasoline to the existing Harbor Fuel tank farm would be re-routed to deliver gasoline to the new Industrial Area tank farm.
- Tanker trucks newly carrying the fuel oil and diesel fuel that has been shipped via barge would follow the same route to the new Industrial Area tank farm as the gasoline trucks.
- Delivering the gasoline, fuel oil, and diesel fuel from the Industrial Area tank farm to retailers or directly to consumers would require re-routing the current tanker truck trips from the Harbor Fuel tank farm.
- New tanker truck trips would be required to supply the Nantucket Boat Basin Marina. This facility currently receives fuel via pipeline from the Harbor Fuel tank farm; two new 15,000- to 20,000-gallon storage tanks would be required at the marina. The new tanks would be serviced by tanker trucks from the new Industrial Area tank farm.

The traffic implications of these changes in on-island tanker truck trips are described in Chapter 3.

2.2.3 Future Fuel Storage Requirements

Storing fuel on Nantucket Island in the future will require bulk storage facilities for temporary storage, as is required today. The proposed Industrial Area tank farm would only replace the existing Harbor Fuel tank farm; other bulk storage facilities and direct delivery of products to consumers are not expected to change. This section discusses future fuel storage requirements at the proposed Industrial Area tank farm based on the current and projected fuel needs described in Section 2.2.1, as well as fuel storage requirements for the Nantucket Boat Basin Marina.

There are three fuel types that are expected to be stored in bulk at the proposed Industrial Area tank farm:

- Gasoline (regular and premium)
- Fuel Oil (No. 2 heating oil) or Bioheat
- Diesel fuel (ultra-low sulfur)

A conceptual design of the proposed tank farm at the Industrial Area site has been prepared to aid the Town in visualizing the facility and anticipating the financial cost of building the tank farm. Based on the Town's requested storage capacities (ullage) for each product, Table 2-20 presents the dimensions of the proposed tanks.

Table 2-20 Proposed Tank Dimensions

Product	Required Ullage (gallons)	Diameter (feet)	Height (feet)	Capacity (gallons)	Number of tanks	Total Ullage (gallons)
Gasoline, regular	200,000	25	30	110,040	2	220,080
Gasoline, premium	40,000	15	18	23,370	2	47,460
ULSD fuel	60,000	15	24	31,710	2	63,420
Fuel oil	300,000	30	30	158,760	2	317,520

Source: Design Approach and Criteria, Nantucket Fuel Farm, Nantucket, Massachusetts (attached)

Note: One premium gasoline tank may be converted to a Bioheat tank when demand is sufficient to justify a dedicated tank. The tank configurations for gasoline and Bioheat are different, limiting the potential for repeated product swaps due to cost for configuration changes.

Figure 2-5 depicts the conceptual layout of the Industrial Area tank farm. Space has also been allocated to accommodate three 30,000-gallon USTs for propane, if needed in the future based on expected growth in propane demand. Other criteria used for the conceptual design include:

- Tank spacing follows the requirements of NFPA 30 for facilities with "protection for exposures;
- Tanker trucks would be parked on a contained parking pad with sufficient capacity for four trucks;
- Kerosene would be stored in a tanker truck located on the contained parking pad;
- Fuel would be received in 12,000-gallon capacity trucks meeting WB-65 specifications; and
- Fuel would be delivered in 2,800- or 5,000-gallon capacity trucks meeting SU specifications.

A memorandum describing the conceptual design is provided in Appendix A.

3

Traffic Evaluation

This Chapter evaluates the current traffic conditions on Nantucket Island and recommends certain improvements to facilitate fuel transportation to and from the proposed tank farm at the Industrial Area site.

3.1 Existing Conditions

The following intersections and locations along the Nantucket truck route to the Industrial Area site were included in this assessment (Figure 3-1):

- Broad Street at South Water Street
- Washington Street at Francis Street
- Union Street at Francis Street
- Union Street Corner
- Union Street at Orange Street
- Milestone Rotary

These intersections are unsignalized. Roadways within the Town of Nantucket are either under the jurisdiction of the Town of Nantucket or the Massachusetts Department of Transportation (MassDOT). Within the project study area, only Milestone Road and Milestone Rotary are owned and maintained by the state. All other roadways within the project study area are under local jurisdiction or are privately maintained.

The existing conditions assessment consisted of evaluating:

- Roadway geometry;
- Traffic volume; and
- Vehicular crash history.

These elements are evaluated in the following sections.

3.1.1 Roadway Geometry

The major travel routes and intersections within the study area are described below. Figure 3-2 shows the observed existing geometry and traffic control at each study-area intersection.

The Town of Nantucket has a designated truck route through the downtown area to keep large trucks from traveling down the various narrow and historic streets that surround the downtown area and include many difficult turns. The truck route begins at the Steamship Authority ferry landing, where trucks arrive on Broad Street. From Broad Street, trucks are directed to take a left onto South Water Street, which eventually turns in Washington Street within the downtown area. From there, there are no additional signs to direct trucks, but observations indicate that all trucks generally travel the same route. Trucks travel from Washington Street southbound to Francis Street westbound and onto Union Street southbound. Union Street turns to the west, and from there trucks take a left-turn onto Orange Street. After a half mile on Orange Street, trucks arrive at the Milestone Rotary, which allows vehicles the ability to travel to the east, west, or south parts of the island. Currently this route has several areas where truck movements can be difficult given existing turns and limited geometric infrastructure. The areas of specific constraints are limited to five intersections between downtown and the Milestone Rotary. These critical locations are discussed in detail below.

Field observations were made at the intersections along the existing truck route from the egress at the Steamship Authority terminal to the Milestone Rotary. Observations were made on Wednesday, July 31, 2013 from 8:00 AM to 12:00 PM, and included an initial safety evaluation and general traffic patterns. Figure 3-2 shows the observed existing intersection geometry and traffic control.

Broad Street at South Water Street

South Water Street intersects Broad Street from the south to form an unsignalized three-legged intersection. The Broad Street eastbound approach consists of one lane in each direction with no center line dividing the roadway. The Broad Street westbound approach consists of one lane in each direction separated by a double yellow center line. South Water Street is a one-way street traveling away (southbound) from this intersection. Both of the Broad Street approaches have a free movement, with no approach under STOP or YIELD control.

Sidewalks are present on both sides of all approaches, and there are pedestrian crosswalks across the Broad Street westbound and South Water Street approaches. Parking is allowed on both sides of the Broad Street eastbound approach and along the easterly side of South Water Street. Signs located on the Broad Street westbound approach and on South Water Street just south of the intersection indicate that Broad Street to South Water Street is the designated truck route. There are no posted speed limit signs within the vicinity of the intersection.

Generally vehicle traffic moves well through the intersection, with little queuing on the approaches, and the observed queuing was due to vehicles stopped for pedestrian crossings. Many trucks were observed traveling from Broad Street westbound and taking a left-turn onto South Water Street. The intersection is generally wide open, allowing sufficient room for trucks to make this movement. Multiple garbage trucks, dump trucks, and construction vehicles were observed to make this maneuver without difficulty. As the only opposing vehicle traffic to this movement is the Broad Street eastbound approach, there is sufficient sight distance for this movement.

Washington Street at Francis Street

Francis Street intersects Washington Street from the west to form a three-legged, unsignalized intersection. The Washington Street northbound approach consists of a single lane under STOP sign control with a faded stop bar pavement marking. The Washington Street southbound approach consists of a single shared through/ right-turn lane and is a free movement. The Francis Street westbound approach consists of a single travel lane under STOP sign control with a stop bar pavement marking. On-street parking is not allowed in the vicinity of this intersection.

Sidewalks are present along both sides of Francis Street and along the westerly side of Washington north of the intersection; there is no sidewalk along Washington Street south of the intersection. There is a crosswalk mid-block on Francis Street but no crosswalks at the intersection. Many pedestrians were observed crossing the Francis Street approach since the sidewalk on the southerly side of Francis Street dead ends at Washington Street, and this is the only way to the sidewalks on the northerly side of the intersection. There are no posted speed limit signs within the vicinity of this intersection.

The intersection appeared to be busy during the weekday mid-morning hours, with a constant stream of vehicles from the north and the west, and few vehicles entering the intersection from the south. At times the queue on Francis Street reached back to its intersection with Union Street, a distance of over 300 feet, and the Washington Street southbound approach was observed to have a queue as long as 250 feet.

The Francis Street eastbound approach has limited sight distance of the Washington Street southbound vehicles. A vehicle stopped at the stop bar on Francis Street has approximately only 50 feet of sight distance to the north; however, if a vehicle pulls up past the stop bar into the intersection, the sight distance is more than 350 feet. A number of heavy vehicles and trucks were observed taking a southbound right-turn from Washington Street and an eastbound left-turn from Francis Street. Smaller dump trucks and dumpster trucks were observed being able to make the turns without traveling outside of their travel lane. However, larger trucks, such as tractor/ trailers and fuel tanker trucks, required the whole width of the intersection to make turns. These vehicles were required to wait at the intersection for a sufficient gap in traffic. Figure B-1 in Appendix B shows the AutoTurn analysis for a tanker truck's path through this intersection.



Two Small Trucks Traveling Through Intersection



Stop & Shop Truck Requiring the Entire Intersection to Turn

Union Street at Francis Street

Francis Street intersects Union Street to form a three-legged, unsignalized intersection. The Union Street southbound approach is a one-way roadway traveling north away from the intersection. This one-way roadway has a solid yellow edge line on the easterly side of the roadway, which may be confusing to motorists since the yellow edge line should be on the opposite side of the roadway for a one-way street in the northbound direction. The Union Street northbound approach consists of a single shared through/ right-turn lane. The Francis Street westbound approach consists of a single travel lane controlled by a STOP sign and faded stop bar pavement marking.

Sidewalks are present along both sides of Francis Street and along the westerly side of Union Street south of the intersection; there is no sidewalk along Union Street north of the intersection. There are no crosswalk markings at the intersection although there is a mid-block crosswalk on Francis Street and along Union Street approximately 200 feet east of the intersection. There are no posted speed limit signs within the vicinity of this intersection.

Due to the close proximity of the Nantucket Lightship Basket Museum and other residential properties to the roadway, there is limited space in the intersection for large vehicles to make the turns. Sight distance from the Francis Street approach is approximately 340 feet from the STOP bar. This intersection is not sufficient for large vehicles to make left-turns out of Francis Street or right-turns from Union Street northbound when vehicles in the opposing lane are present. While two busses were observed to successfully make the opposing turns at the same time, larger trucks required full use of the intersection to make the turn. A Stop & Shop truck was observed having difficulty making the turn with another vehicle in the opposing lane. Figure B-2 in Appendix B shows the AutoTurn analysis for a tanker truck's path through the intersection.



A Bus & Fuel Delivery Truck Passing Through the Intersection

The Town of Nantucket plans to improve the sight distance and safety at this location. There is a history of vehicles crashing into the Nantucket Lightship Basket Museum's staircase, which is located adjacent to the roadway on the westerly side of Union Street. According to Town meeting minutes from a Capital Program Committee meeting in October 2010, easements from the Lightship Basket Museum have been granted and filed to relocate the museum's stairs from the side facing the intersection to the other side of the building. Additionally, the Town is in the process of purchasing the property at 50 Union Street; removal of the structure here would allow the intersection to open up and provide additional sight distance for the Union Street northbound and Francis Street westbound approaches.

Union Street Corner

Approximately 800 feet south of Francis Street, the roadway changes from a north-south direction to an east-west direction with a sharp horizontal curve in the roadway. The Union Street southbound approach consists of one 10-foot travel lane in each direction, separated by a faded double yellow center line.

A 4-foot wide sidewalk is present on both sides of the roadway. The eastbound Union Street approach consists of one 11-foot travel lane in each direction, separated by a faded double yellow center line. There are no posted speed limit signs within the vicinity of the intersection.

Generally vehicle traffic was observed to move well through this curve; however, the speed of vehicles traveling into the curve appeared to be too high. Many small trucks were observed traversing the curve with little difficulty. It is expected that large trucks would need to use the entire roadway width for this turn. Although there are no intersecting roadways at this location, the roadway widths coupled with limited sight distance creates a difficult and potentially dangerous condition for larger vehicles that need to cross the double yellow center line to complete the turn. Figure B-3 in Appendix B shows the AutoTurn analysis for a tanker truck's path through this curve.



Union Street Corner from the Eastbound Approach



Union Street Corner from the Southbound Approach

Union Street at Orange Street

Union Street intersects Orange Street to form a three-legged, unsignalized intersection. The Orange Street southbound approach is a one-way roadway, controlled by a STOP sign and newly painted stop bar pavement marking. The Orange Street northbound approach consists of a single shared through/ right-turn lane under free movement, with a faded double yellow center line separating the northbound and southbound traffic. The Union Street westbound approach consists of a single travel lane controlled by a STOP sign and faded stop bar pavement marking; there is no double yellow center line on the Union Street approach. A private driveway is located across from the Union Street approach.

Sight distance from the Union Street approach is approximately 130 feet when stopped prior to the STOP bar and 380 feet when stopped just past the STOP bar. Stopping sight distance for the Orange Street northbound approach is approximately 380 feet.

A sidewalk is present along the northerly side of Union Street and a brick sidewalk is present along the westerly side of Orange Street. There is a freshly painted crosswalk across the Orange Street southbound approach, but no other crosswalks are present. There is a 20 mph posted limit on Orange Street south of the intersection.

Multiple vehicles were observed to run the STOP sign on the Orange Street southbound approach; however, it has been brought to our attention that the STOP sign had just been installed the morning of our observations, and many residents may not have been familiar with it yet.

This intersection is not sufficient for the large trucks to make left-turns out of Francis Street or right-turns from Union Street northbound when vehicles in the opposing lanes are present. While small and medium sized trucks were observed to successfully make the opposing turns at the same time, larger trucks required the full area of the intersection to make the turn. A Stop & Shop truck was observed having difficulty making the northbound right-turn with another vehicle in the opposing lane, and the trucks stopped on the approach until there were no vehicles queued on the Union Street approach. Figure B-4 in Appendix B shows the AutoTurn analysis for a tanker truck's path through the intersection.



Truck on the Union Street Westbound Approach



Intersection view from Orange Street Northbound

Milestone Rotary

The Milestone Rotary is formed by Lower Orange Street intersecting from the north, Old South Road from the south, Sparks Avenue from the west, and Milestone Road from east. The Lower Orange Street southbound approach consists of one exclusive left-turn lane and one general purpose lane controlled by a yield sign and yield pavement markings. The Old South Road northbound approach consists of one general purpose lane controlled by a yield sign and yield pavement markings. The eastbound Sparks Avenue consist of one general purpose lane. There is a STOP sign with a plaque indicating vehicles must stop for pedestrians in the crosswalk, but what is not clear is if this STOP sign applies to vehicles when there are not pedestrians present. The Milestone Road westbound approach consists of one wide general purpose lane controlled by a yield sign and yield pavement markings; however, this approach was observed to be utilized as two lanes at times. Speed limits vary among the approaches with a 25 mph posted limit on Old South Road and Sparks Avenue, a 30 mph posted limit on Lower Orange Street, and a 35 mph posted limit on Milestone Road.

A sidewalk is present along the westerly side of Lower Orange Street, north of the rotary. The Sconset Bike Path runs along the southerly side of Milestone Road, to the east of the rotary, and the Old South Road Bike Path runs along the easterly side of Old South Road. There are crosswalks across the Old South Road northbound and the Sparks Avenue westbound approaches, connecting the two bike paths to the sidewalk on Lower Orange Street.

It is our understanding that a study and concept level design was completed in 2006 for the redesign of this rotary into a roundabout. The design proposes a roundabout with two approach lanes in each direction and pedestrian accommodations on each approach with connecting sidewalks on all sides.

The intersection as it currently exists appears to be sufficient for the largest vehicles to maneuver around each of the turns. Figure B-5 in Appendix B shows the AutoTurn analysis for a tanker truck's path through the intersection.

3.1.2 Traffic Volume

The traffic volume evaluation is based on data obtained by direct observation as well as other factors such as the seasonality of the data and availability of public transportation, as described in this section.

Traffic Volume Data

Manual turning movement counts [collecting *peak hour* data] were conducted at each of the study-area intersections during the weekday midday from 11:00 AM to 2:00 PM, and weekday evening from 4:00 PM to 6:00 PM. These counts were conducted in August 2013, just prior to the Labor Day holiday weekend that represents peak summer traffic conditions. The peak periods are different from the typical commuter peak periods, as fuel delivery occurs more often during the middle of the weekday and during the weekday evening hours. These periods represent the most critical traffic volume conditions.

The weekday midday peak period occurred 11:30 AM to 12:30 PM for the Milestone Rotary and 12:45 to 1:45 PM for the remainder of the intersections. The weekday evening peak period occurred 4:00 PM to 5:00 PM for all study area locations.

Concurrent with the turning movement counts, 72-hour automatic traffic recorder (ATR) counts were conducted. A summary of the ATR traffic and speed data for Water Street are presented in Tables 3-1 and 3-2, respectively. Table 3-3 shows the number of heavy vehicles present on Water Street, and the percentage of heavy vehicles compared to the total volume of vehicles on the roadway.

Table 3-1 Existing Traffic Volumes

Date and Day	Weekday ADT ^a	Midday Peak Period			Evening Peak Period		
		Volume ^b	K ^c	Dir. Dist ^d	Volume ^b	K ^c	Dir. Dist ^d
Thursday, August 29 th	9,300	650	7%	58% SB	700	8%	61% SB
Friday, August 30 th	10,215	675	7%	60% SB	745	7%	58% SB
Saturday, August 31 st	9,770	685	7%	59% SB	640	6%	57% SB

- a daily traffic expressed in vehicles per day
- b peak period volumes expressed in vehicles per hour
- c percent of daily traffic that occurs during the peak period
- d directional distribution of peak period traffic

Table 3-2 Vehicular Speeds on Washington Street

Condition	Northbound		Southbound	
	Average Speed	85 th Percentile Speed	Average Speed	85 th Percentile Speed
Weekday	19 mph	24 mph	19 mph	25 mph
Saturday	19 mph	24 mph	19 mph	23 mph

Table 3-3 Existing Truck Percentages

Date & Day	Total Weekday		Midday Peak Hour		Evening Peak Hour	
	No. of HV ^a	% HV ^b	No. of HV ^c	% HV ^d	No. of HV ^c	% HV ^d
Thursday, August 29 th	1,066	11%	80	12%	66	9%
Friday, August 30 th	1,090	10%	94	14%	62	8%
Saturday, August 31 st	922	9%	80	11%	59	9%

- a number of heavy vehicles per day
- b percentage of heavy vehicles out of total daily vehicle volume
- c number of heavy vehicles per peak hour
- d percentage of heavy vehicles out of total peak hour vehicle volume

As shown in Table 3-1, the traffic volume on Water Street at the time the counts were conducted was between approximately 9,300 and 9,770 vehicle trips per day (vpd) on a weekday and 10,215 vpd on a Saturday. On weekdays, approximately 7 percent of the daily traffic occurred during the weekday midday peak hour and 8 percent occurred during the weekday evening peak hour. On Saturday, approximately 7 percent of the daily traffic occurred during the midday peak hour and 6 percent of the daily traffic

occurred during the evening peak hour. The peak hour traffic volumes ranged from 610 to 745 vehicles per hour (vph). Table 3-2 indicates that the average speed on Water Street is 19 mph and the 95th percentile speed ranges from 23 to 25 mph.

Seasonality of Data

The traffic count data as compared to historic seasonal data available from MassDOT indicates that the August traffic counts for Nantucket are approximately 24 percent higher than annual average-month conditions. Therefore, to provide a conservative analysis, the collected data was not adjusted. Figures 3-3 and 3-4 reflect the 2013 existing weekday midday and weekday evening peak hour traffic volumes, respectively. The seasonal adjustment factors from MassDOT are provided in Appendix B.

Public Transportation

Nantucket runs its own bus-based public transportation network, called The Wave, throughout the island during the peak summer season. Seven out of the nine Wave bus routes travel along the truck route from the downtown area towards the south and east parts of the island. Five of the routes actually travel the entire truck route through all of the study area location, all the way to the Milestone Rotary, while two of the routes turn on/ off the truck route at the intersection of Union Street at Francis Street.

Three of the study area intersections (Washington Street at Francis Street, Francis Street at Union Street and Union Street at Orange Street) have scheduled bus stops at the intersections for six of bus routes. While there are no stops at the Milestone Rotary, there is a stop on Milestone Road just to the east of the rotary that serves two of the bus routes.

3.1.3 Vehicular Crash History

To identify potential vehicle crash trends in the study area, crash data were obtained for the study area intersections from MassDOT for the most recent 3-year period (2009 through 2011). A summary of the crash data is presented in Table 3-4.

According to MassDOT District 5 (the Nantucket district), the average crash rate for unsignalized intersections is 0.58. This implies that on an average, there were 0.58 motor vehicle crashes at unsignalized intersections for every million vehicles that pass through intersections in the District.

In addition to the study area intersections, general corridor crashes were collected to understand any safety deficiencies along the truck route. Crash records were obtained for the following corridors:

- Washington Street, from Broad Street to Francis Street;
- Union Street, from Francis Street to Orange Street;
- Orange Street/ Lower Orange Street, from Union Street to the Milestone Rotary;
- Milestone Road, from the Milestone Rotary to the Site; and
- Easy Street/ Candle Street, from Washington Street to Broad Street.

Rear-end and angle collisions constituted 61 percent of the crash types in the 3-year period studied, possibly suggesting excessive speeds, a large number of turning vehicles, and a lack of adequate gaps between vehicles as potential reasons for the occurrence of the crashes¹. Additionally, there were six pedestrian or cyclist crashes over the 3-year period. These crashes are likely due to the volume of pedestrians and cyclists present in Nantucket, especially during the tourist season.



¹ adapted from Highway Safety Engineering Studies Procedural Guide, US Department of Transportation, Washington DC (June 1981)

Table 3-4 Vehicle Crash Summary (2009 - 2011)

	Washington Street at Francis Street	Union Street at Francis Street	Orange Street at Union Street	Milestone Rotary	Washington Street Corridor	Union Street Corridor	Orange Street/Lower Orange Street Corridor	Milestone Road Corridor	Easy Street Corridor	Total
MesDOT Average Crash Rate	0.58	0.58	0.58	0.58	**	**	**	**	**	
MesDOT Calculated Crash Rate Exceeds?	No	No	No	No	**	**	**	**	**	
Year										
2009	1	1	1	2	3	0	1	3	2	14
2010	1	0	1	1	4	0	1	2	2	12
2011	0	3	0	1	4	1	3	5	1	18
Total	2	4	2	4	11	1	5	10	5	44
Collision Type										
Angle	0	1	0	1	2	0	0	3	2	9
Head-on	0	0	0	0	1	0	1	0	0	2
Rear-end	0	0	1	3	4	0	3	6	2	19
Rear-to-Rear	0	0	0	0	0	0	0	0	0	0
Sideswipe	1	0	1	0	1	0	0	0	1	4
Single vehicle crash	0	1	0	0	0	1	0	0	0	2
Unknown	1	2	0	0	3	0	1	1	0	5
Total	2	4	2	4	11	1	5	10	5	44
Crash Severity										
Personal Injury	1	0	0	0	1	0	1	3	0	6
Property Damage	1	1	1	3	7	1	4	5	3	26
Fatality	0	0	0	0	0	0	0	0	0	0
Unknown	0	3	1	1	3	0	0	2	2	12
Total	2	4	2	4	11	1	5	10	5	44
Time of Day										
Weekday, 7:00 AM - 9:00 AM	0	0	0	0	3	0	0	0	0	3
Weekday, 9:00 AM - 12:00 PM	1	0	0	0	1	0	1	2	0	5
Weekday, 12:00 PM - 4:00 PM	0	0	0	0	1	0	0	1	0	2
Weekday, 4:00 PM - 6:00 PM	1	4	1	4	2	1	3	7	5	28
Weekday, 6:00 PM - 9:00 PM	0	0	1	0	4	0	1	0	0	5
Weekend, other time	2	4	2	4	11	1	5	10	5	44
Total	2	4	2	4	11	1	5	10	5	44
Pavement Conditions										
Dry	2	4	2	4	9	1	5	9	5	41
Wet	0	0	0	0	1	0	0	1	0	2
Snow	0	0	0	0	0	0	0	0	0	0
Ice/Slush	0	0	0	0	0	0	0	0	0	0
Other	0	0	0	0	0	0	0	0	0	0
Unknown	0	0	0	0	1	0	0	0	0	1
Total	2	4	2	4	11	1	5	10	5	44
Non Motorist (Bike, Pedestrian)										
Total	1	1	0	0	1	0	0	2	0	5

** Volume data not available for this location.
** N/A Applicable to this location.

3.2 Recommended Intersection Improvements

Based on the projections of future fuel transportation needs described in Section 2.2 and the existing traffic conditions described above, this section describes the recommended intersection improvements that the Town of Nantucket could implement along the Nantucket truck route to the proposed tank farm at the Industrial Area site.

Actual fuel delivery truck activities in the downtown area would be reduced as loading/ delivery activities would start and finish at the proposed Industrial Area location and not at the existing Harbor Fuel tank farm. This is a substantial benefit of this project regardless of any intersection improvements.

3.2.1 Washington Street at Francis Street

As previously described, this intersection has minimal sight distance for both Washington Street southbound and Francis Street eastbound motorists. Additionally, large trucks, including fuel delivery vehicles, require the entire width of the intersection to turn. The ideal treatment for this location is to improve the sight lines; however, that would require impacts to private property adjacent to the intersection. All pavement markings should be repainted at the intersection, as they are faded.

A more involved approach would be to install a truck-based signal at the intersection. Essentially the intersection would be in flasher mode and operate the same as today the majority of the time. When a large truck is present, the signal would cease flashing and become red signals for the other approaches in order to allow the truck to move through the intersection. This would require installing a control device in every fuel delivery truck in order for the drivers to activate the signal when approaching or placing heavy vehicle detectors in the approach lanes to the intersection. On both the Washington Street southbound and Francis Street eastbound approaches, the STOP bar for the signal would be positioned further back from the intersection to allow adequate room for a truck to turn without hitting any stopped vehicles.

3.2.2 Union Street at Francis Street

The intersection of Union Street at Francis Street has extremely limited sight distance under the current conditions. Trucks require the entire intersection to make turns, and the restricted sight distance creates an unsafe condition for trucks and cars alike. The Town of Nantucket has already begun the process to move the Nantucket Lightship Basket Museum's staircase away from the intersection to another side of the building. Additionally, the Town is in the process of purchasing the property at

50 Union Street, on the eastern side of the intersection. Removing the structure on this property would allow for improved sight distance at the intersection.

In addition, the faded pavement markings at the intersection should be repainted. Once the intersection has improved sight distance, secondary STOP bars and signage should be installed on the Francis Street westbound and Union Street northbound approaches instructing vehicles to stop farther back when trucks are present in the intersection. This would allow trucks to have full use of the intersection when turning.

3.2.3 Union Street Corner

This corner on Union Street has limited sight distance in both directions and narrow lanes, creating a potentially unsafe condition when large trucks are present. Recommended improvements at this location include traffic calming measures to slow vehicles down as they approach the curve, such as restriping the centerline through the curve and installing signage to warn motorists of the upcoming curve. Another more involved approach would be to install a flashing beacon on both sides of the curve that is activated by oncoming traffic.

3.2.4 Orange Street at Union Street

While this intersection is tight enough that trucks require the entire width of the intersection to turn, there is currently good sight distance on both the Union Street westbound and Orange Street northbound approaches. The existing sight lines should be maintained in all future conditions.

The pavement marking should be repainted as they are currently faded. Secondary STOP bars and signage should be installed on the Francis Street westbound and Union Street northbound approaches instructing vehicles to stop farther back when trucks are present in the intersection. This would allow trucks to have full use of the intersection when turning.

3.2.5 Milestone Road at New South Road/Site Access

At the December 17 public meeting, a member of the public made comment regarding potential impacts of truck access to and from New South Road along Milestone Road. The potential bunker site fuel storage facility would be accessed from New South Road and therefore all truck associated with the facility will travel through the New South Road and Milestone Road intersection. This intersection is a standard T-type 90 degree intersection with the New South Road approach is under STOP control. General truck movement through this intersection is generally good given the current geometric layout of intersection (see Appendix B for truck turning diagram) although widening the throat of the New South Road approach at Milestone Road would be helpful for the larger truck movements. On the south side and parallel to Milestone Road is the Sconset Bike Path which is a very active

pedestrian and bicycle facility. Based on field investigation of this location the Milestone Road eastbound and westbound approaches are straight with fairly level topography and available sight lines are very good for vehicles exiting New South Road. It will be important as part of this project to provide signage and striping improvements at this intersection to identify it as a truck route and to increase the general awareness of truck activity to all motorists and pedestrian/ bicyclist who travel through this area.

Access to the Industrial Area site from New South Road will be via the existing industrial access roadway. The site will provide two points of access, and ingress and egress driveway that will require one-way circulation through the site in a clockwise direction. For the purpose of demonstrating the truck turning movements into and out of the site, refer to figures in Appendix B.

3.26 Summary

Figure 3-5 provides a summary of recommended improvements that can be considered by the Town to improve existing truck movement on island. The improvements outlined assume that substantial geometric improvements that would require property takings would not be possible at any of the intersections. The recommended improvements for these locations are depicted in detail in Appendix B.

This page intentionally left blank.

4

Environmental Resources

This Chapter describes the environmental resources at the proposed tank farm site and along the transportation route.

4.1 Tank Farm Site

The 9-acre Industrial Area site is identified as Lot G within the Nantucket Industrial Park and Recreation Facility created by the Town of Nantucket (Figure 4-1). Lot G is bordered by New South Road (also referred to as Bunker Road) to the north, Proprietor's Road to the west, and right-of-ways created for Industry Road and Shadbush Road to the east and south, respectively. The lot includes an open space easement of approximately 33,450 square feet.

The Industrial Area site is located north and east of Nantucket Memorial Airport and has several favorable physical and environmental characteristics. Elevations at the site range from approximately 52 to 44 feet (NGVD datum) along the western and southern boundaries of the site, respectively. The site generally slopes to south and east at grades of 3 percent or less. Lot G is located approximately 1,500 feet southeast from the boundary of the Zone II established for protection of Nantucket's public water supply wells (Figure 4-2).

Soils mapped at the site consist of the Evesboro series, which is an excessively drained sand that forms on glacio-fluvial outwash plains². The regional groundwater table beneath the site lies at an elevation of approximately 10 feet³. The site is not subject to flooding during a 100-year or 500-year frequency storm event⁴ (Figure 4-3).



2 USDA Soil Conservation Service, 1979. *Soil Survey of Nantucket County, Massachusetts*.

3 USGS, 1980. *Water Resources of Nantucket Island, Massachusetts*. Hydrologic Investigations Atlas HA-615.

4 Federal Emergency Management Agency, 1992. *Flood Insurance Rate Map, Town of Nantucket, Massachusetts, Nantucket County*. Community Panel Numbers 250230 0009 D and 0010 D.

No freshwater wetlands, water bodies or streams occur on the site (Figure 4-3). The property lies within a Priority Site of Rare Species (Figure 4-4) but is not located in an Estimated Habitat of Rare Wildlife and does not contain any Certified Vernal Pools.

Two ecological plant communities, as characterized under Classification of the Natural Communities of Massachusetts, occupy the site⁵. Vegetation on the northern portion of Lot G primarily consists of scrub oak (*Quercus ilicifolia*) shrublands. Dominant vegetation throughout this community consists of scrub oak, huckleberry (*Gaylussacia baccata*), lowbush blueberry (*Vaccinium angustifolium*), sweetfern (*Comptonia peregrina*), and little bluestem (*Schizachyrium scoparium*) with scattered occurrences of pitch pine (*Pinus rigida*). Vegetation on the southern portion consists of a pitch pine-oak forest/ woodland community. This community typically occurs in dry, low nutrient, acidic soils of moraines, rocky slopes and less disturbed sandplains that are removed from regular oceanic influences. Dominant vegetation throughout this community consists of pitch pine, scrub oak, lowbush blueberry, pin oak (*Q. palustris*), black oak (*Q. velutina*), chestnut oak (*Q. prinus*), white oak (*Q. alba*), little bluestem grass, and poison ivy (*Toxicodendron radicans*).

4.2 Transportation Route

The route to the proposed tank farm site from Steamship Wharf is approximately 4.1 miles long (Figure 3-1). From the wharf, the route extends southwestward along Broad Street into Nantucket Village, southeastward along South Water/ Washington Streets, southwest onto Francis Street, and then south along Union Street until it merges with Orange Street. From the intersection of Union/ Orange Streets, the route continues southeast to the Milestone Rotary and then due east along Milestone Road. The route then travels to south to the Industrial Park on New South (Bunker) Road.

According to topographic GIS data provided by the Town of Nantucket, elevations along the transportation route range from approximately 8 feet at the wharf to a high point of 68 feet on Milestone Road just west of its intersection with New South Road (Figure 4-5). Approximately 2.6 miles of the transportation route crosses through the Zone II of Nantucket's public water supply wells (Figure 4-2). The area of greatest vulnerability is the section of Milestone Road between the Milestone Rotary and Tawpoot Road, where the transportation route is along the Wannacommet Water Company water supply wells south of Milestone Road. The Town could choose to install guard rails or a berm along that section of roadway to provide greater protection to the well field.

▼
5 NHESP, 2001. *Classification of the Natural Communities of Massachusetts*, Version 1.3.

The northern portion of the transportation route is located primarily within Zone AE of the 100-year floodplain⁶ and is located within Zone ZE of the 100-year floodplain at three locations (at the Steamship Wharf, Easy Street, and Washington Street) (Figure 4-2). North of the intersection of Bear Street with Orange Street, the route remains within the 500-year floodplain when it is not within the 100-year floodplain. The route is not within an area subject to flooding during a 100-year or 500-year frequency storm event from the intersection of Bear Street with Orange Street south to the proposed tank farm site.

A scrub-shrub swamp is located along the southeast side of Union Street and an emergent marsh occurs along the north side of Orange Street (west of where it intersects with Goose Pond Lane) (Figure 4-3). No other freshwater wetlands occur within 100 feet of the route. The scrub-shrub swamp and emergent marsh are regulated as Bordering Vegetated Wetlands (BVWs) under the Massachusetts Wetlands Protection Act (WPA; MGL Chapter 131, Section 40) and the Town of Nantucket Bylaw for Wetlands (“local bylaw;” Chapter 136).

Coastal wetland resources (Land Under the Ocean and Coastal Bank) occur along Steamship Wharf. In addition, portions of the transportation route that extend through the 100-year floodplain are regulated as Land Subject to Coastal Storm Flowage (LSCSF) under the WPA and local bylaw. The WPA and local bylaw establish a 100-foot buffer zone from the boundaries of BVWs and Coastal Bank. The local bylaw establishes a 100-foot buffer zone from the limits of LSCSF. The approximate limit of freshwater and coastal wetland resources along the transportation route are shown on Figure 4-3.

Approximately 2.2 miles of the transportation route (from the junction of Milestone Road and the Milestone Connector to the proposed tank farm site) crosses through a Priority Habitat of Rare Species (Figure 4-4). The route is not located in an Estimated Habitat of Rare Wildlife and no Certified Vernal Pools are located along or in the vicinity of the route.

▼
⁶ Federal Emergency Management Agency, 1992. *Flood Insurance Rate Map, Town of Nantucket, Massachusetts, Nantucket County*. Community Panel Numbers 250230 0009 D, 0011 D and 0012 D.

This page intentionally left blank.

5

Permitting Assessment

Constructing and operating the new bulk fuel storage facility and implementing some of the improvements along the transportation route will require review and approval from several federal, state and municipal regulatory agencies. Permits needed for the project are listed in Table 5-1 and described in this Chapter. As discussed below, the Town has already secured some of the authorizations that will be required to construct and operate the tank farm.

Table 5-1 Project Permitting Requirements

Law or Regulation	Permit	Issuing Agency
Federal:		
NPDES	Construction General Permit	EPA
NPDES	Multi-Sector Industrial General Permit	EPA
State:		
Fire Prevention Regulations	Aboveground Storage Tank Permit	Department of Fire Services
Municipal:		
Major Commercial Development	Special Permit	Planning Board
Zoning Regulations	Certification	Historic District Commission
Flammable Materials Act	Fuel Storage License	Board of Selectmen
Massachusetts Building Code	Building Permit	Building Inspector
Massachusetts Fire Code	Storage Permit	Fire Department
Wetlands Protection Act ¹	Order of Conditions/Negative Determination of Applicability	Conservation Commission

¹ Potentially required for transportation route improvements only.

5.1 Previously Obtained Approvals

The development of bulk fuel storage facilities usually entails activities that require review under the Massachusetts Environmental Policy Act (MEPA) which is administered by the Massachusetts Executive Office of Energy and Environmental Affairs (EOEEA). In 2010, an Environmental Notification Form (ENF) was filed for Nantucket Industrial Park and Recreation Facility on behalf of the Nantucket Land bank and the Town of Nantucket. The ENF (EOEEA Number 14588) filed for the project included the development of a bulk fuel storage/ distribution on Lot G of the Industrial Park. On June 4, 2010, the Secretary of the EOEEA issued a Certificate on the ENF indicating the project required no further MEPA review.

As discussed in Chapter 4, the tank farm site is located within a Priority Site of Rare Species as established by the Natural Heritage and Endangered Species Program (NHESP) of the Massachusetts Division of Fisheries and Wildlife. Projects proposed within Priority Sites require review and authorization from NHESP pursuant to the requirements of the Massachusetts Endangered Species Act (MESA) and its implementing regulations (321 CMR 10.00). Projects determined to result in a taking of rare species must obtain a Conservation and Management Permit (CMP) from NHESP. NHESP issued a CMP for the Industrial Park and Recreation Facility project (which includes a tank farm on Lot G) on November 8, 2010. This permit is valid for 5 years and may be extended by NHESP upon receipt of a written request from the permit holder.

5.2 Federal Requirements

The proposed project will require authorization from the U.S. Environmental Protection Agency (EPA) under the National Pollutant Discharge Elimination System (NPDES) program that is part of the federal Clean Water Act (CWA). As discussed below, the tank farm will require a Construction General Permit and a Multi-Sector Industrial General Permit. Massachusetts is one of the few states that has not assumed administrative authority over the NPDES program.

Both of the NPDES Notices of Intent (NOIs) for the project, as described below, must include certification that the project will not impact federally listed rare species or property listed or eligible for listing in the National Register of Historic Places. None of the state-listed species associated with the Priority Site established by the NHESP are protected under the federal Endangered Species Act. The absence of federally protected species on records maintained by NHESP can be used to satisfy the certification requirements for NPDES General Permit coverage. As part of the MEPA review process, the Massachusetts Historical Commission determined that the Industrial Park and Recreation Facility project (which includes the proposed tank farm) would not have an adverse impact on any archeological, historic or cultural

resources. This determination satisfies the certification requirement for coverage under the NPDES General Permits.

5.2.1 NPDES Construction General Permit

The NPDES Phase I (40 CFR Parts 122, 123, and 124) and Phase II (40 CFR Parts 9, 122, 234, and 124) regulate construction activities that disturb more than 1 acre of soil. Constructing the tank farm will result in more than 1 acre of soil disturbance and will therefore require a Construction General Permit (CGP) from EPA. Coverage under the CGP is achieved by filing a Notice of Intent (NOI) with EPA. The CGP requires that a site specific Stormwater Pollution Prevention Plan (SWPPP) be prepared prior to the start of work and implemented throughout the construction period. The SWPPP is not provided to or reviewed by EPA. A copy of the SWPPP must be kept on the site at all times. After construction is complete, a Notice of Termination (NOT) must be filed with EPA to close out the permit.

5.2.2 NPDES Multi-Sector Industrial General Permit

Operating the proposed tank farm would constitute an industrial activity that requires approval under NPDES Multi Sector General Permit (MSGP) program from EPA. Coverage under the MSGP is obtained by filing an NOI (using a different form than the CGP NOI) with EPA. As with the CGP, this permit requires an SWPPP. This SWPPP should address the operation of the facility and include provisions for source reduction, spill prevention and spill control. The current MSGP expired at the end of September 2013. A new MSGP is in the process of being reissued; however during the interim any newly discharging facility must meet certain criteria in order to eliminate the possibility of administrative or civil judicial enforcement actions by the EPA, until a new MSGP is issued.

5.3 State Requirements

The proposed tank farm will require approval under the Massachusetts Fire Prevention Regulations cited at 502 CMR 5.00 because it will have a combined capacity of more than 10,000 gallons. These regulations were developed to provide uniform requirements and procedures for the construction, maintenance and use of aboveground storage tanks or containers. They are administered by the State Fire Marshall.

An application must be submitted for each tank and must contain the required form and the following materials:

- Plot plan showing offsets to water bodies or waterways, utilities and private/ public ways;
- Foundation plan showing the location of supporting geotechnical borings;

- Dike (containment) plan illustrating slope, height and capacity; and
- Mechanical plans for all tanks, piping and other components.

All plans must be stamped by a Professional Engineer and/ or Registered Land Surveyor.

The application is reviewed by the State Fire Marshall's staff for compliance with state codes and standard engineering practices. Construction must be started within 6 months of receiving approval and the permit is valid for one year. If the project cannot be completed within that time frame, the applicant must apply for an extension.

5.4 Local Requirements

Nantucket municipal boards and departments must also review the proposed project and issue the permits and approvals described below.

5.4.1 Major Commercial Development Regulations (NPB Special Permit)

As the proposed tank farm entails the construction of more than 5,000 square feet of commercial storage space, it constitutes a Major Commercial Development (MCD) and therefore requires a Special Permit from the Nantucket Planning Board. The application process is outlined in Section 139 of the Nantucket Code and begins with a pre-application conference and site walk. In addition to the required forms, the application package must include:

- Site Inventory and Resource Analysis that depicts/ describes features such as topography, wetlands and floodplains on and adjacent to the property;
- Site Development Plans depicting various aspects of the proposed development including grading, structures, roadways, parking lots, utilities, landscaping and open space; and
- Detailed drawings (including cross sections) of utilities, roads and parking lots.

In addition to the planning board, the MCD application is reviewed by the Nantucket Planning & Economic Development Commission (NPEDC) for compliance with the applicable regulations (including zoning) and conformance with the Nantucket Comprehensive Community Plan. Some of the more stringent standards that must be complied with include:

- Maintaining at least 30 percent of the lot as open space;
- Screening the development from abutting land uses; and
- Minimizing traffic congestion.

Recommendations made by the NPEDC are non-binding. The Board may also retain an engineering firm or other specialists (at the applicant's expense) to review and comment on the application.

5.4.2 Historic District Commission Certification

Projects which require Planning Board approval or a Building Permit must also receive authorization, via the issuance of a Certificate of Appropriateness or a Certificate of Nonapplicability, from the Nantucket Historic District Commission (HDC). This is accomplished by filing the required form, plans and maps with the HDC and attending hearings with the Design Advisory Council. Abutters to the project must be notified via certified mail.

5.4.3 Flammable Materials Act

This state law (MGL Chapter 148, Section 13) is administered by the Nantucket Selectmen. It requires the property owner to apply for a license to store flammable or combustible fuels. The Board of Selectmen shall hear the application at a public hearing then vote on the application. If the application is approved by the Board of Selectmen and the Nantucket Fire Chief, a license will be issued for fuel storage on the specified land to the property owner.

5.4.4 Building and Fire Codes

Constructing the tank farm will require a Building and Fuel Storage Permit from municipal officials. Applications for these permits are reviewed by the Building Inspector and Fire Chief. These individuals must determine that the proposed work comply with state codes.

5.4.5 Wetlands Protection Act/Nantucket Wetlands Bylaw

As discussed in Chapter 4, the site of the proposed bulk fuel storage facility does not contain or abut any local, state, or federally regulated wetland resources and therefore will not require any wetlands permits. Portions of the transportation route cross through LSCF and/ or are located within the Buffer Zone (land within 100 feet) of this and other wetland resources (BVWs and Coastal Bank) that are protected under the WPA and the local bylaw. Work proposed in LSCF or Buffer Zone must be reviewed and authorized by the Nantucket Conservation Commission.

Improvements planned along the transportation route will likely be limited to installing striping/ signage to promote more efficient traffic flow. As these activities will only entail limited earth disturbance/ clearing of vegetation and will not result in creating additional impervious surfaces, they can likely be addressed through the filing of a Request for a Determination of Applicability (RDA) with the Commission.

The RDA must include the required forms, plans depicting the proposed work and supporting information to demonstrate that the proposed activities will not adversely affect wetland resources. The RDA is filed with the Commission and the regional office of the DEP. After holding a public hearing on the filing, the Commission will issue a Determination of Application approving the work or could require filing an NOI.

A NOI filing (if required) generally includes the same materials that are provided with a RDA but provides additional details on measures to prevent adverse impacts to wetland resources. The applicant must notify abutters to the proposed work of the filing. After holding one or more public hearings, the Commission will issue an Order of Conditions for the project (which may contain stipulations that must be adhered to during construction and/ or after completion of the work).

Once a Determination or Order is issued, it is not valid until the appeal period (10 business days) has elapsed. If the permit is appealed (which can be done by the applicant or owner, any person aggrieved, an abutter, any 10 residents of the town or the DEP), the DEP must review the submission and issue a Superseding Determination of Applicability or Superseding Order of Conditions. Any person or party that previously participated in the process (submitted written information) can appeal the DEP's decision by requesting an adjudicatory hearing. Appeals or adjudication can significantly extend the WPA permitting process.

6

Financial Considerations

6.1 Introduction

This Chapter discusses the economic aspects of the proposed relocation of the tank farm to the Industrial Area. The Town is proposing what is essentially a public-private partnership: contributions by both the Town and a private party to achieve a public purpose. The Town has determined, through the Town Meeting votes to rezone and acquire the property, that relocation of the tank farm is a public purpose. The structure of the public-private partnership has yet to be determined. This Chapter provides an overview of the issues associated with structuring a possible transaction and financing the design, construction, and operation of a new bulk storage facility at the Industrial Area site and any related transportation improvements.

6.2 Inducement

The Town would like to induce a private party to do something that it wants: relocation of the tank farm to a specific site. The Town has some regulatory levers that it can use, but they are limited. There is a Town permit required to operate the existing facility, but there has to be reasonable grounds upon which to deny renewal of the permit. Apparently the Town attempted an unreasonable denial of the permit some years ago, and the existing operator prevailed in the subsequent litigation. This time the Town is attempting to use more of a carrot than a stick, by creating an opportunity for a new facility in the location of its choosing. The inducement has included acquiring real estate, establishing appropriate zoning, and pre-permitting the facility with MEPA and the natural resource agencies to streamline the permitting process. The inducement will also likely include favorable economic terms for the acquisition of the property, either by sale or lease.

6.3 Possible Terms

Any financial arrangement must make economic sense for both parties. Both the Town and the private party must have their interests protected. Having identified a location for the relocated tank farm, the Town seeks an ongoing interest assuring that the land use be maintained for fuel storage and distribution. There are three possible approaches: build and lease to an operator, land lease, or land sale.

6.3.1 Build and Lease

The Town could design and build the tank farm, and lease it to an operator, similar to the existing arrangement on the waterfront. This gives the Town maximum control over the facility, now and into the future. Because the Town is making the financial investment in the equipment, the operator does not need a return on capital. The term of the operating agreement can shorter than would be needed to amortize equipment cost, and the Town can set the operating conditions. The Town may also be able to borrow money at more favorable rates than a private party, reducing the overall cost of the project. This approach would require a much higher level of engagement by the Town in the “business” of owning and operating a bulk fuel storage and distribution facility, which may be undesirable as it is outside the typical activities of a municipality. If this approach were taken, it would be advisable to engage a potential operator prior to the final design of the facility, so the selected operator could be involved in its design and construction.

6.3.2 Land Lease

In this scenario, the Town retains ownership of the land, and therefore greater control over its use, and the private party would finance the design, construction, and operation of the tank farm. The length of the lease would need to be sufficiently long to enable payback of the private party’s capital investment. The terms of the lease could specify details that the Town may want, such as specific use of the property, hours of operation, etc.

One potential risk for the Town would be potential liability if there is tank leak or spill in the future. Under the Massachusetts General Laws (M.G.L.) Chapter 21E, the land owner is ultimately liable for cleanup costs. This could be addressed through the terms of a lease, and bonding by the private party, but it adds a complication to this approach.

Through a land lease the Town could retain right of entry for the Town for ingress/ egress on an as needed basis. Under M.G.L, Chapter 186, Section 15B, a Lessor has the right of entry for inspections, repairs, under a court order, etc. This right would allow the Town to enter the property with a given notice of entry, and would allow the Town to inspect or maintain the property as needed. Further, if any historical artifacts or mineral rights are found on the property, the Town would have the ability to enter to inspect for such. This approach has greater benefits to the Town, and fewer benefits to the private party.

6.3.3 Land Sale

Selling the land has advantages and disadvantages. For the Town, there would be the absence of potential ongoing liability if there is tank leak or spill in the future. As noted above, under M.G.L. Chapter 21E, the land owner is liable for cleanup costs. For the private party, having fee interest in the real estate would likely make the project easier to finance. Lenders like security interest in their loans, and the underlying real estate would make for improved collateral. Outright purchase could be a cleaner transaction for both buyer and seller.

However, as discussed above, the Town would presumably want to retain some ongoing interest in the property, to be assured that the property would stay in its intended use as a fuel storage and distribution facility. This might be accomplished in a couple of ways. Prior to sale, the Town could establish a deed restriction that would limit the use of the property to fuel storage and distribution, but state law (M.G.L. Chapter 184, Section 27) generally limits the term of such a restriction to 30 years. This may not give the Town the ongoing interest in the use of the property that it seeks. There is some recent case law (*Killorin v. Zoning Board of Appeals of Andover*, 80 Mass. App. Ct. 655, 656 (2011)) which Town Counsel should review. Given the public purpose of this land sale, a deed restriction by the Town longer than 30 years may be possible. Alternatively, the Town could establish a separate agreement with the purchaser, giving the Town the right of first refusal to buy the property back if the buyer wanted to sell at some point in the future. Land sale gives the Town less control over the design, construction, and operation of the facility, but provides benefits to the private operator of greater control and likely easier project financing.

6.4 Return on Investment

Both parties to this financial transaction would be making financial contributions, and would need to see a reasonable return on their investments. The Town must prudently manage its financial resources, which includes the value of the land that it is contributing in some fashion. If the Town chooses to undertake the design and construction of the facility, it would be taking on a significant debt load to finance it. The private party, in any scenario, will also be making financial contributions to a greater or lesser degree. Presumably the private party will be a for-profit company, and they will want to see a return on their investment.

6.5 Process

Once a decision has been made on the terms of the transaction (build and lease to an operator, land lease, or land sale) the Town will likely seek bids from interested parties. This can be done through a request for proposal (RFP) process. Expected payments to the Town would vary depending on how the transaction was structured. If the Town builds

the facility, an operator would be expected to make annual payments sufficient to cover the Town's debt service and equipment replacement cost. If a ground lease, the payments to the Town would be much lower, as the operator would be responsible for all the capital and operating costs of the facility. Similarly, in a land sale, particularly one with deed restrictions and a possible right of first refusal, the payment to the Town could be expected to be quite low, as the private party would be making all the capital investment in designing and building the facility and only one use of the property would be allowed.

6.6 Estimates of Probable Cost

There are two cost components to the relocation of the bulk fuel facility from the waterfront to the Industrial Area: permitting, design, and construction of the facility itself (as described in Chapter 2), and improvements to certain intersections to improve traffic flow through them (as described in Chapter 3).

6.6.1 Facility Cost

The memorandum provided in Appendix A includes an Engineer's Estimate of Probable Cost, based on the conceptual design for the proposed Industrial Area Tank Farm described in Chapter 2. The estimated capital cost for constructing the facility is approximately \$6.7 million, as summarized in Table 6-1 and provided in detail in the memorandum.

Table 6-1 Summary of Probable Cost Estimate

Component	Estimated Cost
Fuel Tanks	\$3,964,831
Fuel System	\$980,600
Tank Containment Area	\$221,500
Truck Load/Offload Area	\$69,308
Truck Parking Area	\$24,800
Pavement	\$203,810
Fencing	\$51,423
Waterline	\$36,533
Electrical	\$18,000
20% Permitting, engineering, and construction management	\$1,100,000
Total	\$6,670,805

Source: Design Approach and Criteria, Nantucket Fuel Farm, Nantucket, Massachusetts (Appendix A)

6.6.2 Intersection Improvements

The intersection improvements recommended in Chapter 3 include minor signage and striping work that is estimated to range between \$1,500 and \$3,000 per intersection. Signal treatments, where recommended, are estimated to range between \$25,000 and \$100,000. Table 6-2 summarizes the cost estimates for the intersection improvements.

Table 6-2 Cost Estimates of Intersection Improvements

Intersection	Minor Improvements	Cost Estimate Range	Major Improvements	Cost Estimate Range
Washington Street at Francis Street	Signage and striping	\$1,500 - \$3,000	Signal treatment	\$50,000-\$100,000
Union Street at Francis Street	Signage and striping	\$1,500 - \$3,000	None recommended	
Union Street Corner	Signage and striping	\$1,500 - \$3,000	Signal treatment	\$25,000-\$50,000
Orange Street at Union Street	Signage and striping	\$1,500 - \$3,000	None recommended	
Total		\$6,000 - \$12,000		\$75,000-\$150,000

This page intentionally left blank.

7

References

- Ascent Aviation Group, Inc. 2007. *Consult to the Nantucket Bulk Fuel Committee*. Presented to the Nantucket Bulk Fuel Committee. Parish, NY: Ascent Aviation Group, Inc.
- Byrne McKinney & Associates, Inc. *Summary Report: Wilkes Square Economic Study, Nantucket, Massachusetts*. Prepared for the Town of Nantucket, c/ o CBT Architects. Boston: Byrne McKinney & Associates, Inc.
- CBT Architects, et al. 2010. *Wilkes Square Redevelopment*. Presentation to the Town of Nantucket on September 15, 2010. Boston: CBT Architects; Byrne McKinney & Associates, Inc.; Copley Wolff Design Group; Nitsch Engineering; Site Design Inc., and Epsilon Associates.
- Town of Nantucket. 1988. *Energy Planning on Nantucket: Options for Bulk Fuel Storage*. Nantucket, MA: Bulk Fuel Storage Task Force.
- Town of Nantucket. 1998. *Nantucket Island Bulk Fuel Master Plan*. Nantucket, MA: Bulk Fuel Citizens' Advisory Committee.
- Town of Nantucket. 2009. *Nantucket Master Plan*. Nantucket, MA: Nantucket Planning Board.
- Urban Land Institute. 2008. *Downtown Nantucket*. Urban Land Institute Advisory Services Panel Briefing Book. Washington, D.C.: Urban Land Institute.
- _____. 2008. *Nantucket, Massachusetts: Implementing Downtown's Future*. An Advisory Services Panel Report. Washington, D.C.: Urban Land Institute.
- Vanasse Hangen Brustlin, Inc. 2005. *Nantucket Pipeline and Bulk Fuel Storage Feasibility Study*. Prepared for the Nantucket Airport Commission. Watertown, MA: Vanasse Hangen Brustlin, Inc.; Moffat & Nichol; and Enterprise Engineering, Inc.

This page intentionally left blank.

Figures

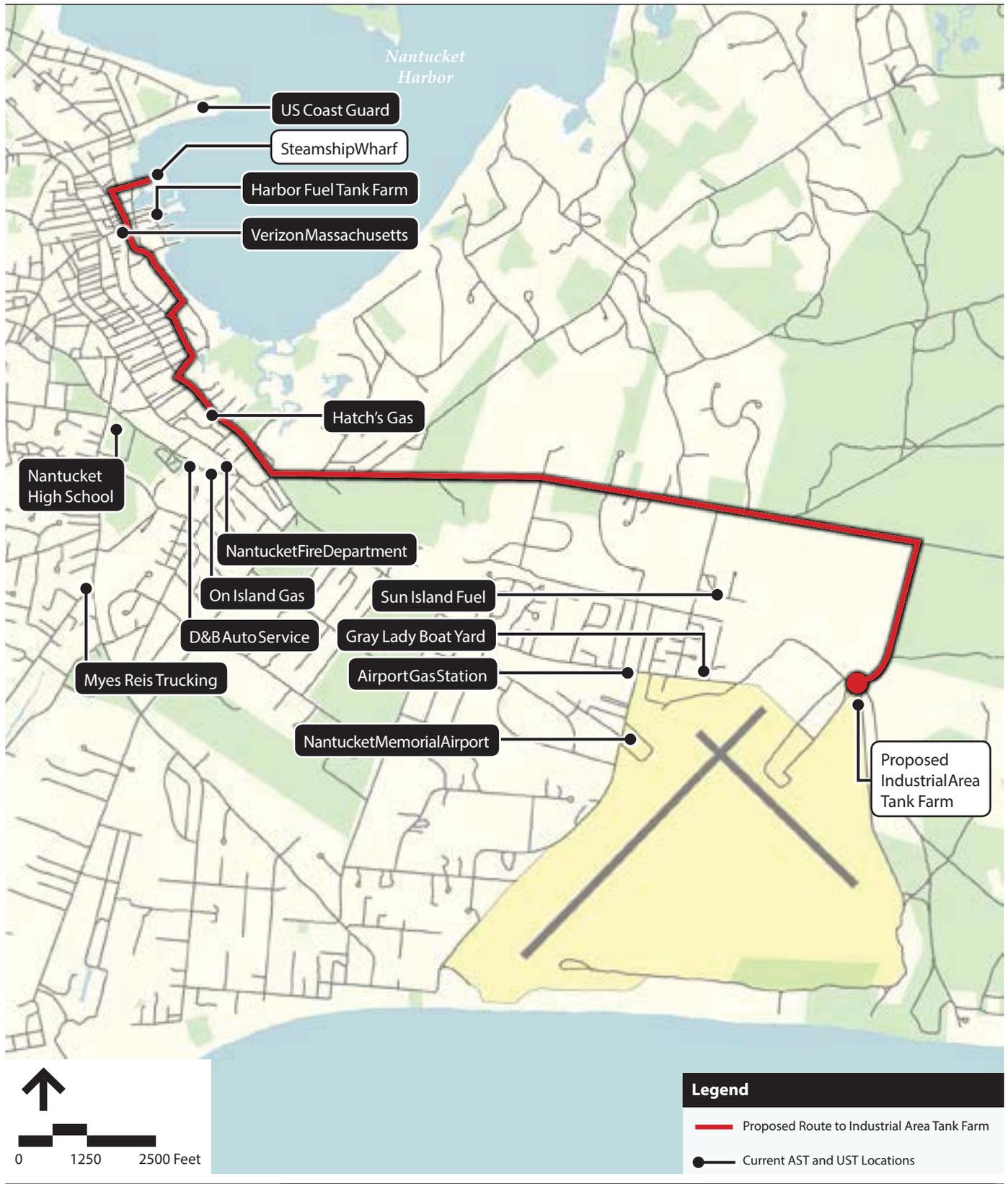


Vanasse Hangen Brustlin, Inc.

Nantucket Harbor

Nantucket Island Bulk Fuel Storage
Feasibility Study
Nantucket, Massachusetts

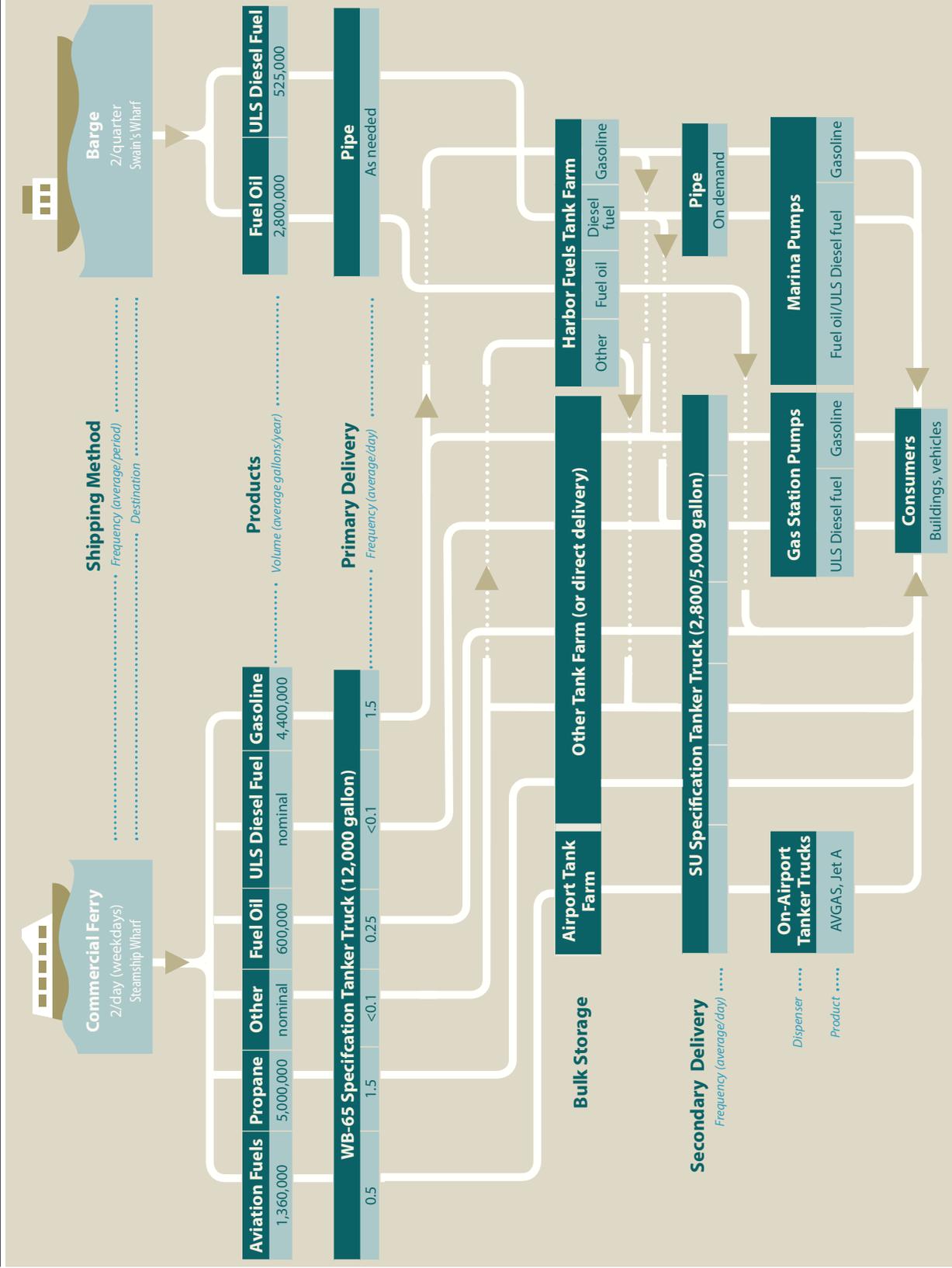
Figure 2-1
January 2014

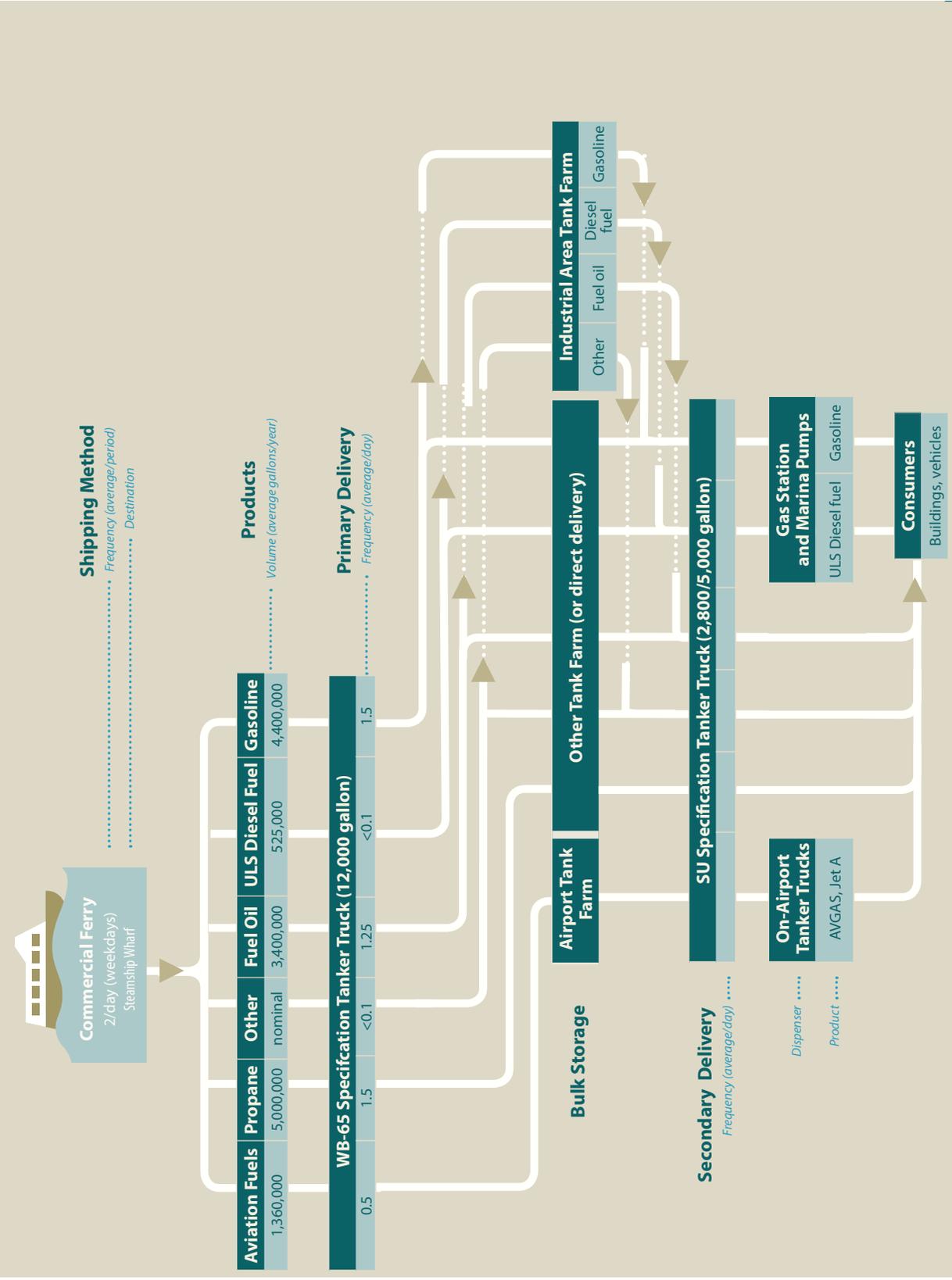


Selected AST and UST Locations

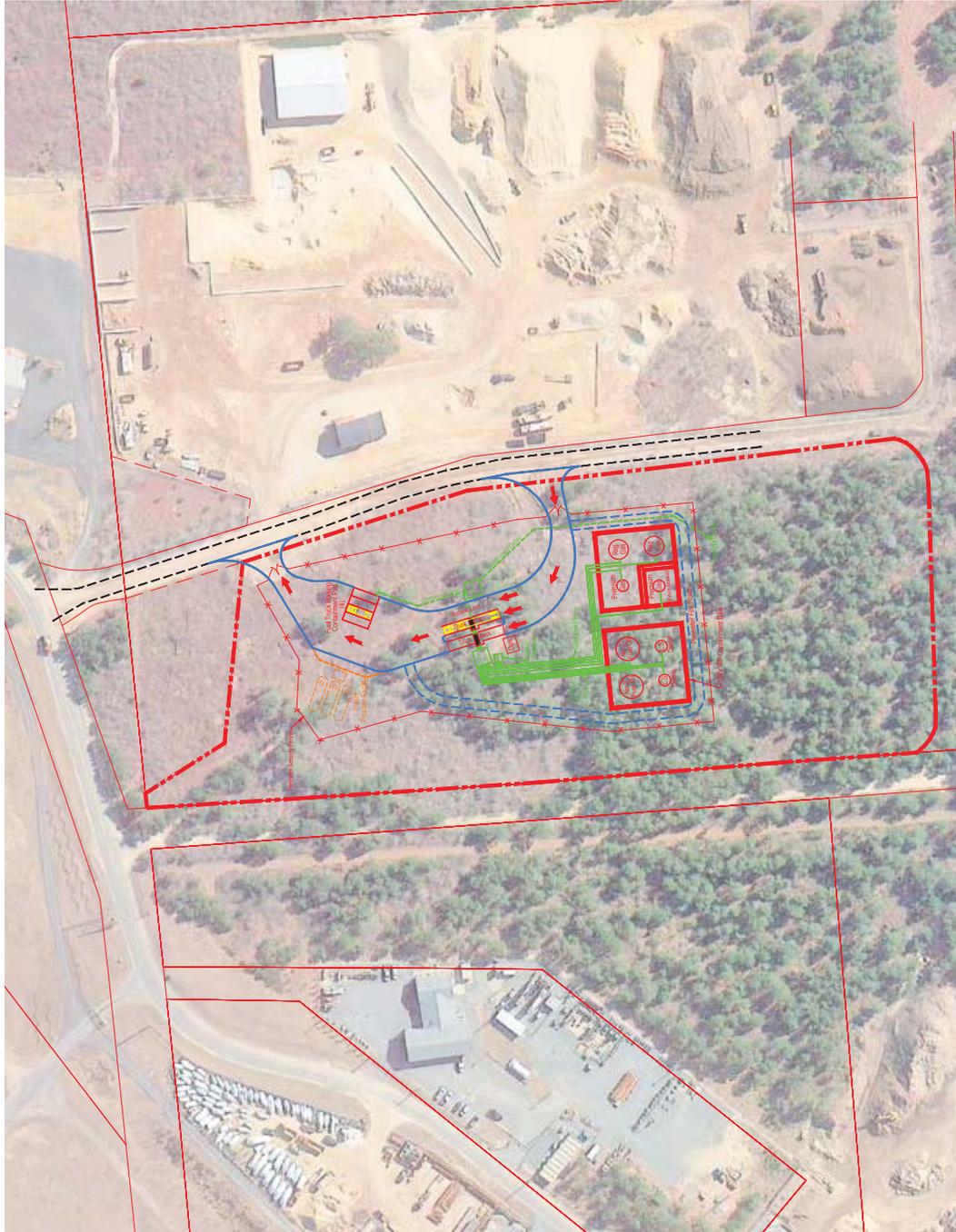
Nantucket Island Bulk Fuel Storage
Feasibility Study
Nantucket, Massachusetts

Figure 2-2
January 2014





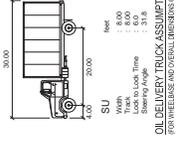
Yanase Hangen Brustlin, Inc.
 Figure 2-4 January 2014
 Future Fuel Management System
 (with current fuel volumes)
 Nantucket Island Bulk Fuel Storage
 Feasibility Study
 Nantucket, Massachusetts



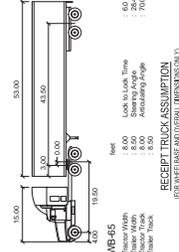
- NOTES:**
1. AS SHOWN BY THE TANK FARM LAYOUT, THE TANK FARM IS LOCATED IN THE CENTER OF THE SITE.
 2. ALL TANKS AND PIPING SHALL BE CONSTRUCTED IN ACCORDANCE WITH THE DESIGN SPECIFICATIONS AND STANDARDS.
 3. ALL TANKS SHALL BE PROVIDED WITH A 15' WIDE WALKWAY AROUND THE PERIMETER.
 4. ALL TANKS SHALL BE PROVIDED WITH A 15' WIDE WALKWAY AROUND THE PERIMETER.
 5. ALL TANKS SHALL BE PROVIDED WITH A 15' WIDE WALKWAY AROUND THE PERIMETER.
 6. ALL TANKS SHALL BE PROVIDED WITH A 15' WIDE WALKWAY AROUND THE PERIMETER.
 7. ALL TANKS SHALL BE PROVIDED WITH A 15' WIDE WALKWAY AROUND THE PERIMETER.
 8. ALL TANKS SHALL BE PROVIDED WITH A 15' WIDE WALKWAY AROUND THE PERIMETER.
 9. ALL TANKS SHALL BE PROVIDED WITH A 15' WIDE WALKWAY AROUND THE PERIMETER.
 10. ALL TANKS SHALL BE PROVIDED WITH A 15' WIDE WALKWAY AROUND THE PERIMETER.

TANK SCHEDULE

PRODUCT	TANK DIA (FT)	MAX HEIGHT (FT)	VOLUME (GAL)	TANK QTY
UNDESIGNED	15	30	10,000	2
UNDESIGNED	15	30	10,000	2
UNDESIGNED	15	30	10,000	2
UNDESIGNED	15	30	10,000	2



OIL DELIVERY TRUCK ASSUMPTION
FOR WHEELBASE AND OVERALL DIMENSIONS (ONLY)



RECEIVING TRUCK ASSUMPTION
FOR WHEELBASE AND OVERALL DIMENSIONS (ONLY)

Yanasse Hangen Brustlin, Inc.
January 2014
Figure 2-5
Conceptual Layout
Industrial Area Tank Farm
Nantucket Island Bulk Fuel Storage
Feasibility Study
Nantucket, Massachusetts

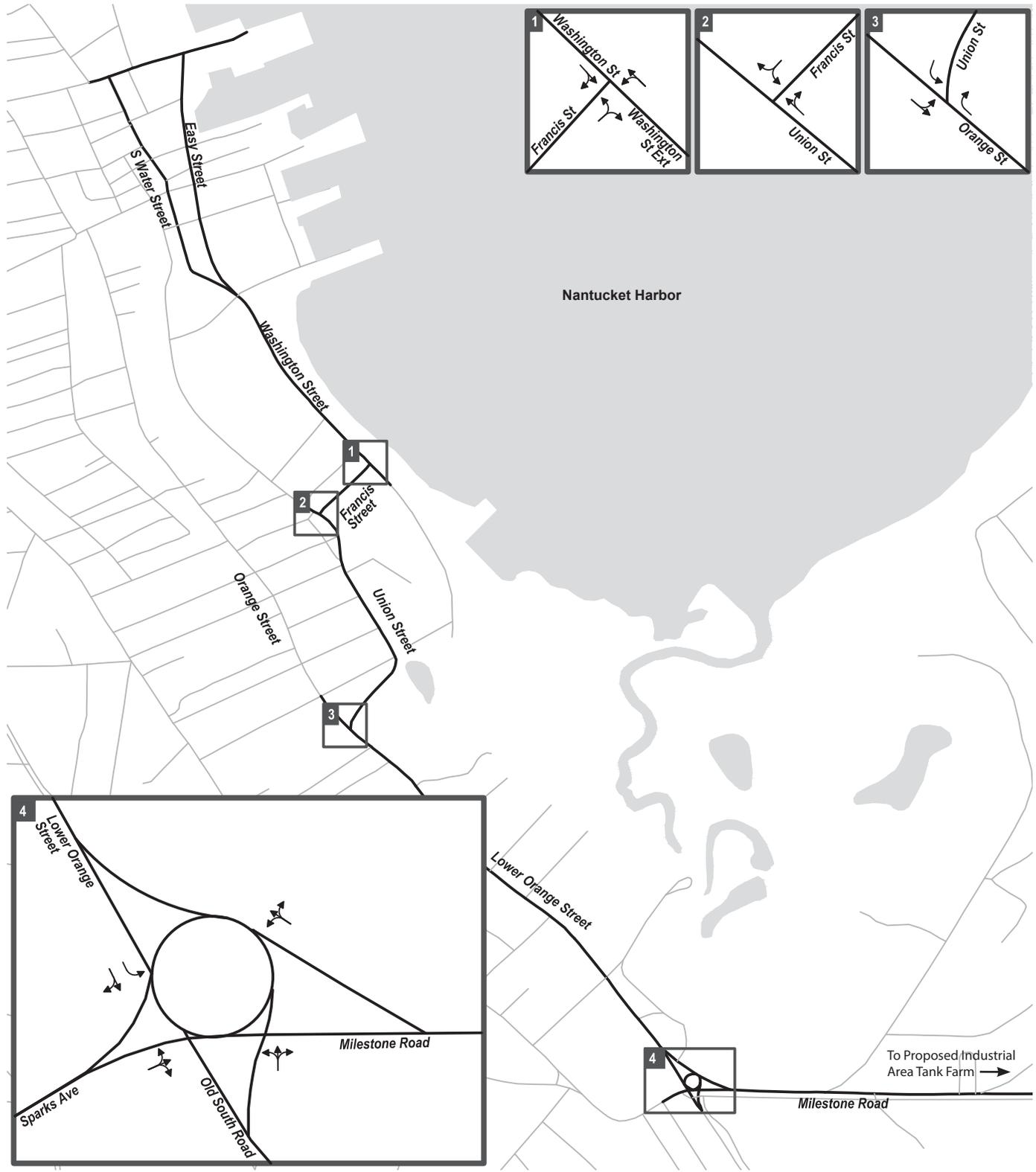


Yanase Hagen Brustlin, Inc.
Figure 3-1 January 2014
Roadway Jurisdiction
Nantucket Island Bulk Fuel Storage
Feasibility Study
Nantucket, Massachusetts

Legend

- Proposed Fuel Truck Route
- Local Jurisdiction
- MasDOT Jurisdiction





Legend

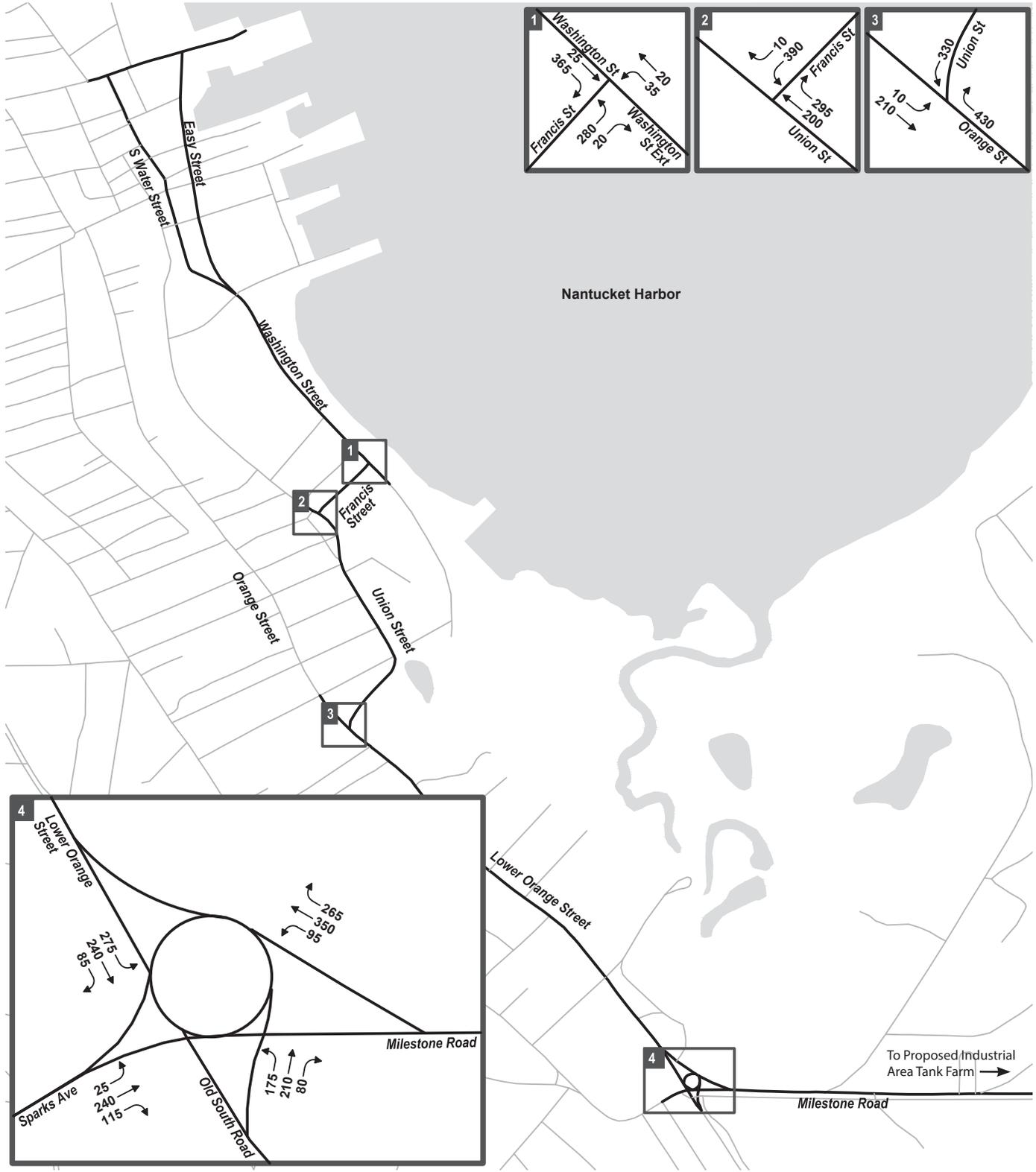
 Traffic Movements through Intersections

Vanasse Hangen Brustlin, Inc.

Existing Lane Geometry

Figure 3-2
January 2014

Nantucket Island Bulk Fuel Storage
Feasibility Study
Nantucket, Massachusetts



Legend



Traffic Movements through Intersections

25

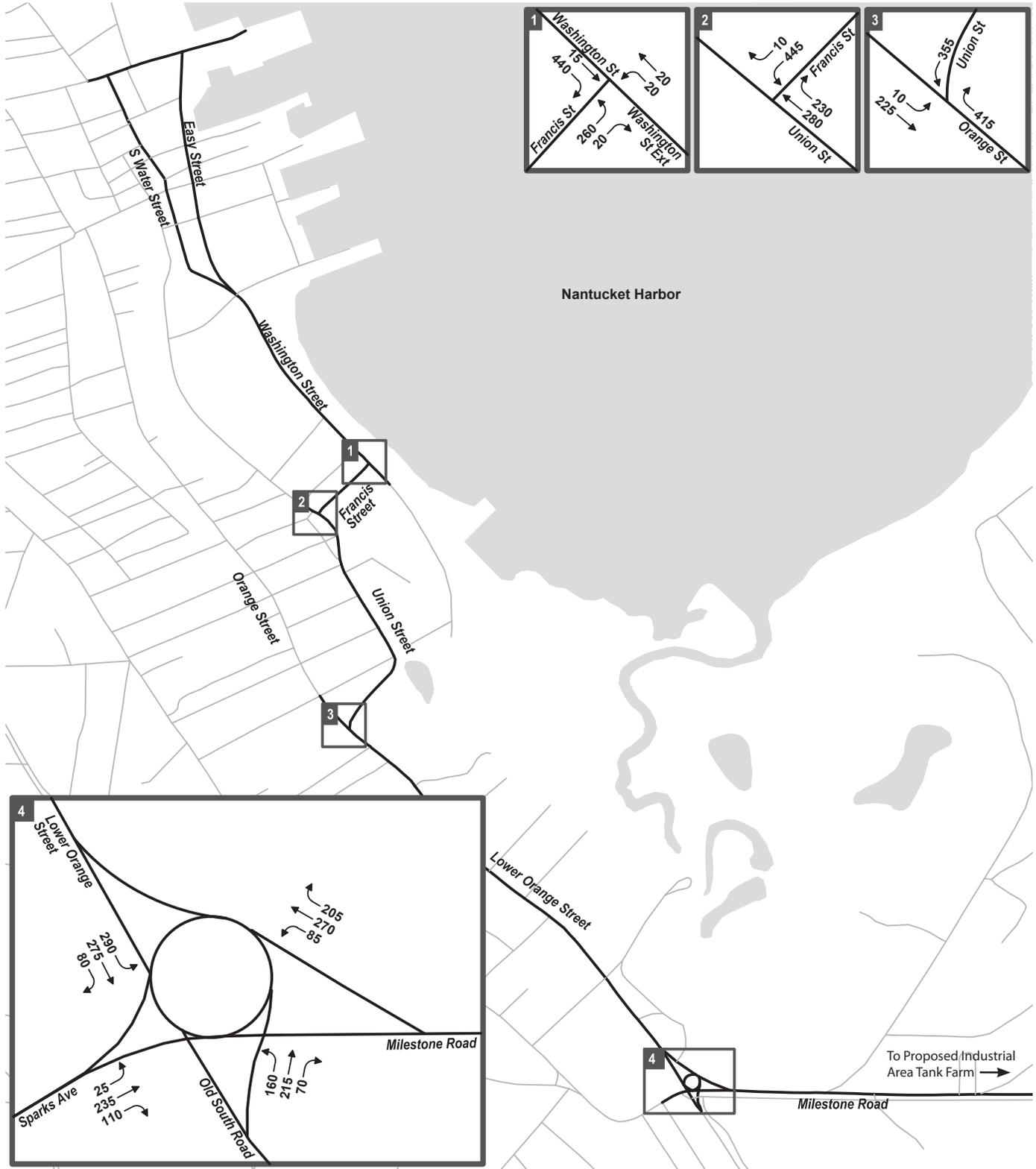
Count of Vehicles Executing Indicated Movement

Vanasse Hangen Brustlin, Inc.

2013 Existing Conditions
Weekday Midday Peak Season
Peak Hour Traffic Volumes

Nantucket Island Bulk Fuel Storage
Feasibility Study
Nantucket, Massachusetts

Figure 3-3
January 2014



Legend



Traffic Movements through Intersections

25

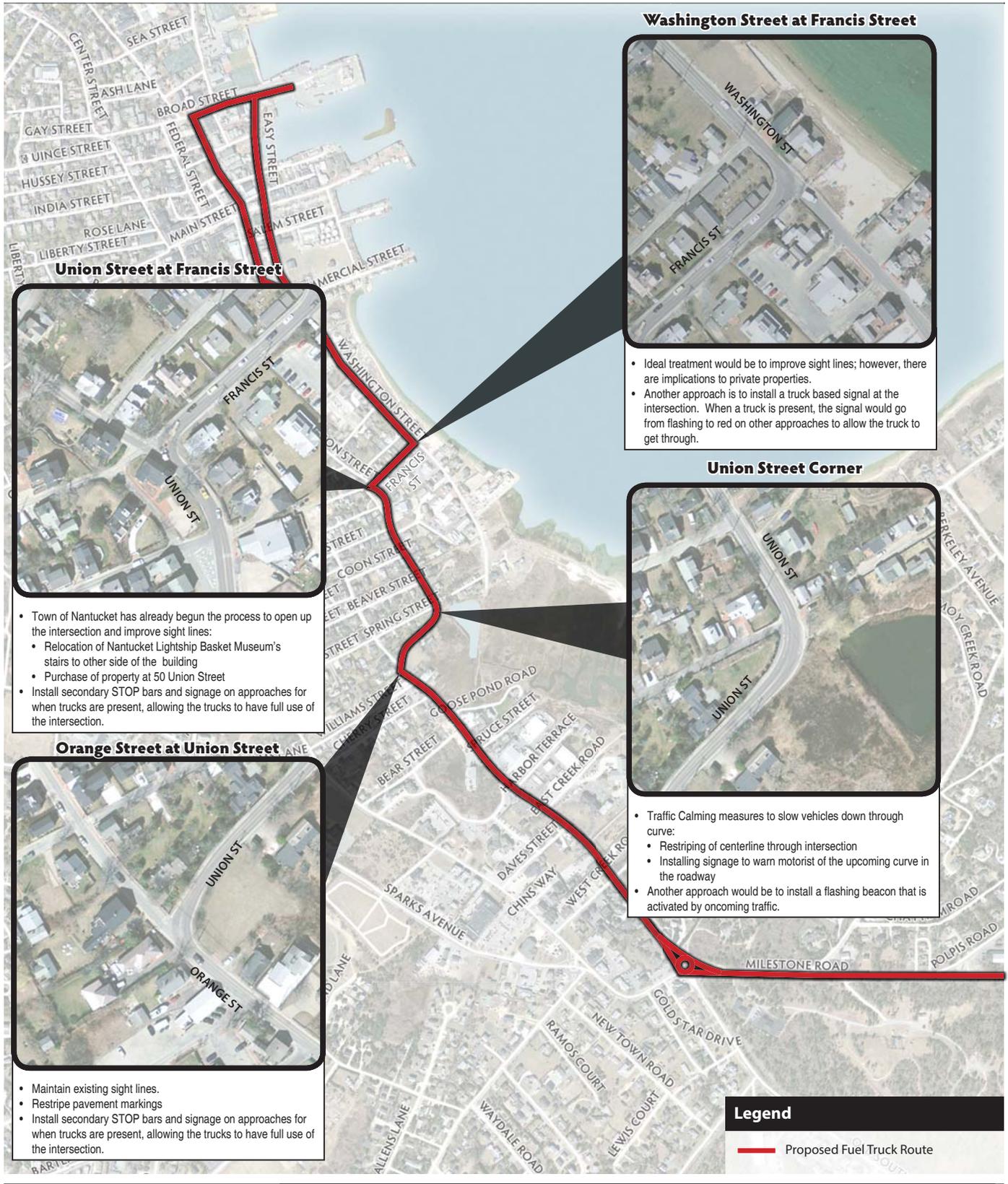
Count of Vehicles Executing Indicated Movement

Vanasse Hangen Brustlin, Inc.

2013 Existing Conditions
Weekday Evening Peak Season
Peak Hour Traffic Volumes

Nantucket Island Bulk Fuel Storage
Feasibility Study
Nantucket, Massachusetts

Figure 3-4
January 2014

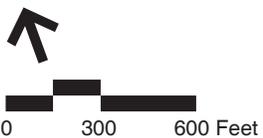


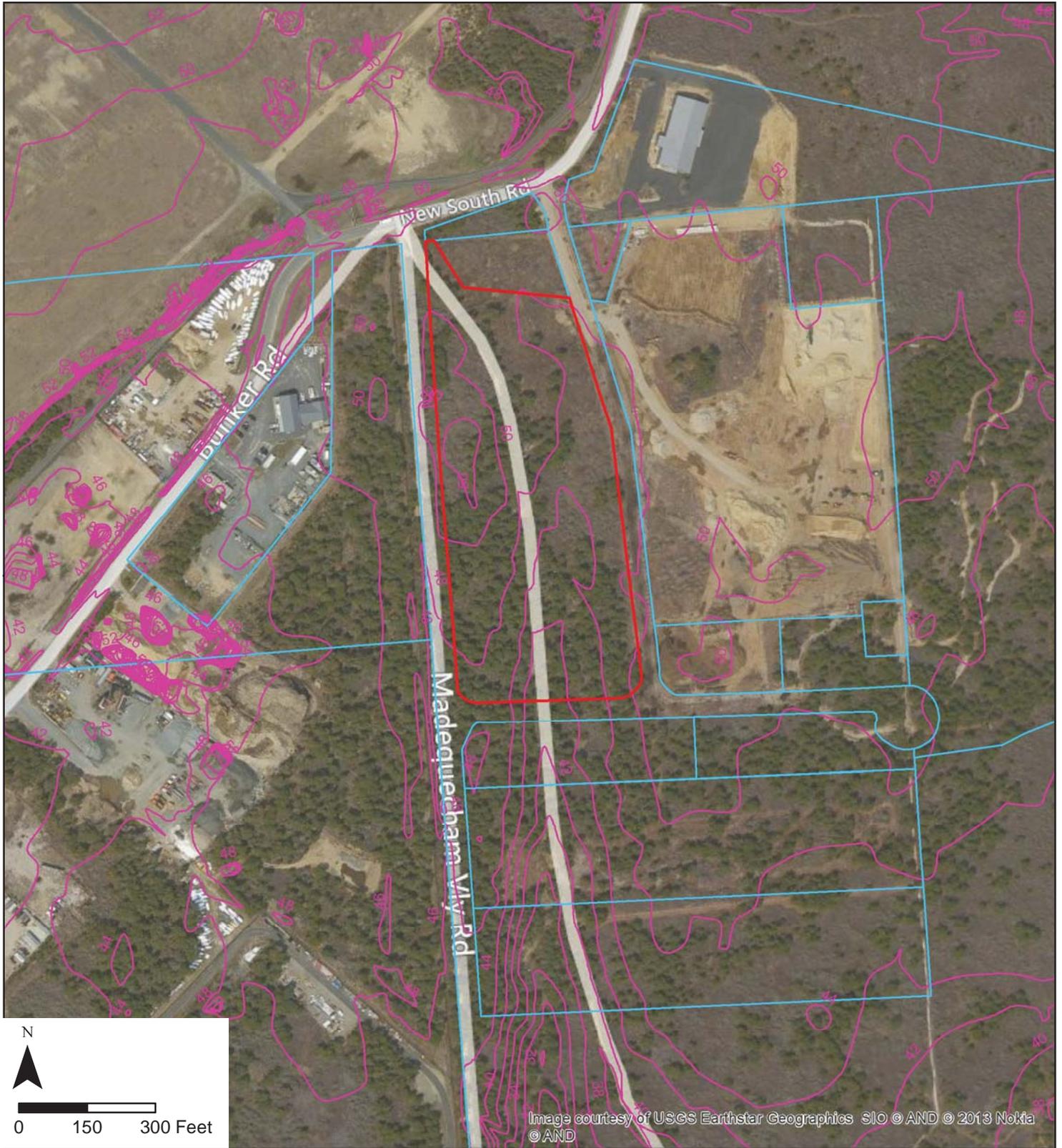
Vanasse Hagen Brustlin, Inc.

Recommended Intersection Improvements

Figure 3-5
January 2014

Nantucket Island Bulk Fuel Storage
Feasibility Study
Nantucket, Massachusetts





Legend

- Proposed Tank Farm Location
- Parcels
- Contours

Vanasse Hangen Brustlin, Inc.

Nantucket Industrial Park and Recreation Facility
Nantucket Island Bulk Fuel Storage
Feasibility Study
Nantucket, Massachusetts

Figure 4-1
January 2014

Source: BING 2013



Source: MassGIS, Bing 2009

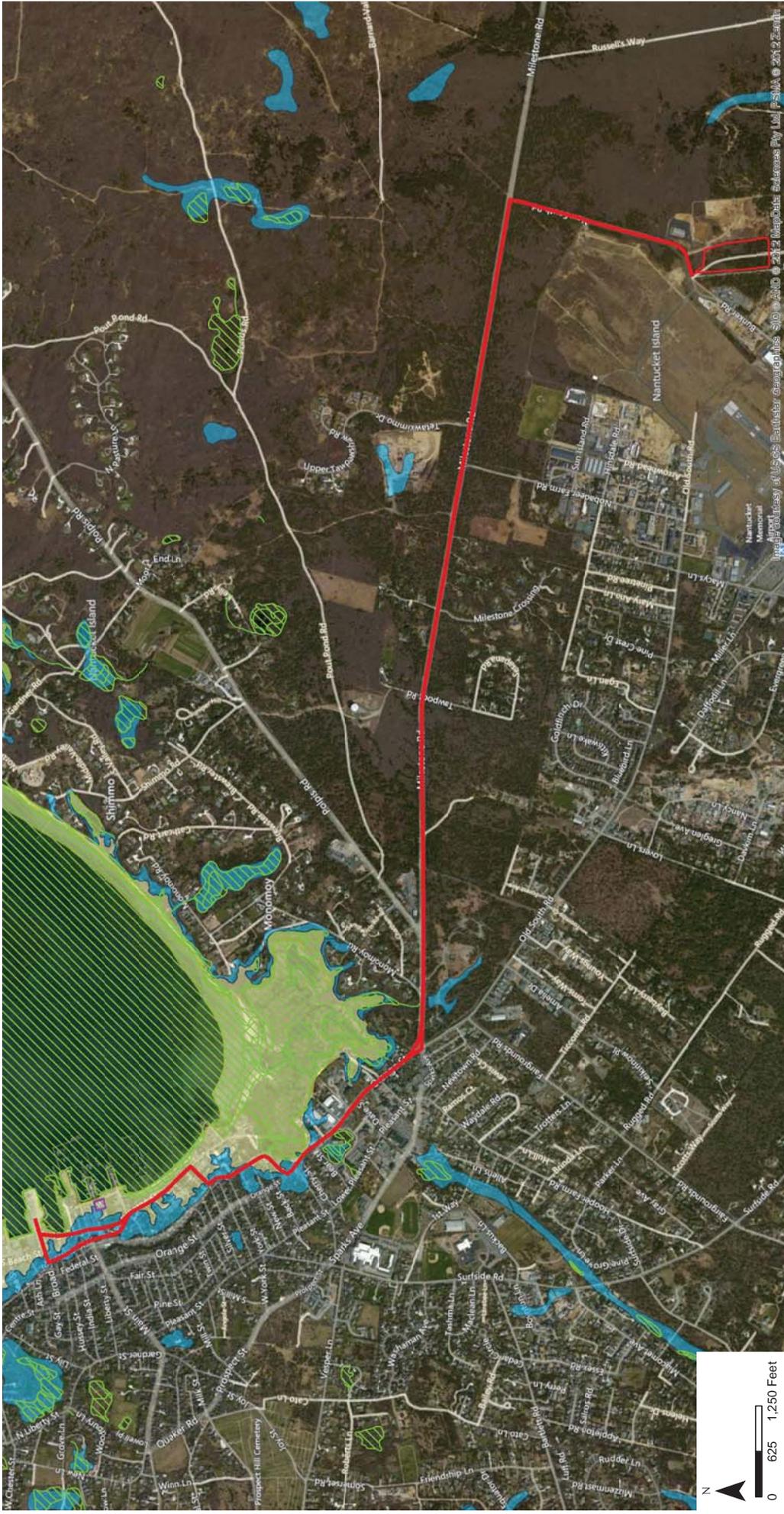
Vanasse Hangen Brustlin, Inc.
January 2014

Figure 4-2

Water Supply Protection Areas
Nantucket Island Bulk Fuel Storage
Feasibility Study
Nantucket, Massachusetts

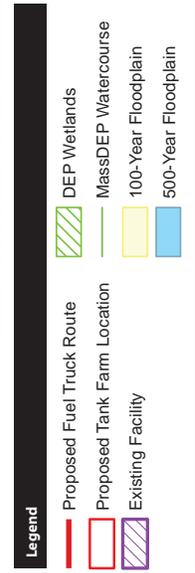
Legend

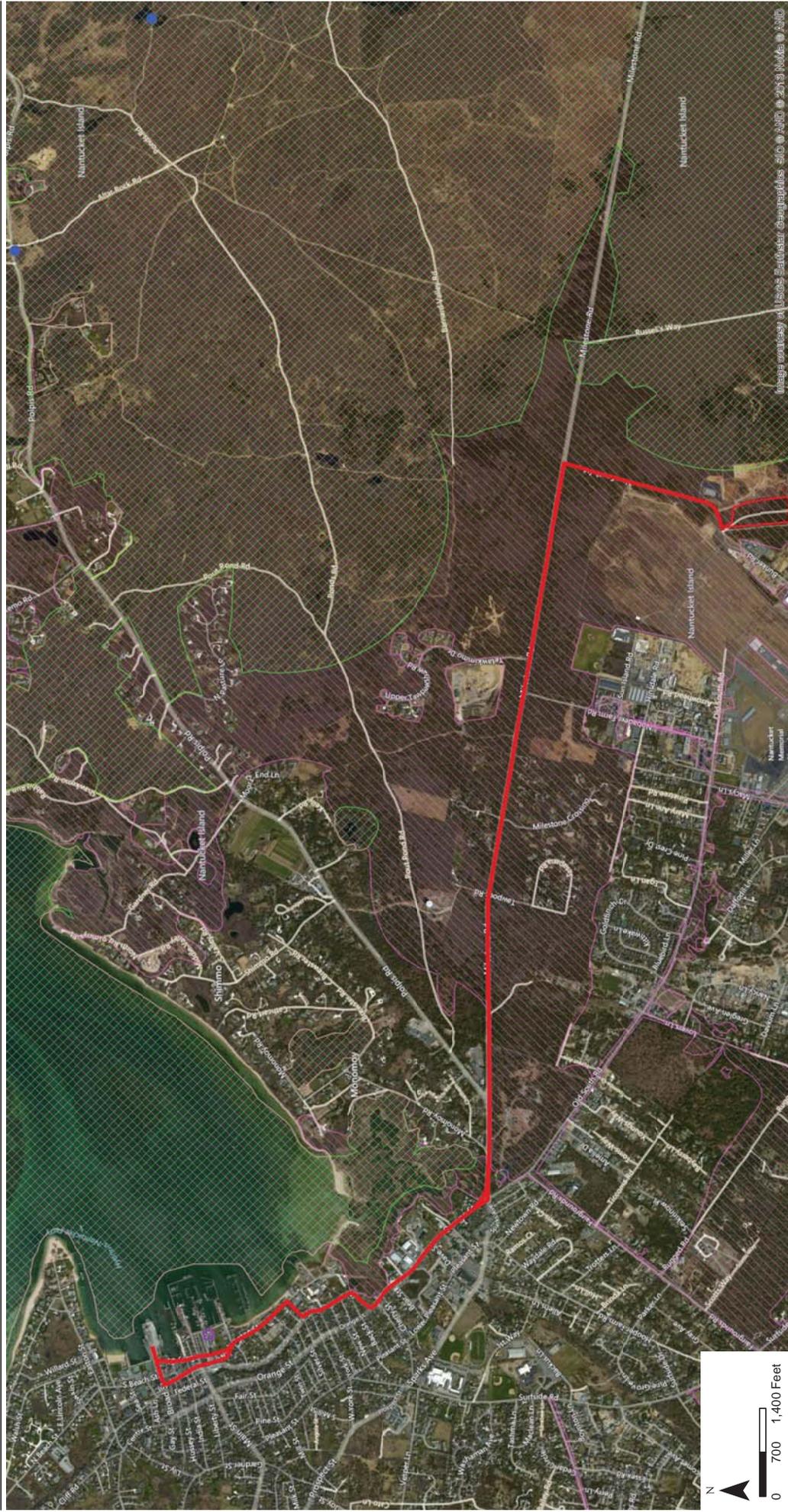
-  Proposed Fuel Truck Route
-  Zone II DEP Wellhead Protection Areas
-  Proposed Tank Farm Location
-  Surface Water Supply Protection Zones
-  Sole Source Aquifers
-  Zone A Surface Water Supply Protection Areas
-  Aquifers



Source: MassGIS, Bing 2009

Yanase Hangen Brustlin, Inc.
 January 2014
 Figure 4-3
 Wetland Resources and Floodplains
 Nantucket Island Bulk Fuel Storage
 Feasibility Study
 Nantucket, Massachusetts





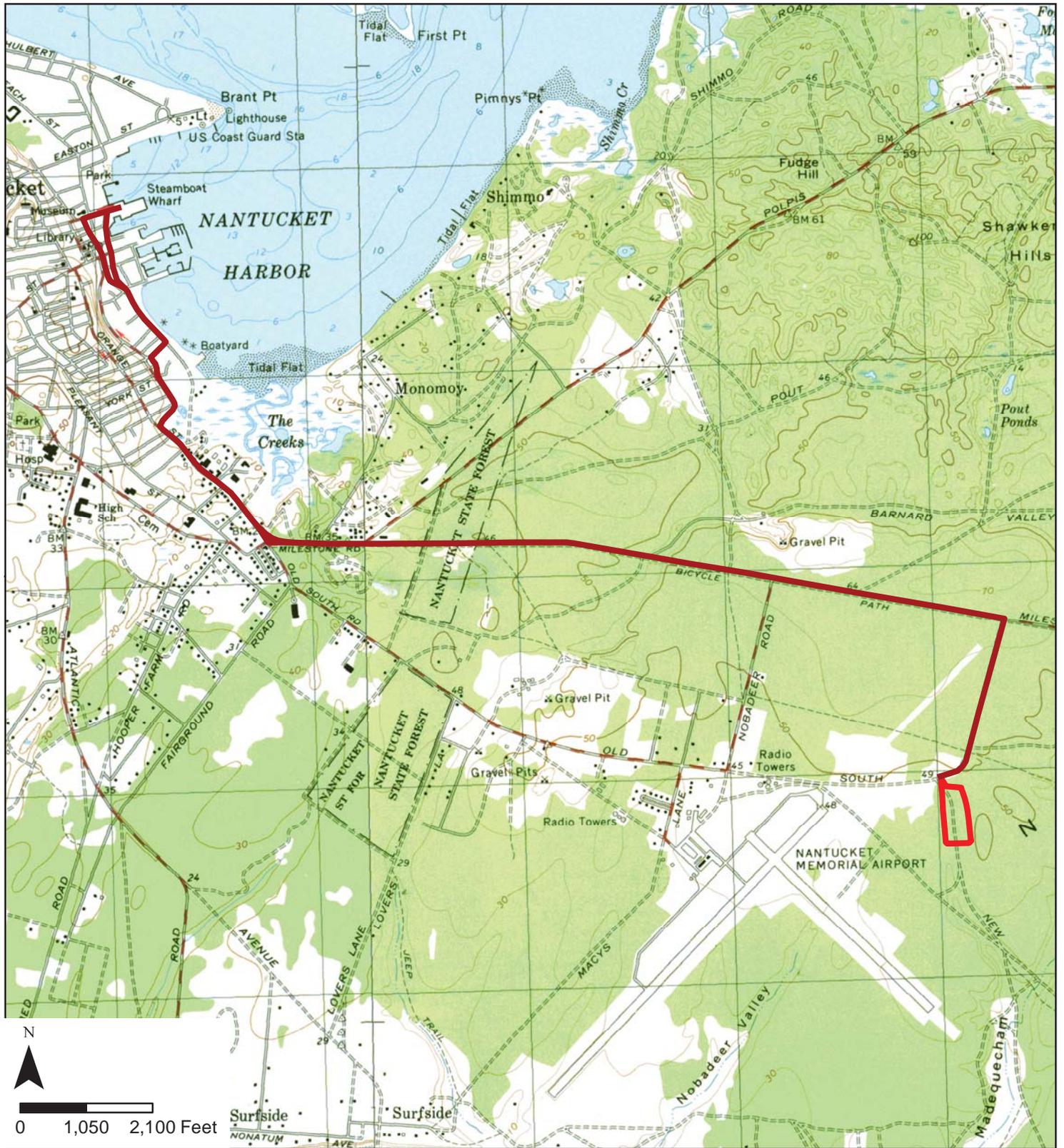
Map courtesy of USGS National Geographics 30° 40' 0" N 71° 0' 0" W

Source: NHESP 2008, Bing 2009

Legend

- Proposed Fuel Truck Route
- Existing Facility
- Proposed Tank Farm Location
- Certified Vernal Pools
- Priority Habitats of Rare Species
- Estimated Habitats of Rare Wildlife

Vanasse Hangen Brustlin, Inc.
 January 2014
 Figure 4-4
 Priority and Estimated Habitats, and
 Certified Vernal Pools
 Nantucket Island Bulk Fuel Storage
 Feasibility Study
 Nantucket, Massachusetts



Legend

-  Proposed Tank Farm Facility
-  Proposed Fuel Truck Route

Vanasse Hangen Brustlin, Inc.

Topographic Map of Project Area
Nantucket Island Bulk Fuel Storage
Feasibility Study
Nantucket, Massachusetts

Figure 4-5
January 2014

Source: USGS 2001

Appendices

- A Nantucket Island Fuel Farm, Design and Approach Memorandum
- B Traffic Data
 - Appendix B-1 Traffic Volume Count Data
 - Appendix B-2 Seasonal Adjustment Factors
 - Appendix B-3 Fuel Truck AutoTurn Figures
 - Appendix B-4 Public Transportation
 - Appendix B-5 Vehicle Crash Data

This page intentionally left blank.

■

Appendix A: Nantucket Island Fuel Farm, Design and Approach Memorandum

This page intentionally left blank.



Revised
 Design Approach and Criteria
 Nantucket Fuel Farm
 Nantucket, Massachusetts
 (January 10, 2014)

TRC is coordinating with VHB to provide design and consulting services for the development of a fuel farm to replace an existing facility located within the Town of Nantucket proper, adjacent to the waterfront. The current location presents potential risk for the safety, health, and welfare of nearby residents and the environment. The proposed fuel farm will be located on an upland parcel, adjacent to the existing airport.

TRC’s initial facility layout evaluated the annual fuel delivery and consumption provided by the Town to project product storage and facility requirements. These findings were presented to the Town of Nantucket during Mid-December 2013. Based on that presentation, the town requested the proposed facility be modified. Those modifications include smaller storage volumes, fewer tanks, larger tank truck parking containment and a future underground propane facility.

The revised facility storage requirements are summarized in the table below.

	Selected Tank Dimensions					
	Required Ullage	Diameter	Height Length	Capacity	No of Tanks	Total Ullage
Regular Gasoline	200,000	25	30	110,040	2	220,080
Premium Gasoline	40,000	15	18	23,730	2	47,460
Diesel	60,000	15	24	31,710	2	63,420
Fuel Oil	300,000	30	30	158,760	2	317,520
Bio-Heat (Note 3)						
Propane (Future)	90,000	12	49	30,000	3	90,000
Notes	1. Volumes recorded in US Gallons, dimensions are in feet					
	2. Required ullage volumes provided by Town of Nantucket following the 12/17/13					
	3. One premium fuel tank will be converted to Bio fuel tank when bio-fuel demand is sufficient to justify a dedicated tank. Tank configuration for gasoline and bio fuel differs, limiting potential for repeated product swaps.					
	4. Propane ullage provided by municipality of Nantucket, 3- 30,000 gal horizontal					

In addition, the refueler truck parking pad was increased in size to accommodate a total of four vehicles. The truck receipt and filling stand was unchanged from the previous concept plan. Finally, the facility was relocated to a smaller site adjacent to the original location.



The revised concept facility is depicted on the attached plan.

The following is a summary of criteria used to develop the concept facility.

Tank spacing follows requirements of NFPA 30 for facilities with “Protection for Exposures.”

Kerosene will continue to be stored in a tank truck and will be located on a contained parking pad. The pad is adequately sized to accommodate four fuel delivery trucks.

No Aviation gasoline or Jet-A tanks are required.

Truck rack requirements are based on maximum fuel through-put from the original demand data provided by the Town of Nantucket. The number of truck positions considers the frequency of loading and unloading for both bulk truck receipt and delivery truck loading.

	2018 Max Monthly Demand	Max Demand Month	Receipt Trucks	Issue Truck
			10,000 gal	2800/5000 gal
Regular Gasoline	676071	July	68	136
Premium Gasoline	75119	July	8	16
Diesel	121000	October	13	25
Fuel Oil	33187	October	34	119
Bio-Heat				
Notes 1. Volumes recorded in US Gallons				

Truck rack design assumes operations will be limited to an 8 hour day, 5 days per week.

Design Criteria Summary:

Future Bio-heat tanks will be a converted premium gasoline tank.

The facility will accommodate three future 30,000 gallon underground propane tanks

Kerosene will continue to be stored in a delivery truck

For the purpose of evaluating truck rack needs the following was assumed:

- #2 fuel oil delivered in 2800 gal tankers modeled using an ASHTO SU design vehicle.
- Bulk fuel delivery to retailers is assumed to be delivered in 5,000 gallon tankers.



- Fuel receipt at the facility is assumed to be by 10,000 gallon tankers.
- Fuel receipt at the facility is assumed to require 60 minutes for offloading the product including hose connection/disconnection and product transfer documentation.
- Fuel loading for local delivery is assumed to require 40 minutes per truck including hose connection/disconnection and product transfer documentation.

Each truck rack will be configured for both receipt and issue of each product type.

Separate fuel piping will be used for distillate and residual product.

Containment areas will drain to an engineered oil water separator (Outfall location has not been identified).

Containment dikes may be concrete, soil-bentonite, geosynthetic liner , or hybrid system. The cost estimate assumes an earthen dike covered with geosynthetic.

Tank containment has been sized for the largest tank in each dike area plus 10%, or reasonable storm volume.

Dike walls are sloped for ease of egress in emergencies.

Entire facility will be fenced.

Sufficient room between containment dike and fence is provided for emergency vehicle access.

Tanks spaced per NFPA 30 and no more than two tanks in any adjacent row.

Tank dimensions kept close to 1:1 ratio of Dia:Height for stability.

Tank height kept to a minimum due to proximity to airport.

With the exception of bio-fuel there are two tanks per product to provide flexibility in managing the tank assets and product stored.

Engineer's Opinion of Probable Cost

The project cost estimate is based on cost data obtained from the R S Means cost estimating guides and historical project information. A local area factor of 35% was applied to any items imported to the island, with the exception of concrete. An area factor of 15% was applied to concrete. The reduced area factor applied to concrete accounts for the availability of locally batched concrete on the island.

The engineering estimate does not carry any costs for the future facilities (bio-fuel or propane), nor costs associated with the disposition of the existing fuel facility.

No contingency, engineering or construction management fees have been applied to the estimate. Costs associated with the facility design, construction management, or municipal costs for administration of the various contracts have not been included.

The facility layout and cost projection relies on assumptions on how the facility will be designed, operated and what fuel services will be provided. The final cost of the facility could vary significantly from the costs presented.



The engineer's opinion of probable cost for the new fuel facility is \$5.6 million.

**Nantucket Fuel Facility
Projection of Cost**

10-Jan-14

Nantucket Transshipment Factors

General materials 35.00%
Concrete 15.00%

	QTY	Units	Unit Price	Nantucket Transshipment	Extended Total
Liquid Fuel Tanks					
Excavation	500	CY	\$6.38	\$0.00	\$3,190.00
Fill	300		\$50.97	\$17.84	\$15,291.00
foundation pad	200	CY	\$286.00	\$42.90	\$57,200.00
Tanks	83500	Bbl	\$38.50	\$13.48	\$3,214,750.00
Coatings	15200	SF	\$32.00	\$11.20	\$486,400.00
Floating pans	4	EA	\$23,000.00	\$8,050.00	\$92,000.00
Misc controls	8	LT	\$12,000.00	\$4,200.00	\$96,000.00
Fuel System					
Piping	2650	LF	\$200.00	\$70.00	\$530,000.00
Pumps	5	EA	\$30,000.00	\$10,500.00	\$150,000.00
Control system	1	LT	\$15,000.00	\$5,250.00	\$15,000.00
Pipe supports	70	EA	\$2,400.00	\$840.00	\$168,000.00
Coatings	4200	SF	\$28.00	\$9.80	\$117,600.00
Tank Containment					
Earth berms	512	lf	\$28.54	\$0.00	\$14,700.00
Liner	24200	SF	\$6.25	\$2.19	\$151,300.00
Oil Water Separator	1	EA	\$35,000.00	\$12,250.00	\$35,000.00
Drain Piping	500	ft	\$41.00	\$14.35	\$20,500.00
Truck load/offload					
Concrete	200	CY	\$286.00	\$42.90	\$57,200.00
Excavation	300	CY	\$6.38	\$0.00	\$1,914.00
Fill	200	CY	\$50.97	\$17.84	\$10,194.00
Truck Parking					
Concrete	66	CY	\$286.00	\$42.90	\$18,900.00
Excavation	160	CY	\$6.38	\$0.00	\$1,100.00
Fill	94	CY	\$50.97	\$17.84	\$4,800.00
Pavement					
Excavation	2000	CY	\$6.38	\$0.00	\$12,760.00
Fill	1000	CY	\$50.97	\$0.00	\$50,970.00
bituminous concrete	1700	tn	\$82.40	\$28.84	\$140,080.00
Fencing					
Fence	1850	LF	\$26.84	\$9.39	\$49,654.00
Gates	2	EA	\$884.50	\$309.58	\$1,769.00
Waterline					
Piping	600	LF	\$53.00	\$18.55	\$31,800.00
Excavation	450	CY	\$6.38	\$0.00	\$2,871.00
Fill	425	CY	\$4.38	\$0.00	\$1,861.50
Site electrical	1	LT	\$18,000.00	\$6,300.00	\$18,000.00
Subtotal					\$5,570,804.50

■

Appendix B: Traffic Data

This page intentionally left blank.

Appendix B-1: Traffic Volume Count Data

This page intentionally left blank.

Washington Street
north of LaFayette Street
City, State: Nantucket, MA
Client: VHB/ M. Kealey



PRECISION
D A T A
INDUSTRIES, LLC

P.O. Box 301 Berlin, MA 01503
Office: 508.481.3999 Fax: 508.545.1234
Email: datarequests@pdillc.com

133491 A Class
Site Code: 12472
Date Start: 29-Aug-13

SB

Start Time	Bikes	Cars & Trailers	2 Axle Long	Buses	2 Axle 6 Tire	3 Axle Single	4 Axle Single	<5 Axl Double	5 Axle Double	>6 Axl Double	<6 Axl Multi	6 Axle Multi	>6 Axl Multi	Total
08/29/1														
3	2	76	11	0	1	0	0	0	0	0	0	0	0	90
01:00	1	52	10	0	3	0	0	0	0	0	0	0	0	66
02:00	0	23	3	0	0	0	0	0	0	0	0	0	0	26
03:00	0	8	1	0	0	0	0	0	0	0	0	0	0	9
04:00	0	4	0	0	1	0	0	0	0	0	0	0	0	5
05:00	1	16	5	0	0	0	0	0	1	0	0	0	0	23
06:00	2	43	28	0	0	1	0	1	0	0	0	0	0	75
07:00	1	103	42	2	14	0	0	0	0	0	0	0	0	162
08:00	1	124	62	0	22	0	0	2	6	0	0	0	0	217
09:00	0	199	47	0	12	0	0	1	0	0	0	0	0	259
10:00	1	236	82	0	15	0	0	3	0	0	0	0	0	337
11:00	5	247	76	1	15	0	0	3	2	0	0	0	0	349
12 PM	6	249	70	0	11	0	0	1	0	0	0	0	0	337
13:00	4	286	70	0	17	0	0	1	3	0	0	0	0	381
14:00	1	277	64	0	15	0	0	2	0	0	0	0	0	359
15:00	5	305	60	1	15	0	0	1	2	0	0	0	0	389
16:00	4	339	68	0	16	0	0	2	1	0	0	0	0	430
17:00	4	302	68	0	16	0	0	5	0	0	0	0	0	395
18:00	5	221	41	0	12	1	0	0	1	0	0	0	0	281
19:00	3	212	54	0	7	0	0	0	1	0	0	0	0	277
20:00	3	202	44	0	8	0	0	0	0	0	0	0	0	257
21:00	1	169	33	0	8	0	0	0	0	0	0	0	0	211
22:00	1	203	30	0	8	0	0	0	0	0	0	0	0	242
23:00	2	118	16	0	6	0	0	0	0	0	0	0	0	142
Total	53	4014	985	4	222	2	0	22	17	0	0	0	0	5319
Percent	1.0%	75.5%	18.5%	0.1%	4.2%	0.0%	0.0%	0.4%	0.3%	0.0%	0.0%	0.0%	0.0%	
AM Peak	11:00	11:00	10:00	07:00	08:00	06:00		10:00	08:00					11:00
Vol.	5	247	82	2	22	1		3	6					349
PM Peak	12:00	16:00	12:00	15:00	13:00	18:00		17:00	13:00					16:00
Vol.	6	339	70	1	17	1		5	3					430

Washington Street
north of LaFayette Street
City, State: Nantucket, MA
Client: VHB/ M. Kealey



PRECISION
D A T A
INDUSTRIES, LLC

P.O. Box 301 Berlin, MA 01503
Office: 508.481.3999 Fax: 508.545.1234
Email: datarequests@pdillc.com

133491 A Class
Site Code: 12472
Date Start: 29-Aug-13

SB

Start Time	Bikes	Cars & Trailers	2 Axle Long	Buses	2 Axle 6 Tire	3 Axle Single	4 Axle Single	<5 Axl Double	5 Axle Double	>6 Axl Double	<6 Axl Multi	6 Axle Multi	>6 Axl Multi	Total
08/30/1														
3	0	79	18	0	0	0	0	0	0	0	0	0	0	97
01:00	1	79	12	0	1	0	0	0	0	0	0	0	0	93
02:00	0	19	1	0	0	0	0	0	0	0	0	0	0	20
03:00	0	0	1	0	0	0	0	0	0	0	0	0	0	1
04:00	0	3	3	0	0	0	0	0	0	0	0	0	0	6
05:00	1	11	4	0	0	0	0	1	0	0	0	0	0	17
06:00	0	41	23	0	3	0	0	1	1	0	0	0	0	69
07:00	2	103	49	1	13	1	0	1	1	0	0	0	0	171
08:00	0	146	61	0	14	0	0	5	6	0	0	0	0	232
09:00	1	251	87	0	19	0	0	1	0	0	0	0	0	359
10:00	3	278	67	1	11	0	0	2	1	0	0	0	0	363
11:00	5	255	76	1	14	1	0	2	2	0	0	0	0	356
12 PM	7	260	76	1	19	0	0	4	0	0	1	0	0	368
13:00	3	296	64	2	18	0	0	2	3	0	0	0	0	388
14:00	7	277	74	0	16	0	0	2	0	0	0	0	0	376
15:00	6	319	70	1	13	1	0	2	0	0	0	0	0	412
16:00	3	348	70	0	16	0	0	1	1	1	0	0	0	440
17:00	5	260	64	1	14	0	0	4	0	0	0	0	0	348
18:00	2	236	56	0	13	0	0	1	0	0	0	0	0	308
19:00	3	252	63	0	11	0	0	0	3	0	0	0	0	332
20:00	3	262	41	0	7	0	0	1	0	0	0	0	0	314
21:00	4	207	45	1	8	0	0	0	0	0	0	0	0	265
22:00	1	244	44	0	8	0	0	1	0	0	0	0	0	298
23:00	5	183	35	0	7	0	0	0	0	0	0	0	0	230
Total	62	4409	1104	9	225	3	0	31	18	1	1	0	0	5863
Percent	1.1%	75.2%	18.8%	0.2%	3.8%	0.1%	0.0%	0.5%	0.3%	0.0%	0.0%	0.0%	0.0%	
AM Peak	11:00	10:00	09:00	07:00	09:00	07:00		08:00	08:00					10:00
Vol.	5	278	87	1	19	1		5	6					363
PM Peak	12:00	16:00	12:00	13:00	12:00	15:00		12:00	13:00	16:00	12:00			16:00
Vol.	7	348	76	2	19	1		4	3	1	1			440

Washington Street
north of LaFayette Street
City, State: Nantucket, MA
Client: VHB/ M. Kealey



PRECISION
D A T A
INDUSTRIES, LLC

P.O. Box 301 Berlin, MA 01503
Office: 508.481.3999 Fax: 508.545.1234
Email: datarequests@pdillc.com

133491 A Class
Site Code: 12472
Date Start: 29-Aug-13

SB

Start Time	Bikes	Cars & Trailers	2 Axle Long	Buses	2 Axle 6 Tire	3 Axle Single	4 Axle Single	<5 Axl Double	5 Axle Double	>6 Axl Double	<6 Axl Multi	6 Axle Multi	>6 Axl Multi	Total
08/31/1														
3	0	115	22	0	2	0	0	0	0	0	0	0	0	139
01:00	0	130	21	0	3	0	0	0	0	0	0	0	0	154
02:00	0	56	14	0	1	0	0	0	0	0	0	0	0	71
03:00	0	5	4	0	0	0	0	0	0	0	0	0	0	9
04:00	0	3	2	0	1	0	0	0	0	0	0	0	0	6
05:00	0	10	3	0	0	0	0	0	1	0	0	0	0	14
06:00	0	43	18	0	2	0	0	0	0	0	0	0	0	63
07:00	2	106	37	0	13	0	0	0	1	0	0	0	0	159
08:00	1	136	55	0	15	1	0	0	2	0	0	0	0	210
09:00	1	194	58	0	11	0	0	3	1	0	0	0	0	268
10:00	2	281	56	2	15	0	0	1	0	0	0	0	0	357
11:00	7	293	54	0	13	0	0	3	0	0	0	0	0	370
12 PM	3	298	73	0	18	0	0	2	0	0	0	0	0	394
13:00	6	297	62	1	14	0	0	1	0	0	0	0	0	381
14:00	5	252	55	0	13	0	0	0	0	1	0	0	0	326
15:00	10	293	63	0	16	0	0	0	0	0	0	0	0	382
16:00	12	265	54	0	14	0	0	2	0	0	0	0	0	347
17:00	7	295	44	1	16	0	0	2	0	0	0	0	0	365
18:00	3	253	36	0	10	0	0	1	0	0	0	0	0	303
19:00	9	240	45	0	6	0	0	3	0	0	0	0	0	303
20:00	4	208	50	0	10	0	0	0	0	0	0	0	0	272
21:00	2	185	29	0	9	0	0	0	0	0	0	0	0	225
22:00	7	224	42	0	9	0	0	1	0	0	0	0	0	283
23:00	1	211	43	0	9	0	0	0	0	0	0	0	0	264
Total	82	4393	940	4	220	1	0	19	5	1	0	0	0	5665
Percent	1.4%	77.5%	16.6%	0.1%	3.9%	0.0%	0.0%	0.3%	0.1%	0.0%	0.0%	0.0%	0.0%	
AM Peak	11:00	11:00	09:00	10:00	08:00	08:00		09:00	08:00					11:00
Vol.	7	293	58	2	15	1		3	2					370
PM Peak	16:00	12:00	12:00	13:00	12:00			19:00		14:00				12:00
Vol.	12	298	73	1	18			3		1				394
Total		12816	3029	17	667	6	0	72	40	2	1	0	0	16847

Washington Street
north of LaFayette Street
City, State: Nantucket, MA
Client: VHB/ M. Kealey



PRECISION
D A T A
INDUSTRIES, LLC

P.O. Box 301 Berlin, MA 01503
Office: 508.481.3999 Fax: 508.545.1234
Email: datarequests@pdillc.com

133491 A Class
Site Code: 12472
Date Start: 29-Aug-13

NB

Start Time	Bikes	Cars & Trailers	2 Axle Long	Buses	2 Axle 6 Tire	3 Axle Single	4 Axle Single	<5 Axl Double	5 Axle Double	>6 Axl Double	<6 Axl Multi	6 Axle Multi	>6 Axl Multi	Total
08/29/1														
3	0	22	1	0	1	0	0	0	0	0	0	0	0	24
01:00	0	21	0	0	0	0	0	0	0	0	0	0	0	21
02:00	0	9	0	0	0	0	0	0	0	0	0	0	0	9
03:00	0	1	3	0	0	0	0	0	0	0	0	0	0	4
04:00	0	3	6	0	0	0	0	0	0	0	0	0	0	9
05:00	0	33	16	0	3	0	0	3	1	0	0	0	0	56
06:00	0	65	31	0	5	0	0	1	1	0	0	0	0	103
07:00	4	110	76	0	18	2	0	0	0	0	0	0	0	210
08:00	1	158	65	0	15	2	0	3	1	0	0	0	0	245
09:00	1	227	70	0	15	2	0	1	0	0	0	1	0	317
10:00	8	218	49	1	18	0	0	1	1	0	0	0	0	296
11:00	5	177	59	0	18	0	0	0	1	0	0	0	0	260
12 PM	4	187	52	1	19	2	0	1	4	0	0	0	0	270
13:00	4	206	43	0	16	0	0	0	1	0	1	0	0	271
14:00	4	238	39	0	14	0	0	1	0	0	0	0	0	296
15:00	2	194	35	0	13	0	0	1	1	0	0	0	0	246
16:00	2	201	51	0	11	0	0	3	0	0	0	0	0	268
17:00	2	191	34	1	17	0	0	0	0	0	0	0	0	245
18:00	0	192	24	0	9	0	0	1	0	0	0	0	0	226
19:00	0	162	35	1	7	0	0	0	0	0	0	0	0	205
20:00	0	132	27	0	8	0	0	0	1	0	0	0	0	168
21:00	0	86	21	0	9	0	0	0	0	0	0	0	0	116
22:00	0	55	4	0	7	0	0	0	0	0	0	0	0	66
23:00	0	36	9	0	3	0	0	0	0	0	0	0	0	48
Total	37	2924	750	4	226	8	0	16	12	0	1	1	0	3979
Percent	0.9%	73.5%	18.8%	0.1%	5.7%	0.2%	0.0%	0.4%	0.3%	0.0%	0.0%	0.0%	0.0%	
AM Peak	10:00	09:00	07:00	10:00	07:00	07:00		05:00	05:00			09:00		09:00
Vol.	8	227	76	1	18	2		3	1			1		317
PM Peak	12:00	14:00	12:00	12:00	12:00	12:00		16:00	12:00		13:00			14:00
Vol.	4	238	52	1	19	2		3	4		1			296

Washington Street
north of LaFayette Street
City, State: Nantucket, MA
Client: VHB/ M. Kealey



PRECISION
D A T A
INDUSTRIES, LLC

P.O. Box 301 Berlin, MA 01503
Office: 508.481.3999 Fax: 508.545.1234
Email: datarequests@pdillc.com

133491 A Class
Site Code: 12472
Date Start: 29-Aug-13

NB

Start Time	Bikes	Cars & Trailers	2 Axle Long	Buses	2 Axle 6 Tire	3 Axle Single	4 Axle Single	<5 Axl Double	5 Axle Double	>6 Axl Double	<6 Axl Multi	6 Axle Multi	>6 Axl Multi	Total
08/30/1														
3	0	27	0	0	0	0	0	0	0	0	0	0	0	27
01:00	0	19	2	0	0	0	0	0	0	0	0	0	0	21
02:00	0	2	0	0	0	0	0	0	0	0	0	0	0	2
03:00	0	1	2	0	0	0	0	0	0	0	0	0	0	3
04:00	0	7	2	0	0	0	0	0	0	0	0	0	0	9
05:00	2	34	19	0	1	0	0	0	0	0	0	0	0	56
06:00	0	70	29	0	9	0	0	0	1	0	0	0	0	109
07:00	1	107	62	0	21	0	0	3	2	0	0	0	0	196
08:00	0	168	69	0	10	0	0	1	3	0	0	0	0	251
09:00	0	215	59	0	16	0	0	4	1	0	0	0	0	295
10:00	6	234	53	0	15	1	0	3	0	0	0	0	0	312
11:00	0	218	42	1	15	1	0	3	0	0	0	0	0	280
12 PM	2	201	47	2	15	0	0	2	4	0	0	0	0	273
13:00	2	198	44	1	12	1	0	2	1	1	0	0	0	262
14:00	6	220	42	1	16	0	0	3	1	0	0	0	0	289
15:00	1	226	55	0	15	0	0	0	1	0	0	0	0	298
16:00	2	224	55	0	10	0	0	2	0	0	0	0	0	293
17:00	4	259	47	0	9	0	0	1	0	0	0	0	0	320
18:00	2	233	40	0	10	0	0	0	0	0	0	0	0	285
19:00	6	195	26	1	7	0	0	1	0	0	1	0	0	237
20:00	1	168	27	0	8	0	0	0	0	0	0	0	0	204
21:00	1	101	20	0	7	0	0	0	0	0	0	0	0	129
22:00	3	85	11	0	8	0	0	0	0	0	0	0	0	107
23:00	0	79	10	0	6	0	0	0	0	0	0	0	0	95
Total	39	3291	763	6	210	3	0	25	14	1	1	0	0	4353
Percent	0.9%	75.6%	17.5%	0.1%	4.8%	0.1%	0.0%	0.6%	0.3%	0.0%	0.0%	0.0%	0.0%	
AM Peak	10:00	10:00	08:00	11:00	07:00	10:00		09:00	08:00					10:00
Vol.	6	234	69	1	21	1		4	3					312
PM Peak	14:00	17:00	15:00	12:00	14:00	13:00		14:00	12:00	13:00	19:00			17:00
Vol.	6	259	55	2	16	1		3	4	1	1			320

Washington Street
north of LaFayette Street
City, State: Nantucket, MA
Client: VHB/ M. Kealey



PRECISION
D A T A
INDUSTRIES, LLC

P.O. Box 301 Berlin, MA 01503
Office: 508.481.3999 Fax: 508.545.1234
Email: datarequests@pdillc.com

133491 A Class
Site Code: 12472
Date Start: 29-Aug-13

NB

Start Time	Bikes	Cars & Trailers	2 Axle Long	Buses	2 Axle 6 Tire	3 Axle Single	4 Axle Single	<5 Axl Double	5 Axle Double	>6 Axl Double	<6 Axl Multi	6 Axle Multi	>6 Axl Multi	Total
08/31/1														
3	0	35	5	0	2	0	0	0	0	0	0	0	0	42
01:00	0	33	1	0	0	0	0	0	0	0	0	0	0	34
02:00	0	8	1	0	0	0	0	0	0	0	0	0	0	9
03:00	0	2	1	0	1	0	0	0	0	0	0	0	0	4
04:00	0	3	3	0	0	0	0	0	0	0	0	0	0	6
05:00	0	45	15	0	3	0	0	1	0	0	0	0	0	64
06:00	0	76	23	0	4	0	0	0	0	0	0	0	0	103
07:00	1	138	40	0	13	1	0	0	2	0	0	0	0	195
08:00	2	150	44	1	12	0	0	0	2	0	0	0	0	211
09:00	0	262	49	0	13	0	0	1	0	0	0	0	0	325
10:00	3	239	47	1	11	1	0	1	0	0	0	0	0	303
11:00	3	239	42	1	11	0	0	3	0	0	0	0	0	299
12 PM	4	213	46	0	19	0	0	1	0	0	0	0	0	283
13:00	2	183	43	0	12	0	0	1	0	0	0	0	0	241
14:00	7	199	45	0	11	0	0	2	0	0	0	0	0	264
15:00	8	202	34	0	13	0	0	1	0	0	0	0	0	258
16:00	5	211	32	1	13	0	0	0	0	0	0	0	0	262
17:00	2	192	28	0	9	0	0	0	0	0	0	0	0	231
18:00	5	198	19	0	9	0	0	1	0	0	0	0	0	232
19:00	2	172	17	0	6	0	0	1	0	0	0	0	0	198
20:00	2	148	30	0	7	0	0	0	0	0	0	0	0	187
21:00	2	113	19	0	9	0	0	0	0	0	0	0	0	143
22:00	1	90	11	0	7	0	0	0	0	0	0	0	0	109
23:00	2	80	13	0	5	0	0	0	0	0	0	0	0	100
Total	51	3231	608	4	190	2	0	13	4	0	0	0	0	4103
Percent	1.2%	78.7%	14.8%	0.1%	4.6%	0.0%	0.0%	0.3%	0.1%	0.0%	0.0%	0.0%	0.0%	
AM Peak	10:00	09:00	09:00	08:00	07:00	07:00		11:00	07:00					09:00
Vol.	3	262	49	1	13	1		3	2					325
PM Peak	15:00	12:00	12:00	16:00	12:00			14:00						12:00
Vol.	8	213	46	1	19			2						283
Total		9446	2121	14	626	13	0	54	30	1	2	1	0	12435

Washington Street
north of LaFayette Street
City, State: Nantucket, MA
Client: VHB/ M. Kealey



PRECISION
D A T A
INDUSTRIES, LLC

P.O. Box 301 Berlin, MA 01503
Office: 508.481.3999 Fax: 508.545.1234
Email: datarequests@pdillc.com

133491 A Speed
Site Code: 12472
Date Start: 29-Aug-13

SB

Start Time	1	15	20	25	30	35	40	45	50	55	60	65	70	Total	85th % ile	Ave Speed
08/29/13	0	9	27	39	9	4	1	0	0	1	0	0	0	90	30	25
01:00	0	3	17	26	20	0	0	0	0	0	0	0	0	66	31	26
02:00	1	0	5	14	5	0	1	0	0	0	0	0	0	26	30	26
03:00	0	0	1	4	4	0	0	0	0	0	0	0	0	9	32	29
04:00	0	0	1	2	2	0	0	0	0	0	0	0	0	5	32	28
05:00	0	2	10	9	2	0	0	0	0	0	0	0	0	23	28	24
06:00	1	9	32	27	5	1	0	0	0	0	0	0	0	75	28	23
07:00	3	25	82	44	7	1	0	0	0	0	0	0	0	162	26	22
08:00	6	52	125	30	4	0	0	0	0	0	0	0	0	217	24	20
09:00	22	61	139	33	4	0	0	0	0	0	0	0	0	259	24	19
10:00	25	101	176	32	3	0	0	0	0	0	0	0	0	337	23	19
11:00	33	138	151	26	1	0	0	0	0	0	0	0	0	349	22	17
12 PM	42	107	150	35	3	0	0	0	0	0	0	0	0	337	23	18
13:00	33	153	161	33	0	1	0	0	0	0	0	0	0	381	22	18
14:00	21	83	212	41	2	0	0	0	0	0	0	0	0	359	24	19
15:00	45	130	164	45	5	0	0	0	0	0	0	0	0	389	23	18
16:00	35	148	195	49	3	0	0	0	0	0	0	0	0	430	23	18
17:00	33	118	194	44	6	0	0	0	0	0	0	0	0	395	23	18
18:00	9	65	150	50	7	0	0	0	0	0	0	0	0	281	25	20
19:00	11	67	154	43	2	0	0	0	0	0	0	0	0	277	24	20
20:00	5	57	150	43	2	0	0	0	0	0	0	0	0	257	24	20
21:00	3	26	123	53	3	2	1	0	0	0	0	0	0	211	26	22
22:00	2	34	138	60	6	2	0	0	0	0	0	0	0	242	26	22
23:00	0	18	47	55	20	2	0	0	0	0	0	0	0	142	29	24

%	6.2%	26.4%	49.0%	15.7%	2.4%	0.2%	0.1%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%		
AM Peak	11:00	11:00	10:00	07:00	01:00	00:00	00:00			00:00					11:00	
Vol.	33	138	176	44	20	4	1			1					349	
PM Peak	15:00	13:00	14:00	22:00	23:00	21:00	21:00								16:00	
Vol.	45	153	212	60	20	2	1								430	
Total	330	1406	2604	837	125	13	3	0	0	1	0	0	0	5319	622	

Percent
15th Percentile : 12 MPH
50th Percentile : 19 MPH
85th Percentile : 24 MPH
95th Percentile : 28 MPH

Stats
10 MPH Pace Speed : 16-25 MPH
Number in Pace : 3236
Percent in Pace : 60.8%
Number of Vehicles > 25 MPH : 699
Percent of Vehicles > 25 MPH : 13.1%
Mean Speed(Average) : 19 MPH

Washington Street
north of LaFayette Street
City, State: Nantucket, MA
Client: VHB/ M. Kealey



PRECISION
D A T A
INDUSTRIES, LLC

P.O. Box 301 Berlin, MA 01503
Office: 508.481.3999 Fax: 508.545.1234
Email: datarequests@pdillc.com

133491 A Speed
Site Code: 12472
Date Start: 29-Aug-13

SB

Start Time	1	15	20	25	30	35	40	45	50	55	60	65	70	Total	85th % ile	Ave Speed
08/30/13	0	1	17	55	21	3	0	0	0	0	0	0	0	97	31	27
01:00	0	4	18	47	17	5	1	1	0	0	0	0	0	93	31	27
02:00	0	1	7	7	4	0	1	0	0	0	0	0	0	20	31	26
03:00	0	0	0	0	0	1	0	0	0	0	0	0	0	1	38	37
04:00	1	0	1	1	2	1	0	0	0	0	0	0	0	6	34	24
05:00	0	2	10	5	0	0	0	0	0	0	0	0	0	17	26	22
06:00	0	2	34	22	11	0	0	0	0	0	0	0	0	69	29	25
07:00	4	36	81	40	10	0	0	0	0	0	0	0	0	171	26	21
08:00	2	58	124	43	4	1	0	0	0	0	0	0	0	232	25	21
09:00	6	99	197	54	3	0	0	0	0	0	0	0	0	359	24	20
10:00	48	106	170	38	1	0	0	0	0	0	0	0	0	363	23	18
11:00	36	122	156	41	1	0	0	0	0	0	0	0	0	356	23	18
12 PM	24	141	167	33	3	0	0	0	0	0	0	0	0	368	23	18
13:00	32	121	193	37	5	0	0	0	0	0	0	0	0	388	23	18
14:00	23	121	184	44	4	0	0	0	0	0	0	0	0	376	23	19
15:00	33	136	194	46	3	0	0	0	0	0	0	0	0	412	23	18
16:00	41	196	179	24	0	0	0	0	0	0	0	0	0	440	22	17
17:00	37	104	155	51	1	0	0	0	0	0	0	0	0	348	24	18
18:00	19	71	158	58	2	0	0	0	0	0	0	0	0	308	24	20
19:00	11	112	164	43	2	0	0	0	0	0	0	0	0	332	24	19
20:00	15	94	158	39	6	2	0	0	0	0	0	0	0	314	24	19
21:00	8	76	137	40	2	1	0	1	0	0	0	0	0	265	24	20
22:00	12	50	150	79	7	0	0	0	0	0	0	0	0	298	26	21
23:00	5	19	110	85	11	0	0	0	0	0	0	0	0	230	27	23

%	6.1%	28.5%	47.1%	15.9%	2.0%	0.2%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%		
AM Peak	10:00	11:00	09:00	00:00	00:00	01:00	01:00	01:00							10:00	
Vol.	48	122	197	55	21	5	1	1							363	
PM Peak	16:00	16:00	15:00	23:00	23:00	20:00		21:00							16:00	
Vol.	41	196	194	85	11	2		1							440	
Total	357	1672	2764	932	120	14	2	2	0	0	0	0	0	0	5863	628

Pecent
t
15th Percentile : 12 MPH
50th Percentile : 19 MPH
85th Percentile : 24 MPH
95th Percentile : 28 MPH

Stats
10 MPH Pace Speed : 16-25 MPH
Number in Pace : 3534
Percent in Pace : 60.3%
Number of Vehicles > 25 MPH : 747
Percent of Vehicles > 25 MPH : 12.7%
Mean Speed(Average) : 19 MPH

Washington Street
north of LaFayette Street
City, State: Nantucket, MA
Client: VHB/ M. Kealey



PRECISION
D A T A
INDUSTRIES, LLC

P.O. Box 301 Berlin, MA 01503
Office: 508.481.3999 Fax: 508.545.1234
Email: datarequests@pdillc.com

133491 A Speed
Site Code: 12472
Date Start: 29-Aug-13

SB

Start Time	1	15	20	25	30	35	40	45	50	55	60	65	70	Total	85th % ile	Ave Speed
08/31/																
13	1	5	34	75	21	2	1	0	0	0	0	0	0	139	30	26
01:00	0	10	46	62	30	3	2	0	1	0	0	0	0	154	31	26
02:00	0	4	19	38	7	1	1	1	0	0	0	0	0	71	29	26
03:00	0	1	2	6	0	0	0	0	0	0	0	0	0	9	28	24
04:00	0	0	2	4	0	0	0	0	0	0	0	0	0	6	28	25
05:00	0	0	8	6	0	0	0	0	0	0	0	0	0	14	27	24
06:00	0	3	31	27	2	0	0	0	0	0	0	0	0	63	27	24
07:00	2	16	89	47	5	0	0	0	0	0	0	0	0	159	26	22
08:00	4	54	106	42	4	0	0	0	0	0	0	0	0	210	25	20
09:00	12	79	136	38	3	0	0	0	0	0	0	0	0	268	24	19
10:00	28	123	158	45	3	0	0	0	0	0	0	0	0	357	23	18
11:00	39	115	150	60	6	0	0	0	0	0	0	0	0	370	24	18
12 PM	24	145	191	28	6	0	0	0	0	0	0	0	0	394	23	18
13:00	25	144	183	26	3	0	0	0	0	0	0	0	0	381	23	18
14:00	24	109	151	36	5	1	0	0	0	0	0	0	0	326	23	18
15:00	26	122	186	42	6	0	0	0	0	0	0	0	0	382	23	19
16:00	22	109	154	58	4	0	0	0	0	0	0	0	0	347	24	19
17:00	28	108	183	41	5	0	0	0	0	0	0	0	0	365	23	19
18:00	8	76	179	36	4	0	0	0	0	0	0	0	0	303	24	20
19:00	11	91	152	46	3	0	0	0	0	0	0	0	0	303	24	19
20:00	10	78	139	39	4	1	1	0	0	0	0	0	0	272	24	20
21:00	8	45	127	40	4	1	0	0	0	0	0	0	0	225	25	20
22:00	5	73	146	47	12	0	0	0	0	0	0	0	0	283	25	20
23:00	9	32	128	84	8	3	0	0	0	0	0	0	0	264	27	22

%	5.0%	27.2%	47.7%	17.2%	2.6%	0.2%	0.1%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
AM Peak	11:00	10:00	10:00	00:00	01:00	01:00	01:00	02:00	01:00						11:00
Vol.	39	123	158	75	30	3	2	1	1						370
PM Peak	17:00	12:00	12:00	23:00	22:00	23:00	20:00								12:00
Vol.	28	145	191	84	12	3	1								394
Total	286	1542	2700	973	145	12	5	1	1	0	0	0	0	5665	610

Percent
15th Percentile : 12 MPH
50th Percentile : 19 MPH
85th Percentile : 25 MPH
95th Percentile : 28 MPH

Stats
10 MPH Pace Speed : 16-25 MPH
Number in Pace : 3444
Percent in Pace : 60.8%
Number of Vehicles > 25 MPH : 803
Percent of Vehicles > 25 MPH : 14.2%
Mean Speed(Average) : 20 MPH

Washington Street
north of LaFayette Street
City, State: Nantucket, MA
Client: VHB/ M. Kealey



PRECISION
D A T A
INDUSTRIES, LLC

P.O. Box 301 Berlin, MA 01503
Office: 508.481.3999 Fax: 508.545.1234
Email: datarequests@pdillc.com

133491 A Speed
Site Code: 12472
Date Start: 29-Aug-13

NB	Start Time	1	15	20	25	30	35	40	45	50	55	60	65	70	Total	85th % ile	Ave Speed
		14	19	24	29	34	39	44	49	54	59	64	69	9999			
08/29/	13	0	0	9	10	4	1	0	0	0	0	0	0	0	24	30	26
	01:00	1	1	5	13	1	0	0	0	0	0	0	0	0	21	28	24
	02:00	0	0	2	7	0	0	0	0	0	0	0	0	0	9	28	26
	03:00	0	1	0	2	1	0	0	0	0	0	0	0	0	4	30	24
	04:00	0	2	3	2	2	0	0	0	0	0	0	0	0	9	30	23
	05:00	0	8	35	13	0	0	0	0	0	0	0	0	0	56	25	22
	06:00	0	15	54	29	4	0	0	1	0	0	0	0	0	103	27	23
	07:00	6	42	116	43	3	0	0	0	0	0	0	0	0	210	25	21
	08:00	6	75	130	31	3	0	0	0	0	0	0	0	0	245	24	20
	09:00	16	101	166	32	2	0	0	0	0	0	0	0	0	317	23	19
	10:00	23	106	155	11	1	0	0	0	0	0	0	0	0	296	22	18
	11:00	23	97	125	15	0	0	0	0	0	0	0	0	0	260	22	18
	12 PM	27	131	98	14	0	0	0	0	0	0	0	0	0	270	22	17
	13:00	19	88	135	29	0	0	0	0	0	0	0	0	0	271	23	18
	14:00	21	91	158	25	1	0	0	0	0	0	0	0	0	296	23	18
	15:00	30	82	112	21	1	0	0	0	0	0	0	0	0	246	23	17
	16:00	26	76	141	25	0	0	0	0	0	0	0	0	0	268	23	18
	17:00	10	77	135	23	0	0	0	0	0	0	0	0	0	245	23	19
	18:00	19	69	118	20	0	0	0	0	0	0	0	0	0	226	23	18
	19:00	4	49	130	20	2	0	0	0	0	0	0	0	0	205	24	20
	20:00	3	39	103	21	2	0	0	0	0	0	0	0	0	168	24	20
	21:00	0	15	71	27	3	0	0	0	0	0	0	0	0	116	26	22
	22:00	1	10	33	17	5	0	0	0	0	0	0	0	0	66	27	22
	23:00	1	2	19	20	5	0	1	0	0	0	0	0	0	48	29	25

%	5.9%	29.6%	51.6%	11.8%	1.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%			
AM Peak	10:00	10:00	09:00	07:00	00:00	00:00		06:00							09:00		
Vol.	23	106	166	43	4	1		1							317		
PM Peak	15:00	12:00	14:00	13:00	22:00		23:00								14:00		
Vol.	30	131	158	29	5		1								296		
Total	236	1177	2053	470	40	1	1	1	0	0	0	0	0	0	3979	604	

Percent
15th Percentile : 12 MPH
50th Percentile : 19 MPH
85th Percentile : 23 MPH
95th Percentile : 26 MPH

Stats
10 MPH Pace Speed : 16-25 MPH
Number in Pace : 2528
Percent in Pace : 63.5%
Number of Vehicles > 25 MPH : 369
Percent of Vehicles > 25 MPH : 9.3%
Mean Speed(Average) : 19 MPH

Washington Street
north of LaFayette Street
City, State: Nantucket, MA
Client: VHB/ M. Kealey



PRECISION
D A T A
INDUSTRIES, LLC

P.O. Box 301 Berlin, MA 01503
Office: 508.481.3999 Fax: 508.545.1234
Email: datarequests@pdillc.com

133491 A Speed
Site Code: 12472
Date Start: 29-Aug-13

NB

Start Time	1	15	20	25	30	35	40	45	50	55	60	65	70	Total	85th % ile	Ave Speed
08/30/13	0	0	9	14	2	2	0	0	0	0	0	0	0	27	30	26
01:00	0	0	9	9	3	0	0	0	0	0	0	0	0	21	29	26
02:00	0	0	0	1	1	0	0	0	0	0	0	0	0	2	32	29
03:00	0	0	0	2	1	0	0	0	0	0	0	0	0	3	31	29
04:00	0	1	4	3	1	0	0	0	0	0	0	0	0	9	28	24
05:00	0	9	36	10	1	0	0	0	0	0	0	0	0	56	25	22
06:00	2	18	56	30	2	1	0	0	0	0	0	0	0	109	26	22
07:00	6	61	107	21	1	0	0	0	0	0	0	0	0	196	23	19
08:00	16	58	150	26	1	0	0	0	0	0	0	0	0	251	23	19
09:00	21	79	155	39	1	0	0	0	0	0	0	0	0	295	24	19
10:00	26	109	146	30	1	0	0	0	0	0	0	0	0	312	23	18
11:00	28	96	138	16	2	0	0	0	0	0	0	0	0	280	22	18
12 PM	24	88	133	27	1	0	0	0	0	0	0	0	0	273	23	18
13:00	21	90	136	15	0	0	0	0	0	0	0	0	0	262	22	18
14:00	51	83	140	14	0	1	0	0	0	0	0	0	0	289	22	17
15:00	24	121	127	25	1	0	0	0	0	0	0	0	0	298	22	18
16:00	28	106	139	19	1	0	0	0	0	0	0	0	0	293	22	18
17:00	28	96	163	32	1	0	0	0	0	0	0	0	0	320	23	18
18:00	13	71	162	38	1	0	0	0	0	0	0	0	0	285	24	20
19:00	4	49	149	31	4	0	0	0	0	0	0	0	0	237	24	21
20:00	12	38	115	37	2	0	0	0	0	0	0	0	0	204	25	20
21:00	5	27	78	19	0	0	0	0	0	0	0	0	0	129	24	20
22:00	3	20	52	26	6	0	0	0	0	0	0	0	0	107	26	21
23:00	1	6	46	35	7	0	0	0	0	0	0	0	0	95	28	24

%	7.2%	28.2%	51.7%	11.9%	0.9%	0.1%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%		
AM Peak	11:00	10:00	09:00	09:00	01:00	00:00									10:00	
Vol.	28	109	155	39	3	2									312	
PM Peak	14:00	15:00	17:00	18:00	23:00	14:00									17:00	
Vol.	51	121	163	38	7	1									320	
Total	313	1226	2250	519	41	4	0	0	0	0	0	0	0	0	4353	601

Percent
15th Percentile : 11 MPH
50th Percentile : 19 MPH
85th Percentile : 23 MPH
95th Percentile : 26 MPH

Stats
10 MPH Pace Speed : 16-25 MPH
Number in Pace : 2726
Percent in Pace : 62.6%
Number of Vehicles > 25 MPH : 404
Percent of Vehicles > 25 MPH : 9.3%
Mean Speed(Average) : 19 MPH

Washington Street
north of LaFayette Street
City, State: Nantucket, MA
Client: VHB/ M. Kealey



PRECISION
D A T A
INDUSTRIES, LLC

P.O. Box 301 Berlin, MA 01503
Office: 508.481.3999 Fax: 508.545.1234
Email: datarequests@pdillc.com

133491 A Speed
Site Code: 12472
Date Start: 29-Aug-13

NB	Start Time	1	15	20	25	30	35	40	45	50	55	60	65	70	Total	85th % ile	Ave Speed
		14	19	24	29	34	39	44	49	54	59	64	69	9999			
08/31/																	
13	0	2	16	20	3	0	0	1	0	0	0	0	0	0	42	28	25
01:00	0	0	10	21	3	0	0	0	0	0	0	0	0	0	34	29	26
02:00	0	1	2	6	0	0	0	0	0	0	0	0	0	0	9	28	24
03:00	0	0	2	2	0	0	0	0	0	0	0	0	0	0	4	27	24
04:00	0	2	2	2	0	0	0	0	0	0	0	0	0	0	6	26	21
05:00	1	16	36	9	0	2	0	0	0	0	0	0	0	0	64	24	21
06:00	0	5	51	42	4	1	0	0	0	0	0	0	0	0	103	27	24
07:00	8	39	96	47	5	0	0	0	0	0	0	0	0	0	195	26	21
08:00	13	78	92	25	3	0	0	0	0	0	0	0	0	0	211	23	18
09:00	17	106	176	26	0	0	0	0	0	0	0	0	0	0	325	23	19
10:00	38	95	145	25	0	0	0	0	0	0	0	0	0	0	303	23	17
11:00	21	99	146	33	0	0	0	0	0	0	0	0	0	0	299	23	18
12 PM	22	98	143	19	1	0	0	0	0	0	0	0	0	0	283	23	18
13:00	26	85	109	19	2	0	0	0	0	0	0	0	0	0	241	23	18
14:00	32	94	124	12	2	0	0	0	0	0	0	0	0	0	264	22	17
15:00	18	80	138	20	2	0	0	0	0	0	0	0	0	0	258	23	18
16:00	27	88	128	18	1	0	0	0	0	0	0	0	0	0	262	23	18
17:00	18	59	128	24	2	0	0	0	0	0	0	0	0	0	231	23	19
18:00	2	54	147	29	0	0	0	0	0	0	0	0	0	0	232	24	20
19:00	5	60	111	20	2	0	0	0	0	0	0	0	0	0	198	23	19
20:00	7	46	107	26	0	0	1	0	0	0	0	0	0	0	187	24	20
21:00	3	29	89	20	2	0	0	0	0	0	0	0	0	0	143	24	20
22:00	0	17	66	24	2	0	0	0	0	0	0	0	0	0	109	25	22
23:00	3	7	55	33	1	1	0	0	0	0	0	0	0	0	100	26	22

%	6.4%	28.3%	51.6%	12.7%	0.9%	0.1%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%				
AM Peak	10:00	09:00	09:00	07:00	07:00	05:00	00:00									09:00		
Vol.	38	106	176	47	5	2	1									325		
PM Peak	14:00	12:00	18:00	23:00	13:00	23:00	20:00									12:00		
Vol.	32	98	147	33	2	1	1									283		
Total	261	1160	2119	522	35	4	2	0	0	0	0	0	0	0	4103	590		

Percent
15th Percentile : 11 MPH
50th Percentile : 19 MPH
85th Percentile : 24 MPH
95th Percentile : 27 MPH

Stats
10 MPH Pace Speed : 16-25 MPH
Number in Pace : 2588
Percent in Pace : 63.1%
Number of Vehicles > 25 MPH : 398
Percent of Vehicles > 25 MPH : 9.7%
Mean Speed(Average) : 19 MPH

Washington Street
north of LaFayette Street
City, State: Nantucket, MA
Client: VHB/ M. Kealey



PRECISION
D A T A
INDUSTRIES, LLC

P.O. Box 301 Berlin, MA 01503
Office: 508.481.3999 Fax: 508.545.1234
Email: datarequests@pdillc.com

133491 A Volume
Site Code: 12472
Date Start: 29-Aug-13

Start Time	SB		NB		Combin ed		29-Aug-13 Thu							
	A.M.	P.M.	A.M.	P.M.	A.M.	P.M.								
12:00	30	93	6	57	36	150								
12:15	23	80	7	54	30	134								
12:30	17	76	7	79	24	155								
12:45	20	90	88	337	4	24	80	270	24	114	168	607		
01:00	14	83	8	74	22	157								
01:15	23	99	4	64	27	163								
01:30	16	99	4	64	20	163								
01:45	13	66	100	381	5	21	69	271	18	87	169	652		
02:00	11	96	4	64	15	160								
02:15	6	91	4	77	10	168								
02:30	8	79	1	63	9	142								
02:45	1	26	93	359	0	9	92	296	1	35	185	655		
03:00	4	97	0	62	4	159								
03:15	1	107	3	71	4	178								
03:30	1	99	1	52	2	151								
03:45	3	9	86	389	0	4	61	246	3	13	147	635		
04:00	2	100	1	84	3	184								
04:15	0	103	1	69	1	172								
04:30	1	134	4	61	5	195								
04:45	2	5	93	430	3	9	54	268	5	14	147	698		
05:00	2	114	10	52	12	166								
05:15	4	104	8	61	12	165								
05:30	5	90	16	64	21	154								
05:45	12	23	87	395	22	56	68	245	34	79	155	640		
06:00	13	98	28	52	41	150								
06:15	22	69	11	57	33	126								
06:30	10	66	27	50	37	116								
06:45	30	75	48	281	37	103	67	226	67	178	115	507		
07:00	21	56	44	55	65	111								
07:15	40	96	65	46	105	142								
07:30	35	55	57	51	92	106								
07:45	66	162	70	277	44	210	53	205	110	372	123	482		
08:00	56	61	49	67	105	128								
08:15	57	76	52	42	109	118								
08:30	44	66	65	39	109	105								
08:45	60	217	54	257	79	245	20	168	139	462	74	425		
09:00	56	53	80	34	136	87								
09:15	66	51	72	24	138	75								
09:30	73	58	91	35	164	93								
09:45	64	259	49	211	74	317	23	116	138	576	72	327		
10:00	87	81	97	16	184	97								
10:15	78	64	58	16	136	80								
10:30	88	48	60	17	148	65								
10:45	84	337	49	242	81	296	17	66	165	633	66	308		
11:00	87	40	71	16	158	56								
11:15	83	39	67	14	150	53								
11:30	90	32	71	4	161	36								
11:45	89	349	31	142	51	260	14	48	140	609	45	190		
Total	1618	3701	1554	2425	3172	6126								
Percent	51.0%	60.4%	49.0%	39.6%										
Day Total		5319		3979		9298								
Peak	11:00	-	04:30	-	09:15	-	00:30	-	10:45	-	03:45	-	-	-
Vol.	349	-	445	-	334	-	297	-	634	-	698	-	-	-
P.H.F.	0.969		0.830		0.861		0.928		0.961		0.895			

Washington Street
north of LaFayette Street
City, State: Nantucket, MA
Client: VHB/ M. Kealey



PRECISION
D A T A
INDUSTRIES, LLC

P.O. Box 301 Berlin, MA 01503
Office: 508.481.3999 Fax: 508.545.1234
Email: datarequests@pdillc.com

133491 A Volume
Site Code: 12472
Date Start: 29-Aug-13

Start Time	SB		NB		Combin ed		30-Aug-13 Fri
	A.M.	P.M.	A.M.	P.M.	A.M.	P.M.	
12:00	32	85	11	77	43	162	
12:15	25	89	6	59	31	148	
12:30	19	110	5	69	24	179	
12:45	21	97 84	368	5 27	68 273	26 124	152 641
01:00	21	109	7	69	28	178	
01:15	34	102	7	64	41	166	
01:30	22	93	5	62	27	155	
01:45	16	93 84	388	2 21	67 262	18 114	151 650
02:00	10	93	1	80	11	173	
02:15	4	88	1	56	5	144	
02:30	4	89	0	66	4	155	
02:45	2	20 106	376	0 2	87 289	2 22	193 665
03:00	1	98	0	76	1	174	
03:15	0	104	2	69	2	173	
03:30	0	107	1	73	1	180	
03:45	0	1 103	412	0 3	80 298	0 4	183 710
04:00	0	118	1	64	1	182	
04:15	0	118	3	65	3	183	
04:30	3	117	5	70	8	187	
04:45	3	6 87	440	0 9	94 293	3 15	181 733
05:00	0	109	8	84	8	193	
05:15	8	70	13	85	21	155	
05:30	4	75	17	90	21	165	
05:45	5	17 94	348	18 56	61 320	23 73	155 668
06:00	10	98	22	72	32	170	
06:15	15	68	20	62	35	130	
06:30	22	74	31	66	53	140	
06:45	22	69 68	308	36 109	85 285	58 178	153 593
07:00	24	82	40	77	64	159	
07:15	36	83	45	62	81	145	
07:30	48	91	53	45	101	136	
07:45	63	171 76	332	58 196	53 237	121 367	129 569
08:00	51	71	55	59	106	130	
08:15	62	84	51	54	113	138	
08:30	58	89	66	42	124	131	
08:45	61	232 70	314	79 251	49 204	140 483	119 518
09:00	88	65	85	33	173	98	
09:15	97	77	72	31	169	108	
09:30	88	57	68	32	156	89	
09:45	86	359 66	265	70 295	33 129	156 654	99 394
10:00	90	96	101	29	191	125	
10:15	92	71	60	25	152	96	
10:30	100	68	75	25	175	93	
10:45	81	363 63	298	76 312	28 107	157 675	91 405
11:00	94	61	70	26	164	87	
11:15	68	67	68	33	136	100	
11:30	93	51	77	19	170	70	
11:45	101	356 51	230	65 280	17 95	166 636	68 325
Total	1784	4079	1561	2792	3345	6871	
Percent	53.3%	59.4%	46.7%	40.6%			
Day Total		5863		4353		10216	
Peak Vol.	09:45 - 368	03:45 - 456	10:00 - 312	04:45 - 353	10:00 - 675	04:15 - 744	
P.H.F.	0.920	0.966	0.772	0.939	0.884	0.964	

Washington Street
north of LaFayette Street
City, State: Nantucket, MA
Client: VHB/ M. Kealey



PRECISION
D A T A
INDUSTRIES, LLC

P.O. Box 301 Berlin, MA 01503
Office: 508.481.3999 Fax: 508.545.1234
Email: datarequests@pdillc.com

133491 A Volume
Site Code: 12472
Date Start: 29-Aug-13

Start Time	SB		NB		Combin ed		31-Aug- 13 Sat						
	A.M.	P.M.	A.M.	P.M.	A.M.	P.M.							
12:00	39	85	9	67	48	152							
12:15	44	105	11	80	55	185							
12:30	24	107	14	68	38	175							
12:45	32	139	97	394	8	42	68	283	40	181	165	677	
01:00	32	93	9	69	41	162							
01:15	58	90	7	51	65	141							
01:30	32	102	13	63	45	165							
01:45	32	154	96	381	5	34	58	241	37	188	154	622	
02:00	31	77	3	63	34	140							
02:15	19	96	2	45	21	141							
02:30	13	83	4	62	17	145							
02:45	8	71	70	326	0	9	94	264	8	80	164	590	
03:00	5	88	1	86	6	174							
03:15	1	116	1	41	2	157							
03:30	0	111	1	59	1	170							
03:45	3	9	67	382	1	4	72	258	4	13	139	640	
04:00	3	99	1	59	4	158							
04:15	1	75	1	63	2	138							
04:30	0	93	2	70	2	163							
04:45	2	6	80	347	2	6	70	262	4	12	150	609	
05:00	2	99	5	51	7	150							
05:15	2	86	11	54	13	140							
05:30	2	90	15	71	17	161							
05:45	8	14	90	365	33	64	55	231	41	78	145	596	
06:00	11	95	28	63	39	158							
06:15	20	83	21	52	41	135							
06:30	12	64	18	53	30	117							
06:45	20	63	61	303	36	103	64	232	56	166	125	535	
07:00	27	80	43	53	70	133							
07:15	35	75	50	50	85	125							
07:30	50	86	54	52	104	138							
07:45	47	159	62	303	48	195	43	198	95	354	105	501	
08:00	46	65	44	58	90	123							
08:15	49	67	43	49	92	116							
08:30	52	82	35	45	87	127							
08:45	63	210	58	272	89	211	35	187	152	421	93	459	
09:00	58	65	82	47	140	112							
09:15	80	63	74	28	154	91							
09:30	66	40	84	37	150	77							
09:45	64	268	57	225	85	325	31	143	149	593	88	368	
10:00	84	82	89	29	173	111							
10:15	92	73	79	21	171	94							
10:30	98	71	66	27	164	98							
10:45	83	357	57	283	69	303	32	109	152	660	89	392	
11:00	86	71	83	23	169	94							
11:15	90	60	81	26	171	86							
11:30	97	67	64	25	161	92							
11:45	97	370	66	264	71	299	26	100	168	669	92	364	
Total	1820	3845	1595	2508	3415	6353							
Percent	53.3%	60.5%	46.7%	39.5%									
Day Total		5665		4103		9768							
Peak	11:00	-	00:15	-	09:30	-	02:15	-	11:00	-	00:15	-	-
Vol.	370	-	402	-	337	-	287	-	669	-	687	-	-
P.H.F.	0.944		0.939		0.947		0.763		0.978		0.928		



PRECISION
D A T A
INDUSTRIES, LLC

P.O. Box 301 Berlin, MA 01503
Office: 508.481.3999 Fax: 508.545.1234
Email: datarequests@pdillc.com

File Name : 133491 A
Site Code : 12472
Start Date : 8/29/2013
Page No : 1

N/S: Washington Street
W: Francis Street
City, State: Nantucket, MA
Client: VHB/ M. Kealey

Groups Printed- Cars - Heavy Vehicles

Start Time	Washington Street From North			Washington Street From South			Francis Street From West			Int. Total
	Right	Thru	U-Turn	Thru	Left	U-Turn	Right	Left	U-Turn	
11:00 AM	89	4	0	4	8	0	5	71	0	181
11:15 AM	84	2	0	4	10	0	4	71	0	175
11:30 AM	91	2	0	5	3	0	4	68	0	173
11:45 AM	81	5	0	2	4	0	5	54	0	151
Total	345	13	0	15	25	0	18	264	0	680
12:00 PM	90	4	0	4	2	0	5	60	0	165
12:15 PM	78	5	0	1	3	0	5	54	0	146
12:30 PM	81	1	0	6	3	0	4	78	0	173
12:45 PM	86	6	0	2	3	0	6	84	0	187
Total	335	16	0	13	11	0	20	276	0	671
01:00 PM	82	10	0	5	12	0	3	71	0	183
01:15 PM	95	5	0	7	8	0	8	64	0	187
01:30 PM	100	5	0	7	10	0	4	62	0	188
01:45 PM	102	3	0	4	5	0	5	66	0	185
Total	379	23	0	23	35	0	20	263	0	743
Grand Total	1059	52	0	51	71	0	58	803	0	2094
Apprch %	95.3	4.7	0	41.8	58.2	0	6.7	93.3	0	
Total %	50.6	2.5	0	2.4	3.4	0	2.8	38.3	0	
Cars	977	47	0	50	63	0	53	720	0	1910
% Cars	92.3	90.4	0	98	88.7	0	91.4	89.7	0	91.2
Heavy Vehicles	82	5	0	1	8	0	5	83	0	184
% Heavy Vehicles	7.7	9.6	0	2	11.3	0	8.6	10.3	0	8.8

Start Time	Washington Street From North				Washington Street From South				Francis Street From West				Int. Total
	Right	Thru	U-Turn	App. Total	Thru	Left	U-Turn	App. Total	Right	Left	U-Turn	App. Total	
Peak Hour Analysis From 11:00 AM to 12:45 PM - Peak 1 of 1													
Peak Hour for Entire Intersection Begins at 11:00 AM													
11:00 AM	89	4	0	93	4	8	0	12	5	71	0	76	181
11:15 AM	84	2	0	86	4	10	0	14	4	71	0	75	175
11:30 AM	91	2	0	93	5	3	0	8	4	68	0	72	173
11:45 AM	81	5	0	86	2	4	0	6	5	54	0	59	151
Total Volume	345	13	0	358	15	25	0	40	18	264	0	282	680
% App. Total	96.4	3.6	0		37.5	62.5	0		6.4	93.6	0		
PHF	.948	.650	.000	.962	.750	.625	.000	.714	.900	.930	.000	.928	.939
Cars	309	12	0	321	15	21	0	36	17	235	0	252	609
% Cars	89.6	92.3	0	89.7	100	84.0	0	90.0	94.4	89.0	0	89.4	89.6
Heavy Vehicles	36	1	0	37	0	4	0	4	1	29	0	30	71
% Heavy Vehicles	10.4	7.7	0	10.3	0	16.0	0	10.0	5.6	11.0	0	10.6	10.4



PRECISION
D A T A
INDUSTRIES, LLC

P.O. Box 301 Berlin, MA 01503
Office: 508.481.3999 Fax: 508.545.1234
Email: datarequests@pdillc.com

File Name : 133491 A
Site Code : 12472
Start Date : 8/29/2013
Page No : 1

N/S: Washington Street
W: Francis Street
City, State: Nantucket, MA
Client: VHB/ M. Kealey

Groups Printed- Cars

Start Time	Washington Street From North			Washington Street From South			Francis Street From West			Int. Total
	Right	Thru	U-Turn	Thru	Left	U-Turn	Right	Left	U-Turn	
11:00 AM	79	4	0	4	6	0	4	60	0	157
11:15 AM	77	1	0	4	9	0	4	68	0	163
11:30 AM	80	2	0	5	2	0	4	59	0	152
11:45 AM	73	5	0	2	4	0	5	48	0	137
Total	309	12	0	15	21	0	17	235	0	609
12:00 PM	84	4	0	4	2	0	5	52	0	151
12:15 PM	72	3	0	1	3	0	4	49	0	132
12:30 PM	75	0	0	6	3	0	3	67	0	154
12:45 PM	83	5	0	2	3	0	6	76	0	175
Total	314	12	0	13	11	0	18	244	0	612
01:00 PM	77	10	0	5	9	0	3	64	0	168
01:15 PM	88	5	0	6	8	0	7	59	0	173
01:30 PM	93	5	0	7	10	0	4	58	0	177
01:45 PM	96	3	0	4	4	0	4	60	0	171
Total	354	23	0	22	31	0	18	241	0	689
Grand Total	977	47	0	50	63	0	53	720	0	1910
Apprch %	95.4	4.6	0	44.2	55.8	0	6.9	93.1	0	
Total %	51.2	2.5	0	2.6	3.3	0	2.8	37.7	0	

Start Time	Washington Street From North				Washington Street From South				Francis Street From West				Int. Total
	Right	Thru	U-Turn	App. Total	Thru	Left	U-Turn	App. Total	Right	Left	U-Turn	App. Total	
Peak Hour Analysis From 11:00 AM to 12:45 PM - Peak 1 of 1													
Peak Hour for Entire Intersection Begins at 12:00 PM													
12:00 PM	84	4	0	88	4	2	0	6	5	52	0	57	151
12:15 PM	72	3	0	75	1	3	0	4	4	49	0	53	132
12:30 PM	75	0	0	75	6	3	0	9	3	67	0	70	154
12:45 PM	83	5	0	88	2	3	0	5	6	76	0	82	175
Total Volume	314	12	0	326	13	11	0	24	18	244	0	262	612
% App. Total	96.3	3.7	0		54.2	45.8	0		6.9	93.1	0		
PHF	.935	.600	.000	.926	.542	.917	.000	.667	.750	.803	.000	.799	.874



PRECISION
D A T A
INDUSTRIES, LLC

P.O. Box 301 Berlin, MA 01503
Office: 508.481.3999 Fax: 508.545.1234
Email: datarequests@pdillc.com

File Name : 133491 A
Site Code : 12472
Start Date : 8/29/2013
Page No : 1

N/S: Washington Street
W: Francis Street
City, State: Nantucket, MA
Client: VHB/ M. Kealey

Groups Printed- Heavy Vehicles

Start Time	Washington Street From North			Washington Street From South			Francis Street From West			Int. Total
	Right	Thru	U-Turn	Thru	Left	U-Turn	Right	Left	U-Turn	
11:00 AM	10	0	0	0	2	0	1	11	0	24
11:15 AM	7	1	0	0	1	0	0	3	0	12
11:30 AM	11	0	0	0	1	0	0	9	0	21
11:45 AM	8	0	0	0	0	0	0	6	0	14
Total	36	1	0	0	4	0	1	29	0	71
12:00 PM	6	0	0	0	0	0	0	8	0	14
12:15 PM	6	2	0	0	0	0	1	5	0	14
12:30 PM	6	1	0	0	0	0	1	11	0	19
12:45 PM	3	1	0	0	0	0	0	8	0	12
Total	21	4	0	0	0	0	2	32	0	59
01:00 PM	5	0	0	0	3	0	0	7	0	15
01:15 PM	7	0	0	1	0	0	1	5	0	14
01:30 PM	7	0	0	0	0	0	0	4	0	11
01:45 PM	6	0	0	0	1	0	1	6	0	14
Total	25	0	0	1	4	0	2	22	0	54
Grand Total	82	5	0	1	8	0	5	83	0	184
Apprch %	94.3	5.7	0	11.1	88.9	0	5.7	94.3	0	
Total %	44.6	2.7	0	0.5	4.3	0	2.7	45.1	0	

Start Time	Washington Street From North				Washington Street From South				Francis Street From West				Int. Total
	Right	Thru	U-Turn	App. Total	Thru	Left	U-Turn	App. Total	Right	Left	U-Turn	App. Total	
Peak Hour Analysis From 11:00 AM to 12:45 PM - Peak 1 of 1													
Peak Hour for Entire Intersection Begins at 11:00 AM													
11:00 AM	10	0	0	10	0	2	0	2	1	11	0	12	24
11:15 AM	7	1	0	8	0	1	0	1	0	3	0	3	12
11:30 AM	11	0	0	11	0	1	0	1	0	9	0	9	21
11:45 AM	8	0	0	8	0	0	0	0	0	6	0	6	14
Total Volume	36	1	0	37	0	4	0	4	1	29	0	30	71
% App. Total	97.3	2.7	0		0	100	0		3.3	96.7	0		
PHF	.818	.250	.000	.841	.000	.500	.000	.500	.250	.659	.000	.625	.740



PRECISION
D A T A
INDUSTRIES, LLC

P.O. Box 301 Berlin, MA 01503
Office: 508.481.3999 Fax: 508.545.1234
Email: datarequests@pdillc.com

File Name : 133491 A
Site Code : 12472
Start Date : 8/29/2013
Page No : 1

N/S: Washington Street
W: Francis Street
City, State: Nantucket, MA
Client: VHB/ M. Kealey

Groups Printed- Peds and Bikes

Start Time	Washington Street From North			Washington Street From South			Francis Street From West			Int. Total
	Right	Thru	Peds	Thru	Left	Peds	Right	Left	Peds	
11:00 AM	10	1	2	1	0	0	0	3	2	19
11:15 AM	15	0	3	2	0	0	0	8	1	29
11:30 AM	5	3	3	3	3	0	0	7	4	28
11:45 AM	10	3	2	0	0	0	0	6	7	28
Total	40	7	10	6	3	0	0	24	14	104
12:00 PM	12	0	3	2	2	0	0	3	11	33
12:15 PM	8	1	6	4	0	0	0	3	7	29
12:30 PM	11	0	5	5	0	2	0	15	8	46
12:45 PM	14	0	0	0	0	0	0	8	4	26
Total	45	1	14	11	2	2	0	29	30	134
01:00 PM	3	7	0	2	2	0	2	13	9	38
01:15 PM	4	2	0	2	0	0	0	4	4	16
01:30 PM	1	2	0	3	0	0	0	8	2	16
01:45 PM	2	0	0	2	0	0	2	9	1	16
Total	10	11	0	9	2	0	4	34	16	86
Grand Total	95	19	24	26	7	2	4	87	60	324
Apprch %	68.8	13.8	17.4	74.3	20	5.7	2.6	57.6	39.7	
Total %	29.3	5.9	7.4	8	2.2	0.6	1.2	26.9	18.5	

Start Time	Washington Street From North				Washington Street From South				Francis Street From West				Int. Total
	Right	Thru	Peds	App. Total	Thru	Left	Peds	App. Total	Right	Left	Peds	App. Total	
Peak Hour Analysis From 11:00 AM to 12:45 PM - Peak 1 of 1													
Peak Hour for Entire Intersection Begins at 11:45 AM													
11:45 AM	10	3	2	15	0	0	0	0	0	6	7	13	28
12:00 PM	12	0	3	15	2	2	0	4	0	3	11	14	33
12:15 PM	8	1	6	15	4	0	0	4	0	3	7	10	29
12:30 PM	11	0	5	16	5	0	2	7	0	15	8	23	46
Total Volume	41	4	16	61	11	2	2	15	0	27	33	60	136
% App. Total	67.2	6.6	26.2		73.3	13.3	13.3		0	45	55		
PHF	.854	.333	.667	.953	.550	.250	.250	.536	.000	.450	.750	.652	.739



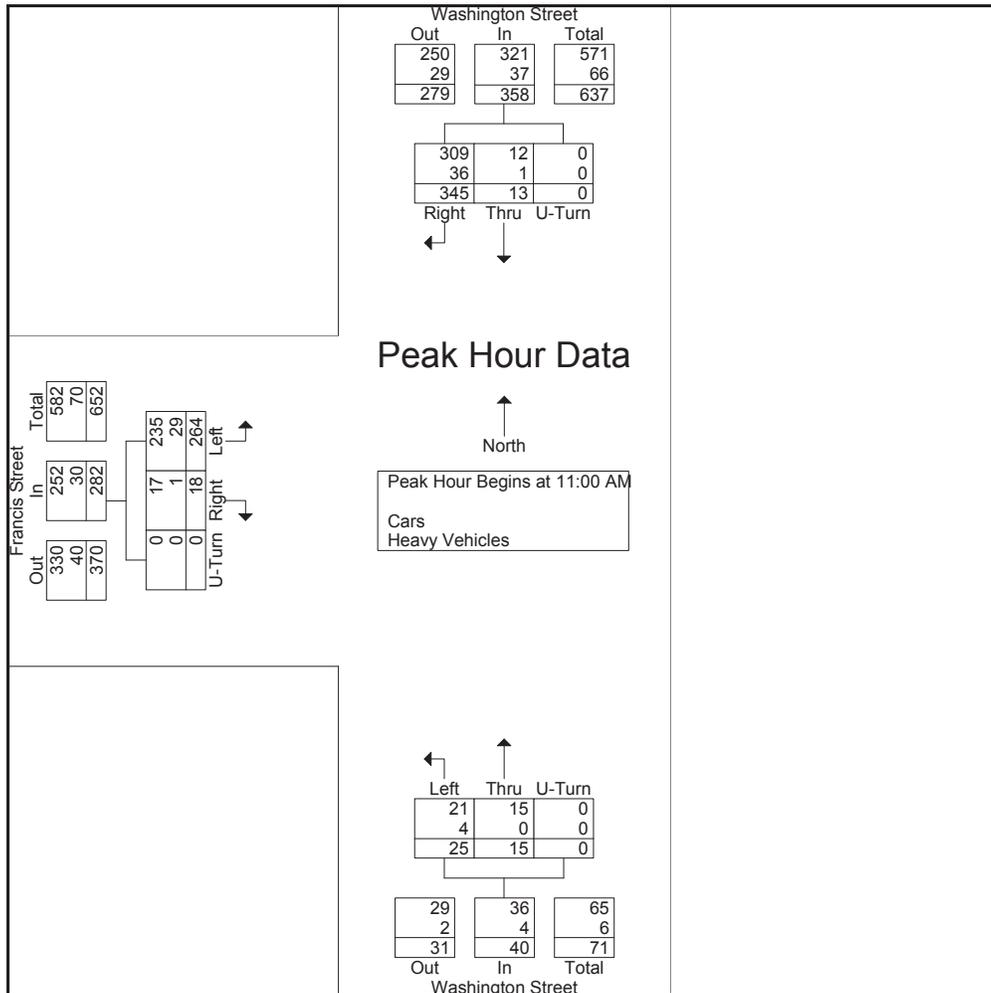
PRECISION
D A T A
INDUSTRIES, LLC

P.O. Box 301 Berlin, MA 01503
Office: 508.481.3999 Fax: 508.545.1234
Email: datarequests@pdillc.com

File Name : 133491 A
Site Code : 12472
Start Date : 8/29/2013
Page No : 1

N/S: Washington Street
W: Francis Street
City, State: Nantucket, MA
Client: VHB/ M. Kealey

Start Time	Washington Street From North				Washington Street From South				Francis Street From West				Int. Total
	Right	Thru	U-Turn	App. Total	Thru	Left	U-Turn	App. Total	Right	Left	U-Turn	App. Total	
Peak Hour Analysis From 11:00 AM to 12:45 PM - Peak 1 of 1													
Peak Hour for Entire Intersection Begins at 11:00 AM													
11:00 AM	89	4	0	93	4	8	0	12	5	71	0	76	181
11:15 AM	84	2	0	86	4	10	0	14	4	71	0	75	175
11:30 AM	91	2	0	93	5	3	0	8	4	68	0	72	173
11:45 AM	81	5	0	86	2	4	0	6	5	54	0	59	151
Total Volume	345	13	0	358	15	25	0	40	18	264	0	282	680
% App. Total	96.4	3.6	0		37.5	62.5	0		6.4	93.6	0		
PHF	.948	.650	.000	.962	.750	.625	.000	.714	.900	.930	.000	.928	.939
Cars	309	12	0	321	15	21	0	36	17	235	0	252	609
% Cars	89.6	92.3	0	89.7	100	84.0	0	90.0	94.4	89.0	0	89.4	89.6
Heavy Vehicles	36	1	0	37	0	4	0	4	1	29	0	30	71
% Heavy Vehicles	10.4	7.7	0	10.3	0	16.0	0	10.0	5.6	11.0	0	10.6	10.4





PRECISION
D A T A
INDUSTRIES, LLC

P.O. Box 301 Berlin, MA 01503
Office: 508.481.3999 Fax: 508.545.1234
Email: datarequests@pdillc.com

File Name : 133491 AA
Site Code : 12472
Start Date : 8/29/2013
Page No : 1

N/S: Washington Street
W: Francis Street
City, State: Nantucket, MA
Client: VHB/ M. Kealey

Groups Printed- Cars - Heavy Vehicles

Start Time	Washington Street From North			Washington Street From South			Francis Street From West			Int. Total
	Right	Thru	U-Turn	Thru	Left	U-Turn	Right	Left	U-Turn	
04:00 PM	105	6	0	4	8	0	4	90	0	217
04:15 PM	103	3	0	3	6	0	5	61	0	181
04:30 PM	131	3	0	8	4	0	4	55	0	205
04:45 PM	99	2	0	3	3	0	5	52	0	164
Total	438	14	0	18	21	0	18	258	0	767
05:00 PM	105	6	0	3	6	0	2	56	0	178
05:15 PM	104	3	0	3	4	0	4	61	0	179
05:30 PM	90	3	0	2	7	0	10	66	0	178
05:45 PM	90	4	0	3	11	0	3	64	0	175
Total	389	16	0	11	28	0	19	247	0	710
Grand Total	827	30	0	29	49	0	37	505	0	1477
Apprch %	96.5	3.5	0	37.2	62.8	0	6.8	93.2	0	
Total %	56	2	0	2	3.3	0	2.5	34.2	0	
Cars	775	26	0	28	48	0	36	463	0	1376
% Cars	93.7	86.7	0	96.6	98	0	97.3	91.7	0	93.2
Heavy Vehicles	52	4	0	1	1	0	1	42	0	101
% Heavy Vehicles	6.3	13.3	0	3.4	2	0	2.7	8.3	0	6.8

Start Time	Washington Street From North				Washington Street From South				Francis Street From West				Int. Total
	Right	Thru	U-Turn	App. Total	Thru	Left	U-Turn	App. Total	Right	Left	U-Turn	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	105	6	0	111	4	8	0	12	4	90	0	94	217
04:15 PM	103	3	0	106	3	6	0	9	5	61	0	66	181
04:30 PM	131	3	0	134	8	4	0	12	4	55	0	59	205
04:45 PM	99	2	0	101	3	3	0	6	5	52	0	57	164
Total Volume	438	14	0	452	18	21	0	39	18	258	0	276	767
% App. Total	96.9	3.1	0		46.2	53.8	0		6.5	93.5	0		
PHF	.836	.583	.000	.843	.563	.656	.000	.813	.900	.717	.000	.734	.884
Cars	413	12	0	425	18	21	0	39	18	237	0	255	719
% Cars	94.3	85.7	0	94.0	100	100	0	100	100	91.9	0	92.4	93.7
Heavy Vehicles	25	2	0	27	0	0	0	0	0	21	0	21	48
% Heavy Vehicles	5.7	14.3	0	6.0	0	0	0	0	0	8.1	0	7.6	6.3



PRECISION
D A T A
INDUSTRIES, LLC

P.O. Box 301 Berlin, MA 01503
Office: 508.481.3999 Fax: 508.545.1234
Email: datarequests@pdillc.com

File Name : 133491 AA
Site Code : 12472
Start Date : 8/29/2013
Page No : 1

N/S: Washington Street
W: Francis Street
City, State: Nantucket, MA
Client: VHB/ M. Kealey

Groups Printed- Cars

Start Time	Washington Street From North			Washington Street From South			Francis Street From West			Int. Total
	Right	Thru	U-Turn	Thru	Left	U-Turn	Right	Left	U-Turn	
04:00 PM	97	6	0	4	8	0	4	85	0	204
04:15 PM	97	2	0	3	6	0	5	55	0	168
04:30 PM	124	2	0	8	4	0	4	48	0	190
04:45 PM	95	2	0	3	3	0	5	49	0	157
Total	413	12	0	18	21	0	18	237	0	719
05:00 PM	100	4	0	3	6	0	2	49	0	164
05:15 PM	94	3	0	2	3	0	3	54	0	159
05:30 PM	83	3	0	2	7	0	10	63	0	168
05:45 PM	85	4	0	3	11	0	3	60	0	166
Total	362	14	0	10	27	0	18	226	0	657
Grand Total	775	26	0	28	48	0	36	463	0	1376
Apprch %	96.8	3.2	0	36.8	63.2	0	7.2	92.8	0	
Total %	56.3	1.9	0	2	3.5	0	2.6	33.6	0	

Start Time	Washington Street From North				Washington Street From South				Francis Street From West				Int. Total
	Right	Thru	U-Turn	App. Total	Thru	Left	U-Turn	App. Total	Right	Left	U-Turn	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	97	6	0	103	4	8	0	12	4	85	0	89	204
04:15 PM	97	2	0	99	3	6	0	9	5	55	0	60	168
04:30 PM	124	2	0	126	8	4	0	12	4	48	0	52	190
04:45 PM	95	2	0	97	3	3	0	6	5	49	0	54	157
Total Volume	413	12	0	425	18	21	0	39	18	237	0	255	719
% App. Total	97.2	2.8	0		46.2	53.8	0		7.1	92.9	0		
PHF	.833	.500	.000	.843	.563	.656	.000	.813	.900	.697	.000	.716	.881



PRECISION
D A T A
INDUSTRIES, LLC

P.O. Box 301 Berlin, MA 01503
Office: 508.481.3999 Fax: 508.545.1234
Email: datarequests@pdillc.com

File Name : 133491 AA
Site Code : 12472
Start Date : 8/29/2013
Page No : 1

N/S: Washington Street
W: Francis Street
City, State: Nantucket, MA
Client: VHB/ M. Kealey

Groups Printed- Heavy Vehicles

Start Time	Washington Street From North			Washington Street From South			Francis Street From West			Int. Total
	Right	Thru	U-Turn	Thru	Left	U-Turn	Right	Left	U-Turn	
04:00 PM	8	0	0	0	0	0	0	5	0	13
04:15 PM	6	1	0	0	0	0	0	6	0	13
04:30 PM	7	1	0	0	0	0	0	7	0	15
04:45 PM	4	0	0	0	0	0	0	3	0	7
Total	25	2	0	0	0	0	0	21	0	48
05:00 PM	5	2	0	0	0	0	0	7	0	14
05:15 PM	10	0	0	1	1	0	1	7	0	20
05:30 PM	7	0	0	0	0	0	0	3	0	10
05:45 PM	5	0	0	0	0	0	0	4	0	9
Total	27	2	0	1	1	0	1	21	0	53
Grand Total	52	4	0	1	1	0	1	42	0	101
Apprch %	92.9	7.1	0	50	50	0	2.3	97.7	0	
Total %	51.5	4	0	1	1	0	1	41.6	0	

Start Time	Washington Street From North				Washington Street From South				Francis Street From West				Int. Total
	Right	Thru	U-Turn	App. Total	Thru	Left	U-Turn	App. Total	Right	Left	U-Turn	App. Total	
Peak Hour Analysis From 04:00 PM to 05:45 PM - Peak 1 of 1													
Peak Hour for Entire Intersection Begins at 04:30 PM													
04:30 PM	7	1	0	8	0	0	0	0	0	7	0	7	15
04:45 PM	4	0	0	4	0	0	0	0	0	3	0	3	7
05:00 PM	5	2	0	7	0	0	0	0	0	7	0	7	14
05:15 PM	10	0	0	10	1	1	0	2	1	7	0	8	20
Total Volume	26	3	0	29	1	1	0	2	1	24	0	25	56
% App. Total	89.7	10.3	0		50	50	0		4	96	0		
PHF	.650	.375	.000	.725	.250	.250	.000	.250	.250	.857	.000	.781	.700



PRECISION
D A T A
INDUSTRIES, LLC

P.O. Box 301 Berlin, MA 01503
Office: 508.481.3999 Fax: 508.545.1234
Email: datarequests@pdillc.com

File Name : 133491 AA
Site Code : 12472
Start Date : 8/29/2013
Page No : 1

N/S: Washington Street
W: Francis Street
City, State: Nantucket, MA
Client: VHB/ M. Kealey

Groups Printed- Peds and Bikes

Start Time	Washington Street From North			Washington Street From South			Francis Street From West			Int. Total
	Right	Thru	Peds	Thru	Left	Peds	Right	Left	Peds	
04:00 PM	15	0	0	3	0	0	2	10	0	30
04:15 PM	9	8	0	8	0	0	0	9	2	36
04:30 PM	12	1	0	1	0	0	1	16	1	32
04:45 PM	10	3	0	2	0	0	0	2	3	20
Total	46	12	0	14	0	0	3	37	6	118
05:00 PM	1	1	1	3	1	1	1	9	0	18
05:15 PM	3	4	1	1	0	0	1	5	2	17
05:30 PM	5	3	0	2	0	0	0	6	0	16
05:45 PM	3	6	0	1	0	0	0	2	0	12
Total	12	14	2	7	1	1	2	22	2	63
Grand Total	58	26	2	21	1	1	5	59	8	181
Apprch %	67.4	30.2	2.3	91.3	4.3	4.3	6.9	81.9	11.1	
Total %	32	14.4	1.1	11.6	0.6	0.6	2.8	32.6	4.4	

Start Time	Washington Street From North				Washington Street From South				Francis Street From West				Int. Total
	Right	Thru	Peds	App. Total	Thru	Left	Peds	App. Total	Right	Left	Peds	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	15	0	0	15	3	0	0	3	2	10	0	12	30
04:15 PM	9	8	0	17	8	0	0	8	0	9	2	11	36
04:30 PM	12	1	0	13	1	0	0	1	1	16	1	18	32
04:45 PM	10	3	0	13	2	0	0	2	0	2	3	5	20
Total Volume	46	12	0	58	14	0	0	14	3	37	6	46	118
% App. Total	79.3	20.7	0		100	0	0		6.5	80.4	13		
PHF	.767	.375	.000	.853	.438	.000	.000	.438	.375	.578	.500	.639	.819



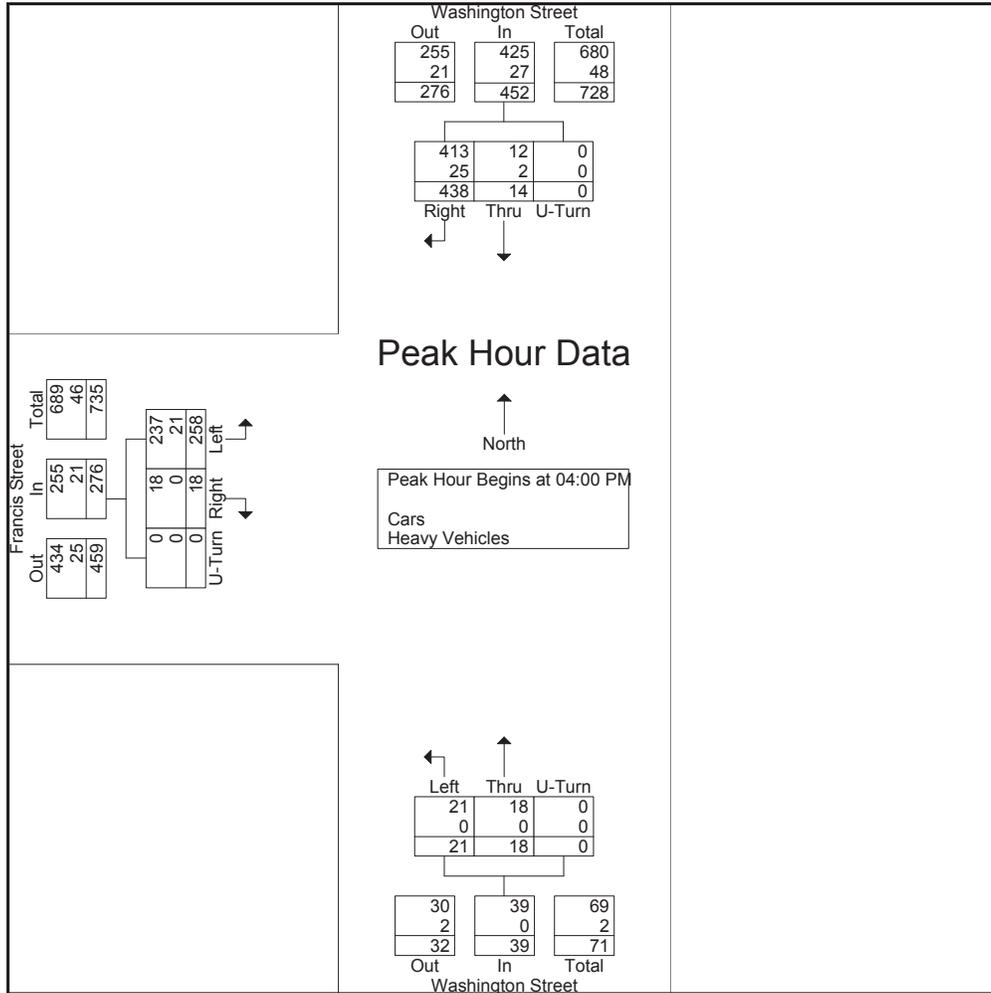
PRECISION
D A T A
INDUSTRIES, LLC

P.O. Box 301 Berlin, MA 01503
Office: 508.481.3999 Fax: 508.545.1234
Email: datarequests@pdillc.com

File Name : 133491 AA
Site Code : 12472
Start Date : 8/29/2013
Page No : 1

N/S: Washington Street
W: Francis Street
City, State: Nantucket, MA
Client: VHB/ M. Kealey

Start Time	Washington Street From North				Washington Street From South				Francis Street From West				Int. Total
	Right	Thru	U-Turn	App. Total	Thru	Left	U-Turn	App. Total	Right	Left	U-Turn	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	105	6	0	111	4	8	0	12	4	90	0	94	217
04:15 PM	103	3	0	106	3	6	0	9	5	61	0	66	181
04:30 PM	131	3	0	134	8	4	0	12	4	55	0	59	205
04:45 PM	99	2	0	101	3	3	0	6	5	52	0	57	164
Total Volume	438	14	0	452	18	21	0	39	18	258	0	276	767
% App. Total	96.9	3.1	0		46.2	53.8	0		6.5	93.5	0		
PHF	.836	.583	.000	.843	.563	.656	.000	.813	.900	.717	.000	.734	.884
Cars	413	12	0	425	18	21	0	39	18	237	0	255	719
% Cars	94.3	85.7	0	94.0	100	100	0	100	100	91.9	0	92.4	93.7
Heavy Vehicles	25	2	0	27	0	0	0	0	0	21	0	21	48
% Heavy Vehicles	5.7	14.3	0	6.0	0	0	0	0	0	8.1	0	7.6	6.3





PRECISION
D A T A
INDUSTRIES, LLC

P.O. Box 301 Berlin, MA 01503
Office: 508.481.3999 Fax: 508.545.1234
Email: datarequests@pdillc.com

File Name : 133491 B
Site Code : 12472
Start Date : 8/29/2013
Page No : 1

N/S: Union Street
E/W: Francis Street/ Weymouth Street
City, State: Nantucket, MA
Client: VHB/ M. Kealey

Groups Printed- Cars - Heavy Vehicles

Start Time	Union Street From North				Francis Street From East				Union Street From South				Weymouth Street From West				Int. Total
	Right	Thru	Left	U-Turn	Right	Thru	Left	U-Turn	Right	Thru	Left	U-Turn	Right	Thru	Left	U-Turn	
11:00 AM	0	0	0	0	0	2	98	0	78	55	0	0	0	0	0	0	233
11:15 AM	0	0	0	0	0	2	92	0	69	58	0	0	0	0	0	0	221
11:30 AM	0	0	0	0	1	2	90	0	68	56	2	0	0	0	0	0	219
11:45 AM	0	0	0	0	0	1	84	0	56	49	0	0	0	0	0	0	190
Total	0	0	0	0	1	7	364	0	271	218	2	0	0	0	0	0	863
12:00 PM	0	0	0	0	0	1	92	0	66	62	0	0	0	0	0	0	221
12:15 PM	0	0	0	0	1	0	80	0	60	50	0	0	0	0	0	0	191
12:30 PM	0	0	0	0	3	2	69	0	83	62	0	0	0	0	0	0	219
12:45 PM	0	0	0	0	1	0	91	0	90	56	1	0	0	0	0	0	239
Total	0	0	0	0	5	3	332	0	299	230	1	0	0	0	0	0	870
01:00 PM	0	0	0	0	2	1	90	0	72	41	0	0	0	0	0	0	206
01:15 PM	0	0	0	0	1	2	99	0	68	47	1	0	0	0	0	0	218
01:30 PM	0	0	0	0	1	0	109	0	66	52	0	0	0	0	0	0	228
01:45 PM	0	0	0	0	1	3	102	0	71	52	2	0	0	0	0	0	231
Total	0	0	0	0	5	6	400	0	277	192	3	0	0	0	0	0	883
Grand Total	0	0	0	0	11	16	1096	0	847	640	6	0	0	0	0	0	2616
Apprch %	0	0	0	0	1	1.4	97.6	0	56.7	42.9	0.4	0	0	0	0	0	
Total %	0	0	0	0	0.4	0.6	41.9	0	32.4	24.5	0.2	0	0	0	0	0	
Cars	0	0	0	0	11	15	1008	0	765	625	6	0	0	0	0	0	2430
% Cars	0	0	0	0	100	93.8	92	0	90.3	97.7	100	0	0	0	0	0	92.9
Heavy Vehicles	0	0	0	0	0	1	88	0	82	15	0	0	0	0	0	0	186
% Heavy Vehicles	0	0	0	0	0	6.2	8	0	9.7	2.3	0	0	0	0	0	0	7.1

Start Time	Union Street From North					Francis Street From East					Union Street From South					Weymouth Street From West					Int. Total
	Right	Thru	Left	U-Turn	App. Total	Right	Thru	Left	U-Turn	App. Total	Right	Thru	Left	U-Turn	App. Total	Right	Thru	Left	U-Turn	App. Total	
12:00 PM	0	0	0	0	0	0	1	92	0	93	66	62	0	0	128	0	0	0	0	0	221
12:15 PM	0	0	0	0	0	1	0	80	0	81	60	50	0	0	110	0	0	0	0	0	191
12:30 PM	0	0	0	0	0	3	2	69	0	74	83	62	0	0	145	0	0	0	0	0	219
12:45 PM	0	0	0	0	0	1	0	91	0	92	90	56	1	0	147	0	0	0	0	0	239
Total Volume	0	0	0	0	0	5	3	332	0	340	299	230	1	0	530	0	0	0	0	0	870
% App. Total	0	0	0	0	0	1.5	0.9	97.6	0		56.4	43.4	0.2	0		0	0	0	0		
PHF	.000	.000	.000	.000	.000	.417	.375	.902	.000	.914	.831	.927	.250	.000	.901	.000	.000	.000	.000	.000	.910
Cars	0	0	0	0	0	5	3	311	0	319	266	223	1	0	490	0	0	0	0	0	809
% Cars	0	0	0	0	0	100	100	93.7	0	93.8	89.0	97.0	100	0	92.5	0	0	0	0	0	93.0
Heavy Vehicles	0	0	0	0	0	0	0	21	0	21	33	7	0	0	40	0	0	0	0	0	61
% Heavy Vehicles	0	0	0	0	0	0	0	6.3	0	6.2	11.0	3.0	0	0	7.5	0	0	0	0	0	7.0

Peak Hour Analysis From 11:00 AM to 12:45 PM - Peak 1 of 1
Peak Hour for Entire Intersection Begins at 12:00 PM



PRECISION
D A T A
INDUSTRIES, LLC

P.O. Box 301 Berlin, MA 01503
Office: 508.481.3999 Fax: 508.545.1234
Email: datarequests@pdillc.com

File Name : 133491 B
Site Code : 12472
Start Date : 8/29/2013
Page No : 1

N/S: Union Street
E/W: Francis Street/ Weymouth Street
City, State: Nantucket, MA
Client: VHB/ M. Kealey

Groups Printed- Cars

Start Time	Union Street From North				Francis Street From East				Union Street From South				Weymouth Street From West				Int. Total
	Right	Thru	Left	U-Turn	Right	Thru	Left	U-Turn	Right	Thru	Left	U-Turn	Right	Thru	Left	U-Turn	
11:00 AM	0	0	0	0	0	2	86	0	68	55	0	0	0	0	0	0	211
11:15 AM	0	0	0	0	0	2	85	0	65	57	0	0	0	0	0	0	209
11:30 AM	0	0	0	0	1	2	78	0	63	53	2	0	0	0	0	0	199
11:45 AM	0	0	0	0	0	1	75	0	51	47	0	0	0	0	0	0	174
Total	0	0	0	0	1	7	324	0	247	212	2	0	0	0	0	0	793
12:00 PM	0	0	0	0	0	1	87	0	58	62	0	0	0	0	0	0	208
12:15 PM	0	0	0	0	1	0	74	0	54	49	0	0	0	0	0	0	178
12:30 PM	0	0	0	0	3	2	62	0	71	60	0	0	0	0	0	0	198
12:45 PM	0	0	0	0	1	0	88	0	83	52	1	0	0	0	0	0	225
Total	0	0	0	0	5	3	311	0	266	223	1	0	0	0	0	0	809
01:00 PM	0	0	0	0	2	1	83	0	65	41	0	0	0	0	0	0	192
01:15 PM	0	0	0	0	1	1	92	0	61	46	1	0	0	0	0	0	202
01:30 PM	0	0	0	0	1	0	103	0	62	51	0	0	0	0	0	0	217
01:45 PM	0	0	0	0	1	3	95	0	64	52	2	0	0	0	0	0	217
Total	0	0	0	0	5	5	373	0	252	190	3	0	0	0	0	0	828
Grand Total	0	0	0	0	11	15	1008	0	765	625	6	0	0	0	0	0	2430
Apprch %	0	0	0	0	1.1	1.5	97.5	0	54.8	44.8	0.4	0	0	0	0	0	
Total %	0	0	0	0	0.5	0.6	41.5	0	31.5	25.7	0.2	0	0	0	0	0	

Start Time	Union Street From North					Francis Street From East					Union Street From South					Weymouth Street From West					Int. Total
	Right	Thru	Left	U-Turn	App. Total	Right	Thru	Left	U-Turn	App. Total	Right	Thru	Left	U-Turn	App. Total	Right	Thru	Left	U-Turn	App. Total	
Peak Hour Analysis From 11:00 AM to 12:45 PM - Peak 1 of 1																					
Peak Hour for Entire Intersection Begins at 12:00 PM																					
12:00 PM	0	0	0	0	0	0	1	87	0	88	58	62	0	0	120	0	0	0	0	0	208
12:15 PM	0	0	0	0	0	1	0	74	0	75	54	49	0	0	103	0	0	0	0	0	178
12:30 PM	0	0	0	0	0	3	2	62	0	67	71	60	0	0	131	0	0	0	0	0	198
12:45 PM	0	0	0	0	0	1	0	88	0	89	83	52	1	0	136	0	0	0	0	0	225
Total Volume	0	0	0	0	0	5	3	311	0	319	266	223	1	0	490	0	0	0	0	0	809
% App. Total	0	0	0	0	0	1.6	0.9	97.5	0		54.3	45.5	0.2	0		0	0	0	0		
PHF	.000	.000	.000	.000	.000	.417	.375	.884	.000	.896	.801	.899	.250	.000	.901	.000	.000	.000	.000	.000	.899



PRECISION
D A T A
INDUSTRIES, LLC

P.O. Box 301 Berlin, MA 01503
Office: 508.481.3999 Fax: 508.545.1234
Email: datarequests@pdillc.com

File Name : 133491 B
Site Code : 12472
Start Date : 8/29/2013
Page No : 1

N/S: Union Street
E/W: Francis Street/ Weymouth Street
City, State: Nantucket, MA
Client: VHB/ M. Kealey

Groups Printed- Heavy Vehicles

Start Time	Union Street From North				Francis Street From East				Union Street From South				Weymouth Street From West				Int. Total
	Right	Thru	Left	U-Turn	Right	Thru	Left	U-Turn	Right	Thru	Left	U-Turn	Right	Thru	Left	U-Turn	
11:00 AM	0	0	0	0	0	0	12	0	10	0	0	0	0	0	0	0	22
11:15 AM	0	0	0	0	0	0	7	0	4	1	0	0	0	0	0	0	12
11:30 AM	0	0	0	0	0	0	12	0	5	3	0	0	0	0	0	0	20
11:45 AM	0	0	0	0	0	0	9	0	5	2	0	0	0	0	0	0	16
Total	0	0	0	0	0	0	40	0	24	6	0	0	0	0	0	0	70
12:00 PM	0	0	0	0	0	0	5	0	8	0	0	0	0	0	0	0	13
12:15 PM	0	0	0	0	0	0	6	0	6	1	0	0	0	0	0	0	13
12:30 PM	0	0	0	0	0	0	7	0	12	2	0	0	0	0	0	0	21
12:45 PM	0	0	0	0	0	0	3	0	7	4	0	0	0	0	0	0	14
Total	0	0	0	0	0	0	21	0	33	7	0	0	0	0	0	0	61
01:00 PM	0	0	0	0	0	0	7	0	7	0	0	0	0	0	0	0	14
01:15 PM	0	0	0	0	0	1	7	0	7	1	0	0	0	0	0	0	16
01:30 PM	0	0	0	0	0	0	6	0	4	1	0	0	0	0	0	0	11
01:45 PM	0	0	0	0	0	0	7	0	7	0	0	0	0	0	0	0	14
Total	0	0	0	0	0	1	27	0	25	2	0	0	0	0	0	0	55
Grand Total	0	0	0	0	0	1	88	0	82	15	0	0	0	0	0	0	186
Apprch %	0	0	0	0	0	1.1	98.9	0	84.5	15.5	0	0	0	0	0	0	
Total %	0	0	0	0	0	0.5	47.3	0	44.1	8.1	0	0	0	0	0	0	

Start Time	Union Street From North					Francis Street From East					Union Street From South					Weymouth Street From West					Int. Total
	Right	Thru	Left	U-Turn	App. Total	Right	Thru	Left	U-Turn	App. Total	Right	Thru	Left	U-Turn	App. Total	Right	Thru	Left	U-Turn	App. Total	
11:00 AM	0	0	0	0	0	0	0	12	0	12	10	0	0	0	10	0	0	0	0	0	22
11:15 AM	0	0	0	0	0	0	0	7	0	7	4	1	0	0	5	0	0	0	0	0	12
11:30 AM	0	0	0	0	0	0	0	12	0	12	5	3	0	0	8	0	0	0	0	0	20
11:45 AM	0	0	0	0	0	0	0	9	0	9	5	2	0	0	7	0	0	0	0	0	16
Total Volume	0	0	0	0	0	0	0	40	0	40	24	6	0	0	30	0	0	0	0	0	70
% App. Total	0	0	0	0	0	0	0	100	0	100	80	20	0	0	100	0	0	0	0	0	
PHF	.000	.000	.000	.000	.000	.000	.000	.833	.000	.833	.600	.500	.000	.000	.750	.000	.000	.000	.000	.000	.795

Peak Hour Analysis From 11:00 AM to 12:45 PM - Peak 1 of 1

Peak Hour for Entire Intersection Begins at 11:00 AM



PRECISION
D A T A
INDUSTRIES, LLC

P.O. Box 301 Berlin, MA 01503
Office: 508.481.3999 Fax: 508.545.1234
Email: datarequests@pdillc.com

File Name : 133491 B
Site Code : 12472
Start Date : 8/29/2013
Page No : 1

N/S: Union Street
E/W: Francis Street/ Weymouth Street
City, State: Nantucket, MA
Client: VHB/ M. Kealey

Groups Printed- Peds and Bikes

Start Time	Union Street From North				Francis Street From East				Union Street From South				Weymouth Street From West				Int. Total
	Right	Thru	Left	Peds	Right	Thru	Left	Peds	Right	Thru	Left	Peds	Right	Thru	Left	Peds	
11:00 AM	0	0	0	0	0	0	8	0	3	1	0	0	0	0	0	0	12
11:15 AM	0	0	0	2	0	0	13	0	9	3	0	0	0	0	0	0	27
11:30 AM	0	0	0	1	0	0	6	0	3	1	0	1	0	0	0	0	12
11:45 AM	0	0	0	0	0	0	11	0	9	0	0	0	0	0	0	0	20
Total	0	0	0	3	0	0	38	0	24	5	0	1	0	0	0	0	71
12:00 PM	0	0	0	0	0	0	15	0	3	2	0	0	0	0	0	1	21
12:15 PM	0	0	0	0	0	2	6	0	3	2	0	5	0	0	0	4	22
12:30 PM	0	0	0	0	1	0	11	0	14	3	0	1	0	0	0	1	31
12:45 PM	0	0	0	0	0	3	10	0	8	1	0	0	0	0	0	0	22
Total	0	0	0	0	1	5	42	0	28	8	0	6	0	0	0	6	96
01:00 PM	0	0	0	13	0	0	4	0	11	7	0	0	0	0	0	3	38
01:15 PM	0	0	0	5	0	0	2	0	3	3	0	0	0	0	0	11	24
01:30 PM	0	0	0	2	0	0	1	0	9	0	0	0	0	0	0	2	14
01:45 PM	0	0	0	0	0	0	3	0	10	1	0	0	0	0	0	0	14
Total	0	0	0	20	0	0	10	0	33	11	0	0	0	0	0	16	90
Grand Total	0	0	0	23	1	5	90	0	85	24	0	7	0	0	0	22	257
Apprch %	0	0	0	100	1	5.2	93.8	0	73.3	20.7	0	6	0	0	0	100	
Total %	0	0	0	8.9	0.4	1.9	35	0	33.1	9.3	0	2.7	0	0	0	8.6	

Start Time	Union Street From North					Francis Street From East					Union Street From South					Weymouth Street From West					Int. Total
	Right	Thru	Left	Peds	App. Total	Right	Thru	Left	Peds	App. Total	Right	Thru	Left	Peds	App. Total	Right	Thru	Left	Peds	App. Total	
Peak Hour Analysis From 11:00 AM to 12:45 PM - Peak 1 of 1																					
Peak Hour for Entire Intersection Begins at 12:00 PM																					
12:00 PM	0	0	0	0	0	0	0	15	0	15	3	2	0	0	5	0	0	0	1	1	21
12:15 PM	0	0	0	0	0	0	2	6	0	8	3	2	0	5	10	0	0	0	4	4	22
12:30 PM	0	0	0	0	0	1	0	11	0	12	14	3	0	1	18	0	0	0	1	1	31
12:45 PM	0	0	0	0	0	0	3	10	0	13	8	1	0	0	9	0	0	0	0	0	22
Total Volume	0	0	0	0	0	1	5	42	0	48	28	8	0	6	42	0	0	0	6	6	96
% App. Total	0	0	0	0		2.1	10.4	87.5	0		66.7	19	0	14.3		0	0	0	100		
PHF	.000	.000	.000	.000	.000	.250	.417	.700	.000	.800	.500	.667	.000	.300	.583	.000	.000	.000	.375	.375	.774



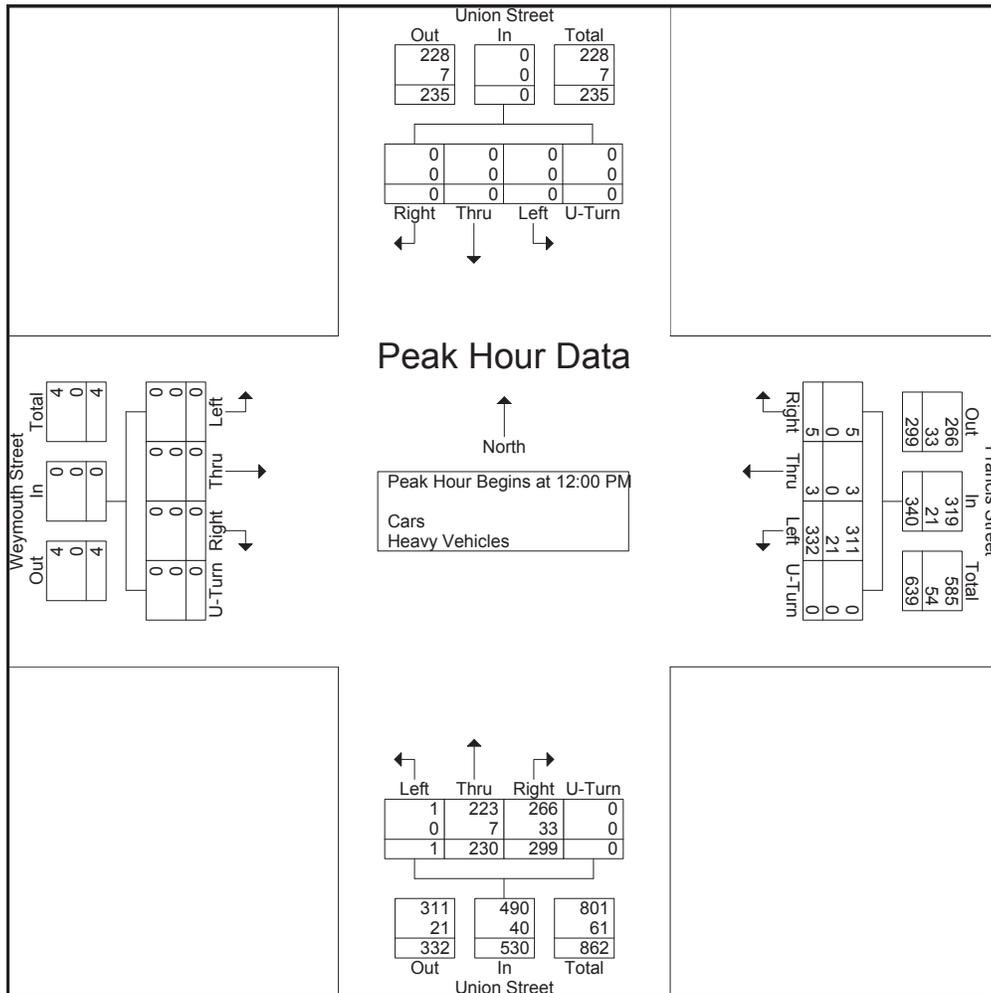
PRECISION
D A T A
INDUSTRIES, LLC

P.O. Box 301 Berlin, MA 01503
Office: 508.481.3999 Fax: 508.545.1234
Email: datarequests@pdillc.com

File Name : 133491 B
Site Code : 12472
Start Date : 8/29/2013
Page No : 1

N/S: Union Street
E/W: Francis Street/ Weymouth Street
City, State: Nantucket, MA
Client: VHB/ M. Kealey

Start Time	Union Street From North					Francis Street From East					Union Street From South					Weymouth Street From West					Int. Total
	Right	Thru	Left	U-Turn	App. Total	Right	Thru	Left	U-Turn	App. Total	Right	Thru	Left	U-Turn	App. Total	Right	Thru	Left	U-Turn	App. Total	
Peak Hour Analysis From 11:00 AM to 12:45 PM - Peak 1 of 1																					
Peak Hour for Entire Intersection Begins at 12:00 PM																					
12:00 PM	0	0	0	0	0	0	1	92	0	93	66	62	0	0	128	0	0	0	0	0	221
12:15 PM	0	0	0	0	0	1	0	80	0	81	60	50	0	0	110	0	0	0	0	0	191
12:30 PM	0	0	0	0	0	3	2	69	0	74	83	62	0	0	145	0	0	0	0	0	219
12:45 PM	0	0	0	0	0	1	0	91	0	92	90	56	1	0	147	0	0	0	0	0	239
Total Volume	0	0	0	0	0	5	3	332	0	340	299	230	1	0	530	0	0	0	0	0	870
% App. Total	0	0	0	0	0	1.5	0.9	97.6	0		56.4	43.4	0.2	0		0	0	0	0	0	
PHF	.000	.000	.000	.000	.000	.417	.375	.902	.000	.914	.831	.927	.250	.000	.901	.000	.000	.000	.000	.000	.910
Cars	0	0	0	0	0	5	3	311	0	319	266	223	1	0	490	0	0	0	0	0	809
% Cars	0	0	0	0	0	100	100	93.7	0	93.8	89.0	97.0	100	0	92.5	0	0	0	0	0	93.0
Heavy Vehicles	0	0	0	0	0	0	0	21	0	21	33	7	0	0	40	0	0	0	0	0	61
% Heavy Vehicles	0	0	0	0	0	0	0	6.3	0	6.2	11.0	3.0	0	0	7.5	0	0	0	0	0	7.0





PRECISION
D A T A
INDUSTRIES, LLC

P.O. Box 301 Berlin, MA 01503
Office: 508.481.3999 Fax: 508.545.1234
Email: datarequests@pdillc.com

File Name : 133491 BB
Site Code : 12472
Start Date : 8/29/2013
Page No : 1

N/S: Union Street
E/W: Francis Street/ Weymouth Street
City, State: Nantucket, MA
Client: VHB/ M. Kealey

Groups Printed- Cars - Heavy Vehicles

Start Time	Union Street From North				Francis Street From East				Union Street From South				Weymouth Street From West				Int. Total
	Right	Thru	Left	U-Turn	Right	Thru	Left	U-Turn	Right	Thru	Left	U-Turn	Right	Thru	Left	U-Turn	
04:00 PM	0	0	0	0	0	0	108	0	93	63	0	0	0	0	0	0	264
04:15 PM	0	0	0	0	1	4	107	0	67	56	0	0	0	0	0	0	235
04:30 PM	0	0	0	0	0	2	124	0	57	57	1	0	0	0	0	0	241
04:45 PM	0	0	0	0	2	0	106	0	61	52	0	0	0	0	0	0	221
Total	0	0	0	0	3	6	445	0	278	228	1	0	0	0	0	0	961
05:00 PM	0	0	0	0	0	0	108	0	57	43	0	0	0	0	0	0	208
05:15 PM	0	0	0	0	0	5	104	0	63	58	1	0	0	0	0	0	231
05:30 PM	0	0	0	0	0	1	90	0	73	33	1	0	0	0	0	0	198
05:45 PM	0	0	0	0	0	0	102	0	62	45	0	0	0	0	0	0	209
Total	0	0	0	0	0	6	404	0	255	179	2	0	0	0	0	0	846
Grand Total	0	0	0	0	3	12	849	0	533	407	3	0	0	0	0	0	1807
Apprch %	0	0	0	0	0.3	1.4	98.3	0	56.5	43.2	0.3	0	0	0	0	0	
Total %	0	0	0	0	0.2	0.7	47	0	29.5	22.5	0.2	0	0	0	0	0	
Cars	0	0	0	0	3	12	798	0	492	402	3	0	0	0	0	0	1710
% Cars	0	0	0	0	100	100	94	0	92.3	98.8	100	0	0	0	0	0	94.6
Heavy Vehicles	0	0	0	0	0	0	51	0	41	5	0	0	0	0	0	0	97
% Heavy Vehicles	0	0	0	0	0	0	6	0	7.7	1.2	0	0	0	0	0	0	5.4

Start Time	Union Street From North					Francis Street From East					Union Street From South					Weymouth Street From West					Int. Total
	Right	Thru	Left	U-Turn	App. Total	Right	Thru	Left	U-Turn	App. Total	Right	Thru	Left	U-Turn	App. Total	Right	Thru	Left	U-Turn	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	0	0	0	0	0	0	108	0	108	93	63	0	0	156	0	0	0	0	0	264
04:15 PM	0	0	0	0	0	1	4	107	0	112	67	56	0	0	123	0	0	0	0	0	235
04:30 PM	0	0	0	0	0	0	2	124	0	126	57	57	1	0	115	0	0	0	0	0	241
04:45 PM	0	0	0	0	0	2	0	106	0	108	61	52	0	0	113	0	0	0	0	0	221
Total Volume	0	0	0	0	0	3	6	445	0	454	278	228	1	0	507	0	0	0	0	0	961
% App. Total	0	0	0	0	0	0.7	1.3	98	0	99.8	54.8	45	0.2	0	99.8	0	0	0	0	0	99.8
PHF	.000	.000	.000	.000	.000	.375	.375	.897	.000	.901	.747	.905	.250	.000	.813	.000	.000	.000	.000	.000	.910
Cars	0	0	0	0	0	3	6	420	0	429	256	224	1	0	481	0	0	0	0	0	910
% Cars	0	0	0	0	0	100	100	94.4	0	94.5	92.1	98.2	100	0	94.9	0	0	0	0	0	94.7
Heavy Vehicles	0	0	0	0	0	0	0	25	0	25	22	4	0	0	26	0	0	0	0	0	51
% Heavy Vehicles	0	0	0	0	0	0	0	5.6	0	5.5	7.9	1.8	0	0	5.1	0	0	0	0	0	5.3



PRECISION
D A T A
INDUSTRIES, LLC

P.O. Box 301 Berlin, MA 01503
Office: 508.481.3999 Fax: 508.545.1234
Email: datarequests@pdillc.com

N/S: Union Street
E/W: Francis Street/ Weymouth Street
City, State: Nantucket, MA
Client: VHB/ M. Kealey

File Name : 133491 BB
Site Code : 12472
Start Date : 8/29/2013
Page No : 1

Groups Printed- Cars

Start Time	Union Street From North				Francis Street From East				Union Street From South				Weymouth Street From West				Int. Total
	Right	Thru	Left	U-Turn	Right	Thru	Left	U-Turn	Right	Thru	Left	U-Turn	Right	Thru	Left	U-Turn	
04:00 PM	0	0	0	0	0	0	101	0	88	60	0	0	0	0	0	0	249
04:15 PM	0	0	0	0	1	4	101	0	60	56	0	0	0	0	0	0	222
04:30 PM	0	0	0	0	0	2	116	0	49	56	1	0	0	0	0	0	224
04:45 PM	0	0	0	0	2	0	102	0	59	52	0	0	0	0	0	0	215
Total	0	0	0	0	3	6	420	0	256	224	1	0	0	0	0	0	910
05:00 PM	0	0	0	0	0	0	104	0	50	42	0	0	0	0	0	0	196
05:15 PM	0	0	0	0	0	5	93	0	57	58	1	0	0	0	0	0	214
05:30 PM	0	0	0	0	0	1	83	0	71	33	1	0	0	0	0	0	189
05:45 PM	0	0	0	0	0	0	98	0	58	45	0	0	0	0	0	0	201
Total	0	0	0	0	0	6	378	0	236	178	2	0	0	0	0	0	800
Grand Total	0	0	0	0	3	12	798	0	492	402	3	0	0	0	0	0	1710
Apprch %	0	0	0	0	0.4	1.5	98.2	0	54.8	44.8	0.3	0	0	0	0	0	
Total %	0	0	0	0	0.2	0.7	46.7	0	28.8	23.5	0.2	0	0	0	0	0	

Start Time	Union Street From North					Francis Street From East					Union Street From South					Weymouth Street From West					Int. Total
	Right	Thru	Left	U-Turn	App. Total	Right	Thru	Left	U-Turn	App. Total	Right	Thru	Left	U-Turn	App. Total	Right	Thru	Left	U-Turn	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	0	0	0	0	0	0	101	0	101	88	60	0	0	148	0	0	0	0	0	249
04:15 PM	0	0	0	0	0	1	4	101	0	106	60	56	0	0	116	0	0	0	0	0	222
04:30 PM	0	0	0	0	0	0	2	116	0	118	49	56	1	0	106	0	0	0	0	0	224
04:45 PM	0	0	0	0	0	2	0	102	0	104	59	52	0	0	111	0	0	0	0	0	215
Total Volume	0	0	0	0	0	3	6	420	0	429	256	224	1	0	481	0	0	0	0	0	910
% App. Total	0	0	0	0	0	0.7	1.4	97.9	0		53.2	46.6	0.2	0		0	0	0	0		
PHF	.000	.000	.000	.000	.000	.375	.375	.905	.000	.909	.727	.933	.250	.000	.813	.000	.000	.000	.000	.000	.914



PRECISION
D A T A
INDUSTRIES, LLC

P.O. Box 301 Berlin, MA 01503
Office: 508.481.3999 Fax: 508.545.1234
Email: datarequests@pdillc.com

File Name : 133491 BB
Site Code : 12472
Start Date : 8/29/2013
Page No : 1

N/S: Union Street
E/W: Francis Street/ Weymouth Street
City, State: Nantucket, MA
Client: VHB/ M. Kealey

Groups Printed- Heavy Vehicles

Start Time	Union Street From North				Francis Street From East				Union Street From South				Weymouth Street From West				Int. Total
	Right	Thru	Left	U-Turn	Right	Thru	Left	U-Turn	Right	Thru	Left	U-Turn	Right	Thru	Left	U-Turn	
04:00 PM	0	0	0	0	0	0	7	0	5	3	0	0	0	0	0	0	15
04:15 PM	0	0	0	0	0	0	6	0	7	0	0	0	0	0	0	0	13
04:30 PM	0	0	0	0	0	0	8	0	8	1	0	0	0	0	0	0	17
04:45 PM	0	0	0	0	0	0	4	0	2	0	0	0	0	0	0	0	6
Total	0	0	0	0	0	0	25	0	22	4	0	0	0	0	0	0	51
05:00 PM	0	0	0	0	0	0	4	0	7	1	0	0	0	0	0	0	12
05:15 PM	0	0	0	0	0	0	11	0	6	0	0	0	0	0	0	0	17
05:30 PM	0	0	0	0	0	0	7	0	2	0	0	0	0	0	0	0	9
05:45 PM	0	0	0	0	0	0	4	0	4	0	0	0	0	0	0	0	8
Total	0	0	0	0	0	0	26	0	19	1	0	0	0	0	0	0	46
Grand Total	0	0	0	0	0	0	51	0	41	5	0	0	0	0	0	0	97
Apprch %	0	0	0	0	0	0	100	0	89.1	10.9	0	0	0	0	0	0	
Total %	0	0	0	0	0	0	52.6	0	42.3	5.2	0	0	0	0	0	0	

Start Time	Union Street From North					Francis Street From East					Union Street From South					Weymouth Street From West					Int. Total
	Right	Thru	Left	U-Turn	App. Total	Right	Thru	Left	U-Turn	App. Total	Right	Thru	Left	U-Turn	App. Total	Right	Thru	Left	U-Turn	App. Total	
Peak Hour Analysis From 04:00 PM to 05:45 PM - Peak 1 of 1																					
Peak Hour for Entire Intersection Begins at 04:30 PM																					
04:30 PM	0	0	0	0	0	0	0	8	0	8	8	1	0	0	9	0	0	0	0	0	17
04:45 PM	0	0	0	0	0	0	0	4	0	4	2	0	0	0	2	0	0	0	0	0	6
05:00 PM	0	0	0	0	0	0	0	4	0	4	7	1	0	0	8	0	0	0	0	0	12
05:15 PM	0	0	0	0	0	0	0	11	0	11	6	0	0	0	6	0	0	0	0	0	17
Total Volume	0	0	0	0	0	0	0	27	0	27	23	2	0	0	25	0	0	0	0	0	52
% App. Total	0	0	0	0	0	0	0	100	0	100	92	8	0	0	100	0	0	0	0	0	
PHF	.000	.000	.000	.000	.000	.000	.000	.614	.000	.614	.719	.500	.000	.000	.694	.000	.000	.000	.000	.000	.765



PRECISION
D A T A
INDUSTRIES, LLC

P.O. Box 301 Berlin, MA 01503
Office: 508.481.3999 Fax: 508.545.1234
Email: datarequests@pdillc.com

File Name : 133491 BB
Site Code : 12472
Start Date : 8/29/2013
Page No : 1

N/S: Union Street
E/W: Francis Street/ Weymouth Street
City, State: Nantucket, MA
Client: VHB/ M. Kealey

Groups Printed- Peds and Bikes

Start Time	Union Street From North				Francis Street From East				Union Street From South				Weymouth Street From West				Int. Total
	Right	Thru	Left	Peds	Right	Thru	Left	Peds	Right	Thru	Left	Peds	Right	Thru	Left	Peds	
04:00 PM	0	0	0	0	0	0	13	1	8	2	0	0	0	0	0	0	24
04:15 PM	0	0	0	0	0	0	8	1	7	3	0	0	0	0	0	0	19
04:30 PM	0	0	0	2	0	1	8	0	13	4	0	1	0	0	0	1	30
04:45 PM	0	0	0	3	0	1	12	3	4	1	0	0	0	0	0	1	25
Total	0	0	0	5	0	2	41	5	32	10	0	1	0	0	0	2	98
05:00 PM	0	0	0	0	0	0	2	0	6	2	0	0	0	0	0	0	10
05:15 PM	0	0	0	0	0	0	3	9	3	1	0	0	0	0	0	0	16
05:30 PM	0	0	0	4	0	0	4	0	7	0	0	0	0	0	0	0	15
05:45 PM	0	0	0	0	0	0	4	0	2	2	0	0	0	0	0	0	8
Total	0	0	0	4	0	0	13	9	18	5	0	0	0	0	0	0	49
Grand Total	0	0	0	9	0	2	54	14	50	15	0	1	0	0	0	2	147
Apprch %	0	0	0	100	0	2.9	77.1	20	75.8	22.7	0	1.5	0	0	0	100	
Total %	0	0	0	6.1	0	1.4	36.7	9.5	34	10.2	0	0.7	0	0	0	1.4	

Start Time	Union Street From North					Francis Street From East					Union Street From South					Weymouth Street From West					Int. Total
	Right	Thru	Left	Peds	App. Total	Right	Thru	Left	Peds	App. Total	Right	Thru	Left	Peds	App. Total	Right	Thru	Left	Peds	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	0	0	0	0	0	0	13	1	14	8	2	0	0	10	0	0	0	0	0	24
04:15 PM	0	0	0	0	0	0	0	8	1	9	7	3	0	0	10	0	0	0	0	0	19
04:30 PM	0	0	0	2	2	0	1	8	0	9	13	4	0	1	18	0	0	0	1	1	30
04:45 PM	0	0	0	3	3	0	1	12	3	16	4	1	0	0	5	0	0	0	1	1	25
Total Volume	0	0	0	5	5	0	2	41	5	48	32	10	0	1	43	0	0	0	2	2	98
% App. Total	0	0	0	100	0	4.2	85.4	10.4	74.4	23.3	0	2.3	0	0	100	0	0	0	100		
PHF	.000	.000	.000	.417	.417	.000	.500	.788	.417	.750	.615	.625	.000	.250	.597	.000	.000	.000	.500	.500	.817



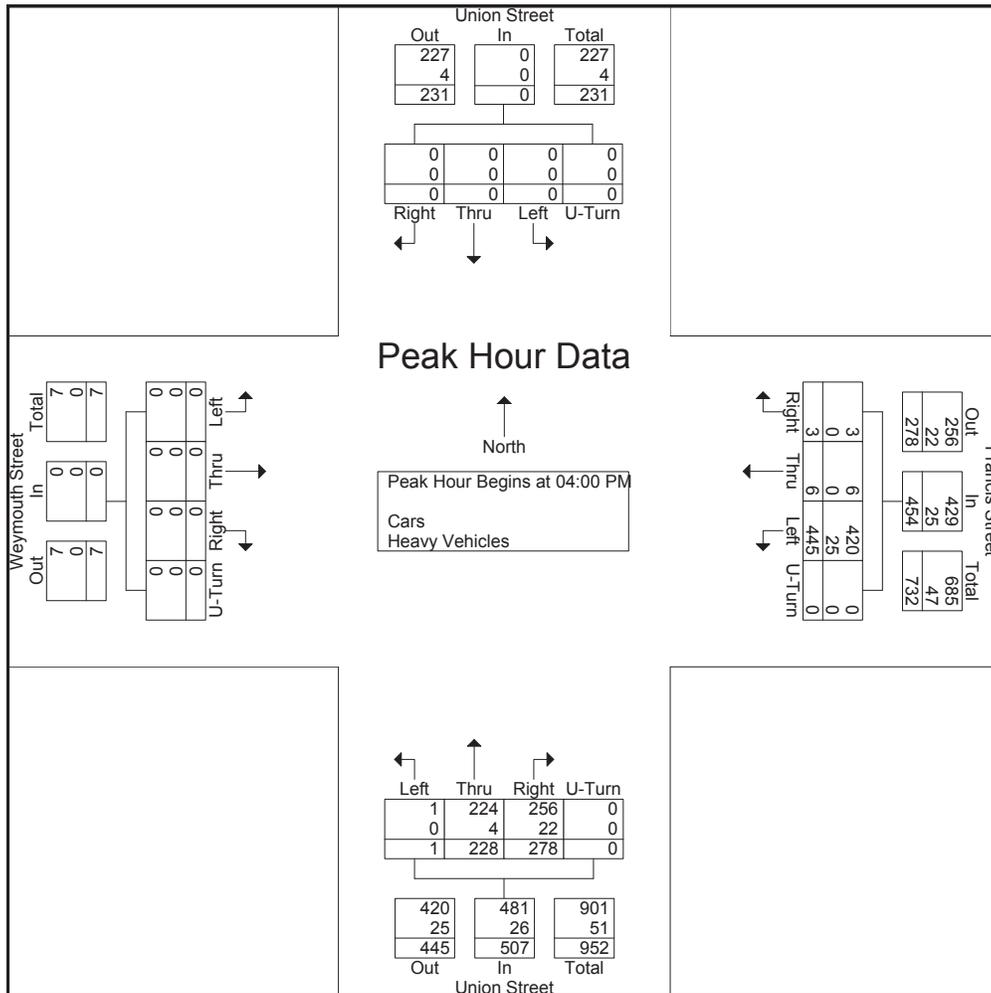
PRECISION
D A T A
INDUSTRIES, LLC

P.O. Box 301 Berlin, MA 01503
Office: 508.481.3999 Fax: 508.545.1234
Email: datarequests@pdillc.com

File Name : 133491 BB
Site Code : 12472
Start Date : 8/29/2013
Page No : 1

N/S: Union Street
E/W: Francis Street/ Weymouth Street
City, State: Nantucket, MA
Client: VHB/ M. Kealey

Start Time	Union Street From North					Francis Street From East					Union Street From South					Weymouth Street From West					Int. Total
	Right	Thru	Left	U-Turn	App. Total	Right	Thru	Left	U-Turn	App. Total	Right	Thru	Left	U-Turn	App. Total	Right	Thru	Left	U-Turn	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	0	0	0	0	0	0	108	0	108	93	63	0	0	156	0	0	0	0	0	264
04:15 PM	0	0	0	0	0	1	4	107	0	112	67	56	0	0	123	0	0	0	0	0	235
04:30 PM	0	0	0	0	0	0	2	124	0	126	57	57	1	0	115	0	0	0	0	0	241
04:45 PM	0	0	0	0	0	2	0	106	0	108	61	52	0	0	113	0	0	0	0	0	221
Total Volume	0	0	0	0	0	3	6	445	0	454	278	228	1	0	507	0	0	0	0	0	961
% App. Total	0	0	0	0	0	0.7	1.3	98	0	100	54.8	45	0.2	0	100	0	0	0	0	0	100
PHF	.000	.000	.000	.000	.000	.375	.375	.897	.000	.901	.747	.905	.250	.000	.813	.000	.000	.000	.000	.000	.910
Cars	0	0	0	0	0	3	6	420	0	429	256	224	1	0	481	0	0	0	0	0	910
% Cars	0	0	0	0	0	100	100	94.4	0	94.5	92.1	98.2	100	0	94.9	0	0	0	0	0	94.7
Heavy Vehicles	0	0	0	0	0	0	0	25	0	25	22	4	0	0	26	0	0	0	0	0	51
% Heavy Vehicles	0	0	0	0	0	0	0	5.6	0	5.5	7.9	1.8	0	0	5.1	0	0	0	0	0	5.3





PRECISION
D A T A
INDUSTRIES, LLC

P.O. Box 301 Berlin, MA 01503
Office: 508.481.3999 Fax: 508.545.1234
Email: datarequests@pdillc.com

File Name : 133491 C
Site Code : 12472
Start Date : 8/29/2013
Page No : 1

N/S: Orange Street
E: Union Street
City, State: Nantucket, MA
Client: VHB/ M. Kealey

Groups Printed- Cars - Heavy Vehicles

Start Time	Orange Street From North			Union Street From East			Orange Street From South			Int. Total
	Thru	Left	U-Turn	Right	Left	U-Turn	Right	Thru	U-Turn	
11:00 AM	51	1	0	0	77	0	108	0	0	237
11:15 AM	48	6	0	0	80	0	110	0	0	244
11:30 AM	55	0	0	0	77	0	108	0	0	240
11:45 AM	50	3	0	0	83	0	104	0	0	240
Total	204	10	0	0	317	0	430	0	0	961
12:00 PM	50	7	0	0	82	0	91	0	0	230
12:15 PM	45	2	0	0	74	0	92	0	0	213
12:30 PM	55	9	0	0	60	0	124	0	0	248
12:45 PM	55	4	0	0	80	0	117	0	0	256
Total	205	22	0	0	296	0	424	0	0	947
01:00 PM	51	2	0	0	72	0	105	0	0	230
01:15 PM	55	1	0	0	88	0	100	0	0	244
01:30 PM	47	2	0	0	91	0	108	0	0	248
01:45 PM	40	4	0	0	88	0	94	0	0	226
Total	193	9	0	0	339	0	407	0	0	948
Grand Total	602	41	0	0	952	0	1261	0	0	2856
Apprch %	93.6	6.4	0	0	100	0	100	0	0	
Total %	21.1	1.4	0	0	33.3	0	44.2	0	0	
Cars	581	41	0	0	877	0	1190	0	0	2689
% Cars	96.5	100	0	0	92.1	0	94.4	0	0	94.2
Heavy Vehicles	21	0	0	0	75	0	71	0	0	167
% Heavy Vehicles	3.5	0	0	0	7.9	0	5.6	0	0	5.8

Start Time	Orange Street From North				Union Street From East				Orange Street From South				Int. Total
	Thru	Left	U-Turn	App. Total	Right	Left	U-Turn	App. Total	Right	Thru	U-Turn	App. Total	
Peak Hour Analysis From 11:00 AM to 12:45 PM - Peak 1 of 1													
Peak Hour for Entire Intersection Begins at 11:00 AM													
11:00 AM	51	1	0	52	0	77	0	77	108	0	0	108	237
11:15 AM	48	6	0	54	0	80	0	80	110	0	0	110	244
11:30 AM	55	0	0	55	0	77	0	77	108	0	0	108	240
11:45 AM	50	3	0	53	0	83	0	83	104	0	0	104	240
Total Volume	204	10	0	214	0	317	0	317	430	0	0	430	961
% App. Total	95.3	4.7	0		0	100	0		100	0	0		
PHF	.927	.417	.000	.973	.000	.955	.000	.955	.977	.000	.000	.977	.985
Cars	199	10	0	209	0	283	0	283	407	0	0	407	899
% Cars	97.5	100	0	97.7	0	89.3	0	89.3	94.7	0	0	94.7	93.5
Heavy Vehicles	5	0	0	5	0	34	0	34	23	0	0	23	62
% Heavy Vehicles	2.5	0	0	2.3	0	10.7	0	10.7	5.3	0	0	5.3	6.5



PRECISION
D A T A
INDUSTRIES, LLC

P.O. Box 301 Berlin, MA 01503
Office: 508.481.3999 Fax: 508.545.1234
Email: datarequests@pdillc.com

File Name : 133491 C
Site Code : 12472
Start Date : 8/29/2013
Page No : 1

N/S: Orange Street
E: Union Street
City, State: Nantucket, MA
Client: VHB/ M. Kealey

Groups Printed- Cars

Start Time	Orange Street From North			Union Street From East			Orange Street From South			Int. Total
	Thru	Left	U-Turn	Right	Left	U-Turn	Right	Thru	U-Turn	
11:00 AM	49	1	0	0	69	0	100	0	0	219
11:15 AM	47	6	0	0	74	0	105	0	0	232
11:30 AM	53	0	0	0	64	0	103	0	0	220
11:45 AM	50	3	0	0	76	0	99	0	0	228
Total	199	10	0	0	283	0	407	0	0	899
12:00 PM	48	7	0	0	78	0	86	0	0	219
12:15 PM	44	2	0	0	70	0	88	0	0	204
12:30 PM	53	9	0	0	54	0	112	0	0	228
12:45 PM	54	4	0	0	78	0	110	0	0	246
Total	199	22	0	0	280	0	396	0	0	897
01:00 PM	48	2	0	0	66	0	100	0	0	216
01:15 PM	53	1	0	0	82	0	94	0	0	230
01:30 PM	46	2	0	0	87	0	104	0	0	239
01:45 PM	36	4	0	0	79	0	89	0	0	208
Total	183	9	0	0	314	0	387	0	0	893
Grand Total	581	41	0	0	877	0	1190	0	0	2689
Apprch %	93.4	6.6	0	0	100	0	100	0	0	
Total %	21.6	1.5	0	0	32.6	0	44.3	0	0	

Start Time	Orange Street From North				Union Street From East				Orange Street From South				Int. Total
	Thru	Left	U-Turn	App. Total	Right	Left	U-Turn	App. Total	Right	Thru	U-Turn	App. Total	
Peak Hour Analysis From 11:00 AM to 12:45 PM - Peak 1 of 1													
Peak Hour for Entire Intersection Begins at 11:00 AM													
11:00 AM	49	1	0	50	0	69	0	69	100	0	0	100	219
11:15 AM	47	6	0	53	0	74	0	74	105	0	0	105	232
11:30 AM	53	0	0	53	0	64	0	64	103	0	0	103	220
11:45 AM	50	3	0	53	0	76	0	76	99	0	0	99	228
Total Volume	199	10	0	209	0	283	0	283	407	0	0	407	899
% App. Total	95.2	4.8	0		0	100	0		100	0	0		
PHF	.939	.417	.000	.986	.000	.931	.000	.931	.969	.000	.000	.969	.969



PRECISION
D A T A
INDUSTRIES, LLC

P.O. Box 301 Berlin, MA 01503
Office: 508.481.3999 Fax: 508.545.1234
Email: datarequests@pdillc.com

File Name : 133491 C
Site Code : 12472
Start Date : 8/29/2013
Page No : 1

N/S: Orange Street
E: Union Street
City, State: Nantucket, MA
Client: VHB/ M. Kealey

Groups Printed- Heavy Vehicles

Start Time	Orange Street From North			Union Street From East			Orange Street From South			Int. Total
	Thru	Left	U-Turn	Right	Left	U-Turn	Right	Thru	U-Turn	
11:00 AM	2	0	0	0	8	0	8	0	0	18
11:15 AM	1	0	0	0	6	0	5	0	0	12
11:30 AM	2	0	0	0	13	0	5	0	0	20
11:45 AM	0	0	0	0	7	0	5	0	0	12
Total	5	0	0	0	34	0	23	0	0	62
12:00 PM	2	0	0	0	4	0	5	0	0	11
12:15 PM	1	0	0	0	4	0	4	0	0	9
12:30 PM	2	0	0	0	6	0	12	0	0	20
12:45 PM	1	0	0	0	2	0	7	0	0	10
Total	6	0	0	0	16	0	28	0	0	50
01:00 PM	3	0	0	0	6	0	5	0	0	14
01:15 PM	2	0	0	0	6	0	6	0	0	14
01:30 PM	1	0	0	0	4	0	4	0	0	9
01:45 PM	4	0	0	0	9	0	5	0	0	18
Total	10	0	0	0	25	0	20	0	0	55
Grand Total	21	0	0	0	75	0	71	0	0	167
Apprch %	100	0	0	0	100	0	100	0	0	
Total %	12.6	0	0	0	44.9	0	42.5	0	0	

Start Time	Orange Street From North				Union Street From East				Orange Street From South				Int. Total
	Thru	Left	U-Turn	App. Total	Right	Left	U-Turn	App. Total	Right	Thru	U-Turn	App. Total	
Peak Hour Analysis From 11:00 AM to 12:45 PM - Peak 1 of 1													
Peak Hour for Entire Intersection Begins at 11:00 AM													
11:00 AM	2	0	0	2	0	8	0	8	8	0	0	8	18
11:15 AM	1	0	0	1	0	6	0	6	5	0	0	5	12
11:30 AM	2	0	0	2	0	13	0	13	5	0	0	5	20
11:45 AM	0	0	0	0	0	7	0	7	5	0	0	5	12
Total Volume	5	0	0	5	0	34	0	34	23	0	0	23	62
% App. Total	100	0	0	100	0	100	0	100	100	0	0	100	
PHF	.625	.000	.000	.625	.000	.654	.000	.654	.719	.000	.000	.719	.775



PRECISION
D A T A
INDUSTRIES, LLC

P.O. Box 301 Berlin, MA 01503
Office: 508.481.3999 Fax: 508.545.1234
Email: datarequests@pdillc.com

File Name : 133491 C
Site Code : 12472
Start Date : 8/29/2013
Page No : 1

N/S: Orange Street
E: Union Street
City, State: Nantucket, MA
Client: VHB/ M. Kealey

Groups Printed- Peds and Bikes

Start Time	Orange Street From North			Union Street From East			Orange Street From South			Int. Total
	Thru	Left	Peds	Right	Left	Peds	Right	Thru	Peds	
11:00 AM	2	0	0	0	6	0	5	0	0	13
11:15 AM	1	0	0	0	8	1	10	0	0	20
11:30 AM	9	0	2	1	7	0	9	0	0	28
11:45 AM	6	1	1	0	8	0	4	0	0	20
Total	18	1	3	1	29	1	28	0	0	81
12:00 PM	2	0	1	0	13	0	1	0	0	17
12:15 PM	4	0	11	1	8	1	11	0	0	36
12:30 PM	5	0	2	0	10	0	11	0	0	28
12:45 PM	3	0	8	0	10	0	6	0	0	27
Total	14	0	22	1	41	1	29	0	0	108
01:00 PM	5	0	4	1	3	0	6	0	2	21
01:15 PM	9	0	2	0	4	0	2	0	0	17
01:30 PM	0	0	2	0	1	0	10	2	0	15
01:45 PM	1	0	2	0	6	0	9	0	0	18
Total	15	0	10	1	14	0	27	2	2	71
Grand Total	47	1	35	3	84	2	84	2	2	260
Apprch %	56.6	1.2	42.2	3.4	94.4	2.2	95.5	2.3	2.3	
Total %	18.1	0.4	13.5	1.2	32.3	0.8	32.3	0.8	0.8	

Start Time	Orange Street From North				Union Street From East				Orange Street From South				Int. Total
	Thru	Left	Peds	App. Total	Right	Left	Peds	App. Total	Right	Thru	Peds	App. Total	
Peak Hour Analysis From 11:00 AM to 12:45 PM - Peak 1 of 1													
Peak Hour for Entire Intersection Begins at 12:00 PM													
12:00 PM	2	0	1	3	0	13	0	13	1	0	0	1	17
12:15 PM	4	0	11	15	1	8	1	10	11	0	0	11	36
12:30 PM	5	0	2	7	0	10	0	10	11	0	0	11	28
12:45 PM	3	0	8	11	0	10	0	10	6	0	0	6	27
Total Volume	14	0	22	36	1	41	1	43	29	0	0	29	108
% App. Total	38.9	0	61.1		2.3	95.3	2.3		100	0	0		
PHF	.700	.000	.500	.600	.250	.788	.250	.827	.659	.000	.000	.659	.750



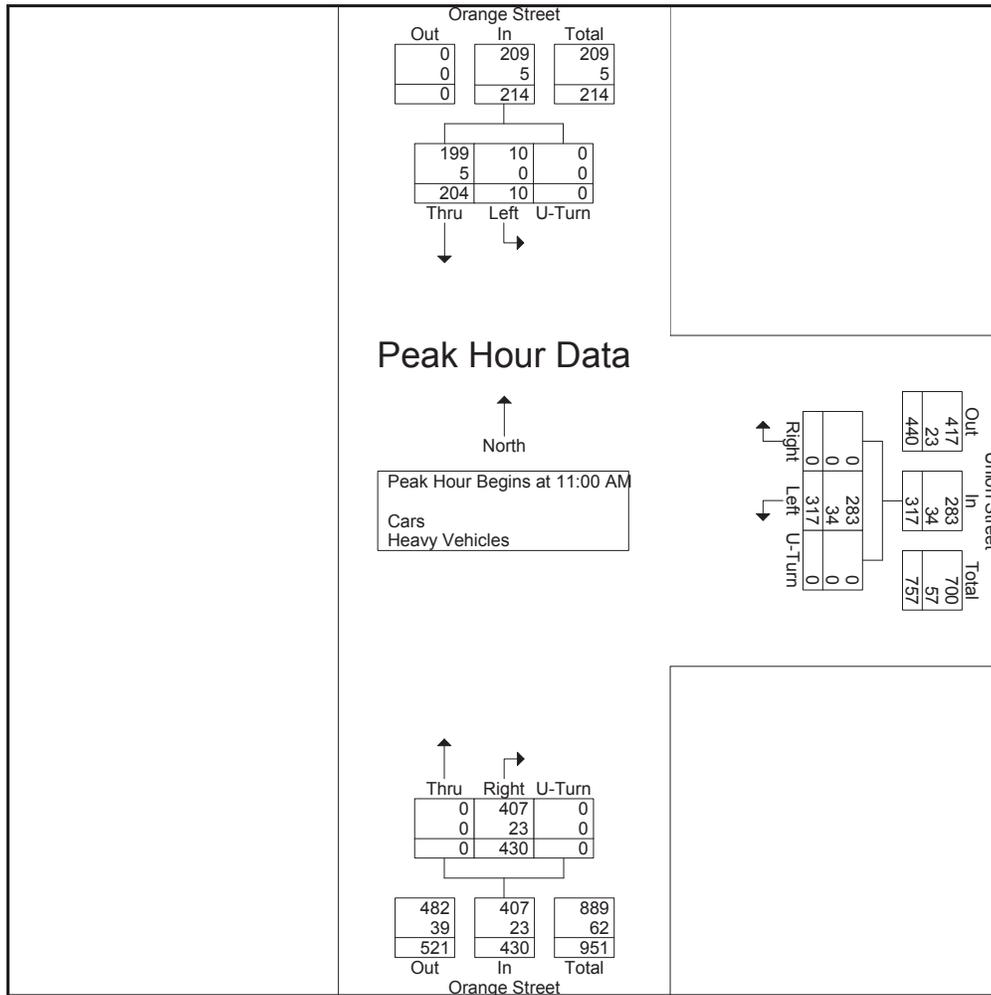
PRECISION
D A T A
INDUSTRIES, LLC

P.O. Box 301 Berlin, MA 01503
Office: 508.481.3999 Fax: 508.545.1234
Email: datarequests@pdillc.com

File Name : 133491 C
Site Code : 12472
Start Date : 8/29/2013
Page No : 1

N/S: Orange Street
E: Union Street
City, State: Nantucket, MA
Client: VHB/ M. Kealey

Start Time	Orange Street From North				Union Street From East				Orange Street From South				Int. Total
	Thru	Left	U-Turn	App. Total	Right	Left	U-Turn	App. Total	Right	Thru	U-Turn	App. Total	
Peak Hour Analysis From 11:00 AM to 12:45 PM - Peak 1 of 1													
Peak Hour for Entire Intersection Begins at 11:00 AM													
11:00 AM	51	1	0	52	0	77	0	77	108	0	0	108	237
11:15 AM	48	6	0	54	0	80	0	80	110	0	0	110	244
11:30 AM	55	0	0	55	0	77	0	77	108	0	0	108	240
11:45 AM	50	3	0	53	0	83	0	83	104	0	0	104	240
Total Volume	204	10	0	214	0	317	0	317	430	0	0	430	961
% App. Total	95.3	4.7	0		0	100	0		100	0	0		
PHF	.927	.417	.000	.973	.000	.955	.000	.955	.977	.000	.000	.977	.985
Cars	199	10	0	209	0	283	0	283	407	0	0	407	899
% Cars	97.5	100	0	97.7	0	89.3	0	89.3	94.7	0	0	94.7	93.5
Heavy Vehicles	5	0	0	5	0	34	0	34	23	0	0	23	62
% Heavy Vehicles	2.5	0	0	2.3	0	10.7	0	10.7	5.3	0	0	5.3	6.5





PRECISION
D A T A
INDUSTRIES, LLC

P.O. Box 301 Berlin, MA 01503
Office: 508.481.3999 Fax: 508.545.1234
Email: datarequests@pdillc.com

File Name : 133491 CC
Site Code : 12472
Start Date : 8/29/2013
Page No : 1

N/S: Orange Street
E: Union Street
City, State: Nantucket, MA
Client: VHB/ M. Kealey

Groups Printed- Cars - Heavy Vehicles

Start Time	Orange Street From North			Union Street From East			Orange Street From South			Int. Total
	Thru	Left	U-Turn	Right	Left	U-Turn	Right	Thru	U-Turn	
04:00 PM	59	1	0	0	83	0	133	0	0	276
04:15 PM	52	2	0	0	81	0	90	0	0	225
04:30 PM	53	5	0	0	92	0	104	0	0	254
04:45 PM	62	2	0	0	98	0	90	0	0	252
Total	226	10	0	0	354	0	417	0	0	1007
05:00 PM	56	0	0	0	89	0	85	0	0	230
05:15 PM	39	1	0	0	82	0	101	0	0	223
05:30 PM	35	1	0	0	66	0	77	0	0	179
05:45 PM	46	3	0	0	77	0	80	0	0	206
Total	176	5	0	0	314	0	343	0	0	838
Grand Total	402	15	0	0	668	0	760	0	0	1845
Apprch %	96.4	3.6	0	0	100	0	100	0	0	
Total %	21.8	0.8	0	0	36.2	0	41.2	0	0	
Cars	395	14	0	0	624	0	731	0	0	1764
% Cars	98.3	93.3	0	0	93.4	0	96.2	0	0	95.6
Heavy Vehicles	7	1	0	0	44	0	29	0	0	81
% Heavy Vehicles	1.7	6.7	0	0	6.6	0	3.8	0	0	4.4

Start Time	Orange Street From North				Union Street From East				Orange Street From South				Int. Total
	Thru	Left	U-Turn	App. Total	Right	Left	U-Turn	App. Total	Right	Thru	U-Turn	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	59	1	0	60	0	83	0	83	133	0	0	133	276
04:15 PM	52	2	0	54	0	81	0	81	90	0	0	90	225
04:30 PM	53	5	0	58	0	92	0	92	104	0	0	104	254
04:45 PM	62	2	0	64	0	98	0	98	90	0	0	90	252
Total Volume	226	10	0	236	0	354	0	354	417	0	0	417	1007
% App. Total	95.8	4.2	0		0	100	0		100	0	0		
PHF	.911	.500	.000	.922	.000	.903	.000	.903	.784	.000	.000	.784	.912
Cars	220	9	0	229	0	334	0	334	402	0	0	402	965
% Cars	97.3	90.0	0	97.0	0	94.4	0	94.4	96.4	0	0	96.4	95.8
Heavy Vehicles	6	1	0	7	0	20	0	20	15	0	0	15	42
% Heavy Vehicles	2.7	10.0	0	3.0	0	5.6	0	5.6	3.6	0	0	3.6	4.2



PRECISION
D A T A
INDUSTRIES, LLC

P.O. Box 301 Berlin, MA 01503
Office: 508.481.3999 Fax: 508.545.1234
Email: datarequests@pdillc.com

File Name : 133491 CC
Site Code : 12472
Start Date : 8/29/2013
Page No : 1

N/S: Orange Street
E: Union Street
City, State: Nantucket, MA
Client: VHB/ M. Kealey

Groups Printed- Cars

Start Time	Orange Street From North			Union Street From East			Orange Street From South			Int. Total
	Thru	Left	U-Turn	Right	Left	U-Turn	Right	Thru	U-Turn	
04:00 PM	58	1	0	0	78	0	127	0	0	264
04:15 PM	49	1	0	0	76	0	84	0	0	210
04:30 PM	53	5	0	0	86	0	102	0	0	246
04:45 PM	60	2	0	0	94	0	89	0	0	245
Total	220	9	0	0	334	0	402	0	0	965
05:00 PM	55	0	0	0	85	0	79	0	0	219
05:15 PM	39	1	0	0	71	0	96	0	0	207
05:30 PM	35	1	0	0	60	0	76	0	0	172
05:45 PM	46	3	0	0	74	0	78	0	0	201
Total	175	5	0	0	290	0	329	0	0	799
Grand Total	395	14	0	0	624	0	731	0	0	1764
Apprch %	96.6	3.4	0	0	100	0	100	0	0	
Total %	22.4	0.8	0	0	35.4	0	41.4	0	0	

Start Time	Orange Street From North				Union Street From East				Orange Street From South				Int. Total
	Thru	Left	U-Turn	App. Total	Right	Left	U-Turn	App. Total	Right	Thru	U-Turn	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	58	1	0	59	0	78	0	78	127	0	0	127	264
04:15 PM	49	1	0	50	0	76	0	76	84	0	0	84	210
04:30 PM	53	5	0	58	0	86	0	86	102	0	0	102	246
04:45 PM	60	2	0	62	0	94	0	94	89	0	0	89	245
Total Volume	220	9	0	229	0	334	0	334	402	0	0	402	965
% App. Total	96.1	3.9	0		0	100	0		100	0	0		
PHF	.917	.450	.000	.923	.000	.888	.000	.888	.791	.000	.000	.791	.914



PRECISION
D A T A
INDUSTRIES, LLC

P.O. Box 301 Berlin, MA 01503
Office: 508.481.3999 Fax: 508.545.1234
Email: datarequests@pdillc.com

File Name : 133491 CC
Site Code : 12472
Start Date : 8/29/2013
Page No : 1

N/S: Orange Street
E: Union Street
City, State: Nantucket, MA
Client: VHB/ M. Kealey

Groups Printed- Heavy Vehicles

Start Time	Orange Street From North			Union Street From East			Orange Street From South			Int. Total
	Thru	Left	U-Turn	Right	Left	U-Turn	Right	Thru	U-Turn	
04:00 PM	1	0	0	0	5	0	6	0	0	12
04:15 PM	3	1	0	0	5	0	6	0	0	15
04:30 PM	0	0	0	0	6	0	2	0	0	8
04:45 PM	2	0	0	0	4	0	1	0	0	7
Total	6	1	0	0	20	0	15	0	0	42
05:00 PM	1	0	0	0	4	0	6	0	0	11
05:15 PM	0	0	0	0	11	0	5	0	0	16
05:30 PM	0	0	0	0	6	0	1	0	0	7
05:45 PM	0	0	0	0	3	0	2	0	0	5
Total	1	0	0	0	24	0	14	0	0	39
Grand Total	7	1	0	0	44	0	29	0	0	81
Apprch %	87.5	12.5	0	0	100	0	100	0	0	
Total %	8.6	1.2	0	0	54.3	0	35.8	0	0	

Start Time	Orange Street From North				Union Street From East				Orange Street From South				Int. Total
	Thru	Left	U-Turn	App. Total	Right	Left	U-Turn	App. Total	Right	Thru	U-Turn	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	1	0	0	1	0	5	0	5	6	0	0	6	12
04:15 PM	3	1	0	4	0	5	0	5	6	0	0	6	15
04:30 PM	0	0	0	0	0	6	0	6	2	0	0	2	8
04:45 PM	2	0	0	2	0	4	0	4	1	0	0	1	7
Total Volume	6	1	0	7	0	20	0	20	15	0	0	15	42
% App. Total	85.7	14.3	0		0	100	0		100	0	0		
PHF	.500	.250	.000	.438	.000	.833	.000	.833	.625	.000	.000	.625	.700



PRECISION
D A T A
INDUSTRIES, LLC

P.O. Box 301 Berlin, MA 01503
Office: 508.481.3999 Fax: 508.545.1234
Email: datarequests@pdillc.com

File Name : 133491 CC
Site Code : 12472
Start Date : 8/29/2013
Page No : 1

N/S: Orange Street
E: Union Street
City, State: Nantucket, MA
Client: VHB/ M. Kealey

Groups Printed- Peds and Bikes

Start Time	Orange Street From North			Union Street From East			Orange Street From South			Int. Total
	Thru	Left	Peds	Right	Left	Peds	Right	Thru	Peds	
04:00 PM	1	0	2	0	19	0	8	0	0	30
04:15 PM	2	0	2	0	5	0	14	0	0	23
04:30 PM	1	0	2	0	7	0	10	0	0	20
04:45 PM	2	0	6	0	9	0	6	1	0	24
Total	6	0	12	0	40	0	38	1	0	97
05:00 PM	7	0	0	0	6	0	3	0	0	16
05:15 PM	3	0	0	0	2	0	2	0	0	7
05:30 PM	1	0	6	0	3	1	3	0	0	14
05:45 PM	6	0	0	0	4	0	3	0	0	13
Total	17	0	6	0	15	1	11	0	0	50
Grand Total	23	0	18	0	55	1	49	1	0	147
Apprch %	56.1	0	43.9	0	98.2	1.8	98	2	0	
Total %	15.6	0	12.2	0	37.4	0.7	33.3	0.7	0	

Start Time	Orange Street From North				Union Street From East				Orange Street From South				Int. Total
	Thru	Left	Peds	App. Total	Right	Left	Peds	App. Total	Right	Thru	Peds	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	1	0	2	3	0	19	0	19	8	0	0	8	30
04:15 PM	2	0	2	4	0	5	0	5	14	0	0	14	23
04:30 PM	1	0	2	3	0	7	0	7	10	0	0	10	20
04:45 PM	2	0	6	8	0	9	0	9	6	1	0	7	24
Total Volume	6	0	12	18	0	40	0	40	38	1	0	39	97
% App. Total	33.3	0	66.7		0	100	0		97.4	2.6	0		
PHF	.750	.000	.500	.563	.000	.526	.000	.526	.679	.250	.000	.696	.808



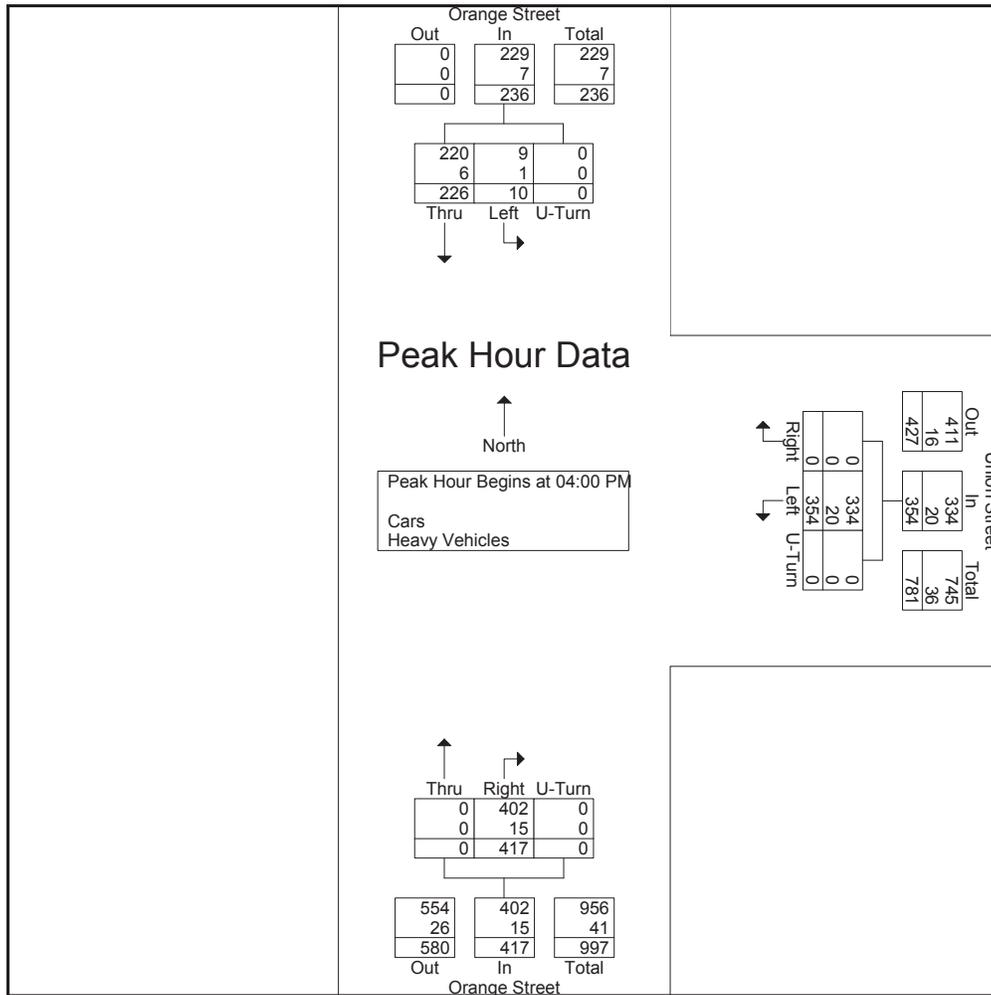
PRECISION
D A T A
INDUSTRIES, LLC

P.O. Box 301 Berlin, MA 01503
Office: 508.481.3999 Fax: 508.545.1234
Email: datarequests@pdillc.com

File Name : 133491 CC
Site Code : 12472
Start Date : 8/29/2013
Page No : 1

N/S: Orange Street
E: Union Street
City, State: Nantucket, MA
Client: VHB/ M. Kealey

Start Time	Orange Street From North				Union Street From East				Orange Street From South				Int. Total
	Thru	Left	U-Turn	App. Total	Right	Left	U-Turn	App. Total	Right	Thru	U-Turn	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	59	1	0	60	0	83	0	83	133	0	0	133	276
04:15 PM	52	2	0	54	0	81	0	81	90	0	0	90	225
04:30 PM	53	5	0	58	0	92	0	92	104	0	0	104	254
04:45 PM	62	2	0	64	0	98	0	98	90	0	0	90	252
Total Volume	226	10	0	236	0	354	0	354	417	0	0	417	1007
% App. Total	95.8	4.2	0		0	100	0		100	0	0		
PHF	.911	.500	.000	.922	.000	.903	.000	.903	.784	.000	.000	.784	.912
Cars	220	9	0	229	0	334	0	334	402	0	0	402	965
% Cars	97.3	90.0	0	97.0	0	94.4	0	94.4	96.4	0	0	96.4	95.8
Heavy Vehicles	6	1	0	7	0	20	0	20	15	0	0	15	42
% Heavy Vehicles	2.7	10.0	0	3.0	0	5.6	0	5.6	3.6	0	0	3.6	4.2





PRECISION
D A T A
INDUSTRIES, LLC

P.O. Box 301 Berlin, MA 01503
Office: 508.481.3999 Fax: 508.545.1234
Email: datarequests@pdillc.com

File Name : 133491 D
Site Code : 12472
Start Date : 8/29/2013
Page No : 1

N/S: Orange Street/Old South Road
E/W: Milestone Road/ Sparks Avenue
City, State: Nantucket, MA
Client: VHB/ M. Kealey

Groups Printed- Cars - Heavy Vehicles

Start Time	Orange Street From North				Milestone Road From East				Old South Road From South				Sparks Avenue From West				Int. Total
	Right	Thru	Left	U-Turn	Right	Thru	Left	U-Turn	Right	Thru	Left	U-Turn	Right	Thru	Left	U-Turn	
11:00 AM	7	49	59	1	57	89	11	0	25	65	40	0	33	70	9	0	515
11:15 AM	20	58	50	1	57	92	24	1	12	59	32	0	21	58	5	0	490
11:30 AM	26	53	58	0	78	116	22	0	16	52	51	0	33	62	9	0	576
11:45 AM	18	75	84	0	63	80	23	3	18	64	39	0	24	58	7	0	556
Total	71	235	251	2	255	377	80	4	71	240	162	0	111	248	30	0	2137
12:00 PM	21	56	73	0	62	72	22	2	26	42	43	0	25	66	5	0	515
12:15 PM	22	57	60	0	60	82	21	0	19	52	40	0	34	52	5	0	504
12:30 PM	19	57	75	0	75	83	18	0	20	56	28	0	29	59	11	3	533
12:45 PM	25	64	68	0	76	68	6	0	20	57	30	1	25	74	11	0	525
Total	87	234	276	0	273	305	67	2	85	207	141	1	113	251	32	3	2077
01:00 PM	19	70	59	0	59	62	11	4	20	81	24	0	29	63	8	1	510
01:15 PM	28	75	60	0	67	63	15	0	28	53	34	0	23	59	9	0	514
01:30 PM	19	67	78	0	57	67	17	3	8	49	30	0	18	65	7	1	486
01:45 PM	23	68	65	0	63	86	16	1	27	44	40	0	26	67	8	0	534
Total	89	280	262	0	246	278	59	8	83	227	128	0	96	254	32	2	2044
Grand Total	247	749	789	2	774	960	206	14	239	674	431	1	320	753	94	5	6258
Apprch %	13.8	41.9	44.2	0.1	39.6	49.1	10.5	0.7	17.8	50.1	32	0.1	27.3	64.2	8	0.4	
Total %	3.9	12	12.6	0	12.4	15.3	3.3	0.2	3.8	10.8	6.9	0	5.1	12	1.5	0.1	
Cars	236	693	761	2	742	924	198	14	230	636	413	1	301	722	77	5	5955
% Cars	95.5	92.5	96.5	100	95.9	96.2	96.1	100	96.2	94.4	95.8	100	94.1	95.9	81.9	100	95.2
Heavy Vehicles	11	56	28	0	32	36	8	0	9	38	18	0	19	31	17	0	303
% Heavy Vehicles	4.5	7.5	3.5	0	4.1	3.8	3.9	0	3.8	5.6	4.2	0	5.9	4.1	18.1	0	4.8

Start Time	Orange Street From North					Milestone Road From East					Old South Road From South					Sparks Avenue From West					Int. Total
	Right	Thru	Left	U-Turn	App. Total	Right	Thru	Left	U-Turn	App. Total	Right	Thru	Left	U-Turn	App. Total	Right	Thru	Left	U-Turn	App. Total	
Peak Hour Analysis From 11:00 AM to 12:45 PM - Peak 1 of 1																					
Peak Hour for Entire Intersection Begins at 11:30 AM																					
11:30 AM	26	53	58	0	137	78	116	22	0	216	16	52	51	0	119	33	62	9	0	104	576
11:45 AM	18	75	84	0	177	63	80	23	3	169	18	64	39	0	121	24	58	7	0	89	556
12:00 PM	21	56	73	0	150	62	72	22	2	158	26	42	43	0	111	25	66	5	0	96	515
12:15 PM	22	57	60	0	139	60	82	21	0	163	19	52	40	0	111	34	52	5	0	91	504
Total Volume	87	241	275	0	603	263	350	88	5	706	79	210	173	0	462	116	238	26	0	380	2151
% App. Total	14.4	40	45.6	0		37.3	49.6	12.5	0.7		17.1	45.5	37.4	0		30.5	62.6	6.8	0		
PHF	.837	.803	.818	.000	.852	.843	.754	.957	.417	.817	.760	.820	.848	.000	.955	.853	.902	.722	.000	.913	.934
Cars	82	224	265	0	571	256	345	83	5	689	74	195	165	0	434	107	231	21	0	359	2053
% Cars	94.3	92.9	96.4	0	94.7	97.3	98.6	94.3	100	97.6	93.7	92.9	95.4	0	93.9	92.2	97.1	80.8	0	94.5	95.4
Heavy Vehicles	5	17	10	0	32	7	5	5	0	17	5	15	8	0	28	9	7	5	0	21	98
% Heavy Vehicles	5.7	7.1	3.6	0	5.3	2.7	1.4	5.7	0	2.4	6.3	7.1	4.6	0	6.1	7.8	2.9	19.2	0	5.5	4.6



PRECISION
D A T A
INDUSTRIES, LLC

P.O. Box 301 Berlin, MA 01503
Office: 508.481.3999 Fax: 508.545.1234
Email: datarequests@pdillc.com

File Name : 133491 D
Site Code : 12472
Start Date : 8/29/2013
Page No : 1

N/S: Orange Street/Old South Road
E/W: Milestone Road/ Sparks Avenue
City, State: Nantucket, MA
Client: VHB/ M. Kealey

Groups Printed- Cars

Start Time	Orange Street From North				Milestone Road From East				Old South Road From South				Sparks Avenue From West				Int. Total
	Right	Thru	Left	U-Turn	Right	Thru	Left	U-Turn	Right	Thru	Left	U-Turn	Right	Thru	Left	U-Turn	
11:00 AM	7	43	58	1	55	86	11	0	25	60	38	0	32	66	8	0	490
11:15 AM	18	51	49	1	52	89	24	1	11	56	30	0	21	57	4	0	464
11:30 AM	25	48	56	0	76	114	20	0	14	49	49	0	32	61	8	0	552
11:45 AM	16	70	79	0	60	79	22	3	17	59	39	0	21	55	6	0	526
Total	66	212	242	2	243	368	77	4	67	224	156	0	106	239	26	0	2032
12:00 PM	20	52	71	0	61	71	20	2	25	39	41	0	23	65	3	0	493
12:15 PM	21	54	59	0	59	81	21	0	18	48	36	0	31	50	4	0	482
12:30 PM	19	55	73	0	67	77	18	0	20	53	26	0	28	55	10	3	504
12:45 PM	25	61	63	0	73	62	6	0	20	56	28	1	25	73	10	0	503
Total	85	222	266	0	260	291	65	2	83	196	131	1	107	243	27	3	1982
01:00 PM	19	67	56	0	58	55	10	4	20	77	23	0	26	59	7	1	482
01:15 PM	27	67	59	0	65	61	15	0	26	50	33	0	20	57	7	0	487
01:30 PM	19	66	76	0	56	65	17	3	7	47	30	0	17	61	6	1	471
01:45 PM	20	59	62	0	60	84	14	1	27	42	40	0	25	63	4	0	501
Total	85	259	253	0	239	265	56	8	80	216	126	0	88	240	24	2	1941
Grand Total	236	693	761	2	742	924	198	14	230	636	413	1	301	722	77	5	5955
Apprch %	13.9	41	45	0.1	39.5	49.2	10.5	0.7	18	49.7	32.3	0.1	27.2	65.3	7	0.5	
Total %	4	11.6	12.8	0	12.5	15.5	3.3	0.2	3.9	10.7	6.9	0	5.1	12.1	1.3	0.1	

Start Time	Orange Street From North					Milestone Road From East					Old South Road From South					Sparks Avenue From West					Int. Total
	Right	Thru	Left	U-Turn	App. Total	Right	Thru	Left	U-Turn	App. Total	Right	Thru	Left	U-Turn	App. Total	Right	Thru	Left	U-Turn	App. Total	
Peak Hour Analysis From 11:00 AM to 12:45 PM - Peak 1 of 1																					
Peak Hour for Entire Intersection Begins at 11:30 AM																					
11:30 AM	25	48	56	0	129	76	114	20	0	210	14	49	49	0	112	32	61	8	0	101	552
11:45 AM	16	70	79	0	165	60	79	22	3	164	17	59	39	0	115	21	55	6	0	82	526
12:00 PM	20	52	71	0	143	61	71	20	2	154	25	39	41	0	105	23	65	3	0	91	493
12:15 PM	21	54	59	0	134	59	81	21	0	161	18	48	36	0	102	31	50	4	0	85	482
Total Volume	82	224	265	0	571	256	345	83	5	689	74	195	165	0	434	107	231	21	0	359	2053
% App. Total	14.4	39.2	46.4	0		37.2	50.1	12	0.7		17.1	44.9	38	0		29.8	64.3	5.8	0		
PHF	.820	.800	.839	.000	.865	.842	.757	.943	.417	.820	.740	.826	.842	.000	.943	.836	.888	.656	.000	.889	.930



PRECISION
D A T A
INDUSTRIES, LLC

P.O. Box 301 Berlin, MA 01503
Office: 508.481.3999 Fax: 508.545.1234
Email: datarequests@pdillc.com

N/S: Orange Street/Old South Road
E/W: Milestone Road/ Sparks Avenue
City, State: Nantucket, MA
Client: VHB/ M. Kealey

File Name : 133491 D
Site Code : 12472
Start Date : 8/29/2013
Page No : 1

Groups Printed- Heavy Vehicles

Start Time	Orange Street From North				Milestone Road From East				Old South Road From South				Sparks Avenue From West				Int. Total
	Right	Thru	Left	U-Turn	Right	Thru	Left	U-Turn	Right	Thru	Left	U-Turn	Right	Thru	Left	U-Turn	
11:00 AM	0	6	1	0	2	3	0	0	0	5	2	0	1	4	1	0	25
11:15 AM	2	7	1	0	5	3	0	0	1	3	2	0	0	1	1	0	26
11:30 AM	1	5	2	0	2	2	2	0	2	3	2	0	1	1	1	0	24
11:45 AM	2	5	5	0	3	1	1	0	1	5	0	0	3	3	1	0	30
Total	5	23	9	0	12	9	3	0	4	16	6	0	5	9	4	0	105
12:00 PM	1	4	2	0	1	1	2	0	1	3	2	0	2	1	2	0	22
12:15 PM	1	3	1	0	1	1	0	0	1	4	4	0	3	2	1	0	22
12:30 PM	0	2	2	0	8	6	0	0	0	3	2	0	1	4	1	0	29
12:45 PM	0	3	5	0	3	6	0	0	0	1	2	0	0	1	1	0	22
Total	2	12	10	0	13	14	2	0	2	11	10	0	6	8	5	0	95
01:00 PM	0	3	3	0	1	7	1	0	0	4	1	0	3	4	1	0	28
01:15 PM	1	8	1	0	2	2	0	0	2	3	1	0	3	2	2	0	27
01:30 PM	0	1	2	0	1	2	0	0	1	2	0	0	1	4	1	0	15
01:45 PM	3	9	3	0	3	2	2	0	0	2	0	0	1	4	4	0	33
Total	4	21	9	0	7	13	3	0	3	11	2	0	8	14	8	0	103
Grand Total	11	56	28	0	32	36	8	0	9	38	18	0	19	31	17	0	303
Apprch %	11.6	58.9	29.5	0	42.1	47.4	10.5	0	13.8	58.5	27.7	0	28.4	46.3	25.4	0	
Total %	3.6	18.5	9.2	0	10.6	11.9	2.6	0	3	12.5	5.9	0	6.3	10.2	5.6	0	

Start Time	Orange Street From North					Milestone Road From East					Old South Road From South					Sparks Avenue From West					Int. Total
	Right	Thru	Left	U-Turn	App. Total	Right	Thru	Left	U-Turn	App. Total	Right	Thru	Left	U-Turn	App. Total	Right	Thru	Left	U-Turn	App. Total	
11:00 AM	0	6	1	0	7	2	3	0	0	5	0	5	2	0	7	1	4	1	0	6	25
11:15 AM	2	7	1	0	10	5	3	0	0	8	1	3	2	0	6	0	1	1	0	2	26
11:30 AM	1	5	2	0	8	2	2	2	0	6	2	3	2	0	7	1	1	1	0	3	24
11:45 AM	2	5	5	0	12	3	1	1	0	5	1	5	0	0	6	3	3	1	0	7	30
Total Volume	5	23	9	0	37	12	9	3	0	24	4	16	6	0	26	5	9	4	0	18	105
% App. Total	13.5	62.2	24.3	0		50	37.5	12.5	0		15.4	61.5	23.1	0		27.8	50	22.2	0		
PHF	.625	.821	.450	.000	.771	.600	.750	.375	.000	.750	.500	.800	.750	.000	.929	.417	.563	1.00	.000	.643	.875

Peak Hour Analysis From 11:00 AM to 12:45 PM - Peak 1 of 1
Peak Hour for Entire Intersection Begins at 11:00 AM



PRECISION
D A T A
INDUSTRIES, LLC

P.O. Box 301 Berlin, MA 01503
Office: 508.481.3999 Fax: 508.545.1234
Email: datarequests@pdillc.com

File Name : 133491 D
Site Code : 12472
Start Date : 8/29/2013
Page No : 1

N/S: Orange Street/Old South Road
E/W: Milestone Road/ Sparks Avenue
City, State: Nantucket, MA
Client: VHB/ M. Kealey

Groups Printed- Peds and Bikes

Start Time	Orange Street From North				Milestone Road From East				Old South Road From South				Sparks Avenue From West				Int. Total
	Right	Thru	Left	Peds	Right	Thru	Left	Peds	Right	Thru	Left	Peds	Right	Thru	Left	Peds	
11:00 AM	0	0	1	1	0	0	0	0	0	1	0	16	0	0	1	4	24
11:15 AM	2	0	0	4	1	0	0	0	0	0	0	38	0	0	0	24	69
11:30 AM	0	0	0	0	0	0	0	0	0	0	0	39	0	0	0	5	44
11:45 AM	3	1	1	0	0	3	0	0	0	2	0	34	0	0	0	23	67
Total	5	1	2	5	1	3	0	0	0	3	0	127	0	0	1	56	204
12:00 PM	0	1	0	0	0	0	0	0	0	0	0	33	0	0	0	16	50
12:15 PM	0	0	0	0	5	0	0	0	0	0	2	46	0	0	0	10	63
12:30 PM	0	0	0	0	0	0	0	0	0	0	0	44	0	0	0	22	66
12:45 PM	0	0	0	0	1	0	0	0	0	0	0	33	0	0	0	21	55
Total	0	1	0	0	6	0	0	0	0	0	2	156	0	0	0	69	234
01:00 PM	0	0	0	0	0	0	0	0	0	0	0	48	0	0	0	35	83
01:15 PM	0	0	0	0	0	0	0	0	1	0	0	42	0	0	0	28	71
01:30 PM	0	0	0	0	2	1	0	0	0	0	0	30	0	0	0	17	50
01:45 PM	1	2	0	0	1	0	0	0	0	0	0	32	0	0	0	25	61
Total	1	2	0	0	3	1	0	0	1	0	0	152	0	0	0	105	265
Grand Total	6	4	2	5	10	4	0	0	1	3	2	435	0	0	1	230	703
Apprch %	35.3	23.5	11.8	29.4	71.4	28.6	0	0	0.2	0.7	0.5	98.6	0	0	0.4	99.6	
Total %	0.9	0.6	0.3	0.7	1.4	0.6	0	0	0.1	0.4	0.3	61.9	0	0	0.1	32.7	

Start Time	Orange Street From North					Milestone Road From East					Old South Road From South					Sparks Avenue From West					Int. Total
	Right	Thru	Left	Peds	App. Total	Right	Thru	Left	Peds	App. Total	Right	Thru	Left	Peds	App. Total	Right	Thru	Left	Peds	App. Total	
11:45 AM	3	1	1	0	5	0	3	0	0	3	0	2	0	34	36	0	0	0	23	23	67
12:00 PM	0	1	0	0	1	0	0	0	0	0	0	0	0	33	33	0	0	0	16	16	50
12:15 PM	0	0	0	0	0	5	0	0	0	5	0	0	2	46	48	0	0	0	10	10	63
12:30 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	44	44	0	0	0	22	22	66
Total Volume	3	2	1	0	6	5	3	0	0	8	0	2	2	157	161	0	0	0	71	71	246
% App. Total	50	33.3	16.7	0	62.5	37.5	0	0	0	1.2	1.2	97.5	0	0	0	100					
PHF	.250	.500	.250	.000	.300	.250	.250	.000	.000	.400	.000	.250	.250	.853	.839	.000	.000	.000	.772	.772	.918

Peak Hour Analysis From 11:00 AM to 12:45 PM - Peak 1 of 1

Peak Hour for Entire Intersection Begins at 11:45 AM



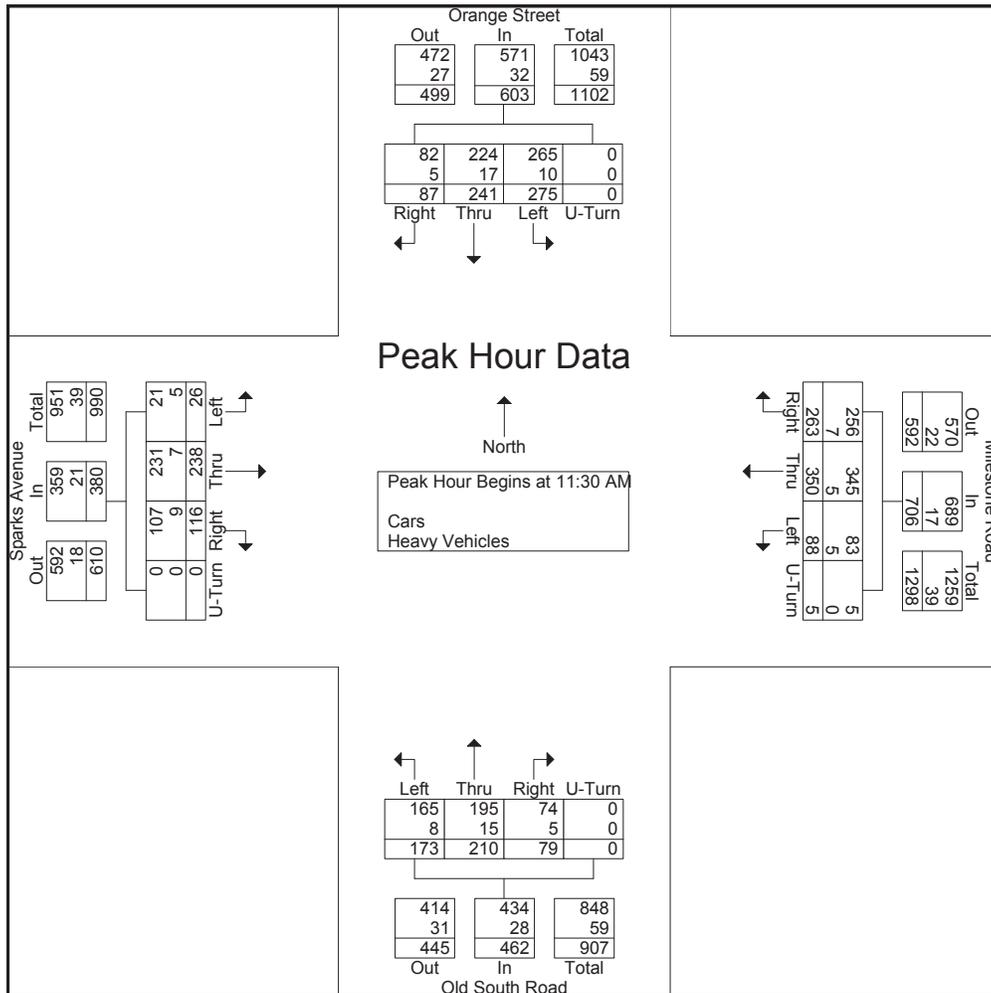
PRECISION
D A T A
INDUSTRIES, LLC

P.O. Box 301 Berlin, MA 01503
Office: 508.481.3999 Fax: 508.545.1234
Email: datarequests@pdillc.com

File Name : 133491 D
Site Code : 12472
Start Date : 8/29/2013
Page No : 1

N/S: Orange Street/Old South Road
E/W: Milestone Road/ Sparks Avenue
City, State: Nantucket, MA
Client: VHB/ M. Kealey

Start Time	Orange Street From North					Milestone Road From East					Old South Road From South					Sparks Avenue From West					Int. Total
	Right	Thru	Left	U-Turn	App. Total	Right	Thru	Left	U-Turn	App. Total	Right	Thru	Left	U-Turn	App. Total	Right	Thru	Left	U-Turn	App. Total	
Peak Hour Analysis From 11:00 AM to 12:45 PM - Peak 1 of 1																					
Peak Hour for Entire Intersection Begins at 11:30 AM																					
11:30 AM	26	53	58	0	137	78	116	22	0	216	16	52	51	0	119	33	62	9	0	104	576
11:45 AM	18	75	84	0	177	63	80	23	3	169	18	64	39	0	121	24	58	7	0	89	556
12:00 PM	21	56	73	0	150	62	72	22	2	158	26	42	43	0	111	25	66	5	0	96	515
12:15 PM	22	57	60	0	139	60	82	21	0	163	19	52	40	0	111	34	52	5	0	91	504
Total Volume	87	241	275	0	603	263	350	88	5	706	79	210	173	0	462	116	238	26	0	380	2151
% App. Total	14.4	40	45.6	0		37.3	49.6	12.5	0.7		17.1	45.5	37.4	0		30.5	62.6	6.8	0		
PHF	.837	.803	.818	.000	.852	.843	.754	.957	.417	.817	.760	.820	.848	.000	.955	.853	.902	.722	.000	.913	.934
Cars	82	224	265	0	571	256	345	83	5	689	74	195	165	0	434	107	231	21	0	359	2053
% Cars	94.3	92.9	96.4	0	94.7	97.3	98.6	94.3	100	97.6	93.7	92.9	95.4	0	93.9	92.2	97.1	80.8	0	94.5	95.4
Heavy Vehicles	5	17	10	0	32	7	5	5	0	17	5	15	8	0	28	9	7	5	0	21	98
% Heavy Vehicles	5.7	7.1	3.6	0	5.3	2.7	1.4	5.7	0	2.4	6.3	7.1	4.6	0	6.1	7.8	2.9	19.2	0	5.5	4.6





PRECISION
D A T A
INDUSTRIES, LLC

P.O. Box 301 Berlin, MA 01503
Office: 508.481.3999 Fax: 508.545.1234
Email: datarequests@pdillc.com

N/S: Orange Street/Old South Road
E/W: Milestone Road/ Sparks Avenue
City, State: Nantucket, MA
Client: VHB/ M. Kealey

File Name : 133491 DD
Site Code : 12472
Start Date : 8/29/2013
Page No : 1

Groups Printed- Cars - Heavy Vehicles

Start Time	Orange Street From North				Milestone Road From East				Old South Road From South				Sparks Avenue From West				Int. Total
	Right	Thru	Left	U-Turn	Right	Thru	Left	U-Turn	Right	Thru	Left	U-Turn	Right	Thru	Left	U-Turn	
04:00 PM	14	65	74	1	70	80	23	0	23	70	37	0	29	47	5	0	538
04:15 PM	25	69	65	0	52	74	17	0	17	42	47	0	23	66	7	1	505
04:30 PM	18	75	61	0	55	57	18	1	25	53	39	0	27	61	8	0	498
04:45 PM	25	68	88	0	30	61	23	1	5	51	39	0	29	61	6	0	487
Total	82	277	288	1	207	272	81	2	70	216	162	0	108	235	26	1	2028
05:00 PM	21	65	69	0	30	61	20	2	22	49	39	0	30	51	8	0	467
05:15 PM	16	64	57	0	52	63	16	1	15	59	48	1	31	63	9	0	495
05:30 PM	12	54	39	0	39	71	11	0	11	42	32	0	42	52	7	0	412
05:45 PM	21	42	52	1	39	61	10	0	14	46	36	1	37	55	2	0	417
Total	70	225	217	1	160	256	57	3	62	196	155	2	140	221	26	0	1791
Grand Total	152	502	505	2	367	528	138	5	132	412	317	2	248	456	52	1	3819
Apprch %	13.1	43.2	43.5	0.2	35.4	50.9	13.3	0.5	15.3	47.7	36.7	0.2	32.8	60.2	6.9	0.1	
Total %	4	13.1	13.2	0.1	9.6	13.8	3.6	0.1	3.5	10.8	8.3	0.1	6.5	11.9	1.4	0	
Cars	148	459	490	2	358	511	136	4	131	392	313	2	234	449	42	1	3672
% Cars	97.4	91.4	97	100	97.5	96.8	98.6	80	99.2	95.1	98.7	100	94.4	98.5	80.8	100	96.2
Heavy Vehicles	4	43	15	0	9	17	2	1	1	20	4	0	14	7	10	0	147
% Heavy Vehicles	2.6	8.6	3	0	2.5	3.2	1.4	20	0.8	4.9	1.3	0	5.6	1.5	19.2	0	3.8

Start Time	Orange Street From North					Milestone Road From East					Old South Road From South					Sparks Avenue From West					Int. Total
	Right	Thru	Left	U-Turn	App. Total	Right	Thru	Left	U-Turn	App. Total	Right	Thru	Left	U-Turn	App. Total	Right	Thru	Left	U-Turn	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	14	65	74	1	154	70	80	23	0	173	23	70	37	0	130	29	47	5	0	81	538
04:15 PM	25	69	65	0	159	52	74	17	0	143	17	42	47	0	106	23	66	7	1	97	505
04:30 PM	18	75	61	0	154	55	57	18	1	131	25	53	39	0	117	27	61	8	0	96	498
04:45 PM	25	68	88	0	181	30	61	23	1	115	5	51	39	0	95	29	61	6	0	96	487
Total Volume	82	277	288	1	648	207	272	81	2	562	70	216	162	0	448	108	235	26	1	370	2028
% App. Total	12.7	42.7	44.4	0.2		36.8	48.4	14.4	0.4		15.6	48.2	36.2	0		29.2	63.5	7	0.3		
PHF	.820	.923	.818	.250	.895	.739	.850	.880	.500	.812	.700	.771	.862	.000	.862	.931	.890	.813	.250	.954	.942
Cars	80	256	281	1	618	201	264	80	2	547	69	205	160	0	434	101	230	20	1	352	1951
% Cars	97.6	92.4	97.6	100	95.4	97.1	97.1	98.8	100	97.3	98.6	94.9	98.8	0	96.9	93.5	97.9	76.9	100	95.1	96.2
Heavy Vehicles	2	21	7	0	30	6	8	1	0	15	1	11	2	0	14	7	5	6	0	18	77
% Heavy Vehicles	2.4	7.6	2.4	0	4.6	2.9	2.9	1.2	0	2.7	1.4	5.1	1.2	0	3.1	6.5	2.1	23.1	0	4.9	3.8



PRECISION
D A T A
INDUSTRIES, LLC

P.O. Box 301 Berlin, MA 01503
Office: 508.481.3999 Fax: 508.545.1234
Email: datarequests@pdillc.com

N/S: Orange Street/Old South Road
E/W: Milestone Road/ Sparks Avenue
City, State: Nantucket, MA
Client: VHB/ M. Kealey

File Name : 133491 DD
Site Code : 12472
Start Date : 8/29/2013
Page No : 1

Groups Printed- Cars

Start Time	Orange Street From North				Milestone Road From East				Old South Road From South				Sparks Avenue From West				Int. Total
	Right	Thru	Left	U-Turn	Right	Thru	Left	U-Turn	Right	Thru	Left	U-Turn	Right	Thru	Left	U-Turn	
04:00 PM	14	59	72	1	69	77	22	0	22	64	37	0	27	45	4	0	513
04:15 PM	25	64	64	0	50	73	17	0	17	39	46	0	22	63	6	1	487
04:30 PM	17	71	61	0	54	54	18	1	25	52	39	0	24	61	6	0	483
04:45 PM	24	62	84	0	28	60	23	1	5	50	38	0	28	61	4	0	468
Total	80	256	281	1	201	264	80	2	69	205	160	0	101	230	20	1	1951
05:00 PM	20	59	66	0	29	59	19	1	22	47	39	0	29	50	8	0	448
05:15 PM	15	54	56	0	51	61	16	1	15	54	48	1	29	63	7	0	471
05:30 PM	12	50	39	0	38	67	11	0	11	42	31	0	40	51	6	0	398
05:45 PM	21	40	48	1	39	60	10	0	14	44	35	1	35	55	1	0	404
Total	68	203	209	1	157	247	56	2	62	187	153	2	133	219	22	0	1721
Grand Total	148	459	490	2	358	511	136	4	131	392	313	2	234	449	42	1	3672
Apprch %	13.5	41.8	44.6	0.2	35.5	50.6	13.5	0.4	15.6	46.8	37.4	0.2	32.2	61.8	5.8	0.1	
Total %	4	12.5	13.3	0.1	9.7	13.9	3.7	0.1	3.6	10.7	8.5	0.1	6.4	12.2	1.1	0	

Start Time	Orange Street From North					Milestone Road From East					Old South Road From South					Sparks Avenue From West					Int. Total
	Right	Thru	Left	U-Turn	App. Total	Right	Thru	Left	U-Turn	App. Total	Right	Thru	Left	U-Turn	App. Total	Right	Thru	Left	U-Turn	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	14	59	72	1	146	69	77	22	0	168	22	64	37	0	123	27	45	4	0	76	513
04:15 PM	25	64	64	0	153	50	73	17	0	140	17	39	46	0	102	22	63	6	1	92	487
04:30 PM	17	71	61	0	149	54	54	18	1	127	25	52	39	0	116	24	61	6	0	91	483
04:45 PM	24	62	84	0	170	28	60	23	1	112	5	50	38	0	93	28	61	4	0	93	468
Total Volume	80	256	281	1	618	201	264	80	2	547	69	205	160	0	434	101	230	20	1	352	1951
% App. Total	12.9	41.4	45.5	0.2		36.7	48.3	14.6	0.4		15.9	47.2	36.9	0		28.7	65.3	5.7	0.3		
PHF	.800	.901	.836	.250	.909	.728	.857	.870	.500	.814	.690	.801	.870	.000	.882	.902	.913	.833	.250	.946	.951



PRECISION
D A T A
INDUSTRIES, LLC

P.O. Box 301 Berlin, MA 01503
Office: 508.481.3999 Fax: 508.545.1234
Email: datarequests@pdillc.com

N/S: Orange Street/Old South Road
E/W: Milestone Road/ Sparks Avenue
City, State: Nantucket, MA
Client: VHB/ M. Kealey

File Name : 133491 DD
Site Code : 12472
Start Date : 8/29/2013
Page No : 1

Groups Printed- Heavy Vehicles

Start Time	Orange Street From North				Milestone Road From East				Old South Road From South				Sparks Avenue From West				Int. Total
	Right	Thru	Left	U-Turn	Right	Thru	Left	U-Turn	Right	Thru	Left	U-Turn	Right	Thru	Left	U-Turn	
04:00 PM	0	6	2	0	1	3	1	0	1	6	0	0	2	2	1	0	25
04:15 PM	0	5	1	0	2	1	0	0	0	3	1	0	1	3	1	0	18
04:30 PM	1	4	0	0	1	3	0	0	0	1	0	0	3	0	2	0	15
04:45 PM	1	6	4	0	2	1	0	0	0	1	1	0	1	0	2	0	19
Total	2	21	7	0	6	8	1	0	1	11	2	0	7	5	6	0	77
05:00 PM	1	6	3	0	1	2	1	1	0	2	0	0	1	1	0	0	19
05:15 PM	1	10	1	0	1	2	0	0	0	5	0	0	2	0	2	0	24
05:30 PM	0	4	0	0	1	4	0	0	0	0	1	0	2	1	1	0	14
05:45 PM	0	2	4	0	0	1	0	0	0	2	1	0	2	0	1	0	13
Total	2	22	8	0	3	9	1	1	0	9	2	0	7	2	4	0	70
Grand Total	4	43	15	0	9	17	2	1	1	20	4	0	14	7	10	0	147
Apprch %	6.5	69.4	24.2	0	31	58.6	6.9	3.4	4	80	16	0	45.2	22.6	32.3	0	
Total %	2.7	29.3	10.2	0	6.1	11.6	1.4	0.7	0.7	13.6	2.7	0	9.5	4.8	6.8	0	

Start Time	Orange Street From North					Milestone Road From East					Old South Road From South					Sparks Avenue From West					Int. Total
	Right	Thru	Left	U-Turn	App. Total	Right	Thru	Left	U-Turn	App. Total	Right	Thru	Left	U-Turn	App. Total	Right	Thru	Left	U-Turn	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	6	2	0	8	1	3	1	0	5	1	6	0	0	7	2	2	1	0	5	25
04:15 PM	0	5	1	0	6	2	1	0	0	3	0	3	1	0	4	1	3	1	0	5	18
04:30 PM	1	4	0	0	5	1	3	0	0	4	0	1	0	0	1	3	0	2	0	5	15
04:45 PM	1	6	4	0	11	2	1	0	0	3	0	1	1	0	2	1	0	2	0	3	19
Total Volume	2	21	7	0	30	6	8	1	0	15	1	11	2	0	14	7	5	6	0	18	77
% App. Total	6.7	70	23.3	0		40	53.3	6.7	0		7.1	78.6	14.3	0		38.9	27.8	33.3	0		
PHF	.500	.875	.438	.000	.682	.750	.667	.250	.000	.750	.250	.458	.500	.000	.500	.583	.417	.750	.000	.900	.770



PRECISION
D A T A
INDUSTRIES, LLC

P.O. Box 301 Berlin, MA 01503
Office: 508.481.3999 Fax: 508.545.1234
Email: datarequests@pdillc.com

N/S: Orange Street/Old South Road
E/W: Milestone Road/ Sparks Avenue
City, State: Nantucket, MA
Client: VHB/ M. Kealey

File Name : 133491 DD
Site Code : 12472
Start Date : 8/29/2013
Page No : 1

Groups Printed- Peds and Bikes

Start Time	Orange Street From North				Milestone Road From East				Old South Road From South				Sparks Avenue From West				Int. Total
	Right	Thru	Left	Peds	Right	Thru	Left	Peds	Right	Thru	Left	Peds	Right	Thru	Left	Peds	
04:00 PM	0	0	0	0	0	0	0	0	0	4	0	38	0	0	0	20	62
04:15 PM	0	1	0	0	2	0	0	0	0	9	0	30	0	0	0	13	55
04:30 PM	0	0	0	0	0	0	0	0	0	7	0	30	0	0	0	27	64
04:45 PM	0	0	0	0	0	0	0	0	0	4	0	27	0	0	0	13	44
Total	0	1	0	0	2	0	0	0	0	24	0	125	0	0	0	73	225
05:00 PM	0	0	0	0	0	0	0	0	0	0	0	35	0	0	0	16	51
05:15 PM	0	0	0	0	0	0	0	0	0	0	0	23	0	0	0	7	30
05:30 PM	0	0	0	0	0	0	0	0	0	1	2	20	0	1	0	6	30
05:45 PM	0	0	0	0	0	0	0	0	0	0	0	24	0	1	0	14	39
Total	0	0	0	0	0	0	0	0	0	1	2	102	0	2	0	43	150
Grand Total	0	1	0	0	2	0	0	0	0	25	2	227	0	2	0	116	375
Apprch %	0	100	0	0	100	0	0	0	0	9.8	0.8	89.4	0	1.7	0	98.3	
Total %	0	0.3	0	0	0.5	0	0	0	0	6.7	0.5	60.5	0	0.5	0	30.9	

Start Time	Orange Street From North					Milestone Road From East					Old South Road From South					Sparks Avenue From West					Int. Total
	Right	Thru	Left	Peds	App. Total	Right	Thru	Left	Peds	App. Total	Right	Thru	Left	Peds	App. Total	Right	Thru	Left	Peds	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	0	0	0	0	0	0	0	0	0	0	4	0	38	42	0	0	0	20	20	62
04:15 PM	0	1	0	0	1	2	0	0	0	2	0	9	0	30	39	0	0	0	13	13	55
04:30 PM	0	0	0	0	0	0	0	0	0	0	0	7	0	30	37	0	0	0	27	27	64
04:45 PM	0	0	0	0	0	0	0	0	0	0	0	4	0	27	31	0	0	0	13	13	44
Total Volume	0	1	0	0	1	2	0	0	0	2	0	24	0	125	149	0	0	0	73	73	225
% App. Total	0	100	0	0		100	0	0	0		0	16.1	0	83.9		0	0	0	100		
PHF	.000	.250	.000	.000	.250	.250	.000	.000	.000	.250	.000	.667	.000	.822	.887	.000	.000	.000	.676	.676	.879



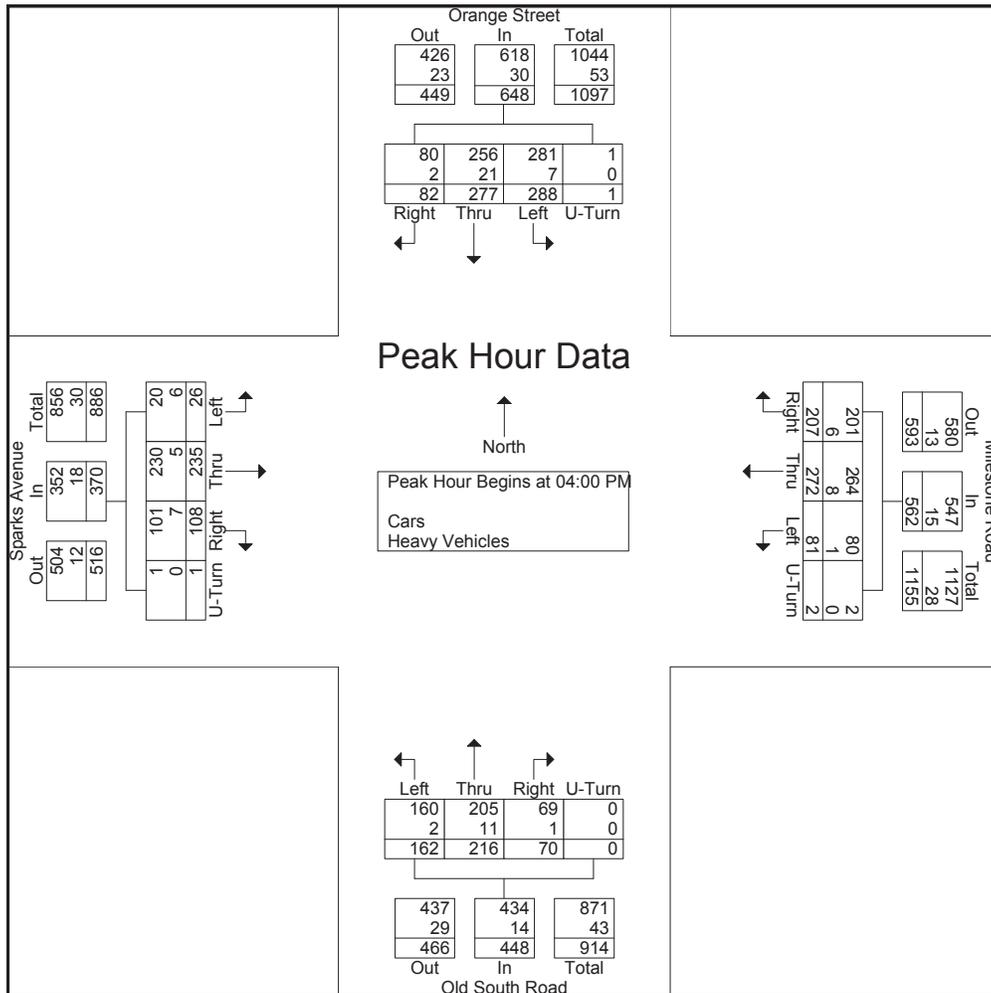
PRECISION
D A T A
INDUSTRIES, LLC

P.O. Box 301 Berlin, MA 01503
Office: 508.481.3999 Fax: 508.545.1234
Email: datarequests@pdillc.com

N/S: Orange Street/Old South Road
E/W: Milestone Road/ Sparks Avenue
City, State: Nantucket, MA
Client: VHB/ M. Kealey

File Name : 133491 DD
Site Code : 12472
Start Date : 8/29/2013
Page No : 1

Start Time	Orange Street From North					Milestone Road From East					Old South Road From South					Sparks Avenue From West					Int. Total
	Right	Thru	Left	U-Turn	App. Total	Right	Thru	Left	U-Turn	App. Total	Right	Thru	Left	U-Turn	App. Total	Right	Thru	Left	U-Turn	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	14	65	74	1	154	70	80	23	0	173	23	70	37	0	130	29	47	5	0	81	538
04:15 PM	25	69	65	0	159	52	74	17	0	143	17	42	47	0	106	23	66	7	1	97	505
04:30 PM	18	75	61	0	154	55	57	18	1	131	25	53	39	0	117	27	61	8	0	96	498
04:45 PM	25	68	88	0	181	30	61	23	1	115	5	51	39	0	95	29	61	6	0	96	487
Total Volume	82	277	288	1	648	207	272	81	2	562	70	216	162	0	448	108	235	26	1	370	2028
% App. Total	12.7	42.7	44.4	0.2		36.8	48.4	14.4	0.4		15.6	48.2	36.2	0		29.2	63.5	7	0.3		
PHF	.820	.923	.818	.250	.895	.739	.850	.880	.500	.812	.700	.771	.862	.000	.862	.931	.890	.813	.250	.954	.942
Cars	80	256	281	1	618	201	264	80	2	547	69	205	160	0	434	101	230	20	1	352	1951
% Cars	97.6	92.4	97.6	100	95.4	97.1	97.1	98.8	100	97.3	98.6	94.9	98.8	0	96.9	93.5	97.9	76.9	100	95.1	96.2
Heavy Vehicles	2	21	7	0	30	6	8	1	0	15	1	11	2	0	14	7	5	6	0	18	77
% Heavy Vehicles	2.4	7.6	2.4	0	4.6	2.9	2.9	1.2	0	2.7	1.4	5.1	1.2	0	3.1	6.5	2.1	23.1	0	4.9	3.8



Appendix B-2: Seasonal Adjustment Factors

This page intentionally left blank.

MASSACHUSETTS HIGHWAY DEPARTMENT - STATEWIDE TRAFFIC DATA COLLECTION

2011 WEEKDAY SEASONAL FACTORS *

* Note: These are weekday factors. The average of the factors for the year will not equal 1, as weekend data are not considered.

FACTOR GROUP	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC
GROUP 1 - WEST INTERSTATE	0.98	0.93	0.90	0.89	0.90	0.88	0.91	0.90	0.89	0.89	0.93	0.95
GROUP 2 - RURAL MAJOR COLLECTOR (R-5) Use group 2 for R5, R6, & R0	1.12	1.12	1.07	0.99	0.91	0.90	0.86	0.86	0.92	0.93	1.01	1.05
GROUP 3A - RECREATIONAL ** (1-4) See below	1.26	1.25	1.20	1.06	0.96	0.89	0.76	0.76	0.92	0.99	1.08	1.14
GROUP 3B - RECREATIONAL *** (5) See below	1.22	1.26	1.22	1.06	0.96	0.90	0.72	0.74	0.97	1.02	1.14	1.15
GROUP 4 - I-495 INTERSTATE	1.02	1.00	1.00	0.96	0.92	0.89	0.85	0.83	0.93	0.96	1.01	1.03
GROUP 5 - EAST INTERSTATE	1.04	1.00	0.96	0.93	0.92	0.91	0.91	0.89	0.93	0.93	0.96	1.01
GROUP 6 - URBAN ARTERIALS, COLLECTORS & RURAL ARTERIALS (R-2, R-3) Use group 6 for U2, U3, U5, U6, U0, R2, & R3	1.03	1.01	0.96	0.92	0.91	0.90	0.92	0.92	0.93	0.92	0.97	0.97
GROUP 7 - I-84 PROXIMITY (STAS. 17,3921)	1.24	1.24	1.15	1.04	0.99	1.00	0.93	0.89	1.05	1.05	1.05	1.12
GROUP 8 - I-295 PROXIMITY (STA. 6590)	1.00	0.99	0.95	0.92	0.94	0.91	0.93	0.92	0.95	0.94	0.97	0.95
GROUP 9 - I-195 PROXIMITY (STA. 7)	1.13	1.05	1.03	0.95	0.89	0.87	0.86	0.79	0.88	0.91	0.99	1.03

RECREATIONAL: (ALL YEARS)

**GROUP 3A:

- CAPE COD (ALL TOWNS)
- PLYMOUTH(SOUTH OF RTE.3A)

7014, 7079,7080,7090,7091,7092,7093,7094,7095,7096,7097,7108,7178

3.MARTHA'S VINEYARD

4.NANTUCKET

***GROUP 3B:

5.PERMANENTS 2 & 189

1066,1067,1068,1084,1085,1086,1087,1088,1089,1090,1091,1092,

1093,1094,1095,1096,1097,1098,1099,1100,1101,1102,1103,1104,

1105,1106,1107,1108,1113,1114,1116,2196,2197,2198

Apply I-84 factor to stations: 3290,3929

2011 AXLE CORRECTION FACTORS

ROAD INVENTORY FUNCTIONAL CLASSIFICATION

RURAL

1

2

3

0,5,6

URBAN

1

2

3

5

0,6

I-84

AXLE CORRECTION FACTOR

0.95

0.97

0.98

0.98

0.96

0.98

0.98

0.99

0.99

0.90

ROUND OFF

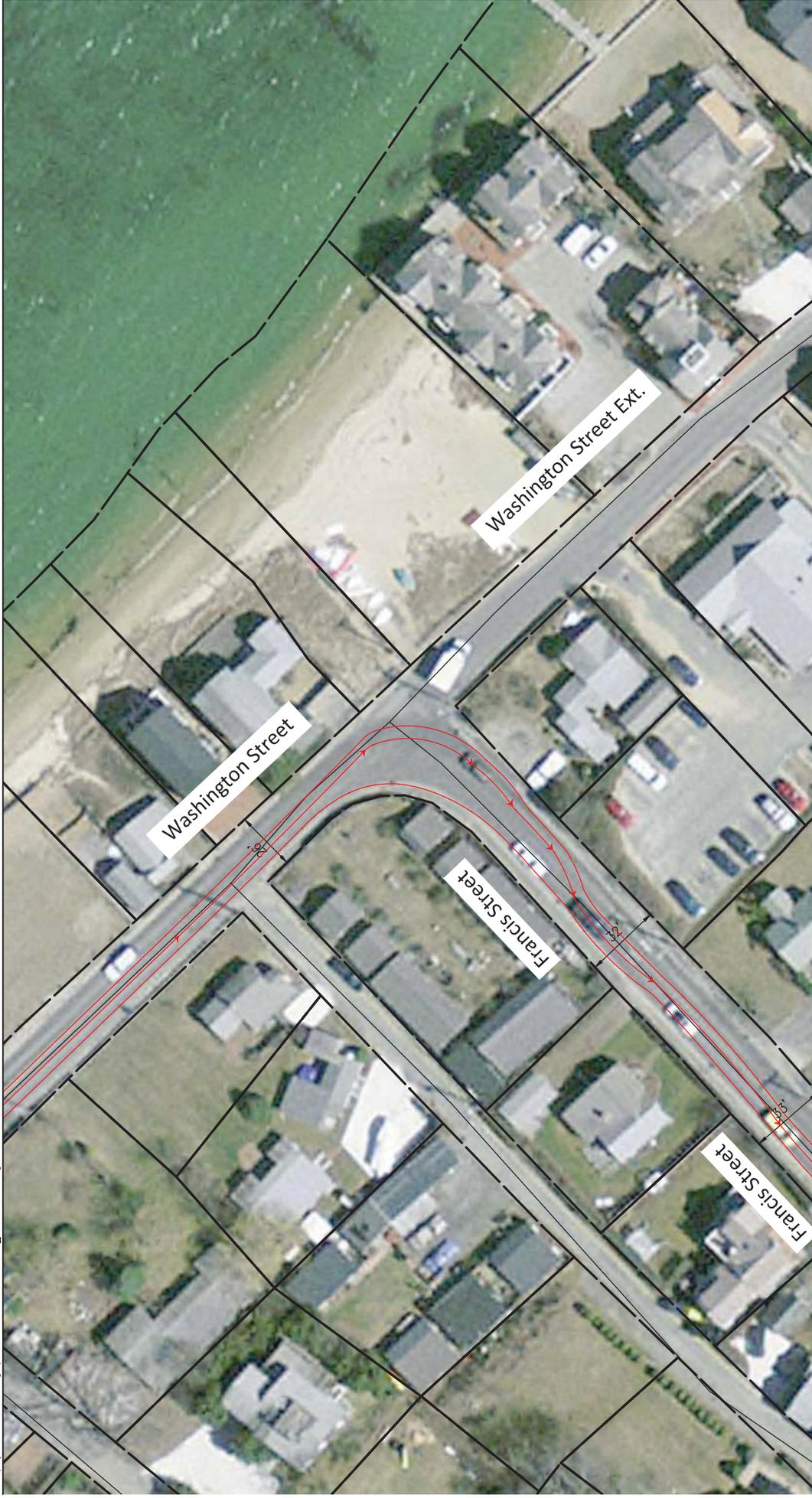
0 - 999.....10

> 1,000.....100

Appendix B-3: Fuel Truck AutoTurn Figures

This page intentionally left blank.

\\nhbproj\Wa-e\12472\00\graphics\FIGURES\Traffic\12472_Intersections.dwg



Vanasse Hangen Brustlin, Inc.

Figure A-1 December 2013

Washington Street at Francis Street
Nantucket, Massachusetts



\\hbproj\Wa-EV\12472\00\graphics\FIGURES\Traffic\12472_Intersections.dwg



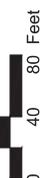
Vanasse Hangen Brustlin, Inc.

Figure A-2 December 2013

Union Street at Francis Street
Nantucket, Massachusetts



\\nhbproj\Wa-e\12472\00\graphics\FIGURES\Traffic\12472_Intersections.dwg



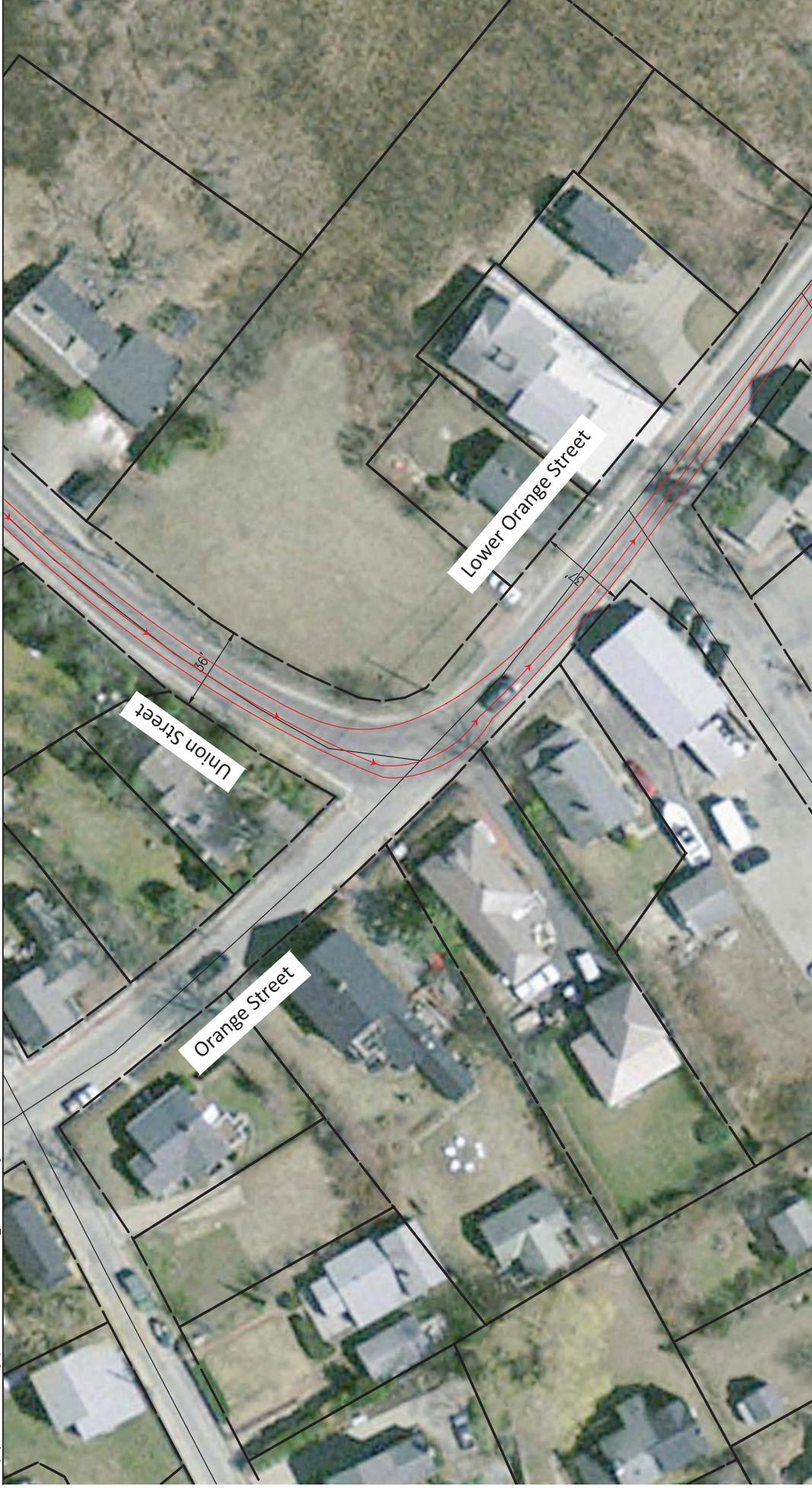
Vanasse Hangen Brustlin, Inc.

Figure A-3 December 2103

Union Street at Spring Street

Nantucket, Massachusetts

I:\hbproj\Wa-EV\12472_00\graphics\FIGURES\Traffic\12472_Intersections.dwg

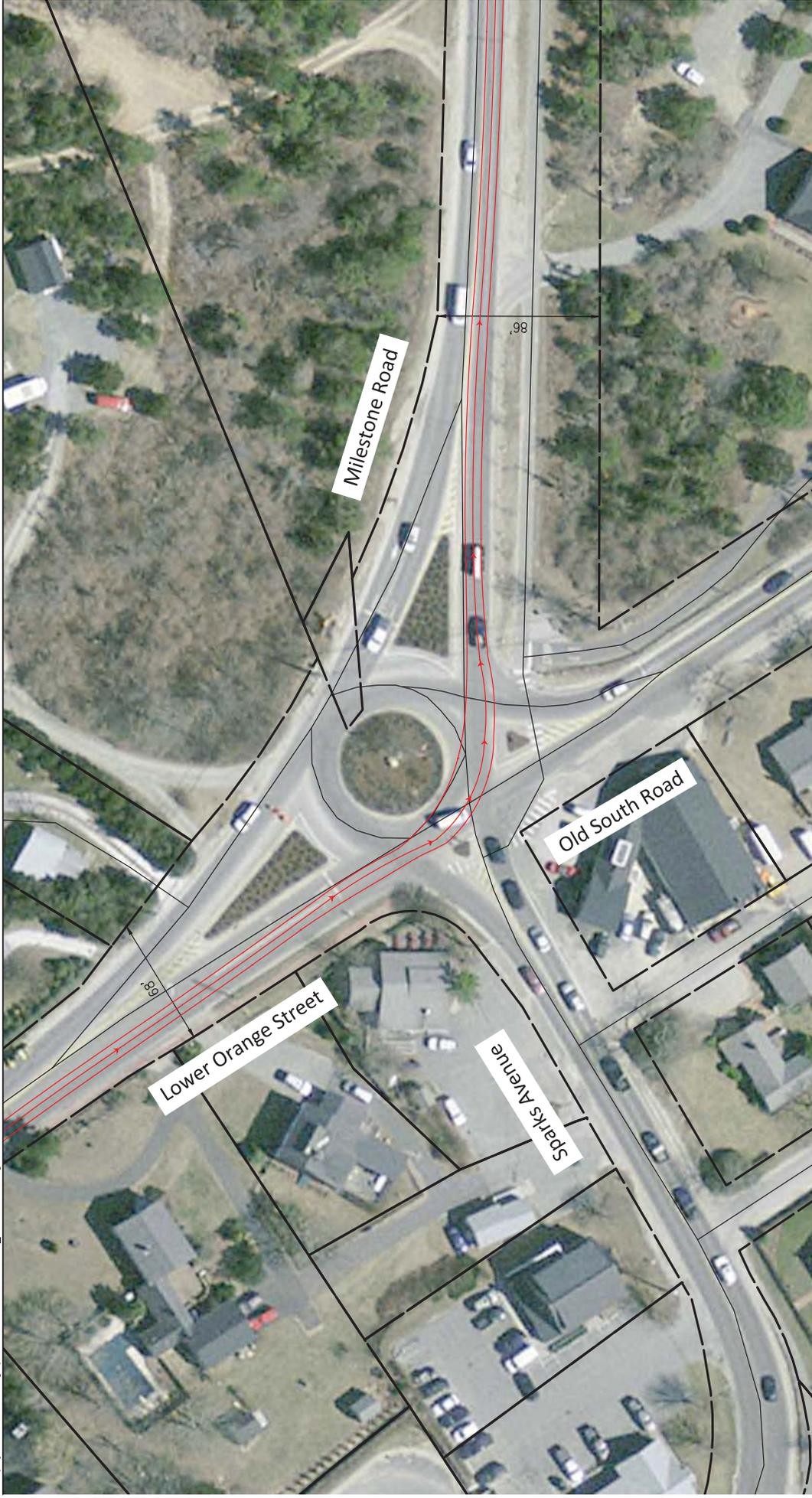


Vanasse Hangen Brustlin, Inc.

December 2103

Figure A-4
Orange Street/Lower Orange Street
at Union Street
Nantucket, Massachusetts

\\nhbproj\Wa-e\12472_00\graphics\FIGURES\Traffic\12472_Intersections.dwg



Vanasse Hangen Brustlin, Inc.

Figure A-5 December 2103

Lower Orange Street/Old South Road at
Sparks Avenue/Milestone Road (Rotary)
Nantucket, Massachusetts



\\mawar\EV\12472_00\graphics\FIGURES\Traffic\Traffic1\2472_Intersections_010814_2\withthemagsshevwants.dwg



0 40 80 Feet

Vanasse Hangen Brustlin, Inc.
December 2103
Figure A-6
Milestone Road at New South Road
Nantucket, Massachusetts

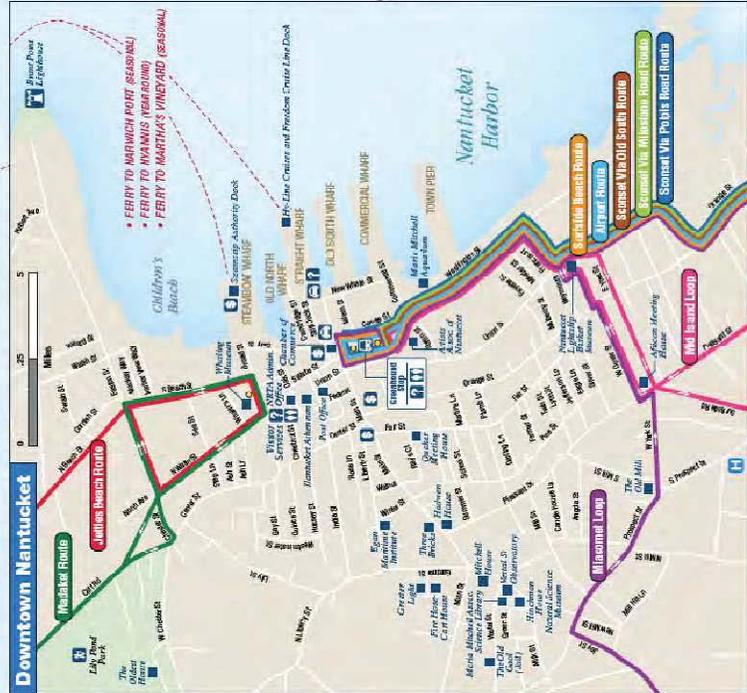
Appendix B-4: Public Transportation

This page intentionally left blank.



LEGEND

	Highway
	John South Road
	Market St. Bus
	Market Loop



Scan to get QR Code to download your real-time WAZE app.

Access real-time information on bus locations, arrival times, and more. Use our app to get the most accurate information on public transit.



- Wave Quick Reference
- System Map
- Schedules & Stops
- Fares & Passes
- How to Ride The Wave
- Special Services
- Getting to Nantucket
- On the Island
- About NRTA
- Photo Gallery
- Policies/Information
- Public Notices
- Performance Measures
- Advertising Ops



Real Time info from your
cell phone or computer at
live.nrtawave.com

Select Language

Powered by Google Translate

Airport Route

Fare: \$2.00 each way

Dates of Service:

June 24 – September 2, 2013

- The bus leaves town from Washington Street and Nantucket Memorial Airport every 20 minutes between 10:00 a.m. and 6:00 p.m.

Airport Road Stops

Washington Street
Francis Street/Union Street (outbound only)
Francis Street/Washington Street (inbound only)
Union Street/Orange Street (outbound only)
Bayberry Court
Orange Street/Landmark House
Rotary/Old South Road (outbound)
Amelia Drive
Youngs Way
Lovers Lane
Goldfinch Drive
Egan Lane
Pine Crest Drive
Mary Ann Lane
Airport Road/Old South Road (free transfer to Sconset Route)
Nantucket Memorial Airport



- Wave Quick Reference
- System Map
- Schedules & Stops
- Fares & Passes
- How to Ride The Wave
- Special Services
- Getting to Nantucket
- On the Island
- About NRTA
- Photo Gallery
- Policies/Information
- Public Notices
- Performance Measures
- Advertising Ops



Real Time info from your cell phone or computer at live.nrtawave.com

Select Language

Powered by Google Translate

Miacomet Loop

Fare: \$1.00

Dates of Service:

May 20 – June 21 and September 16 – October 14, 2013

- The bus leaves town from the Greenhound Stop, Washington Street every 30 minutes (on the hour and half hour) between 7:00 a.m. and 11:30 p.m. The last bus leaves town from the Greenhound Stop at 11:20 p.m.

June 22 – September 15

- The bus leaves town from the Greenhound Stop every 20 minutes between 7:00 a.m. and 11:30 p.m. The last bus leaves town from the Greenhound Stop at 11:20 p.m.

Miacomet Loop - will operate on its 20 minute schedule through September 15th.

Miacomet Loop Stops

Washington Street, Greenhound Stop
Francis Street/Union Street (outbound only)
Francis Street/Washington Street (inbound only)
Union Street/Orange Street (outbound only)
Bayberry Court
Orange Street/Landmark House
Rotary/Old South Road
Fairgrounds Road/Newtown Road
Faregrounds Restaurant - Park and Ride Lot 7am-5 pm
Trotters Lane
Parker Lane
Fairgrounds Road/Surfside Road, 1 mile to Surfside Beach
Surfside Drive
The Muse – Covered Shelter Park and Ride Lot
Thirty Acres
Cedar Circle
Appleton Road
Friendship Lane
Marble Way
83 Bartlett Road

83 Bartlett Road
Raceway Drive/Somerset Lane
Catherine Lane
Somerset Lane/Hummock Pond Road
Burnt Swamp Lane
Hawthorne Lane
Hussey Farm Road
Hummock Pond Road/Vesper Lane/Somerset Road
Joy Street/Mt. Vernon Street
The Old Mill
West York Lane at 5 Corners
West Dover Street/Orange Street
East Dover Street





- [Wave Quick Reference](#)
- [System Map](#)
- [Schedules & Stops](#)
- [Fares & Passes](#)
- [How to Ride The Wave](#)
- [Special Services](#)
- [Getting to Nantucket](#)
- [On the Island](#)
- [About NRTA](#)
- [Photo Gallery](#)
- [Policies/Information](#)
- [Public Notices](#)
- [Performance Measures](#)
- [Advertising Ops](#)

 Real Time info from your cell phone or computer at live.nrtawave.com

Select Language

Powered by Google Translate

Mid Island Loop

Fare: \$1.00

Dates of Service:

May 20 – June 21 and September 16 – October 14, 2013

- The bus leaves town from the Greenhound Stop, Washington Street every 30 minutes (on the hour and half hour) between 7:00 a.m. and 11:30 p.m. The last bus leaves town from the Greenhound Stop at 11:30 p.m.

June 22 – September 15

- The bus leaves town from the Greenhound Stop every 15 minutes between 7:00 a.m. and 11:30 p.m. The last bus leaves town from the Greenhound Stop at 11:30 p.m.

Mid Island Loop will continue to operate on its 15 minute schedule through September 15th.

Mid Island Loop Stops

Washington Street, Greenhound Stop
Francis Street/Union Street (outbound only)
Francis Street/Washington Street (inbound only)
York Street/Orange Street
York Street/Pleasant Street
Atlantic Avenue/Prospect Street
Anna Drive
Nantucket Elem. School (June 23-September 3) Park and Ride Lot
The Muse – Covered Shelter Park and Ride Lot
Miacomet Avenue
Surfside Road/Surfside Drive
Surfside Drive/ Hooper Farm Road
Parker Lane
Brinda Lane
Trotters Lane
Waydale Road
Hooper Farm Road/Newtown Road
Milestone Lane
Orange Street/Landmark House
Dave Street – Park and Ride Lot
Freedom Square
Pleasant Street at 5 Corners
West Dover Street/Orange Street
East Dover Street



- Wave Quick Reference
- System Map
- Schedules & Stops
- Fares & Passes
- How to Ride The Wave
- Special Services
- Getting to Nantucket
- On the Island
- About NRTA
- Photo Gallery
- Policies/Information
- Public Notices
- Performance Measures
- Advertising Ops



Real Time info from your cell phone or computer at live.nrtawave.com

Select Language

Powered by Google Translate

Sconset via Milestone Road Route

Fare: \$2.00 each way - (\$1.00 to/from Rotary and town)

Dates of Service: June 24 – September 8, 2013

- The bus leaves Sconset every hour at quarter after the hour. The first bus leaves Sconset at 7:15 a.m. The last bus leaves Sconset at 7:15 p.m.
- The bus leaves town from the Greenhound Stop, Washington Street every hour at quarter of the hour. The first bus leaves town from the Greenhound Stop, at 7:45 a.m. The last bus leaves town from the Greenhound Stop at 6:45 p.m.

Sconset via Milestone Road Route - will operate through September 8th.

Sconset via Milestone Road Route Stops

Washington Street, Greenhound Stop
Francis Street/Union Street (outbound only)
Francis Street/Washington Street (inbound only)
Union Street/Orange Street (outbound only)
Bayberry Court
Orange Street/Landmark House
Milestone Road @ Water Company (outbound only)
Monomoy Road (inbound only)
Tawpoot Road
Milestone Crossing/Sheep Commons Lane
Nobadeer Farm Road/Milestone Road
Tetawkimmo Drive
Bunker Road
Russells Way
Tom Nevers Road – Covered Shelter
Chuck Hollow Road
Sconset Golf Course
New Street
Main Street/Morey Lane (outbound only)
Main Street/West Sankaty Road (inbound only)
Main Street Rotary, Sconset



- [Wave Quick Reference](#)
- [System Map](#)
- [Schedules & Stops](#)
- [Fares & Passes](#)
- [How to Ride The Wave](#)
- [Special Services](#)
- [Getting to Nantucket](#)
- [On the Island](#)
- [About NRTA](#)
- [Photo Gallery](#)
- [Policies/Information](#)
- [Public Notices](#)
- [Performance Measures](#)
- [Advertising Ops](#)



Real Time info from your cell phone or computer at live.nrtawave.com

Select Language

Powered by [Google Translate](#)

Sconset via Old South Road Route

Fare: \$2.00 each way - (\$1.00 to/from Rotary and town)

Dates of Service: **May 20 – October 14, 2013**

- The bus leaves town from the Greenhound Stop, Washington Street every hour at quarter after the hour. The first bus leaves town from the Greenhound Stop, at 7:15 a.m. The last bus leaves town from the Greenhound Stop at 11:15 p.m.
- The bus leaves Sconset every hour at quarter of the hour. The first bus leaves Sconset at 7:45 a.m. The last bus leaves Sconset at 10:45 p.m.

Sconset via Old South Road Route Stops

Washington Street, Greenhound Stop
Francis Street/Union Street (outbound only)
Francis Street/Washington Street (inbound only)
Union Street/Orange Street (outbound only)
Bayberry Court
Orange Street/Landmark House
Rotary/Old South Road
Amelia Drive
Youngs Way
Lovers Lane
Goldfinch Drive
Egan Lane
Pine Crest Drive
Mary Ann Lane
Airport Road (3/10 of a mile from airport terminal) (outbound only)
Macy's Lane (inbound only)
Square Rigger Road
Hinsdale Road
Sun Island Road
Nobadeer Crossing
Nobadeer Farm Road/Milestone Road
Tetawkimmo Drive
Bunker Road
Russells Way
Tom Nevers Road – Covered Shelter

RUSSELLS WAY

Tom Nevers Road – Covered Shelter
Chuck Hollow Road
Sconset Golf Course
New Street
Main Street/Morey Lane (outbound only)
Main Street/West Sankaty Road (inbound only)
Main Street Rotary, Sconset



- [Wave Quick Reference](#)
- [System Map](#)
- [Schedules & Stops](#)
- [Fares & Passes](#)
- [How to Ride The Wave](#)
- [Special Services](#)
- [Getting to Nantucket](#)
- [On the Island](#)
- [About NRTA](#)
- [Photo Gallery](#)
- [Policies/Information](#)
- [Public Notices](#)
- [Performance Measures](#)
- [Advertising Ops](#)



Real Time info from your cell phone or computer at

live.nrtawave.com

Select Language

Powered by Google Translate

Sconset Via Polpis Road Route

Fare: \$2.00 each way - (\$1.00 to/from Rotary and town)

Dates of Service: June 29 – September 2, 2013

- The bus leaves from Washington Street and Sconset on the following schedule:

Departing Town	Departing Sconset
10:00 a.m.	10:40 a.m.
11:20 a.m.	12:00 p.m.
12:40 p.m.	1:20 p.m.
2:00 p.m.	2:40 p.m.
3:20 p.m.	4:00 p.m.
4:40 p.m.	5:20 p.m.

Sconset via Polpis Road Route Stops

Washington Street
Francis Street/Union Street (outbound only)
Francis Street/Washington Street (inbound only)
Union Street/Orange Street (outbound only)
Bayberry Court
Orange Street/Landmark House
Milestone Road @ Water Company (outbound only)
Monomoy Road (inbound only)
Polpis Road (just past intersection)
Shimmo Pond Road
Moors End Lane/Gardner Road
North Pasture Lane
Shawkemo
Life Saving Museum
UMass Field Station
Quaise Road/Altar Rock Road
Quaise Pastures
240 Polpis Road
253 Polpis Road
Wauwinet Road
Quidnet Road
334 Polpis Road

334 Polpis Road
Hoicks Hollow Road
Sankaty Head Golf Club
Bayberry Lane
Anne's Lane
Sconset Avenue/Emily Street
Rosaly Lane/Clifton Street
Shell Street/Coffin Street (outbound only)
Sankaty Road/Coffin Street (inbound only)
West Sankaty Road/Coffin Street (outbound only)
West Sankaty Road/New Street
West Sankaty Road/Main Street
Main Street Rotary, Sconset



- [Wave Quick Reference](#)
- [System Map](#)
- [Schedules & Stops](#)
- [Fares & Passes](#)
- [How to Ride The Wave](#)
- [Special Services](#)
- [Getting to Nantucket](#)
- [On the Island](#)
- [About NRTA](#)
- [Photo Gallery](#)
- [Policies/Information](#)
- [Public Notices](#)
- [Performance Measures](#)
- [Advertising Ops](#)



Real Time info from your cell phone or computer at
live.nrtawave.com

Select Language

Powered by Google Translate

Surfside Beach Route

Fare: \$2.00 each way

Dates of Service: June 24 – September 2, 2013

• The bus leaves from Washington Street and Surfside Beach on the following schedule:

Departing Town	Departing Surfside
10:00 a.m.	10:20 a.m.
10:40 a.m.	11:00 a.m.
11:20 a.m.	11:40 a.m.
12:00 p.m.	12:20 p.m.
12:40 p.m.	1:00 p.m.
1:20 p.m.	1:40 p.m.
2:00 p.m.	2:20 p.m.
2:40 p.m.	3:00 p.m.
3:20 p.m.	3:40 p.m.
4:00 p.m.	4:20 p.m.
4:40 p.m.	5:00 p.m.
5:20 p.m.	5:40 p.m.

Surfside Beach Route Stops

- Washington Street
- Union Street/Orange Street (outbound only)
- Bayberry Court
- Rotary/Old South Road
- Faregrounds Restaurant
- Fairgrounds Road/Surfside Road
- The Boulevard
- Masaquet Avenue
- Nonantum Avenue
- Surfside Beach

Appendix B-5: Vehicle Crash Data

This page intentionally left blank.



INTERSECTION CRASH RATE WORKSHEET

CITY/TOWN : Nantucket, MA COUNT DATE : 8/29/2013

DISTRICT : 6 UNSIGNALIZED : **X** SIGNALIZED :

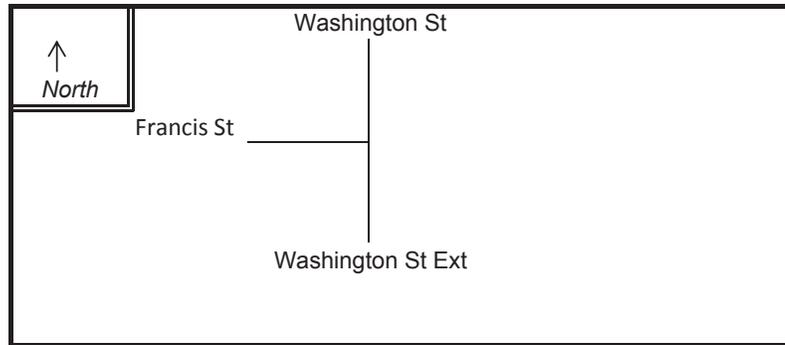
~ INTERSECTION DATA ~

MAJOR STREET : Washington Street

MINOR STREET(S) : Francis Street

Washington Street Ext

**INTERSECTION
DIAGRAM**
(Label Approaches)



PEAK HOUR VOLUMES

	1	2	3	4	5	
APPROACH :						Total Peak Hourly Approach Volume
DIRECTION :	EB	WB	NB	SB		
PEAK HOURLY VOLUMES (PM) :	280		40	455		775

" K " FACTOR :

0.090	INTERSECTION ADT (V) = TOTAL DAILY APPROACH VOLUME :	8,611
--------------	---	--------------

TOTAL # OF CRASHES :

2	# OF YEARS :	3	AVERAGE # OF CRASHES PER YEAR (A) :	0.67
---	--------------	---	--	-------------

CRASH RATE CALCULATION :

0.21

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

Comments : 2009-2011 MassDOT Crash Data

Project Title & Date: _____



INTERSECTION CRASH RATE WORKSHEET

CITY/TOWN : Nantucket, MA COUNT DATE : 8/29/2013

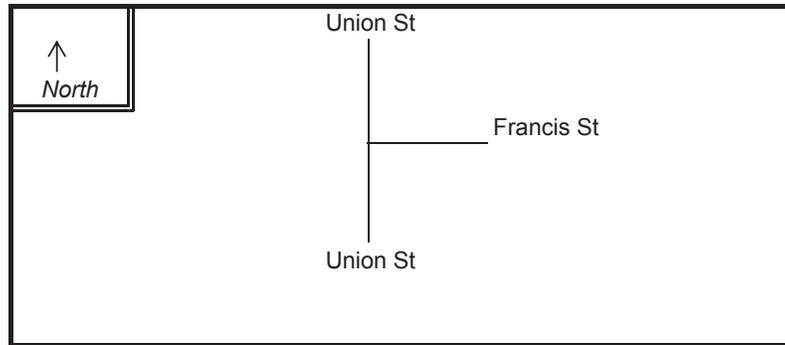
DISTRICT : 6 UNSIGNALIZED : SIGNALIZED :

~ INTERSECTION DATA ~

MAJOR STREET : Union Street

MINOR STREET(S) : Francis Street

**INTERSECTION
DIAGRAM**
(Label Approaches)



PEAK HOUR VOLUMES

APPROACH :	1	2	3	4	5	Total Peak Hourly Approach Volume
DIRECTION :	EB	WB	NB	SB		
PEAK HOURLY VOLUMES (PM) :		455	510			965

" K " FACTOR :

0.090	INTERSECTION ADT (V) = TOTAL DAILY APPROACH VOLUME :	10,722
-------	--	--------

TOTAL # OF CRASHES :

4	# OF YEARS :	3	AVERAGE # OF CRASHES PER YEAR (A) :	1.33
---	--------------	---	---------------------------------------	------

CRASH RATE CALCULATION :

0.34

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

Comments : 2009-2011 MassDOT Crash Data
 Project Title & Date: _____

INTERSECTION CRASH RATE WORKSHEET

CITY/TOWN : Nantucket, MA COUNT DATE : 8/29/2013

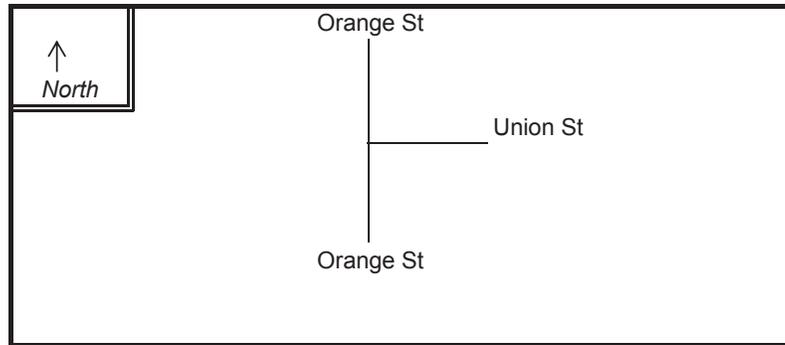
DISTRICT : 6 UNSIGNALIZED : **X** SIGNALIZED :

~ INTERSECTION DATA ~

MAJOR STREET : Orange Street

MINOR STREET(S) : Union Street

**INTERSECTION
 DIAGRAM**
 (Label Approaches)



PEAK HOUR VOLUMES

APPROACH :	1	2	3	4	5	Total Peak Hourly Approach Volume
DIRECTION :	EB	WB	NB	SB		
PEAK HOURLY VOLUMES (PM) :		355	415	235		1,005

" K " FACTOR :

0.090	INTERSECTION ADT (V) = TOTAL DAILY APPROACH VOLUME :	11,167
--------------	---	---------------

TOTAL # OF CRASHES :

2	# OF YEARS :	3	AVERAGE # OF CRASHES PER YEAR (A) :	0.67
----------	--------------	----------	--	-------------

CRASH RATE CALCULATION :

0.16

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

Comments : 2009-2011 MassDOT Crash Data

Project Title & Date: _____

INTERSECTION CRASH RATE WORKSHEET

CITY/TOWN : Nantucket, MA COUNT DATE : 8/29/2013

DISTRICT : 6 UNSIGNALIZED : **X** SIGNALIZED :

~ INTERSECTION DATA ~

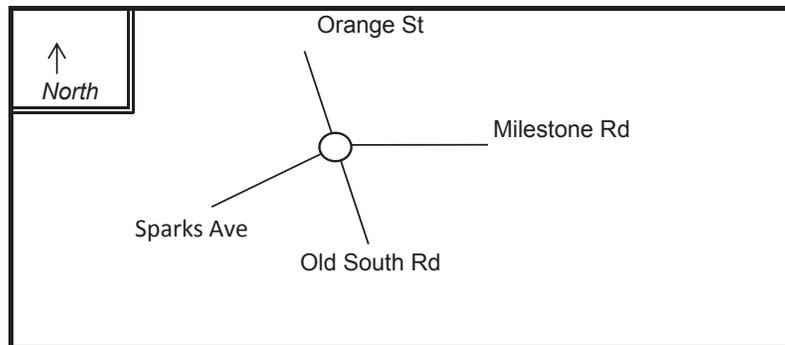
MAJOR STREET : Lower Orange Street

MINOR STREET(S) : Old South Road

Sparks Avenue

Milestone Road

**INTERSECTION
 DIAGRAM**
 (Label Approaches)



PEAK HOUR VOLUMES

	1	2	3	4	5	
APPROACH :						Total Peak Hourly Approach Volume
DIRECTION :	EB	WB	NB	SB		
PEAK HOURLY VOLUMES (PM) :	370	560	445	645		2,020

" K " FACTOR :

0.090	INTERSECTION ADT (V) = TOTAL DAILY APPROACH VOLUME :	22,444
--------------	---	---------------

TOTAL # OF CRASHES :

4	# OF YEARS :	3	AVERAGE # OF CRASHES PER YEAR (A) :	1.33
---	--------------	---	--	-------------

CRASH RATE CALCULATION :

0.16

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

Comments : 2009-2011 MassDOT Crash Data

Project Title & Date: _____

■

Existing Fuel Truck Demands

- Existing Fuel Demands
- Truck Calculations

Gasoline Throughput in Gallons At the Harbor Fuel Tank Farm Nantucket

(note: does not include gasoline delivered directly to gas stations)

<u>2010</u>		<u>2011</u>		<u>2012</u>	
January	42,695	January	6,263	January	2,798
February	31,010	February	5,715	February	1,175
March	42,581	March	64,593	March	8,724
April	32,976	April	error	April	131,279
May	50,702	May	48,823	May	24,715
June	39,301	June	error	June	92,873
July	242,965	July	255,117	July	200,138
August	169,721	August	467,924	August	52,200
September	error	September	57,939	September	88,394
October	31,309	October	12,239	October	60,619
November	25,318	November	13,275	November	88,364
December	51,451	December	3,803	December	29,799
TOTAL	731,504		899,881		781,078

All gasoline is being transported to the Island by truck on the commercial ferry.

During the winter one tanker of gasoline per month is required on average.

During August 2011 forty-seven tankers made deliveries to the tank farm or 2 to 3 deliveries per business day.

These numbers do not include any gasoline tanker deliveries directly to one of the gas stations.

ULS Diesel Throughput in Gallons At the Harbor Fuel Tank Farm Nantucket (typical average)

January	25,000
February	25,000
March	25,000
April	50,000
May	50,000
June	50,000
July	0
August	0
September	100,000
October	100,000

November	50,000
December	50,000
TOTAL	525,000 (range 500,000 to 600,000)

All ULS Diesel (on-road) is being transported to the Island by Barge.

During the summer one Barge of oil is required on average.

During the fall 2 to 3 Barges per month make deliveries to the tank farm

To convert to truck deliveries would require 2 to 3 deliveries per business week.

No. 2 Heating Oil Throughput in Gallons At the Harbor Fuel Tank Farm Nantucket (typical average)

January	200,000
February	200,000
March	200,000
April	200,000
May	200,000
June	200,000
July	0
August	0
September	400,000
October	400,000
November	400,000
December	400,000
TOTAL	2,800,000 (range 2,500,000 to 3,000,000)

All No. 2 Heating Oil is being transported to the Island by Barge.

During the summer one Barge of oil is required on average.

During the fall 2 to 3 Barges per month make deliveries to the tank farm

To convert to truck deliveries would require 2 to 3 deliveries per business day in the fall.

In addition to the above listed fuels Low Sulfur Diesel (off-road) and Kerosene are brought to the Island by tanker truck as needed.

The facility is going to start selling BioHeat home heating oil, which will be brought to the Island by tanker truck as needed. Using tank S-5 they will have a maximum of 48,000 gallons of storage on Island.

The Tank farm has the maximum storage capacity for:

Regular Gasoline	238,000 gallons
Premium Gasoline	164,000 gallons
No.2 Heating Oil	366,000 gallons
ULS Diesel	128,000 gallons
TOTAL	896,000 gallons

This total does not include the 48,000 gallon BioHeat tank and 10,000 gallon Kerosene tank, which are not in use at this time.

EXISTING

Gasoline All Truck Deliveries

Month	Storage	Existing	# of Trucks	# of Trucks/week	# of Trucks/da
January		17,252	2	1	1
February		12,633	2	1	1
March		38,633	4	1	1
April		82,128	8	2	1
May		41,413	4	1	1
June		66,087	6	2	1
July		232,740	21	6	2
August		229,948	20	5	1
September		73,167	7	2	1
October		34,722	3	1	1
November		42,319	4	1	1
December		28,351	3	1	1
Total	402,000	899,393	84	24	5
				21	5

Peak: Need 2-3 delivery trucks per business day.

Diesel All Barge Deliveries

Month	Storage	AVERAGE	# of Barges
January		25,000	1
February		25,000	1
March		25,000	1
April		50,000	1
May		50,000	1
June		50,000	1
July		0	0
August		0	0
September		100,000	2 to 3
October		100,000	2 to 3
November		50,000	1
December		50,000	1
Total	128,000	525,000	11
Peak:			

Heating Oil All Barge Deli All Barge Deliveries

Month	Storage	AVERAGE	# of Barges
January		200,000	1 to 2
February		200,000	1 to 2
March		200,000	1 to 2
April		200,000	1 to 2
May		200,000	1 to 2
June		200,000	1 to 2
July		0	0
August		0	0
September		400,000	2 to 3
October		400,000	2 to 3
November		400,000	2 to 3
December		400,000	2 to 3
Total	366,000	2,800,000	14-24

Peak:

Additional Gasoline delivered directly to Stations

All Truck Deliveries

Month	Storage	Existing	# of Trucks	# of Trucks/week	# of Trucks/da
January		28,800	3	1	1
February		21,100	2	1	1
March		64,400	6	2	1
April		137,000	12	3	1
May		69,100	6	2	1
June		110,200	10	3	1
July		388,200	34	9	2
August		383,500	34	9	2
September		122,000	11	3	1
October		57,900	5	2	1
November		70,600	7	2	1
December		47,300	5	2	1
Total	None	1,500,000	135	34	7
					0

Peak: Need 2-3 delivery trucks per business day

Additional Heating Oil All Truck Deliveries

Month	Storage	Existing	# of Trucks	# of Trucks/week	# of Trucks/da
January		37,100	4	1	1
February		37,100	4	1	1
March		37,100	4	1	1
April		37,100	4	1	1
May		37,100	4	1	1
June		37,100	4	1	1
July		0	0	0	0
August		0	0	0	0
September		74,300	8	2	1
October		74,300	8	2	1
November		74,300	8	2	1
December		74,300	8	2	1
Total		520,000	52	13	3

Peak: Need 2-3 delivery trucks per business day



www.vhb.com