

## MASSDOT DESIGN JUSTIFICATION WORKBOOK

### CORRIDOR IMPROVEMENTS ON WASHINGTON STREET (ROUTE 138)-STOUGHTON

PROJECT 607403

9-Oct-20; Revised 11-Feb-21, Revised 09-March-21

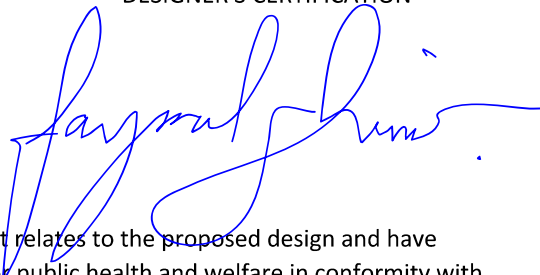
**PREPARED BY:**

Nitsch Engineering  
2 Center Plaza, Suite 430  
Boston, MA 02108

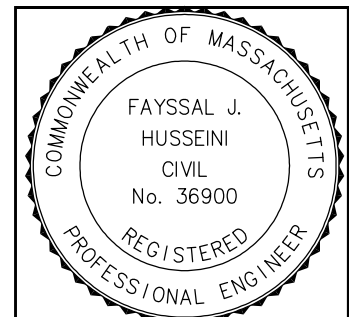
**PREPARED FOR:**

Massachusetts Department of Transportation  
Highway Division, MassDOT District 5 Office  
1000 County Street  
Taunton, MA 02780

--- 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: Fayssal J. Hussein, PE, PTOE, LEED GA

DATE: 03/09/2021

TITLE: Vice President - Transportation

FIRM: Nitsch Engineering

### MassDOT Design Justification Workbook

Project: 607403 Description: CORRIDOR IMPROVEMENTS ON WASHINGTON STREET (ROUTE 138)-STOUGHTON

#### SUMMARY OF JUSTIFICATIONS

The project meets all applicable design criteria, except for the following two criteria:

**-Stopping Sight Distance:**

Two existing crest vertical curves do not meet the required K-Value, which results in lower than warranted SSD at these two curves. Lowering the roadway to meet the required design speed would result in significant utility modifications, grading, and impacts to abutting driveways and properties.

**-Pedestrian Accommodations:**

Sidewalks along both sides of Washington Street are proposed from Station 39+00 to the intersection with York Street at Station 27+50. North of the York Street intersection, from the northerly project limit at Route 138 (Construction baseline Station 11+45 to Station 27+50), sidewalks are only proposed on the westerly side of Washington Street to the Canton Town Line (Station 12+70) and to the northerly project limits (Station 11+45). No existing sidewalks are present along either side of this stretch of Washington Street. One sidewalk along Washington Street is provided due to restrictive topography, environmental impacts, and ROW impacts.

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

APPROVED:



(Chief Engineer, MassDOT)


DATE: 7/7/2021

APPROVED:

(FHWA)

DATE:

APPROVED:

  
Jamey Tesler (Feb 15, 2022 11:26 EST)

(Secretary / CEO of MassDOT)

DATE: 02/15/2022



## MassDOT Design Justification Workbook

Project: 607403

Description: CORRIDOR IMPROVEMENTS ON WASHINGTON STREET (ROUTE 138)-STOUGHTON

### PROJECT SUMMARY

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

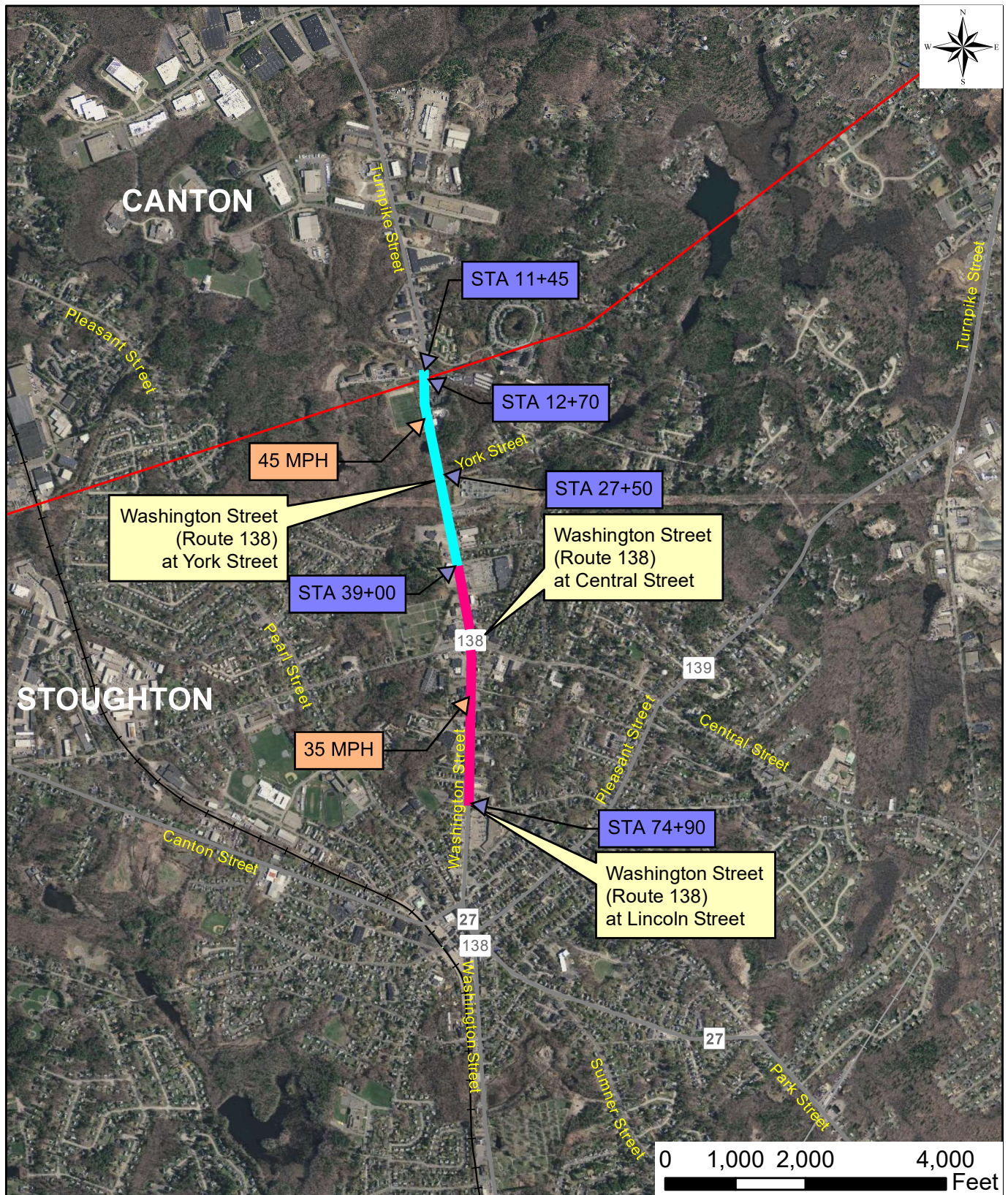
Route 138 is a state-numbered route extending from Milton, MA south to Somerset, MA. In Stoughton, Route 138 is Washington Street and is the main north-south roadway through the town center. Washington Street (Route 138) is classified by MassDOT as an urban principal arterial within the study area. It is listed as a National Highway System (NHS) principal arterial in the MassDOT Road Inventory GIS system. It is under MassDOT jurisdiction north of Lincoln Street, and it is under Town of Stoughton jurisdiction from Lincoln Street southward through the town center. It is an undivided two-lane roadway within the study area, except from the Stop & Shop driveway south to Central Street where it is a four-lane roadway. A 0.2-mile passing zone for both directions is present between Phillips Avenue and Glen Street, and a northbound passing zone is present for 350 feet south of York Street. The existing pavement is generally in good condition. Pavement markings are in good condition in localized areas but in poor condition overall, largely faded throughout the corridor.

The regulatory speed limit on Washington Street is 45 miles per hour (MPH) from the northern study limit to the Stop & Shop driveway (Station 11+45 to 39+00), and it is 35 MPH from the Stop & Shop driveway to the southern study limit (Station 39+00 to 74+90). This project's purpose is to incorporate safety enhancements outlined in the Road Safety Audit (RSA) report while maintaining acceptable levels of service at the Stop & Shop driveway and improving operations at the York Street intersection. Currently, the project corridor poses several operational and safety issues, including high crash frequency in some segments, as well as substandard bicycle and pedestrian facilities. Existing sidewalks, where present in the proposed corridor, directly abut the roadway, and some are in poor condition. There are no bicycle accommodations present along the corridor.

The proposed project limits begin at the Stoughton/Canton Town Line, and extend southerly to the intersection with Lincoln Street. The proposed northerly limits meet a separate MassDOT Project (Proj #608484), and the proposed cross section is to be consistent amongst the two projects. The Town of Stoughton is performing a capital improvements project of Washington Street from Lincoln Street to the Center of Stoughton.

Project improvements include new traffic signal installation at the York Street intersection, sidewalk reconstruction in compliance with current Americans with Disabilities Act (ADA) and Massachusetts Architectural Access Board (MAAB) guidelines, and providing buffered bicycle lanes to address MassDOT's Complete Streets and GreenDOT Initiatives. Furthermore, a flashing beacon will be installed in advance of the York Street intersection and Rectangular Rapid Flashing Warning Beacon (RRFB) systems will be installed at mid-block crossings. Proposed improvements also include, pavement milling and overlay, full depth pavement box widening, drainage improvements, traffic markings, traffic signs, and other incidental work.





**Figure 1 – Locus Map**  
 Washington Street (Route 138)  
 Stoughton, MA



# MassDOT Design Justification Workbook

Project: 607403 Description: CORRIDOR IMPROVEMENTS ON WASHINGTON STREET (ROUTE 138)-STOUGHTON

## FACILITY INFORMATION

Facility: Washington Street (Route 138) (Station 11+45 to Station 39+00)

NHS: YES Design Speed: 50 MPH Functional Classification: PRINCIPAL 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.)

Pedestrian Facilities Not met

Bicycle Facilities

Shoulder Width

Horizontal Curve Radius

Stopping Sight Distance Not met

Design Speed

Maximum Grade

Cross Slope

Lane Width

(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.

Route 138 is a state-numbered route extending from Milton, MA south to Somerset, MA. In Stoughton, Route 138 is Washington Street and is the main north-south roadway through the town center. Washington Street (Route 138) is classified by MassDOT as an urban principal arterial within the study area. The regulatory speed limit on Washington Street is 45 miles per hour (MPH) from the northern study limit to the Stop & Shop driveway (Station 11+45 to 39+00), and it is 35 MPH from the Stop & Shop driveway to the southern study limit (Station 39+00 to 74+90). This project's purpose is to incorporate safety enhancements outlined in the Road Safety Audit (RSA) report while maintaining acceptable levels of service at the Stop & Shop driveway and improving operations at the York Street intersection. Currently, the project corridor poses several operational and safety issues, including high crash frequency in some segments, as well as substandard bicycle and pedestrian facilities. Existing sidewalks, where present in the proposed corridor, directly abut the roadway, and some are in poor condition. There are no bicycle accommodations present along the corridor.

The project meets all applicable design criteria, except for the following two criteria:

-Stopping Sight Distance (SSD):

Two existing crest vertical curves do not meet the required K-Value, which results in lower than warranted SSD at these two curves. Lowering the roadway to meet the required SSD would result in significant utility modifications, grading, and impacts to abutting driveways and properties.

One existing sag vertical curve, PVI at Station 23+10, does not meet the minimum K-value, which results in lower than warranted SSD/HSD. Raising the roadway elevation to meet the required K-Value and SSD/HSD would result in significant fill requiring retaining walls, environmental impacts, and utility modifications.

-Pedestrian Accommodations:

Sidewalks along both sides of Washington Street are proposed from Station 39+00 to the intersection with York Street at Station 27+50. North of the York Street intersection, sidewalks are only proposed on the westerly side of Washington Street to the Canton Town Line (Station 12+70) & northerly limits (Station 11+45). No existing sidewalks are present along either side of this stretch of Washington Street. One sidewalk along Washington Street is provided due to restrictive topography, environmental impacts, and ROW impacts.



Washington Street at Stop and Shop Signal  
Looking North (Source: Google)



Washington Street near STA 37+00 Looking  
North (Source: Google)



Existing Transmission Line Retaining Wall  
along West Side Near STA 30+00 Looking  
North (Source: Google)



Existing York Street Intersection Looking South  
(Source: Google)



Existing Slope/Guardrail along East Side Near  
STA 25+00 Looking East (Source: Google)

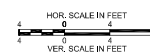
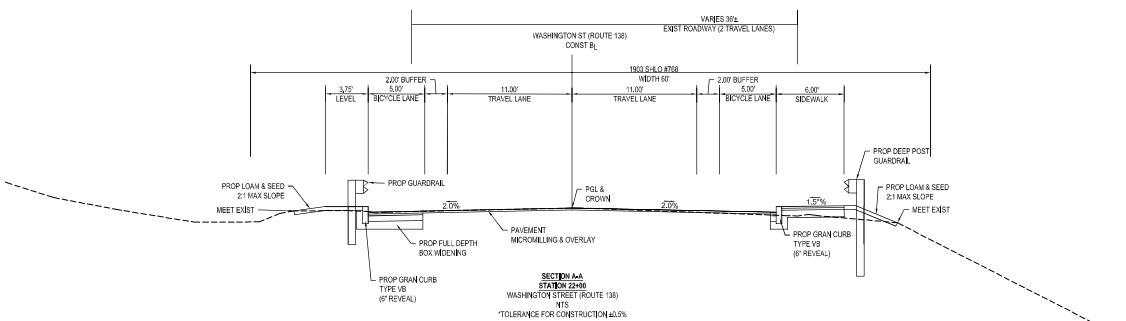




Washington Street near STA 23+00 Looking North (Source: Google)



Washington Street near STA 15+00 Looking North (Source: Google)



### MassDOT Design Justification Workbook

Project: 607403 Description: CORRIDOR IMPROVEMENTS ON WASHINGTON STREET (ROUTE 138)-STOUGHTON

#### PEDESTRIAN FACILITIES

Standard not met.

Facility: Washington Street (Route 138) (Station 11+45 to Station 39+00)

☐ 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

Minimum: 5.0 FT

Existing: 0.0 FT

Proposed: 5.5 FT

(If the width varies, provide a minimum.)

Source used for minimum: MassDOT Controlling Criteria

Justify the proposed width.

Town of Stoughton requested 6.0' sidewalk (inclusive of curb).  
Sidewalk exists on west side from Station 34+50 to 39+00 (5.0' min)

#### Subcriterion: Presence

Pedestrian facilities exist on

NEITHER SIDE

of the facility.

Pedestrian facilities are proposed on

ONE SIDE

of the facility.

Standard not met.

(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.

Per MassDOT GIS (03/20/20) Potential for Walkable Trips is rated "9 - Lowest" within this area of the project.

**Subcriterion: Crosswalks at Signalized Intersections**

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

Justify the proposed value.

*Crosswalks proposed at all 3 legs of the Washington Street/York Street Intersection.*

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**Subcriterion: Existing Crosswalk Removal**

Existing crosswalks HAVE NOT been removed from this facility.

Justify the proposed value.

*No existing crosswalks are being removed.*

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*(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.

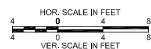
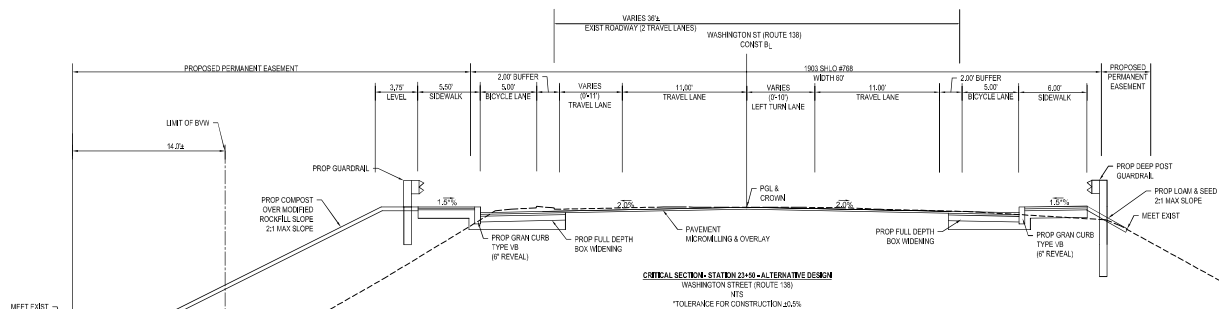
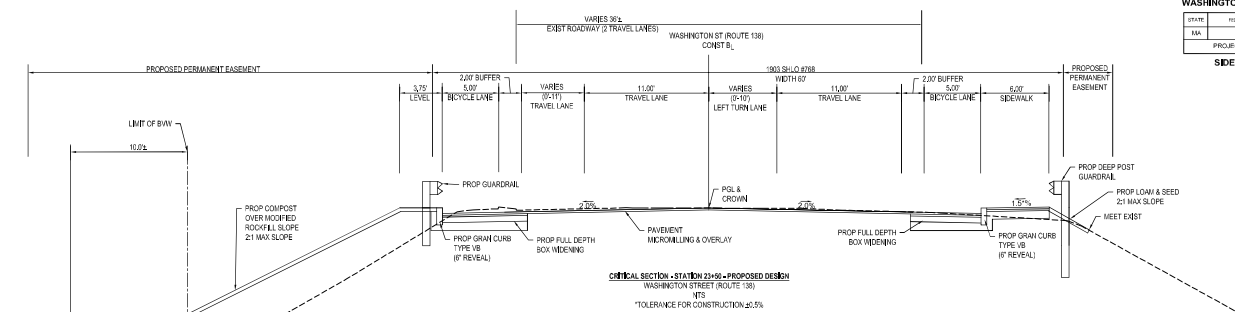
*Sidewalks are proposed on both sides of Washington Street South of the York Street Intersection (Station 27+50 to Station 39+00). Therefore, the design criteria is met south of the intersection of York Street. The design exception is requested for the sidewalk along one side of Washington Street proposed north of the York Street intersection to the Canton Town Line (Station 27+50 to Station 12+70), and to the project limits at Station 11+45.*

*For Washington Street north of York Street, no sidewalks exist on either side of the roadway. There are no transit facilities north of the Central Street intersection. There are isolated commercial properties along the east side of Washington Street. Near the northerly limits, there are residential apartments and other commercial properties along the west side of Washington Street. The existing topography has steep foreslopes and back slopes along the westerly side, and steep backslopes on the easterly side. There are existing wetlands and an Article 97 property on the easterly side. The existing slope on the easterly side begins at the existing guardrail posts, so widening within this area will result in slope work directly adjacent to wetland areas. A sidewalk is proposed on the westerly side because there is an existing level area before the slopes begin and there are no bordering wetlands. The sidewalk will also provide a pedestrian connection from the residential apartments at the project limits through the project limits southerly. The proposed sidewalk is proposed to terminate at the Canton Town Line, where a separate MassDOT project will continue to sidewalk northerly. The preferred design proposes a 2:1 slope on the east side of the roadway, with about 625 SF of wetland impacts. The wetlands can be replicated near Station 24+00 to 24+50, where there is approximately 1,700 SF of level area outside the wetland area. This option also limits permanent easements within the Article 97 property. The proposed design provides a new sidewalk connection along Washington Street from York Street to the Canton Town Line. It also connects to an existing sidewalk along York Street.*

*Attached herein are critical cross-sections showing the proposed sidewalk on the westerly side, and cross sections showing the impacts of constructing sidewalks on both sides of Washington Street.*

*By adding a sidewalk along the easterly side of Washington Street, the proposed 2:1 slope will be extended further into the wetland area at the bottom of the slope. The additional sidewalk will yield an additional 475 SF of wetland impacts, for a total of 1,100 SF. The sidewalk will also require the permanent easement to increase by about 2,500 SF on the Article 97 property. There is an existing concrete box culvert that crosses under Washington Street, the addition of the sidewalk on the east side would require this culvert be extended to the face of the new slope. The sidewalk will not provide a connection to an existing sidewalk at the project terminus, but users can still access waypoints north by crossing at the York Street signalized intersection and continuing north on the proposed sidewalk on the west side of the road. The total estimated additional construction cost to add the second sidewalk is approximately \$500,000, which would equate to a ~5% increase in total project costs.*

*The sidewalk was selected to be on the westerly side of the roadway due to existing topography, environmental impacts, land use, and right of way. By placing the sidewalk on the westerly side of the roadway, no wetland impacts would be required. The sidewalk is able to be constructed within the relatively flat area before the steep downslope. The easterly side of the roadway has significant down slopes, with wetlands at the bottom. There are also 2 retaining walls to the north, near STA 19+00 LT, which would need to be reconstructed. The existing utility poles are also located on the easterly side of the roadway and additional relocations and easements would be required to allow the sidewalk to be constructed. Additional right of way would also be required for the sidewalk construction on the easterly side. The westerly location requires minimal additional right of way, no environmental impacts, and provides a connection from York St to Windsor Woods Road in Canton. By placing the sidewalk on the west side, a new pedestrian connection is made from the residential apartments at the northerly limits to the project area southerly. The businesses along the east side of the roadway are commercial properties such as landscape supply, that are not desirable for pedestrians. Crosswalks are not provided from the sidewalk on the west side to the isolated businesses on the east side due to high vehicle speeds, deficient stopping sight distance, and minimal desire for pedestrian access.*



**MassDOT Design Justification Workbook**

Project: 607403 Description: CORRIDOR IMPROVEMENTS ON WASHINGTON STREET (ROUTE 138)-STOUGHTON

**BICYCLE FACILITIES**

Facility: Washington Street (Route 138) (Station 11+45 to Station 39+00)

☐ 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:

BUFFERED BICYCLE LANE

Posted or statutory speed of facility:

45 MPH

Facility volume (vehicles per day):

23,394

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.

*Per MassDOT GIS (03/20/20) Potential for Everyday Biking is rated "9 - Lowest" within this area of the project.***Subcriterion: Width***(Width excludes any buffer areas.)*

Minimum:

5.0 FT

Existing:

0.0 FT

Proposed:

5.0 FT

*(If the width varies, provide a minimum.)*

Source used for minimum:

MassDOT Controlling Criteria

Justify the proposed value.

*Proposed roadway widening to include 5.0' minimum bicycle lanes width to avoid impacts to existing topography, ROW, and wetlands.**Proposed 2-foot buffer from travel lane.**Buffered bicycle lane was reviewed with District 5 and the Town as the preferred bicycle facility.***Subcriterion: Presence**

Bicycle facilities exist on

NEITHER SIDE

of the facility.

Bicycle facilities are proposed on

EACH DIRECTION OF VEHICULAR TRAVEL

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.

*Proposed bicycle lane in each direction to provide continuity within the corridor.  
Buffered bicycle lane was reviewed with District 5 and the Town as the preferred bicycle facility.*

*(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 satisfied.

Additional comments may be provided in the box below.

N/A

MassDOT Design Justification Workbook

Project: 607403 Description: CORRIDOR IMPROVEMENTS ON WASHINGTON STREET (ROUTE 138)-STOUGHTON

TRANSIT ACCOMMODATION

Criterion not applicable.

Facility: Washington Street (Route 138) (Station 11+45 to Station 39+00)

(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.

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.

**Subcriterion: Transit Priority**

Transit route headways: 

20	mins
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*(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.

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Justify the proposed value.

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Based on the preceding responses, the Transit Accommodation criterion is not applicable.
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Additional comments may be provided in the box below.

N/A
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MassDOT Design Justification Workbook

Project: 607403 Description: CORRIDOR IMPROVEMENTS ON WASHINGTON STREET (ROUTE 138)-STOUGHTON

RAMP LENGTH

Criterion not applicable.

Facility: Washington Street (Route 138) (Station 11+45 to Station 39+00)

(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: 1000 FT

Existing Ramp Length: 0 FT

Proposed Ramp Length: 1000 FT

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

Additional comments may be provided in the box below.

N/A

### MassDOT Design Justification Workbook

Project: 607403

Description: CORRIDOR IMPROVEMENTS ON WASHINGTON STREET (ROUTE 138)-STOUGHTON

#### DESIGN SPEED

Facility: Washington Street (Route 138) (Station 11+45 to Station 39+00)

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

Minimum Design Speed: 30 MPH

Maximum Design Speed: 50 MPH

Source used for range: MassDOT PDDG, Exhibit 3-7

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

*Suburban High Intensity Development - Major Arterial.*

Existing Design Speed: 45 MPH

Posted Speed Limit: 45 MPH

Proposed Design Speed: 50 MPH

Statutory Speed Limit: 45 MPH

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

Additional comments may be provided in the box below.

N/A



**MassDOT Design Justification Workbook**

Project: 607403 Description: CORRIDOR IMPROVEMENTS ON WASHINGTON STREET (ROUTE 138)-STOUGHTON

**DESIGN LOADING STRUCTURAL CAPACITY**

Criterion not applicable.

Facility: Washington Street (Route 138) (Station 11+45 to Station 39+00)

☒ 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: HL-93

Proposed Loading: HL-93

Source used for minimum: MassDOT LRFD Bridge Manual , Section 7.2.4

Justify use of this source for the minimum loading.

Minimum Design Loading

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

Additional comments may be provided in the box below.

N/A

MassDOT Design Justification Workbook

Project: 607403 Description: CORRIDOR IMPROVEMENTS ON WASHINGTON STREET (ROUTE 138)-STOUGHTON

LANE WIDTH

Facility: Washington Street (Route 138) (Station 11+45 to Station 39+00)

(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.

Suburban High Density Arterial

Based on the preceding responses, the Lane Width criterion has been satisfied.

Additional comments may be provided in the box below.

N/A

### MassDOT Design Justification Workbook

Project: 607403 Description: CORRIDOR IMPROVEMENTS ON WASHINGTON STREET (ROUTE 138)-STOUGHTON

#### SHOULDER WIDTH

Facility: Washington Street (Route 138) (Station 11+45 to Station 39+00)

(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

Min. RT (Outside) Shoulder Width: 

4.0 FT
12.0 FT

<sup>(1)</sup> Proposed RT (Outside) Shoulder Width: 7.0 FT

Max. RT (Outside) Shoulder Width:

Source used for range: MassDOT PDDG, Exhibit 5-12

Function of shoulder: Buffered Bicycle Lane (2' Buffer, 5' Bicycle Lane)

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

*Suburban High Intensity, Arterial.*

*Additional reference - MassDOT Separated Bike Lane Design Guide, Chapter 3*

<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, Section XX

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

*No left shoulder available, no medians proposed/existing*

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Based on the preceding responses, the Lane Width criterion  
has been satisfied.

Additional comments may be provided in the box below.

N/A

MassDOT Design Justification Workbook

Project: 607403 Description: CORRIDOR IMPROVEMENTS ON WASHINGTON STREET (ROUTE 138)-STOUGHTON

HORIZONTAL CURVE RADIUS

Facility: Washington Street (Route 138) (Station 11+45 to Station 39+00)

☐ 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 1390 FT Proposed Horizontal Curve Radius 1400.0 FT

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

Source used for minimum: MassDOT PDDG, Section 4.2.1.4

Justify use of this source for the horizontal curve radius.

50 MPH Design Speed,  $f = 0.14$ ,  $e = -2\%$

Based on the preceding responses, the Curve Radius criterion has been satisfied.

Additional comments may be provided in the box below.

See attached proposed horizontal alignment report.

MassDOT Design Justification Workbook

Project: 607403 Description: CORRIDOR IMPROVEMENTS ON WASHINGTON STREET (ROUTE 138)-STOUGHTON

SUPERELEVATION RATE

Criterion not applicable.

Facility: Washington Street (Route 138) (Station 11+45 to Station 39+00)

☒ 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:

4 %

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:

MassDOT PDDG, Section 4.2.4

Justify use of this source for the superelevation rate.

Per Section 4.2.4, superelevation is impractical due to land context (Suburban High Intensity), adjacent property grades, driveways, and existing topography.

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

Additional comments may be provided in the box below.

Proposed Mill & Overlay, no proposed superelevation.

## MassDOT Design Justification Workbook

Project: 607403 Description: CORRIDOR IMPROVEMENTS ON WASHINGTON STREET (ROUTE 138)-STOUGHTON

### STOPPING SIGHT DISTANCE

Standard not met.

Facility: Washington Street (Route 138) (Station 11+45 to Station 39+00)

(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: 425.0 FT

Proposed SSD: 206.5 FT

Source used for minimum: MassDOT PDDG, Exhibit 3-8, & Exhibit 4-26 (Crest Vertical Curve), Exhibit 4-27 (Sag Vertical Curve)

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

Stopping Sight Distance not met due to non-compliant crest vertical curves at:  
PVI Station 18+10, Proposed K Value= 43.05, Minimum K-Value = 84, SSD=304.8'  
PVI Station 32+45, Proposed K Value= 44.73 Minimum K-Value = 84, SSD=310.7'  
Horizontal Sight Distance Met  
Headlight Sight Distance not met due to non-compliant sag vertical curve at:  
PVI Station 23+10, Proposed K Value = 38.05, Minimum K-Value = 96, HSD=206.5'  
Horizontal Sight Distance Met

#### Subcriterion: SSD Middle Ordinate

Minimum SSD: 16.0 FT

Proposed SSD: 16.0 FT

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

Source used for minimum: MassDOT PDDG, Section 4.4.2

Justify use of this source for the SSD middle ordinate.

MassDOT PDDG, Exhibit 4-5, R = 1400', V=50 MPH

Based on the preceding responses, the SSD criterion

has been violated.

Provide additional justification for why this criterion cannot be met.

*The project proposes to micro-mill & overlay the existing roadway surface. At two locations, the existing crest vertical curves do not meet the minimum K-Value and Stopping Sight Distance (SSD) for the 50 MPH design speed. Below is a summary of the non-complaint curves and the analysis performed.*

PVI Station 18+10, Proposed K Value= 43.05, Minimum K-Value = 84:

*The proposed design meets SSD and K-Value for a 40MPH roadway (K=44), per MassDOT PDDG Exhibit 4-26. The proposed curve length is 400 feet, with a SSD of 304.8 feet. This option allows for roadway surface to be micromilled and overlayed. This option will maintain the existing grades/slopes at private driveways, not require any additional retaining walls, and can retain the existing underground utilities. This option maintains the existing geometry/topography.*

*In order to meet the minimum SSD for a 50 MPH design speed, the curve length would need to be increased to 700 feet. This increase would lower the existing roadway approximately 4 feet. This option would satisfy the minimum design requirements. This increase would require 700-feet of full depth pavement, additional retaining walls along the west side of the roadway (approx 350 feet), existing underground utilities to be lowered (water, gas, electric ductbank), and significant impact to abutting driveways. The additional construction cost is estimated to be \$1,500,000. Additional ROW easements are not anticipated due to the existing wide SHLO within this area, any additional easements are considered minor and not considered for this curve.*

*As part of the design development, incremental analysis was performed to see if the crest curve could be designed to meet a different design speed. In order for the curve to meet a 45 MPH design speed (K=61), the curve length would need to be increased from 300 feet to 510 feet. This would lower the existing roadway approximately 2.25 feet. This increase would required 500-feet of full depth pavement, additional retaining walls along the west side of the roadway (approx 200 feet), existing underground utilities to be lowered (water, gas, electric ductbank) ,and significant impact to abutting driveways. The additional construction cost is estimated to be \$1,000,000. This option would not meet the proposed design speed, but would meet the statutory speed limit.*

*The attached profile compares the proposed design to a crest curve meeting both 50 MPH and 45 MPH design speeds.*

PVI Station 32+45.00, Proposed K Value= 44.73, Minimum K-Value = 84:

*The proposed design meets SSD and K-Value for a 40MPH roadway (K=44), per MassDOT PDDG Exhibit 4-26. The proposed curve length is 310 feet, with a SSD of 310.7 feet. This option allows for roadway surface to be micromilled and overlayed. This option will maintain the existing grades/slopes at private driveways, not require any additional retaining walls, and can retain the existing underground utilities. This option maintains the existing*



geometry/topography. This design also includes a flashing signal ahead beacon for the northbound traffic, so that they are made aware of the upcoming signal since there is insufficient SSD.

In order to meet the minimum SSD for a 50 MPH design speed, the curve length would need to be increased to 580 feet. This increase would lower the existing roadway approximately 2.5 feet. This option would satisfy the minimum design requirements. This increase would require 580-feet of full depth pavement, additional retaining walls along the west side of the roadway (approx 200 feet), existing underground utilities to be lowered (water, gas, sewer, drain), and significant impact to abutting driveways. By lowering the roadway by this significant amount, driveways would be steepened from their current grade to meet the new proposed elevations. Some driveways will be steeper than the recommended grades, and vehicles may have difficulty entering/exiting. For example, lowering the roadway 2.50-feet would require a 10% grade driveway for 25-feet onto private property. In addition, the existing retaining wall on the west side of the roadway that supports electric transmission wires would need to be reconstructed. The additional construction cost is estimated to be \$1,000,000. Additional ROW easements are not anticipated due to the existing wide SHLO within this area, any additional easements are considered minor and not considered for this curve.

As part of the design development, incremental analysis was performed to see if the crest curve could be designed to meet a different design speed. In order for the curve to meet a 45 MPH design speed ( $K=61$ ), the curve length would need to be increased from 300 feet to 425 feet. This would lower the existing roadway approximately 1.50 feet. This increase would require 425-feet of full depth pavement, existing underground utilities to be lowered (water, gas, electric ductbank), and significant impact to abutting driveways. The additional construction cost is estimated to be \$650,000. This option would not meet the proposed design speed, but would meet the statutory speed limit.

The attached profile compares the proposed design to a crest curve meeting both 50 MPH and 45 MPH design speeds.

Sag Curve PVI Station 23+10.00, Proposed K Value= 38.05, Minimum K-Value = 96:

The proposed design meets HSD and K-Value for a 30MPH roadway ( $K=37$ ), per MassDOT PDDG Exhibit 4-27. The proposed curve length is 300 feet, with an HSD of 206.5 feet. This option allows for roadway surface to be micro milled and overlaid. This option will maintain the existing grades/slopes, not require any additional retaining walls, steep embankments, limit impacts to bordering vegetated wetlands, and can retain the existing underground utilities. This option maintains the existing geometry/topography.

To meet the minimum HSD for a 50 MPH design speed ( $K=96$ ), the curve length would need to be increased to 790 feet. This increase would lower the existing roadway approximately 5 feet. This option would satisfy the minimum design requirements. This increase would require 790-feet of full depth pavement, additional retaining walls along both sides of the roadway (approx. 600 feet), proposed steep slopes reconstruction along both sides of the roadway, existing underground utilities to be raised (water, gas, electric ductbank), and require ~1,800 SF of wetland impacts. The additional construction cost is estimated to be \$1,400,000. Additional ROW easements are anticipated for the slope/wall construction.

As part of the design development, incremental analysis was performed to see if the crest curve could be designed to meet a different design speed. For the curve to meet a 45 MPH design speed ( $K=79$ ), the curve length would need to be increased from 300 feet to 650 feet. This would raise the existing roadway approximately 3.60 feet. This increase would require 650-feet of full depth pavement, additional retaining walls/steep slopes (approx. 300 feet), existing underground utilities to be raised (water, gas, electric ductbank), and impacts to wetlands (~1,250 SF). The additional construction cost is estimated to be \$1,100,000. This option would not meet the proposed design speed but would meet the statutory speed limit.

Incremental analysis was also performed on the sag curve to meet K values for 40 MPH ( $K=64$ ), and 35 MPH ( $K=49$ ). For these curves, the proposed design curve length would need to be increased from 300 feet to 525 feet, and 300 feet to 400 feet, respectively. This lengthening of the sag curve would result in an increase grade of approx. 2.1 feet for the 40 MPH, and approx. 1.2 feet for the 35 MPH. Increasing the K value to meet both design speeds would result in additional retaining wall/slope reconstruction, wetland impacts, and additional easements. The proposed design proposed to tie into the existing topography and the top of the slope to extent possible to limits wetland impacts. By raising the

*roadway elevation, the slopes would need to be reconstructed to the bottom of the slope which results in filling wetlands that are present at the bottom of the slope.*

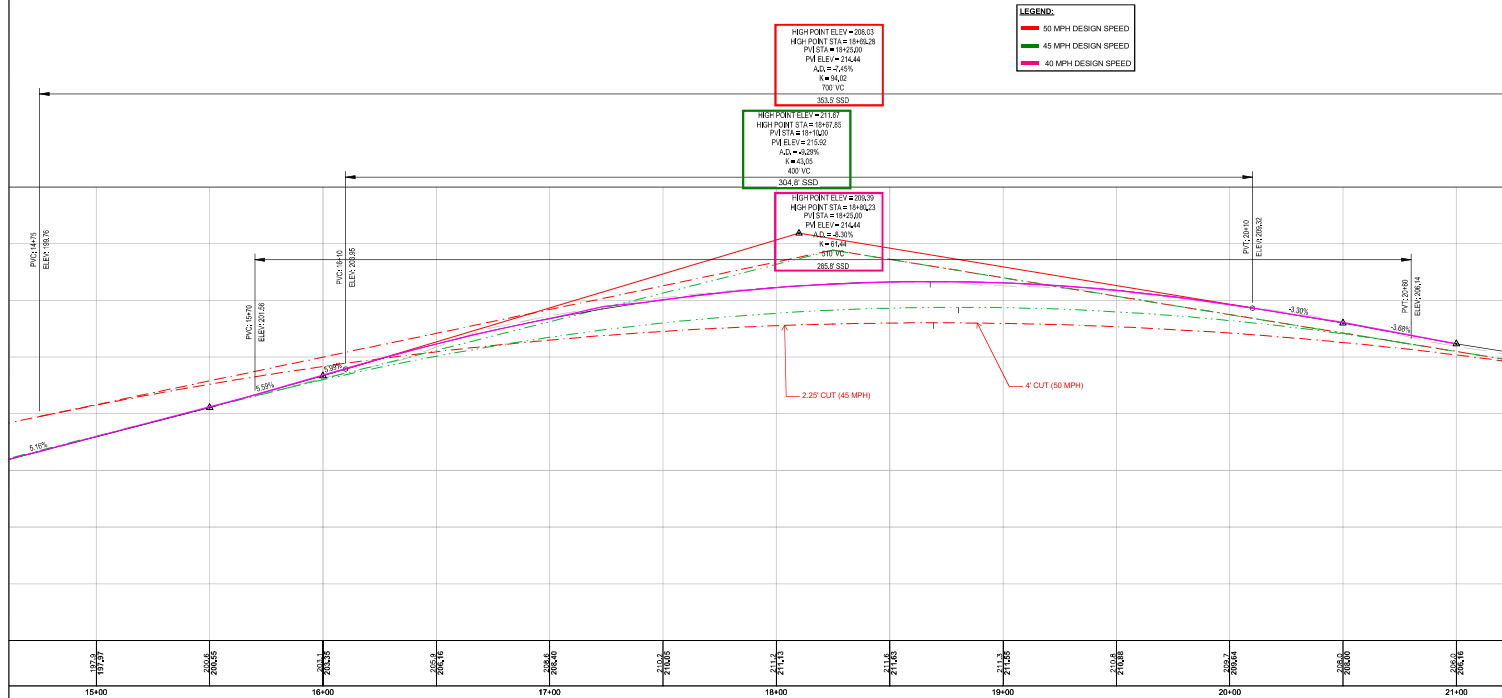
*The attached profile compares the proposed design to a sag curve meeting both 50 MPH, 45 MPH, 40 MPH, 35 MPH, and 30 MPH design speeds.*

LEGEND:  
 50 MPH DESIGN SPEED  
 45 MPH DESIGN SPEED  
 40 MPH DESIGN SPEED

HIGH POINT ELEV = 208.03  
 HIGH POINT STA = 19+85.25  
 PVI STA = 19+25.00  
 PVI ELEV = 214.44  
 A/E = -2.45%  
 K = 14.05  
 700' VC  
 353' SSD

HIGH POINT ELEV = 211.97  
 HIGH POINT STA = 19+87.85  
 PVI STA = 19+16.00  
 PVI ELEV = 215.52  
 A/E = -2.25%  
 K = 14.05  
 400' VC  
 304' SSD

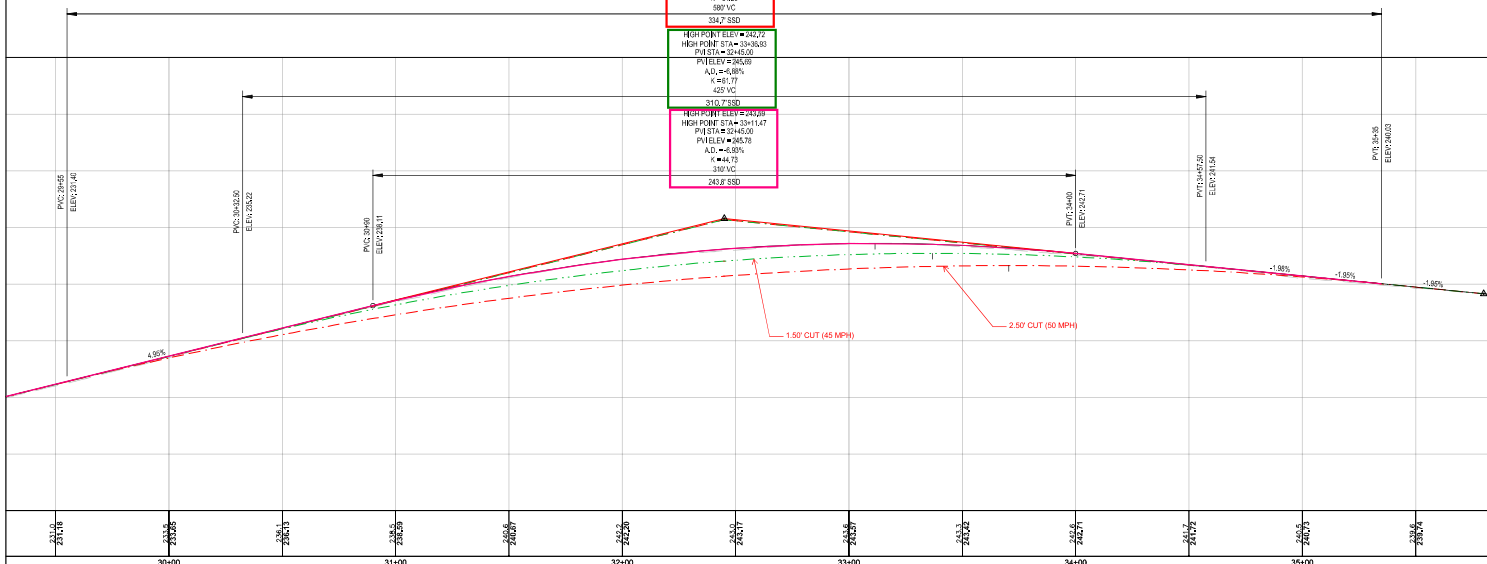
HIGH POINT ELEV = 208.39  
 HIGH POINT STA = 19+84.23  
 PVI STA = 19+25.00  
 PVI ELEV = 214.44  
 A/E = -2.45%  
 K = 14.05  
 700' VC  
 353' SSD



HOR. SCALE IN FEET  
 0 20 40  
 4 8  
 VER. SCALE IN FEET

LEGEND:  
 50 MPH DESIGN SPEED  
 45 MPH DESIGN SPEED  
 40 MPH DESIGN SPEED

HIGH POINT ELEV=241.24  
 HIGH POINT STA=30+74.6  
 P1 STA=29+45.00  
 P1 ELEV=240.06  
 AD=6.68%  
 K=4.29  
 180' VC  
 334.7' SSD  
 HIGH POINT ELEV=242.75  
 HIGH POINT STA=33+36.0  
 P1 STA=32+45.00  
 P1 ELEV=240.06  
 AD=6.68%  
 K=8.77  
 120' VC  
 310.7' SSD  
 HIGH POINT ELEV=242.08  
 HIGH POINT STA=35+11.47  
 P1 STA=34+45.00  
 P1 ELEV=240.78  
 AD=-6.80%  
 K=4.73  
 180' VC  
 243.8' SSD



HOR. SCALE IN FEET  
 0 20 40  
 VER. SCALE IN FEET  
 4 8



### MassDOT Design Justification Workbook

Project: 607403

Description: CORRIDOR IMPROVEMENTS ON WASHINGTON STREET (ROUTE 138)-STOUGHTON

#### MAXIMUM GRADE

Facility: Washington Street (Route 138) (Station 11+45 to Station 39+00)

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

Maximum Grade: 7 %

Proposed Grade: 5.9 %

(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.

Arterials & Highways, Rolling, (Surburban High-Intensity) - 50 MPH

Based on the preceding responses, the maximum grade criterion has been satisfied.

Additional comments may be provided in the box below.

N/A

MassDOT Design Justification Workbook

Project: 607403 Description: CORRIDOR IMPROVEMENTS ON WASHINGTON STREET (ROUTE 138)-STOUGHTON

CROSS SLOPE

Facility: Washington Street (Route 138) (Station 11+45 to Station 39+00)

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

Maximum Cross Slope (HMA):	2.0 %	Proposed surface:	HMA
Maximum Cross Slope (Conc):	1.6 %	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.

Proposed HMA

Based on the preceding responses, the cross slope criterion has been satisfied.

Additional comments may be provided in the box below.

N/A

MassDOT Design Justification Workbook

Project: 607403 Description: CORRIDOR IMPROVEMENTS ON WASHINGTON STREET (ROUTE 138)-STOUGHTON

VERTICAL CLEARANCE

Criterion not applicable.

Facility: Washington Street (Route 138) (Station 11+45 to Station 39+00)

☒ 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:

16.5 FT

Proposed Vertical Clearance:

16.5 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.

Bridges over Arterials

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

Additional comments may be provided in the box below.

N/A



### MassDOT Design Justification Workbook

Project: 607403 Description: CORRIDOR IMPROVEMENTS ON WASHINGTON STREET (ROUTE 138)-STOUGHTON

#### FACILITY INFORMATION

Facility: Washington Street (Route 138) (Station 39+00 to Station 74+90)

NHS: YES Design Speed: 40 MPH Functional Classification: PRINCIPAL 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.)*

Pedestrian Facilities Not met

Bicycle Facilities

Transit Accommodation

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.

*All applicable controlling criteria are met for this portion of the project. Except for pedestrian crosswalks at intersections. Crosswalks proposed at three of the four legs of the Stop and Shop Driveway/Washington Street Intersection. The existing signal is proposed to be retained. There is no existing/proposed crosswalk on the southerly leg of the intersection crossing Route 138.*

**Project Photos:**



**Driveway to Gentle Dental plaza on the west side of Washington Street**



**Existing sidewalks on Washington Street  
(Source: Google)**



**CVS, Empire Loan, and Wendy's exit driveways on the west side of Washington Street (Source: Google)**

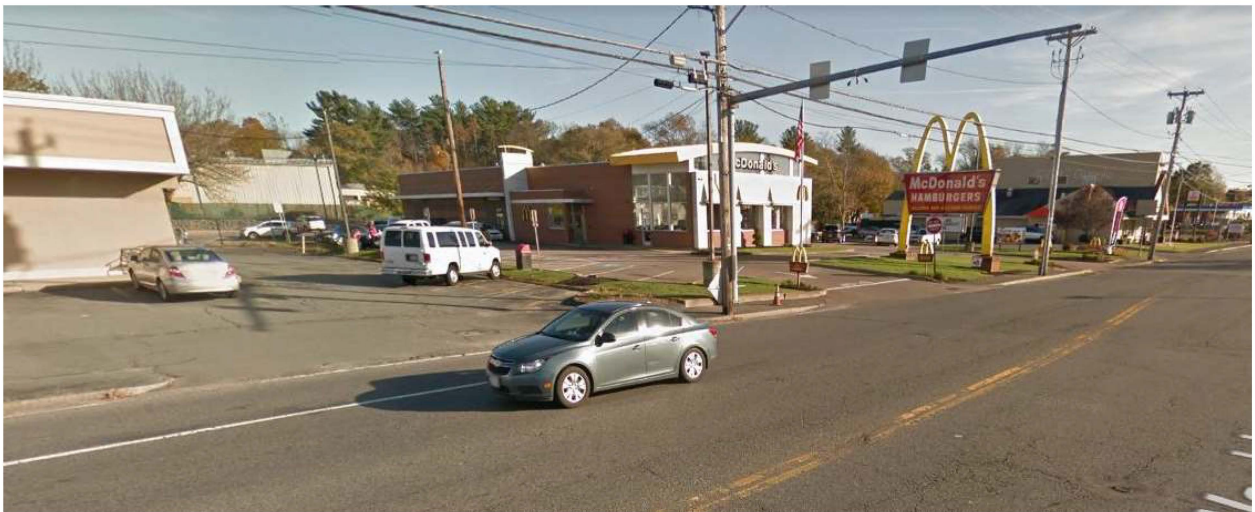




Looking west on Kimball Avenue toward Washington Street (Source: Google)



The plaza with Daddy's Dairy on off of Washington Street (Source: Google)



Susu Sushi and McDonald's driveways on the east side of Washington Street (Source: Google)



Looking north near Halliden Street (Source: Google)



U.S. Route 6 looking westbound towards intersection at Maple Avenue





Looking north on Washington Street toward Central Street (Source: Google)



Looking south on Washington Street, south of the mid-block crosswalk (Source: Google)



On the east side of Washington Street at the midblock crosswalk (Source: Google)



On the west side of Washington Street at the midblock crosswalk (Source: Google)



On the westbound approach of Lincoln Street to Washington Street (Source: Google)



On the east side of Washington Street at Club Alex's and Sullivan Tire (Source: Google)

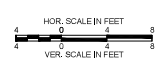
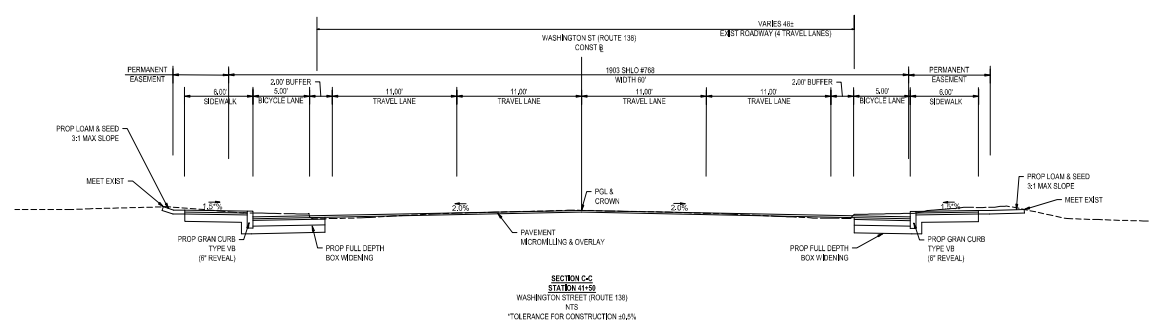
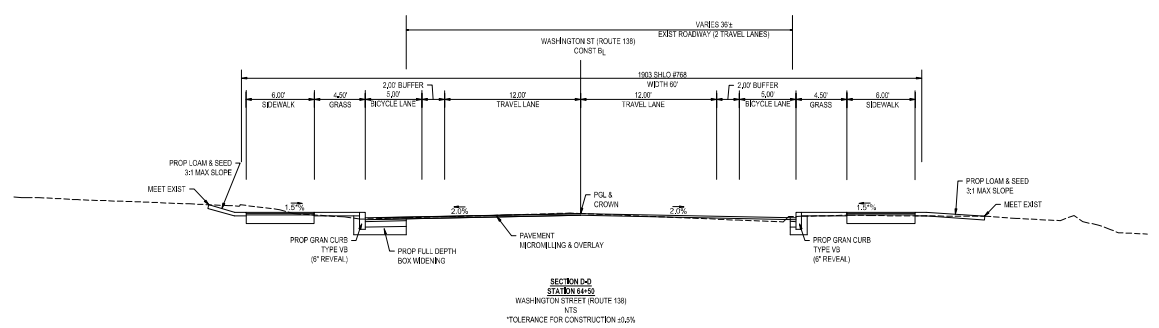


**On the east side of Washington Street at Club Alex's and Sullivan Tire (Source: Google)**



**Looking south on Washington Street at the existing crosswalk on the north side of Lincoln Street (Source: Google)**

STOUGHTON WASHINGTON STREET (ROUTE 138)			
STATE	FED. AID PROJ. NO.	SHEET NO.	TOTAL SHEETS
MA	-	1	1
PROJECT FILE NO.		807465	



## MassDOT Design Justification Workbook

Project: 607403

Description: CORRIDOR IMPROVEMENTS ON WASHINGTON STREET (ROUTE 138)-STOUGHTON

### PEDESTRIAN FACILITIES

Standard not met.

Facility: Washington Street (Route 138) (Station 39+00 to Station 74+90)

☐ 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

Minimum: 5.0 FT

Existing: 5.0 FT

Proposed: 6.0 FT

(If the width varies, provide a minimum.)

Source used for minimum: MassDOT Controlling Criteria

Justify the proposed width.

Town of Stoughton requested 6.0' sidewalk.

#### 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.

Per MassDOT GIS (03/20/20) Potential for Walkable Trips is not rated.

#### Subcriterion: Crosswalks at Signalized Intersections

Standard not met.

Crosswalks ARE NOT provided across every leg of all signalized intersections on the facility.

Justify the proposed value.

*Crosswalks proposed at all 4 legs of the Washington Street/Central Street Intersection, therefore complies with the design criteria.*

*Crosswalks proposed at three legs of the Stop and Shop Driveway/Washington Street Intersection. The existing signal is proposed to be retained. There is no existing/proposed crosswalk on the southerly leg of the intersection crossing Route 138. In order to add this crosswalk to the signal, a new signal would be required, adding an additional \$250,000 or ~3% to the overall project cost. Currently the signal operates with concurrent pedestrian phases. By adding this third leg, an exclusive pedestrian phase would be required. This exclusive pedestrian phase would require a 150 second cycle phase compared to the proposed 75 second cycle. This extended length is not operationally preferred at a commercial drive signal.*

---

**Subcriterion: Existing Crosswalk Removal**

Existing crosswalks HAVE NOT been removed from this facility.

Justify the proposed value.

*No existing crosswalks are being 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.



**MassDOT Design Justification Workbook**

Project: 607403 Description: CORRIDOR IMPROVEMENTS ON WASHINGTON STREET (ROUTE 138)-STOUGHTON

**BICYCLE FACILITIES**

Facility: Washington Street (Route 138) (Station 39+00 to Station 74+90)

☐ 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:

BUFFERED BICYCLE LANE

Posted or statutory speed of facility:

35 MPH

Facility volume (vehicles per day):

23,394

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.

*Per MassDOT GIS (03/20/20) Potential for Everyday Biking is not rated.***Subcriterion: Width***(Width excludes any buffer areas.)*

Minimum:

5.0 FT

Existing:

0.0 FT

Proposed:

5.0 FT

*(If the width varies, provide a minimum.)*

Source used for minimum:

MassDOT Controlling Criteria

Justify the proposed value.

*Proposed roadway widening to include 5.0' minimum bicycle lanes width to avoid impacts to existing topography, ROW, and private parking lots.**Proposed 2-foot buffer from travel lane.**Buffered bicycle lane was reviewed with District 5 and the Town as the preferred bicycle facility.***Subcriterion: Presence**

Bicycle facilities exist on

NEITHER SIDE

of the facility.

Bicycle facilities are proposed on

EACH DIRECTION OF VEHICULAR TRAVEL

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.

*Proposed bicycle lane in each direction to provide continuity within the corridor.  
Buffered bicycle lane was reviewed with District 5 and the Town as the preferred bicycle facility.*

*(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 satisfied.

Additional comments may be provided in the box below.

N/A

## MassDOT Design Justification Workbook

Project: 607403 Description: CORRIDOR IMPROVEMENTS ON WASHINGTON STREET (ROUTE 138)-STOUGHTON  
TRANSIT ACCOMMODATION

Facility: Washington Street (Route 138) (Station 39+00 to Station 74+90)

(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: BROCKTON AREA TRANSIT AUTHORITY (BAT)

(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. ARE provided

Justify the proposed value.

For stop near Station 59+00, crosswalk provided at Phillips Avenue. (~200' away)  
For stop near Station 54+50, crosswalks provided at Central Street & Phillips Avenue. (~125' away)  
For stop near Station 63+50, crosswalks provided at Warren Avenue (~75' away)

### 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.

Bus stops within the project limits are flag down stops. Ridership is not more than 100 boardings per day.

**Subcriterion: Transit Priority**

Transit route headways: 

40	mins
----	------

 (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.

*No transit priorities are proposed as part of this project since the bus stops are flag down stops only.*

Justify the proposed value.

*Per BAT schedule dated 7/1/19, the most frequent weekday trip runs every 40-50 minutes in each direction.*

---

Based on the preceding responses, the Transit Accommodation criterion has been satisfied.

Additional comments may be provided in the box below.

N/A

MassDOT Design Justification Workbook

Project: 607403 Description: CORRIDOR IMPROVEMENTS ON WASHINGTON STREET (ROUTE 138)-STOUGHTON

RAMP LENGTH

Criterion not applicable.

Facility: Washington Street (Route 138) (Station 39+00 to Station 74+90)

(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: 1000 FT

Existing Ramp Length: 0 FT

Proposed Ramp Length: 1000 FT

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

Additional comments may be provided in the box below.

N/A

MassDOT Design Justification Workbook

Project: 607403 Description: CORRIDOR IMPROVEMENTS ON WASHINGTON STREET (ROUTE 138)-STOUGHTON

DESIGN SPEED

Facility: Washington Street (Route 138) (Station 39+00 to Station 74+90)

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

Minimum Design Speed: 30 MPH Maximum Design Speed: 50 MPH

Source used for range: MassDOT PDDG, Exhibit 3-7

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

Suburban High Intensity Development - Major Arterial.

Existing Design Speed: 35 MPH Posted Speed Limit: 35 MPH

Proposed Design Speed: 40 MPH Statutory Speed Limit: 35 MPH

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

Additional comments may be provided in the box below.

N/A

**MassDOT Design Justification Workbook**

Project: 607403 Description: CORRIDOR IMPROVEMENTS ON WASHINGTON STREET (ROUTE 138)-STOUGHTON

**DESIGN LOADING STRUCTURAL CAPACITY**

Criterion not applicable.

Facility: Washington Street (Route 138) (Station 39+00 to Station 74+90)

☒ 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: HL-93

Proposed Loading: HL-93

Source used for minimum: MassDOT LRFD Bridge Manual , Section 7.2.4

Justify use of this source for the minimum loading.

*Minimum Design Loading*

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

Additional comments may be provided in the box below.

N/A

MassDOT Design Justification Workbook

Project: 607403 Description: CORRIDOR IMPROVEMENTS ON WASHINGTON STREET (ROUTE 138)-STOUGHTON

LANE WIDTH

Criterion not applicable.

Facility: Washington Street (Route 138) (Station 39+00 to Station 74+90)

(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.

Suburban High Density Arterial

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: 607403 Description: CORRIDOR IMPROVEMENTS ON WASHINGTON STREET (ROUTE 138)-STOUGHTON

#### SHOULDER WIDTH

Criterion not applicable.

Facility: Washington Street (Route 138) (Station 39+00 to Station 74+90)

(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

Min. RT (Outside) Shoulder Width: 

4.0 FT
12.0 FT

<sup>(1)</sup> Proposed RT (Outside) Shoulder Width: 7.0 FT

Max. RT (Outside) Shoulder Width:

Source used for range: MassDOT PDDG, Exhibit 5-12

Function of shoulder: Buffered Bicycle Lane (2' Buffer, 5' Bicycle Lane)

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

*Suburban High Intensity, Arterial.*

*Additional reference - MassDOT Separated Bike Lane Design Guide, Chapter 3*

<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, Section XX

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

*No left shoulder available, no medians proposed/existing*

---

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: 607403 Description: CORRIDOR IMPROVEMENTS ON WASHINGTON STREET (ROUTE 138)-STOUGHTON

HORIZONTAL CURVE RADIUS

Criterion not applicable.

Facility: Washington Street (Route 138) (Station 39+00 to Station 74+90)

☐ 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

765 FT

Proposed Horizontal Curve Radius

765.0 FT

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

Source used for minimum:

MassDOT PDDG, Section 4.2.1.4

Justify use of this source for the horizontal curve radius.

40 MPH Design Speed, e=-2%

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

Additional comments may be provided in the box below.

See attached proposed horizontal alignment report.

### MassDOT Design Justification Workbook

Project: 607403

Description: CORRIDOR IMPROVEMENTS ON WASHINGTON STREET (ROUTE 138)-STOUGHTON

#### SUPERELEVATION RATE

Criterion not applicable.

Facility:

Washington Street (Route 138) (Station 39+00 to Station 74+90)

☒ 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:

4 %

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:

MassDOT PDDG, Section 4.2.4

Justify use of this source for the superelevation rate.

*Per Section 4.2.4, superelevation is impractical due to land context (Suburban High Intensity), adjacent property grades, driveways, and existing topography.*

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

Additional comments may be provided in the box below.

*Proposed Mill & Overlay, no proposed superelevation.*

### MassDOT Design Justification Workbook

Project: 607403 Description: CORRIDOR IMPROVEMENTS ON WASHINGTON STREET (ROUTE 138)-STOUGHTON

#### STOPPING SIGHT DISTANCE

Criterion not applicable.

Facility: Washington Street (Route 138) (Station 39+00 to Station 74+90)

*(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

Minimum SSD: 305.0 FT

Proposed SSD: 701.9 FT

Source used for minimum: MassDOT PDDG, Exhibit 3-8, & Exhibit 4-26 (Crest Vertical Curve)

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

40 MPH

#### Subcriterion: SSD Middle Ordinate

Minimum SSD: 15.0 FT

Proposed SSD: 15.0 FT

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

Source used for minimum: MassDOT PDDG, Section 4.4.2

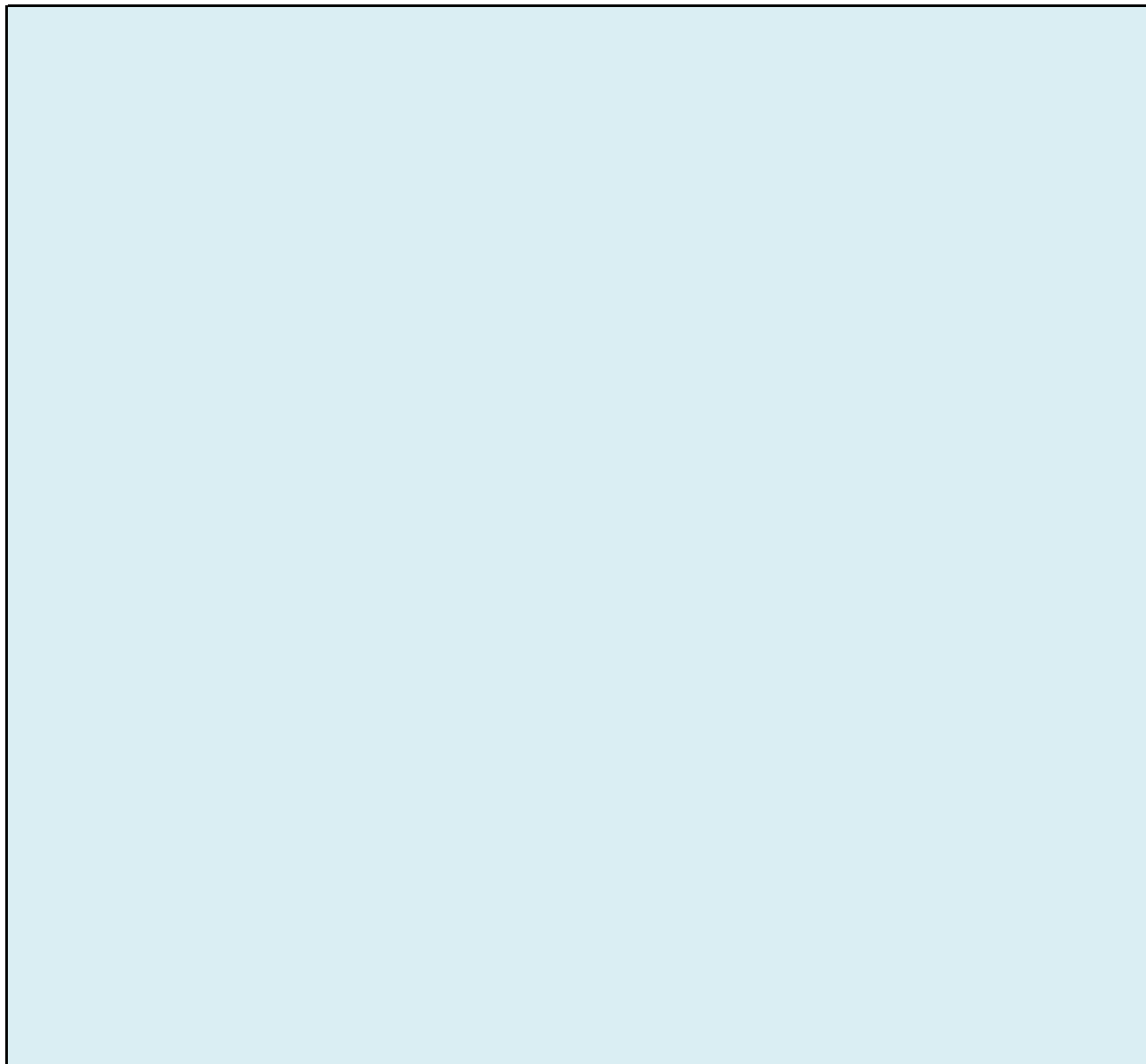
Justify use of this source for the SSD middle ordinate.

MassDOT PDDG, Exhibit 4-5, R = 765', V=40 MPH

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

Additional comments may be provided in the box below.





### MassDOT Design Justification Workbook

Project: 607403 Description: CORRIDOR IMPROVEMENTS ON WASHINGTON STREET (ROUTE 138)-STOUGHTON

#### MAXIMUM GRADE

Criterion not applicable.

Facility: Washington Street (Route 138) (Station 39+00 to Station 74+90)

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

Maximum Grade: 8 %

Proposed Grade: 1.1 %

(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.

Arterials & Highways, Rolling, (Surburban High-Intensity) - 40 MPH

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: 607403 Description: CORRIDOR IMPROVEMENTS ON WASHINGTON STREET (ROUTE 138)-STOUGHTON

CROSS SLOPE

Criterion not applicable.

Facility: Washington Street (Route 138) (Station 39+00 to Station 74+90)

(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.

Proposed HMA

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: 607403 Description: CORRIDOR IMPROVEMENTS ON WASHINGTON STREET (ROUTE 138)-STOUGHTON

VERTICAL CLEARANCE

Criterion not applicable.

Facility: Washington Street (Route 138) (Station 39+00 to Station 74+90)

☒ 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:

16.5 FT

Proposed Vertical Clearance:

16.5 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.

Bridges over Arterials

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

Additional comments may be provided in the box below.

N/A