

DESIGN EXCEPTION REPORT

**Walker Street Reconstruction
Project No. 606462**

Walker Street

Lenox, Massachusetts

Prepared for:



Massachusetts Department of Transportation
10 Park Plaza
Boston, Massachusetts

And



Town of Lenox, Massachusetts

Submitted: May 2012

Resubmitted: February 2013 (Revised per 25% Design Comments from MassDOT District 1)

Foresight Land Services, Inc.

TABLE OF CONTENTS

	Page No.
1.0 EXECUTIVE SUMMARY	1
2.0 EXISTING CONDITIONS	2
2.1 LOCATION	2
2.2 FUNCTIONAL CLASSIFICATION & LAND USE	2
2.2.1 VEHICLE SPEEDS	3
2.2.2 ACCIDENT DATA	3
2.3 LANE & SHOULDER WIDTHS	5
2.4 VERTICAL ALIGNMENT, HORIZONTAL ALIGNMENT & STOPPING SIGHT DISTANCES	5
2.5 ENVIRONMENTAL FACTORS	5
2.6 RIGHT-OF-WAY	5
2.7 CULTURAL RESOURCES	6
3.0 PROPOSED IMPROVEMENTS	7
3.1 PROJECT DESCRIPTION	7
3.2 PURPOSE	7
3.3 IMPROVEMENTS	7
4.0 DESIGN EXCEPTIONS	8
4.1 CONTROLLING CRITERIA	8
4.2 MASSDOT STANDARDS & PROPOSED VALUES	10
4.3 COMPATIBILITY & FUTURE IMPROVEMENTS	10
4.4 RIGHT-OF-WAY CONSTRAINTS	10
4.5 BICYCLE ACCOMMODATIONS	11
5.0 RECOMMENDATIONS	12

TABLES

	Page No.
2.2.2-1 SUMMARY OF REPORTED ACCIDENTS (2008-2010)	4
4.2-1 MASSDOT STANDARDS AND PROPOSED VALUES	10
4.5-1 SUMMARY OF IMPACTS OF 5-FOOT BIKE LANE	11

FIGURES

	Page No.
2.1-1 LOCUS MAP	2
2.2-1 TYPICAL SECTION	3
4.1-1 HORIZONTAL ALIGNMENT – LENOX DALE	8
4.1-2 EXISTING HORIZONTAL CURVES	8
4.1-3 RE-ALIGNMENT OF STA 81+58.92	9
4.1-4 SIDEWALK ABUTTING ROADWAY	10
4.1-5 UTILITY POLES ABUTTING ROADWAY	10

ATTACHMENTS

MASSACHUSETTS DPW TOWN OF LENOX SPEED REGULATION #336
DESIGN EXCEPTION REPORT CHECKLIST
ATTACHMENT A - CONTROLLING CRITERIA
ATTACHMENT B - SUMMARY OF IMPACTS
ATTACHMENT C - TYPICAL SECTIONS

1.0 EXECUTIVE SUMMARY

The Walker Street Reconstruction Project is located on the southeast portion of Walker Street from Route 7/Route 20 to Crystal Street/Lenox Dale in Lenox, MA. This portion of Walker Street includes approximately 8,100 linear feet (1.53 miles) of roadway oriented in an east-west direction. The roadway is in poor condition with significant wheel ruts, pavement cracking, poor pedestrian and bicycle accommodates and other deficiencies. The road is classified as an Urban Minor Arterial and accommodates truck and commercial traffic from Lane Quarry, Lenox Dale businesses, the Lee Mills and Route 7/Route 20.

The implementation of the proposed design will include, but shall not be limited to: reconstruction of existing paved surface, installation of curbing, the installation of new wheelchair ramps, reconstruction of an existing sidewalk and construction of a new sidewalk on one side of the roadway for the full length of the project, widening of the road for improved shoulder widths (bicycle accommodation), upgrading drainage, and new or improved pavement markings and signage, as appropriate.

This report is prepared in accordance with Chapter 2 of the Massachusetts Department of Transportation Highway Division's 2006 Project Development & Design Guide. Additional direction in relation to the Design Exception Report Checklist is described in Engineering Directive E-09-005 and E-99-002. The purpose of this report is to present rational to support the request for a design waiver for the horizontal alignment (radius of curve) controlling criteria required per AASHTO for the project.

2.0 EXISTING CONDITIONS

2.1 LOCATION

Walker Street is located in Lenox in middle Berkshire County. The section of Walker Street included in this project, as shown in Figure 2.1-1, extends for approximately 8,200 feet from the intersection of Walker Street with the Route 7/Route 20 bypass to the intersection with Crystal Street near the Lee town line.

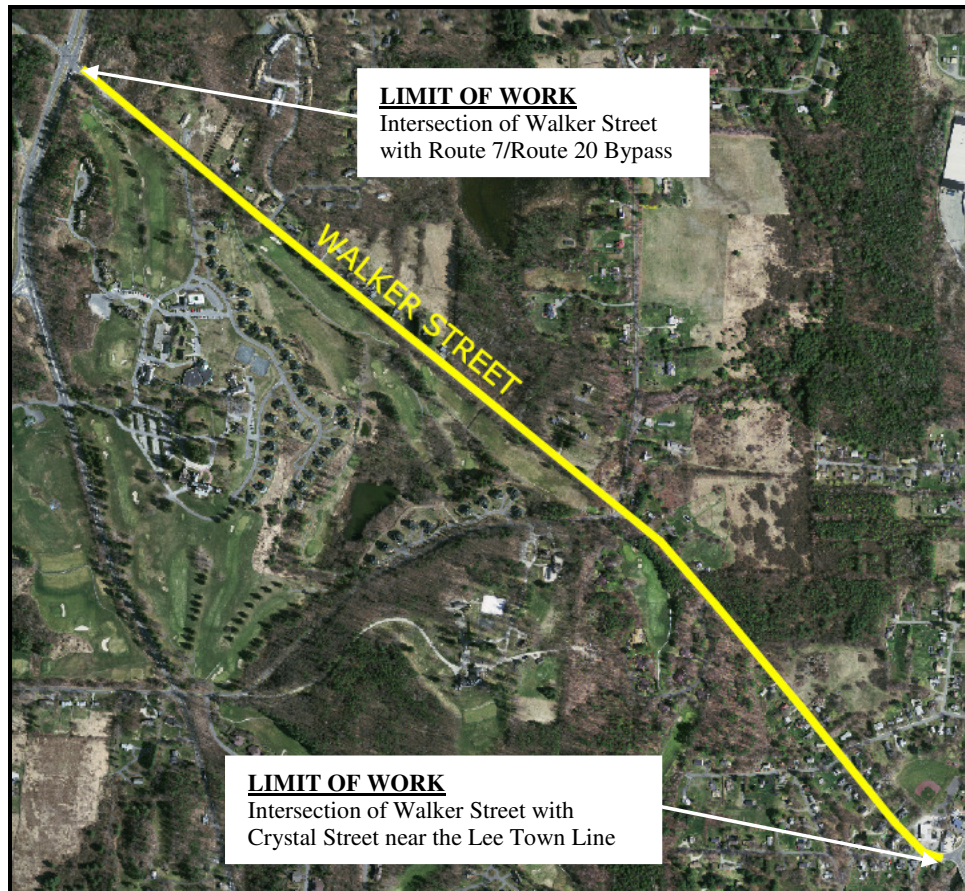


Figure 2.1-1 Locus Map
(Source: MassGIS)

2.2 FUNCTIONAL CLASSIFICATION AND LAND USE

Walker Street is under local administrative jurisdiction and is functionally classified as an “Urban Minor Arterial”. A minor arterial is defined as a roadway which serves as a link to cities and towns in rural areas and interconnects principal arterials within urban areas with a moderate degree of local access. Walker Street provides a link between downtown Lenox and Lenox Dale and Lee and interconnects Route 7/Route 20, a principal arterial, with those towns.

The Level of Service (LOS) for Walker Street is A (free flow).

DESIGN EXCEPTION REPORT (REVISED)

Walker Street Reconstruction, Lenox, Massachusetts

Land uses along the westerly portions of Walker Street are mostly forest, low density residential and golf course. The forested land consists of at least 50% tree coverage over the land. The low density residential areas consist of housing on lots approximately one half to one acre in size. The Cranwell Resort Golf course makes up a significant portion of the land use on the south west side of the roadway following the Route 7/Route 20 intersection. Within the golf course there are also commercial and medium density residential land uses that make up the resort. As you travel south east towards Lenox Dale, medium density residential areas consisting of housing on lots one quarter to one half acre in size make up most of the land use along this portion of the project.

In addition to these land uses along Walker Street, there are also smaller areas of open land, wetlands, pastures, crops, commercial, and industrial areas. Aside from the Cranwell Resort, the commercial and industrial areas are located on the south east end of the roadway near Lenox Dale.



Figure 2.2-1 Typical Section

2.2.1 VEHICLE SPEEDS

Vehicle speeds along Walker Street vary depending upon time, date, and traffic. The posted speed limit varies from 25 mph to 40 mph. The 85th percentile speed is 40 mph. The design speed for the proposed project is 40 mph.

2.2.2 ACCIDENT DATA

The Town of Lenox Police Department has supplied the most recent available accident data, which includes data from 2008-2010, as shown in Table 2.2.2-1.

DESIGN EXCEPTION REPORT (REVISED)**Walker Street Reconstruction, Lenox, Massachusetts**

	Walker Street	Walker Street / East Street	Walker Street / Galway Court	Walker Street / Cranwell Drive	Total
Year					
2008	2	4	0	0	6
2009	3	1	1	0	5
2010	0	3	1	1	5
Total	5	8	2	1	16
Average Per Year	1.66	2.66	0.66	0.33	5.33
Type of Accident					
Single Vehicle Crash	0	1	1	0	2
Angle	1	7	0	1	9
Rear-End	2	0	1	0	3
Rear-to-Rear	1	0	0	0	1
Side Swipe (Same Dir.)	0	0	0	0	0
Side Swipe (Opp. Dir.)	1	0	0	0	1
Not Reported	0	0	0	0	0
Total	5	8	2	1	16
Severity					
Property Damage	5	5	1	1	12
Non-Fatal Injury	0	3	1	0	4
Fatality	0	0	0	0	0
Not Reported	0	0	0	0	0
Total	5	8	2	1	16
Time					
8:00 AM – 9:00 AM	0	1	0	0	1
3:00 PM – 4:00 PM	2	6	0	0	8
Other	3	1	2	1	7
Total	5	8	2	1	16

Table 2.2.2-1 Summary of Reported Accidents 2008-2010
(Data Provided by Lenox Police Department)

Based on this research, a total of 16 accidents occurred within the section of Walker Street included in the scope of this project. This equates to an accident rate of approximately 5.33 per year.

A total of 5 accidents occurred along Walker Street and another 11 occurred at three of the eight intersections located along Walker Street, for a total of 16 accidents occurring within the project area between 2008 and 2010. Approximately thirty-one percent (5 total) occurred along Walker Street. Half (8 total) of the accidents reported occurred at the intersection of Walker Street and East Street. Another 2 accidents occurred at the intersection of Walker Street and Galway Court and one accident occurred at the intersection of Walker Street and the Cranwell Resort driveway. The reported accidents were mainly angular or rear-end collisions. The majority of accidents resulted in property damage. There were no fatalities reported during this time period.

2.3 LANE AND SHOULDER WIDTHS

The existing pavement width of Walker Street varies from the Route 7 and Route 20 intersection to the Crystal Street intersection. The pavement width is variable ranging from 24 to 28 feet wide. The pavement markings on Walker Street generally consist of a double yellow centerline with white edges delineating two 10 to 14 foot travel lanes and two 0 to 3 foot paved shoulders.

2.4 VERTICAL ALIGNMENT, HORIZONTAL ALIGNMENT & STOPPING SIGHT DISTANCES

The existing vertical alignment along Walker Street (K-value) varies significantly along the entire length of the roadway. All of the curves along Walker Street meet the minimum K-value requirement of 44 for a crest curve and 64 for a sag curve for a vehicle speed of 40 M.P.H. There are two locations in Lenox Dale where the curves in the alignment do not meet the minimum horizontal radius of 765 feet with no super elevation. These curves are located at STA 79+90.64 and STA 81+58.92 and have radii of 346.80 feet and 210.91 feet respectively. The minimum stopping site distance of 305 feet is met at all locations along Walker Street.

2.5 ENVIRONMENTAL FACTORS

There are numerous wetland areas abutting Walker Street. Under the current design, minor wetland impacts are proposed for the reconstruction of existing drainage culverts and grading. A wetland replication area has been shown on the plans and wetland alteration will be replaced at a rate of 110% minimum. All proposed work shall be approved by local and state agencies. Tree removal with the present proposal will be kept to a minimum. There are mature trees and tree lines along the route that are an important factor in the suburban nature of the roadway. The section of Walker Street included in this project falls within a small portion of the 100-year flood plain where the roadway crosses the Woods Crossing Brook. The southern portion of Walker Street falls within the Upper Housatonic River Area of Critical Environmental Concern (ACEC). There are no known habitats of rare wildlife, certified vernal pools, or rare species within the project limits as per the October 2008 Massachusetts Natural Heritage Atlas. Given that the reconstruction of Walker Street is proposed within the existing road right-of-way, there will be minimal impacts to Bordering Vegetated Wetlands, the ACEC, and floodplain.

2.6 RIGHT-OF-WAY

The existing layout for Walker Street is a town layout approximately 66 feet wide. As a result of improvements to drainage infrastructure, sidewalks, and shoulder widening, there are temporary construction easements and permanent drainage, slope and sidewalk easements required within the project limits. Other than the aforementioned impacts, there do not appear to be any major adverse right-of-way impacts.

2.7 CULTURAL RESOURCES

There are no known cultural or historic properties located along this portion of Walker Street. There will be no adverse affects to any cultural resource as part of this design. All proposed work shall be approved by local and state agencies.

3.0 PROPOSED IMPROVEMENTS

3.1 PROJECT DESCRIPTION

Due to the existing conditions noted previously, the goals of this project, for the Town, are to repair poor and failing pavements, replace and repair failing drainage and water system components, and provide improved pedestrian and bicycle accommodations.

Preliminarily, the current roadway geometry (except for bicycle accommodations in the form of widened shoulders) appears sufficient for the driver level of service and does not need to be altered. Pavement improvements without changing the roadway geometry (horizontal/vertical curvature) will increase the driver level of service without impacting the community context or transportation and land use functions. Widened shoulders and improved pavement conditions will also enhance the bicycle level of service by providing safer bicycling conditions. Improvements to the poor condition of the sidewalks and new sidewalks where none currently exist will result in a higher pedestrian level of service along the roadway.

3.2 PURPOSE

The primary purpose of the project is to improve road surfaces and accommodate pedestrian and bicycle traffic by installing a new sidewalk along the entire length of the road, by eliminating significant wheel ruts in the road surface, improve drainage systems to avoid icing and rutting, and improve bicycle safety by adding widened shoulders and signage along the road.

3.3 IMPROVEMENTS

The improvements listed within this report will result in safer vehicle and pedestrian conditions by improving wheelchair access to the most recent A.D.A. standards, adding improved and new sidewalks, signing and marking all crosswalks, signing of bicycle accommodations, and the delineation of travel lanes and shoulders.

4.0 DESIGN EXCEPTIONS

4.1 CONTROLLING CRITERIA

A design exception is being requested for horizontal alignment (radius of curve and compound curve) in the Lenox Dale area at STA 79+90.64 and STA 81+58.92. The purpose for the horizontal alignment exception is due to right-of-way limitation and building locations. Clearing and grading, as required without an exception to horizontal alignment, would require large easements on at least six private properties due to the limited right-of-way in this area. Additionally, the buildings in this location have minimal setbacks from the roadway therefore there is not substantial area to expand the roadway.



Figure 4.1-1 Horizontal Alignment – Lenox Dale



Figure 4.1-2 Existing Horizontal Curves

Conforming to the minimum curve radius at STA 79+90.64 would result in relocating a portion of the roadway and the sidewalk through the corner of the CSCF Distributer's building. This is not considered a practical alternative. Relocating this portion of the roadway would also result approximately 1,500 square feet of impacts to the ACEC and significant right-of-way and building impacts. Additionally, according to the historical accident data (2008-2010), no accidents were reported in this area, therefore it does not appear that the current curve layout is problematic for drivers. The curve meets the design speed regulation at 25 M.P.H.

Conforming to the minimum curve radius at STA 81+58.92 would result in relocating the roadway approximately 20 feet south into the abutting properties. In addition, major bridge and Town owned park property improvements would be required to match the curve. Relocating this portion of the roadway would also result approximately 5,500 square feet of impacts to the ACEC, approximately 4,000 cubic feet of impacts to the Floodplain, and approximately 2,500 square feet of impacts to parkland. Significant improvements to the existing bridge over the Housatonic River to accommodate the roadway re-alignment would include a new approach, rails, curb, and retaining wall, relocation of utilities, and potential complete bridge demolition and installation. Additionally, according to the historical accident data (2008-2010), no accidents were reported in this area, therefore it does not appear that the current curve layout is

DESIGN EXCEPTION REPORT (REVISED)

Walker Street Reconstruction, Lenox, Massachusetts

problematic for drivers. This is not considered a practical alternative. The curve meets the design speed regulation at 25 M.P.H.

Figure 4.1-3 illustrates the conceptual location of the roadway required to meet the minimum curve radius for STA 81+58.92.

A design exception is being request for use of a compound curve for the horizontal alignment for the curves at STA PI 77+62.75 and STA PI 79+90.64 as shown on the plans. A design exception is required when the radius of the tighter curve is less than 50% of the flatter curve. The tighter curve (PI STA 79+90.64) has a radius of 346.80 feet and the flatter curve (PI STA 77+62.75) has a radius of 8,200.00 feet, in this case the radius of the tighter curve is approximately 4.23% of the flatter curve.



Figure 4.1-3 Re-Alignment at STA 81+58.92

A design exception is requested because eliminating the compound curve at this location would require the addition of a tangent between the two curves. A 150-foot tangent was used to develop the summary of impacts. This would shift the road to the south approximately 1 foot at STA 77+80± which would impact approximately 200 feet of roadway between STA 76+75± and 78+75±. Impacts would include the removal and relocation of several utility poles and overhead wires, additional grading that would impact approximately 300 square feet of the ACEC, removal of additional trees and an overall increase in cost.

Extending the clearing and grading at these areas (STA PI 77+62.75, STA PI 79+90.64 and STA PI 81+58.92) to re-align or superelevate the roadway does not appear to be justified by the current or historic accident data, traffic data, ACEC and Floodplain impacts, proximity to intersections and bridge, or observed conditions. The proposed design will improve shoulder widths for vehicular and bicycle safety.

Re-alignment does not appear to be justified for the reasons noted above. The speed limit in this area shall be posted at 25 M.P.H. – see attached Massachusetts Department of Public Works Town of Lenox Speed Regulation #336.

A design exception is not required for shoulder width. A 5-foot shoulder is provided in all locations where curbing is present and a 6-foot shoulder is provided in all locations where guardrails are present.

A design exception is not required for the horizontal clearance requirement. There were four locations (STA 28+85.83, 30+13.73, 45+06.16 and 72+37.56, left) where the horizontal clearance requirement was not being met due to utility pole locations, however the utility poles at these locations are currently proposed to be relocated outside of the horizontal clearance area.

DESIGN EXCEPTION REPORT (REVISED)

Walker Street Reconstruction, Lenox, Massachusetts



Figure 4.1-4 Sidewalk Abutting Roadway



Figure 4.1-5 Utility Poles Abutting Roadway

A design exception is not required for the stopping sight distance requirement. The previous submission included a 0.5-foot object height for determining stopping sight distance which resulted in areas of non-compliance; the current design uses a 2-foot object height as per AASHTO. The 305-foot minimum stopping sight distance requirement is met in all locations.

4.2 MASSDOT STANDARDS & PROPOSED VALUES

The standard criteria for design speed, lane width, shoulder width, horizontal alignment, vertical alignment, grades, stopping sight distance, cross slope, superelevation, and horizontal clearance are set forth in the current 2006 edition of MassDOT's Project Development and Design Guide for an Urban Minor Arterial roadway. The proposed values are shown in the attached DER checklist. The following project values that do not meet the criteria are as follows:

	Minimum	Proposed
Horizontal Alignment Radius of Curve	765'	340.00' (PI STA 79+90.64) 210.91' (PI STA 81+58.92)
Compound Curve	Radius of tighter curve no less than 50% radius of flatter curve (4,100')	4.23% (PCC 78+87.58) PI STA 77+62.75 Radius = 8,200.00' PI STA 79+90.64 Radius = 346.80'

Table 4.2-1 MassDOT Standards and Proposed Values
(Source: MassDOT 2006 Project Development and Design Guide)

All other controlling criteria along Walker Street meet the minimum requirements for an urban minor arterial roadway except for horizontal alignment (see Attachment A – Controlling Criteria and the plans for the locations of deficiency).

A design exception is being requested for horizontal alignment (radius of curve) for the two locations listed above. The curves at these locations cannot be improved upon without significant impacts to the surrounding area. These curves are located in Lenox Dale at the intersections with Golden Hill Road and Crystal Street and Mill Street. There is limited right-of-way in this location and the buildings in this area have minimal setbacks from the roadway; therefore

DESIGN EXCEPTION REPORT (REVISED)

Walker Street Reconstruction, Lenox, Massachusetts

substantial changes cannot be made to the roadway alignment without infringing on buildings and large easements on private property. Additionally, as discussed in Section 4.1 of this report, changes to the roadway alignment would have impacts to the bridge, ACEC and Floodplain in these areas.

A design exception is being requested for the use of a compound curve in which the radius of the tighter curve is less than 50% of the radius of the flatter curve at the location listed in Table 4.2-1. Eliminating the compound curve in this location could not be completed without significant impacts to the surrounding area. As discussed in Section 4.1 of this report, impacts would include additional grading within the ACEC, the removal and relocation of additional utility poles and overhead wires, removal of additional trees and an increase in cost.

4.3 COMPATIBILITY AND FUTURE IMPROVEMENTS

There are no other planned roadway improvements within the project limits.

4.4 RIGHT-OF-WAY CONSTRAINTS

A sixty-six foot right-of-way exists and easements are proposed for grading, walls, drainage and construction related items.

4.5 BICYCLE ACCOMMODATIONS

Walker Street does not currently meet the requirements for bicycle accommodations. The minimum required shoulder width for safe bicycle travel is 4 feet; the current shoulder width varies from 0 to 3 feet along the roadway. Therefore, it is proposed to provide a 4-foot wide shoulder along the entire length of the roadway with 5-foot wide shoulders where curbing is proposed and 6-foot wide shoulders where guardrails are proposed.

Per AASHTO and MassDOT, a 5-foot bike lane is recommended and 4-feet is the minimum allowed without a curb or on-street parking. Due to impacts of a 5-foot wide bike lane, we are recommending a 4-foot wide bike lane be used in areas with no curb or on-street parking. It is our opinion that a 4-foot wide bike lane, in these cases, is appropriate for this rural roadway with design speeds less than 45 mph. The AASHTO and MassDOT minimum operating bike lane width is 4 feet without a curb or on-street parking, 5 feet with a curb, and 6 feet with a guardrail. These minimums are currently met with this design. Table 4.5-1 below summarizes the additional impacts that would be required to increase the currently proposed 4-foot bike lane sections to 5-foot bike lanes.

Area of Impact	Approximate Total Additional Impact/Alteration
Wetlands – BVW	2,000 SF ±
ACEC	10,000 SF ±
Trees	50 ±
Utility Poles Utilities	15 Poles, Guys and Aerial Connections

Table 4.5-1 Summary of Impacts of 5-Foot Bike Lane (where no curb or on-street parking is proposed)

5.0 RECOMMENDATIONS

Based on the rationale presented in this report, it is requested that the horizontal alignment (radius of curve) design exception (2 total) for the Walker Street Reconstruction project be approved. The design improvements allow Walker Street and its surrounding area to retain its uses as an “Urban Minor Arterial” without compromising safety. There has not been a historical safety issue attributable to the existing horizontal alignment which will be either improved or maintained. Reasonable engineering judgment has been applied during the design process to determine a safe and sufficient design with regards to project constraints. The posted speed limit is 25 M.P.H. at these curves. Therefore, the curves meet the design criteria for horizontal alignment at 25 M.P.H. at the posted speed limit.

***MASSACHUSETTS DPW TOWN OF LENOX
SPEED REGULATION #336***

Check Holmes Rd. speed
for New Lenox Rd. West Ad.
RC9

TOWN OF LENOX
SPECIAL SPEED REGULATION
336

MASS. D. P. W. Dist. 1
MAY 6 1966
T. H. E. Eng. 19.
Att. Rep. Ans.

HIGHWAY LOCATION:

TOWN OF LENOX Road by 2 Circ.

Authority in Control:

TOWN OF LENOX Board of Selectmen File

Name of Highways:

Stockbridge Road East Street
West Street New Lenox Road
Walker Street Holmes Road

In accordance with the provisions of Chapter 90, Section 18, of the General Laws (Ter. Ed.) as amended, the following Special Speed Regulation is

hereby Adopted
by the Board of Selectmen
of the Town of Lenox

That the following speed limits are established at which motor vehicles may be operated in the areas described:

STOCKBRIDGE ROAD NORTHBOUND

REVISED REFER # 336-A
1968

Beginning at the Stockbridge Town Line, thence northerly in Lenox:

	0.34 miles at 25 miles per hour	1795'
thence	0.26 " " 30 " " "	1373'
"	1.51 " " 35 " " "	7973'
"	0.05 " " 25 " " "	264'

ending at Main Street. The total distance being 2.16 miles.

STOCKBRIDGE ROAD SOUTHBOUND

REVISED REFER # 336-A
1968

Beginning at Main Street, thence southerly:

	0.05 miles at 25 miles per hour	264'
thence	1.51 " " 35 " " "	7973'
"	0.26 " " 30 " " "	1373'
"	0.34 " " 25 " " "	1795'

ending at the Stockbridge Town Line. The total distance being 2.16 miles.

WEST STREET EASTBOUND *Revised Report # 336-A 336-E*
1968 1977

Beginning at the Stockbridge Town Line, thence easterly in Lenox:

	0.44 miles at 45 miles per hour	2323'	9/22/98
thence	0.31 " " 40 " " "	1637'	
"	0.52 " " 35 " " "	2746'	HOUSE #140 (ACROSS)
"	0.08 " " 25 " " "	422'	HOUSE #12 (ACROSS)

ending at Main Street. The total distance being 1.35 miles.

WEST STREET WESTBOUND *Revised Report # 336-A 336-E*
1968 1977

Beginning at Main Street, thence westerly:

	0.08 miles at 25 miles per hour	422'	9/22/98
thence	0.52 " " 35 " " "	2746'	HOUSE #12
"	0.31 " " 40 " " "	1637'	HOUSE #140 + HOUSE #201
"	0.44 " " 45 " " "	2323'	N/A 40 @ TOWN LINE

ending at the Stockbridge Town Line. The total distance being 1.35 miles.

* WALKER STREET EASTBOUND

Beginning at Veterans Memorial Highway (Route 20), thence easterly:

	0.08 miles at 25 miles per hour	422'
thence	1.10 miles at 40 miles per hour	5808'
"	0.25 " " 35 " " "	1320'
→ "	0.10 " " 25 " " "	528'

ending at Crystal Street. The total distance being 1.53 miles.

* WALKER STREET WESTBOUND

Beginning at Crystal Street, thence westerly:

→	0.10 miles at 25 miles per hour	528'
thence	0.25 " " 35 " " "	1320'
"	1.10 " " 40 " " "	5808'
"	0.08 " " 25 " " "	422'

ending at Veterans Memorial Highway (Route 20). The total distance being 1.53 miles.

MASS. D. P. W. Dist. 1

MAY 6 1966

Att. Rep. Ans.

Read by Circ.

Requisition File

Town

DESIGN EXCEPTION REPORT CHECKLIST

DESIGN EXCEPTION REPORT CHECKLIST

City/Town: Lenox

Project File No.: 606462

Facility: Walker Street

Fed. Aid Proj. No.: _____

I. Project Description

A. Type of Work Proposed

- | | |
|---|--|
| <input checked="" type="checkbox"/> Full Depth Reconstruction | <input type="checkbox"/> Resurfacing/Box Widening |
| <input type="checkbox"/> Reclamation | <input type="checkbox"/> NHS Bridge Replacement/Rehabilitation |
| <input type="checkbox"/> New Construction | <input checked="" type="checkbox"/> Other <u>Sidewalk</u> |

B. Purpose of Project

- | | |
|--|---|
| <input checked="" type="checkbox"/> Safety Improvement | <input checked="" type="checkbox"/> Maintenance |
| <input type="checkbox"/> Additional Capacity | <input type="checkbox"/> Other |
| <input checked="" type="checkbox"/> Describe if Other: <u>Pedestrian and bicycle improvements.</u> | |

C. Footprint Road Project? ☐ YES ☒ NO

II. Indicate Controlling Criteria, as defined by Project Development and Design Guide, requiring a Design Exception. (See worksheet ATTACHMENT A).

A. Roadway and Bridge Criteria

- | | |
|--|--|
| <input type="checkbox"/> Design Speed | <input type="checkbox"/> Grades |
| <input type="checkbox"/> Lane Width | <input type="checkbox"/> Stopping Sight Distance |
| <input type="checkbox"/> Shoulder Width | <input type="checkbox"/> Cross Slope |
| <input checked="" type="checkbox"/> Horizontal Alignment | <input type="checkbox"/> Superelevation |
| <input type="checkbox"/> Vertical Alignment | <input type="checkbox"/> Horizontal Clearance |

B. Bridge Only Criteria

- | | |
|--|---|
| <input type="checkbox"/> Width | <input type="checkbox"/> Vertical Clearance |
| <input type="checkbox"/> Structural Capacity | |

III. Description of Facility

A. Functional Classification

- | | |
|--|--|
| <input type="checkbox"/> Urban Freeway | <input type="checkbox"/> Rural Freeway |
| <input checked="" type="checkbox"/> Urban Arterial | <input type="checkbox"/> Rural Arterial |
| <input type="checkbox"/> Urban Collector | <input type="checkbox"/> Rural Collector |
| <input type="checkbox"/> Urban Local | <input type="checkbox"/> Rural Local |

DESIGN EXCEPTION REPORT CHECKLIST

City/Town: Lenox

Project File No.: 606462

(Description of Facility cont'd)

B. NHS

☐ Yes

☒ No

C. General Description of Project Area

☐ Undeveloped

☒ Residential

☐ Commercial

☐ Industrial

☐ Scenic

☐ Historic

☒ Describe if Other: Multiple commercial properties & one Golf Course/Resort.

D. Traffic Volume

ADT (Current)	<u>3,200</u>	T (Peak Hour)	<u>7.30%</u>
ADT (Design Year)	<u>3,905</u>	T (Avg. Day)	<u>Not Available</u>
K	<u>9%</u>	DHV	<u>351</u>
D	<u>52%</u>	DDHV	<u>183</u>

E. Speed

Posted	<u>25 - 40</u>	85th Percentile	<u>Not Available</u>
Observed	<u>31 (Avg)</u>	Existing Design Speed	<u>40</u>

F. Lane and Shoulder Width

Existing

Lane Width 11'-14' Right Shoulder 0'-3' Left Shoulder 0'-3'

Attach a Typical Section (8 1/2" x 11") depicting existing dimensions and proposed cross-sections. Include R.O.W lines.

G. Right of Way

☒ State Highway

☒ County

☐ City/Town

Average Width 66' (County Highway Layout) - Width varies for State Highway Layout at Route 7 & Route 20.

DESIGN EXCEPTION REPORT CHECKLIST

City/Town: Lenox

Project File No.: 606462

(Description of Facility cont'd)

H. Crash Data

The crash rate shall be calculated based on the latest three years of crash data available. Crash rates should be calculated for roadway segments based on Hundred Million Vehicle Miles traveled (HMVM) as follows:

$$\text{HMVM} = (A \times 100,000,000) / (\text{ADT} \times D \times L)$$

A = number of total crashes at the study location during a given period

ADT = Average Daily Traffic

D = number of days in the study period

L = length of study location in miles

Attach additional tables and diagrams as necessary to accurately communicate the crash history within the project limits.

Provide a detailed narrative that summarizes available data and draws a conclusion as to the expected effectiveness of any proposed improvements.

I. Environmental Factors

Attach a brief discussion of the natural, cultural, historic or other environmental constraints associated with the proposed project. All of the following must be addressed: wetland/floodplain, trees, parkland, endangered species, cultural, historic, archaeological, etc.

V. Summary of Impacts

Complete the attached spreadsheet titled Summary of Impacts (ATTACHMENT B). A separate spreadsheet is required for each of the controlling criteria for which a design exception is requested.

Attach photographs that illustrate existing features important to the proposed design.

VI. Recommendation

By drawing from all of the above information, attach a narrative documenting that reasonable engineering judgement was used to justify the proposed design.

**DESIGN EXCEPTION REPORT
CHECKLIST**

City/Town: Lenox

Project File No.: 606462

VII. Certification of Design Exception Report (Engineering Directive E-99-002)

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.

Signature and P.E. Stamp of Principal or Chief Engineer of firm preparing report:

Steven A. Mack, P.E.
Name
Principal Engineer
Title
2/8/13
Date



ATTACHMENT A
CONTROLLING CRITERIA

DESIGN EXCEPTION REPORT
ATTACHMENT A
CONTROLLING CRITERIA

City/Town: Lenox **Project File No.:** 606462

Design Speed

Refer to Guidebook, Exhibit 3-7

Desirable	<u>40</u>
Minimum	<u>25</u>
Posted	<u>25-40</u>
Proposed	<u>40</u>

☐ Design Exception Required.

Lane Width

Refer to Guidebook, Exhibit 5-14

Desirable	<u>11'-12'</u>
Minimum	<u>11'</u>
Proposed	<u>11'</u>

☐ Design Exception Required.

Shoulder Width

Refer to Guidebook, Exhibit 5-12 (see note 3)

	Right	
Desirable	<u>4'</u>	6' to face of GR
Minimum	<u>4'</u>	
Proposed	<u>4'-6'</u>	

☐ Design Exception Required.

	Left	
Desirable	<u>4'</u>	6' to face of GR
Minimum	<u>4'</u>	
Proposed	<u>4'-6'</u>	

☐ Design Exception Required.

Horizontal Alignment

Refer to Guidebook, Exhibit 4-8 and 4-9

Minimum	<u>765'</u>	
Proposed	<u>210.91', 346.80'</u>	<i>See attached list.</i>

PI Sta.	<u> </u>	PI Sta.	<u> </u>	PI Sta.	<u> </u>	PI Sta.	<u> </u>
Radius	<u> </u>	Radius	<u> </u>	Radius	<u> </u>	Radius	<u> </u>

☒ Design Exception Required.

Refer to Guidebook, Chapter 4, Section 4.2 (Compound Curves).

Check all compound curves. The radius of the tighter curve should be no less than 50 percent of the flatter curve.

☒ Design Exception Required.

DESIGN EXCEPTION REPORT
ATTACHMENT A
CONTROLLING CRITERIA

City/Town: Lenox **Project File No.:** 606462

(Horizontal Alignment cont'd)

Length of Curve.

Lmin = 30 V (freeways)

Lmin = 15 V (other major highways)

V = Design Speed

☐ Design Exception Required.

*Not required - not a Freeway
or a Major Highway.*

Vertical Alignment

For Crest Vertical Curves, refer to Guidebook, Exhibit 4-26

Minimum 44

Proposed 44.00 *See attached list.*

PVI Sta.

K

PVI Sta.

K

PVI Sta.

K

PVI Sta.

K

☐ Design Exception Required.

For sag curves, refer to Guidebook, Exhibit 4-27

Minimum 64

Proposed 64.00 *See attached list.*

PVI Sta.

K

PVI Sta.

K

PVI Sta.

K

PVI Sta.

K

☐ Design Exception Required.

Grades

Refer to Guidebook, Exhibit 4-21

Maximum 10.00%

Proposed 9.60%

☐ Design Exception Required.

Stopping Sight Distance

Refer to Guidebook, Exhibit 3-8

Minimum 305'

Desirable 305'

Proposed 316.72' *See attached list.*

☐ Design Exception Required.

DESIGN EXCEPTION REPORT
ATTACHMENT A
CONTROLLING CRITERIA

City/Town: Lenox **Project File No.:** 606462

(Stopping Sight Distance cont'd)

Refer to Guidebook Section 3.7 and Exhibit 4-4 (SSD Middle Ordinate)

Minimum 9.5 (@ 40mph)

Desirable 9.5

☐ Design Exception Required.

Cross Slope

Refer to Guidebook, Section 5.5.2

Bit Conc. 0.020

Cem Conc. 0.016

Proposed 0.020

☐ Design Exception Required.

Superelevation

Refer to Guidebook Section 4.2. Check required values for superelevation rates, transitioning, runoff, banking, etc. for all lanes and shoulders.

☐ Design Exception Required.

Horizontal Clearance

Refer to AASHTO A Policy on Geometric Design of Highways and Streets.

Minimum 18 inches beyond face of curb.

☐ Design Exception Required.

Bridge Only Criteria

Lane and Shoulder Width

Refer to AASHTO A Policy on Geometric Design of Highways and Streets.

☐ Design Exception Required.

Structural Capacity

Refer to Chapter 3 of MassHighway Bridge Manual.

☐ Design Exception Required.

Vertical Clearance

Refer to Guidebook, Exhibit 4-28

Minimum

Proposed

☐ Design Exception Required.

Horizontal Alignment

Refer to Guidebook, Exhibit 4-8 and 4-9

Minimum	<u>765'</u>
Proposed	<u>210.91', 346.80'</u>

PI Sta.	<u>3+82.57</u>	PI Sta.	<u>10+66.18</u>	PI Sta.	<u>18+72.24</u>	PI Sta.	<u>31+25.07</u>
Radius	<u>23,647.09</u>	Radius	<u>38,180.00</u>	Radius	<u>860,560.00</u>	Radius	<u>71,940.00</u>

PI Sta.	<u>52+72.57</u>	PI Sta.	<u>61+19.22</u>	PI Sta.	<u>77+62.75</u>	PI Sta.	<u>79+90.64</u>
Radius	<u>3,400.00</u>	Radius	<u>88,680.00</u>	Radius	<u>8,200.00</u>	Radius	<u>346.80</u>

PI Sta.	<u>81+58.92</u>
Radius	<u>210.91</u>



Design Exception Required.

Vertical Alignment

For Crest Vertical Curves, refer to Guidebook, Exhibit 4-26

Minimum	<u>44</u>
Proposed	<u>44.00</u>

PVI Sta.	<u>9+62.89</u>	PVI Sta.	<u>14+05.66</u>	PVI Sta.	<u>22+73.48</u>	PVI Sta.	<u>28+54.29</u>
K	<u>50.13</u>	K	<u>267.89</u>	K	<u>94.45</u>	K	<u>92.57</u>

PVI Sta.	<u>40+97.09</u>	PVI Sta.	<u>43+08.47</u>	PVI Sta.	<u>53+05.06</u>	PVI Sta.	<u>58+14.68</u>
K	<u>44.00</u>	K	<u>67.66</u>	K	<u>48.29</u>	K	<u>69.92</u>

<input type="checkbox"/> PVI Sta.	<u>71+62.02</u>	PVI Sta.	<u>79+30.13</u>
K	<u>44.00</u>	K	<u>70.57</u>

Design Exception Required.

For Sag Curves, refer to Guidebook, Exhibit 4-27

Minimum	<u>64</u>
Proposed	<u>64.00</u>

PVI Sta.	<u>4+74.36</u>	PVI Sta.	<u>6+97.77</u>	PVI Sta.	<u>17+87.11</u>	PVI Sta.	<u>20+56.67</u>
K	<u>66.62</u>	K	<u>64.00</u>	K	<u>64.00</u>	K	<u>107.90</u>

PVI Sta.	<u>34+28.17</u>	PVI Sta.	<u>37+86.08</u>	PVI Sta.	<u>46+08.44</u>	PVI Sta.	<u>67+22.82</u>
K	<u>73.68</u>	K	<u>71.68</u>	K	<u>82.90</u>	K	<u>129.66</u>

<input type="checkbox"/> PVI Sta.	<u>73+91.90</u>	PVI Sta.	<u>75+75.61</u>
K	<u>193.81</u>	K	<u>99.63</u>

Design Exception Required.

Stopping Sight Distance

Refer to Guidebook, Exhibit 3-8

Minimum	<u>305</u>
Desirable	<u>305</u>
Proposed	<u>316.72</u>

PVI Sta.	<u>4+74.36</u>	PVI Sta.	<u>6+97.77</u>	PVI Sta.	<u>9+62.89</u>	PVI Sta.	<u>14+05.66</u>
SSD	<u>316.72</u>	SSD	<u>317.00</u>	SSD	<u>328.92</u>	SSD	<u>870.76</u>

PVI Sta.	<u>17+87.11</u>	PVI Sta.	<u>20+56.67</u>	PVI Sta.	<u>22+73.48</u>	PVI Sta.	<u>28+54.29</u>
SSD	<u>928.79</u>	SSD	<u>643.47</u>	SSD	<u>843.08</u>	SSD	<u>494.80</u>

PVI Sta.	<u>34+28.17</u>	PVI Sta.	<u>37+86.08</u>	PVI Sta.	<u>40+97.09</u>	PVI Sta.	<u>43+08.47</u>
SSD	<u>348.33</u>	SSD	<u>335.65</u>	SSD	<u>607.80</u>	SSD	<u>538.55</u>

<input type="checkbox"/> PVI Sta.	<u>46+08.44</u>	PVI Sta.	<u>53+05.06</u>	PVI Sta.	<u>54+14.68</u>	PVI Sta.	<u>67+22.82</u>
SSD	<u>1,106.54</u>	SSD	<u>326.99</u>	SSD	<u>389.75</u>	SSD	<u>547.39</u>

PVI Sta.	<u>71+62.02</u>	PVI Sta.	<u>73+91.90</u>	PVI Sta.	<u>75+75.61</u>	PVI Sta.	<u>79+30.13</u>
SSD	<u>797.30</u>	SSD	<u>1,166.69</u>	SSD	<u>820.22</u>	SSD	<u>446.08</u>

Design Exception Required.

ATTACHMENT B
SUMMARY OF IMPACTS

ATTACHMENT B1
SUMMARY OF IMPACTS
CONTROLLING CRITERIA: HORIZONTAL ALIGNMENT

The recommended horizontal alignment for radius of curve is 765 feet, based on a design speed of 40 M.P.H. According to the Massachusetts Department of Public Works Town of Lenox Speed Regulation, the speed limit in this area is 25 M.P.H. The design plans incorporate this speed regulation. The horizontal radius of curve for a 25 M.P.H. design speed is 200 feet (210.9 feet is the minimum proposed). The proposed design matches existing horizontal alignment to the maximum extent practicable and no significant changes are proposed to meet this criterion. Specifically, the existing curves in Lenox Dale near the intersection of Mill Street, Crystal Street, and Golden Hill Road can not be modified without significant roadway and bridge realignment, impacts to abutting properties and impacts to the ACEC and Floodplain.

For a compound curve, the radius of the tighter curve should be no less than 50% of the flatter curve. A design exception is being requested for the use of a compound curve in which the radius of the tighter curve is less than 50% of the radius of the flatter curve. Eliminating the compound curve could not be completed without significant impacts to the surrounding area, including additional grading within the ACEC, the removal and relocation of additional utility poles and overhead wires, removal of additional trees and an increase in cost.

ATTACHMENT B **DESIGN EXCEPTION REPORT** **SUMMARY OF IMPACTS**

Provide a summary of the incremental impacts associated with the Desirable, Minimum and Proposed design. Include impacts of incremental designs.

A separate Summary of Impacts sheet shall be prepared for each controlling criteria element that does not meet the minimum specified.

CONTROLLING CRITERIA: Horizontal Alignment (Radius of Curve) - STA PI 79+90.64

SUMMARY OF IMPACTS

INSERT VALUE IN THIS COLUMN	WETLANDS (SF) ACEC	TREES (EA)	PARKLANDS (SF)	STONE WALLS (LF)	SALT MARSH (SF)	ROW (\$)	CONST. COST (\$)	TOTAL COST (\$)
DESIRABLE 765 FT	1500	-	-	-	-	\$500,000	\$350,000	\$850,000
MINIMUM 765 FT	1500	-	-	-	-	\$500,000	\$350,000	\$850,000
ALTERNATIVE 1 346.8 FT	0 Match Existing	-	-	-	-	-	\$290,000	\$290,000
ALTERNATIVE 2	-	-	-	-	-	-	-	-
RECOMMENDED 346.8 FT	0 Match Existing	-	-	-	-	-	\$290,000	\$290,000

NOTE: Attach a narrative detailing the impacts of each alternative.

NOTE: Columns and rows may need to be added to address additional incremental designs or impacts

ATTACHMENT B **DESIGN EXCEPTION REPORT** **SUMMARY OF IMPACTS**

Provide a summary of the incremental impacts associated with the Desirable, Minimum and Proposed design. Include impacts of incremental designs.

A separate Summary of Impacts sheet shall be prepared for each controlling criteria element that does not meet the minimum specified.

CONTROLLING CRITERIA: Horizontal Alignment (Radius of Curve) - STA PI 81+58.92

SUMMARY OF IMPACTS

INSERT VALUE IN THIS COLUMN	WETLANDS (SF) ACEC	PARKLANDS (SF)	BRIDGE (EA) IMPROV'MENTS	RET. WALLS (LF)	FLOODPLAIN (CF)	ROW (\$)	CONST. COST (\$)	TOTAL COST (\$)
DESIRABLE 765 FT	5500	2500	1	20	4000	\$5,500	\$1.495 MIL	\$1.5 MIL
MINIMUM 765 FT	5500	2500	1	20	4000	\$5,500	\$1.495 MIL	\$1.5 MIL
ALTERNATIVE 1 210.9 FT	0 Match Existing	-	-	-	-	-	\$140,000	\$140,000
ALTERNATIVE 2	-	-	-	-	-	-	-	-
RECOMMENDED 210.9 FT	0 Match Existing	-	-	-	-	-	\$140,000	\$140,000

NOTE: Attach a narrative detailing the impacts of each alternative.

NOTE: Columns and rows may need to be added to address additional incremental designs or impacts

ATTACHMENT B DESIGN EXCEPTION REPORT SUMMARY OF IMPACTS

Provide a summary of the incremental impacts associated with the Desirable, Minimum and Proposed design. Include impacts of incremental designs.

A separate Summary of Impacts sheet shall be prepared for each controlling criteria element that does not meet the minimum specified.

CONTROLLING CRITERIA: Horizontal Alignment (Compound Curve) - STA PI's 77+62.75 & 79+90.64

SUMMARY OF IMPACTS

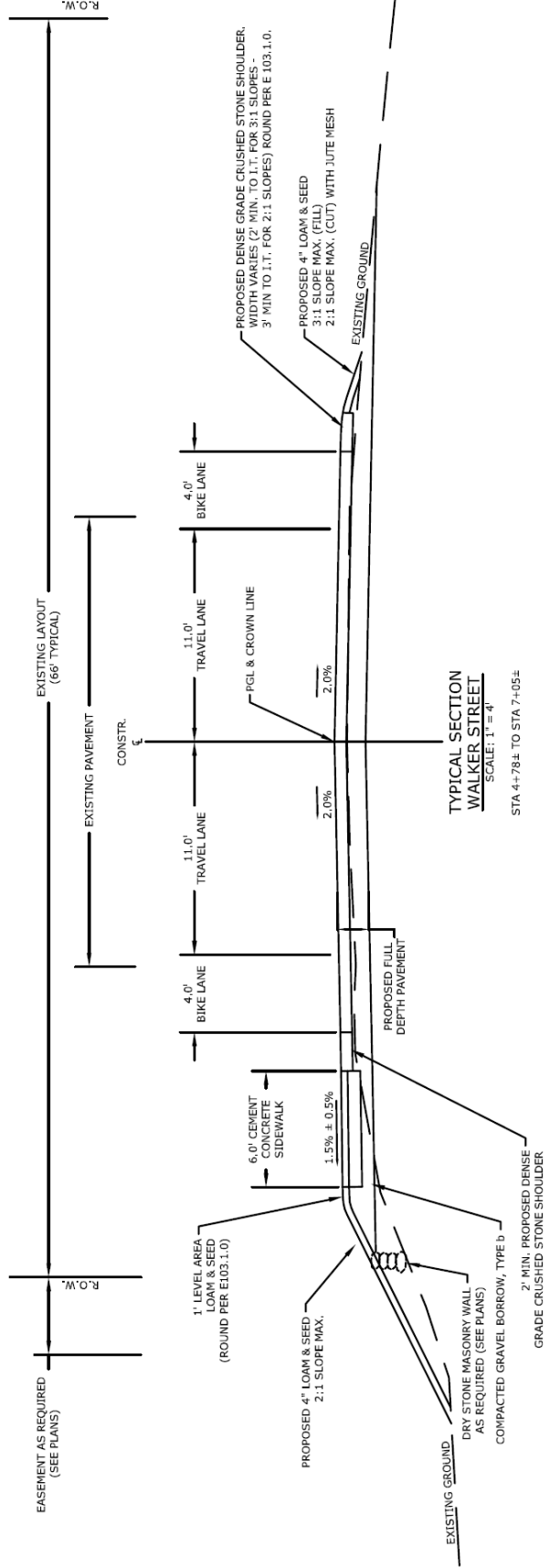
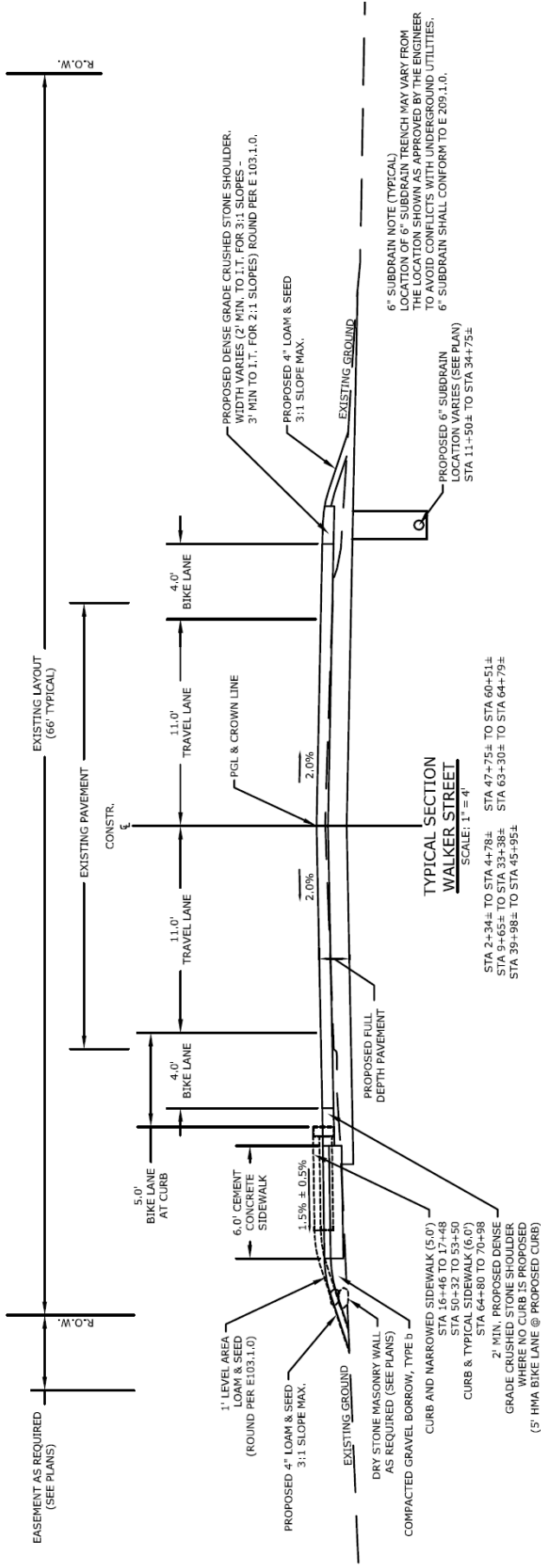
INSERT VALUE IN THIS COLUMN	WETLANDS (SF) ACEC	TREES (EA)	PARKLANDS (SF)	STONE WALLS (LF)	SALT MARSH (SF)	ROW (\$)	CONST. COST (\$)	TOTAL COST (\$)
DESIRABLE 4100 FT	300	2	-	-	-	\$30,000	\$175,000	\$205,000
MINIMUM 4100 FT	300	2	-	-	-	\$30,000	\$175,000	\$205,000
ALTERNATIVE 1 346.8 FT	0 Match Existing	0 Match Existing	-	-	-	-	\$134,000	\$134,000
ALTERNATIVE 2	-	-	-	-	-	-	-	-
RECOMMENDED 346.8 FT	0 Match Existing	0 Match Existing	-	-	-	-	\$134,000	\$134,000

NOTE: Attach a narrative detailing the impacts of each alternative.

NOTE: Columns and rows may need to be added to address additional incremental designs or impacts

ATTACHMENT C
TYPICAL SECTIONS

ATTACHMENT C Typical Cross Sections (N.T.S.)



TYPICAL SECTION WALKER STREET

EXISTING LAYOUT (60' TYPICAL)

EXISTING PAVEMENT CONSTR.

11.0' TRAVEL LANE

5.0' BIKE LANE

11.0' TRAVEL LANE

5.0' BIKE LANE

6.0' CEMENT CONCRETE SIDEWALK

1.5% SLOPE

EXISTING GROUND

PROPOSED 4" LOAM & SEED 3:1 SLOPE MAX.

1' WIDE MIN. LOAM & SEED AT 3% SLOPE

PROPOSED GRANITE CURB TYPE VA4 (TYP.) REMOVE AND DISPOSE OF EXISTING

PROPOSED FULL DEPTH PAVEMENT

2.0%

2.0%

PROPOSED GRANITE CURB TYPE VA4 (TYP.) REMOVE AND DISPOSE OF EXISTING (SEE MASSDOT DETAIL E 106.3.0R) (INSTALL CURB TO 10+16 RT)

1' LEVEL AREA LOAM & SEED (ROUND PER E103.1.0)

EXISTING GROUND

TREE PROTECTION FENCING - SEE PLANS

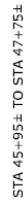
PROTECT ALL TREES AS NOTED ON PLANS

EXISTING TREE TO BE PROTECTED

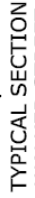
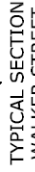
EASEMENT AS REQUIRED (SEE PLANS)

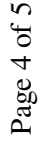
R.O.W.

STA 7+05± TO STA 9+65±

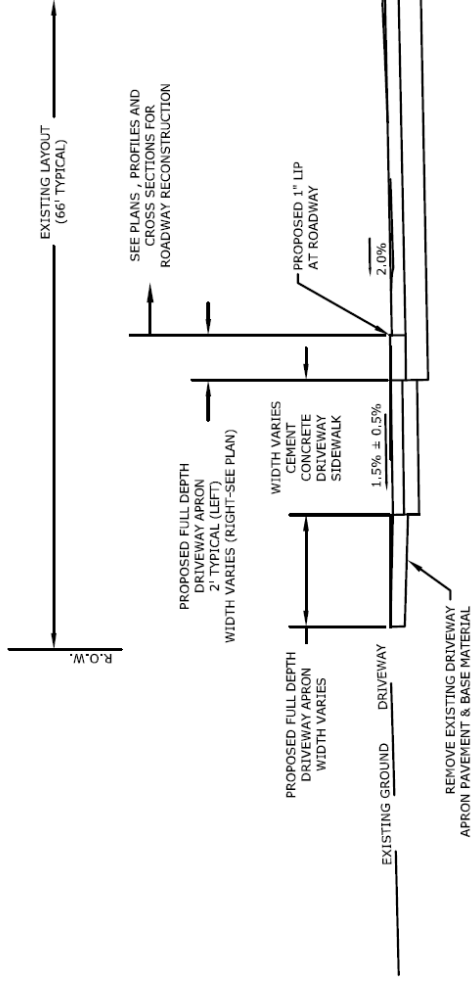


ATTACHMENT C



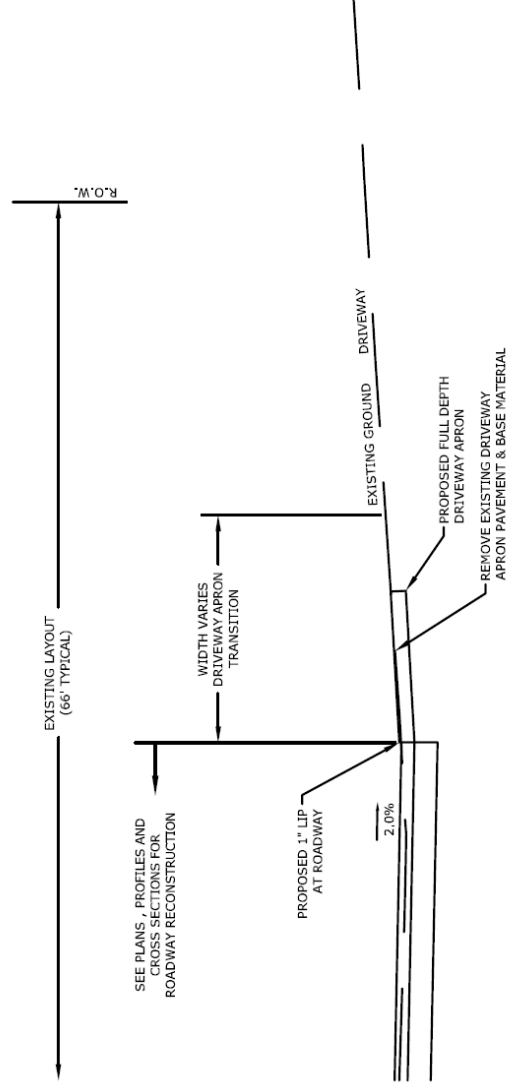
[illegible]

ATTACHMENT C Typical Cross Sections (N.T.S.)



TYPICAL SECTION
WALKER STREET
SCALE: 1" = 4'

DRIVEWAY APRON TRANSITION WITH SIDEWALK



TYPICAL SECTION
WALKER STREET
SCALE: 1" = 4'

DRIVEWAY APRON TRANSITION

