

## MASSDOT DESIGN JUSTIFICATION WORKBOOK

Nantasket Beach Area Two-Way Flow - George Washington Boulevard - Hull, MA

PROJECT 1

30-Aug-22

**PREPARED BY:**

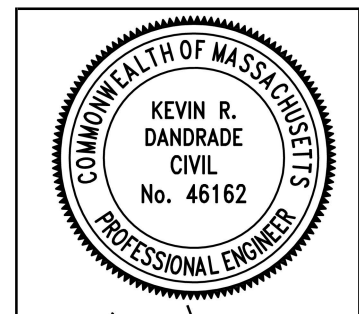
TEC, Inc.  
311 Main Street, Second Floor / 282 Merrimack Street, Second Floor  
Worcester, MA 01609 / Lawrence, MA 01843

**PREPARED FOR:**

Town of Hull  
253 Atlantic Avenue  
Hull, MA 02045

--- DESIGNER'S CERTIFICATION ---

"I have reviewed this document as it relates to the proposed design and have determined the design to be safe for public health and welfare in conformity with accepted engineering standards."



NAME: Kevin R. Dandrade, P.E., PTOE

DATE: 8/30/2022

TITLE: Principal

FIRM: TEC, Inc.

MassDOT Design Justification Workbook

Project: 1 Description: Nantasket Beach Area Two-Way Flow - George Washington Boulevard - Hull, MA

SUMMARY OF JUSTIFICATIONS

The proposed project includes vehicular flow modifications, and bicycle and pedestrian safety and mobility improvements along George Washington Boulevard in Hull, MA. The proposed improvements accommodate the conversion of one-way to two-way traffic flow on roadways connecting to SHLO. George Washington Boulevard is a minor arterial roadway under the jurisdiction of the Massachusetts Department of Transportation.

Design Exception #1: Pedestrian Facilities:

The project requests a design exception for providing a sidewalk width less than the 5 foot minimum (4.5 feet) for an approximate length of 5 feet along the northeast edge of George Washington Boulevard due to the introduction of a new roadway curve (noted below) and the constraint of an existing building. The constriction in the proposed sidewalk is similarly to a normal sidewalk obstruction, such as a utility pole or bench.

Design Exception #2: Bicycle Facilities:

The project requests a design exception for providing a bicycle facility with only one primary direction of vehicular travel for the length of George Washington Boulevard within the project limits (Bay Street to just west of Wharf Avenue). Currently, there is no proposed bicycle lane or shared use path for northbound travel, along the northeast edge of the roadway. Due to site constraints just beyond MassDOT's jurisdiction, in Town layout, it is not feasible to provide buffered or separated bicycle facilities along both sides of the roadway in the Surfside Commercial District, whose pedestrian infrastructure was fully reconstructed with a MassWorks grant approximately 6 years ago. Constraints include existing on-street parking supply and existing buildings located closely to the back of sidewalk. The current design provides an alternate route for northbound bicyclists traveling northbound via the proposed shared use path on Nantasket Ave Connector and an newly proposed bicycle lane on Hull Shore Drive (DCR).

Design Exception #3: Shoulder Width:

The shoulder width will improve over the existing conditions in areas where the roadway has a four-lane section. The proposed 2-foot shoulder has been designed as part of a road diet to provide sufficient room for a separated bicycle facility through the limited segment of SHLO where work is proposed. At the southerly limit of curb modifications, both outside shoulders will match the existing width of 1 foot. Four foot shoulders would result in additional acquisition of land and impacts to existing buildings, shoreland resource areas, and additional utility poles.

Design Exception #4: Horizontal Curve

The proposed horizontal curve radii for curves C6 and C7 was determined based on the need to provide a roadway connection between Nantasket Avenue and George Washington Boulevard. Increasing the radii to the minimum 333 feet would require impacts to two buildings on private property on either side of the roadway. The minimum radius meets the standard for a 25mph design speed. To ensure the safety of roadway users through this area, a reverse curve sign (W1-4) and an advisory speed plaque for 25mph (W13-1P(25)) will be proposed ahead of the alignment change in both directions. The planned road diet to the south of this reverse curve will provide a speed transition segment near the end of SHLO - it is not desirable for motor vehicle traffic to operate in excess of 25 mph through the Surfside Commercial District, which has on-street parking on both sides and a higher level of pedestrian activity.

--- FOR MASSDOT/FHWA USE ONLY ---

APPROVED: \_\_\_\_\_  
(Chief Engineer, MassDOT)

DATE: \_\_\_\_\_

APPROVED: \_\_\_\_\_  
(FHWA)

DATE: \_\_\_\_\_

APPROVED: \_\_\_\_\_  
(Secretary / CEO of MassDOT)

DATE: \_\_\_\_\_

MassDOT Design Justification Workbook

Project: 1

Description: Nantasket Beach Area Two-Way Flow - George Washington Boulevard - Hull, MA

PROJECT SUMMARY

Provide an overview of the project, below. (Include additional pages as necessary.)

*This project proposes improvements to convert the existing roadway network (outside the limits of SHLO) from a one-way to a two-way traffic flow. This conversion is an opportunity to improve roadway connectivity throughout the Nantasket Beach area, reduce seasonal congestion, improve vehicular access and emergency vehicle access to the Nantasket Beach area, and support more direct connections to local businesses. The design as proposed will also provide safety and access improvements for both pedestrians and bicyclists. Most notably, the conversion to two-way flow is expected to slightly reduce operating speeds and eliminate the "multi-lane threat" associated with the existing crosswalks traversing two one-way lanes along Hull Shore Drive and Nantasket Avenue.*

*George Washington Boulevard project limits extend from Nantasket Avenue on the northern end to a point just north of Wharf Avenue at the southern end. Proposed work includes roadway reconstruction to provide a new northbound through movement connection between George Washington Boulevard and Nantasket Avenue with an 11 foot travel lane in each direction. The project includes an existing 5-foot wide southbound bicycle lane that will transition to a new 10-foot shared use path. Sidewalks will be constructed along the northeasterly edge of the roadway to retain pedestrian accommodations. The segment of George Washington Boulevard that connects to Hull Shore Drive will be reconstructed as a perpendicular cross street with two T-intersections and will be renamed to Nantasket Avenue Connector. Between the proposed Nantasket Avenue Connector and Wharf Avenue, improvements are limited to restriping within the existing curb lines and modifications to traffic signs related to wayfinding with the new two-way flow pattern and other signs associated with transitional bicycle accommodations approaching the limits of work.*

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Project: 1

Description: Nantasket Beach Area Two-Way Flow - George Washington Boulevard - Hull, MA

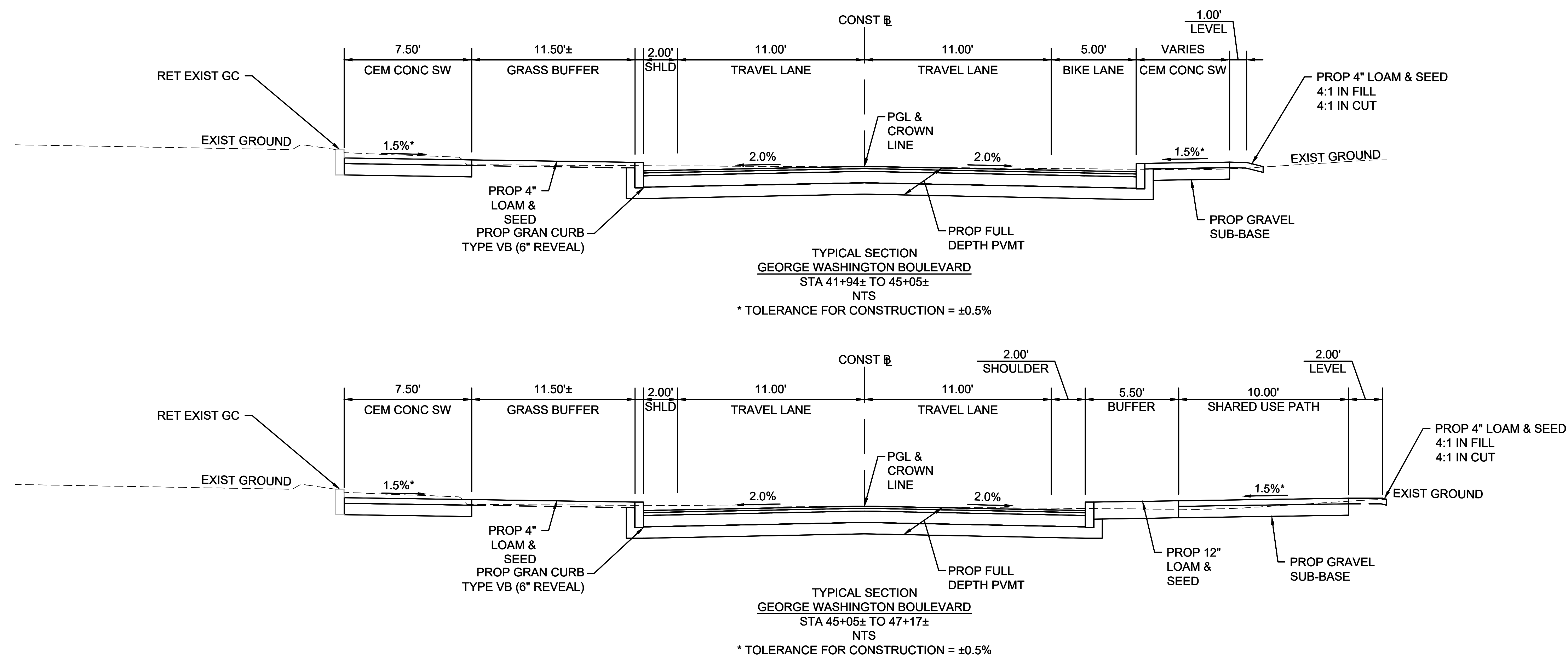
LOCUS MAP



T:\T0597\T0597\_03\CAD\Highway\Graphics\T0597\_03\_Locus Map.dwg 7/6/2022 9:07:54 AM

Figure 1  
Project Location Map





**PAVEMENT NOTES**

**PROPOSED FULL DEPTH PAVEMENT**

SURFACE: 1 3/4" HMA SURFACE COURSE OVER  
1 3/4" HMA INTERMEDIATE COURSE OVER

BASE: 3 1/2" HMA BASE COURSE OVER

SUBBASE: 4" DENSE GRADED CRUSHED STONE OVER  
8" GRAVEL BORROW, TYPE b (COMPACTED) (SEE PAVEMENT NOTE 6 BELOW)

**PROPOSED FULL DEPTH PAVEMENT LESS THAN 4 FEET WIDE**

SURFACE: 1 3/4" HMA SURFACE COURSE OVER  
1 3/4" HMA INTERMEDIATE COURSE OVER

BASE: 6" HIGH EARLY STRENGTH CEMENT CONCRETE BASE COURSE OVER

SUBBASE: 12" GRAVEL BORROW, TYPE b (COMPACTED) (SEE PAVEMENT NOTE 6 BELOW)

**PROPOSED HMA OVERLAY**

SURFACE: 1 3/4" HMA SURFACE COURSE OVER  
VARIABLE HMA LEVELING COURSE AS REQUIRED TO MAINTAIN 2% MIN CROSS SLOPE

**PROPOSED PERMANENT UTILITY TRENCH PATCH**

SURFACE: HMA OVERLAY OVER  
VARIABLE DEPTH (MATCH EXIST TOP COURSE THICKNESS) HMA INTERMEDIATE  
COURSE OVER

BASE: VARIABLE DEPTH (MATCH EXIST BINDER / BASE COURSE THICKNESS) HMA BASE  
COURSE OVER

SUBBASE: 12" GRAVEL BORROW, TYPE b (COMPACTED) (SEE PAVEMENT NOTE 6 BELOW)

**PROPOSED HMA DRIVEWAY (TO MATCH EXISTING)**

SURFACE: 1 1/2" HMA SURFACE COURSE OVER  
2" HMA INTERMEDIATE COURSE OVER

BASE: 8" GRAVEL BORROW, TYPE b (COMPACTED) (SEE PAVEMENT NOTE 6 BELOW)

**PROPOSED CEMENT CONCRETE SIDEWALK / WHEELCHAIR RAMPS  
/SHARED USE PATH/BICYCLE RAMPS**

SURFACE: 4" CEMENT CONCRETE (AIR ENTRAINED, 4000 PSI, 3/4", 610)

BASE: 8" GRAVEL BORROW, TYPE b (COMPACTED)

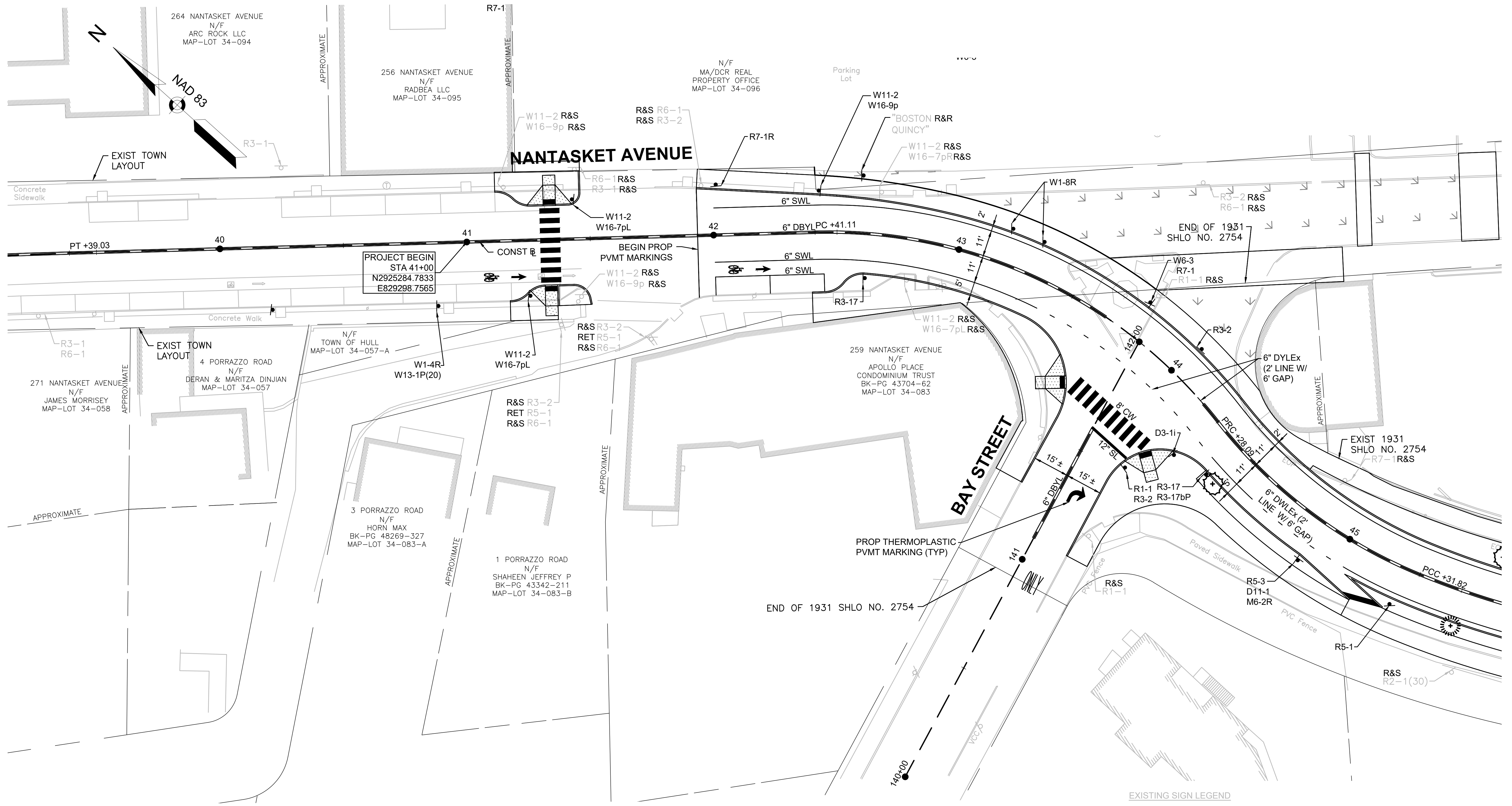
**PROPOSED CEMENT CONCRETE SIDEWALK THROUGH DRIVEWAY**

SURFACE: 6" CEMENT CONCRETE (AIR ENTRAINED, 4000 PSI, 3/4", 610)

BASE: 8" GRAVEL BORROW, TYPE b (COMPACTED)

**GENERAL PAVEMENT NOTES:**

1. ASPHALT EMULSION FOR TACK COAT SHALL BE APPLIED BETWEEN ALL ASPHALT SURFACES AND SAWCUT JOINTS BEFORE PAVING. HMA JOINT SEALANT SHALL BE APPLIED TO ALL COLD JOINTS (LONGITUDINAL AND TRANSVERSE) BEFORE PAVING SURFACE COURSE. ASPHALT EMULSION FOR TACK COAT SHALL BE APPLIED AT A RATE OF 0.05 GAL/SY, EXCEPT OVER MILLED AND CEMENT CONCRETE SURFACES, WHERE THE APPLICATION RATE SHALL BE 0.07 GAL/SY. ALL SURFACES SHALL BE CLEAN OF ALL ORGANICS, DEBRIS, AND SAND PRIOR TO PAVING.
2. ALL HMA SHALL BE PRODUCED WITH WMA ADDITIVE.
3. ALL HMA SHALL BE IN ACCORDANCE WITH SECTION 450.
4. ASPHALT EMULSION FOR TACK COAT SHALL BE RS-1H TO RESIST TRACKING OF TACK BY HAUL VEHICLES.
5. HMA FOR WALKS AND DRIVEWAYS SHALL BE IN ACCORDANCE WITH SECTION 700.
6. ALL GRAVEL BORROW MEETING SPECIFICATION SHALL BE RETAINED IN PLACE, COMPACTED, AND LEVELED AS REQUIRED.

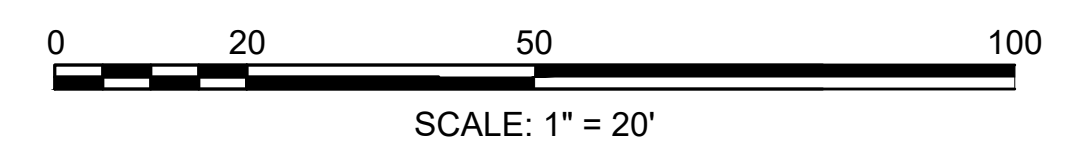


- NOTES:**
1. ALL EXISTING SIGNS WITHIN THE PROJECT LIMITS SHALL BE RETAINED UNLESS INDICATED OTHERWISE ON THE DRAWINGS.
  2. ALL PAVEMENT MARKINGS WITHIN THE LIMITS OF WORK SHALL BE THERMOPLASTIC MATERIALS.
  3. IN AREAS WHERE THE EXISTING PAVEMENT IS BEING RETAINED, ALL EXISTING PAVEMENT MARKINGS IN CONFLICT WITH PROPOSED PAVEMENT MARKINGS SHALL BE REMOVED BY APPROVED METHODS.
  4. A MINIMUM OF 3'-0" PATH OF TRAVEL CLEARANCE, EXCLUDING CURB, IS REQUIRED WHEN PLACING SIGNS.
  5. THE MINIMUM MOUNTING HEIGHT OF POST MOUNTED SIGNS, MEASURED VERTICALLY FROM THE BOTTOM OF THE SIGN TO THE TOP OF THE CURB OR SIDEWALK SHALL BE 7 FEET.

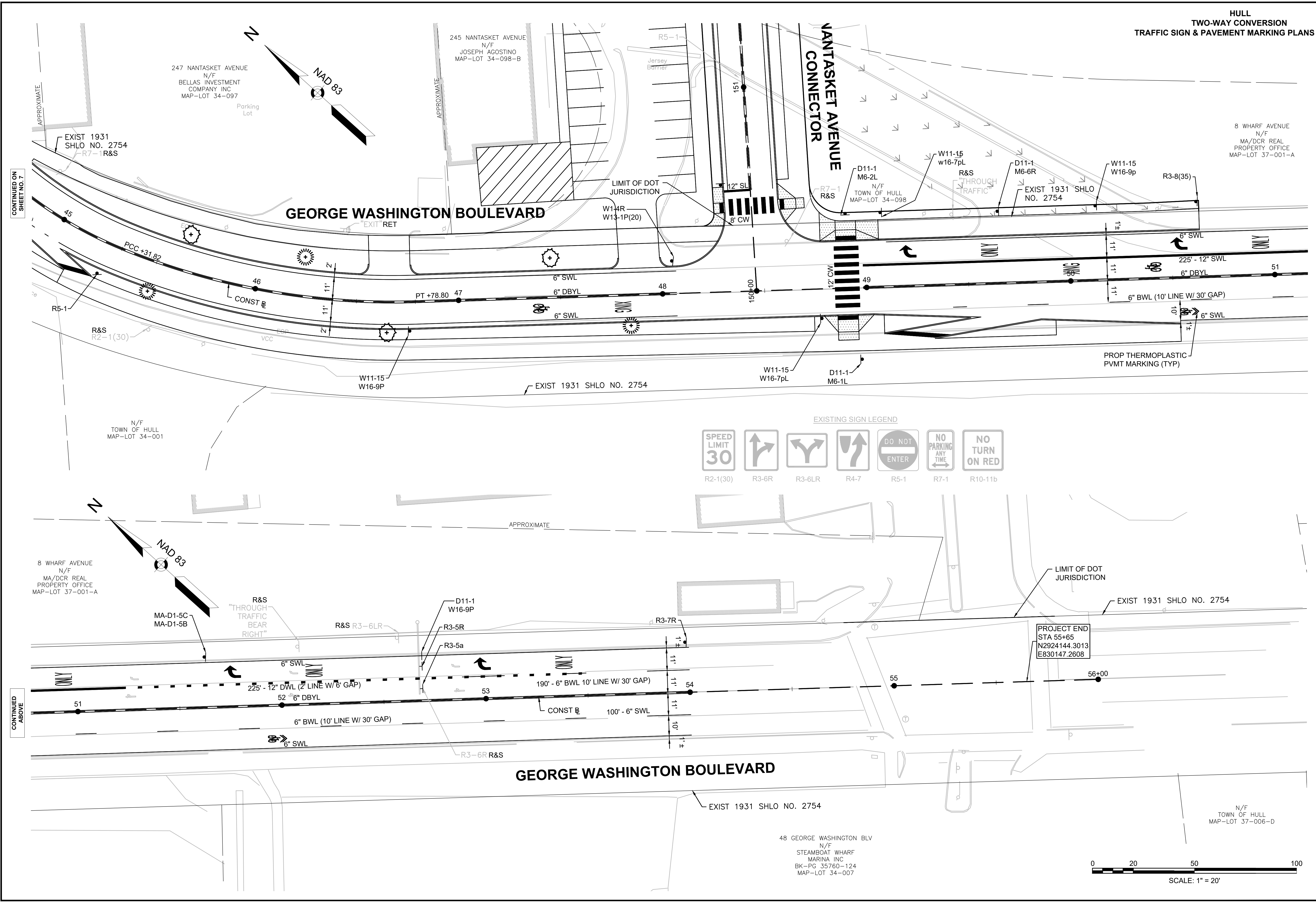
FOR SIGN SUMMARY: SEE SHEET 9

**EXISTING SIGN LEGEND**

R1-1	R2-1(30)	R3-1	R3-2	R5-1	R6-1	R7-1	W11-2	W16-7L	W16-7pR	W16-9p



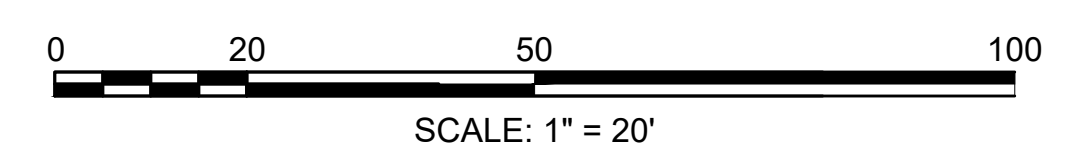
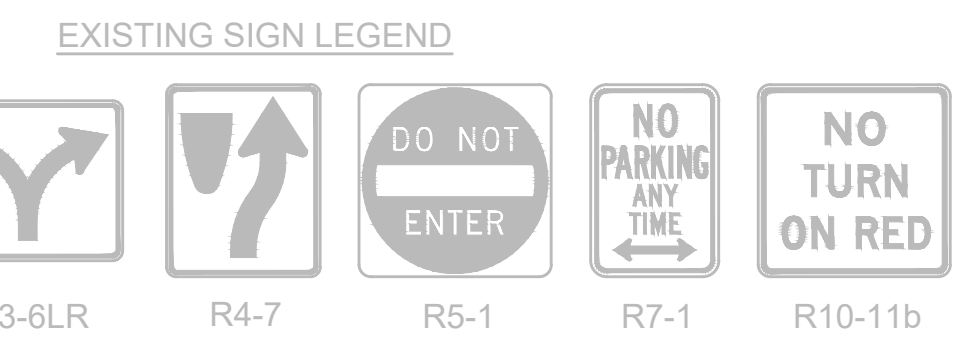
CONTINUED ON SHEET NO. 8



CONTINUED ON  
SHEET NO. 7

CONTINUED  
BELOW

CONTINUED  
ABOVE



247 NANTASKET AVENUE  
N/F  
BELLAS INVESTMENT  
COMPANY INC  
MAP-LOT 34-097  
Parking Lot

245 NANTASKET AVENUE  
N/F  
JOSEPH AGOSTINO  
MAP-LOT 34-098-B

NANTASKET AVENUE  
CONNECTOR

8 WHARF AVENUE  
N/F  
MA/DCR REAL  
PROPERTY OFFICE  
MAP-LOT 37-001-A

N/F  
TOWN OF HULL  
MAP-LOT 34-001

8 WHARF AVENUE  
N/F  
MA/DCR REAL  
PROPERTY OFFICE  
MAP-LOT 37-001-A

PROJECT END  
STA 55+65  
N2924144.3013  
E830147.2608

48 GEORGE WASHINGTON BLV  
N/F  
STEAMBOAT WHARF  
MARINA INC  
BK-PG 35760-124  
MAP-LOT 34-007

N/F  
TOWN OF HULL  
MAP-LOT 37-006-D

MassDOT Design Justification Workbook

Project: 1 Description: Nantasket Beach Area Two-Way Flow - George Washington Boulevard - Hull, MA

FACILITY INFORMATION

Facility: George Washington Boulevard

NHS: NO Design Speed: 25 MPH Functional Classification: MINOR ARTERIAL Roadway Owner: MassDOT

Based on this information, the following design criteria are considered Controlling Criteria for this facility. (This list will also add or remove entries based on the responses in other sheets.)

Table with 2 columns: Facility Type, Status. Rows: Pedestrian Facilities (Not met), Bicycle Facilities (Not met).

Design Speed

(Any criteria that is not considered a "Controlling Criteria" is still a design criteria; the applicable worksheet should still be filled out to document the Designer's decision-making process when selecting these values.) (After completing the workbook, this sheet will serve as a summary for any Controlling Criteria not met.)

Provide a description of the existing roadway and its context, and summarize why the Controlling Criteria above cannot be met. Provide information on alternatives considered; comparison of the safety and operational performance of the roadway and other impacts such as right-of-way, community, environmental, cost, and usability by all modes of transportation; proposed mitigation measures; and compatibility with adjacent sections of roadway. Attach additional pages as necessary.

Existing Conditions: The existing network of streets as part of this project comprises George Washington Boulevard (MassDOT), Hull Shore Drive, and Nantasket Avenue as well as some smaller side streets. Most northbound traffic from George Washington Boulevard northbound is directed onto Hull Shore Drive at Miller's Crossing (Nantasket Avenue - Town/DCR). George Washington Boulevard is generally a four-lane, north-south urban minor arterial roadway under the jurisdiction of the Massachusetts Department of Transportation. The roadway provides a connection to Route 3A in Hingham. South of Wharf Avenue, the roadway has a posted speed limited of 35 mph and is 48 feet wide. There is no on-street parking provided on either side of the roadway in SHLO. Land use along George Washington Boulevard includes retail, commercial, recreational, and residential uses; and abuts shoreline resource areas. Directional flow along the corridor is separated by a double yellow centerline and traffic flow in the same direction is separated by a dashed white lane lines. Sidewalks are provided on both sides of the roadway. No formal bicycle accommodations are currently provided. Proposed Conditions: George Washington Boulevard is proposed to be reconstructed to develop a new "through" roadway connection with a reverse curve between George Washington Boulevard and Nantasket Avenue in the Surfside Commercial District. The segment of George Washington Boulevard that connects to Hull Shore Drive will be reconstructed as a perpendicular cross street with two T-intersections and will be renamed to Nantasket Avenue Connector. The proposed cross section includes an 11 foot travel lane in each direction. The northern end of George Washington Boulevard proposes a 5 foot bicycle lane on the west edge that ties into the existing bicycle lane on Nantasket Avenue and 2 foot shoulder on the east edge. Sidewalks will be constructed on both sides to provide pedestrian accommodation. South of Bay Street, a 10-foot shared use path is proposed with a 2-foot shoulder on the west edge. Between the proposed Nantasket Avenue Connector to Wharf Avenue, improvements are aenerally limited to restripina within the existina curb



lines and modifications to signing along the roadway.

A design exception is required from the provision of providing a 5-foot minimum sidewalk width, bicycle accommodations along both sides of the roadway, and minimum 4 foot outside shoulder widths. Due to the location of an existing building, the sidewalk at a pinch point will be 4.5 to 5 feet wide for a length of 5 feet. Bicycle accommodations are proposed for only southbound travel on George Washington boulevard due to limited available width from the existing buildings located on both sides of the proposed roadway. Bicyclists traveling northbound will be able to use the proposed shared use path on Nantasket Ave Connection and a new striped bicycle lane along Hull Shore Drive as an alternative route. Proposed outside shoulders will be 2 feet. The proposed width will be able to serve the primary function of drainage of the traveled way, and in limited use, provide space for the encroachment of wide vehicles. Although the minimum width of 4 feet is required because of the value it provides for bicycle and pedestrian accommodation, a shared use path or a bicycle lane in combination with sidewalk will be proposed to provide this accommodation.

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FIGURES AND PHOTOGRAPHS



George Washington Boulevard from Mezzo Mare Lot facing southbound



George Washington Boulevard from Mezzo Mare Lot facing northbound



At George Washington Boulevard x Nantasket Avenue fork, northbound

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Description: Nantasket Beach Area Two-Way Flow - George Washington Boulevard - Hull, MA

**FIGURES AND PHOTOGRAPHS**



George Washington Boulevard northbound at Bay Street, at limits of SHLO.

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Project: 1 Description: Nantasket Beach Area Two-Way Flow - George Washington Boulevard - Hull, MA

PEDESTRIAN FACILITIES

Standard not met.

Facility: George Washington Boulevard

If pedestrians are not legally allowed on the facility, check this box and do not fill out this sheet.

(Fill in information about the proposed Pedestrian Accommodations on this facility.)
(For the purposes of this Workbook, the entries for this criterion have been split into several "subcriteria".)

Type of Pedestrian Accommodation: SIDEWALK

Subcriterion: Width Standard not met.

Minimum: 5.0 FT Existing: 6.5 FT Proposed: 4.5 FT

(If the width varies, provide a minimum.)

Source used for minimum: MassDOT Controlling Criteria

Justify the proposed width.

The isolated restriction in the sidewalk width is necessary to introduce horizontal roadway curves to create the through connection between George Washington Blvd and Nantasket Avenue. The sidewalk widens immediately before and after this building-related constriction to a standard sidewalk width of 5 feet or greater. Any other widening would impact two existing retail buildings. This construction would be similar to any other isolated sidewalk obstruction, such as street furniture, light poles, or other utilities.

Subcriterion: Presence

Pedestrian facilities exist on BOTH SIDES of the facility.
Pedestrian facilities are proposed on BOTH SIDES of the facility.

(Check the boxes if any of the following apply:)

- The roadway is in an urbanized area, an urban cluster, or a rural village.
The project involves work on or underneath a bridge.
The roadway is identified as having a High Potential of Walkable Trips in the Pedestrian Plan.

Justify the proposed number of sidewalks.

Pedestrian facilities are proposed along both sides of George Washington Boulevard within the limit of work. A sidewalk is proposed on the east side and both a shared use path and sidewalk is proposed on the west side.

**Subcriterion: Crosswalks at Signalized Intersections**

Crosswalks  provided across every leg of all signalized intersections on the facility.

Justify the proposed value.

*There are no existing signals along George Washington Boulevard within project limits.*

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**Subcriterion: Existing Crosswalk Removal**

Existing crosswalks  been removed from this facility.

Justify the proposed value.

*No crosswalks have been removed.*

---

*(Check the boxes if any of the following apply:)*

- Facility is a side street and pedestrian facilities are not already present within 1500-ft.
- Project involves work only on pavement markings.
- Pedestrians are not legally allowed on the facility.

Based on the preceding responses, the Pedestrian Facilities criterion **has been violated.**

Provide additional justification for why this criterion cannot be met.

*A design exception is being requested for pedestrian facilities. Due to the proposed horizontal alignment and an existing building, a pinch point in the sidewalk exists that results in a minimum sidewalk width of 4.5 feet on the west side of the corridor. This area has a sidewalk width less than the 5 feet for an approximate length of 5 feet. Meeting the minimum sidewalk width would require significant acquisition of property not owned by the Town of Hull in addition to impacts to an existing building. Given the nature of the pinch point in this area, it behaves similarly to an obstruction in the sidewalk rather than a true proposed minimum width of less than 5 feet for a significant stretch of the corridor. The minimum width of 4.5 feet is greater than the 3 foot minimum clear width required to bypass obstructions.*

*The proposed improvements along George Washington Boulevard include a 10-foot shared-use path with 5.5-foot buffer and a minimum 7-foot wide sidewalk along the west side of the street, and a typical 7.5 feet wide sidewalk along the east side of the street. The project has been designed to provide a safe, accessible space for pedestrians and bicyclists and remove them from direct conflict with vehicular traffic.*

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BICYCLE FACILITIES

Standard not met.

Facility: George Washington Boulevard

If bicyclists are not legally allowed on the facility, check this box and do not fill out this sheet.

(Fill in information about the proposed Bicycle Accommodations on this facility.)
(For the purposes of this Workbook, the entries for this criterion have been split into several "subcriteria".)

Subcriterion: Type

Type of Bicycle Accommodation: SHARED USE PATH
Posted or statutory speed of facility: 30 MPH
Facility volume (vehicles per day): 3,252
Number of travel lanes (in each direction): 2 (If this varies, use the higher number.)
The roadway is classified as a corridor with a High Potential for Everyday Biking in the Bike Plan.

Justify the proposed value.

The proposed design introduces a 10-foot shared use path at Bay Street, near the limits of SHLO, where an existing striped bicycle lane will transition to an separate facility in this short segment of SHLO between Bay Street and (just west of) Wharf Avenue. There is potential for a future SUP extension along the southwesterly edge of George Washinton Avenue based on prior documents from CTPS and active conversations with DCR.

Subcriterion: Width

(Width excludes any buffer areas.)
Minimum: 10.0 FT Existing: 0.0 FT Proposed: 10.0 FT
(If the width varies, provide a minimum.)
Source used for minimum: MassDOT Controlling Criteria

Justify the proposed value.

The existing striped bicycle lane is 5 feet wide. The proposed shared-use path is proposed to be 10-feet with a minimum 5.5-feet buffer as part of a planned road diet where the existing four-lane section is not utilized.

**Subcriterion: Presence**

Bicycle facilities exist on

NEITHER SIDE

Standard not met.

Bicycle facilities are proposed on

ONLY ONE DIRECTION OF VEHICULAR TRAVEL

of the facility.

of the facility.

*(If this is a one way road, a one-way facility in the direction of vehicular travel satisfies the requirement for "each".)*

Justify the proposed value.

*The existing segment of Nantasket Avenue, just beyond the limits of SHLO, cannot accommodate a northbound bicycle lane without significant impacts to on-street parking in the commercial district and/or building impacts. The project provides an alternate northbound bicycle route using a proposed shared use path on Nantasket Ave Connector and a proposed striped bicycle lane on Hull Shore Drive northbound.*

*(Check the boxes if any of the following apply:)*

- Facility is a side street and bicycle facilities are not already present within 1500-ft.
- Project involves work only on sidewalks or curb ramps.
- The roadway has a functional classification of "local".
- Bicyclists are not legally allowed on the facility.

Based on the preceding responses, the Bicycle Facilities criterion **has been violated.**

Provide additional justification for why this criterion cannot be met.

*A design exception is being requested for bicycle accommodations. George Washington Boulevard as currently proposed provides a 5 foot bicycle lane and 10 foot shared use path along the west edge of the corridor. Given the site constraints, it is not feasible to provide satisfactory bicycle accommodations along both sides of the roadway. There is limited width available around station 43+00 to 44+50 due to the existing ROW lines and the two existing buildings on either side of the roadway. This limited width allows for one bicycle lane which was chosen to be proposed on the west edge to maintain continuity with the existing bicycle lane on Nantasket Avenue southbound. To propose a bicycle lane or shared use path along the east side of the corridor would involve impacts to an existing building. Furthermore, it would involve an additional impacts to two utility poles that are currently proposed as being retained. South of proposed Nantasket Avenue Connector, the project begins to tie into existing George Washington Boulevard with improvements limited to pavement markings. A series of sharrows will be added to the outermost southbound travel lane to provide a transitional features where the shared use path ends just north of the intersection at Wharf Avenue.*

*Existing George Washington Boulevard currently has no bike facilities along the corridor and will be improved by the introduction of a shared use path, principally intended for southbound travel. The project as proposed will provide an alternative option for bicyclists traveling northbound via Hull Shore Drive. Bicyclists approaching from the south, looking to reach the northern limits of the project to Phipps Street can utilize the shared use path along the southern edge of Nantasket Avenue Connector, cross Nantasket Avenue / Hull Shore Drive, and then follow the bicycle lane along the east edge of Hull Shore Drive to travel northbound. Bicyclists will also have the option to utilize the proposed shared use path and bicycle lane along the east edge of Nantasket Avenue (not SHLO) by using the proposed shared use path along the northern edge of Water Street. This will provide a connection between the bicycle facilities along both streets.*

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TRANSIT ACCOMMODATION

Criterion not applicable.

Facility: George Washington Boulevard

(Check the boxes if any of the following apply:)

- Project is not within the service district of any of the RTAs or of the MBTA.
- There are no existing or proposed RTA/MBTA transit services on the roadway.
- Pedestrians are not legally allowed on the facility.

Service District: NONE

Based on the previous responses, Transit Accommodation is not applicable. Do not fill out this sheet.

(Fill in information about the proposed Transit Accommodations on this facility.)

(For the purposes of this Workbook, the entries for this criterion have been split into several "subcriteria".)

Subcriterion: Coordination

- The 25 Percent Design plans were sent the applicable RTA or the MBTA.

Subcriterion: Crosswalks

Crosswalks or other means of facilitating pedestrian access across the road within 250 feet of all bus stops.  provided

Justify the proposed value.

There are no transit services located within the project area.

Subcriterion: Amenities

(Check the boxes if any of the following apply:)

- There is a bus stop present within the project limits with 100 or more boardings per day.
- All bus stops with 100 or more boardings per day have a bench or shelter.

Justify the proposed value.

There are no transit services located within the project area.



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**Subcriterion: Transit Priority**

Transit route headways:  (Consider ALL buses that use the corridor, not just a single route.)

Some form of transit priority treatment is provided on the corridor.

Describe the type of transit priority treatments that are provided on the corridor.

*There are no transit services located within the project area.*

Justify the proposed value.

*There are no transit services located within the project area.*

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Based on the preceding responses, the Transit Accommodation criterion is not applicable.

Additional comments may be provided in the box below.

N/A

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RAMP LENGTH

Criterion not applicable.

Facility:

(Check the boxes if any of the following apply:)

- Project does not involve work at an interchange.
- Work on the on- or off-ramp does not constitute *new construction* or *major reconstruction/reconfiguration*.

**Based on the previous responses, Ramp Length is not applicable. Do not fill out this sheet.**

(Fill in information about the proposed Ramp Length on this facility.)

Minimum Ramp Length:  FT

Existing Ramp Length:  FT

Proposed Ramp Length:  FT

Based on the preceding responses, the Ramp Length criterion is not applicable.

Additional comments may be provided in the box below.

*The project does not include any work at an interchange.*

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Project: 1 Description: Nantasket Beach Area Two-Way Flow - George Washington Boulevard - Hull, MA

DESIGN SPEED

Facility:

(Fill in all known information about the proposed Design Speed on this facility.)

Minimum Design Speed:

Maximum Design Speed:

Source used for range:

Justify use of this source for the range of design speeds.

*George Washington Boulevard is designated an urban minor arterial per MassDOT's jurisdiction mapping. The end of SHLO is within the Surfside Commercial District with the presence of on-street parking on both sides of the roadway (Nantasket Avenue) as it meets the end of George Washington Blvd.*

Existing Design Speed:

Posted Speed Limit:

Proposed Design Speed:

Statutory Speed Limit:

Based on the preceding responses, the Design Speed criterion has been satisfied.

Additional comments may be provided in the box below.

*The proposed design speed due to the context of the sense village shopping district with significant pedestrian and bicycle use. See 'Horizontal Curve' and 'SSD' sections for speed warning placards for 20 mph for Curves C6 and C7. The northerly end of George Washington Blvd currently operates under stop sign control, but will be modified as a through street as part of the project. Traffic in the southbound direction currently operates as a right-turn with a lower corner radius when compared with the proposed condition. Therefore, motor vehicle traffic is accustomed to traveling at 20 mph or less in this area.*

**MassDOT Design Justification Workbook**

Project: 1 Description: Nantasket Beach Area Two-Way Flow - George Washington Boulevard - Hull, MA

**DESIGN LOADING STRUCTURAL CAPACITY**

Criterion not applicable.

Facility:

**If there are no bridges or structures in the project, check this box and do not fill out this sheet.**

*(Fill in information about the proposed Design Loading Structural Capacity on this facility.)*

Minimum Loading:  Proposed Loading:

Source used for minimum:

Justify use of this source for the minimum loading.

Based on the preceding responses, the Design Loading criterion is not applicable.

Additional comments may be provided in the box below.

MassDOT Design Justification Workbook

Project: 1 Description: Nantasket Beach Area Two-Way Flow - George Washington Boulevard - Hull, MA

LANE WIDTH

Criterion not applicable.

Facility: George Washington Boulevard

(Fill in information about the proposed Lane Width on this facility.)

Minimum Lane Width:	11.0 FT	Proposed Lane Width:	11.0 FT
Maximum Lane Width:	12.0 FT		
Source used:	MassDOT PDDG, Exhibit 5-14		

Justify the value and the use of this source (if not the PDDG) for the lane width.

George Washington Boulevard is designated an minor arterial per MassDOT's jurisdiction mapping.

Based on the preceding responses, the Lane Width criterion is not applicable.

Additional comments may be provided in the box below.

N/A

MassDOT Design Justification Workbook

Project: 1 Description: Nantasket Beach Area Two-Way Flow - George Washington Boulevard - Hull, MA

SHOULDER WIDTH

Criterion not applicable.

Facility: George Washington Boulevard

(Fill in information about the proposed Shoulder Width on this facility.)  
(For the purposes of this Workbook, the entries for this criterion have been split into several "subcriteria".)

Subcriterion: Outside Shoulder

Standard not met.

Min. RT (Outside) Shoulder Width: 4.0 FT<sup>(1)</sup> Proposed RT (Outside) Shoulder Width: 2.0 FT  
Max. RT (Outside) Shoulder Width: 12.0 FT  
Source used for range: MassDOT PDDG, Exhibit 5-12  
Function of shoulder: Drainage of Traveled Way

Justify the value, the intended function, and the use of this source (if not the PDDG) for the outside shoulder width.

The should width improves over the existing conditions in areas where the roadway has a four-lane section. The proposed 2-foot shoulder has been designed as part of a road diet to provide sufficient room for separated bicycle facility through the limited segment of SHLO where work is proposed. At the southerly limit of curb modifications, both outside shoulders will match the existing width of 1 foot.

<sup>(1)</sup> Along the right side of freeways, 10-foot shoulders should be provided. The right shoulder should be increased to 12 feet when truck and bus volumes are greater than 250 per hour. An additional 2-foot offset from the edge of the shoulder is required to vertical elements over 6-inches in height (such as guardrail).

Subcriterion: Inside Shoulder

Min. LT (Inside) Shoulder Width: 0.0 FT Proposed LT (Inside) Shoulder Width: 0.0 FT  
Source used for minimum: MassDOT PDDG

Justify the value and the use of this source (if not the PDDG) for the inside shoulder width.

No inside shoulders are present or proposed within the project limits.

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Based on the preceding responses, the Lane Width criterion is not applicable.

Additional comments may be provided in the box below.

*The proposed street cross-section will provide an appropriate transition between the wider segment of SHLO before reaching the existing narrower section of Nantasket Avenue within the Surfside Commercial District.*

MassDOT Design Justification Workbook

Project: 1 Description: Nantasket Beach Area Two-Way Flow - George Washington Boulevard - Hull, MA

HORIZONTAL CURVE RADIUS

Criterion not applicable.

Facility: George Washington Boulevard

If there are no horizontal curves in the project, check this box and do not fill out this sheet.

(Fill in information about the proposed horizontal curvature on this facility.)

Min. Horizontal Curve Radius 333 FT Proposed Horizontal Curve Radius 200.0 FT

(If there are multiple curves, provide the smallest radius used and attach the alignment report.)

Source used for minimum: AASHTO Green Book Table 3-13

Justify use of this source for the horizontal curve radius.

The proposed horizontal curve radii for the reverse curve (Curves C6 and C7) was determined based on the need to provide a roadway connection between Nantasket Avenue and George Washington Boulevard. Increasing the radii to the minimum 333 feet would require impacts to two buildings on private property on either side of the roadway. The minimum radius meets the standard for a 20 mph design speed. To ensure the safety of roadway users through this area, a reverse curve sign (W1-4) and an advisory speed plaque for 20mph (W13-1P(25)) will be proposed ahead of the alignment change in both directions. The planned road diet to the south of this reverse curve will provide a speed transition segment near the end of SHLO - it is not desirable for motor vehicle traffic to operate in excess of 20 to 25 mph through the Surfside Commercial District, which has on-street parking on both sides and a higher level of pedestrian activity.

Based on the preceding responses, the Curve Radius criterion is not applicable.

Standard not met.

Additional comments may be provided in the box below.

Minimum curve radii standard is not met for two curves within the project limits on George Washington Boulevard at the limit of SHLO:  
C6 - station 42+41.11 to 44+28.09 has a proposed radius = 200'  
C7 - station 44+28.09 to 45+31.82 has a proposed radius = 200'



MassDOT Design Justification Workbook

Project: 1 Description: Nantasket Beach Area Two-Way Flow - George Washington Boulevard - Hull, MA

SUPERELEVATION RATE

Criterion not applicable.

Facility: George Washington Boulevard

If there are no superelevated curves in the project, check this box and do not fill out this sheet.

(Fill in information about the proposed Superelevation Rate on this facility.)

Maximum Superelevation Rate: 2.0 % Proposed Superelevation Rate: 2.0 %

(If there are multiple superelevated curves, provide the largest rate used and attach the alignment report.)

Source used for minimum: AASHTO Green Book Section 3.3.3.2

Justify use of this source for the superelevation rate.

For urbanized areas, designers should avoid using superelevation to the extent possible for design speeds lower than 35 mph and use normal crown.

Based on the preceding responses, the Superelevation criterion is not applicable.

Additional comments may be provided in the box below.

N/A

MassDOT Design Justification Workbook

Project: 1 Description: Nantasket Beach Area Two-Way Flow - George Washington Boulevard - Hull, MA

STOPPING SIGHT DISTANCE

Criterion not applicable.

Facility: George Washington Boulevard

(Fill in information about the proposed SSD on this facility.)

(For the purposes of this Workbook, the entries for this criterion have been split into several "subcriteria".)

Subcriterion: SSD

Standard not met.

Minimum SSD: 205.0 FT

Proposed SSD: 160.0 FT

Source used for minimum: MassDOT PDDG, Section 3.7, Exhibit 3-8

Justify the use of this source for the stopping sight distance.

Meeting the stopping sight distance guidance would result in significant acquisition of property not owned by the Town of Hull in addition to impacts to either one or two existing buildings in order to propose an alignment with a "flatter" curve throughout this area. There are no other feasible means to flatten the horizontal reverse curve without building acquisition.

Subcriterion: SSD Middle Ordinate

Standard not met.

Minimum SSD: 26.5 FT

Proposed SSD: 13.3 FT

(If the middle ordinate is not applicable, leave blank.)

Source used for minimum: MassDOT PDDG, Section 4.2.2, Exhibit 4-5

Justify use of this source for the SSD middle ordinate.

The minimum middle ordinate was calculated for the controlling curve C6 at Sta 43+06.9 (14.99 feet) and Sta 44+43.6 (13.28 feet) using the equation provided in Section 4.2.2. Meeting the middle ordinate would result in significant acquisition of property not owned by the Town of Hull in addition to impacts to either one or two existing buildings in order to propose an alignment with a "flatter" curve throughout this area.

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Based on the preceding responses, the SSD criterion is not applicable.

Additional comments may be provided in the box below.

*The maximum proposed grade is 1.35%. Using the design speed of 30 mph and the 3% downgrade column, the minimum stopping sight distance is 205 feet. A design exception is being requested for stopping sight distance.*

*The SSD middle ordinate is not met for curves C6 and C7 from station 42+41.11 to 45+31.82 due to existing buildings located along George Washington Boulevard and Nantasket Avenue. To mitigate the safety of roadway users through this area, a reverse curve sign (W1-4) and an advisory speed plaque for 20 mph (W13-1P(20)) will be proposed ahead of the alignment change in both directions. At 20 mph, the minimum middle ordinate can be as low as 8 feet with a corresponding stopping sight distance of 158 feet.*

MassDOT Design Justification Workbook

Project: 1 Description: Nantasket Beach Area Two-Way Flow - George Washington Boulevard - Hull, MA

MAXIMUM GRADE

Criterion not applicable.

Facility: George Washington Boulevard

(Fill in information about the proposed grade on this facility.)

Maximum Grade: 8 %

Proposed Grade: 1.4 %

(Where the grade varies, provide the maximum value used.)

Source used for minimum: MassDOT PDDG, Exhibit 4-21

Justify use of this source for the grade.

George Washing Boulevard is a minor arterial in an urban area with level terrain and a design speed of 30 mph, which equates to a maximum grade of 8%.

Based on the preceding responses, the maximum grade criterion is not applicable.

Additional comments may be provided in the box below.

N/A

MassDOT Design Justification Workbook

Project: 1 Description: Nantasket Beach Area Two-Way Flow - George Washington Boulevard - Hull, MA

CROSS SLOPE

Criterion not applicable.

Facility: George Washington Boulevard

(Fill in information about the proposed roadway cross slope on this facility.)

Maximum Cross Slope (HMA): 2.0 %

Maximum Cross Slope (Conc): 1.6 %

Proposed surface: HMA

Proposed Cross Slope: 2.0 %

(Where the grade varies, provide the maximum value used.)

Source used for minimum: MassDOT PDDG, Section 5.5.2

Justify use of this source for the cross slope.

The project proposes a HMA surface.

Based on the preceding responses, the cross slope criterion is not applicable.

Additional comments may be provided in the box below.

N/A

MassDOT Design Justification Workbook

Project: 1 Description: Nantasket Beach Area Two-Way Flow - George Washington Boulevard - Hull, MA

VERTICAL CLEARANCE

Criterion not applicable.

Facility: George Washington Boulevard

If there are no bridges or structures in the project, check this box and do not fill out this sheet.

*(Fill in information about the proposed Vertical Clearance on this facility.)*

Minimum Vertical Clearance: FT Proposed Vertical Clearance: FT

*(If there are multiple structures, provide the lowest value.)*

Source used for minimum: MassDOT PDDG, Exhibit 4-28

Justify use of this source for the vertical clearance.

N/A

Based on the preceding responses, the vertical clearance criterion is not applicable.

Additional comments may be provided in the box below.

N/A