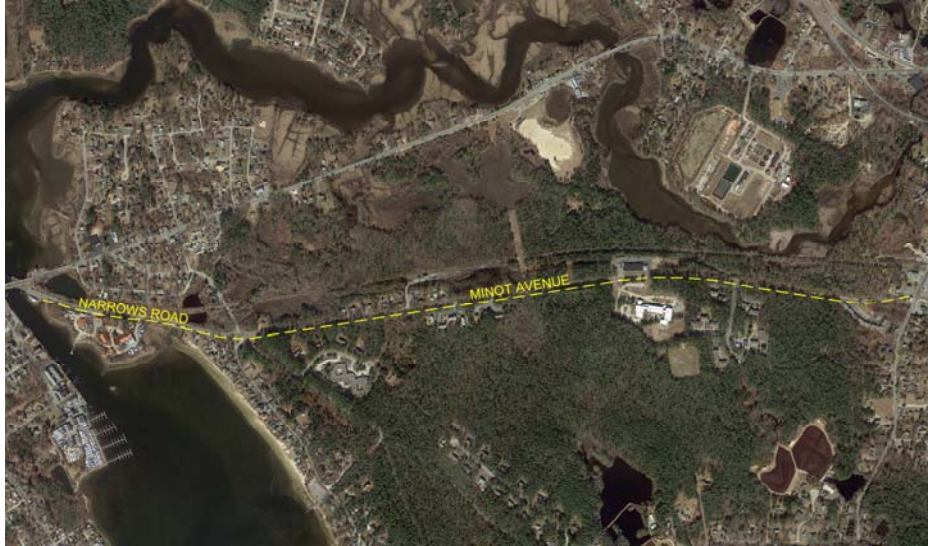


# WAREHAM SHARED USE PATH

Narrows Road & Minot Avenue  
Wareham, Massachusetts

MassDOT Project File #607825



## 25% Design Report

February 13, 2020

### Prepared for:

MassDOT

Town of Wareham  
54 Marion Road  
Wareham, MA 02571

### Prepared by:

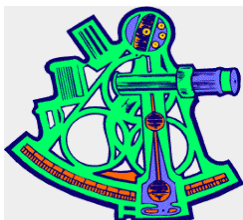
## JC ENGINEERING, INC.

Civil & Environmental Engineering

2854 Cranberry Highway

East Wareham, Massachusetts 02538

Ph. 508-273-0377—Fax 508-273-0367



# Wareham Shared Use Path

MassDOT Project File #607825

## TABLE OF CONTENTS

	<u>Page</u>
1. Functional Design Report .....	1-1
1.1 Existing Conditions.....	1-1
1.2 Proposed Design.....	1-2
1.3 Traffic & Volumes.....	1-4
1.4 Safety Analysis.....	1-5
1.5 MUTCD Signal Warrants.....	1-5
2. Early Environmental Coordination	
2.1 EEC Checklist	
2.2 Checklist Documentation.....	2-1
3. Preliminary Construction Cost Estimate	
3.1 CPE Estimate Printout	
5. Appendices	
I. Traffic and Safety Checklist	
II. Highway Design Checklist	
III. MassDOT Traffic Count & Volume Data	
IV. Crash Data & Crash Rate Worksheets	
V. Horizontal Alignment Report	
VI. Photographs of Existing Roadway	

# 1.0 Functional Design Report

## 1.1 Existing Conditions

### Road Description

The area of study for the Shared Use Path extends from the intersection of Narrows Road and Sandwich Road (Route 6), then easterly along Narrows Road and Minot Avenue and terminating at the intersection of Minot Avenue and Depot Street/Great Neck Road. Narrows Road and Minot Avenue are classified as minor arterials.

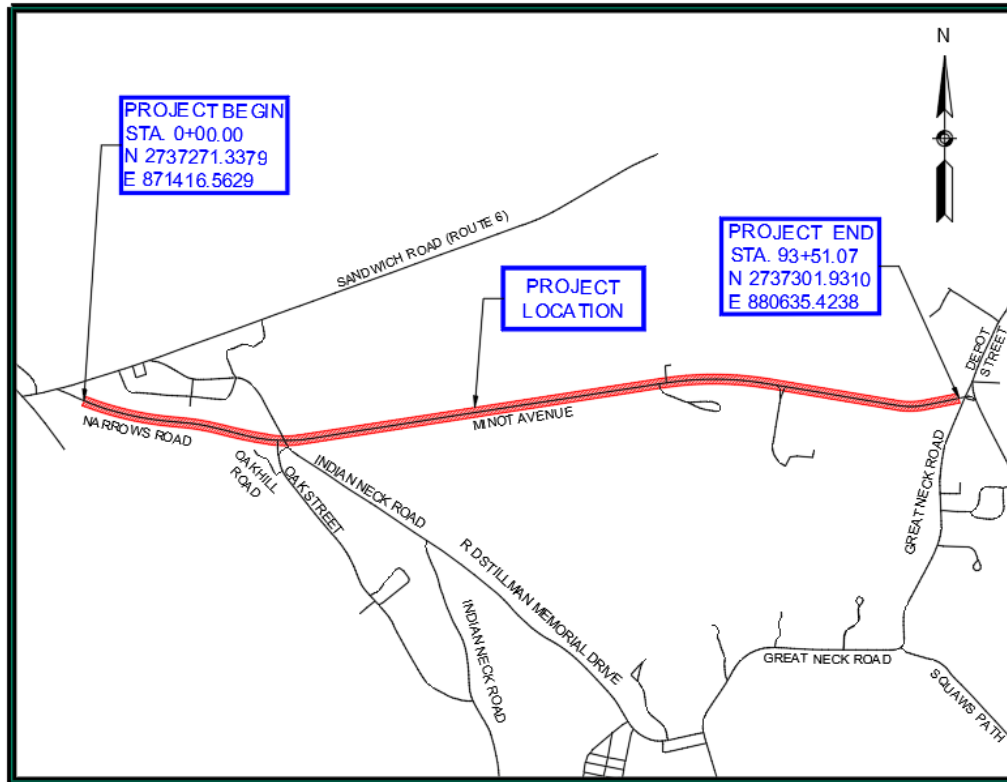


Figure 1 – Locus Map of Project Location

Narrows Road begins at the intersection with Sandwich Road and continues for approximately 2,455 feet eastbound to the intersection with Oak Street/Indian Neck Road. The road becomes Minot Avenue following the aforementioned intersection and continues easterly for approximately 7,178 ft. The total length of the road is 9,633 ft (1.82 Miles). The road is owned and maintained by the Municipality of Wareham.

In general, the road consists of 11-ft travel lanes, 2-ft min. paved shoulders. Accommodation for pedestrians and bicyclists with a 5-ft wide sidewalk on the southerly side of the road for the entire study area length. The posted speed limit is 35 MPH for the entire study area length. The majority of the road is separated by a painted double yellow centerline line, however there are a number of passing zones indicated by broken yellow

lines for one or both travel directions. The sidewalk is separated from the road with granite curbing, while the north side of the street has no curbing element.

The proposed corridor location of the Shared use path consists of the where the existing 5-ft sidewalk is situated, and the adjacent area off the southerly side of the road. This area consists of mostly brush and variable slopes, as well as driveways for commercial and residential uses. There is no on-street parking, transit facilities, or other on-street facilities for the entire project study area.

### **Existing Deficiencies**

There is little to no signage, pavement markings, or signals for the existing sidewalk. These issues will be addressed with the construction of a shared use path. In addition, the condition of the pavement and drainage structure associated with the existing road will likely require maintenance and/or replacement in the near future, and coordination with Wareham Municipal Maintenance will continue as the project progresses.

### **Land Use/Environmental Concerns**

As indicated previously there are a residential and commercial land uses in the study area. In total, there are two businesses (The Narrows Restaurant & Cape Cod Ship Building) located on the southerly side of Narrows Road, seven residential driveways, and the Minot Elementary School which is anticipated to begin construction in Spring of 2020. Three residential communities are situated on the southerly side of the road (The Narrows, Brandy Hill, and Depot Crossing Apartments).

The study area is near a number of resource areas including the 100-year floodplain, coastal banks and bordering vegetated wetlands. It is anticipated that there will be impacts to these resource areas as a result of the construction of the shared use path.

### **Right of Way**

The study area will primarily stay within the limits of the existing right-of-way and the immediate adjacent properties on the southerly side of the street. It is anticipated that temporary slope easements and permanent easements will be required for the construction of the shared use path.

## **1.2 Proposed Design**

### **Design Considerations**

This a transportation improvements project intended to address the need to provide improved pedestrian and bicycle accommodation. The project is part of a broader plan to create a safe and efficient network of paths for pedestrians and bicyclists in all of Southeastern Massachusetts. The shared-use path is an off-road facility that is exclusive to non-motorized uses. In this instance, the shared use path is adjacent to an existing roadway and is separated by curbing and a grass strip buffer from travel lanes. The proposed path will be 10-ft wide with 2-ft minimum grass shoulders for the path users. In most locations the shared use path will be a minimum of 7-ft from the travel lane. Design issues evaluated for the proposed shared use path included pedestrian and bicycle access,

approach geometry, sight distance for vehicles and cyclists, appropriate signage and pavement markings, and traffic control. Figure 2 below shows the typical section for the majority of the proposed shared use path.

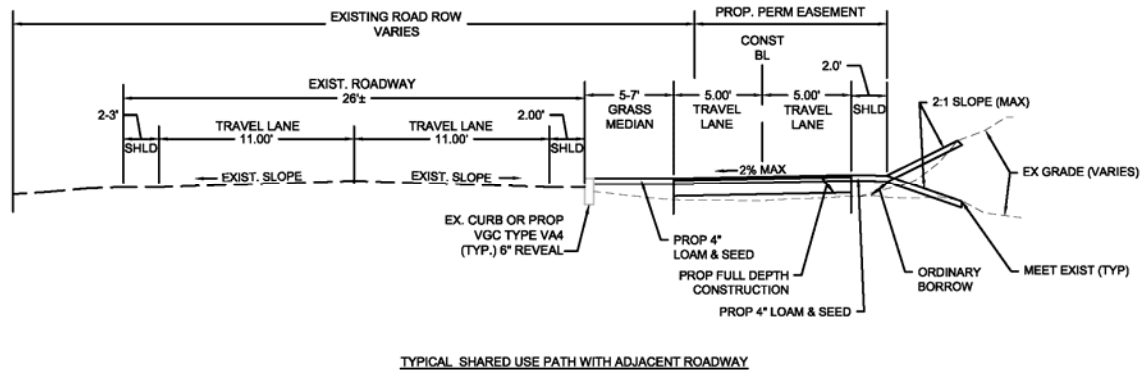


Figure 2 – Typical Shared Use Path Section with Adjacent Roadway

### Alternatives

Multiple alternatives to provide improved pedestrian and bicycle accommodation along the right-of-way were considered in the early planning stages of the project. Two alternatives discussed included a combination of on-road bike lanes with widened sidewalks for the entire project length, and on-road bicycle lanes that transition to a shared use path. The safety and accommodation for both alternatives were discussed with the Town of Wareham and MassDOT staff, and ultimately narrowed down to the chosen path in order to minimize conflict points between users of the path and vehicles.

### Path Alignment & Geometry

The path will generally follow the alignment and direction of the existing sidewalk situated on the southerly side of Narrows Road and Minot Avenue. The existing sidewalk closely follows the roadway geometry which is significantly more restrictive in terms of horizontal and vertical geometry. Therefore, it is not anticipated that the path will require sharp curves and steep grades.

### Access

The path will begin shortly after the Narrows Road and Sandwich Road (Route 6) signalized intersection. A narrow median with removable bollards at the beginning of the path, and other intersection points, will be considered in order to deter unauthorized motorized users while still provided access for emergency and maintenance purposes. The path will terminate at the intersection of Minot Avenue and Great Neck Road/Depot Street. At this location, the path will rejoin with the existing 6-ft sidewalk.

### Crossing with Indian Neck Road and Oak Street

The shared use path will encounter two street crossings in its entirety. The intersection with Oak Street and Indian Neck Road are shown in Figure below. At this location, Rectangular Rapid Flash Beacons (RRFB) will be considered to warn vehicles in the vicinity of the intersection that pedestrian and/or bicycle users are using the path and may have the right of way. In addition, signage and pavement markings will be provided on

the shared use path as well as the approaching streets to give further warning on the crossing.

### **Mitigation Measures**

While the path closely follows the existing travel behavior of Narrow Road and Minot Avenue, the development of a wider path and required buffers will have an impact on abutting properties, resource areas, and adjacent slopes. The following measures are considered and implemented into the design plan:

1. Relocation of existing road crown and travel lanes to provide additional room on the southerly side of road for the shared-use path.
2. Retaining walls of variable height are provided in numerous locations where the construction of the path may result in significant cut/ fill of existing slopes. Walls are also provided in locations where there are sensitive resource and historic areas.
3. Fencing (typically 3.5-ft high wood rail fence) is provided in various locations to protect users from steep slopes and retaining walls.

### **Utilities**

The study area contains various utilities including but not limited to overhead wires with utility poles, fire hydrants, and gas and sewer service lines. A number of utilities will need to be relocated as a result of the construction of the shared use path.

The shared use path will be sloped towards the existing roadway, and runoff will be captured in the existing drainage systems located along Narrows Road and Minot Avenue. It is evident that a number of these facilities will require significant maintenance or complete replacement, increased sizing, and additional structures may be required to adequately address the additional drainage. Coordination with Wareham Municipal Maintenance will continue as the project advances.

### **Right-of-Way Impacts**

The right of way is owned and maintained by the town of Wareham. In general, the goal of the project was to maintain balance between providing safe access and accommodation for pedestrians and bicyclists and minimizing impacts outside of the existing right-of-way layout.

Temporary slope easements will be required on the majority of the abutting lots on the southerly side of Narrows Road and Minot Avenue. Permanent easements for relocated utilities and clearance for path shoulders, walls, and fences will be required on a portion of the abutting lots.

## **1.3 Traffic Analysis**

### **Traffic Volume and Characteristics**

The project is limited to the replacement of the existing sidewalk with a 10-ft shared use path and associated work, however existing traffic volumes and data were evaluated in the vicinity of the proposed path to identify general flow characteristics and speeds.

ATR data was analyzed at the intersection of Indian Neck Road, Narrows Road, Oak Street, and Minot Avenue. The shared use path will cross at Indian Neck Road on the southerly side of Minot Avenue. Traffic Volumes at this location are summarized below in Table 1. Additional traffic volume data in the vicinity of this intersection is provided in appendix I.

Weekday Morning Peak Hour			Weekday Evening Peak Hour		
Volume	K Factor	Dir. Dist.	Volume	K Factor	Dir. Dist.
279	10%	57% NB	273	10%	61% SB

Table 1 – Existing Traffic Volume Summary  
Source: MassDOT Transportation Data Management System

### **Safety & Crash Analysis**

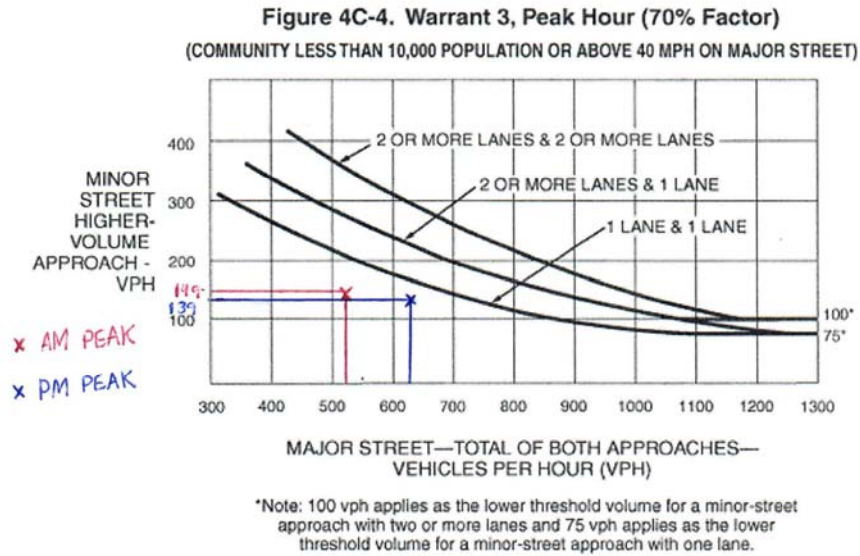
Crash records from the past 5 years (2015-2019) available were obtained from MassDOT to identify potential crash trends and roadway deficiencies that may have impacts on the shared use path. In the time period between 2015 and 2019, 21 reported crashes occurred at the intersection of Minot Avenue, Indian Neck Road, Oak Street, and Narrows Road. The tabulated crash data is provided in Appendix II.

Crash rates were calculated based on the number of vehicles travelling through the intersection on a daily basis, and the number of crashes that occur annually. The average crash rate for an unsignalized intersection within MassDOT District 5 is 0.57 (i.e. .57 crashes per million vehicles entering the intersection). Crash rate worksheets were prepared and presented in Appendix II. In comparison to the average crash rate figure for MassDOT, the calculated crash rate at this intersection is 1.00, therefore indicating a higher than average crash tendency at this location.

### **MUTCD Signal Warrant Analysis**

MUTCD Signal warrants were reviewed to determine if traffic signals at this location would be appropriate. In accordance with MUTCD, traffic signals should not be installed if it will seriously disrupt progressive traffic flow. Due to the nature of this project and existing traffic counts warrants 3 and 4 were evaluated.

Warrant 3 - The Peak Hour signal warrant is intended for use at a location where traffic conditions are such that for a minimum of 1 hour of an average day, the minor-street traffic suffers undue delay when entering or crossing the major street. The 85th-percentile speed on the major street exceeds 40 mph, therefore traffic counts were evaluated based on MUTCD Figure 4C-4, as shown below. Traffic volumes do not exceed the threshold of this warrant.

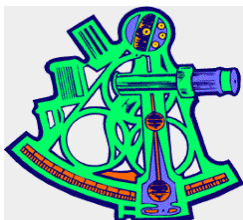


Warrant 4 - Pedestrian Volume signal warrant shall not be applied at locations where the distance to the nearest traffic control signal or STOP sign controlling the street that pedestrians desire to cross is less than 300 feet, unless the proposed traffic control signal will not restrict the progressive movement of traffic. The shared use path will cross within 300-ft of an existing stop sign in both directions. In addition, 5 or more crashes that could be correctable with a traffic signal did not occur within a 12-month period.

At unsignalized locations where the proposed bikeway would cross the roadway, rectangular rapid flashing beacons (RRFBs) and advance crosswalk warning signs should be installed. It is recommended that, following completion of the shared use path, the town monitor increases in pedestrian and bicycle use at this location to determine if a pedestrian hybrid beacon is warranted.



# EARLY ENVIRONMENTAL COORDINATION



## **JC ENGINEERING, INC.**

**Civil & Environmental Engineering**

*2854 Cranberry Highway*

*East Wareham, Massachusetts 02538*

*Ph. 508-273-0377—Fax 508-273-0367*



**25% Design Submission Checklist  
Early Environmental Coordination for Design Projects  
Revised 1/20/16**

**The Designer shall complete and submit this form electronically with backup information and explanations of how each item has been addressed or documented. Completion of this checklist and its requirements is necessary for the project to obtain approval from Environmental Services to proceed with a 25% Design Public Hearing.**

Note: In an attempt to reduce paper consumption, Environmental Services requests that only one (1) paper copy of the 25% Design is submitted for Environmental review. All Early Environmental Coordination documentation should be submitted only in an electronic format (.pdf, .doc, .xls, etc) wherever possible. Documentation should be submitted to the MassDOT project manager for routing to Environmental Services.

<i>PUBLIC COORDINATION</i>		<b>Instructions</b>	<b>Addressed?</b>
1	Coordinate with local boards, commissions & officials to identify specific issues or concerns regarding the project purpose and need and general scope of work. Attach all written correspondence.	<a href="#">Click Here</a>	Y
2	If the proponent has presented the project in a public meeting setting, provide information regarding the meeting including the name of the public board/commission, the date and location, public comments and any formal meeting minutes.		Y
3	Send a letter to the Local Historical Commission (LHC) with a project description and location map, seeking comments. Provide a hardcopy (with a scope of work and locus) to the State Historic Preservation Officer (SHPO) and an electronic copy to MassDOT Highway Division Environmental Services Cultural Resources Unit (CRU). The Designer will no longer be responsible for sending notification letters to any of the three federally recognized tribes in Massachusetts. MassDOT CRU staff will assume responsibility for submitting early notification letters and accompanying materials to the three federally recognized tribes in Massachusetts for all projects.	<a href="#">Click Here</a>	Y
4	Submit a Navigability Survey to the Municipal Harbor Master where work will occur on bridges over U.S. Coast Guard (USCG) regulated navigable waterways. Attach the completed survey.	<a href="#">Click Here</a>	Y
5	Where work will occur within or adjacent to a Wild and Scenic River, submit a letter to the National Park Service with a project description and location map to initiate early coordination. Attach all written correspondence.	<a href="#">Click Here</a>	Y
<i>REGULATORY FRAMEWORK AND REQUIRED DELIVERABLES</i>			
6	Complete and submit an editable (MS Word format .doc or other), electronic Categorical Exclusion (CE) checklist for review and processing by Environmental Services. The draft CE should include a thorough project description and responses to checklist questions.	<a href="#">Click Here</a>	Y
7	Evaluate the project in light of MEPA Review Thresholds. Provide documentation that the project does/does not exceed thresholds. If thresholds are exceeded, an editable (MS Word format .doc or other) draft ENF should be prepared and submitted once the 25% Design Public Hearing has been completed. This does not apply to projects which are exempt from MEPA review under the Bridge Exemption.	<a href="#">Click Here</a>	Y
8	Electronically complete and submit the 25% Design portion of the Water Quality Data Form to determine the impairment status of waterbodies receiving highway runoff.	<a href="#">Click Here</a>	Y
9	If the project will impact wetland resource areas (BVW, Bank, LUW, etc), determine if the project is subject to permitting under Sections 401 and 404 of the Clean Water Act and the Massachusetts Wetlands Protection Act. Provide explanations for each determination of applicability. Ensure that permitting timelines are included in the project schedule.		Y
<i>PROJECT CONTEXT/SETTING AND FIELD RECONNAISSANCE</i>			
10	Identify the dominant land uses within the project area, its general context characteristics, and ownership. Identify any publicly-owned open space (Section 4(f) or Article 97 protected property - parks, recreational areas, conservation land and wildlife refuges) within the project area and describe its designated and current use. This information should be included within the project description attached to the CE Checklist.	<a href="#">Click Here</a>	Y
11	Determine if the project occurs within or adjacent to sensitive environmental resources: Outstanding Resource Waters, stormwater "critical areas", Areas of Critical Environmental Concern (ACECs), NHESP designated endangered species habitat and certified/potential vernal pools, impaired waterbodies, regulated wetland resources, FEMA delineated floodways, Wild & Scenic Rivers, ACOE Special Aquatic Sites (salt marsh, tidal flats, vegetated shallows, etc), Essential Fish Habitat and/or high quality streams.	<a href="#">Click Here</a>	Y
12	Identify known cultural and historical resources in the project area. These include properties or structures listed on the National/State Register(s) of Historic Places or the Inventory of Historic and Archaeological Assets of the Commonwealth.	<a href="#">Click Here</a>	Y
13	Identify all existing or proposed material within the project limits which may require handling as hazardous waste or be subject to other environmental handling regulations upon disposal. These materials include suspected treated timber, asbestos, lead-based paint, mercury switches, PCB-containing materials, etc.	<a href="#">Click Here</a>	Y
14	List locations of known oil and hazardous materials releases in proximity to the project limits. For projects involving excavation work, provide all available relevant soil, sediment, and groundwater sampling results along with maps indicating sample locations.	<a href="#">Click Here</a>	Y
15	Provide a copy of all activity use limitation (AUL) deed restrictions including the map depicting an outline of the AUL area for all AULs located on property within or adjacent to the project limits.		Y
16	Conduct field reconnaissance to verify existing conditions. See Instructions for list of conditions to verify.	<a href="#">Click Here</a>	Y
17	Provide photographic documentation of field conditions and features. See Instructions for list of conditions and features to photograph.	<a href="#">Click Here</a>	Y
<i>PLAN REQUIREMENTS</i>			
18	Show property lines, plus footprints, ownership, and street addresses of all buildings and parcels adjacent to the project.		Y
19	If the project requires Right-of-Way acquisition (takings, rights-of-entries, temporary/permanent easements, DCR permit, etc.), submit Preliminary Right-of-Way Plans.	<a href="#">Click Here</a>	Y
20	Show all bridges and culverts and label with MassDOT Highway Division BDEPT # (if structure has one). Label the waterway, RR line, street or other feature intersected by the bridge/culvert.		Y
21	Show and label the existing and proposed edge of roadway and limits of grading.		Y
22	Show and label all existing and proposed guardrail.		Y
23	Show and label all walls and fences.		Y
24	Show and label all public shade trees 14" or more at breast height in the project area.	<a href="#">Click Here</a>	Y
25	Show and label all roadway monuments, historical markers, highway bounds, etc., and show future locations if any are proposed to be removed and/or relocated.		Y
26	Show and label all publicly owned parks, recreational areas, and wildlife refuges.	<a href="#">Click Here</a>	Y
27	Show and label any proposed landscape improvements.		Y
28	Show the location of all existing and proposed drainage structures and discharge points.		Y
29	Show all wetland boundaries within 100-ft of the project limits, including Bordering and Isolated Vegetated Wetlands, Bank, Land Under Water, Bordering Land Subject to Flooding and Ordinary High Water (i.e., 1-yr flood).		Y
30	For projects requiring a Section 401 Water Quality Certificate (WQC), complete the 401 WQC Plan Requirements Checklist and update plans to meet its requirements.	<a href="#">Click Here</a>	Y
31	Show and label all 100-ft wetland buffer zones and Riverfront Areas.		Y
32	Show the location of potential wetland replacement areas.	<a href="#">Click Here</a>	Y
33	Provide details of any proposed ornamental elements, such as street lighting.		Y

## **2.0 Early Environmental Coordination Checklist Responses**

### **Public Coordination**

1. Coordination with local boards, commissions & officials is expected with continue as the project progresses. The attached letters have been sent to the Police Chief, Fire Chief, and Board of Selectmen.
2. The project was presented at the SRPEDD Joint Transportation Planning Group Meeting on January 8, 2020. Minutes are not currently available.
3. Addressed – the attached letter will be sent to the Local Historic Commission with the 25% submittal.
4. Navigability Survey not applicable to this project.
5. Project is not within or adjacent to a Wild and Scenic River.

### **Regulatory Framework and Required Deliverables**

6. Categorical Exclusion Checklist will be submitted to MassDOT Environmental Services under separate cover.
7. The proposed project does not appear to exceed any MEPA Review thresholds necessitating the preparation of an Environmental Notification Form (ENF).
8. Addressed. 25% WQDF Draft completed. Wareham River is a receiving waterbody adjacent to the project and is an impaired waterway with estuarine bioassessments, fecal coliform, and total Nitrogen.
9. Addressed. The project will result in alteration of wetland resource areas regulated as a Water of the U.S. subject to jurisdiction under Sections 401 and/or 404 of the Clean Water Act. The project will require work that will impact resources subject to protection which are subject to jurisdiction under the Massachusetts Wetlands Protection Act (WPA).

### **Project Context/Settings and Field Reconnaissance**

10. The area adjacent to the project study area includes commercial and residential land uses. Minot Forest is an adjacent piece of land owned by the Town of Wareham for the conservation and recreational purposes and may be subject to protection under Section 4(f), but is generally not impacted by this project. Means to provide access as a result of the new path will be discussed with the Minot Forest Committee.
11. Addressed. The project is not located within NHESP mapped Priority Habitat and Estimated Habitat of Rare Species or Wildlife. Project is partially located within mapped 100-year flood plain as per latest FEMA data. No portion of project is located within an Area of Critical Environmental Concern (ACEC), Zone II, or Wild & Scenic Rivers
12. According to the Massachusetts Cultural Resource Information System (MACRIS) MAPS 2.0 beta, a portion of the project is located adjacent to a

- Massachusetts Historical Commission Inventoried property (Cape Cod Ship Building). The project is a Shared use path following an existing and established right-of-way and impacts to existing historical structures are not anticipated. Coordination with the Wareham Historic Commission will be initiated and further review by MassDOT Highway Division's Environmental Services Cultural Resource Unit (CRU) is required to determine compliance with Section 106 of the National Historic Preservation Act (NHPA) of 1966.
13. Existing and proposed materials within the project limits are not anticipated to require handling as hazardous waste or be subject to other environmental handling regulations upon disposal.
  14. Based on a review of the Massachusetts Department of Environmental Protection (MassDEP) Bureau of Waste Site Cleanup (BWSC) online database, one (1) state-listed disposal site was identified in the vicinity of the proposed project. (72 Minot Avenue). Excavation in this area is not anticipated.
  15. No known activity use limitation (AUL) deed restrictions are located within or adjacent to the project limits.
  16. Additional field reconnaissance and survey will be required to verify existing conditions on northerly side of Minot Avenue.
  17. Photographic documentation provided in Appendix III.

### **Plan Requirements**

18. Addressed – shown on 25% design plan set.
19. Addressed - shown on 25% design plan set.
20. Addressed – N/A.
21. Addressed - shown on 25% design plan set.
22. Addressed - shown on 25% design plan set.
23. Addressed - shown on 25% design plan set.
24. Addressed - shown on 25% design plan set.
25. Addressed - shown on 25% design plan set.
26. Addressed - shown on 25% design plan set.
27. Addressed - shown on 25% design plan set.
28. Addressed - shown on 25% design plan set.
29. Addressed - shown on 25% design plan set. Additional delineating of resource areas may be required.
30. Addressed – Notice of Intent to be filed with Wareham Conservation Commission at later submittal.
31. Addressed - shown on 25% design plan set. Additional delineating of resource areas may be required.
32. Addressed – potential wetland replication areas shown on 25% design plan
33. Addressed – further detail to be provide on later design submissions.



**JC ENGINEERING, Inc.**  
**Civil & Environmental Engineering**

*2854 Cranberry Highway.  
East Wareham, Massachusetts 02538  
Ph. 508-273-0377 – Fax 508-273-0367*

February 13, 2020

Angela Dunham, Chair  
Wareham Historical Commission  
54 Marion Road  
Wareham, MA 02571

RE: Minot Avenue/Narrows Road Shared-use Path Phase 3A (MassDOT Highway Division Project Number 607825) Section 106 Review – Early Environmental Coordination

Dear Ms. Dunham,

The Massachusetts Department of Transportation, Highway Division (MassDOT Highway Division) and the Town of Wareham propose to construct a Shared-use path along Minot Avenue and Narrows Road from Sandwich Road to Depot Street. It is anticipated that this project will be supported in part with federal funds and will require review, therefore, under Section 106 of the National Historic Preservation Act of 1966 as amended (36 CFR 800). The enclosed project information is provided for the Wareham Historical Commission's review in compliance with the regulations governing Section 106.

The proposed project will consist of the development of a shared-use path within the Town of Wareham, extending approximately 1.77 miles along the right-of-way of Narrows Road and Minot Avenue. The path will initiate approximately 250-ft from the intersection of Narrows Road and Sandwich Road (Route 6) and extend to the intersection of Minot Avenue and Great Neck Road/Depot Street. The path will be a 10-ft wide paved bikeway with minimum 2-ft shoulders throughout its length and will effectively replace the existing 4-5' wide sidewalk located on the southerly side of the roadway. The project is intended to provide safer and more accessible infrastructure and is part of a regional effort to provide safer and more accessible paths of transportation for pedestrians and bicyclists. In general, the path will be situated 5-7-ft from the travel lanes of Narrows Road and Minot Avenue. Temporary slope easements and permanent easements for the shared use path and relocated utilities are anticipated.

MassDOT Highway Division and the Town of Wareham request that the Wareham Historical Commission review the enclosed materials at its earliest convenience and solicit any comments that the Commission wishes to make regarding this project. Written comments should be submitted to: Patricia Leavenworth, P.E., Chief Engineer, MassDOT Highway Division, 10 Park Plaza, Boston, MA 02116, Attn: Jeffrey Shrimpton.



**JC ENGINEERING, Inc.**  
**Civil & Environmental Engineering**

*2854 Cranberry Highway.  
East Wareham, Massachusetts 02538  
Ph. 508-273-0377 – Fax 508-273-0367*

If you have any questions concerning the enclosed project information, please feel free to contact Greg J. Frazier (857.368.9342) of MassDOT Highway Division's Project Management Section. If you have any questions concerning the Section 106 process, please feel free to contact Jeffrey Shrimpton (857.368.8824) of MassDOT Highway Division's Cultural Resources Unit.

Sincerely,

A handwritten signature in black ink, appearing to read "Brian Wallace". The signature is fluid and cursive, with a prominent initial "B" and "W".

Brian Wallace, E.I.T.  
Project Engineer

CC: Brona Simon, Massachusetts Historic Commission, with attachments (via mail)  
Jeffrey Shrimpton, MassDOT Highway Division, with attachments (via email)





**JC ENGINEERING, Inc.**  
**Civil & Environmental Engineering**

2854 Cranberry Highway.  
East Wareham, Massachusetts 02538  
Ph. 508-273-0377 – Fax 508-273-0367

February 13, 2020

Matthew Rowley, Fire Chief  
Wareham Fire Department  
273 Main Street  
Wareham, MA 02571

RE: Minot Avenue/Narrows Road Shared-use Path Phase 3A (MassDOT Highway Division Project Number 607825)

Dear Chief Rowley,

On behalf of the Town of Wareham and the Massachusetts Department of Transportation, Highway Division (MassDOT Highway Division), JC Engineering, Inc wishes to notify you that the town and MassDOT are proposing to construct a shared use path along the southerly side of Narrows Road and Minot Avenue. The project proponents have provided the enclose locus map and work scope below for your review, and any information on significant assets which might be affected by the project.

Scope of Work

The proposed project will consist of the development of a shared-use path within the Town of Wareham, extending approximately 1.77 miles along the right-of-way of Narrows Road and Minot Avenue. The path will initiate approximately 250-ft from the intersection of Narrows Road and Sandwich Road (Route 6) and extend to the intersection of Minot Avenue and Great Neck Road/Depot Street. The path will be a 10-ft wide paved bikeway with minimum 2-ft shoulders throughout its length and will effectively replace the existing 4-5' wide sidewalk located on the southerly side of the roadway. The project is intended to provide safer and more accessible infrastructure and is part of a regional effort to provide safer and more accessible paths of transportation for pedestrians and bicyclists. In general, the path will be situated 5-7-ft from the travel lanes of Narrows Road and Minot Avenue. Temporary slope easements and permanent easements for the shared use path and relocated utilities are anticipated.

The proposed path will navigate through the intersection of Narrows Road/Indian Neck Road/Oak Street, and effectively follows the path of the existing sidewalk. Due to the possible increase in users of the shared use path traffic control devices, such as Rectangular Rapid Flash Beacons (RRFB), are being considered to provide better warning to motor vehicles of pedestrian and bicycle traffic. Additional crossings along Narrows Road and Minot Avenue are currently not being considered in the 25% design phase.



**JC ENGINEERING, Inc.**  
**Civil & Environmental Engineering**

*2854 Cranberry Highway.  
East Wareham, Massachusetts 02538  
Ph. 508-273-0377 – Fax 508-273-0367*

MassDOT Highway Division and the Town of Wareham requests that the materials are reviewed at your earliest convenience and solicit any comments that you might wish to make regarding this project. Written comments should be submitted to: Patricia Leavenworth, P.E., Chief Engineer, MassDOT Highway Division, 10 Park Plaza, Boston, MA 02116, Attn: Greg J. Frazier, with a copy to JC Engineering, Inc.

If you have any questions concerning the enclosed project information, please feel free to contact Greg J. Frazier (857.368.9342) of MassDOT Highway Division's Project Management Section. Your attention to this letter is greatly appreciated.

Sincerely,

JC Engineering, Inc.  
Brian Wallace, E.I.T.  
Project Engineer

CC: Greg Frazier, MassDOT





**JC ENGINEERING, Inc.**  
**Civil & Environmental Engineering**  
*2854 Cranberry Highway.*  
*East Wareham, Massachusetts 02538*  
*Ph. 508-273-0377 – Fax 508-273-0367*

February 13, 2020

John Walcek, Chief of Police  
Wareham Police Department  
2515 Cranberry Highway  
Wareham, MA 02571

RE: Minot Avenue/Narrows Road Shared-use Path Phase 3A (MassDOT Highway Division Project Number 607825)

Dear Chief Walcek,

On behalf of the Town of Wareham and the Massachusetts Department of Transportation, Highway Division (MassDOT Highway Division), JC Engineering, Inc wishes to notify you that the town and MassDOT are proposing to construct a shared use path along the southerly side of Narrows Road and Minot Avenue. The project proponents have provided the enclose locus map and work scope below for your review, and any information on significant assets which might be affected by the project.

Scope of Work

The proposed project will consist of the development of a shared-use path within the Town of Wareham, extending approximately 1.77 miles along the right-of-way of Narrows Road and Minot Avenue. The path will initiate approximately 250-ft from the intersection of Narrows Road and Sandwich Road (Route 6) and extend to the intersection of Minot Avenue and Great Neck Road/Depot Street. The path will be a 10-ft wide paved bikeway with minimum 2-ft shoulders throughout its length and will effectively replace the existing 4-5' wide sidewalk located on the southerly side of the roadway. The project is intended to provide safer and more accessible infrastructure and is part of a regional effort to provide safer and more accessible paths of transportation for pedestrians and bicyclists. In general, the path will be situated 5-7-ft from the travel lanes of Narrows Road and Minot Avenue. Temporary slope easements and permanent easements for the shared use path and relocated utilities are anticipated.

The proposed path will navigate through the intersection of Narrows Road/Indian Neck Road/Oak Street, and effectively follows the path of the existing sidewalk. Due to the possible increase in users of the shared use path traffic control devices, such as Rectangular Rapid Flash Beacons (RRFB), are being considered to provide better warning to motor vehicles of pedestrian and bicycle traffic. Additional crossings along Narrows Road and Minot Avenue are currently not being considered in the 25% design phase.



**JC ENGINEERING, Inc.**  
**Civil & Environmental Engineering**

*2854 Cranberry Highway.  
East Wareham, Massachusetts 02538  
Ph. 508-273-0377 – Fax 508-273-0367*

MassDOT Highway Division and the Town of Wareham requests that the materials are reviewed at your earliest convenience and solicit any comments that you might wish to make regarding this project. Written comments should be submitted to: Patricia Leavenworth, P.E., Chief Engineer, MassDOT Highway Division, 10 Park Plaza, Boston, MA 02116, Attn: Greg J. Frazier, with a copy to JC Engineering, Inc.

If you have any questions concerning the enclosed project information, please feel free to contact Greg J. Frazier (857.368.9342) of MassDOT Highway Division's Project Management Section. Your attention to this letter is greatly appreciated.

Sincerely,

A handwritten signature in black ink, appearing to read "B. Wallace".

JC Engineering, Inc.  
Brian Wallace, E.I.T.  
Project Engineer

CC: Greg Frazier, MassDOT





**JC ENGINEERING, Inc.**  
**Civil & Environmental Engineering**  
*2854 Cranberry Highway.*  
*East Wareham, Massachusetts 02538*  
*Ph. 508-273-0377 – Fax 508-273-0367*

February 13, 2020

Patrick G. Tropeano, Chairman  
Wareham Board of Selectmen  
Memorial Town Hall  
54 Marion Road  
Wareham, MA 02571

RE: Minot Avenue/Narrows Road Shared-use Path Phase 3A (MassDOT Highway Division Project Number 607825)

Dear Mr Tropeano,

On behalf of the Town of Wareham and the Massachusetts Department of Transportation, Highway Division (MassDOT Highway Division), JC Engineering, Inc wishes to notify you that the town and MassDOT are proposing to construct a shared use path along the southerly side of Narrows Road and Minot Avenue. The project proponents have provided the enclose locus map and work scope below for your review, and any information on significant assets which might be affected by the project.

Scope of Work

The proposed project will consist of the development of a shared-use path within the Town of Wareham, extending approximately 1.77 miles along the right-of-way of Narrows Road and Minot Avenue. The path will initiate approximately 250-ft from the intersection of Narrows Road and Sandwich Road (Route 6) and extend to the intersection of Minot Avenue and Great Neck Road/Depot Street. The path will be a 10-ft wide paved bikeway with minimum 2-ft shoulders throughout its length and will effectively replace the existing 4-5' wide sidewalk located on the southerly side of the roadway. The project is intended to provide safer and more accessible infrastructure and is part of a regional effort to provide safer and more accessible paths of transportation for pedestrians and bicyclists. In general, the path will be situated 5-7-ft from the travel lanes of Narrows Road and Minot Avenue. Temporary slope easements and permanent easements for the shared use path and relocated utilities are anticipated.

The proposed path will navigate through the intersection of Narrows Road/Indian Neck Road/Oak Street, and effectively follows the path of the existing sidewalk. Due to the possible increase in users of the shared use path traffic control devices, such as Rectangular Rapid Flash Beacons (RRFB), are being considered to provide better warning to motor vehicles of pedestrian and bicycle traffic. Additional crossings along Narrows Road and Minot Avenue are currently not being considered in the 25% design phase.



**JC ENGINEERING, Inc.**  
**Civil & Environmental Engineering**

*2854 Cranberry Highway.  
East Wareham, Massachusetts 02538  
Ph. 508-273-0377 – Fax 508-273-0367*

MassDOT Highway Division and the Town of Wareham requests that the materials are reviewed at your earliest convenience and solicit any comments that you might wish to make regarding this project. Written comments should be submitted to: Patricia Leavenworth, P.E., Chief Engineer, MassDOT Highway Division, 10 Park Plaza, Boston, MA 02116, Attn: Greg J. Frazier, with a copy to JC Engineering, Inc.

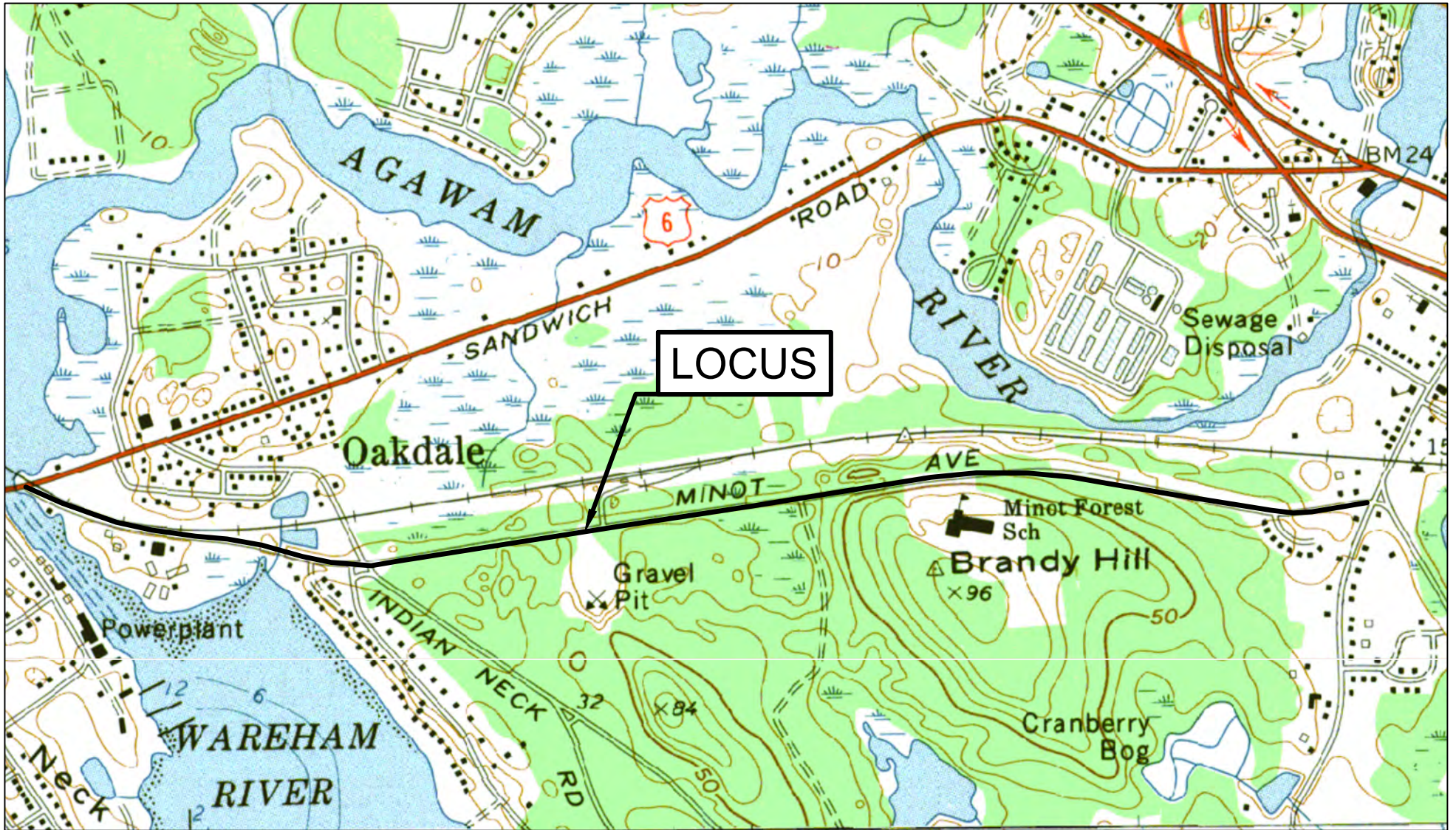
If you have any questions concerning the enclosed project information, please feel free to contact Greg J. Frazier (857.368.9342) of MassDOT Highway Division's Project Management Section. Your attention to this letter is greatly appreciated.

Sincerely,

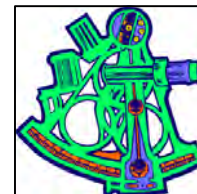
JC Engineering, Inc.  
Brian Wallace, E.I.T.  
Project Engineer

CC: Greg Frazier, MassDOT





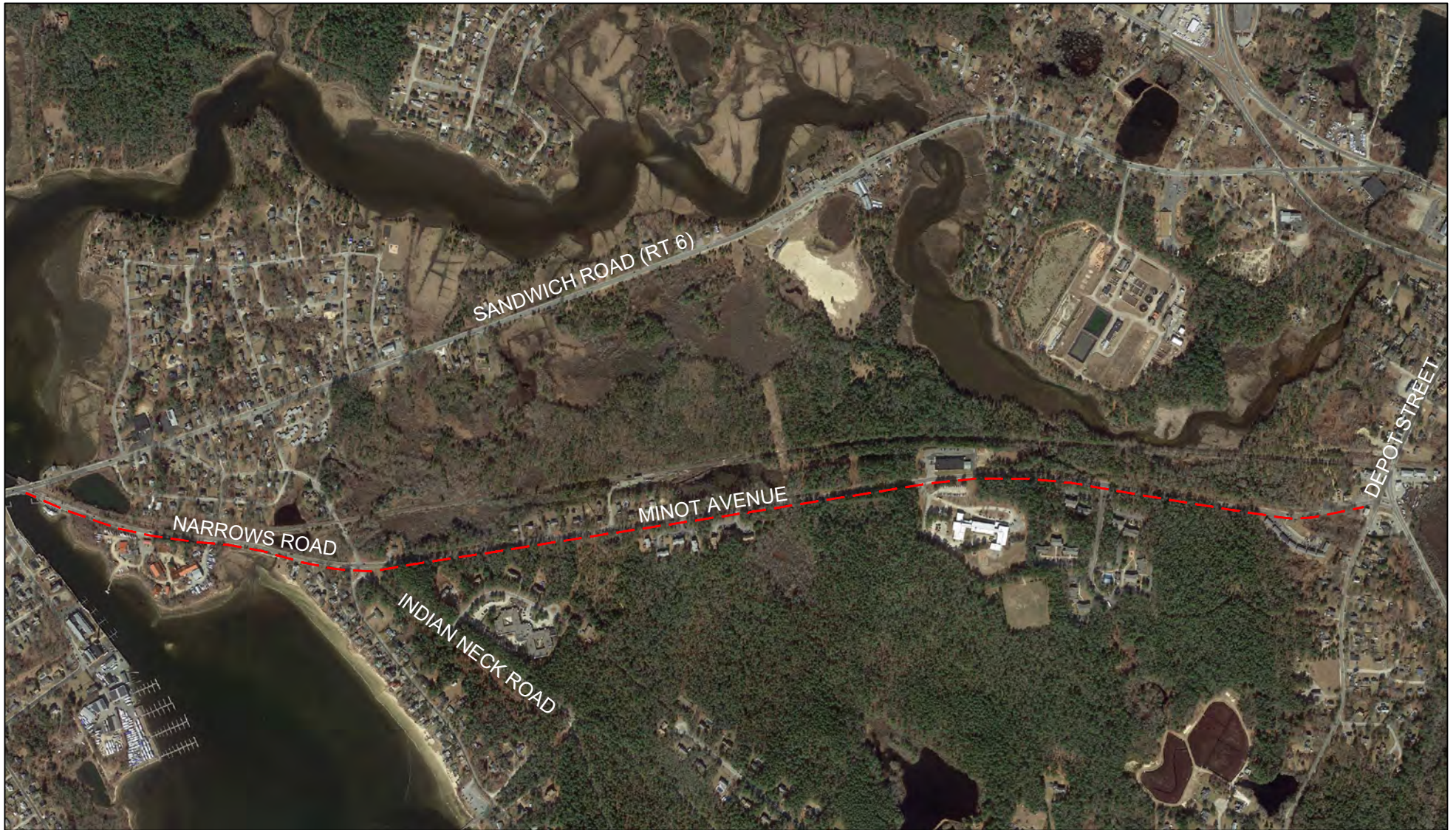
USGS MAP  
 NARROWS ROAD AND MINOT AVENUE  
 WAREHAM, MASSACHUSETTS



ENGINEERING BY:  
 JC ENGINEERING, INC.  
 2854 CRANBERRY HIGHWAY  
 EAST WAREHAM, MA 02538  
 (508) 273-0377

SCALE: 1" = 1000'±





LOCUS MAP  
NARROWS ROAD AND MINOT AVENUE  
WAREHAM, MASSACHUSETTS

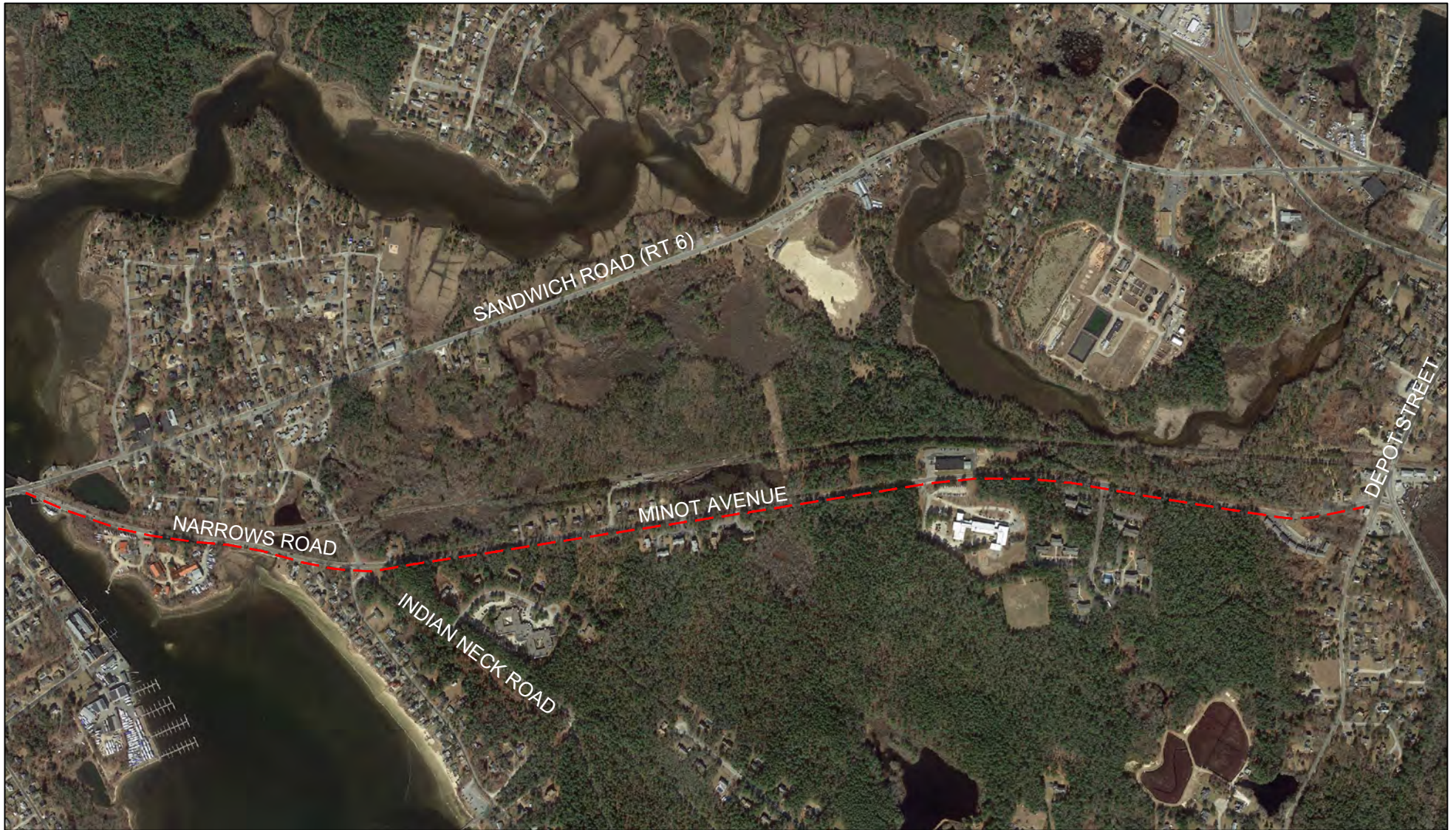
LEGEND  
— — PROJECT AREA



ENGINEERING BY:  
**JC ENGINEERING, INC.**  
2854 CRANBERRY HIGHWAY  
EAST WAREHAM, MA 02538  
(508) 273-0377





SCALE: 1" = 1000'±





**Critical Resources Map**  
**NARROWS ROAD AND MINOT AVENUE**  
**WAREHAM, MASSACHUSETTS**

**LEGEND**

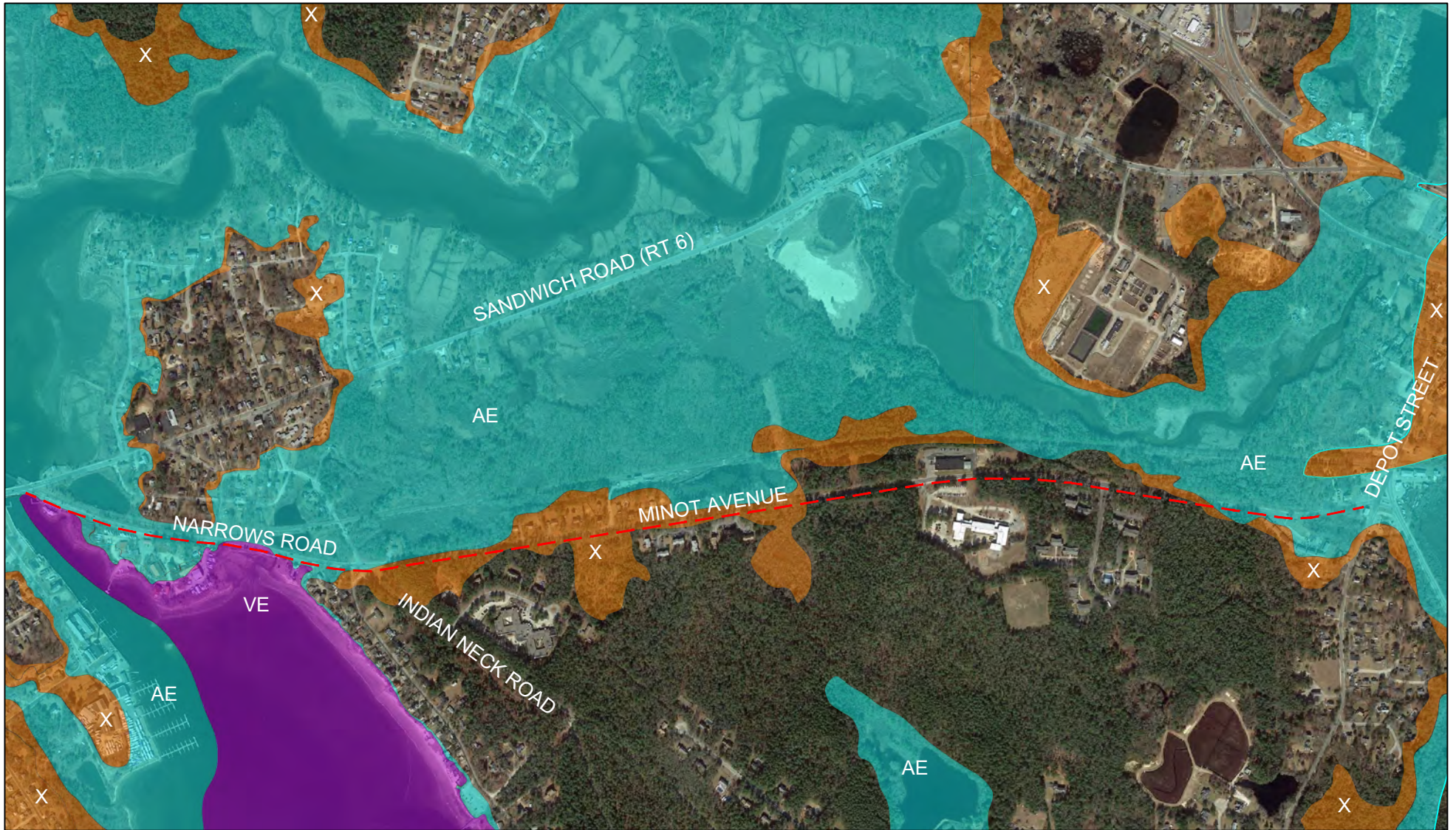
-  PROJECT AREA
-  OUTSTANDING RESOURCE WATERS
-  AREAS OF CRITICAL ENVIRONMENTAL CONCERN
-  ZONE II DEP WELLHEAD PROTECTION AREA



ENGINEERING BY:  
**JC ENGINEERING, INC.**  
 2854 CRANBERRY HIGHWAY  
 EAST WAREHAM, MA 02538  
 (508) 273-0377





SCALE: 1" = 1000'±





**FEMA FIRM MAP**  
**NARROWS ROAD AND MINOT AVENUE**  
**WAREHAM, MASSACHUSETTS**

**LEGEND**

-  PROJECT AREA
-  100-YR FLOODPLANE (VE)
-  100-YR FLOODPLANE (AE)
-  500-YR FLOODPLANE



ENGINEERING BY:  
**JC ENGINEERING, INC.**  
 2854 CRANBERRY HIGHWAY  
 EAST WAREHAM, MA 02538  
 (508) 273-0377




SCALE: 1" = 1000'±





**NHESP MAP**  
**NARROWS ROAD AND MINOT AVENUE**  
**WAREHAM, MASSACHUSETTS**

**LEGEND**

-  PROJECT AREA
-  NHESP EST. HABITATS OF RARE WILDLIFE
-  NHESP PRIORITY HABITATS OF RARE SPECIES



ENGINEERING BY:  
**JC ENGINEERING, INC.**  
 2854 CRANBERRY HIGHWAY  
 EAST WAREHAM, MA 02538  
 (508) 273-0377

SCALE: 1" = 1000'±





Openspace & Historic Resources Map  
**NARROWS ROAD AND MINOT AVENUE**  
**WAREHAM, MASSACHUSETTS**

**LEGEND**

-  PROJECT AREA
-  MUNICIPAL
-  LAND TRUST
-  PRIVATE
-  DCR-URBAN PARKS & RECREATION
-  HISTORIC PLACES



ENGINEERING BY:

**JC ENGINEERING, INC.**  
 2854 CRANBERRY HIGHWAY  
 EAST WAREHAM, MA 02538  
 (508) 273-0377

SCALE: 1" = 1000'±



Address or MHC#  Search

[Bing](#) [MassDOT](#) [Street View](#)



## Legend

### MHC Inventory Points

- Nat'l Register of Historic Places
- ★ Preservation Restriction
- ▲ Local Historic District
- ▲ NRHP and LHD
- Inventoried Property

### MHC Inventory Areas

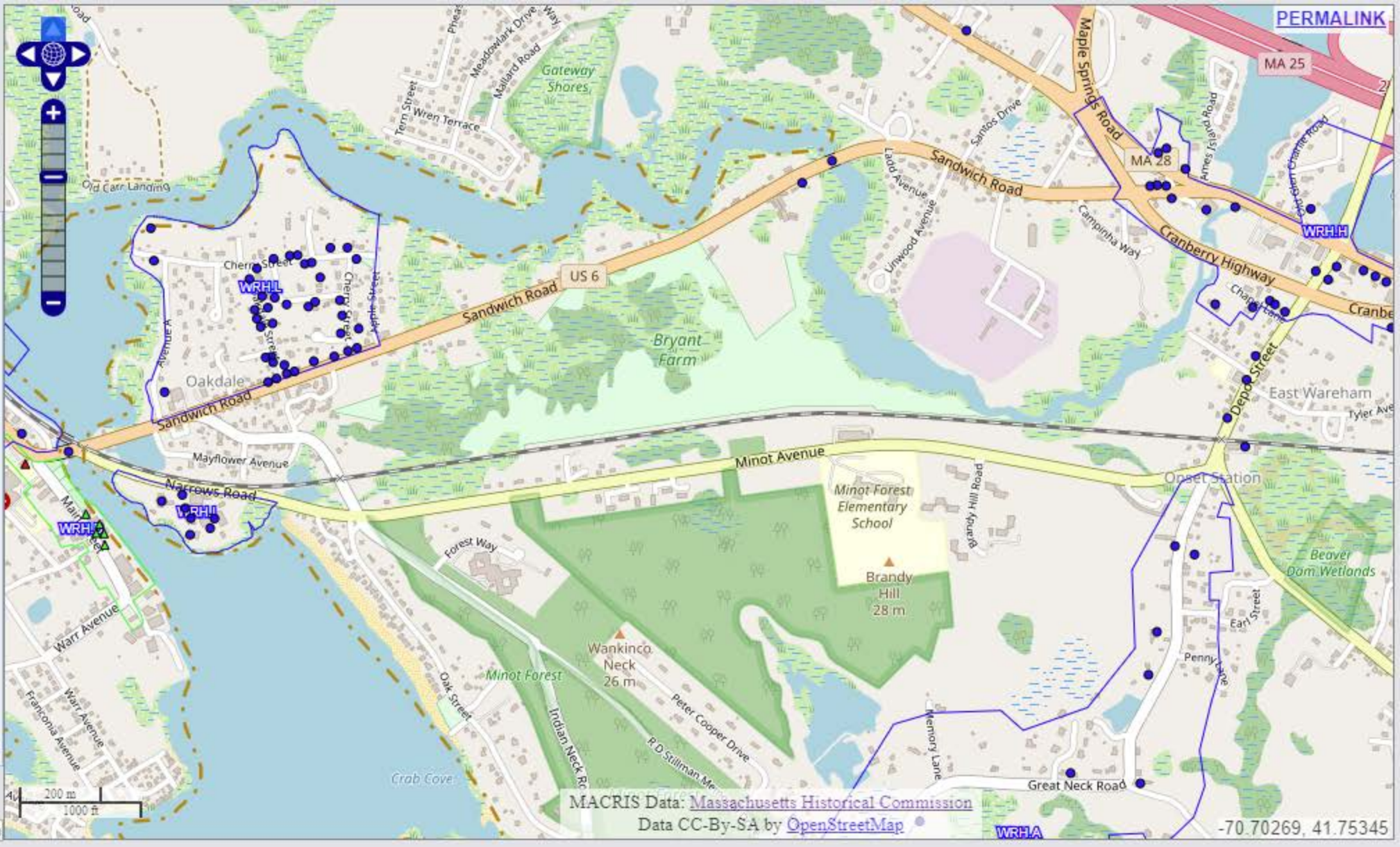
- Nat'l Register of Historic Places
- Preservation Restriction
- Local Historic District
- NRHP and LHD
- Inventoried Area

### MHC Towns Completed

- Updates Pending
- Completed
- Not Completed

### Archaeology Login

Username:   
Password:



---

### Project Information

The following questions should be filled out at the 25% design stage.

**WARNING: Do not attempt to cut and paste cells. Form will malfunction.**

1. Have you downloaded the most recent version of the Water Quality Data Form?

Yes

For questions 2-5, please use MassDOT's Project Information Look-Up Website to populate the yellow fields.

2. Project Number (From Project Info Website):

607825

3. Project Type (From Project Info Website):

Other

4. Project Name (From Project Info Website):

Wareham Shared Use Path

5. Location of Project (From Project Info Website):

Project Road(s): Narrows Road, Minot Avenue

Cities and/or Towns: Wareham

District Number: 5

6. Project Designer:

Design Firm: JC Engineering, Inc

Contact Person for Follow-Up: Brian Wallace

Email Address for Follow-Up: bwallace@jceengineeringinc.com

Phone Number for Follow-Up: 508-273-0377

Extension:

7. Who will have final ownership of the road or bridge this project is addressing?

Municipality

---

### Receiving Water Body Information

8. Does any runoff from the site enter a separate storm sewer system (MS4) operated by an organization other than MassDOT, such as a municipality?

Yes

- 9a. Is the project located in a watershed with one or more Draft or Final pollutant Total Maximum Daily Load(s) (TMDL)?

Yes

- 9b. Which Draft and/or Final pollutant TMDL(s) apply to the watershed?

Bacteria/Pathogens

Nitrogen

Stormwater

Phosphorus

10. How many water bodies on MassDEP's Year 2012 Integrated List of Waters receive stormwater runoff from the area impacted by this project (via any combination of piped or over land flow)?

1

---

**Water Body #1**

**11. Segment ID of the receiving listed water body:**

ma95-03

**Name of the receiving listed water body:**

Wareham River

**Receiving water body status:**

Impaired

**Receiving water body impairments:**

Estuarine Bioassessments, Fecal Coliform, Nitrogen (Total)

**Final TMDLs for receiving water body:**

Bacteria/Pathogens

**12. Notes about conceptual BMPs that are planned to treat stormwater flowing to Water Body #1 (Wareham River):**

Project will include drainage improvements to existing MS4 infrastructure. New deep sump catch basins and water quality units are anticipated to be included in the design.

**Recommendations and Requirements for BMPs Based on Status of Water Body #1**

Ensure that any BMPs are recorded on the Water Quality Data Form for the 75% design stage. See the section of this form titled **Project Specific BMP Recommendations** for project-wide recommendations and contact information for MassDOT.

**Recommendations Based on Receiving Water Body Impairment Status**

BMPs must be implemented to ensure that stormwater discharging from this site does not contribute to the water quality impairments of this receiving water body. Water bodies impaired for nitrogen benefit from BMPs with bio-uptake capabilities, such as bioretention basins. Water bodies with most other impairments related to stormwater runoff (such as phosphorus, turbidity, excess algal growth, dissolved oxygen, etc.) benefit from infiltration or bioretention BMPs. Water bodies impaired for chlorides benefit mostly from non-structural BMPs, such as source control, so BMPs proposed for sites adjacent to these types of water bodies should be discussed with MassDOT.

**Recommendations Applicable to Receiving Water Bodies with TMDL(s)**

BMPs must be implemented to ensure that stormwater discharge is consistent with any applicable Waste Load Allocation (WLA) for the TMDL(s) covering this receiving water body.

---





---

## Project Specific BMP Recommendations

Reference the MassDEP Storm Water Handbook for more detailed guidance on selecting BMPs.

### Recommendations for Projects Located within TMDL Watershed(s)

BMPs must be implemented to ensure that stormwater discharge is consistent with any applicable Waste Load Allocation (WLA) for the TMDL(s) covering this watershed.

### Recommendations for Projects with a Listed Receiving Water Body

When weighing the need for BMPs versus the feasibility of design and construction, consider the proximity of receiving water bodies on MassDEP's Year 2012 Integrated List of Waters. For example, if stormwater runoff from the project area flows through an expansive wetland or ephemeral stream prior to entering a water body on the list, take into account that many stormwater pollutants will be naturally treated. In such instances, pollutant-specific BMPs are suggested but not required under the Impaired Waters Program. It is more important to retain the integrity of the wetland or ephemeral stream and only implement additional BMPs to the maximum extent practicable in accordance with the Massachusetts Stormwater Standards.

At the other extreme, if stormwater runoff from the site is piped directly into a water body listed on the Year 2012 Integrated List of Waters, no pollutants are removed from stormwater prior to discharge, and it is more likely that stormwater runoff will negatively impact water quality. In this case, pollutant-specific BMPs need to be incorporated into the project. Consider all possibilities to overcome site limitations. This shall be a project by project determination.

### Recommendations for Other Projects

Consider reconstructing existing outfalls so as to maximize the length of the flow path between the outfall and the receiving water body. This may involve moving the outfall further away from the receiving water body and/or positioning the outfall to discharge runoff at an angle. New outfalls should also incorporate protection against erosive discharge velocities. If land is available, consider incorporating an infiltration-style BMP at the new outfall. Otherwise, investigate the feasibility of re-routing stormwater to an area with more available space, such as within roadway interchanges and ramp systems. Leaching catch basins are also a good option for infiltrating in constrained spaces.

For project areas discharging to a cold water fishery, consider implementing infiltration BMPs to reduce the likelihood that the temperature of the stormwater will negatively impact the fishery habitat.

Consider reducing the amount of existing impervious cover in the project area while remaining in compliance with applicable safety standards.

Consider replacing concrete-lined swales and eroded ditches with vegetated swales. Vegetated swales should include check dams where possible to slow stormwater velocities, reduce erosion, and promote infiltration. Consideration should be given to the use of suitable subgrade materials, a geotextile liner, suitable vegetation, and/or an underdrain, depending on the characteristics of a site.

Consider using the highway median as an infiltration swale with check dams. In some instances, existing stormwater infrastructure can be re-routed to discharge to the median with an overflow outlet to a water body or the edge of the SHLO. In other instances, an existing trunk line may be day-lighted and retrofitted with an infiltration swale.

For parking lots, rest areas, and other similar areas, consider the use of porous or permeable pavements. Designs that include porous or permeable pavements should also incorporate suitable subgrade layers.

### Recommendations for Non-Structural BMPs

Consider implementing as many of the following non-structural BMPs as possible:

- Preserve as much of the pre-development vegetation as possible
- Preserve natural drainage patterns and riparian buffers
- Minimize disturbance to wetland resource areas
- Reduce or eliminate curbing in well-vegetated areas that gently slope downward and away from the road
- Use shallow, grassed roadside swales and parking lot islands with check dams instead of curb and gutter storm drainage systems
- Reduce existing impervious cover or minimize the construction of additional impervious cover

Contact Bryan Cordeiro in the Environmental Section of MassDOT for guidance selecting appropriate BMPs. He can be reached at 857-368-8813 or at [Bryan.Cordeiro@state.ma.us](mailto:Bryan.Cordeiro@state.ma.us)

---

## Form Submission

### 13. Submittal Type:

### Name of MassDOT Reviewer:

(For internal use only)

### 14. Date Submitted to MassDOT:

(mm/dd/yyyy)

Check box once all entries have been filled out. Form can be submitted once box has been successfully checked.

---

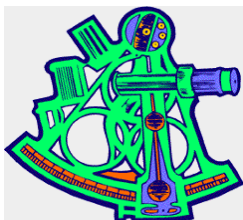
MEPA ACTION DETERMINATION Review Threshold	Threshold Met
<b>(3) Land</b>	
Direct alteration of 50 or more acres of land, unless the Project is consistent with an approved conservation farm plan or forest cutting plan or other similar generally accepted agricultural or forestry practices.	NO
Creation of ten or more acres of impervious area.	NO
Direct alteration of 25 or more acres of land, unless the Project is consistent with an approved conservation farm plan or forest cutting plan or other similar generally accepted agricultural or forestry practices.	NO
Creation of five or more acres of impervious area.	NO
Conversion of land held for natural resources purposes in accordance with Article 97 of the Amendments to the Constitution of the Commonwealth to any purpose not in accordance with Article 97.	NO
Conversion of land in active agricultural use to nonagricultural use, provided the land includes soils classified as prime, state-important or unique by the United States Department of Agriculture, unless the Project is accessory to active agricultural use or consists solely of one single family dwelling.	NO
Release of an interest in land held for conservation, preservation or agricultural or watershed preservation purposes.	NO
Approval in accordance with M.G.L. c. 121A of a New urban redevelopment project or a fundamental change in an approved urban redevelopment project, provided that the Project consists of 100 or more dwelling units or 50,000 or more sf of non-residential space.	NO
Approval in accordance with M.G.L. c. 121B of a New urban renewal plan or a major modification of an existing urban renewal plan.	NO
<b>(2) State-listed Species under M.G.L. c. 131A.</b>	
Alteration of designated significant habitat.	NO
Greater than two acres of disturbance of designated priority habitat, as defined in 321 CMR 10.02, that results in a take of a state-listed endangered or threatened species or species of special concern.	NO
<b>(3) Wetlands, Waterways and Tidelands.</b>	
Alteration of one or more acres of salt marsh or bordering vegetating wetlands      Alteration of ten or more acres of any other wetlands	NO
Alteration requiring a variance in accordance with the Wetlands Protection Act.	NO
Construction of a New dam.	NO
Structural alteration of an existing dam that causes an Expansion of 20% or any decrease in impoundment Capacity.	NO
Provided that a Chapter 91 License is required, New non-water dependent use or Expansion of an existing non-water dependent structure, provided the use or structure occupies one or more acres of waterways or tidelands.	NO
Alteration of coastal dune, barrier beach or coastal bank	NO
Alteration of 500 or more linear feet of bank along a fish run or inland bank	
Alteration of 1,000 or more sf of salt marsh or outstanding resource waters	
Alteration of 5,000 or more sf of bordering or isolated vegetated wetlands	
New fill or structure or Expansion of existing fill or structure, except a pile-supported structure, in a velocity zone or regulatory floodway	NO
Alteration of one half or more acres of any other wetlands.	NO
Construction of a New roadway or bridge providing access to a barrier beach or a New utility line providing service to a structure on a barrier beach.	NO
Dredging of 10,000 or more cy of material.	NO



Disposal of 10,000 or more cy of dredged material, unless at a designated in-water disposal site.	NO
Provided that a Chapter 91 License is required, New or existing unlicensed non-water dependent use of waterways or tidelands, unless the Project is an overhead utility line, a structure of 1,000 or less sf base area accessory to a single family dwelling, a temporary use in a designated port area, or an existing unlicensed structure in use prior to January 1, 1984.	NO
Construction, reconstruction or Expansion of an existing solid fill structure of 1,000 or more sf base area or of a pile-supported or bottom-anchored structure of 2,000 or more sf base area, except a seasonal, pile-held or bottom-anchored float, provided the structure occupies flowed tidelands or other waterways.	NO
<b>(4) Water</b>	
New withdrawal or Expansion in withdrawal of 2,500,000 or more gpd from a surface water source	NO
New withdrawal or Expansion in withdrawal of 1,500,000 or more gpd from a groundwater source.	NO
New interbasin transfer of water of 1,000,000 or more gpd or any amount determined significant by the Water Resources Commission.	NO
Construction of one or more New water mains ten or more miles in length.	NO
Provided that the Project is undertaken by an Agency, New water service to a municipality or water district across a municipal boundary through New or existing pipelines, unless a disruption of service emergency is declared in accordance with applicable statutes and regulations.	NO
<b>(6) Transportation</b>	
Unless the Project consists solely of an internal or on-site roadway or is located entirely on the site of a non-roadway Project: a. construction of a New roadway two or more miles in length; or b. widening of an existing roadway by one or more travel lanes for two or more miles.	NO
New interchange on a completed limited access highway.	NO
Construction of a New airport.	NO
Construction of a New runway or terminal at an existing airport.	NO
Construction of a New rail or rapid transit line along a New, unused or abandoned right-of-way for transportation of passengers or freight (not including sidings, spurs or other lines not leading to an ultimate destination).	NO
Generation of 3,000 or more New adt on roadways providing access to a single location.	NO
Construction of 1,000 or more New parking spaces at a single location.	NO
Unless the Project consists solely of an internal or on-site roadway or is located entirely on the site of a non-roadway Project: a. construction of a New roadway one-quarter or more miles in length; or b. widening of an existing roadway by four or more feet for one-half or more miles.	NO
2. Construction, widening or maintenance of a roadway or its right-of-way that will: a. alter the bank or terrain located ten more feet from the existing roadway for one-half or more miles, unless necessary to install a structure or equipment; b. cut five or more living public shade trees of 14 or more inches in diameter at breast height; or c. eliminate 300 or more feet of stone wall.	NO
Expansion of an existing runway at an airport.	NO
Construction of a New taxiway at an airport.	NO
Expansion of an existing terminal at Logan Airport by 100,000 or more sf.	NO
Expansion of an existing terminal at any other airport by 25,000 or more sf.	NO
Construction of New or Expansion of existing air cargo buildings at an airport by 100,000 or more sf.	NO

Conversion of a military airport to a non-military airport.	NO
Construction of a New rail or rapid transit line for transportation of passengers or freight.	NO
Discontinuation of passenger or freight service along a rail or rapid transit line.	NO
Abandonment of a substantially intact rail or rapid transit right-of-way.	NO
Generation of 2,000 or more New adt on roadways providing access to a single location.	NO
Generation of 1,000 or more New adt on roadways providing access to a single location and construction of 150 or more New parking spaces at a single location.	NO
Construction of 300 or more New parking spaces at a single location.	NO
<b>(9) Solid and Hazardous Waste</b>	
ENF and Mandatory EIR. New Capacity or Expansion in Capacity of 150 or more tpd for storage, treatment, processing, combustion or disposal of solid waste, unless the Project is a transfer station, is an Expansion of an existing facility within a validly site assigned area for the proposed use, or is exempt from site assignment requirements.	NO
New Capacity or Expansion in Capacity for combustion or disposal of any quantity of solid waste, or storage, treatment or processing of 50 or more tpd of solid waste, unless the Project is exempt from site assignment requirements.	NO
Provided that a Permit is required in accordance with M.G.L. c. 21D, New Capacity or Expansion in Capacity for the storage, recycling, treatment or disposal of hazardous waste.	NO
<b>(10) Historical and Archaeological Resources</b>	
Demolition of all or any exterior part of any Historic Structure listed in or located in any Historic District listed in the State Register of Historic Places or the Inventory of Historic and Archaeological Assets of the Commonwealth; or	NO
Destruction of all or any part of any Archaeological Site listed in the State Register of Historic Places or the Inventory of Historic and Archaeological Assets of the Commonwealth.	NO
<b>(11) Areas of Critical Environmental Concern</b>	
Any Project within a designated ACEC, unless the Project consists solely of one single family dwelling.	NO
<b>(12) Regulations</b>	
ENF and Other MEPA Review if the Secretary So Requires. Promulgation of New or revised regulations, of which a primary purpose is protecting against Damage to the Environment, that significantly reduce: 1. standards for environmental protection; 2. opportunities for public participation in permitting or other review processes; or 3. public access to information generated or provided in accordance with the regulations.	NO

# PRELIMINARY COST ESTIMATE



## **JC ENGINEERING, INC.**

**Civil & Environmental Engineering**

*2854 Cranberry Highway*

*East Wareham, Massachusetts 02538*

*Ph. 508-273-0377—Fax 508-273-0367*

FA - Congestion  
Mitigation/Air  
Quality (CMAQ)FA - Trans.  
Alternative Prgm  
(TAP)

Item No	Description	Unit of Measure	Unit Price	CMQ/CMQ	TAP/TAP	Total Quantity	Total
100.	SCHEDULE OF OPERATIONS - FIXED PRICE \$	LS	\$49,500.000		1.000	1.000	\$49,500.00
101.	CLEARING AND GRUBBING	A	\$32,500.000	1.250	1.250	2.500	\$81,250.00
102.1	TREE TRIMMING	FT	\$23.500	400.000	400.000	800.000	\$18,800.00
103.	TREE REMOVED - DIAMETER UNDER 24 INCHES	EA	\$1,500.000	4.000	4.000	8.000	\$12,000.00
105.	STUMP REMOVED	EA	\$177.500	4.000	4.000	8.000	\$1,420.00
120.	EARTH EXCAVATION	CY	\$35.000	1,200.000	1,200.000	2,400.000	\$84,000.00
123.	MUCK EXCAVATION	CY	\$60.000	500.000	500.000	1,000.000	\$60,000.00
146.	DRAINAGE STRUCTURE REMOVED	EA	\$2,465.000	10.000	10.000	20.000	\$49,300.00
150.	ORDINARY BORROW	CY	\$30.000	1,641.000	1,641.000	3,282.000	\$98,460.00
156.2	CRUSHED STONE FOR SLOPE TREATMENT	TON	\$150.000	500.000	500.000	1,000.000	\$150,000.00
170.	FINE GRADING AND COMPACTING SUBGRADE AREA	SY	\$7.000	9,000.000	9,000.000	18,000.000	\$126,000.00
180.01	ENVIRONMENTAL HEALTH AND SAFETY PROGRAM	LS	\$5,000.000	0.500	0.500	1.000	\$5,000.00
180.02	PERSONAL PROTECTION LEVEL C UPGRADE	HR	\$10.000	20.000	20.000	40.000	\$400.00
180.03	LICENSED SITE PROFESSIONAL SERVICES	HR	\$105.000	40.000	40.000	80.000	\$8,400.00
181.14	DISPOSAL OF HAZARDOUS WASTE	TON	\$425.000	0.500	0.500	1.000	\$425.00
201.5	CATCH BASIN - MUNICIPAL STANDARD	EA	\$6,000.000	3.000	3.000	6.000	\$36,000.00
202.	MANHOLE	EA	\$5,000.000	5.000	5.000	10.000	\$50,000.00
204.3	GUTTER INLET - MUNICIPAL STANDARD	EA	\$5,000.000	5.000	5.000	10.000	\$50,000.00
220.	DRAINAGE STRUCTURE ADJUSTED	EA	\$500.000	5.000	5.000	10.000	\$5,000.00
222.3	FRAME AND GRATE (OR COVER) MUNICIPAL STANDARD	EA	\$896.000	5.000	5.000	10.000	\$8,960.00
224.12	12 INCH HOOD	EA	\$550.000	3.000	3.000	6.000	\$3,300.00

227.3	REMOVAL OF DRAINAGE STRUCTURE SEDIMENT	CY	\$200.000	80.000	80.000	160.000	\$32,000.00
227.31	REMOVAL OF DRAINAGE PIPE SEDIMENT	FT	\$6.250	150.000	150.000	300.000	\$1,875.00
241.12	12 INCH REINFORCED CONCRETE PIPE	FT	\$122.500	150.000	150.000	300.000	\$36,750.00
241.15	15 INCH REINFORCED CONCRETE PIPE	FT	\$112.500	100.000	100.000	200.000	\$22,500.00
241.18	18 INCH REINFORCED CONCRETE PIPE	FT	\$119.500	75.000	75.000	150.000	\$17,925.00
241.30	30 INCH REINFORCED CONCRETE PIPE	FT	\$205.000	30.000	30.000	60.000	\$12,300.00
242.12	12 INCH REINFORCED CONCRETE PIPE FLARED END	EA	\$1,500.000	4.000	4.000	8.000	\$12,000.00
242.18	18 INCH REINFORCED CONCRETE PIPE FLARED END	EA	\$1,350.000	3.000	3.000	6.000	\$8,100.00
258.	STONE FOR PIPE ENDS	SY	\$66.420	120.000	120.000	240.000	\$15,940.80
376.2	HYDRANT - REMOVED AND RESET	EA	\$2,936.050	4.500	4.500	9.000	\$26,424.45
384.1	CURB STOP REMOVED AND RESET	EA	\$875.000	4.500	4.500	9.000	\$7,875.00
415.1	PAVEMENT STANDARD MILLING	SY	\$17.000	3,380.000	3,380.000	6,760.000	\$114,920.00
440.	CALCIUM CHLORIDE FOR ROADWAY DUST CONTROL	LB	\$0.010	75,000.000	75,000.000	150,000.000	\$1,500.00
443.	WATER FOR ROADWAY DUST CONTROL	MGL	\$75.000	50.000	50.000	100.000	\$7,500.00
450.23	SUPERPAVE SURFACE COURSE - 12.5 (SSC - 12.5)	TON	\$142.500	730.000	730.000	1,460.000	\$208,050.00
450.31	SUPERPAVE INTERMEDIATE COURSE - 12.5 (SIC -12.5)	TON	\$125.000	1,215.000	1,215.000	2,430.000	\$303,750.00
453.	HMA JOINT SEALANT	FT	\$1.050	20.000	20.000	40.000	\$42.00
501.	GRANITE CURB TYPE VA1 - STRAIGHT	FT	\$78.750	1,000.000	1,000.000	2,000.000	\$157,500.00
501.1	GRANITE CURB TYPE VA1 - CURVED	FT	\$92.250	250.000	250.000	500.000	\$46,125.00
509.	GRANITE TRANSITION CURB FOR WHEELCHAIR RAMPS - STRAIGHT	FT	\$75.000	20.000	20.000	40.000	\$3,000.00
514.2	GRANITE CURB INLET - STRAIGHT-MUNICIPAL STANDARD	EA	\$465.000	4.000	4.000	8.000	\$3,720.00

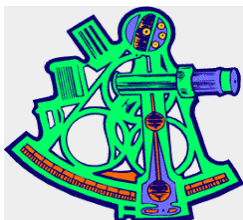
583.	EDGING REMOVED AND RESET	FT	\$29.030	1,250.000	1,250.000	2,500.000	\$72,575.00
620.12	GUARDRAIL, TL-2 (SINGLE FACED)	FT	\$30.500	440.000	440.000	880.000	\$26,840.00
627.92	GUARDRAIL FLARED END TREATMENT, TL-2	EA	\$4,291.900	2.000	2.000	4.000	\$17,167.60
655.	CEDAR RAIL FENCE	FT	\$59.500	800.000	800.000	1,600.000	\$95,200.00
666.	CHAIN LINK FENCE REMOVED AND RESET	FT	\$52.000	37.500	37.500	75.000	\$3,900.00
685.	STONE MASONRY WALL IN CEMENT MORTAR	CY	\$567.500	782.500	782.500	1,565.000	\$888,137.50
697.1	SILT SACK	EA	\$227.770	12.000	12.000	24.000	\$5,466.48
698.1	GEOTEXTILE FABRIC FOR STABILIZATION	SY	\$7.000	296.000		296.000	\$2,072.00
707.8	STEEL BOLLARD	EA	\$1,500.000	3.000	3.000	6.000	\$9,000.00
711.	BOUND REMOVED AND RESET	EA	\$550.000	4.000	4.000	8.000	\$4,400.00
748.	MOBILIZATION	LS	\$61,000.000	0.500	0.500	1.000	\$61,000.00
755.	WETLAND REPLICATION AREA	SY	\$25.000	800.000	800.000	1,600.000	\$40,000.00
756.	NPDES STORMWATER POLLUTION PREVENTION PLAN	LS	\$5,000.000	0.500	0.500	1.000	\$5,000.00
765.	SEEDING	SY	\$2.450	7,750.000	7,750.000	15,500.000	\$37,975.00
767.121	SEDIMENT CONTROL BARRIER	FT	\$8.000	1,815.000	1,815.000	3,630.000	\$29,040.00
824.20	FLASHING WARNING BEACON TYPE A	LS	\$50,000.000		1.000	1.000	\$50,000.00
850.41	ROADWAY FLAGGER	HR	\$65.000	150.000	150.000	300.000	\$19,500.00
851.1	TRAFFIC CONES FOR TRAFFIC MANAGEMENT	DAY	\$1.000	50.000	50.000	100.000	\$100.00
852.	SAFETY SIGNING FOR TRAFFIC MANAGEMENT	SF	\$8.000	220.000	220.000	440.000	\$3,520.00
861.04	4 INCH REFLECTORIZED YELLOW LINE (THERMOPLASTIC)	LF	\$1.000	1,350.000	1,350.000	2,700.000	\$2,700.00
864.	PAVEMENT ARROW REFLECTORIZED WHITE (PAINTED)	SF	\$16.000	50.000	50.000	100.000	\$1,600.00
866.04	4 INCH REFLECTORIZED WHITE LINE (THERMOPLASTIC)	LF	\$0.750	2,933.000	2,933.000	5,866.000	\$4,399.50
866.112	12 INCH REFLECTORIZED WHITE LINE (THERMOPLASTIC)	FT	\$2.500	550.000	550.000	1,100.000	\$2,750.00

874.1	STREET SIGN REMOVED AND RESET	EA	\$120.000	6.000	7.000	13.000	\$1,560.00
876.	ELECTRIC POLE REMOVED AND STACKED	EA	\$2,500.000	20.000	20.000	40.000	\$100,000.00
876.1	ELECTRIC POLE	EA	\$3,000.000	20.000	20.000	40.000	\$120,000.00
877.	SIGN POST REMOVED AND RESET	EA	\$70.000	6.000	7.000	13.000	\$910.00
983.2	RIPRAP	CY	\$100.000	295.000	295.000	590.000	\$59,000.00
984.61	STONE FOR EROSION CONTROL	SY	\$85.000	295.000	295.000	590.000	\$50,150.00

SUBTOTAL= \$3,651,975.33  
 25% CONTIGENCY= \$912,993.83  
 CONSTRUCTION TOTAL= \$4,564,969.16

# **APPENDIX I**

## **TRAFFIC AND SAFETY CHECKLIST**



**JC ENGINEERING, INC.**

**Civil & Environmental Engineering**

*2854 Cranberry Highway*

*East Wareham, Massachusetts 02538*

*Ph. 508-273-0377—Fax 508-273-0367*



PURPOSE

The 25% Traffic Engineering Review is intended to provide MassDOT the opportunity to evaluate the proposed design and Functional Design Report relative to current design standards, operation impacts, safety impacts and other potential community concerns associated with the proposed design.

GENERAL

This checklist represents the minimum amount of issues that should be considered when reviewing a 25% traffic submittal. The information below is not intended to address all aspects of report or plan preparation. To the extent practical, any comments relative to plan preparation made at the 25% stage will certainly improve the quality of the 75% submittal.

Any question listed below with a No or N/A answer requires a written comment.

I. Functional Design Report

- |                               | Yes   | No                                  | N/A                                 |   |
|-------------------------------|---|-------------------------------------|-------------------------------------|---|
| <b>A. Existing Conditions</b> |   |                                     |                                     |   |
| 1                             | <input checked="" type="checkbox"/>                                   | <input type="checkbox"/>            | <input type="checkbox"/>            | Is a description of the project study area included?  |
|                               | Comment: _____  |                                     |                                     |   |
| 2                             | <input checked="" type="checkbox"/>                                   | <input type="checkbox"/>            | <input type="checkbox"/>            | Is the project location (locus) map included?   |
|                               | Comment: _____  |                                     |                                     |   |
| 3                             | <input checked="" type="checkbox"/>                                   | <input type="checkbox"/>            | <input type="checkbox"/>            | Is a discussion of existing deficiencies and an evaluation of the existing signs, signals and markings  |
|                               | Comment: _____  |                                     |                                     |   |
| <b>B. Traffic Volumes</b>     |   |                                     |                                     |   |
| 4                             | <input type="checkbox"/>  | <input checked="" type="checkbox"/> | <input type="checkbox"/>            | Is the traffic count data less than 2 years old from the date of FDR submission?  |
|                               | Comment: _____  |                                     |                                     |   |
| 5                             | <input type="checkbox"/>  | <input type="checkbox"/>            | <input checked="" type="checkbox"/> | Are the Automatic Traffic Recorder (ATR) Counts included for the minor street approach for signalized intersections?                          |
|                               | Comment: _____  |                                     |                                     |   |
| 6                             | <input type="checkbox"/>  | <input checked="" type="checkbox"/> | <input type="checkbox"/>            | Are Manual Turn Movement Counts (TMC): Peak hour data for all study intersections included?   |
|                               | Comment: <i>Project is for a shared use path; Data not collected.</i> |                                     |                                     |   |
| 7                             | <input type="checkbox"/>  | <input checked="" type="checkbox"/> | <input type="checkbox"/>            | Are Peak Hour Factors (PHF) identified?   |
|                               | Comment: <i>Project is for a shared use path; Data not collected.</i> |                                     |                                     |   |
| 8                             | <input type="checkbox"/>  | <input checked="" type="checkbox"/> | <input type="checkbox"/>            | Are heavy vehicle, bicycle, and pedestrian count data included in the TMC?  |
|                               | Comment: _____  |                                     |                                     |   |
| 9                             | <input type="checkbox"/>  | <input checked="" type="checkbox"/> | <input type="checkbox"/>            | Do the base year volumes represent an average month during the year the FDR is submitted or no more than 2 years for MEPA permitted projects? |
|                               | Comment: _____  |                                     |                                     |   |
| 10                            | <input type="checkbox"/>  | <input type="checkbox"/>            | <input checked="" type="checkbox"/> | Have seasonal factors been reviewed and applied as necessary?   |
|                               | Comment: <i>Traffic counts conducted in August.</i>                   |                                     |                                     |   |
| 11                            | <input type="checkbox"/>  | <input type="checkbox"/>            | <input checked="" type="checkbox"/> | Do the future year volumes represent a minimum of 7 years from the base year?   |
|                               | Comment: <i>No associated traffic impacts expected.</i>               |                                     |                                     |   |
| 12                            | <input type="checkbox"/>  | <input type="checkbox"/>            | <input checked="" type="checkbox"/> | Do the future year volumes include background growth and site development as necessary?   |
|                               | Comment: <i>No associated traffic impacts expected.</i>               |                                     |                                     |   |
| 13                            | <input type="checkbox"/>  | <input type="checkbox"/>            | <input checked="" type="checkbox"/> | Are trip generation/distribution data for private development trips schematically displayed on the network?                                   |
|                               | Comment: _____  |                                     |                                     |   |
| 14                            | <input type="checkbox"/>  | <input type="checkbox"/>            | <input checked="" type="checkbox"/> | Are base year and future year traffic volume networks provided?   |
|                               | Comment: <i>Project is for a shared use path; Data not collected.</i> |                                     |                                     |   |

- C. Safety Analysis**
- 15  Yes  No  N/A Are three years of Crash Data analyzed for project locations? (5 years is preferred)  
 Comment: \_\_\_\_\_
- 16  Yes  No  N/A Are crash rate calculations included for all study area intersections and segments?  
 Comment: \_\_\_\_\_
- 17  Yes  No  N/A Are collision diagrams provided for all study area intersections with more than 3 crashes per year?  
 Comment: \_\_\_\_\_
- 18  Yes  No  N/A Is a collision map provided for all study area segments?  
 Comment: \_\_\_\_\_
- 19  Yes  No  N/A Was the Safety Review Prompt List utilized during a site visit?  
 Comment: \_\_\_\_\_
- 20  Yes  No  N/A Is discussion regarding the Safety Review Prompt List included?  
 Comment: \_\_\_\_\_

- D. MUTCD Signal Warrants**
- 21  Yes  No  N/A Is traffic count data provided for a minimum of the 8 highest hours for the major streets and minor street?  
 Comment: \_\_\_\_\_
- 22  Yes  No  N/A Was the minor street count data collected by a manual turning movement count method?  
 Comment: *Project is for a shared use path; Data not collected.*
- 23  Yes  No  N/A Does the signal warrant analysis follow procedures from MUTCD?  
 Comment: \_\_\_\_\_
- 24  Yes  No  N/A Do proposed signal installations meet an 8-hour volume warrant?  
 Comment: *No traffic signals are proposed.*

- E. Operational Analysis**
- 25  Yes  No  N/A Are the intersection approaches evaluated using observed/appropriate peak hour factors?  
 Comment: *Capacity analysis not performed.*
- 26  Yes  No  N/A Are heavy vehicle percentages used in the analyses?  
 Comment: *Capacity analysis not performed.*
- 27  Yes  No  N/A Are pedestrian volumes and phasing incorporated into the analyses?  
 Comment: *Capacity analysis not performed.*
- 28  Yes  No  N/A Are capacity analyses completed for all the required analysis scenarios?  
 Comment: *Capacity analysis not performed.*
- 29  Yes  No  N/A Do capacity analyses reflect the existing and proposed geometry conditions?  
 Comment: *Capacity analysis not performed.*
- 30  Yes  No  N/A Are coordinated signals/closely spaced intersections evaluated under a systems analysis?  
 Comment: *Capacity analysis not performed.*
- 31  Yes  No  N/A Are the 50th and 95th percentile vehicle queues documented?  
 Comment: *Capacity analysis not performed.*

- F. Proposed Design**
- 32  Yes  No  N/A Is a description of the proposed geometric changes and/or alternative designs included?  
 Comment: \_\_\_\_\_
- 33  Yes  No  N/A Is a narrative describing the pedestrian and bicycle accomodation improvments included?  
 Comment: \_\_\_\_\_
- 34  Yes  No  N/A Is discussion included of how the proposed design will alter the traffic control conditions?  
 Comment: \_\_\_\_\_
- 35  Yes  No  N/A Was a roundabout design an alternative considered?  
 Comment: \_\_\_\_\_
- 36  Yes  No  N/A Are the Section 61 Findings attached for the Private Development projects?  
 Comment: \_\_\_\_\_
- 37  Yes  No  N/A Do all traffic calming design treatments (where allowed) follow the Traffic Calming Guidelines?  
 Comment: \_\_\_\_\_
- 38  Yes  No  N/A Do all study area intersections include corrective design measures?  
 Comment: *Recommendations are made for path and roadway crossing.*

39    Has "work to be done by others" been factored into schedule/design?

Comment: *"Work done by others" not anticipated at this time.*

Yes No N/A G. Traffic Management

40    Is a Construction Management Outline included?

Comment:

41    Are the appropriate traffic counts and capacity analyses included?

Comment:

## II. 25% Design Plans

Yes No N/A A. Basic Design Plan Set

42    Does the plan set follow the preparation guidelines specified in the current Project Development and Design Guidebook?

Comment:

43    Do the plans provide linework and details of the existing conditions for use in reference to the proposed design?

Comment:

44    Do the proposed roadway cross-sections conform to current standards?

Comment:

45    Are provisions made for bicycle accommodation where applicable?

Comment:

46    Do pedestrian facilities meet the Massachusetts Architectural Access Board (MAAB) standards?

Comment:

Yes No N/A B. Traffic Signal Plans

47    Do the plans indicate the proper placement of the signal heads?

Comment: *Traffic signals not included in design.*

48    Are the signal head configurations in conformance with the MUTCD standards?

Comment: *Traffic signals not included in design.*

49    Do the signal layout plans show the proposed lane assignments and stop lines?

Comment:

50    Is the Sequence and Timing Chart provided on the plans?

Comment: *Traffic signals not included in design.*

51    Is the Preferential Phasing Diagram, including pedestrian phases, shown on the signal plan?

Comment: *Traffic signals not included in design.*

52    Is a Time-Space Diagram for the interconnected signals included?

Comment: *Traffic signals not included in design.*

53    Is signal detector type and location included on the signal plans?

Comment: *Traffic signals not included in design.*

Yes No N/A C. Traffic Management Plans (TMP)

54    Are preliminary Temporary Traffic Control Plans provided?

Comment:

55    Do the typical layouts follow MassDOT's Standard Details and Drawings for the Development of TMP's?

Comment:

56    If required, have the detour routes been clearly defined?

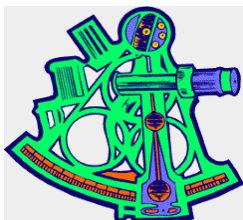
Comment: *Detours will not be required.*

57    Is pedestrian and bicycle accommodation maintained during construction?

Comment:

# **APPENDIX II**

## **HIGHWAY DESIGN CHECKLIST**



**JC ENGINEERING, INC.**

**Civil & Environmental Engineering**

*2854 Cranberry Highway*

*East Wareham, Massachusetts 02538*

*Ph. 508-273-0377—Fax 508-273-0367*

PURPOSE

The 25% highway design review is intended to provide MassDOT's Highway Division the opportunity to evaluate the proposed design relative to current design standards, right of way impacts, environmental impacts and other potential community concerns associated with the proposed design, and Incentives/Disincentives (I/Ds) Initialization (if applicable) to be defined by P.M. as a reminder.

GENERAL

This checklist represents the minimum amount of issues that should be considered when reviewing a 25% highway submittal. The information below is not intended to address all aspects of plan preparation. To the extent practical, any comments relative to plan preparation made at the 25% stage will certainly improve the quality of the 75% submittal.

Any question listed below with a No (N) or Not Applicable (NA) answer requires a written comment.

PLANS

- Y    N    NA    0.00 Drawing Files

0.01    For projects initiated after January 1, 2012, have the plans been prepared according to and in conformance with the MassDOT Highway Division CAD Standards?

Comment: \_\_\_\_\_
- Y    N    NA    1.00 Title Sheet

1.01    For projects initiated prior to January 1, 2012, is the Title Sheet prepared consistent with Exhibit 18-14?

Comment: Project initiated after Jan 1, 2012
- 1.02    Is the DESIGN DESIGNATION table completed?

Comment: \_\_\_\_\_
- 1.03    Does the Design Speed correlate with Exhibit 3-7, or the design speed identified in the Design Exception Report, if applicable?

Comment: \_\_\_\_\_
- 1.04    Are the stations and coordinates for the beginning and end of project shown on the locus map?

Comment: \_\_\_\_\_
- 1.05    Are bridge numbers shown on the locus map?

Comment: \_\_\_\_\_

Y N NA 2.00 Typical Sections

2.01    Do the proposed lane and shoulder widths shown on the typical sections properly account for the offset dimension?

Comment: \_\_\_\_\_

2.02    Are the proposed lane and shoulder widths consistent with Section 5.3.3, or the Design Exception Report, if applicable?

Comment: \_\_\_\_\_

2.03    Is the method of banking adequately represented on the Typical Sections in manner consistent with Section 4.2.5?

Comment: *Superelevation not included in design.*

2.04    Is the location of the PGL the most appropriate location for the proposed project?

Comment: \_\_\_\_\_

2.05    Does the shoulder break away from travel lanes when the width is greater than 4 feet?

Comment: \_\_\_\_\_

2.06    Is the proposed pavement structure appropriate (full depth, reclamation, overlay)?

Comment: \_\_\_\_\_

2.07    Are the pavement structure materials labeled consistent with the latest STANDARD NOMENCLATURE AND LIST OF STANDARD ITEMS?

Comment: \_\_\_\_\_

2.08    Is the proposed wearing surface compatible with the function of the proposed roadway?

Comment: *Project is a shared-use path.*

2.09    If a narrow (less than 4 feet) box widening is proposed, was Cement Concrete Base Course considered in lieu of full depth pavement?

Comment: \_\_\_\_\_

2.10    Are the guardrail details consistent with the CONSTRUCTION AND TRAFFIC STANDARD DETAILS?

Comment: \_\_\_\_\_

2.11    Section 5.3 provided general guidance on a variety of cross section elements for each area type. Are the proposed Typical Sections consistent with these figures relative to dimensions, slopes and materials?

Comment: \_\_\_\_\_

2.12    If retaining walls are proposed, does the design allow for guardrail to be adequately installed? Guardrail located on top of an existing or proposed stone masonry wall generally requires a moment slab.

Comment: \_\_\_\_\_

Y N NA 3.00 Construction Drawings

3.01    Is the existing Base Plan information plotted consistent with Section 18.2.1.2?

Comment: \_\_\_\_\_

3.02    Is the proposed horizontal geometry adequately described? (PC, PT, R, T, DELTA, L)?

Comment: \_\_\_\_\_

3.03    Is the minimum radius consistent with Exhibits 4-8 & 4-9 based on the Design Speed noted on the Title Sheet?

Comment: \_\_\_\_\_

3.04    If compound curves are employed, are they designed in accordance with Section 4.2.1.3?

Comment: *Project is a shared-use path.*

- Y N NA 3.00 Construction Drawings (Cont.)
- 3.05    Are there any features which negatively impact horizontal sight distance as described in Section 4.2.2?  
 Comment: \_\_\_\_\_
- 3.06    Are cross culverts and drainage outlet locations shown on the plans?  
 Comment: \_\_\_\_\_
- 3.07    Are approximate slope limits shown?  
 Comment: \_\_\_\_\_
- 3.08    Based on the cross-sections provided and other available information are the proposed guardrail locations appropriate?  
 Comment: \_\_\_\_\_
- 3.09    Have the impacts to existing wetlands and other resource areas been minimized?  
 Comment: \_\_\_\_\_
- 3.10    Does the proposed design reasonably accommodate vehicle turning movements based on the turning paths transparencies included in Chapter 6?  
 Comment: *Project is a shared-use path.*
- 3.11    If applicable, are storage and deceleration lengths consistent with Section 6.7.3?  
 Comment: *Roadwork does not impact auxiliary lanes.*
- 3.12    Is the proposed design consistent with ADA and AAB requirements?  
 Comment: \_\_\_\_\_
- 3.13    Are stations at the beginning and end of project noted?  
 Comment: \_\_\_\_\_
- 3.14    Is the existing layout information accurately depicted?  
 Comment: \_\_\_\_\_
- 3.15    Are the approximate limits of proposed takings and easements shown?  
 Comment: \_\_\_\_\_
- 3.16    Is sufficient right of way available to perform the work?  
 Comment: *Temporary and Permanent easements are anticipated outside of ROW limits.*
- 3.17    Are all the walks, sidewalks, crosswalks, and curbcut wheelchair ramps meet the requirements listed in Americans with Disabilities Act Accessibility Guidelines (ADAAG) and Public Rights of Way Accessibility Guidelines (PROWAG), which are discussed in the Engineering Directive E12-005)?  
 Comment: \_\_\_\_\_
- If not, have all violations been identified and clearly discussed for MassDOT's review?  
 Comment: \_\_\_\_\_

- Y N NA 4.00 Profiles
- 4.01    Is the existing base profile information plotted consistent with Section 18.2.1.3? (station equations, cross culverts, bridge structures, sills of structures, high tension lines, bench marks, etc.)  
 Comment: \_\_\_\_\_
- 4.02    Are the proposed profiles prepared consistent with Exhibit 18-11?  
 Comment: \_\_\_\_\_
- 4.03    Are all aspects of the vertical geometry noted (Stopping Sight Distance, Passing Sight Distance (if applicable), G1, G2, L, K, station and elevation of the PVC, PVT and PVI)?  
 Comment: \_\_\_\_\_

Y N NA 4.00 Profiles (Cont.)  
 4.04    Is the stopping sight distance consistent with the Design Speed noted on the Title Sheet and Exhibit 3-8?

Comment: \_\_\_\_\_

4.05    Is the K value consistent with the Design Speed noted on the Title Sheet and Exhibit 4-26 or 4-27?

Comment: \_\_\_\_\_

Y N NA 4.00 Profiles (Cont.)  
 4.06    Is the maximum grade consistent with the Design Speed noted on the Title Sheet and Exhibit 4-21?

Comment: \_\_\_\_\_

4.07    Is the minimum grade consistent with Section 4.3.1? If a closed drainage system is proposed it is recommended that a minimum grade of 0.6% be used.

Comment: \_\_\_\_\_

Y N NA 5.00 Traffic Signal Plans  
 5.01    Are signal heads located in the vision cone specified by the MUTCD?

Comment: No traffic signals are proposed.

5.02    Are pavement markings clearly displayed and labeled?

Comment: \_\_\_\_\_

5.03    Does the Phasing Diagram adequately address pedestrian volumes? (pedestrian phases concurrent or actuated)

Comment: No traffic signals are proposed.

5.04    If appropriate does the Phasing Diagram address emergency preemption?

Comment: No traffic signals are proposed.

Y N NA 6.00 Traffic Management Plans (may be 8-1/2 x 11 for simple projects)  
 6.01    Does the TMP provide sufficient information to determine that the proposed project can be constructed without undue inconvenience to the public?

Comment: \_\_\_\_\_

6.02    For projects with a detour, is the proposed detour reasonable considering available traffic data?

Comment: Detour will not be required.

6.03    Does the proposed TMP adequately address bicycle and pedestrian accommodation?

Comment: \_\_\_\_\_

7.00 Cross Sections (Although only top line sections in critical areas are required according to the PDDG, the latest engineering software makes providing all cross sections a simple matter. The top line information is intended to depict the relationship between the proposed roadway and the existing features only. However to the extent that additional information is provided, it is worthwhile to comment relative to consistency with Section 18.2.2.5.)

Y N NA  
 7.01    Is the existing cross-section information plotted consistent with Section 18.2.1.4 and Exhibit 18-5? Are walls, hydrants, poles, trees over 8 inches, sills, wells, septic systems, cross culverts, ledge, layout lines, etc. plotted on the cross-sections?

Comment: \_\_\_\_\_



Y N NA 7.00 Cross Sections (Cont.)

7.02    Does the proposed cross-section provide sufficient area to install guardrail where necessary?

Comment: \_\_\_\_\_

7.03    Have the proposed side and back slopes been appropriately chosen to balance impacts with safety and slope stability?

Comment: \_\_\_\_\_

SPECIAL CONSIDERATIONS

Y N NA 8.00 Projects that include bridge(s)

8.01    Is the project subject to the Highway Division's Non-NHS Bridge R&R Policy? (According to Engineering Directive P-92-010 in order for these guidelines to apply the roadway must be classified as either a Minor Arterial, Urban Extension of a Minor Arterial, Collector or Local roadway)

Comment: \_\_\_\_\_

8.02    If the project is subject to P-92-010 is the proposed bridge width and approach geometry consistent with the Engineering Directive?

Comment: \_\_\_\_\_

8.03    For bridge projects that are not subject to P-92-010 are the proposed bridge dimensions and vertical clearance consistent with Section 4.3.4 and Exhibit 4-28?

Comment: \_\_\_\_\_

8.04    Do the construction drawings adequately depict the existing bridge structure including subsurface features?

Comment: \_\_\_\_\_

8.05    Do the construction drawings adequately depict the relationship between the existing and the proposed bridge structure?

Comment: \_\_\_\_\_

8.06    Does the TMP provide adequate dimensions such that the relationship between the lane configurations and the beam spacing of both the existing and the proposed structure can be evaluated?

Comment: \_\_\_\_\_

8.07    Do the plans and cross-sections indicate that sufficient space is available to install approach guardrail?

Comment: \_\_\_\_\_

9.00 Freeways

The review of Freeway designs, particularly those involving grade separated interchanges does not lend itself well to a checklist type review. The design of a grade separated interchange must be evaluated based on the entire contents of Chapter 6. Listed below are some of the key items that should be reviewed.

Y N NA

9.01    Is the proposed cross-section consistent with Section 5.3.4.1?

Comment: \_\_\_\_\_

9.02    Is the median barrier provided consistent Exhibit 5-33?

Comment: \_\_\_\_\_

Y N NA 9.00 Freeways (Cont.)

9.03    Is the ramp spacing consistent with Exhibit 7-12?

Comment: \_\_\_\_\_

9.04    Are the deceleration and acceleration lengths consistent with Exhibits 7-13 & 7-14?

Comment: \_\_\_\_\_

9.05    Are the selected ramp design speeds consistent with Exhibit 7-15?

Comment: \_\_\_\_\_

9.06    Does the minimum radius meet the criteria in Exhibit 7-24?

Comment: \_\_\_\_\_

9.07    Are the ramp cross sections consistent with Section 7.7.1.2 and Exhibits 7-22 & 7-23?

Comment: \_\_\_\_\_

9.08    Is the ramp geometry consistent with the guidelines provided in Exhibit 7-30 (a-k)?

Comment: \_\_\_\_\_

Y N NA 10.00 ESTIMATE

10.01    Is sufficient back up information provided to determine if the preliminary estimate is reasonable?

Comment: \_\_\_\_\_

10.02    Does the estimate total qualify for the need to request a 'bottoms-up' estimate at the 75% submission as referenced in Attachment J, Article IV, Section C, Paragraph 1b?

Comment: \_\_\_\_\_

11.00 INCENTIVE/DISINCENTIVE (I/D)

Refer to Incentive/Disincentive Daily Rate Work Sheet.

11.01    Has the Incentive/Disincentive (I/D) Work Sheet been completed? If I/Ds are required has the amount (3-5% budget) been entered into CAPE as initial budget?

Comment: \_\_\_\_\_

12.00 FUNCTIONAL DESIGN REPORT

Refer to the Traffic & Safety Engineering Checklist.

13.00 DESIGN EXCEPTION REPORT

Refer to Chapter 2 of the Project Development and Design Guide and the Design Exception Report Checklist.

Y N NA 13.00 CONCLUSIONS

13.01    Is the scope of work consistent with the scope approved by PRC?

Comment: \_\_\_\_\_

13.02    Is the estimated total construction cost consistent with the STIP?

Comment: \_\_\_\_\_

13.03    Does the project address known geometric and safety concerns?

Comment: *Project is a shared-use path.*

13.04    Do the plans represent a project that is reasonable from a constructability standpoint with respect to construction techniques and available right of way?

Comment: \_\_\_\_\_

Y N NA

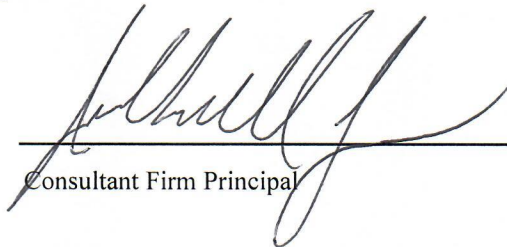
13.05    Is a letter of support and all correspondence with local historic commissions included?

Comment: *Letter will be sent with 25% submittal.*

13.06    Are the plans suitable for conducting a Design Public Hearing?

Comment: \_\_\_\_\_

Designer Certification

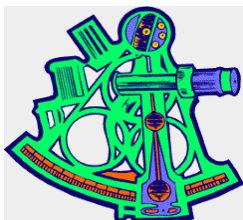
  
\_\_\_\_\_  
Consultant Firm Principal

*2/14/20*

\_\_\_\_\_  
Date

# **APPENDIX III**

## **TRAFFIC DATA**



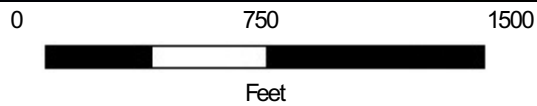
**JC ENGINEERING, INC.**

**Civil & Environmental Engineering**

*2854 Cranberry Highway*

*East Wareham, Massachusetts 02538*

*Ph. 508-273-0377—Fax 508-273-0367*



**TCDS Locations**

- Short
- Continuous
- WIM
- Located Short
- Located Continuous
- Located WIM
- Inactive Location

**TMC Intersections**

- Traffic Signal
- Non-signalized/Other
- CCTV
- CMS
- Curve Sign Flasher
- Fire Sign Flasher
- Flasher
- Keep Right
- Overhead Sign/Case
- Prepare to Stop w/ Flasher
- Railroad Sign Flasher
- Removed
- Reversible Sign Lane
- RWS
- School-Fiber w/ Flasher



2/5/2020

## Massachusetts Highway Department

### 3372474 Weekly Volume Report - Mon 08/01/2016 - Sun 08/07/2016

<b>Location ID:</b>	3372474
<b>Located On:</b>	NARROWS ROAD
<b>Direction</b>	2-WAY
<b>Community:</b>	Wareham
<b>AADT:</b>	8408

<b>Type:</b>	SPOT
<b>EAST OF:</b>	SANDWICH ROAD
<b>Period:</b>	Mon 08/01/2016 - Sun 08/07/2016

Start Time	Mon	Tue	Wed	Thu	Fri	Sat	Sun	Avg
12:00 AM		35	23	54				37
1:00 AM		21	20	22				21
2:00 AM		15	15	19				16
3:00 AM		13	21	20				18
4:00 AM		18	27	35				27
5:00 AM		118	129	118				122
6:00 AM		268	269	249				262
7:00 AM		474	479	435				463
8:00 AM		576	541	554				557
9:00 AM		504	572	326				467
10:00 AM		561	606	0				389
11:00 AM	651	578	654					628
12:00 PM	724	640	700					688
1:00 PM	629	597	701					642
2:00 PM	637	657	678					657
3:00 PM	724	686	742					717
4:00 PM	728	740	771					746
5:00 PM	729	696	816					747
6:00 PM	591	568	596					585
7:00 PM	454	423	502					460
8:00 PM	344	338	414					365
9:00 PM	226	273	326					275
10:00 PM	154	155	151					153
11:00 PM	78	86	91					85
<b>Total</b>	<b>6669</b>	<b>9040</b>	<b>9844</b>	<b>1832</b>	<b>0</b>	<b>0</b>	<b>0</b>	
<b>24HrTotal</b>		9272	9139	8974				9128
<b>AM Pk Hr</b>		11:00	11:00					
<b>AM Peak</b>		578	654					616
<b>PM Pk Hr</b>		4:00	5:00					
<b>PM Peak</b>		740	816					778
<b>% Peak Hr</b>		8.19%	8.29%					8.00%
<b>% Peak Hr</b>		7.86%	8.10%	9.09%				8.35%

## Massachusetts Highway Department

### 3372474\_EB Weekly Volume Report - Mon 08/01/2016 - Sun 08/07/2016

<b>Location ID:</b>	3372474_EB
<b>Located On:</b>	NARROWS ROAD
<b>Direction:</b>	EB
<b>Community:</b>	Wareham
<b>AADT:</b>	4592

<b>Type:</b>	SPOT
<b>EAST OF:</b>	SANDWICH ROAD
<b>Period:</b>	Mon 08/01/2016 - Sun 08/07/2016

Start Time	Mon	Tue	Wed	Thu	Fri	Sat	Sun	Avg
12:00 AM		25	12	24				20
1:00 AM		15	13	14				14
2:00 AM		6	7	11				8
3:00 AM		5	13	9				9
4:00 AM		5	7	14				9
5:00 AM		42	54	37				44
6:00 AM		113	106	98				106
7:00 AM		187	192	183				187
8:00 AM		276	269	262				269
9:00 AM		248	287	161				232
10:00 AM		299	348	0				216
11:00 AM	363	293	388					348
12:00 PM	397	348	392					379
1:00 PM	344	313	383					347
2:00 PM	353	378	360					364
3:00 PM	401	392	430					408
4:00 PM	434	430	467					444
5:00 PM	403	401	511					438
6:00 PM	337	339	354					343
7:00 PM	282	248	289					273
8:00 PM	217	213	249					226
9:00 PM	142	188	161					164
10:00 PM	90	99	85					91
11:00 PM	45	43	44					44
<b>Total</b>	<b>3808</b>	<b>4906</b>	<b>5421</b>	<b>813</b>	<b>0</b>	<b>0</b>	<b>0</b>	
<b>24HrTotal</b>	5029	4993	4926					4983
<b>AM Pk Hr</b>		10:00	11:00					
<b>AM Peak</b>		299	388					344
<b>PM Pk Hr</b>		4:00	5:00					
<b>PM Peak</b>		430	511					471
<b>% Peak Hr</b>		8.76%	9.43%					9.00%
<b>% Peak Hr</b>	8.63%	8.61%	10.37%					9.21%



## Massachusetts Highway Department

### 3372474\_WB Weekly Volume Report - Mon 08/01/2016 - Sun 08/07/2016

<b>Location ID:</b>	3372474_WB
<b>Located On:</b>	NARROWS ROAD
<b>Direction:</b>	WB
<b>Community:</b>	Wareham
<b>AADT:</b>	3815

<b>Type:</b>	SPOT
<b>EAST OF:</b>	SANDWICH ROAD
<b>Period:</b>	Mon 08/01/2016 - Sun 08/07/2016

Start Time	Mon	Tue	Wed	Thu	Fri	Sat	Sun	Avg
12:00 AM		10	11	30				17
1:00 AM		6	7	8				7
2:00 AM		9	8	8				8
3:00 AM		8	8	11				9
4:00 AM		13	20	21				18
5:00 AM		76	75	81				77
6:00 AM		155	163	151				156
7:00 AM		287	287	252				275
8:00 AM		300	272	292				288
9:00 AM		256	285	165				235
10:00 AM		262	258	0				173
11:00 AM	288	285	266					280
12:00 PM	327	292	308					309
1:00 PM	285	284	318					296
2:00 PM	284	279	318					294
3:00 PM	323	294	312					310
4:00 PM	294	310	304					303
5:00 PM	326	295	305					309
6:00 PM	254	229	242					242
7:00 PM	172	175	213					187
8:00 PM	127	125	165					139
9:00 PM	84	85	165					111
10:00 PM	64	56	66					62
11:00 PM	33	43	47					41
<b>Total</b>	<b>2861</b>	<b>4134</b>	<b>4423</b>	<b>1019</b>	<b>0</b>	<b>0</b>	<b>0</b>	
<b>24HrTotal</b>	4243		4146		4048			4146
<b>AM Pk Hr</b>		8:00	7:00					
<b>AM Peak</b>		300	287					294
<b>PM Pk Hr</b>		4:00	1:00					
<b>PM Peak</b>		310	318					314
<b>% Peak Hr</b>		7.50%	7.19%					7.00%
<b>% Peak Hr</b>		7.71%	7.48%	7.86%				7.68%

Location ID	3372474	Located On	NARROWS ROAD	Community	Wareham
Counted By	TCDS_Combined	Between		County	Plymouth
Start Date	8/2/2016	And		Module	
Start Time	11:00:00 AM	Direction	2-WAY	Agency	MHD
		Source	Syst_Combine	Owner ID	rpa10

### Speed Range (mph)

Start Time	0-15	15-20	20-25	25-30	30-35	35-40	40-45	45-50	50-55	55-60	60-65	65-70	70+	9999+	Total
12:00 AM	0	0	1	0	5	9	5	2	0	0	1	0	0	0	23
1:00 AM	0	0	0	2	2	10	4	2	0	0	0	0	0	0	20
2:00 AM	0	0	0	0	2	6	4	3	0	0	0	0	0	0	15
3:00 AM	0	0	0	0	3	6	6	6	0	0	0	0	0	0	21
4:00 AM	0	2	0	0	2	12	7	3	1	0	0	0	0	0	27
5:00 AM	0	0	0	0	15	44	44	22	3	1	0	0	0	0	129
6:00 AM	5	1	0	2	20	75	113	48	4	1	0	0	0	0	269
7:00 AM	19	0	0	1	30	142	198	79	7	3	0	0	0	0	479
8:00 AM	11	2	2	6	52	168	198	82	19	1	0	0	0	0	541
9:00 AM	21	1	4	3	64	203	198	65	13	0	0	0	0	0	572
10:00 AM	26	2	6	3	64	216	225	56	7	1	0	0	0	0	606
11:00 AM	16	2	2	7	102	251	149	45	4	0	0	0	0	0	578
12:00 PM	17	1	2	6	75	261	229	42	7	0	0	0	0	0	640
1:00 PM	25	1	2	4	73	265	179	46	1	1	0	0	0	0	597
2:00 PM	35	1	5	18	100	254	195	38	11	0	0	0	0	0	657
3:00 PM	17	0	2	4	84	280	211	73	13	0	0	2	0	0	686
4:00 PM	25	3	0	1	53	299	270	78	9	2	0	0	0	0	740
5:00 PM	16	3	0	3	48	248	283	82	9	1	1	1	1	0	696
6:00 PM	10	1	1	3	44	209	233	54	9	4	0	0	0	0	568
7:00 PM	12	1	1	3	26	159	169	42	9	1	0	0	0	0	423
8:00 PM	5	1	0	1	66	154	83	25	3	0	0	0	0	0	338
9:00 PM	6	1	1	4	49	120	66	19	6	1	0	0	0	0	273
10:00 PM	2	0	0	1	21	68	54	6	2	1	0	0	0	0	155
11:00 PM	2	0	0	1	13	27	29	9	4	1	0	0	0	0	86
<b>TOTAL</b>	<b>270</b>	<b>23</b>	<b>29</b>	<b>73</b>	<b>1013</b>	<b>3486</b>	<b>3152</b>	<b>927</b>	<b>141</b>	<b>19</b>	<b>2</b>	<b>3</b>	<b>1</b>	<b>0</b>	<b>9139</b>

Location ID	3372474_EB	Located On	NARROWS ROAD	Community	Wareham
Counted By		Between		County	Plymouth
Start Date	8/2/2016	And		Module	
Start Time	11:00:00 AM	Direction	EB	Agency	MHD
		Source		Owner ID	rpa10

### Speed Range (mph)

Start Time	0-15	15-20	20-25	25-30	30-35	35-40	40-45	45-50	50-55	55-60	60-65	65-70	70+	9999+	Total
12:00 AM	0	0	1	0	4	1	5	1	0	0	0	0	0	0	12
1:00 AM	0	0	0	2	2	6	2	1	0	0	0	0	0	0	13
2:00 AM	0	0	0	0	2	3	1	1	0	0	0	0	0	0	7
3:00 AM	0	0	0	0	2	3	4	4	0	0	0	0	0	0	13
4:00 AM	0	1	0	0	0	3	2	0	1	0	0	0	0	0	7
5:00 AM	0	0	0	0	11	24	12	5	2	0	0	0	0	0	54
6:00 AM	2	0	0	2	11	30	44	16	1	0	0	0	0	0	106
7:00 AM	6	0	0	0	13	70	69	28	4	2	0	0	0	0	192
8:00 AM	6	1	2	6	33	79	100	36	6	0	0	0	0	0	269
9:00 AM	11	1	4	2	22	105	108	29	5	0	0	0	0	0	287
10:00 AM	9	1	5	0	31	126	141	30	4	1	0	0	0	0	348
11:00 AM	7	1	1	5	49	122	85	22	1	0	0	0	0	0	293
12:00 PM	8	0	1	5	33	130	149	19	3	0	0	0	0	0	348
1:00 PM	10	1	1	2	33	145	94	25	1	1	0	0	0	0	313
2:00 PM	15	0	5	7	56	153	118	16	8	0	0	0	0	0	378
3:00 PM	6	0	0	1	54	170	120	33	6	0	0	2	0	0	392
4:00 PM	11	0	0	1	28	174	156	51	7	2	0	0	0	0	430
5:00 PM	4	1	0	2	35	154	161	39	3	0	1	0	1	0	401
6:00 PM	3	1	1	0	24	127	143	32	8	0	0	0	0	0	339
7:00 PM	4	1	1	2	16	102	99	20	2	1	0	0	0	0	248
8:00 PM	2	1	0	0	37	102	57	13	1	0	0	0	0	0	213
9:00 PM	2	0	1	2	36	95	38	11	2	1	0	0	0	0	188
10:00 PM	2	0	0	1	15	47	32	2	0	0	0	0	0	0	99
11:00 PM	1	0	0	0	5	14	17	3	3	0	0	0	0	0	43
<b>TOTAL</b>	<b>109</b>	<b>10</b>	<b>23</b>	<b>40</b>	<b>552</b>	<b>1985</b>	<b>1757</b>	<b>437</b>	<b>68</b>	<b>8</b>	<b>1</b>	<b>2</b>	<b>1</b>	<b>0</b>	<b>4993</b>

Location ID	3372474_WB		Located On		NARROWS ROAD				Community	Wareham					
Counted By			Between						County	Plymouth					
Start Date	8/2/2016		And						Module						
Start Time	11:00:00 AM		Direction		WB				Agency	MHD					
			Source						Owner ID	rpa10					
<b>Speed Range (mph)</b>															
Start Time	0-15	15-20	20-25	25-30	30-35	35-40	40-45	45-50	50-55	55-60	60-65	65-70	70+	9999+	Total
12:00 AM	0	0	0	0	1	8	0	1	0	0	1	0	0	0	11
1:00 AM	0	0	0	0	0	4	2	1	0	0	0	0	0	0	7
2:00 AM	0	0	0	0	0	3	3	2	0	0	0	0	0	0	8
3:00 AM	0	0	0	0	1	3	2	2	0	0	0	0	0	0	8
4:00 AM	0	1	0	0	2	9	5	3	0	0	0	0	0	0	20
5:00 AM	0	0	0	0	4	20	32	17	1	1	0	0	0	0	75
6:00 AM	3	1	0	0	9	45	69	32	3	1	0	0	0	0	163
7:00 AM	13	0	0	1	17	72	129	51	3	1	0	0	0	0	287
8:00 AM	5	1	0	0	19	89	98	46	13	1	0	0	0	0	272
9:00 AM	10	0	0	1	42	98	90	36	8	0	0	0	0	0	285
10:00 AM	17	1	1	3	33	90	84	26	3	0	0	0	0	0	258
11:00 AM	9	1	1	2	53	129	64	23	3	0	0	0	0	0	285
12:00 PM	9	1	1	1	42	131	80	23	4	0	0	0	0	0	292
1:00 PM	15	0	1	2	40	120	85	21	0	0	0	0	0	0	284
2:00 PM	20	1	0	11	44	101	77	22	3	0	0	0	0	0	279
3:00 PM	11	0	2	3	30	110	91	40	7	0	0	0	0	0	294
4:00 PM	14	3	0	0	25	125	114	27	2	0	0	0	0	0	310
5:00 PM	12	2	0	1	13	94	122	43	6	1	0	1	0	0	295
6:00 PM	7	0	0	3	20	82	90	22	1	4	0	0	0	0	229
7:00 PM	8	0	0	1	10	57	70	22	7	0	0	0	0	0	175
8:00 PM	3	0	0	1	29	52	26	12	2	0	0	0	0	0	125
9:00 PM	4	1	0	2	13	25	28	8	4	0	0	0	0	0	85
10:00 PM	0	0	0	0	6	21	22	4	2	1	0	0	0	0	56
11:00 PM	1	0	0	1	8	13	12	6	1	1	0	0	0	0	43
<b>TOTAL</b>	<b>161</b>	<b>13</b>	<b>6</b>	<b>33</b>	<b>461</b>	<b>1501</b>	<b>1395</b>	<b>490</b>	<b>73</b>	<b>11</b>	<b>1</b>	<b>1</b>	<b>0</b>	<b>0</b>	<b>4146</b>

Location ID	3372474	Located On	NARROWS ROAD	Community	Wareham
Counted By	TCDS_Combined	Between		County	Plymouth
Start Date	8/2/2016	And		Module	
Start Time	11:00:00 AM	Direction	2-WAY	Agency	MHD
		Source	Syst_Combine	Owner ID	rpa10

### FHWA-Scheme F Classification

Start Time	Motor cycle	Car	Light Truck	Bus	2A SU	3A SU	>3A SU	<5A 2U	5A 2U	>5A 2U	<6A >2U	6A >2U	>6A >2U	14	15	Total
12:00 AM	0	22	1	0	0	0	0	0	0	0	0	0	0	0	0	23
1:00 AM	0	17	3	0	0	0	0	0	0	0	0	0	0	0	0	20
2:00 AM	0	13	2	0	0	0	0	0	0	0	0	0	0	0	0	15
3:00 AM	0	19	2	0	0	0	0	0	0	0	0	0	0	0	0	21
4:00 AM	0	14	12	0	0	1	0	0	0	0	0	0	0	0	0	27
5:00 AM	2	89	35	0	2	0	0	1	0	0	0	0	0	0	0	129
6:00 AM	2	185	67	2	6	2	0	0	0	0	0	0	0	5	0	269
7:00 AM	4	342	98	0	15	0	0	1	0	0	0	0	0	19	0	479
8:00 AM	5	395	101	2	21	2	0	2	2	0	0	0	0	11	0	541
9:00 AM	1	426	92	1	25	2	0	3	1	0	0	0	0	21	0	572
10:00 AM	6	439	108	2	21	1	0	3	0	0	0	0	0	26	0	606
11:00 AM	0	443	106	1	11	0	0	0	1	0	0	0	0	16	0	578
12:00 PM	2	460	139	2	18	2	1	0	0	0	0	0	0	16	0	640
1:00 PM	1	442	108	0	16	4	0	1	0	0	0	0	0	25	0	597
2:00 PM	2	497	101	0	21	1	0	0	0	0	0	0	0	35	0	657
3:00 PM	4	510	135	1	14	4	0	1	0	0	0	0	0	17	0	686
4:00 PM	2	551	142	0	19	0	0	1	0	0	0	0	0	25	0	740
5:00 PM	6	542	109	0	20	0	0	2	1	0	0	0	0	16	0	696
6:00 PM	1	459	82	0	16	0	0	0	0	0	0	0	0	10	0	568
7:00 PM	3	329	67	0	11	0	0	1	0	0	0	0	0	12	0	423
8:00 PM	1	274	54	0	4	0	0	0	0	0	0	0	0	5	0	338
9:00 PM	1	233	28	0	5	0	0	0	0	0	0	0	0	6	0	273
10:00 PM	0	123	26	0	4	0	0	0	0	0	0	0	0	2	0	155
11:00 PM	0	71	12	0	1	0	0	0	0	0	0	0	0	2	0	86
<b>TOTAL</b>	<b>43</b>	<b>6895</b>	<b>1630</b>	<b>11</b>	<b>250</b>	<b>19</b>	<b>1</b>	<b>16</b>	<b>5</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>269</b>	<b>0</b>	<b>9139</b>

Location ID	3372474_EB	Located On	NARROWS ROAD	Community	Wareham
Counted By		Between		County	Plymouth
Start Date	8/2/2016	And		Module	
Start Time	11:00:00 AM	Direction	EB	Agency	MHD
		Source		Owner ID	rpa10

### FHWA-Scheme F Classification

Start Time	Motor cycle	Car	Light Truck	Bus	2A SU	3A SU	>3A SU	<5A 2U	5A 2U	>5A 2U	<6A >2U	6A >2U	>6A >2U	14	15	Total
12:00 AM	0	12	0	0	0	0	0	0	0	0	0	0	0	0	0	12
1:00 AM	0	11	2	0	0	0	0	0	0	0	0	0	0	0	0	13
2:00 AM	0	6	1	0	0	0	0	0	0	0	0	0	0	0	0	7
3:00 AM	0	12	1	0	0	0	0	0	0	0	0	0	0	0	0	13
4:00 AM	0	5	2	0	0	0	0	0	0	0	0	0	0	0	0	7
5:00 AM	1	41	10	0	1	0	0	1	0	0	0	0	0	0	0	54
6:00 AM	0	71	29	0	2	2	0	0	0	0	0	0	0	2	0	106
7:00 AM	2	138	36	0	9	0	0	1	0	0	0	0	0	6	0	192
8:00 AM	4	187	54	2	11	2	0	2	1	0	0	0	0	6	0	269
9:00 AM	1	203	53	0	16	1	0	2	0	0	0	0	0	11	0	287
10:00 AM	4	248	68	1	16	1	0	1	0	0	0	0	0	9	0	348
11:00 AM	0	232	48	0	5	0	0	0	1	0	0	0	0	7	0	293
12:00 PM	1	256	69	0	12	1	1	0	0	0	0	0	0	8	0	348
1:00 PM	1	231	58	0	10	2	0	1	0	0	0	0	0	10	0	313
2:00 PM	1	294	56	0	11	1	0	0	0	0	0	0	0	15	0	378
3:00 PM	4	299	72	1	8	1	0	1	0	0	0	0	0	6	0	392
4:00 PM	2	333	74	0	10	0	0	0	0	0	0	0	0	11	0	430
5:00 PM	2	326	55	0	12	0	0	2	0	0	0	0	0	4	0	401
6:00 PM	0	280	44	0	12	0	0	0	0	0	0	0	0	3	0	339
7:00 PM	2	197	40	0	5	0	0	0	0	0	0	0	0	4	0	248
8:00 PM	1	177	32	0	1	0	0	0	0	0	0	0	0	2	0	213
9:00 PM	1	163	18	0	4	0	0	0	0	0	0	0	0	2	0	188
10:00 PM	0	82	13	0	2	0	0	0	0	0	0	0	0	2	0	99
11:00 PM	0	37	5	0	0	0	0	0	0	0	0	0	0	1	0	43
<b>TOTAL</b>	<b>27</b>	<b>3841</b>	<b>840</b>	<b>4</b>	<b>147</b>	<b>11</b>	<b>1</b>	<b>11</b>	<b>2</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>109</b>	<b>0</b>	<b>4993</b>

Location ID	3372474_WB	Located On	NARROWS ROAD	Community	Wareham
Counted By		Between		County	Plymouth
Start Date	8/2/2016	And		Module	
Start Time	11:00:00 AM	Direction	WB	Agency	MHD
		Source		Owner ID	rpa10

### FHWA-Scheme F Classification

Start Time	Motor cycle	Car	Light Truck	Bus	2A SU	3A SU	>3A SU	<5A 2U	5A 2U	>5A 2U	<6A >2U	6A >2U	>6A >2U	14	15	Total
12:00 AM	0	10	1	0	0	0	0	0	0	0	0	0	0	0	0	11
1:00 AM	0	6	1	0	0	0	0	0	0	0	0	0	0	0	0	7
2:00 AM	0	7	1	0	0	0	0	0	0	0	0	0	0	0	0	8
3:00 AM	0	7	1	0	0	0	0	0	0	0	0	0	0	0	0	8
4:00 AM	0	9	10	0	0	1	0	0	0	0	0	0	0	0	0	20
5:00 AM	1	48	25	0	1	0	0	0	0	0	0	0	0	0	0	75
6:00 AM	2	114	38	2	4	0	0	0	0	0	0	0	0	3	0	163
7:00 AM	2	204	62	0	6	0	0	0	0	0	0	0	0	13	0	287
8:00 AM	1	208	47	0	10	0	0	0	1	0	0	0	0	5	0	272
9:00 AM	0	223	39	1	9	1	0	1	1	0	0	0	0	10	0	285
10:00 AM	2	191	40	1	5	0	0	2	0	0	0	0	0	17	0	258
11:00 AM	0	211	58	1	6	0	0	0	0	0	0	0	0	9	0	285
12:00 PM	1	204	70	2	6	1	0	0	0	0	0	0	0	8	0	292
1:00 PM	0	211	50	0	6	2	0	0	0	0	0	0	0	15	0	284
2:00 PM	1	203	45	0	10	0	0	0	0	0	0	0	0	20	0	279
3:00 PM	0	211	63	0	6	3	0	0	0	0	0	0	0	11	0	294
4:00 PM	0	218	68	0	9	0	0	1	0	0	0	0	0	14	0	310
5:00 PM	4	216	54	0	8	0	0	0	1	0	0	0	0	12	0	295
6:00 PM	1	179	38	0	4	0	0	0	0	0	0	0	0	7	0	229
7:00 PM	1	132	27	0	6	0	0	1	0	0	0	0	0	8	0	175
8:00 PM	0	97	22	0	3	0	0	0	0	0	0	0	0	3	0	125
9:00 PM	0	70	10	0	1	0	0	0	0	0	0	0	0	4	0	85
10:00 PM	0	41	13	0	2	0	0	0	0	0	0	0	0	0	0	56
11:00 PM	0	34	7	0	1	0	0	0	0	0	0	0	0	1	0	43
<b>TOTAL</b>	<b>16</b>	<b>3054</b>	<b>790</b>	<b>7</b>	<b>103</b>	<b>8</b>	<b>0</b>	<b>5</b>	<b>3</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>160</b>	<b>0</b>	<b>4146</b>

## Massachusetts Highway Department

### 3372475 Weekly Volume Report - Mon 08/01/2016 - Sun 08/07/2016

<b>Location ID:</b>	3372475
<b>Located On:</b>	INDIAN NECK ROAD
<b>Direction:</b>	2-WAY
<b>Community:</b>	Wareham
<b>AADT:</b>	3027

<b>Type:</b>	SPOT
<b>SOUTH OF:</b>	MINOT AVENUE
<b>Period:</b>	Mon 08/01/2016 - Sun 08/07/2016

Start Time	Mon	Tue	Wed	Thu	Fri	Sat	Sun	Avg
12:00 AM		16	7	13				12
1:00 AM		5	5	4				5
2:00 AM		4	6	5				5
3:00 AM		3	4	7				5
4:00 AM		14	14	11				13
5:00 AM		55	51	48				51
6:00 AM		94	99	90				94
7:00 AM		190	205	162				186
8:00 AM		225	185	219				210
9:00 AM		180	221	176				192
10:00 AM		213	196	0				136
11:00 AM	244	212	114					190
12:00 PM	257	227	266					250
1:00 PM	201	231	237					223
2:00 PM	214	221	220					218
3:00 PM	250	244	259					251
4:00 PM	253	262	300					272
5:00 PM	273	267	307					282
6:00 PM	234	223	212					223
7:00 PM	151	158	164					158
8:00 PM	124	131	140					132
9:00 PM	82	97	109					96
10:00 PM	52	50	59					54
11:00 PM	33	31	30					31
<b>Total</b>	<b>2368</b>	<b>3353</b>	<b>3410</b>	<b>735</b>	<b>0</b>	<b>0</b>	<b>0</b>	
<b>24HrTotal</b>	3367	3347	3152					3289
<b>AM Pk Hr</b>		8:00	9:00					
<b>AM Peak</b>		225	221					223
<b>PM Pk Hr</b>		5:00	5:00					
<b>PM Peak</b>		267	307					287
<b>% Peak Hr</b>		7.96%	9.00%					8.50%
<b>% Peak Hr</b>	8.11%	7.98%	9.74%					8.61%



## Massachusetts Highway Department

### 3372475\_NB Weekly Volume Report - Mon 08/01/2016 - Sun 08/07/2016

<b>Location ID:</b>	3372475_NB
<b>Located On:</b>	INDIAN NECK ROAD
<b>Direction:</b>	NB
<b>Community:</b>	Wareham
<b>AADT:</b>	1531

<b>Type:</b>	SPOT
<b>SOUTH OF:</b>	MINOT AVENUE
<b>Period:</b>	Mon 08/01/2016 - Sun 08/07/2016

Start Time	Mon	Tue	Wed	Thu	Fri	Sat	Sun	Avg
12:00 AM		2	2	5				3
1:00 AM		0	0	0				0
2:00 AM		2	3	2				2
3:00 AM		2	3	6				4
4:00 AM		11	13	10				11
5:00 AM		46	43	43				44
6:00 AM		72	77	71				73
7:00 AM		147	147	116				137
8:00 AM		146	119	144				136
9:00 AM		103	127	104				111
10:00 AM		121	108	0				76
11:00 AM	133	103	54					97
12:00 PM	123	125	111					120
1:00 PM	101	120	121					114
2:00 PM	107	118	113					113
3:00 PM	123	113	117					118
4:00 PM	98	100	134					111
5:00 PM	121	97	125					114
6:00 PM	99	95	102					99
7:00 PM	69	73	69					70
8:00 PM	42	52	49					48
9:00 PM	28	34	37					33
10:00 PM	20	18	28					22
11:00 PM	11	9	9					10
<b>Total</b>	<b>1075</b>	<b>1709</b>	<b>1711</b>	<b>501</b>	<b>0</b>	<b>0</b>	<b>0</b>	
<b>24HrTotal</b>	1727	1699	1570					1665
<b>AM Pk Hr</b>		7:00	7:00					
<b>AM Peak</b>		147	147					147
<b>PM Pk Hr</b>		12:00	4:00					
<b>PM Peak</b>		125	134					130
<b>% Peak Hr</b>		8.60%	8.59%					9.00%
<b>% Peak Hr</b>	7.70%	8.65%	9.36%					8.57%

## Massachusetts Highway Department

### 3372475\_SB Weekly Volume Report - Mon 08/01/2016 - Sun 08/07/2016

<b>Location ID:</b>	3372475_SB
<b>Located On:</b>	INDIAN NECK ROAD
<b>Direction:</b>	SB
<b>Community:</b>	Wareham
<b>AADT:</b>	1497

<b>Type:</b>	SPOT
<b>SOUTH OF:</b>	MINOT AVENUE
<b>Period:</b>	Mon 08/01/2016 - Sun 08/07/2016

Start Time	Mon	Tue	Wed	Thu	Fri	Sat	Sun	Avg
12:00 AM		14	5	8				9
1:00 AM		5	5	4				5
2:00 AM		2	3	3				3
3:00 AM		1	1	1				1
4:00 AM		3	1	1				2
5:00 AM		9	8	5				7
6:00 AM		22	22	19				21
7:00 AM		43	58	46				49
8:00 AM		79	66	75				73
9:00 AM		77	94	72				81
10:00 AM		92	88	0				60
11:00 AM	111	109	60					93
12:00 PM	134	102	155					130
1:00 PM	100	111	116					109
2:00 PM	107	103	107					106
3:00 PM	127	131	142					133
4:00 PM	155	162	166					161
5:00 PM	152	170	182					168
6:00 PM	135	128	110					124
7:00 PM	82	85	95					87
8:00 PM	82	79	91					84
9:00 PM	54	63	72					63
10:00 PM	32	32	31					32
11:00 PM	22	22	21					22
<b>Total</b>	<b>1293</b>	<b>1644</b>	<b>1699</b>	<b>234</b>	<b>0</b>	<b>0</b>	<b>0</b>	
<b>24HrTotal</b>	1640	1648	1582					1623
<b>AM Pk Hr</b>		11:00	9:00					
<b>AM Peak</b>		109	94					102
<b>PM Pk Hr</b>		5:00	5:00					
<b>PM Peak</b>		170	182					176
<b>% Peak Hr</b>		10.34%	10.71%					10.50%
<b>% Peak Hr</b>	9.45%	10.32%	11.50%					10.42%

Location ID	3372475	Located On	INDIAN NECK ROAD										Community	Wareham	
Counted By	TCDS_Combined	Between											County	Plymouth	
Start Date	8/2/2016	And											Module		
Start Time	11:30:00 AM	Direction	2-WAY										Agency	MHD	
		Source	Syst_Combine										Owner ID	rpa10	
<b>Speed Range (mph)</b>															
Start Time	0-15	15-20	20-25	25-30	30-35	35-40	40-45	45-50	50-55	55-60	60-65	65-70	70+	9999+	Total
12:00 AM	0	0	0	1	2	2	2	0	0	0	0	0	0	0	7
1:00 AM	0	0	0	1	2	1	1	0	0	0	0	0	0	0	5
2:00 AM	0	0	0	0	2	3	0	0	1	0	0	0	0	0	6
3:00 AM	0	0	0	0	1	1	2	0	0	0	0	0	0	0	4
4:00 AM	0	0	0	1	4	5	2	1	1	0	0	0	0	0	14
5:00 AM	1	0	0	1	9	18	12	7	2	0	1	0	0	0	51
6:00 AM	1	0	0	2	12	34	33	13	3	1	0	0	0	0	99
7:00 AM	3	0	1	4	42	70	54	24	5	1	1	0	0	0	205
8:00 AM	1	0	2	8	39	67	50	13	5	0	0	0	0	0	185
9:00 AM	2	0	1	4	53	78	54	24	3	1	1	0	0	0	221
10:00 AM	2	0	0	7	51	78	42	11	2	2	1	0	0	0	196
11:00 AM	1	1	3	8	60	77	48	12	2	0	0	0	0	0	212
12:00 PM	8	0	0	10	61	94	39	12	3	0	0	0	0	0	227
1:00 PM	3	0	0	18	59	90	47	10	2	2	0	0	0	0	231
2:00 PM	1	0	0	9	61	86	48	13	3	0	0	0	0	0	221
3:00 PM	3	0	0	18	60	96	49	13	5	0	0	0	0	0	244
4:00 PM	9	0	1	9	49	112	58	20	4	0	0	0	0	0	262
5:00 PM	9	0	2	9	49	111	63	17	5	1	1	0	0	0	267
6:00 PM	2	0	0	9	50	89	45	24	4	0	0	0	0	0	223
7:00 PM	0	0	1	6	38	60	42	8	3	0	0	0	0	0	158
8:00 PM	0	1	0	10	45	52	15	8	0	0	0	0	0	0	131
9:00 PM	0	0	0	5	34	31	19	5	0	2	1	0	0	0	97
10:00 PM	0	0	0	2	12	19	10	6	1	0	0	0	0	0	50
11:00 PM	0	0	1	0	9	9	7	3	2	0	0	0	0	0	31
TOTAL	46	2	12	142	804	1283	742	244	56	10	6	0	0	0	3347

Location ID	3372475_NB		Located On		INDIAN NECK ROAD				Community		Wareham				
Counted By			Between						County		Plymouth				
Start Date	8/2/2016		And						Module						
Start Time	11:30:00 AM		Direction		NB				Agency		MHD				
			Source						Owner ID		rpa10				
<b>Speed Range (mph)</b>															
Start Time	0-15	15-20	20-25	25-30	30-35	35-40	40-45	45-50	50-55	55-60	60-65	65-70	70+	9999+	Total
12:00 AM	0	0	0	0	0	1	1	0	0	0	0	0	0	0	2
1:00 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
2:00 AM	0	0	0	0	0	2	0	0	1	0	0	0	0	0	3
3:00 AM	0	0	0	0	0	1	2	0	0	0	0	0	0	0	3
4:00 AM	0	0	0	1	3	5	2	1	1	0	0	0	0	0	13
5:00 AM	0	0	0	0	6	16	12	6	2	0	1	0	0	0	43
6:00 AM	1	0	0	1	9	27	24	11	3	1	0	0	0	0	77
7:00 AM	1	0	1	3	23	45	44	23	5	1	1	0	0	0	147
8:00 AM	0	0	0	3	14	46	39	12	5	0	0	0	0	0	119
9:00 AM	1	0	0	0	25	40	37	19	3	1	1	0	0	0	127
10:00 AM	1	0	0	4	21	43	27	8	2	1	1	0	0	0	108
11:00 AM	1	0	0	3	20	45	21	11	2	0	0	0	0	0	103
12:00 PM	3	0	0	4	33	51	26	6	2	0	0	0	0	0	125
1:00 PM	2	0	0	7	31	41	29	6	2	2	0	0	0	0	120
2:00 PM	1	0	0	4	32	36	31	11	3	0	0	0	0	0	118
3:00 PM	2	0	0	7	31	40	22	8	3	0	0	0	0	0	113
4:00 PM	3	0	0	5	15	41	25	8	3	0	0	0	0	0	100
5:00 PM	5	0	1	2	6	41	26	10	4	1	1	0	0	0	97
6:00 PM	1	0	0	6	20	31	23	11	3	0	0	0	0	0	95
7:00 PM	0	0	1	3	9	29	24	6	1	0	0	0	0	0	73
8:00 PM	0	0	0	3	17	20	8	4	0	0	0	0	0	0	52
9:00 PM	0	0	0	5	7	12	8	0	0	1	1	0	0	0	34
10:00 PM	0	0	0	1	2	8	4	2	1	0	0	0	0	0	18
11:00 PM	0	0	0	0	2	1	3	3	0	0	0	0	0	0	9
TOTAL	22	0	3	62	326	622	438	166	46	8	6	0	0	0	1699

Location ID	3372475_SB		Located On		INDIAN NECK ROAD				Community	Wareham					
Counted By			Between						County	Plymouth					
Start Date	8/2/2016		And						Module						
Start Time	11:30:00 AM		Direction		SB				Agency	MHD					
			Source						Owner ID	rpa10					
<b>Speed Range (mph)</b>															
Start Time	0-15	15-20	20-25	25-30	30-35	35-40	40-45	45-50	50-55	55-60	60-65	65-70	70+	9999+	Total
12:00 AM	0	0	0	1	2	1	1	0	0	0	0	0	0	0	5
1:00 AM	0	0	0	1	2	1	1	0	0	0	0	0	0	0	5
2:00 AM	0	0	0	0	2	1	0	0	0	0	0	0	0	0	3
3:00 AM	0	0	0	0	1	0	0	0	0	0	0	0	0	0	1
4:00 AM	0	0	0	0	1	0	0	0	0	0	0	0	0	0	1
5:00 AM	1	0	0	1	3	2	0	1	0	0	0	0	0	0	8
6:00 AM	0	0	0	1	3	7	9	2	0	0	0	0	0	0	22
7:00 AM	2	0	0	1	19	25	10	1	0	0	0	0	0	0	58
8:00 AM	1	0	2	5	25	21	11	1	0	0	0	0	0	0	66
9:00 AM	1	0	1	4	28	38	17	5	0	0	0	0	0	0	94
10:00 AM	1	0	0	3	30	35	15	3	0	1	0	0	0	0	88
11:00 AM	0	1	3	5	40	32	27	1	0	0	0	0	0	0	109
12:00 PM	5	0	0	6	28	43	13	6	1	0	0	0	0	0	102
1:00 PM	1	0	0	11	28	49	18	4	0	0	0	0	0	0	111
2:00 PM	0	0	0	5	29	50	17	2	0	0	0	0	0	0	103
3:00 PM	1	0	0	11	29	56	27	5	2	0	0	0	0	0	131
4:00 PM	6	0	1	4	34	71	33	12	1	0	0	0	0	0	162
5:00 PM	4	0	1	7	43	70	37	7	1	0	0	0	0	0	170
6:00 PM	1	0	0	3	30	58	22	13	1	0	0	0	0	0	128
7:00 PM	0	0	0	3	29	31	18	2	2	0	0	0	0	0	85
8:00 PM	0	1	0	7	28	32	7	4	0	0	0	0	0	0	79
9:00 PM	0	0	0	0	27	19	11	5	0	1	0	0	0	0	63
10:00 PM	0	0	0	1	10	11	6	4	0	0	0	0	0	0	32
11:00 PM	0	0	1	0	7	8	4	0	2	0	0	0	0	0	22
<b>TOTAL</b>	<b>24</b>	<b>2</b>	<b>9</b>	<b>80</b>	<b>478</b>	<b>661</b>	<b>304</b>	<b>78</b>	<b>10</b>	<b>2</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>1648</b>

Location ID	3372475	Located On	INDIAN NECK ROAD	Community	Wareham
Counted By	TCDS_Combined	Between		County	Plymouth
Start Date	8/2/2016	And		Module	
Start Time	11:30:00 AM	Direction	2-WAY	Agency	MHD
		Source	Syst_Combine	Owner ID	rpa10

### FHWA-Scheme F Classification

Start Time	Motor cycle	Car	Light Truck	Bus	2A SU	3A SU	>3A SU	<5A 2U	5A 2U	>5A 2U	<6A >2U	6A >2U	>6A >2U	14	15	Total
12:00 AM	0	5	2	0	0	0	0	0	0	0	0	0	0	0	0	7
1:00 AM	0	4	1	0	0	0	0	0	0	0	0	0	0	0	0	5
2:00 AM	0	6	0	0	0	0	0	0	0	0	0	0	0	0	0	6
3:00 AM	0	3	1	0	0	0	0	0	0	0	0	0	0	0	0	4
4:00 AM	0	5	8	0	1	0	0	0	0	0	0	0	0	0	0	14
5:00 AM	0	32	16	0	3	0	0	0	0	0	0	0	0	0	0	51
6:00 AM	1	64	29	0	4	0	0	0	0	0	0	0	0	1	0	99
7:00 AM	2	136	53	1	9	0	0	1	0	0	0	0	0	3	0	205
8:00 AM	0	119	50	1	10	1	0	1	2	0	0	0	0	1	0	185
9:00 AM	1	152	49	0	14	0	0	3	0	0	0	0	0	2	0	221
10:00 AM	3	141	39	2	6	1	0	2	0	0	0	0	0	2	0	196
11:00 AM	0	137	62	2	7	2	0	1	0	0	0	0	0	1	0	212
12:00 PM	0	140	70	2	6	0	1	0	0	0	0	0	0	8	0	227
1:00 PM	0	171	45	0	10	2	0	0	0	0	0	0	0	3	0	231
2:00 PM	0	153	53	1	11	0	0	2	0	0	0	0	0	1	0	221
3:00 PM	1	166	59	1	11	1	0	1	0	0	0	0	0	4	0	244
4:00 PM	1	182	59	0	10	1	0	0	0	0	0	0	0	9	0	262
5:00 PM	0	189	53	0	12	1	0	1	2	0	0	0	0	9	0	267
6:00 PM	2	162	41	0	15	0	0	1	0	0	0	0	0	2	0	223
7:00 PM	1	119	29	0	8	0	0	1	0	0	0	0	0	0	0	158
8:00 PM	0	105	24	0	2	0	0	0	0	0	0	0	0	0	0	131
9:00 PM	1	77	17	0	2	0	0	0	0	0	0	0	0	0	0	97
10:00 PM	0	36	13	0	1	0	0	0	0	0	0	0	0	0	0	50
11:00 PM	0	27	3	0	1	0	0	0	0	0	0	0	0	0	0	31
<b>TOTAL</b>	<b>13</b>	<b>2331</b>	<b>776</b>	<b>10</b>	<b>143</b>	<b>9</b>	<b>1</b>	<b>14</b>	<b>4</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>46</b>	<b>0</b>	<b>3347</b>



Location ID	3372475_NB	Located On	INDIAN NECK ROAD	Community	Wareham
Counted By		Between		County	Plymouth
Start Date	8/2/2016	And		Module	
Start Time	11:30:00 AM	Direction	NB	Agency	MHD
		Source		Owner ID	rpa10

### FHWA-Scheme F Classification

Start Time	Motor cycle	Car	Light Truck	Bus	2A SU	3A SU	>3A SU	<5A 2U	5A 2U	>5A 2U	<6A >2U	6A >2U	>6A >2U	14	15	Total
12:00 AM	0	2	0	0	0	0	0	0	0	0	0	0	0	0	0	2
1:00 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
2:00 AM	0	3	0	0	0	0	0	0	0	0	0	0	0	0	0	3
3:00 AM	0	2	1	0	0	0	0	0	0	0	0	0	0	0	0	3
4:00 AM	0	5	7	0	1	0	0	0	0	0	0	0	0	0	0	13
5:00 AM	0	27	13	0	3	0	0	0	0	0	0	0	0	0	0	43
6:00 AM	1	52	19	0	4	0	0	0	0	0	0	0	0	1	0	77
7:00 AM	2	100	38	1	5	0	0	0	0	0	0	0	0	1	0	147
8:00 AM	0	81	29	0	7	1	0	0	1	0	0	0	0	0	0	119
9:00 AM	1	95	23	0	7	0	0	0	0	0	0	0	0	1	0	127
10:00 AM	2	78	21	1	2	1	0	2	0	0	0	0	0	1	0	108
11:00 AM	0	72	24	1	4	1	0	0	0	0	0	0	0	1	0	103
12:00 PM	0	76	39	2	5	0	0	0	0	0	0	0	0	3	0	125
1:00 PM	0	86	26	0	5	1	0	0	0	0	0	0	0	2	0	120
2:00 PM	0	80	26	1	8	0	0	2	0	0	0	0	0	1	0	118
3:00 PM	0	78	25	0	6	0	0	1	0	0	0	0	0	3	0	113
4:00 PM	0	73	18	0	6	0	0	0	0	0	0	0	0	3	0	100
5:00 PM	0	63	19	0	8	0	0	1	1	0	0	0	0	5	0	97
6:00 PM	2	67	16	0	9	0	0	0	0	0	0	0	0	1	0	95
7:00 PM	1	55	11	0	6	0	0	0	0	0	0	0	0	0	0	73
8:00 PM	0	43	7	0	2	0	0	0	0	0	0	0	0	0	0	52
9:00 PM	0	26	7	0	1	0	0	0	0	0	0	0	0	0	0	34
10:00 PM	0	13	4	0	1	0	0	0	0	0	0	0	0	0	0	18
11:00 PM	0	7	1	0	1	0	0	0	0	0	0	0	0	0	0	9
<b>TOTAL</b>	<b>9</b>	<b>1184</b>	<b>374</b>	<b>6</b>	<b>91</b>	<b>4</b>	<b>0</b>	<b>6</b>	<b>2</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>23</b>	<b>0</b>	<b>1699</b>

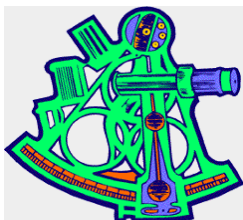
Location ID	3372475_SB	Located On	INDIAN NECK ROAD	Community	Wareham
Counted By		Between		County	Plymouth
Start Date	8/2/2016	And		Module	
Start Time	11:30:00 AM	Direction	SB	Agency	MHD
		Source		Owner ID	rpa10

### FHWA-Scheme F Classification

Start Time	Motor cycle	Car	Light Truck	Bus	2A SU	3A SU	>3A SU	<5A 2U	5A 2U	>5A 2U	<6A >2U	6A >2U	>6A >2U	14	15	Total
12:00 AM	0	3	2	0	0	0	0	0	0	0	0	0	0	0	0	5
1:00 AM	0	4	1	0	0	0	0	0	0	0	0	0	0	0	0	5
2:00 AM	0	3	0	0	0	0	0	0	0	0	0	0	0	0	0	3
3:00 AM	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	1
4:00 AM	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	1
5:00 AM	0	5	3	0	0	0	0	0	0	0	0	0	0	0	0	8
6:00 AM	0	12	10	0	0	0	0	0	0	0	0	0	0	0	0	22
7:00 AM	0	36	15	0	4	0	0	1	0	0	0	0	0	2	0	58
8:00 AM	0	38	21	1	3	0	0	1	1	0	0	0	0	1	0	66
9:00 AM	0	57	26	0	7	0	0	3	0	0	0	0	0	1	0	94
10:00 AM	1	63	18	1	4	0	0	0	0	0	0	0	0	1	0	88
11:00 AM	0	65	38	1	3	1	0	1	0	0	0	0	0	0	0	109
12:00 PM	0	64	31	0	1	0	1	0	0	0	0	0	0	5	0	102
1:00 PM	0	85	19	0	5	1	0	0	0	0	0	0	0	1	0	111
2:00 PM	0	73	27	0	3	0	0	0	0	0	0	0	0	0	0	103
3:00 PM	1	88	34	1	5	1	0	0	0	0	0	0	0	1	0	131
4:00 PM	1	109	41	0	4	1	0	0	0	0	0	0	0	6	0	162
5:00 PM	0	126	34	0	4	1	0	0	1	0	0	0	0	4	0	170
6:00 PM	0	95	25	0	6	0	0	1	0	0	0	0	0	1	0	128
7:00 PM	0	64	18	0	2	0	0	1	0	0	0	0	0	0	0	85
8:00 PM	0	62	17	0	0	0	0	0	0	0	0	0	0	0	0	79
9:00 PM	1	51	10	0	1	0	0	0	0	0	0	0	0	0	0	63
10:00 PM	0	23	9	0	0	0	0	0	0	0	0	0	0	0	0	32
11:00 PM	0	20	2	0	0	0	0	0	0	0	0	0	0	0	0	22
<b>TOTAL</b>	<b>4</b>	<b>1147</b>	<b>402</b>	<b>4</b>	<b>52</b>	<b>5</b>	<b>1</b>	<b>8</b>	<b>2</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>23</b>	<b>0</b>	<b>1648</b>

# **APPENDIX IV**

## **CRASH DATA & WORKSHEETS**



### **JC ENGINEERING, INC.**

**Civil & Environmental Engineering**

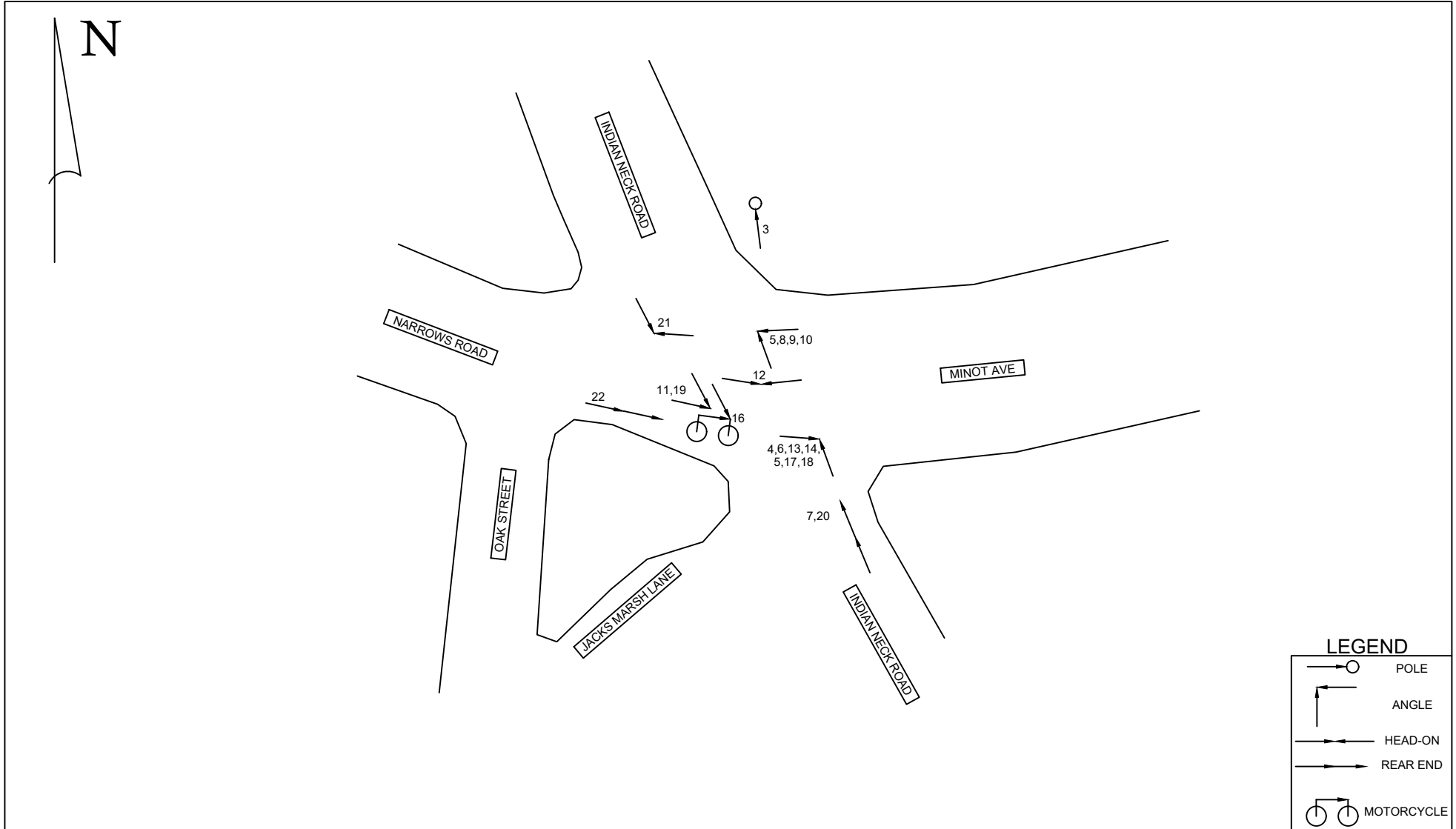
*2854 Cranberry Highway*

*East Wareham, Massachusetts 02538*

*Ph. 508-273-0377—Fax 508-273-0367*

# CRASH DATA TABLE

RMV Crash Number	City Town Name	Crash Date	Crash Time	Crash Severity (none injured)	Maximum Injury Severely Reported	Number of Vehicles	Total Nonfatal Injuries	Total Fatal Injuries	Manner of Collision	Vehicle Action Prior to Crash	Vehicle Travel Directions	Most Harmful Events	Vehicle Configuration	Road Surface Condition	Ambient Light	Weather Condition	At Roadway Intersection	X Coordinate	Y Coordinate
<b>MINOT AVE / INDIAN NECK RD / OAK ST / GREAT NECK RD / NARROWS RD</b>																			
3990647	WAREHAM	03-Jan-2015	5:29 PM	Property damage only (none injured)	No injury	1	0	0	Single vehicle crash	V1: Travelling straight ahead	V1: N	V1:(Collision with utility pole)	V1:(Passenger car)	Snow	Dark - lighted roadway	Snow/blowing sand, snow	INDIAN NECK RD / MINOT AVE	266251.7499	834201.6248
4144943	WAREHAM	01-Feb-2016	6:45 PM	Property damage only (none injured)	No injury	2	0	0	Angle	V1: Travelling straight ahead / V2: Backing	V1: E / V2: N	V1:(Collision with motor vehicle in traffic) / V2:(Collision with motor vehicle in traffic)	V1:(Single-unit truck (2-axle, 6-tires)) / V2:(Passenger car)	Dry	Dark - lighted roadway	Clear/Unknown	INDIAN NECK ROAD / MINOT AVENUE	266251.7499	834201.6248
4236896	WAREHAM	23-Aug-2016	2:46 PM	Non-fatal injury	Non-fatal injury - Non-incapacitating	2	1	0	Angle	V1: Entering traffic lane / V2: Travelling straight ahead	V1: N / V2: W	V1:(Collision with motor vehicle in traffic) / V2:(Collision with motor vehicle in traffic)	V1:(Light truck/van, mini-van, pickup, sport utility) / V2:(Passenger car)	Dry	Daylight	Clear	INDIAN NECK RD / MINOT AVE	266251.7499	834201.6248
4255264	WAREHAM	26-Sep-2016	9:59 AM	Non-fatal injury	Non-fatal injury - Possible	2	1	0	Angle	V1: Travelling straight ahead / V2: Entering traffic lane	V1: N / V2: E	V1:(Collision with motor vehicle in traffic) / V2:(Collision with motor vehicle in traffic)	V1:(Passenger car) / V2:(Passenger car)	Dry	Daylight	Clear	INDIAN NECK ROAD / NARROWS ROAD / MINOT AVENUE	266251.7499	834201.6248
4255265	WAREHAM	27-Sep-2016	9:50 AM	Non-fatal injury	Non-fatal injury - Possible	2	3	0	Rear-end	V1: Slowing or stopped in traffic / V2: Slowing or stopped in traffic	V1: N / V2: N	V1:(Collision with motor vehicle in traffic) / V2:(Collision with motor vehicle in traffic)	V1:(Passenger car) / V2:(Passenger car)	Wet	Daylight	Rain/Cloudy	MINOT AVE / INDIAN NECK RD	266251.7499	834201.6248
4293905	WAREHAM	03-Dec-2016	5:33 PM	Property damage only (none injured)	No injury	2	0	0	Angle	V1: Travelling straight ahead / V2: Travelling straight ahead	V1: N / V2: W	V1:(Collision with motor vehicle in traffic) / V2:(Collision with motor vehicle in traffic)	V1:(Passenger car) / V2:(Passenger car)	Dry	Dark - lighted roadway	Clear	MINOT AVE / INDIAN NECK RD	266251.7499	834201.6248
4370195	WAREHAM	26-May-2017	8:16 PM	Not Reported	Not Applicable	2	0	0	Angle	V1: Travelling straight ahead / V2: Travelling straight ahead	V1: W / V2: N	V1:(Collision with motor vehicle in traffic) / V2:(Collision with motor vehicle in traffic)	V1:(Passenger car) / V2:(Passenger car)	Wet	Dark - roadway not lighted	Rain	INDIAN NECK RD / MINOT AVE	266251.7499	834201.6248
4377308	WAREHAM	14-Jun-2017	8:54 AM	Property damage only (none injured)	No injury	2	0	0	Angle	V1: Travelling straight ahead / V2: Entering traffic lane	V1: N / V2: W	V1:(Collision with motor vehicle in traffic) / V2:(Collision with motor vehicle in traffic)	V1:(Passenger car) / V2:(Passenger car)	Dry	Daylight	Clear/Unknown	INDIAN NECK RD / MINOT AVE	266251.7499	834201.6248
4492001	WAREHAM	15-Jan-2018	1:42 PM	Property damage only (none injured)	No injury	2	0	0	Angle	V1: Travelling straight ahead / V2: Entering traffic lane	V1: E / V2: S	V1:(Collision with motor vehicle in traffic) / V2:(Collision with motor vehicle in traffic)	V1:(Passenger car) / V2:(Light truck/van, mini-van, pickup, sport utility)	Ice	Daylight	Cloudy	INDIAN NECK ROAD / MINOT AVENUE / NARROWS ROAD	266251.7044	834202.5761
4488096	WAREHAM	19-Jan-2018	4:29 PM	Non-fatal injury	Non-fatal injury - Possible	2	3	0	Head-on	V1: Travelling straight ahead / V2: Turning left	V1: W / V2: E	V1:(Collision with motor vehicle in traffic) / V2:(Collision with motor vehicle in traffic)	V1:(Passenger car) / V2:(Passenger car)	Dry	Daylight	Clear/Cloudy	INDIAN NECK RD / MINOT AVE	266251.7499	834201.6248
4555111	WAREHAM	18-Jun-2018	8:55 AM	Non-fatal injury	Non-fatal injury - Possible	2	1	0	Angle	V1: Travelling straight ahead / V2: Turning left	V1: E / V2: N	V1:(Collision with motor vehicle in traffic) / V2:(Collision with motor vehicle in traffic)	V1:(Passenger car) / V2:(Passenger car)	Dry	Daylight	Clear	MINOT AVE / INDIAN NECK RD	266251.7499	834201.6248
4798803	WAREHAM	03-Jan-2020	9:53 AM	Non-fatal injury	Suspected Minor injury (B)	2	0	0	Angle	V1: Travelling straight ahead / V2: Travelling straight ahead	V1: N / V2: E	V1:(Collision with motor vehicle in traffic) / V2:(Collision with motor vehicle in traffic)	V1:(Passenger car) / V2:(Passenger car)		Daylight	Clear	MINOT AVE / INDIAN NECK RD	266251.7499	834201.6248
4210952	WAREHAM	23-Jun-2016	2:14 PM	Non-fatal injury	Non-fatal injury - Possible	2	2	0	Angle	V1: Travelling straight ahead / V2: Entering traffic lane	V1: N / V2: E	V1:(Collision with motor vehicle in traffic) / V2:(Collision with motor vehicle in traffic)	V1:(Passenger car) / V2:(Passenger car)	Dry	Daylight	Clear	NARROWS RD / INDIAN NECK RD	266251.7499	834201.6248
4212953	WAREHAM	04-Jul-2016	8:13 AM	Non-fatal injury	Non-fatal injury - Incapacitating	2	1	0	Angle	V1: Travelling straight ahead / V2: Travelling straight ahead	V1: E / V2: S	V1:(Collision with motor vehicle in traffic) / V2:(Collision with motor vehicle in traffic)	V1:(Motorcycle) / V2:(Passenger car)	Dry	Daylight	Clear	INDIAN NECK RD / NARROWS RD	266251.7499	834201.6248
4255264	WAREHAM	26-Sep-2016	9:59 AM	Non-fatal injury	Non-fatal injury - Possible	2	1	0	Angle	V1: Travelling straight ahead / V2: Entering traffic lane	V1: N / V2: E	V1:(Collision with motor vehicle in traffic) / V2:(Collision with motor vehicle in traffic)	V1:(Passenger car) / V2:(Passenger car)	Dry	Daylight	Clear	INDIAN NECK ROAD / NARROWS ROAD / MINOT AVENUE	266251.7499	834201.6248
4377415	WAREHAM	10-Jun-2017	3:57 PM	Property damage only (none injured)	No injury	2	0	0	Angle	V1: Entering traffic lane / V2: Travelling straight ahead	V1: N / V2: E	V1:(Collision with motor vehicle in traffic) / V2:(Collision with motor vehicle in traffic)	V1:(Passenger car) / V2:(Passenger car)	Dry	Daylight	Clear	NARROWS RD / INDIAN NECK RD	266251.7499	834201.6248
4492001	WAREHAM	15-Jan-2018	1:42 PM	Property damage only (none injured)	No injury	2	0	0	Angle	V1: Travelling straight ahead / V2: Entering traffic lane	V1: E / V2: S	V1:(Collision with motor vehicle in traffic) / V2:(Collision with motor vehicle in traffic)	V1:(Passenger car) / V2:(Light truck/van, mini-van, pickup, sport utility)	Ice	Daylight	Cloudy	INDIAN NECK ROAD / MINOT AVENUE / NARROWS ROAD	266251.7044	834202.5761
4538631	WAREHAM	12-May-2018	1:23 PM	Non-fatal injury	Non-fatal injury - Possible	2	1	0	Rear-end	V1: Slowing or stopped in traffic / V2: Travelling straight ahead	V1: N / V2: N	V1:(Collision with motor vehicle in traffic) / V2:(Collision with motor vehicle in traffic)	V1:(Passenger car) / V2:(Passenger car)	Wet	Daylight	Rain	NARROWS RD / INDIAN NECK RD	266251.7499	834201.6248
4574169	WAREHAM	28-Jul-2018	11:26 AM	Non-fatal injury	Non-fatal injury - Possible	2	1	0	Angle	V1: Entering traffic lane / V2: Travelling straight ahead	V1: S / V2: W	V1:(Collision with motor vehicle in traffic) / V2:(Collision with motor vehicle in traffic)	V1:(Passenger car) / V2:(Passenger car)	Dry	Daylight	Clear	NARROWS RD / INDIAN NECK RD	266251.7499	834201.6248
4726526	WAREHAM	17-Jul-2019	1:15 PM	Property damage only (none injured)	No Apparent Injury (D)	2	0	0	Front to Rear	V1: Turning left / V2: Travelling straight ahead	V1: W / V2: W	V1:(Collision with motor vehicle in traffic) / V2:(Collision with motor vehicle in traffic)	V1:(Passenger car) / V2:(Passenger car)		Daylight	Clear	INDIAN NECK RD / NARROWS RD	266251.7499	834201.6248
<b>NARROWS RD / OAKHILL RD</b>																			
4635845	WAREHAM	08-Dec-2018	10:20 PM	Non-fatal injury	Non-fatal injury - Non-incapacitating	2	3	0	Head-on	V1: Travelling straight ahead / V2: Travelling straight ahead	V1: N / V2: S	V1:(Collision with motor vehicle in traffic) / V2:(Collision with motor vehicle in traffic)	V1:(Passenger car) / V2:(Passenger car)	Dry	Dark - lighted roadway	Clear	NARROWS RD / OAKHILL RD		
<b>MINOT AVE</b>																			
4617498	WAREHAM	02-Nov-2018	6:27 PM	Non-fatal injury	Non-fatal injury - Non-incapacitating	2	2	0	Rear-end	V1: Slowing or stopped in traffic / V2: Slowing or stopped in traffic	V1: W / V2: W	V1:(Collision with motor vehicle in traffic) / V2:(Collision with motor vehicle in traffic)	V1:(Passenger car) / V2:(Passenger car)	Wet	Dark - roadway not lighted	Rain	MINOT AVENUE / MINOTO AVENUE	266251.7044	834202.5761
4763979	WAREHAM	18-Oct-2019	3:07 PM	Non-fatal injury	Possible injury (C)	1	0	0	Single vehicle crash	V1: Travelling straight ahead	V1: E	V1:(Collision with curb)	V1:(Motorcycle)		Daylight	Clear	MINOT AVE		
<b>MINOT AVE / FREIGHT HOUSE RD</b>																			
4612251	WAREHAM	20-Oct-2018	6:44 PM	Property damage only (none injured)	No injury	1	0	0	Single vehicle crash	V1: Travelling straight ahead	V1: E	V1:(Collision with animal - deer)	V1:(Passenger car)	Dry	Dark - roadway not lighted	Clear	MINOT AVE / FREIGHT HOUSE RD		



**LEGEND**

	POLE
	ANGLE
	HEAD-ON
	REAR END
	MOTORCYCLE

**COLLISION DIAGRAM**

NARROWS RD, MINOT AVE, AND INDIAN NECK RD  
WAREHAM, MASSACHUSETTS



ENGINEERING BY:  
**JC ENGINEERING, INC.**  
2854 CRANBERRY HIGHWAY  
EAST WAREHAM, MA 02538  
(508) 273-0377

SCALE: NOT TO SCALE

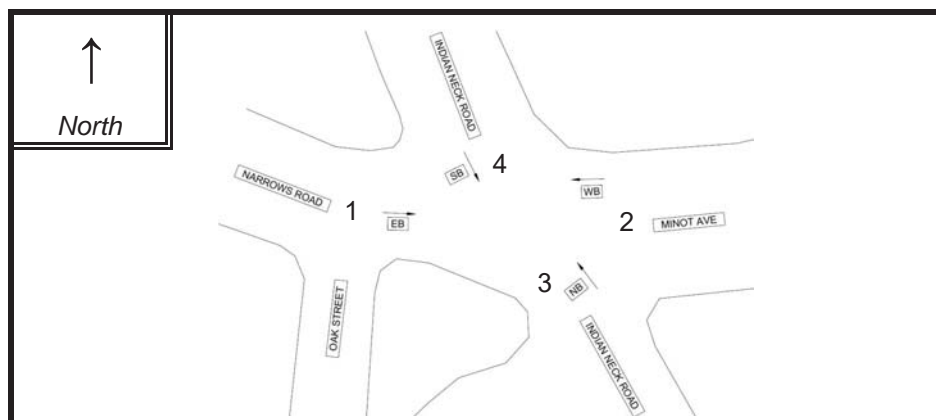
## INTERSECTION CRASH RATE WORKSHEET

CITY/TOWN : WAREHAM COUNT DATE : 8/2/16  
 DISTRICT : 5 UNSIGNALIZED :  X SIGNALIZED :

~ INTERSECTION DATA ~

MAJOR STREET : NARROWS ROAD & MINOT AVENUE  
 MINOR STREET(S) : INDIAN NECK ROAD

**INTERSECTION  
 DIAGRAM  
 (Label Approaches)**



**PEAK HOUR VOLUMES**

APPROACH :	<b>1</b>	<b>2</b>	<b>3</b>	<b>4</b>	<b>5</b>	<b>Total Peak Hourly Approach Volume</b>
DIRECTION :	EB	EB	EB	EB		
PEAK HOURLY VOLUMES (AM/PM) :	447	326	139	180		1092

" K " FACTOR : .10 INTERSECTION ADT ( V ) = TOTAL DAILY APPROACH VOLUME : 10920

TOTAL # OF CRASHES : 20 # OF YEARS : 5 AVERAGE # OF CRASHES PER YEAR ( A ) : 4.0

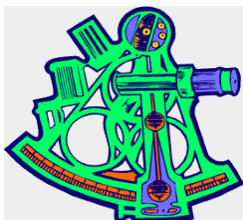
**CRASH RATE CALCULATION :**

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

Comments : CRASH RATE OF 1.00 HIGHER THAN DISTRICT AVERAGE OF 0.57

Project Title & Date : WAREHAM SHARED USE PATH - 2/4/20

**APPENDIX V**  
**HORIZONTAL ALIGNMENT REPORT**



**JC ENGINEERING, INC.**  
**Civil & Environmental Engineering**  
*2854 Cranberry Highway*  
*East Wareham, Massachusetts 02538*  
*Ph. 508-273-0377—Fax 508-273-0367*



# Jc Engineering Inc.

2854 Cranberry Highway

East Wareham, Massachusetts 02538

---

## Alignment Station and Curve Report

**Project Name:** W:\JOBS-ACTIVE\4303 - Minot Avenue Bike Path (Town of Wareham)\607825 CAD 25Stage\Project Drawing Data\DWG\607825\_HD3(Const. and Profile) 3.dwg

**Report Date:** 2/4/2020 5:00:47 PM

**Client:** Town of Wareham

**Project Description:** Bikepath

**Prepared by:** Jc Engineering Inc.

---

## Alignment: Shared Use Path Centerline

### Description:

---

---

#### Tangent Data

Description	PT Station	Northing	Easting
Start:	0+00.000	2737271.338	871416.563
End:	0+63.533	2737247.333	871475.387

#### Tangent Data

Parameter	Value	Parameter	Value
Length:	63.533	Course:	S 67° 48' 03.0513" E

---

#### Curve Point Data

Description	Station	Northing	Easting
PC:	0+63.533	2737247.333	871475.387
RP:		2737062.158	871399.822
PT:	0+73.346	2737243.405	871484.377

#### Circular Curve Data

Parameter	Value	Parameter	Value
Delta:	02° 48' 39.7767"	Type:	RIGHT
Radius:	200.000		
Length:	9.812	Tangent:	4.907

Mid-Ord: 0.060 External: 0.060  
 Chord: 9.811 Course: S 66° 23' 43.1630" E

Tangent Data

Description	PT Station	Northing	Easting
Start:	0+73.346	2737243.405	871484.377
End:	0+78.587	2737241.188	871489.128

Tangent Data

Parameter	Value	Parameter	Value
Length:	5.242	Course:	S 64° 59' 23.2746" E

Curve Point Data

Description	Station	Northing	Easting
PC:	0+78.587	2737241.188	871489.128
RP:		2737513.058	871615.961
PCC:	1+08.150	2737230.029	871516.490

Circular Curve Data

Parameter	Value	Parameter	Value
Delta:	05° 38' 45.6244"	Type:	LEFT
Radius:	300.000		
Length:	29.562	Tangent:	14.793
Mid-Ord:	0.364	External:	0.365
Chord:	29.550	Course:	S 67° 48' 46.0868" E

Curve Point Data

Description	Station	Northing	Easting
PCC:	1+08.150	2737230.029	871516.490
RP:		2740475.627	872657.166
PT:	9+72.298	2737048.362	872359.005

Circular Curve Data

Parameter	Value	Parameter	Value
Delta:	14° 23' 31.7782"	Type:	LEFT
Radius:	3440.210		
Length:	864.148	Tangent:	434.360
Mid-Ord:	27.098	External:	27.313
Chord:	861.878	Course:	S 77° 49' 54.7881" E

Tangent Data

Description	PT Station	Northing	Easting
-------------	------------	----------	---------

Start: 9+72.298 2737048.362 872359.005  
 End: 11+46.121 2737033.297 872532.173

Tangent Data

Parameter	Value	Parameter	Value
Length:	173.823	Course:	S 85° 01' 40.6773" E

Curve Point Data

Description	Station	Northing	Easting
PC:	11+46.121	2737033.297	872532.173
RP:		2737232.544	872549.507
PCC:	11+73.635	2737032.802	872559.661

Circular Curve Data

Parameter	Value	Parameter	Value
Delta:	07° 52' 55.9217"	Type:	LEFT
Radius:	200.000		
Length:	27.514	Tangent:	13.779
Mid-Ord:	0.473	External:	0.474
Chord:	27.492	Course:	S 88° 58' 08.6381" E

Curve Point Data

Description	Station	Northing	Easting
PCC:	11+73.635	2737032.802	872559.661
RP:		2736833.060	872569.815
PCC:	12+07.879	2737031.611	872593.843

Circular Curve Data

Parameter	Value	Parameter	Value
Delta:	09° 48' 36.9658"	Type:	RIGHT
Radius:	200.000		
Length:	34.244	Tangent:	17.164
Mid-Ord:	0.732	External:	0.735
Chord:	34.202	Course:	S 88° 00' 18.1161" E

Curve Point Data

Description	Station	Northing	Easting
PCC:	12+07.879	2737031.611	872593.843
RP:		2735315.134	872386.123
PT:	14+26.997	2736991.592	872809.126

Circular Curve Data

Parameter	Value	Parameter	Value
-----------	-------	-----------	-------

Delta:	07° 15' 40.1683"	Type:	RIGHT
Radius:	1729.000		
Length:	219.118	Tangent:	109.706
Mid-Ord:	3.470	External:	3.477
Chord:	218.971	Course:	S 79° 28' 09.5491" E

Tangent Data

Description	PT Station	Northing	Easting
Start:	14+26.997	2736991.592	872809.126
End:	16+14.536	2736945.710	872990.966

Tangent Data

Parameter	Value	Parameter	Value
Length:	187.539	Course:	S 75° 50' 19.4649" E

Curve Point Data

Description	Station	Northing	Easting
PC:	16+14.536	2736945.710	872990.966
RP:		2736751.788	872942.036
PCC:	16+27.972	2736941.988	873003.874

Circular Curve Data

Parameter	Value	Parameter	Value
Delta:	03° 50' 57.0432"	Type:	RIGHT
Radius:	200.000		
Length:	13.436	Tangent:	6.721
Mid-Ord:	0.113	External:	0.113
Chord:	13.434	Course:	S 73° 54' 50.9433" E

Curve Point Data

Description	Station	Northing	Easting
PCC:	16+27.972	2736941.988	873003.874
RP:		2738368.488	873467.659
PT:	18+28.302	2736892.935	873197.952

Circular Curve Data

Parameter	Value	Parameter	Value
Delta:	07° 39' 07.3447"	Type:	LEFT
Radius:	1500.000		
Length:	200.330	Tangent:	100.314
Mid-Ord:	3.343	External:	3.351
Chord:	200.181	Course:	S 75° 48' 56.0941" E

---

Tangent Data

Description	PT Station	Northing	Easting
Start:	18+28.302	2736892.935	873197.952
End:	19+06.516	2736878.871	873274.891

Tangent Data

Parameter	Value	Parameter	Value
Length:	78.214	Course:	S 79° 38' 29.7664" E

---

Curve Point Data

Description	Station	Northing	Easting
PC:	19+06.516	2736878.871	873274.891
RP:		2736141.095	873140.037
PCC:	20+07.354	2736854.136	873372.570

Circular Curve Data

Parameter	Value	Parameter	Value
Delta:	07° 42' 12.6091"	Type:	RIGHT
Radius:	750.000		
Length:	100.839	Tangent:	50.495
Mid-Ord:	1.694	External:	1.698
Chord:	100.763	Course:	S 75° 47' 23.4618" E

---

Curve Point Data

Description	Station	Northing	Easting
PCC:	20+07.354	2736854.136	873372.570
RP:		2737044.281	873434.579
PT:	20+76.208	2736844.365	873440.384

Circular Curve Data

Parameter	Value	Parameter	Value
Delta:	19° 43' 30.0437"	Type:	LEFT
Radius:	200.000		
Length:	68.853	Tangent:	34.771
Mid-Ord:	2.956	External:	3.000
Chord:	68.514	Course:	S 81° 48' 02.1791" E

---

Tangent Data

Description	PT Station	Northing	Easting
Start:	20+76.208	2736844.365	873440.384
End:	22+33.036	2736848.917	873597.146

Tangent Data

Parameter	Value	Parameter	Value
Length:	156.828	Course:	N 88° 20' 12.7991" E

Curve Point Data

Description	Station	Northing	Easting
PC:	22+33.036	2736848.917	873597.146
RP:		2737348.706	873582.634
PT:	22+95.961	2736854.691	873659.763

Circular Curve Data

Parameter	Value	Parameter	Value
Delta:	07° 12' 38.2547"	Type:	LEFT
Radius:	500.000		
Length:	62.925	Tangent:	31.504
Mid-Ord:	0.990	External:	0.992
Chord:	62.883	Course:	N 84° 43' 53.6717" E

Tangent Data

Description	PT Station	Northing	Easting
Start:	22+95.961	2736854.691	873659.763
End:	58+16.538	2737397.766	877138.202

Tangent Data

Parameter	Value	Parameter	Value
Length:	3520.578	Course:	N 81° 07' 34.5444" E

Curve Point Data

Description	Station	Northing	Easting
PC:	58+16.538	2737397.766	877138.202
RP:		2735915.720	877369.588
PCC:	59+34.346	2737411.352	877255.193

Circular Curve Data

Parameter	Value	Parameter	Value
Delta:	04° 29' 59.6823"	Type:	RIGHT
Radius:	1500.000		
Length:	117.807	Tangent:	58.934
Mid-Ord:	1.156	External:	1.157
Chord:	117.777	Course:	N 83° 22' 34.3855" E

Curve Point Data

Description	Station	Northing	Easting
PCC:	59+34.346	2737411.352	877255.193
RP:		2737660.624	877236.127
PT:	59+54.646	2737413.720	877275.349

Circular Curve Data

Parameter	Value	Parameter	Value
Delta:	04° 39' 08.8869"	Type:	LEFT
Radius:	250.000		
Length:	20.300	Tangent:	10.156
Mid-Ord:	0.206	External:	0.206
Chord:	20.295	Course:	N 83° 17' 59.7833" E

Tangent Data

Description	PT Station	Northing	Easting
Start:	59+54.646	2737413.720	877275.349
End:	62+88.956	2737466.169	877605.519

Tangent Data

Parameter	Value	Parameter	Value
Length:	334.310	Course:	N 80° 58' 25.3398" E

Curve Point Data

Description	Station	Northing	Easting
PC:	62+88.956	2737466.169	877605.519
RP:		2734651.462	878052.649
PT:	64+28.296	2737484.657	877743.613

Circular Curve Data

Parameter	Value	Parameter	Value
Delta:	02° 48' 04.5298"	Type:	RIGHT
Radius:	2850.000		
Length:	139.340	Tangent:	69.684
Mid-Ord:	0.852	External:	0.852
Chord:	139.326	Course:	N 82° 22' 27.6047" E

Tangent Data

Description	PT Station	Northing	Easting
Start:	64+28.296	2737484.657	877743.613
End:	64+97.468	2737492.158	877812.377

Tangent Data

Parameter	Value	Parameter	Value
-----------	-------	-----------	-------



Length: 69.172 Course: N 83° 46' 29.8696" E

Curve Point Data

Description	Station	Northing	Easting
PC:	64+97.468	2737492.158	877812.377
RP:		2737591.568	877801.533
PCC:	65+13.485	2737495.160	877828.093

Circular Curve Data

Parameter	Value	Parameter	Value
Delta:	09° 10' 37.9192"	Type:	LEFT
Radius:	100.000		
Length:	16.017	Tangent:	8.026
Mid-Ord:	0.321	External:	0.322
Chord:	16.000	Course:	N 79° 11' 10.9100" E

Curve Point Data

Description	Station	Northing	Easting
PCC:	65+13.485	2737495.160	877828.093
RP:		2737360.188	877865.276
PCC:	65+41.390	2737499.850	877855.554

Circular Curve Data

Parameter	Value	Parameter	Value
Delta:	11° 25' 12.9775"	Type:	RIGHT
Radius:	140.000		
Length:	27.905	Tangent:	13.999
Mid-Ord:	0.695	External:	0.698
Chord:	27.859	Course:	N 80° 18' 28.4392" E

Curve Point Data

Description	Station	Northing	Easting
PCC:	65+41.390	2737499.850	877855.554
RP:		2734629.795	878055.340
PT:	72+23.586	2737466.472	878535.334

Circular Curve Data

Parameter	Value	Parameter	Value
Delta:	13° 35' 09.6165"	Type:	RIGHT
Radius:	2877.000		
Length:	682.196	Tangent:	342.705
Mid-Ord:	20.197	External:	20.339

Chord: 680.599 Course: S 87° 11' 20.2638" E

Tangent Data

Description	PT Station	Northing	Easting
Start:	72+23.586	2737466.472	878535.334
End:	78+75.487	2737357.710	879178.098

Tangent Data

Parameter	Value	Parameter	Value
Length:	651.901	Course:	S 80° 23' 45.4556" E

Curve Point Data

Description	Station	Northing	Easting
PC:	78+75.487	2737357.710	879178.098
RP:		2738097.198	879303.227
PT:	79+04.056	2737353.481	879206.351

Circular Curve Data

Parameter	Value	Parameter	Value
Delta:	02° 10' 57.2664"	Type:	LEFT
Radius:	750.000		
Length:	28.570	Tangent:	14.287
Mid-Ord:	0.136	External:	0.136
Chord:	28.568	Course:	S 81° 29' 14.0888" E

Tangent Data

Description	PT Station	Northing	Easting
Start:	79+04.056	2737353.481	879206.351
End:	79+19.178	2737351.528	879221.346

Tangent Data

Parameter	Value	Parameter	Value
Length:	15.122	Course:	S 82° 34' 42.7220" E

Curve Point Data

Description	Station	Northing	Easting
PC:	79+19.178	2737351.528	879221.346
RP:		2736607.810	879124.471
PT:	79+47.748	2737347.299	879249.600

Circular Curve Data

Parameter	Value	Parameter	Value
Delta:	02° 10' 57.2664"	Type:	RIGHT

Radius:	750.000	Tangent:	14.287
Length:	28.570	External:	0.136
Mid-Ord:	0.136	Course:	S 81° 29' 14.0888" E
Chord:	28.568		

Tangent Data

Description	PT Station	Northing	Easting
Start:	79+47.748	2737347.299	879249.600
End:	86+08.480	2737237.063	879901.071

Tangent Data

Parameter	Value	Parameter	Value
Length:	660.731	Course:	S 80° 23' 45.4556" E

Curve Point Data

Description	Station	Northing	Easting
PC:	86+08.480	2737237.063	879901.071
RP:		2738418.273	880100.943
PT:	90+41.006	2737242.612	880331.216

Circular Curve Data

Parameter	Value	Parameter	Value
Delta:	20° 41' 10.0000"	Type:	LEFT
Radius:	1198.000		
Length:	432.527	Tangent:	218.644
Mid-Ord:	19.467	External:	19.789
Chord:	430.181	Course:	N 89° 15' 39.5444" E

Tangent Data

Description	PT Station	Northing	Easting
Start:	90+41.006	2737242.612	880331.216
End:	91+51.380	2737263.827	880439.532

Tangent Data

Parameter	Value	Parameter	Value
Length:	110.373	Course:	N 78° 55' 04.5444" E

Curve Point Data

Description	Station	Northing	Easting
PC:	91+51.380	2737263.827	880439.532
RP:		2739226.533	880055.102
PCC:	92+49.073	2737284.939	880534.906

Circular Curve Data

<b>Parameter</b>	<b>Value</b>	<b>Parameter</b>	<b>Value</b>
Delta:	02° 47' 55.2935"	Type:	LEFT
Radius:	2000.000		
Length:	97.693	Tangent:	48.856
Mid-Ord:	0.596	External:	0.597
Chord:	97.683	Course:	N 77° 31' 06.8977" E

Curve Point Data

<b>Description</b>	<b>Station</b>	<b>Northing</b>	<b>Easting</b>
PCC:	92+49.073	2737284.939	880534.906
RP:		2736799.540	880654.857
PCC:	92+92.480	2737293.511	880577.444

Circular Curve Data

<b>Parameter</b>	<b>Value</b>	<b>Parameter</b>	<b>Value</b>
Delta:	04° 58' 26.7018"	Type:	RIGHT
Radius:	500.000		
Length:	43.407	Tangent:	21.717
Mid-Ord:	0.471	External:	0.471
Chord:	43.393	Course:	N 78° 36' 22.6019" E

Curve Point Data

<b>Description</b>	<b>Station</b>	<b>Northing</b>	<b>Easting</b>
PCC:	92+92.480	2737293.511	880577.444
RP:		2734718.441	880980.997
PT:	93+51.069	2737301.931	880635.424

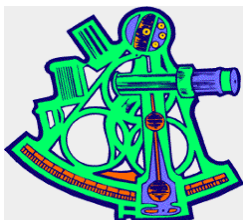
Circular Curve Data

<b>Parameter</b>	<b>Value</b>	<b>Parameter</b>	<b>Value</b>
Delta:	01° 17' 16.4152"	Type:	RIGHT
Radius:	2606.500		
Length:	58.589	Tangent:	29.296
Mid-Ord:	0.165	External:	0.165
Chord:	58.588	Course:	N 81° 44' 14.1604" E

---

# **APPENDIX VI**

## **PHOTOGRAPHIC DOCUMENTATION**



**JC ENGINEERING, INC.**

**Civil & Environmental Engineering**

*2854 Cranberry Highway*

*East Wareham, Massachusetts 02538*

*Ph. 508-273-0377—Fax 508-273-0367*



View of intersection at Narrows Rd and Sandwich Rd looking Westbound



View of intersection at Narrows Rd and Sandwich Rd looking Eastbound





View of Narrows Rd looking Eastbound in front of Narrows Restaurant



View of Narrows Rd looking Westbound in front of Narrows Restaurant





View of Narrows Rd looking Eastbound at STA point 0+00 +/-



View of Narrows Rd looking Westbound at STA point 0+00 +/-





View of Narrows Rd looking Westbound at STA point 12+00 +/-



View of Narrows Rd looking Eastbound at STA point 12+00 +/-





View of Narrows Rd looking Eastbound at STA point 16+00 +/-



View of Narrows Rd looking Westbound at STA point 16+00 +/-





View of intersection at Narrows Rd and Indian Neck Rd looking Westbound at STA point 20+00 +/-



View of intersection at Narrows Rd and Indian Neck Rd looking Eastbound at STA point 20+00 +/-





View of Minot Ave looking Westbound at STA point 45+00 +/-



View of Minot Ave looking Eastbound at STA point 45+00 +/-





View of Minot Ave looking Westbound at STA point 53+00 +/-



View of Minot Ave looking Eastbound at STA point 53+00 +/-



View of Minot Ave looking Westbound at STA point 61+00 +/-



View of Minot Ave looking Eastbound at STA point 61+00 +/-





View of Minot Ave looking Westbound at STA point 67+00 +/-



View of Minot Ave looking Eastbound at STA point 67+00 +/-





View of Minot Ave looking Westbound at STA point 88+00 +/-



View of Minot Ave looking Eastbound at STA point 88+00 +/-





View of intersection at Minot Ave and Depot St looking Westbound at STA point 93+00 +/-



View of intersection at Minot Ave and Depot St looking Eastbound at STA point 93+00 +/-



View of culvert at Sta 15+57.00 +/- (Northerly Side)



View of culvert at Sta 15+57.00 +/- (Southerly Side)





View of culvert at Sta 89+30.00 +/- (Southerly Side)



View of culvert at Sta 89+30.00 +/- (Northerly Side)



View of existing rip-rap by Sta 0+00.00 (Southerly Side)