

South Medford Connector Feasibility Study

Phase I Technical Memorandum



August 2018

Prepared For:

**City of Medford, Massachusetts &
Mystic River Watershed Association**



Mystic River
WATERSHED ASSOCIATION

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Executive Summary

In May 2018, the City of Medford in coordination with the Mystic River Watershed Association contracted with Nitsch Engineering to prepare a Feasibility Study (the Study) for a new segment of riverfront path named the South Medford Connector (the Project). Once completed, the Project will provide a critical link in the regional transportation network that connects the two existing Department of Conservation and Recreation (DCR) paths and support bicycle commuter access throughout the region. The proposed South Medford Connector will extend from I-93 to the Cradock Bridge within the undeveloped corridor between the Mystic Valley Parkway (Route 16) and the shoreline of the Mystic River. To assist Medford and MyRWA with developing a preferred strategy to advance the South Medford Connector project, Nitsch Engineering evaluated several design alternatives with respect to environmental and ecological impacts, preliminary pricing, and ease of construction.

Throughout the Feasibility Study process, Nitsch Engineering met with a stakeholder group that included the City of Medford, MyRWA, Massachusetts Gaming Commission, Metropolitan Area Planning Council, Massachusetts Department of Transportation and the department of Conservation and Recreation. This group provided valuable feedback on preferred design strategies and local and regional traffic considerations.

Through the Study process, ten alternatives were analyzed at two key locations, subsequently referred to as Locations A and B. Location A is located at the Route 16 west bound exit ramp to Main Street (Route 38) and consists of a steep stone embankment from the exit ramp down to the river's edge. Location B is located at an existing stormwater culvert located to the west of Riverbend Park (opposite Andrews Middle School). The Project's northwestern terminus is located at the Cradock Bridge / Main Street, which connects Route 16 to Medford Square. During the Study period (May – August 2018), the Cradock Bridge was under construction and the Route 16 exit ramp was closed to vehicular traffic. To reflect the ramp-closed condition, one (1) Location A alternative considered the opportunity to keep the exit ramp closed and use the exit ramp as the surface for the shared-use path. However, the Cradock Bridge Replacement Project intends to reopen the exit ramp upon completion in Fall of 2018, so the Feasibility Study also included alternatives where the ramp is open, and the path is either on the ramp or adjacent to the ramp on the sloped embankment:

Location A Alternatives - At the Rt. 16 Exit Ramp

- A0 – Ramp Closed
- A1 – Ramp Open, Path Directly Adjacent to Vehicular Traffic
- A2 – Ramp Open, Path Elevated on Piles
- A3, A4, A5 – Ramp Open, Path Elevated with High, Low and Mid-Height Retaining Walls Along Route 16
- A2/A5 Hybrid – Ramp Open, Path Elevated on Piles and Low Retaining Wall Along Route 16

Horizontal alignment alternatives explored at the existing culvert crossing are depicted in the 'B' alternatives, the alignments at the culvert crossing explore methods for the path to cross the culvert.

Location B – At the Large Drainage Culverts and Associated Outfall

- B1 – Path South of Exposed Concrete with Retaining Wall Along Route 16
- B2 – Path Over Exposed Concrete with Structural Span for Approaches to Culvert
- B3 – Span Over Culvert with Path on Piles

The Stakeholder Engagement process identified that the preferred alternative would be the alternative(s) that had the lowest construction cost while maintaining compliance with the MassDOT and DCR shared-use path design guidelines for safety. Therefore, the preliminary construction cost estimate was a critical element of the Study. Based on the feedback received from the Stakeholder Meeting, six (6) alternatives were selected to be included in the preliminary construction cost estimate. This estimate provided a clear picture of the most cost-effective A and B alternatives – Alternative A0 and Alternative B2. Both alternatives are significantly less expensive than the others since they do not include path on new structural supports. However, there are additional considerations in each location that require further evaluation to determine if these recommended alternatives are viable; this includes the determination of if the Route 16 exit ramp can be permanently closed.

If the Route 16 Exit Ramp can remain closed, or is closed in the future, Alignment A0 would be the recommended alternative. Alignment A0 provides the lowest cost option and minimizes environmental impacts to the embankment between Route 16 and the Mystic River shoreline. Additional investigating into the process

of having the ramp closed is needed and will include a traffic study and coordination with MassDOT and the FHWA. However, if the Route 16 exit ramp does re-open, Alternative A2 was preferred by the Stakeholder Group because it keeps the path vertically aligned with the existing ramp elevation. A2 also provides the most setback from the River, reducing the encroachment into the Riverfront, Buffer Zone, and floodplain. Though the costs for A2 are significantly higher than A0, if A2 is further pursued additional geotechnical is recommended to further develop the structural design and refine the associated cost.

At Location B, Alternative B2 is the recommended alternative, provided additional structural investigations of the existing drainage culverts indicate that it could support the additional weight of the path and vehicles. If the existing drainage culverts cannot support additional weight, Alternative B3 would be the suggested alternative. If B3 is further pursued, additional geotechnical is recommended to further develop the structural design and refine the associated cost.

Since the Route 16 exit ramp is a critical location within the City of Medford, and it's open/closed status impacts many current initiatives of the City (including the South Medford Connector Project), the City is pursuing the potential of permanently closing ramp. It is anticipated that the South Medford Connector Project and its recommendations will be revisited after the Route 16 exit ramp process is complete.

I Introduction and Background

Nitsch Engineering was contracted by the City of Medford in coordination with the Mystic River Watershed Association (MyRWA) to prepare a Feasibility Study (the Study) and perform conceptual design services for the proposed South Medford Connector in Medford, Massachusetts (the Project). The Project is a one-mile shared-use path located on the southern side of the Mystic River between the Cradock Bridge and the Medford/Somerville municipal boundary (Appendix A - Map A10).

The South Medford Connector project will provide a 'missing link' to an otherwise continuous path system and will connect the shorelines at the Mystic River headwaters at the Mystic Lakes to the Boston Harbor with approximately 20 miles of continuous paths. The South Medford Connector is an integral component of the larger Mystic River Greenways vision and will connect Medford Center to the General Lawrence Bridge. The vision includes improving hundreds of acres of parkland and engaging thousands of community members. See Appendix A - Map A9 for a larger version of this map.

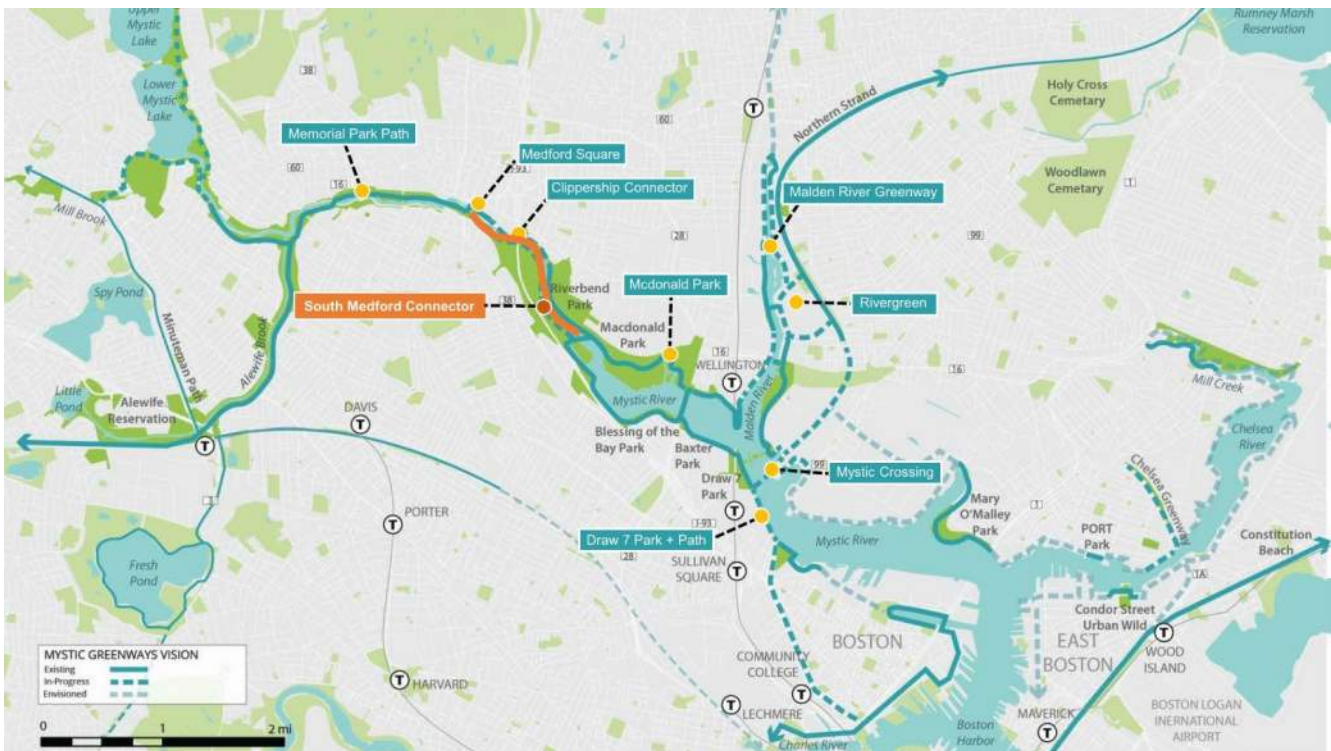


Figure 1. Regional Context of the South Medford Connector (Full size version available in Appendix A)

The South Medford Connector Project has regional support for its importance as a regional bicycle commuter connection. The Massachusetts Department of Conservation and Recreation (DCR), Metropolitan Area Planning Council (MAPC), and MyRWA have studied the Lower Mystic River area in detail resulting in recommendations to increase shared-use paths in the region. Through their Mystic Greenway Vision, MyRWA has been working to develop a continuous link of shared-use paths along the banks of the Mystic River and has identified the South Medford Connector as an important regional connection. The 2009 DCR Mystic River Master Plan also specifically highlights the South Medford Connector as an important connection between two other DCR shared-use paths in the Mystic River Reservation.

Locally within Medford, the Project will link Medford Square to the surrounding communities. Medford Square is an important commercial center that has been thoroughly studied by the City and is the focus of recent revitalization and redevelopment efforts (refer to Appendix D – Reference Documents). To provide access in and around Medford Square on the north side of the Mystic River, DCR is currently finalizing designs for the 0.5-mile Clippership Connector path. This path will provide a connection between Clippership Drive and Medford Center south to Riverbend Park and is intended to serve as a local route for Medford residents and families around the adjacent schools. Conversely, the South Medford Connector located on the south side of the River will serve as a regional connector.

The Project's northwestern terminus is located at the Cradock Bridge / Main Street interchange in Medford, which connects Route 16 to Medford Square. During the Feasibility Study period (May – August 2018), the Cradock Bridge was under construction and the Route 16 exit ramp was closed to vehicular traffic. Currently, the Cradock Bridge Replacement Project intends to reopen the exit ramp upon completion in Fall of 2018. However, the City of Medford is interested in exploring the opportunity to permanently close the exit ramp. Therefore, the alternatives considered within the Feasibility Study looked at both ramp open and ramp closed scenarios.

I.1 Stakeholder Engagement

The Study engaged a Stakeholder Group with representatives from the City of Medford, Mystic River Watershed Association (MyRWA), Massachusetts Gaming Commission (MGC), Metropolitan Area Planning Council (MAPC), Department of Transportation (MassDOT), and Department of Conservation and Recreation (DCR). Because the Project is anticipated to be located within MassDOT- and DCR-owned land, their involvement in the process was critical. Members of the Stakeholder Group are listed below:

Alicia Hunt	Director of Energy and Environment	City of Medford
Todd Blake	Transportation Engineer	City of Medford
Amber Christoffersen	Mystic Greenways Director	MyRWA
Joe Delaney	Project Oversight Manager	MGC
John Ziemba	Ombudsman	MGC
David Loutzenheiser	Senior Transportation Planner	MAPC
Connie Raphael	Transportation Planner	MassDOT District 4
Karl Haglund	Regional Planner & Project Manager	DCR
Ginna Johnson	Deputy Chief Design and Project Management	DCR

During the Study, there were two (2) site walks and three Stakeholder Group meetings. The Meeting Notes from each meeting are provided in Appendix C. Since the Project will have regional impacts, representatives from City of Somerville and MassDOT state-level planning were also included on the distribution of stakeholder meeting information.

I.2 Study Process and Design Criteria

The Feasibility Study studied the existing conditions of the Project site, developed alignment alternatives for constructing the South Medford Connector Path, reviewed the alternatives against key design criteria, and identified recommended alternatives. The key design criteria included:

1. Suitability with the existing site conditions, including land cover and topography;
2. Coordination with existing site utilities;
3. Compliance with MassDOT and DCR shared-use path design guidelines for safety;
4. Level of impact on environmental and ecological resources and required permitting;
5. Ease of construction, specifically related to earthwork, structural design elements, and dewatering; and
6. Preliminary construction cost estimates.

The Stakeholder Engagement process identified that the preferred alternative would be the alternative(s) that had the lowest construction cost while maintaining compliance with the MassDOT and DCR shared-use path design guidelines for safety.

I.3 Funding

This project was funded by a Transportation Planning Grant (TPG) through the 2017 Massachusetts Gaming Commission Community Mitigation Fund. The Community Mitigation Fund helps communities offset costs related to the construction and operation of the Encore Boston Harbor. The TPG allows eligible communities to receive funds related to mitigating the transportation impacts created by the casino such as roadway level of service and road capacity. As a regional bicycle commuter route, the South Medford Connector has the potential to ease traffic surrounding the Encore Boston Harbor and supports the casino's goal to reduce reliance on vehicular travel.

DATE	MEETING
February 20, 2018	Site Walk with Medford and MyRWA
March 21, 2018	Stakeholder Meeting #1 - Kick-Off Meeting with Stakeholder Group
April 18, 2018	Nitsch Team Site Walk
May 9, 2018	Stakeholder Meeting #2 with Stakeholder Group
June 20, 2018	Stakeholder Meeting #3 with Stakeholder Group

This Phase I Technical Memorandum documents the decision-making process throughout the Feasibility Study leading to the recommended alternatives.

2 Existing Conditions

The South Medford Connector consists of approximately one mile of shared-use path along the south shore of the Mystic River. The Connector begins at the Cradock Bridge (Main Street). On the west side of Main Street, an existing path continues towards Somerville and Arlington. The path continues for one mile to the southeast, terminating at the existing DCR path north of the General Lawrence Bridge (Route 16). An existing shared use path extends 0.6-miles from the General Lawrence Bridge to the Medford/Somerville border. The South Medford Connector is proposed to continue the existing path an additional one mile northwest from the current terminus to the Cradock Bridge.

2.1 South Medford Connector Path Segments

The one-mile project has been analyzed in a series of three segments, each approximately 1,500 to 2,000 feet long. The segments break at two distinct points along the path, where the path passes over an existing drainage culvert, and where the path passes beneath Interstate 93.



Figure 2. South Medford Connector Segments

Segment A - Cradock Bridge to I-93 Underpass

Segment A is approximately 2,000 feet long and is generally densely vegetated. The northern end of Segment A meets Main Street (Route 38) at the Cradock Bridge. The Cradock Bridge is still under construction at the time of this study, and the Route 16 Exit Ramp is closed to automobile traffic. Segment A continues to the southeast from the Cradock Bridge to the I-93 Underpass beneath Route 16.

Moving from northwest to southeast, the first 200 feet of Segment A include a flat area with a concrete sidewalk. This space is approximately 25 feet wide from curb to an existing retaining wall. The next 800 feet of Segment A include a steep embankment from the Route 16 Exit Ramp down to the Mystic River. This embankment is covered by large stones and dense vegetation which stabilize the embankment. The embankment is adjacent to the Route 16 exit ramp, which includes a vehicular guardrail on the north side of the ramp between the travelled way and the River. The remaining 1,000 feet of Segment A from the embankment to the I-93 Underpass widens to provide a plateau between the bottom of the slope from Route 16 and the River bank. This plateau increases in width from 40 feet at the embankment side to approximately 250 feet at the I-93 Underpass. The I-93 Underpass vertical clearance varies between 10 and 12 feet from existing grade to the bottom of the highway structural beams.



Figure 3. South Medford Connector Segment A – Cradock Bridge to I-93 Underpass



Figure 4. Segment A – Rt.16 Ramp to Cradock Bridge



Figure 5. Typical section along Segment A south of ramp

Segment B - I-93 Underpass to Culvert

Segment B runs for approximately 1,800 feet from the I-93 Underpass to a large drainage structure that discharges to the River. Segment B includes approximately 200 feet of clear area directly to the east of the I-93 Underpass. This area includes a newly constructed stormwater basin that detains stormwater from the interstate roadway surface.

Moving from northwest to southeast, the first 900 feet after the clearing includes a wooded area that includes some of the larger diameter trees along the path alignment. For the remaining 700 feet of Segment B, Route 16 is elevated above the River and there is a steep embankment from Route 16 down to an approximately 15-foot wide flat area along the River. As the river bends towards the south, the distance between the bottom of the Route 16 embankment and the western edge of the river becomes narrower. The portion of Segment B to the south varies in width between 35 feet and 50 feet between the Route 16 guardrail and the western edge of the Mystic River. There are existing trees along the river edge. The embankment up to Route 16 includes small deciduous shrubs and perennial grasses. The Riverside Yacht Club is opposite the Property east of the I-93 Underpass, including along dock system that follows the path of the river. Opposite the yacht club, on the Property, is a small encampment; it is unknown if the area is regularly occupied, although a small shelter covering stacked firewood was observed along the slope north of Route 16.



Figure 6. South Medford Connector Segment B – I-93 Bridge to Culvert



Figure 7. Segment B - Approach to I-93 overpass (south)



Figure 8. Segment B - Beneath I-93 Bridge



Figure 9. Segment B - Drainage basin adjacent to I-93



Figure 10. Typical section along Segment B south of I-93

Segment C - Culvert to Southern Terminus

Segment C includes approximately 1,800 linear feet of path alignment between the existing stormwater Culvert and the existing path located near the General Lawrence Bridge. Like Segment B, Route 16 is at a higher elevation than the River. Segment C includes a portion of sloped, vegetated land that varies in width between 35 and 45 feet.

There is an existing drainage culvert at the northern end of Segment C which connects to a wetland area located between Route 16 and Interstate 93. This wetland between Route 16 and I-93 is connected to the municipal storm drain system. The culvert is a concrete culvert with two parallel concrete pipes. The segment includes small trees along the river's edge, with a plateau at the bottom of the slope up to Route 16. This segment includes what appeared to be an informal walking trail, though understory vegetation obscures the path at times. The southern terminus of the segment includes a clearing adjacent to Route 16. This clearing includes the existing paved path which circles from the roadway elevation underneath the General Lawrence Bridge.



Figure 11. South Medford Connector Segment C – Culvert to Southern Terminus



Figure 12. Segment C - Southern culvert opening



Figure 13. Segment C - Culvert concrete access structure



Figure 14. Typical section along Segment C



Figure 15. Southern connection point to existing path

2.2 Additional Existing Conditions Observations

Abutters

The South Medford Connector is located entirely on publicly owned land and is sited in such a way that there are no private abutters to the path corridor. The City of Medford Department of Public Works facility and industrial and commercial parcels are present to the west of Interstate 93 but are generally not visible from the Project site. On the east side of the Mystic River opposite from Segment C is Riverbend Park, which includes Andrews and McGlynn schools and Hormel Stadium. North of Riverbend Park is the Riverside Yacht Club. As the path turns to the west under Interstate 93, there are two large residential buildings, at 99 and 121 Riverside Avenue. Between 99 Riverside Avenue and the Cradock Bridge is Clippership Park, a narrow park between Clippership Drive and the northern bank of the Mystic River.

Noise

Since the Project is adjacent to Route 16 and Interstate 93, traffic noise is present. However, noise is mitigated by the grade difference between the path and the roadways above. Existing vegetation between the proposed path alignment and Route 16 should be maintained where possible to further mitigate roadway noise.

Encampments

During the site visits, informal encampments were observed in the woods adjacent to Route 16. It is unknown if the area is regularly occupied, although a small shelter covering stacked firewood was noted along the north

slope of Route 16. Construction of the path will disrupt the existing encampments. Consideration for these encampments should be given during future design phases and construction and may include coordination with the residents.

2.3 Environmental and Ecological Conditions

Wetland Resource Areas

The Project site is bordered by the Mystic River, which has associated wetland resource areas as defined by the Wetlands Protection Act, promulgated by MassDEP (Appendix A – Map A3). The Mystic River contains the following resource areas:

- **Bank:** As defined at 310 CMR 10.54 (2), a Bank is the portion of the land surface, which normally abuts and confines a water body. The upper boundary of Bank is the first observable break in slope.
- **Land Under Water Bodies and Waterways:** As defined by 310 CMR 10.56(2), LUWW “is the bottom of, or land under, the surface of the ocean or any estuary, creek, river, stream, pond, or lake.”
- **Bordering Land Subject to Flooding:** As defined by 310 CMR 10.57(1)(a)(1), BLSF is “an area which floods from a rise in a bordering waterway or water body.” The extent of BLSF is based on published Federal Emergency Management Agency (FEMA) flood elevations, which estimate the elevations to which water will flood during a 100-year storm event.
- **Riverfront Area:** As defined at 310 CMR 10.58 (a)(3), RFA is “the area of land between a river’s mean annual high-water line measured horizontally outward from the river and a parallel line located 200 feet away.”
- **100-Foot Buffer to Bank:** 310 CMR 10.02(2)(b)) establishes a 100-foot Buffer Zone from the limits of Bank.

A wetland scientist should confirm the wetland resource areas jurisdictional to the proposed project during subsequent design phases.

Natural Heritage & Endangered Species Program (NHESP) Priority and Estimated Habitat

Based on the 14th Edition Natural Heritage Atlas, effective August 1, 2017, the Project site is not located within designated Estimated Habitat of Rare Wildlife or Priority Habitat of Rare Species and does not contain any Certified or Potential Vernal Pools (Appendix A – Map A5).

Federal Endangered Species

The Information, Planning, and Conservation (IPaC) online system process indicated the Northern Long-eared Bat (*Myotis septentrionalis*) as species of concern for our action area (Appendix A – Map A6). It also identified numerous migratory birds listed in the IPaC system that breed within the area of the Project site.

The IPaC report is an automatically generated list of species and other resources such as critical habitat (collectively referred to as trust resources) under the U.S. Fish and Wildlife Service's (USFWS) jurisdiction that are known or expected to be on or near the project area referenced below. The list may also include trust resources that occur outside of the project area, but that could potentially be directly or indirectly affected by activities in the project area.

Generally, the concern with both the Northern Long-eared Bat and migratory birds is the removal of their habitat during breeding season. However, given that there are minimal trees within the Project site itself, there are not anticipated to be any negative impacts to these species. This should be confirmed as the design develops.

FEMA Regulatory Floodway and Floodplain

Based on the Federal Emergency Management Agency (FEMA) Flood Insurance Rate Maps for Medford (Community Panel Number 250205 0436 E), portions of the 100- and 500-year floodplain associated with the Mystic River encroach upon the Project site. The Mystic River also contains a Regulatory Floodway that appears to encroach onto the shoreline in some areas (Figure 16).



Figure 16. Excerpt from the FEMA Firm Map along the Project route (Appendix A – Map A4)

These FEMA designations are further defined as:

- **Zone AE** is the area subject to inundation by the 1-percent-annual-chance flood event determined by detailed methods. Base Flood Elevations (BFEs) are shown.
- **Regulatory Floodway** is the channel of a river or other watercourse and the adjacent land areas that must be reserved to discharge the base flood without cumulatively increasing the water surface elevation more than a designated height. Communities must regulate development in these floodways to ensure that there are no increases in upstream flood elevations.

The proposed design intent is to minimize work within regulatory FEMA areas to the maximum extent possible. However, in some portions of the Project site there is limited horizontal space between Route 16 and the Mystic River. Closer analysis of the FEMA floodplain and regulatory floodway will be needed in subsequent survey and design phases.

Phase I Environmental Site Assessment

Tracey Environmental Consulting, LLC, prepared a Phase 1 Environmental Site Assessment (ESA) to evaluate the possible presence of recognized environmental conditions (RECs) which are defined as “the presence or likely presence of hazardous substances or petroleum products on a property under conditions that indicate an existing release, a past release, or a material threat of a release of hazardous substances or petroleum products into structures on the property or into the ground, groundwater, or surface water of the property.”

The ESA did not identify any releases or response actions connected to the Property according to state records at Massachusetts Department of Environmental Protection (MassDEP) and no additional research was recommended. MassDOT records did not indicate specific information regarding the filling in of the Mystic River that occurred during the development of I-93 or the materials used to create the existing embankments of the current Mystic River. Additionally, the ESA, did not identify any RECs for the Property. The Phase 1 ESA summary is provided in Appendix B.

3 South Medford Connector Conceptual Design Approach

The South Medford Connector is envisioned as a 10-foot wide path with a paved surface. Refer to Appendix E – Design Guidelines for the guidelines that were consulted during the feasibility study.

3.1 Horizontal Alignment

The horizontal alignment for the South Medford Connector connects two existing paths and is situated between Route 16 and the Mystic River, leaving little room for horizontal layout variability. In general, the on-grade portion of the path will rest at the toe of the slope heading down from the Route 16 roadway on the west/south and stay as far away from the river's edge as possible. Given the horizontal constraints, it is anticipated that the path alignment will be within the 200-foot Riverfront Area and the 100-foot Buffer Zone to Bank.

For the purposes of this Study and enclosed pricing, the shared-use path was assumed to be a 10-foot wide paved surface located between the base of the Route 16 embankment and the Bank of the Mystic River. A minimum 3-foot clearance should be maintained from the edge of the path to existing obstructions such as signs, trees, fences or other obstructions where possible.

Where the trail is located adjacent to steep slopes, a five-foot separation between the edge of the path surface to the top of the slope is recommended. If the five-foot separation is not possible due to horizontal constraints, a physical barrier such as a wood rail fence or other vertical barrier should be installed along the top of the slope to protect path users. A minimum vertical clearance of 12 feet is recommended where the path crosses under Interstate 93. The existing topography under the bridge provides more vertical clearance near the Mystic River, therefore, the path may need to be aligned closer to the River in this location. See Typical Cross Section (Figure 17) for additional information.

3.2 Path Profile / Vertical Alignment

The existing topography of the project site includes an existing plateau between the toe of the Route 16 embankment and the riparian slope of the river. The trail and any connections along the alignment should have a 4.5% maximum slope or grade to meet accessibility guidelines. A 1.5% longitudinal slope is recommended at any overlooks or stopping points along the path route.

3.3 Vegetative Clearing

Sixteen feet of vegetative clearing will be required for the length of the path. The 16 feet of vegetation clearing includes the 10-foot width of the path itself and three (3) feet minimum on both sides for a shoulder and shy distance. Vegetative clearing and tree pruning may also be required to provide for a 10-foot minimum vertical clearance from the path surface or all overhead obstructions. See Section 3.5 Project Considerations: Pedestrian Overlooks and Viewing Areas for more information.

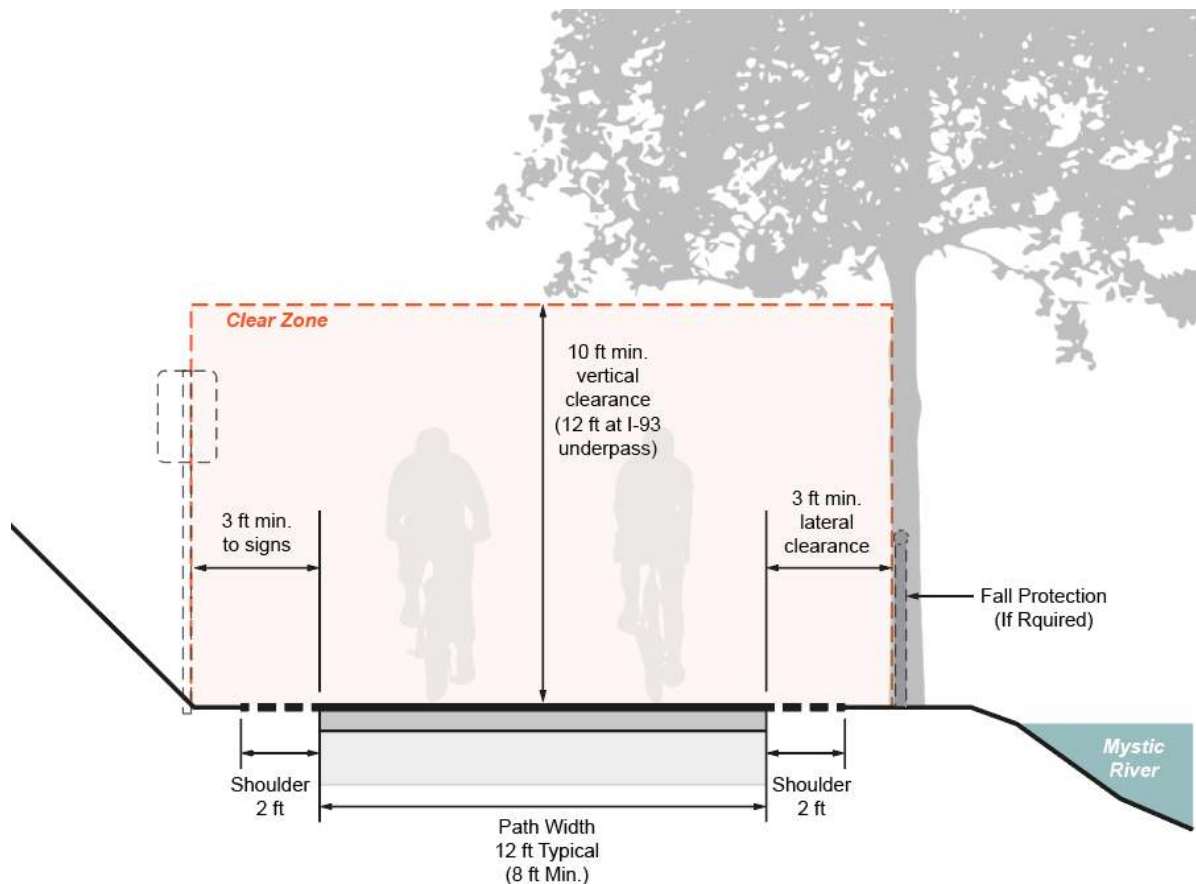


Figure 17 - Typical Cross Section and Clearances

3.4 Access

The path alignment is bounded on the west by the interstate highway and on the east by the Mystic River, leaving few locations for vehicular access points. Emergency vehicles needing to access the path may need to use the shoulder of the Route 16 interchange and descend the slope down to the path. For maintenance purposes, the South Medford Connector can be accessed at the northern end at the Cradock Bridge and southern end at the General Lawrence Bridge. The design should include barriers so vehicular traffic cannot gain regular access to the path; however, removable bollards or gates could be used to allow emergency vehicle access.

3.5 Pedestrian Resting and Viewing Areas

Recommendations for selected clearing are designed to provide greater visual access and a greater sense of connection to the river. Recommended locations for vegetative clearings or overlooks are recommended in locations that provide good views across, or up and down the river, of bridges, and where vegetation removal would be minimal. The 2009 Mystic River Master Plan includes two locations along the South Medford Connector Path length for Cleared Views (V) and two locations for proposed Overlooks (O).

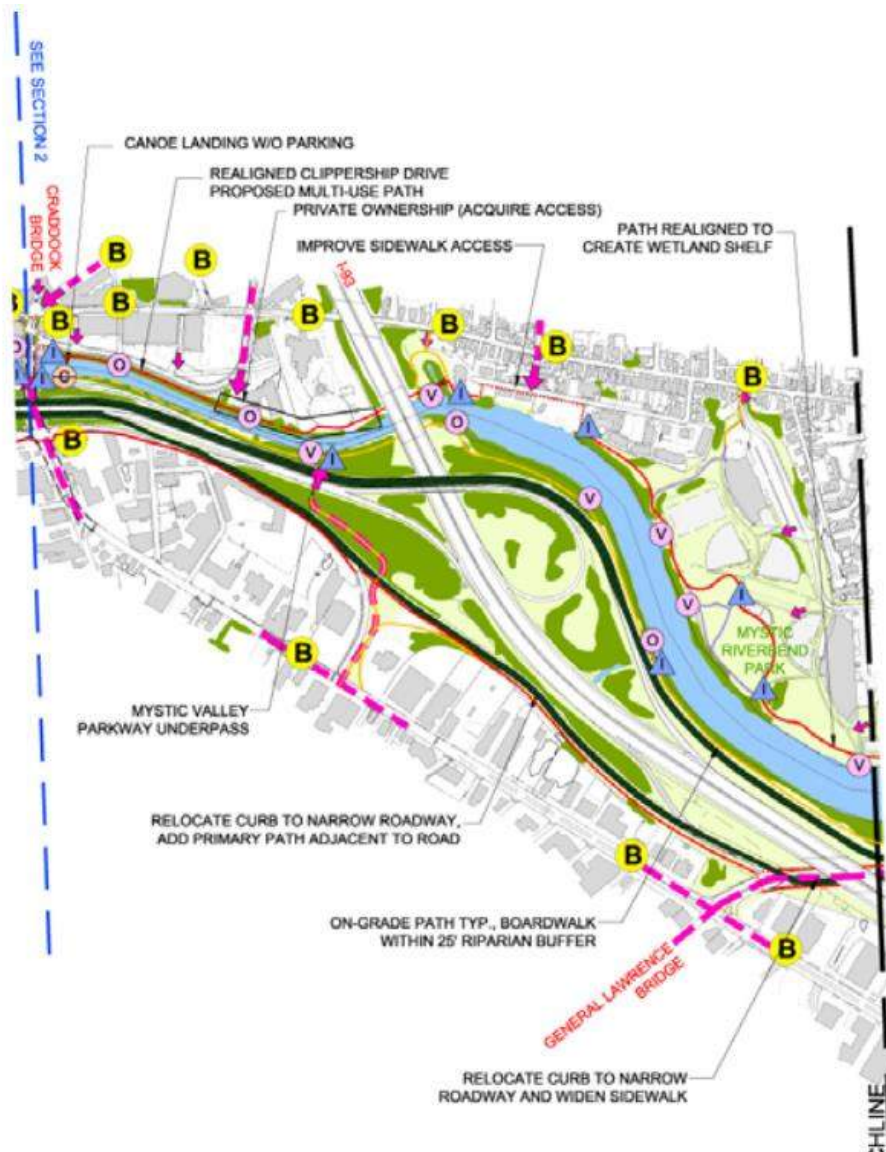


Figure 18 - Excerpt from 2009 DCR Mystic River Master Plan

3.6 Lighting

Lighting the path should be considered to increase usable hours of the path and to provide a safer environment for path users. Feedback received from the Stakeholder Group indicated that the location where the path crosses below Interstate 93 must be lit. Other lights along the pathways could also be considered but are less critical as most of the Project corridor is already lit by the existing roadway lights along Route 16. The path under the I-93 Bridge could be lit with wall or ceiling mounted lights.

For the purposes of the Conceptual Cost Estimate Nitsch Engineering assumed lighting would be included under the I-93 bridge in all alternatives. An alternate cost is included for lighting along the path with pedestrian-scale post and light fixtures spaced at thirty feet.

3.7 Path Material

The selected shared-use path material must ensure stability, accessibility, long-term durability and safety while considering cost, snow removal, and maintenance. MassDOT's guidance for shared use paths indicates that paths in urban areas with high use should be paved or consist of other "hard-surface" materials like asphalt. Alternatively, stone dust and other unpaved paths may be suitable in areas with lower levels of use.. Given the intended use of the South Medford connector, asphalt was used for pricing assumptions. Asphalt is typically set in a four-inch depth on top of eight (8) to 12 (12) inches of dense graded crushed stone or gravel borrow base.

This subbase is important to ensure the long-term durability of the pavement. Prior to construction, a geotechnical sampling program and investigation should be performed to garner a greater understanding of the subsurface conditions and potential issues.

Hardscape alternatives to asphalt that could be considered in future design phases include recycled asphalt, stabilized granular surface, and porous asphalt.

3.8 Signage and Pavement Markings

Cradock Bridge Intersection

The South Medford Connector Path's northern terminus at the Cradock Bridge should be carefully considered as the design progresses. Path users will naturally want to connect to the path on the western side of Main Street, however the design plans for the Cradock Bridge show a raised metal bridge curb and no crosswalk in this location.

The most recent striping plans for the Cradock Bridge project indicate separated bike lanes are proposed on Main Street. With this revised striping, a crosswalk is recommended to connect the northern terminus of the South Medford connector and the existing path on the west side of the bridge. The crosswalk will become critical if the South Medford Connector Path is constructed (Figure 19).

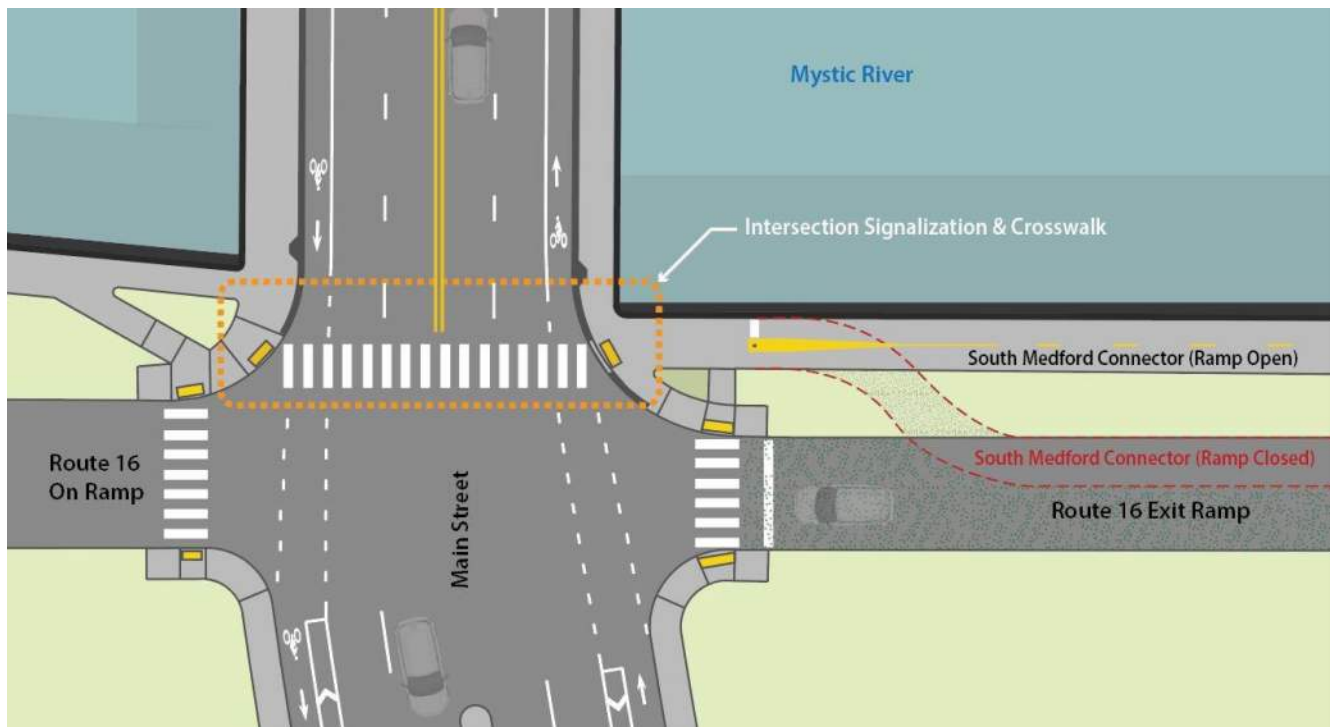


Figure 19 Pavement Markings at Main Street Intersection and Cradock Bridge Crosswalk.

3.9 Stormwater Management

Along the proposed route of the South Medford Connector path, there are 10 observed stormwater outfalls. These outfalls connect to the catch basins located along Route 16 on the south side of the path and discharge runoff from the roadway into the Mystic River.

These outfalls were observed to be approximately 12-inch diameter corrugated metal pipes that are generally in good condition. The stability of the area downstream of the outfalls varies. Most of the outfalls are located at the base of the Route 16 embankment. Flow from the outfalls travels 15-30 feet overland into the Mystic River, directly through the proposed path alignment. All outfalls are located within 100 feet of the Bank of the Mystic River and within the 200-foot Riverfront Area. In several locations, discharge from the outfalls has caused soil erosion with ruts which are approximately one to two feet deep (Figures 20 & 21).

These outfalls must be thoughtfully considered during the design of the proposed path. If left in their current condition, discharge from the pipes will flow over the path on its way to the river. This creates a maintenance and public safety concern, with water, soil, and debris washing onto the path, and potentially causing icy conditions during winter months. Further, the construction of this path provides an opportunity to improve the function and stability of the outfall areas and restore degraded areas of the Buffer Zone to Bank and Riverfront Area.

To reduce the potential for stormwater runoff and debris on the path, a conceptual approach to capturing and redirecting the flow was developed. In this design, the outfalls will be protected and maintained during construction of the path. Any unstable or eroded areas immediately downstream of the outfall will be restored using riprap settling basins. A drainage structure will be located on the upgradient side of the proposed path to intercept the runoff and convey it to the downstream side of the path. This drainage structure could be either a trench drain or an area drain, depending on the horizontal and vertical site constraints at each outfall location.



Figures 20 and 21 Existing Stormwater outfalls and observed erosion.

The drainage structure would discharge on the river-side of the path into a water quality Best Management practice and stabilized area. The approaches to providing this stabilization may include linear rain gardens or vegetated swales with native vegetation or riprap, again depending on the horizontal and vertical site constraints at each outfall location. Vegetated solutions are preferred and would be employed at all locations where space allows. Riprap may be required in areas where there is limited horizontal distance between Route 16 and the Mystic River. See Figure 22 for a conceptual drawing of the stormwater management approach at existing outfalls



Figure 22. Stormwater Management Schematic at existing outfalls

4 Route Alignments and Alternatives

During the Feasibility Study process, 10 alternatives were analyzed at two key locations, subsequently referred to as Locations A and B (Figure 23). Location A is located at the Route 16 west bound exit ramp to Main Street (Route 38) and consists of a steep stone embankment from the exit ramp down to the river's edge. Location B is located at an existing stormwater culvert located west of Riverbend Park (opposite Andrews Middle School).

Location A - At the Rt. 16 Exit Ramp

Seven (7) design alternatives were developed for Location A:

- A0 – Ramp Closed
- A1 – Ramp Open, Path Directly Adjacent to Vehicular Traffic
- A2 – Ramp Open, Path Elevated on Piles
- A3, A4, A5 – Ramp Open, Path Elevated with High, Low and Mid-Height Retaining Walls Along Rt. 16
- A2/A5 Hybrid – Ramp Open, Path Elevated on Piles and Low Retaining Wall Along Rt. 16

The conceptual horizontal alignments for the Location A alternatives are illustrated in Figure 24. Alternative A0 presumes that the Route 16 Exit Ramp is closed to vehicular traffic and the path will be in the existing paved area. In Alternative A1, the Route 16 Exit Ramp is open to vehicular traffic and the path is located within the current ramp right-of-way as a separated bike lane. In the other alternatives, the Route 16 Exit Ramp is open to vehicular traffic and the path is located on structure along the steep embankment between the ramp and the Mystic River.

Location B – At the Large Drainage Culverts and Associated Outfall

Horizontal alignment alternatives explored at the existing culvert crossing are depicted in the 'B' alternatives, (See Figure 29 for cross sections). The alignments at the culvert crossing explore methods for the path to cross the culvert.

- B1 – Path South of Exposed Concrete with Retaining Wall Along Rt. 16
- B2 – Path Over Exposed Concrete with Structural Span for Approaches to Culvert
- B3 – Span Over Culvert with Path on Piles



Figure 23. Alternative Location A and Location B

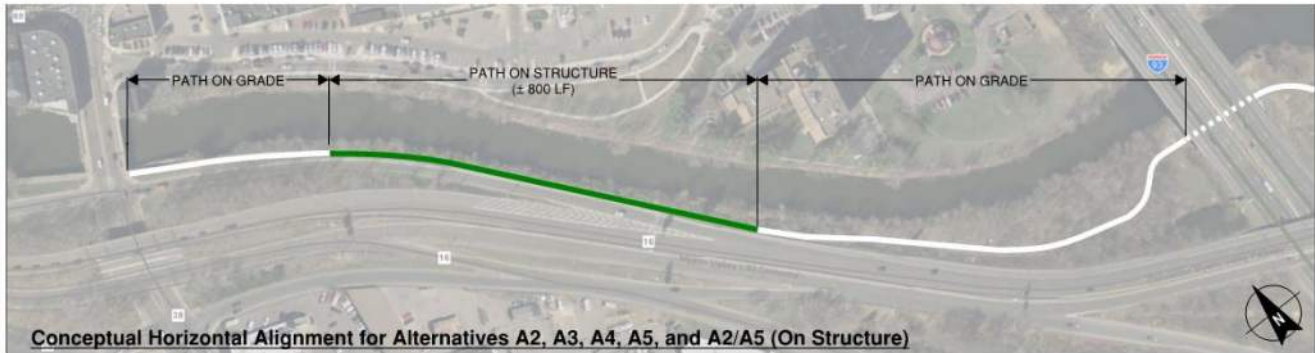
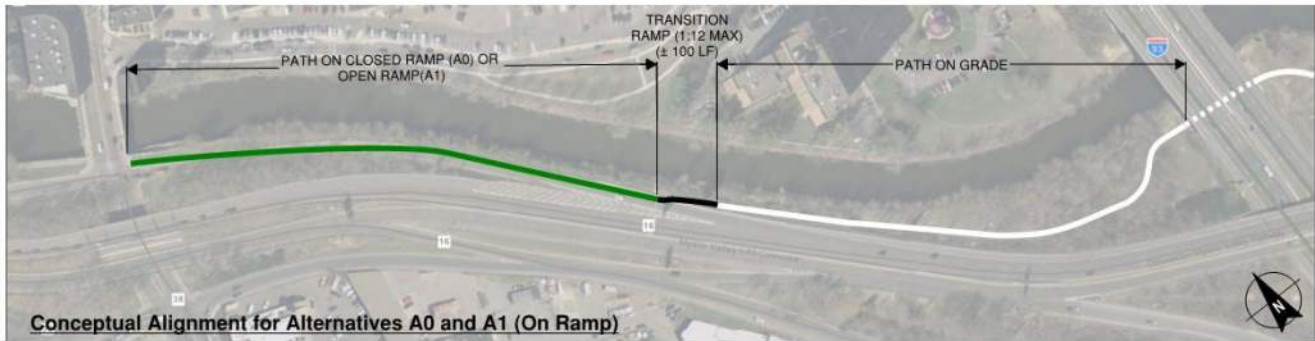


Figure 24. Conceptual Horizontal Alignments for Location A Alternatives

Summary of Selection Process

The Feasibility Study set forth to review the Location A and B alternatives the key design criteria established in coordination with the Stakeholder Group:

1. Suitability with the existing site conditions, including land cover and topography;
2. Coordination with existing site utilities;
3. Compliance with MassDOT and DCR shared-use path design guidelines for safety;
4. Level of impact on environmental and ecological resources and required permitting;
5. Ease of construction, specifically related to earthwork, structural design elements, and dewatering; and
6. Preliminary construction cost estimates.

The Location A and B alternatives were compared against these criteria and presented at the Stakeholder Meetings held on May 9, 2018 and June 20, 2018 (refer to Appendix D). Through this process, which is documented in Sections 4, 5 and 6 below, it was determined that Alternative A0 and Alternative B2 were the most cost-effective alternatives that also met the other key design criteria. Therefore, they were selected as the “Recommended Alternatives”. Because Alternative A0 requires that the Route 16 exit ramp be closed to vehicular traffic, a second Location A alternative was also recommended – Alternative A2 – which would move forward if the ramp remains open to vehicular traffic. **The three Recommended Alternatives, A0, A2, and B2, are denoted with ** in subsequent sections of this report for easy identification.**

4.1 Summary of Alternatives – Location A

A0 – Ramp Closed**

The Route 16 exit ramp is currently closed due to the construction of the Cradock Bridge (Figure 25). Although MassDOT has indicated that the ramp will reopen after construction is complete, the Nitsch Team received feedback at the Stakeholder Meeting to document an alternative where the ramp is permanently closed. Under this alternative, vehicular traffic would not be allowed on the ramp, thereby providing a place for the path to be located within the existing paved area. An earthen ramp will be required to bring the path from the bottom to the top of the Route 16 embankment (Figure 26).



Figure 25. Google imagery of Alternative A0 Location on Route 16 Off-Ramp (prior to ramp closure)

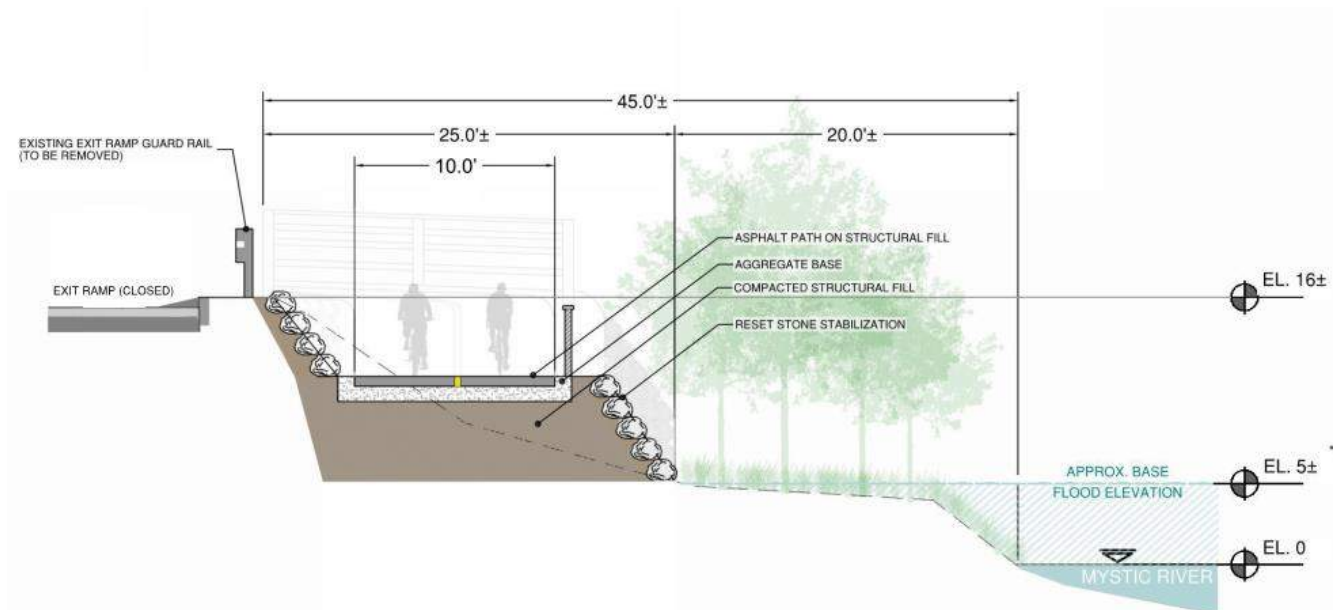


Figure 26. Section View of Alternative A0 – Ramp Closed, Path Transition up to Route 16 Exit Ramp

AI – Ramp Open, Path Adjacent to Vehicular Travel Lane

Alternative A1 assumes that the Route 16 exit ramp will reopen and proposes to use the ramp for both a vehicular travel lane and the shared-use path (Figure 27). To provide both uses, the existing 23-foot-wide travelled way would need to be widened to provide the appropriate width for a vehicular lane, a shared-use path, and appropriate safety separation measures such as guardrails.

This alternative minimizes construction costs by limiting the amount of new pavement and earthwork required to construct the path. There would also be minimal impacts to environmental resources associated with the Mystic River because the path uses existing disturbed/impervious area and is elevated above the regulatory floodway and 100-year floodplain.

However, there are safety concerns with Alternative A1. The proposed vehicular travel lane width does not meet the minimum exit ramp lane width of 22 feet as indicated by MassDOT at the Stakeholder Meeting. MassDOT indicated that the 22-foot width includes a 12-foot lane width with a 2-foot shoulder on one side and an 8-foot pull-off area on the other. Based on the feedback at the Stakeholder Meeting, altering this layout is not preferred by MassDOT as it would deviate from MassDOT standards and compromise safety of both road and path users.

There are also safety concerns associated with locating the shared-use path so close to the vehicular travel lane. The recommended separation between a vehicular lane and shared use path is 5-7 feet. This alternative provides very little separation. Additionally, due to the higher speeds of vehicles on the ramp, a guardrail or similar physical barrier is necessary to protect users of the path. The inclusion of some type of protective barrier between the vehicular travelled way and the path could increase the amount of widening necessary. At the Stakeholder Meeting, there were also concerns noted about the potential for snow plows directing snow onto the path which is a concern for both safety and overall use of the path during winter months.

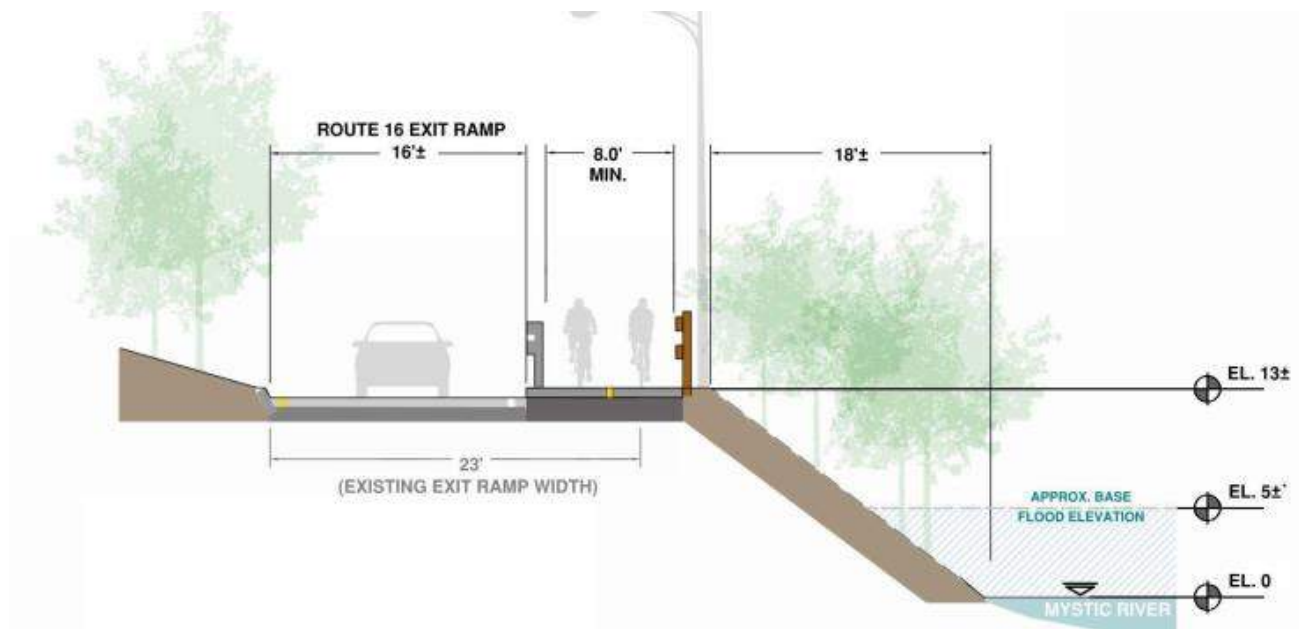


Figure 27. Section View of Alternative A1 – Ramp Open, Path Adjacent to Vehicular Travel Lane

A2 – Ramp Open, Path Elevated on Piles**

Alternative A2 assumes that the Route 16 exit ramp will reopen and proposes to locate the path on the slope between the ramp and the Mystic River (Figure 28). The path will be located on a deck that is supported by structural piles driven into the embankment between the ramp and the Mystic River.

Alternative A2 was received favorably at the Stakeholder Meetings because of the low impact to the Route 16 exit ramp, horizontal separation between the ramp and the shared-use path, and the minimal environmental impacts associated with having the path elevated on piles. Additional structural design would be required to fully understand the construction impacts and cost of this alternative.

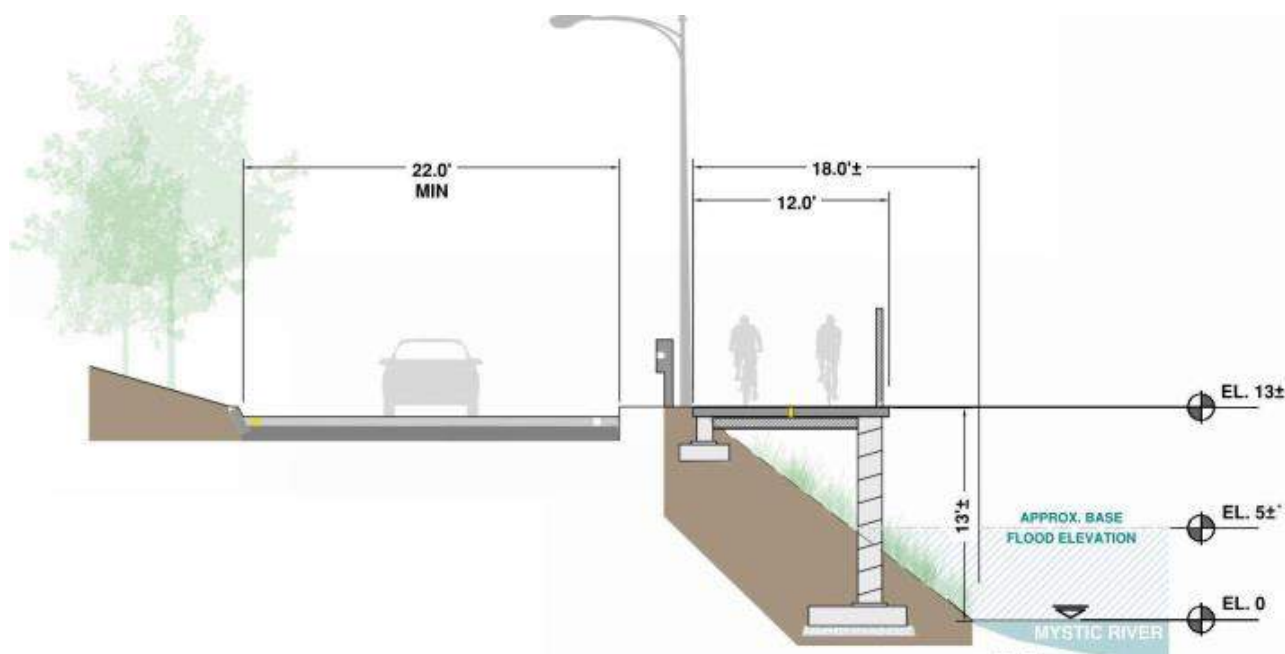


Figure 28. Section View of Alternative A2 – Ramp Open, Path Elevated on Piles

A3, A4, A5 – Ramp Open, Path Elevated with High, Low and Mid-Height Retaining Walls Along Rt. 16

Alternatives A3, A4, and A5 assume that the Route 16 exit ramp will reopen and proposes to locate the path on the slope between the ramp and the Mystic River. The path will be elevated using structural retaining walls along Route 16 and the Mystic River.

Alternative A3 proposes a low elevation path that is closest in elevation to the River but requires a retaining wall and substantial fill along the Mystic River in the floodway and floodplain. There are concerns about the structural requirements associated with constructing a high wall to support the exit ramp. Construction of the wall will require shoring of the existing ramp during construction which would dramatically increase construction costs associated with the wall and the path. Additionally, the path would be shaded by the wall, potentially causing issues for both the wall and the path, including moss growth, maintenance concerns, and potential safety concerns.

Alternative A4 proposes a high elevation path with the path at road-level but requires a retaining wall and substantial fill along the Mystic River. This alternative will require a substantial amount of fill within the floodplain, requiring considerable compensatory floodplain storage in the vicinity of the filled area. Depending on the path extents, this alternative may also require impacts to the regulatory floodway, which requires additional permitting and floodway analysis.

Alternative A5, which proposes a mid-elevation path with shorter walls along the exit ramp and the River. There are construction and cost impacts associated with supporting the existing ramp and the construction of walls along the River. There are also environmental impacts associated with filling the floodplain and potentially the floodway.

Alternative A5, was identified as the most viable during the Stakeholder Meeting (Figure 29). Participants at the Stakeholder Meeting noted that they preferred the mid-elevation height and that the path provided both a vertical and horizontal buffer from the exit ramp. However, there are still concerns with this alternative since it will require filling of floodplain (and potentially regulatory floodway) with the construction of the wall along the river (although less than Alternative A4). It will also require shoring of the exit ramp due to the construction of the wall on the ramp side.

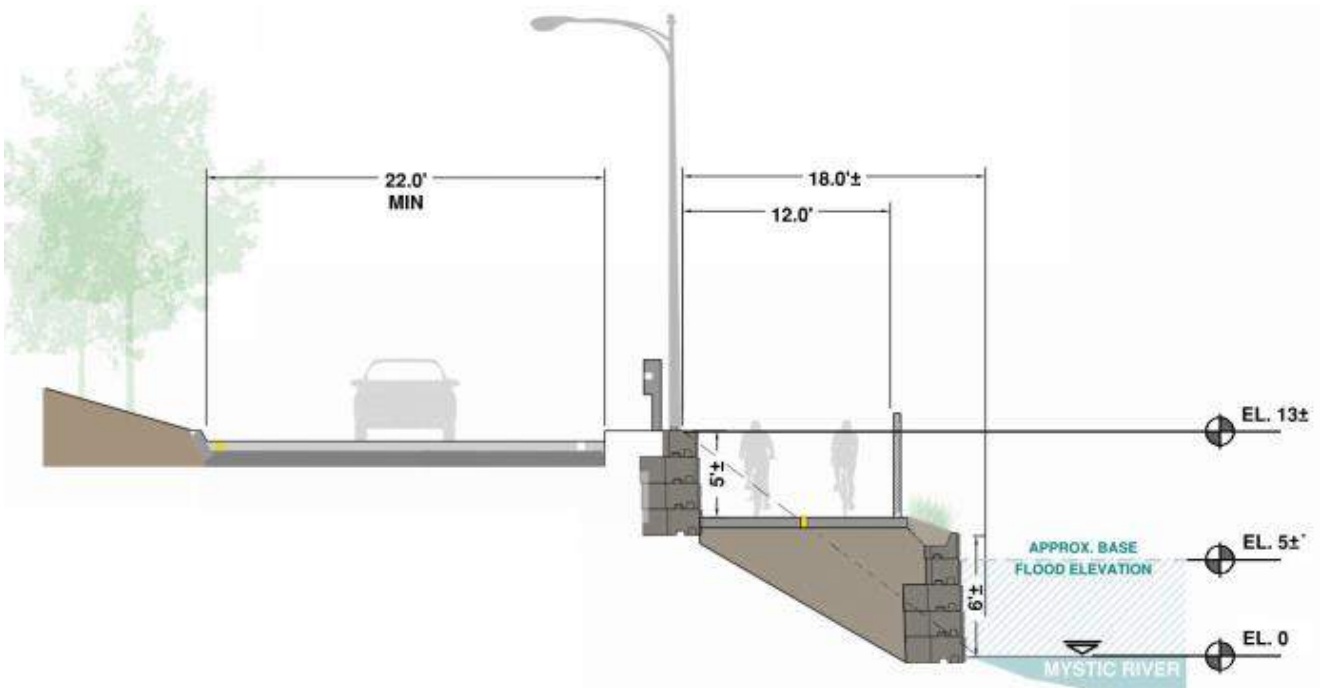


Figure 29. Section View of Alternative A5 – Ramp Open, Path Elevated with Mid-Height Retaining Wall Along Rt. 16

A2/A5 Hybrid – Ramp Open, Path elevated on Piles at Mid-Height

Alternative A2/A5 hybrid assumes that the Route 16 exit ramp will reopen and proposes to locate the path above the slope between the ramp and the Mystic River (Figure 30). The path will be located on a deck that is supported by structural piles driven into the embankment between the ramp and the Mystic River. The alternative includes the off-ramp pile approach included in Alternative A2 with the mid-height approach included in A5. Additional structural design would be required to fully understand the construction impacts and cost of this alternative. The A2/A5 hybrid alternative would replace the wall included in A5 along the river with structural piles, minimizing the fill within floodplain.

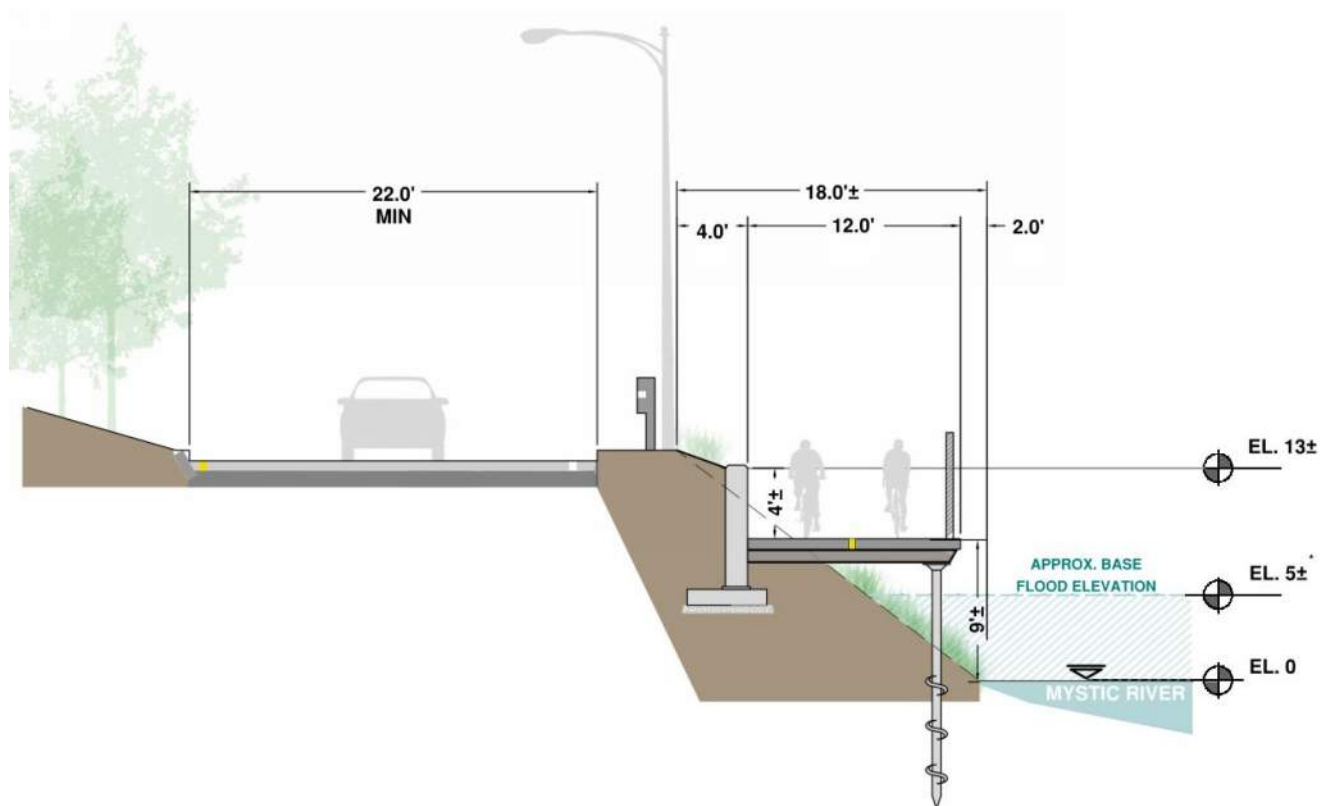


Figure 30. Section View of Alternative A2/A5 Hybrid – Ramp Open, Path Elevated on Piles at Mid-Height

4.2 Summary of Alternatives – Location B

Three alternatives were discussed at the Stakeholder Meetings regarding treatment of the path at Location B as described below:

- **B1 – Path West of Exposed Concrete with Retaining Wall Along Rt. 16**
Alternative B1 proposes to locate the path south of the exposed concrete outfall. This alternative would not impact the existing outfall structure but will require a retaining wall where the path is located closest to Route 16 (Figure 31). Like Alternative A3 described above, construction of the retaining wall will likely require shoring the Route 16 roadway to construct the wall, which adds additional substantial cost.
- **B2 – Path Over Exposed Concrete with Structural Span for Approaches to Culvert****
Alternative B2 proposes to locate the path directly over the exposed concrete outfall of the culverts and requires structural spanning of the approaches on either side of the culvert (Figure 32).
- **B3 – Path Structurally Spans Over Culvert**
Alternative B3 proposes to construct structural supports on either side of the culverts so that the path spans the culverts (Figure 33).

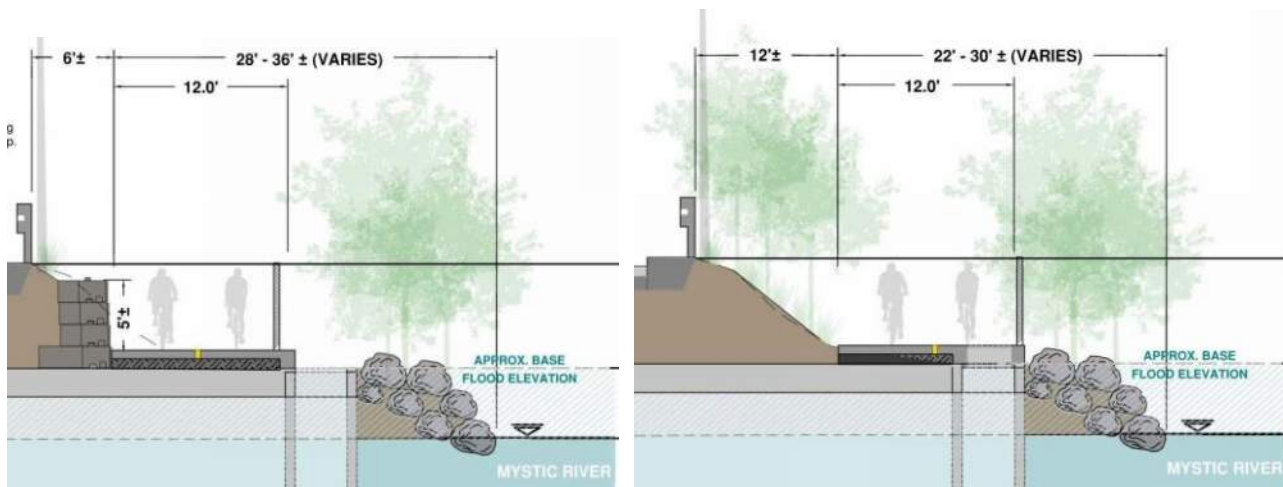


Figure 31 and 32 Alternatives B1 and B2, respectively, at Existing Drainage Culverts**

To determine if Alternatives B1 and B2** are viable, additional investigation into the existing culverts is needed to determine the load-bearing capacity of the culverts and their ability to withstand the load of the path and vehicles traveling along the path. Although typical bicycle traffic is not anticipated to be an issue, there is the possibility that motor vehicles would occasionally use the path.

Additionally, the structural design/footings associated with the retaining wall construction for Alternative B1 may have impacts on the existing culvert. To better understand these issues the existing culverts should be further inspected during future design phases by a structural and/or geotechnical engineer.

Due to these structural concerns associated with Alternatives B1 and B2, a third alternative, B3, was suggested at the Stakeholder Meeting held on May 9, 2018. This alternative would use structural supports on either side of the culverts to span the culverts and minimize the impact of the path on their structure. This option was envisioned as a low bridge, like an existing bridge in Torbert MacDonald Park.

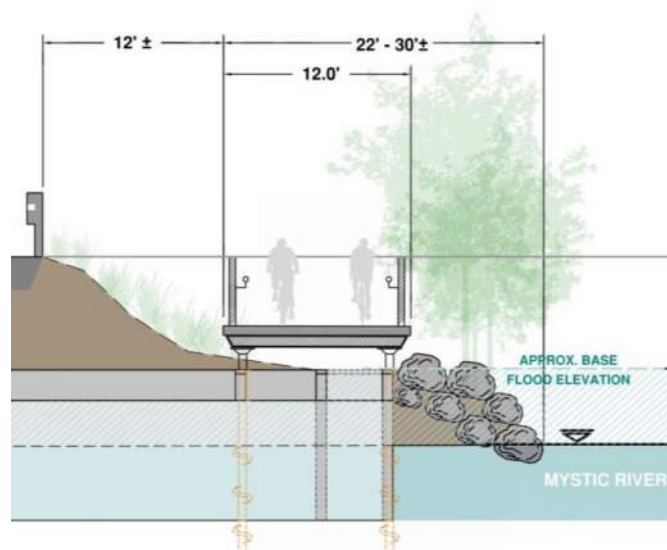


Figure 33. Alternative B3 at Existing Drainage Culverts

5 Permitting Analysis

As summarized in Section 2.3, the proposed Project alignment is located within environmentally sensitive areas, as well as MassDOT and DCR property, and therefore will require permit applications to be filed in accordance with federal, state, and local regulatory requirements. This section provides an overview of the potential permits that may be required for the Project.

5.1 Federal

Federal Highway Administration

As discussed by MassDOT at the Stakeholder Meetings, proposed changes to the Route 16 exit ramp will require coordination and permitting with the Federal Highway Administration because it is part of the Interstate 93 layout. If Alternative A0 moves forward and coordination with FHWA becomes applicable, the process and permits required should be explored further with MassDOT and FHWA.

Army Corps of Engineers

Depending on the amount of work directly impacting the Mystic River, the project may require filing under the Massachusetts Army Corps of Engineers (ACOE) Massachusetts General Permit (GP). Although there are many ACOE review thresholds, there are two (2) thresholds potentially applicable to the South Medford Connector Project that require the filing of an ACOE permit:

- **GP 3. Structures in Navigable Waters of the U.S. (Authority: §10)**
New, expansions, reconfigurations or modifications of structures in navigable waters of the U.S. including pile and pole-supported piers, floats, stairs, shore out hauls, and boat and float lifts.
- **GP 7. Bank and Shoreline Stabilization (Authorities: §§10 & 404)**
Bank and shoreline stabilization activities in waters of the U.S. necessary for erosion control or prevention, such as vegetative stabilization, sills, rip rap, revetment, gabion baskets, stream barbs, and bulkheads, or combinations of techniques (e.g., living shorelines).

With GP 7, there are specific numeric thresholds (i.e. 100 to 500 linear feet of bank to be impacted) that should be reviewed during subsequent design phases to confirm if a permit is required.

Therefore, the need to file an ACOE permit will primarily depend upon:

- Whether the proposed project includes new, expansions, reconfigurations or modifications of structures in navigable waters (i.e. the Mystic River); or
- Whether the trail results in alteration of 100 to 500 or more feet of Bank.

The alternatives that are closer to the Mystic River, including Alternatives A2, A4, and A5, have more potential to require ACOE permitting due to their potential impacts within the river itself. The ACOE thresholds should continue to be reviewed in subsequent design phases to identify if a permit will be required.

NPDES Construction General Permit

The National Pollutant Discharge Elimination System (NPDES) Construction General Permit (CGP) requires the submission of a Notice of Intent (NOI) to the U.S. EPA prior to the start of construction for projects disturbing one (1) acre or greater (defined as any activity which disturbs land, including clearing and grubbing).

The CGP also requires the preparation and implementation of a Storm Water Pollution Prevention Plan (SWPPP) in accordance with the NPDES regulations. The SWPPP details construction activities, erosion control measures, and inspection schedules to be implemented during construction to ensure that the construction activities do not have an adverse impact on wetlands and waterways.

Because the Project (under all alternatives) is anticipated to impact greater than 1 acre of land, filing under the NPDES CGP is anticipated.

5.2 State

Massachusetts Environmental Policy Act (MEPA)

The MEPA office is part of the Executive Office of Energy and Environmental Affairs (EOEEA). The purpose of MEPA is to provide an opportunity early in project design for state regulatory agencies and the public to comment on a proposed project prior to the filing of permits.

An Environmental Notification Form (ENF) or Environmental Impact Report (EIR) is required to be submitted to MEPA if:

- The project is subject to MEPA review (e.g. the project is undertaken by an Agency of the Commonwealth);
- Involves State Agency Financial Assistance or requires an Agency Action/Permit; and
- Environmental impacts or review thresholds as referenced in the MEPA regulations are exceeded.

Although there are many review thresholds for various types of projects, there are two (2) that are potentially applicable to the South Medford Connector Project that require the filing of an ENF (and Other MEPA Review if the Secretary So Requires):

- **Wetlands, Waterways and Tidelands - Alteration of 500 or more linear feet of bank along a fish run or inland bank**
The Project approach is to minimize the impacts to the Bank of the Mystic River. The final route alignment will be determined in the next phase of design, which will determine the impact to Bank and jurisdiction under this MEPA threshold.
- **Wetlands, Waterways and Tidelands - New fill or structure or expansion of existing fill or structure, except a pile-supported structure, in a velocity zone or regulatory floodway**
The Project approach is to be located outside of the regulatory floodway associated with the Mystic River wherever possible. The final route alignment will be determined in the next phase of design, which will determine the location of the path with respect to the regulatory floodway and jurisdiction under this MEPA threshold.

Therefore, the need to file an ENF will primarily depend upon:

- The presence/absence of financial assistance from an agency of the Commonwealth; or
- Whether the trail results in alteration of 500 or more feet of Bank OR is located within a regulatory floodway.

The alternatives that are closer to the Mystic River, including Alternatives A2, A4, and A5, have more potential to require MEPA permitting due to their potential impacts along the bank. Alternatives A0 and A2 provide the most offset to the River and are less likely to result in Bank or floodway impacts, however this will need continued review during future phases of the project.

Massachusetts Endangered Species Act (MESA)

Project review with the Massachusetts Division of Fisheries and Wildlife (DFW) and Natural Heritage and Endangered Species Program (NHESP) is required when a Project impacts NHESP mapped habitat or certified vernal pools. Based on the 14th Edition Natural Heritage Atlas, effective August 1, 2017, the Project site is not located within designated Estimated Habitat of Rare Wildlife or Priority Habitat of Rare Species and does not contain any Certified or Potential Vernal Pools. Therefore, MESA permitting is not anticipated for any of the Project alternatives.

MassDOT Access Permit

Given the proposed Project location within MassDOT property, it is anticipated that a Non-Vehicular Access Permit will be required. A Non-Vehicular Access Permit is required for projects that require access to the state highway layout (SHLO) that do not involve physical modifications to the roadway including construction, relocation or repair of utilities within the SHLO, or tree cutting or landscaping within the SHLO.

It is assumed that all alternatives would require a MassDOT Access permit. The permit application and supporting design documents will be reviewed by the MassDOT Environmental, Traffic, Geotechnical, Structural divisions, and possibly the Hydraulic and Highway divisions if there are changes related to their jurisdiction.

This MassDOT permit assessment assumes that MassDOT is not funding the construction of the Project. If the Project is funded through MassDOT (i.e. through the TIP process), this would change the process for design and permitting with MassDOT. MassDOT-funded projects require MassDOT review at specific milestones during the project (25% design 75% design, 100% design, PS&E) and MassDOT would be involved in review and submittal of permitting applications

Chapter 91

The Project site lies within Historic High Water (filled river and tidelands) and is under Chapter 91 jurisdiction (refer to Map A7, Chapter 91 Jurisdiction). Filled tidelands are former submerged lands and tidal flats which are no longer subject to tidal action due to the presence of fill. Chapter 91 authorization is required for activities on filled tidelands if located:

- a) In designated port areas (DPAs), or
- b) Between the first public way (i.e. road) and the mean high-water mark, or
- c) Between 250 feet and the shore, whichever is further from the water.

The location of the proposed path is located between Route 16 and the Mystic River, as well as being within 250 feet of the river, therefore Chapter 91 authorization is required.

As a shared-use path, the Project aligns with the description of a facility “which promotes the public use and enjoyment of the waterfront such as boardwalks, parks or esplanades” and meets the criteria of a water-dependent use under Chapter 91. Therefore, the Project (under all alternatives) will require a Chapter 91 Water Dependent License (BRP WW01).

5.3 Local

Wetlands Protection Act / Wetlands Bylaw

The project is located within the 100-foot Buffer to Bank and the 200-foot Riverfront Area to the Mystic River. The path also appears to be partially located within Bordering Land Subject to Flooding and potentially along the Bank of the Mystic River. Work within these resources areas will require the filing of a Notice of Intent (NOI) Application with the Medford Conservation Commission.

6 Preliminary Construction Cost Estimate

Based on the feedback received from the Stakeholder Meeting, four (4) Location A alternatives (A0, A2, A2/A5, and A5) and two Location B alternatives (B2 and B3) were selected to include in the preliminary construction cost estimate:

- A0 – Ramp Closed, Path on Ramp**
- A2 – Ramp Open, Path Elevated on Piles**
- A5 – Ramp Open, Path Elevated with Mid-Height Retaining Walls Along Rt. 16
- A2/A5 – Ramp Open, Path Elevated on Piles and Low Retaining Wall Along Rt. 16
- B2 – Path on Culvert**
- B3 – Path Elevated over Culvert

Figure 34 summarizes the preliminary cost estimate for the selected alternatives, which was prepared by VJ Associates (refer to Appendix C). Since the Project designs are conceptual, the cost estimate of each alternative included contingencies resulting in a 66% markup on the construction cost. These contingencies will continue to be refined in future cost estimates as the project design develops and the timeline for construction is more defined. Since on-site geotechnical investigations were not available in the Feasibility Study, VJ Associates used their understanding of the local site conditions and designs developed for nearby projects to make assumptions on the subgrade materials and structural support design for Alternatives A2, A2/A5, and A5, B2 and B3. Future geotechnical investigations of the Project site will allow these costs to be refined and reflective of the on-site conditions.

The cost estimate for each alternative included consistent pricing for the portion of the proposed path to be placed on-grade (including site furnishings and lighting). This generally includes all areas outside of Locations A and B where the alternatives are proposed and comprises approximately 4,980 linear feet of the path. To quantify the cost impact of the structural requirements some of the alternatives at Location A, the estimate breaks out the price for construction-period excavation support and dewatering requirements, as well as the cost of the permanent structural elements (i.e. piles or wall(s)) required for construction of the path on the steep slope. Because the structural elements are required for Alternatives A2/A5, A2, and A5, their estimated construction cost is significantly (3x) higher than Alternative A0.

Preliminary pricing was also provided for Alternatives B2 and B3. Due to the permanent structural supports required to construct Alternative B3, the cost for B3 is more than twice the cost of B2.

	Alternative A2/A5 Hybrid (Wall along Ramp, Path on Elevated Piles)	Alternative A2 ** (Path on Elevated Piles)	Alternative A5 (Path Elevated with Mid-Height Wall)	Alternative A0 ** (Path on Closed Exit Ramp)
Path on Grade with Furnishings (4,980 LF)*	\$1,611,000	\$1,611,000	\$1,611,000	\$1,376,000
Path on Structure (800 LF)	\$3,903,000	\$4,812,000	\$4,895,000	\$596,000
General Conditions/ Contingencies (66% Markup)	\$3,634,000	\$4,232,000	\$4,287,000	\$1,299,000
Subtotal	\$9,148,000	\$10,655,000	\$10,793,000	\$3,271,000
Outfall-B2 - On Culvert **	\$134,000	\$134,000	\$134,000	\$134,000
Outfall-B3 - Spanning Culvert	\$309,000	\$309,000	\$309,000	\$309,000
Total – Low (Subtotal + B2)	\$9,282,000	\$10,789,000	\$10,927,000	\$3,405,000
Total – High (Subtotal + B3)	\$9,457,000	\$10,964,000	\$11,102,000	\$3,580,000

*Includes \$467,800 for lighting along path

Figure 34. Summary of Alternatives Costs (** denotes Recommended Alternative)

7 Recommended Alternatives

The Feasibility Study set forth to review the Location A and B alternatives the key design criteria established in coordination with the Stakeholder Group:

1. Suitability with the existing site conditions, including land cover and topography;
2. Coordination with existing site utilities;
3. Compliance with MassDOT and DCR shared-use path design guidelines for safety;
4. Level of impact on environmental and ecological resources and required permitting;
5. Ease of construction, specifically related to earthwork, structural design elements, and dewatering; and
6. Preliminary construction cost estimates.

The Stakeholder Engagement process identified that the preferred alternative would be the alternative(s) that had the lowest construction cost while maintaining compliance with the MassDOT and DCR shared-use path design guidelines for safety. Therefore, the preliminary construction cost estimate was a critical element of the Study and provided a clear picture of the most cost-effective A and B alternatives – Alternative A0 and Alternative B2. Both alternatives are significantly less expensive than the others since they do not include path on new structural supports. However, there are additional considerations in each location that require further evaluation to determine if these recommended alternatives are viable:

- **Location A**

- If the Route 16 Exit Ramp can remain closed, or is closed in the future, Alignment A0 would be the recommended alternative. Alignment A0 provides the lowest cost option and minimizes environmental impacts to the embankment between Route 16 and the Mystic River shoreline. Additional investigating into the process of having the ramp closed is needed and will include a traffic study and coordination with MassDOT and the FHWA.
- If the Route 16 exit ramp does re-open, Alternative A2 was preferred by the Stakeholder Group because it keeps the path vertically aligned with the existing ramp elevation. A2 also provides the most setback from the River, reducing the encroachment into the Riverfront, Buffer Zone, and floodplain. Though the costs for A2 are significantly higher than A0, if A2 is further pursued

additional geotechnical will allow further development of the structural design and refinement of the construction costs/contingencies. Refer to Section 6 for the assumptions made during the preliminary pricing process.

- **Location B**

- Alternative B2 is the recommended alternative, provided additional structural investigations of the existing drainage culverts indicate that it could support the additional weight of the path and vehicles.
- If the existing drainage culverts cannot support additional weight, Alternative B3 would be the suggested alternative. If B3 is further pursued, additional geotechnical is recommended to further develop the structural design and refine the associated cost.

8 Next Steps

In 2018, the Massachusetts Gaming Commission awarded the City of Medford with an additional \$190,000 for future design phases of the Medford Connector Project. Since the selection of a Recommended Alternative for the path was contingent on decisions to be made outside the South Medford Connector project, there has been an interim process between the Feasibility Study phase and future phases of the Project to determine the next steps.

As the Route 16 exit ramp is a critical location within the City of Medford and it's open/closed status impacts many current initiatives of the City (including the South Medford Connector Project), the City is pursuing the potential of permanently closing ramp. Following the final South Medford Connector Feasibility Study stakeholder engagement meeting on June 20, 2018, there was a meeting on July 26, 2018 with representatives from the City of Medford (including Mayor Burke), MyRWA, DCR, MassDOT, and Central Transportation Planning Staff (CTPS). This meeting explored opportunities for the permanent closure of the Route 16 Exit Ramp. These meeting notes are provided in Appendix F. The next steps from this meeting are to meet with representatives of the Federal Highway Administration to determine the feasibility of the ramp closure, develop a scope of a traffic study, and identify the data required to move forward.

It is anticipated that the South Medford Connector Project and its recommendations will be revisited after the Route 16 exit ramp process is complete. If the ramp is closed to vehicular traffic, Alternative A0 can be further refined. If the ramp remains open permanently, the next steps for the design and engineering of the South Medford Connector path will include a geotechnical analysis, wetlands flagging, survey (including property ownership, environmental resource areas and topographical data) and capital funding opportunities.



Figure 35. Rendering of the South Medford Connector at Interstate 93 overpass

APPENDIX A

Maps and Plans

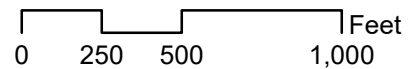
Map A1	Aerial Locus Map
Map A2	USGS Topo Map
Map A3	MassDEP Wetlands
Map A4	FEMA Flood Insurance Rate Map
Map A5	Natural Heritage and Endangered Species Map
Map A6	Federal Endangered Species Map (iPAC)
Map A7	Chapter 91 Jurisdiction
Map A8	City of Medford Storm System
Map A9	Regional Map (Mystic Greenways)
Map A10	Project Location
Map A11-A	South Medford Connector Segment A
Map A11-B	South Medford Connector Segment B
Map A11-C	South Medford Connector Segment C
Figure A12-A	Visualization 1
Figure A12-B	Visualization 2

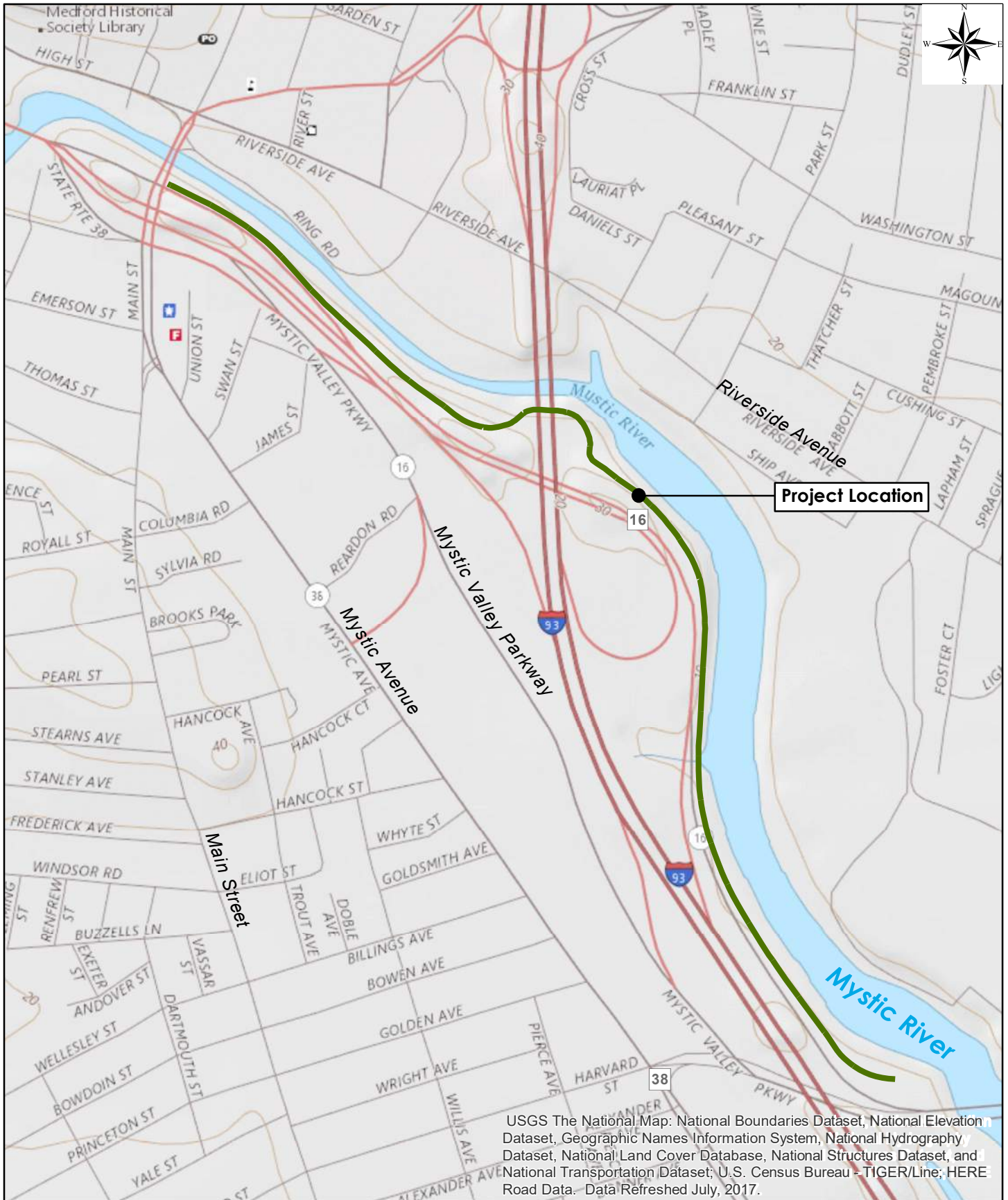


Map A1: Aerial Locus Map

South Medford Connector
 Medford, MA

Data Source: MassGIS
 Nitsch Project #12626.2





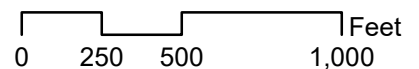
Map A2: USGS Locus Map

South Medford Connector
Medford, MA

Data Source: MassGIS
Nitsch Project #12626.2

Legend

 Approximate Path Alignment

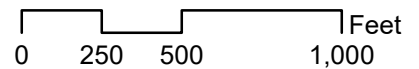


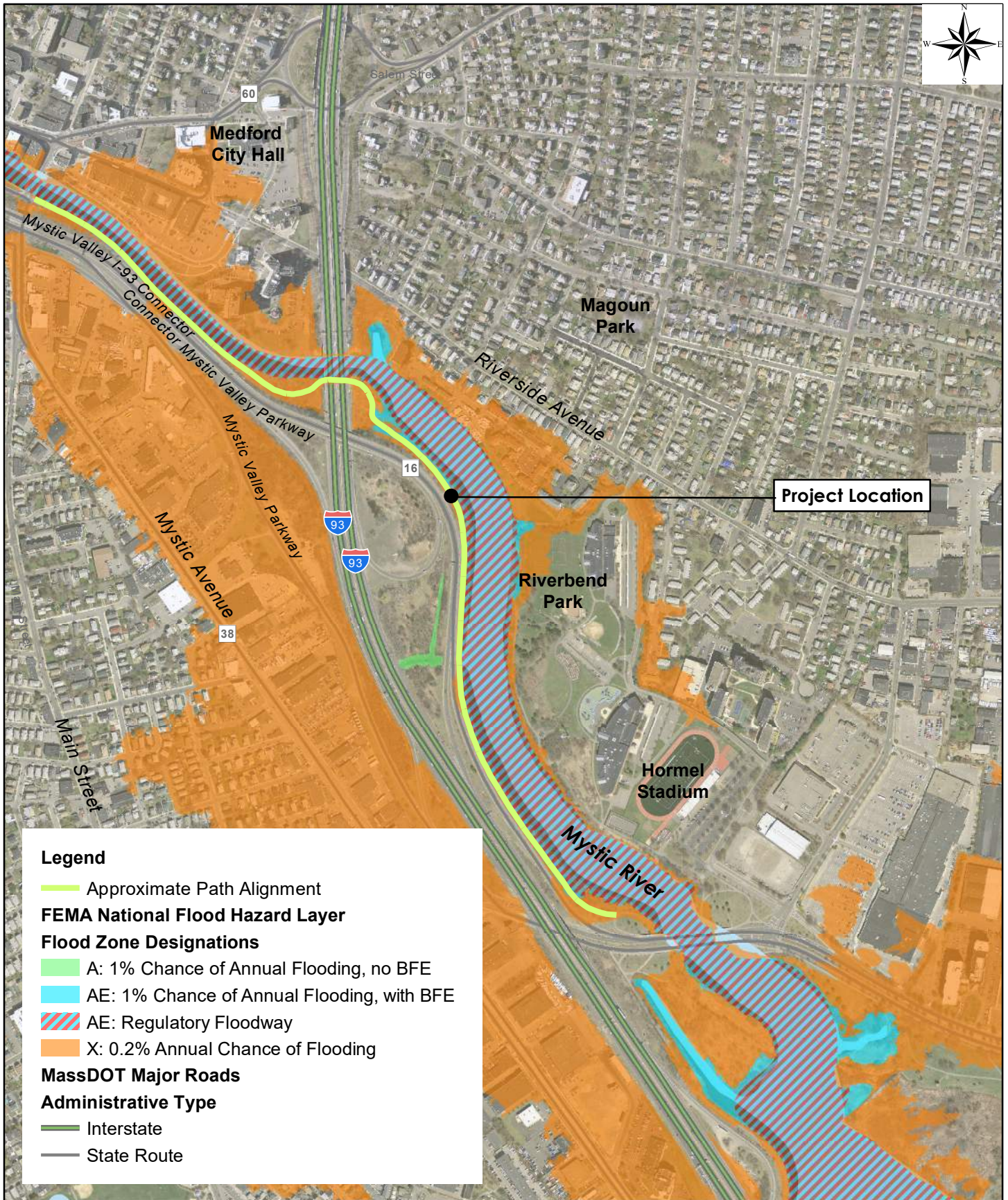


Map A3: MassDEP Wetlands

South Medford Connector
Medford, MA

Data Source: MassGIS
Nitsch Project #12626.2





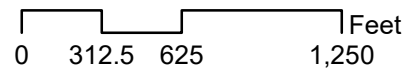
Legend

- Approximate Path Alignment
- FEMA National Flood Hazard Layer**
- Flood Zone Designations**
- A: 1% Chance of Annual Flooding, no BFE
- AE: 1% Chance of Annual Flooding, with BFE
- AE: Regulatory Floodway
- X: 0.2% Annual Chance of Flooding
- MassDOT Major Roads**
- Administrative Type**
- Interstate
- State Route

Map A4: FEMA Flood Insurance Map

South Medford Connector
Medford, MA

Data Source: MassGIS
Nitsch Project #12626.2

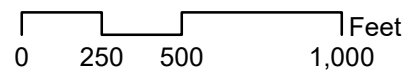




Map A5: Natural Heritage and Endangered Species Map

South Medford Connector
Medford, MA

Data Source: MassGIS
Nitsch Project #12626.2



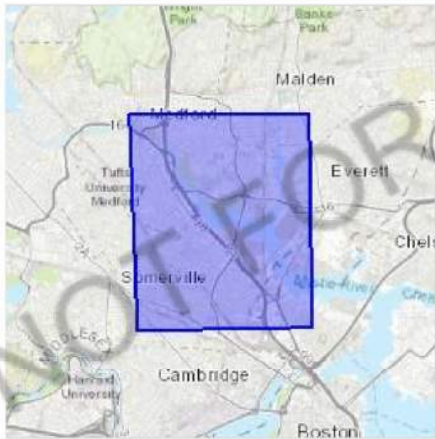
IPaC resource list

This report is an automatically generated list of species and other resources such as critical habitat (collectively referred to as *trust resources*) under the U.S. Fish and Wildlife Service's (USFWS) jurisdiction that are known or expected to be on or near the project area referenced below. The list may also include trust resources that occur outside of the project area, but that could potentially be directly or indirectly affected by activities in the project area. However, determining the likelihood and extent of effects a project may have on trust resources typically requires gathering additional site-specific (e.g., vegetation/species surveys) and project-specific (e.g., magnitude and timing of proposed activities) information.

Below is a summary of the project information you provided and contact information for the USFWS office(s) with jurisdiction in the defined project area. Please read the introduction to each section that follows (Endangered Species, Migratory Birds, USFWS Facilities, and NWI Wetlands) for additional information applicable to the trust resources addressed in that section.

Location

Middlesex and Suffolk counties, Massachusetts



Local office

New England Ecological Services Field Office

☎ (603) 223-2541

📅 (603) 223-0104

70 Commercial Street, Suite 300
Concord, NH 03301-5094

<http://www.fws.gov/newengland>

Endangered species

This resource list is for informational purposes only and does not constitute an analysis of project level impacts.

The primary information used to generate this list is the known or expected range of each species. Additional areas of influence (AOI) for species are also considered. An AOI includes areas outside of the species range if the species could be indirectly affected by activities in that area (e.g., placing a dam upstream of a fish population, even if that fish does not occur at the dam site, may indirectly impact the species by reducing or eliminating water flow downstream). Because species can move, and site conditions can change, the species on this list are not guaranteed to be found on or near the project area. To fully determine any potential effects to species, additional site-specific and project-specific information is often required.

Section 7 of the Endangered Species Act **requires** Federal agencies to "request of the Secretary information whether any species which is listed or proposed to be listed may be present in the area of such proposed action" for any project that is conducted, permitted, funded, or licensed by any Federal agency. A letter from the local office and a species list which fulfills this requirement can **only** be obtained by requesting an official species list from either the Regulatory Review section in IPaC (see directions below) or from the local field office directly.

For project evaluations that require USFWS concurrence/review, please return to the IPaC website and request an official species list by doing the following:

1. Draw the project location and click CONTINUE.
2. Click DEFINE PROJECT.
3. Log in (if directed to do so).
4. Provide a name and description for your project.
5. Click REQUEST SPECIES LIST.

Listed species

¹ and their critical habitats are managed by the [Ecological Services Program](#) of the U.S. Fish and Wildlife Service (USFWS) and the fisheries division of the National Oceanic and Atmospheric Administration (NOAA Fisheries²).

Species and critical habitats under the sole responsibility of NOAA Fisheries are **not** shown on this list. Please contact [NOAA Fisheries](#) for [species under their jurisdiction](#).

1. Species listed under the [Endangered Species Act](#) are threatened or endangered; IPaC also shows species that are candidates, or proposed, for listing. See the [listing status page](#) for more information.
2. [NOAA Fisheries](#), also known as the National Marine Fisheries Service (NMFS), is an office of the National Oceanic and Atmospheric Administration within the Department of Commerce.

The following species are potentially affected by activities in this location:

Mammals

NAME	STATUS
Northern Long-eared Bat <i>Myotis septentrionalis</i> No critical habitat has been designated for this species. https://ecos.fws.gov/ecp/species/9045	Threatened

Critical habitats

Potential effects to critical habitat(s) in this location must be analyzed along with the endangered species themselves.

THERE ARE NO CRITICAL HABITATS AT THIS LOCATION.

Migratory birds

Certain birds are protected under the Migratory Bird Treaty Act

¹ and the Bald and Golden Eagle Protection Act².

Any person or organization who plans or conducts activities that may result in impacts to migratory birds, eagles, and their habitats should follow appropriate regulations and consider implementing appropriate conservation measures, as described [below](#).

1. The [Migratory Birds Treaty Act](#) of 1918.
2. The [Bald and Golden Eagle Protection Act](#) of 1940.

Additional information can be found using the following links:

- Birds of Conservation Concern <http://www.fws.gov/birds/management/managed-species/birds-of-conservation-concern.php>
- Measures for avoiding and minimizing impacts to birds <http://www.fws.gov/birds/management/project-assessment-tools-and-guidance/conservation-measures.php>
- Nationwide conservation measures for birds

The birds listed below are birds of particular concern either because they occur on the [USFWS Birds of Conservation Concern](#) (BCC) list or warrant special attention in your project location. To learn more about the levels of concern for birds on your list and how this list is generated, see the FAQ [below](#). This is not a list of every bird you may find in this location, nor a guarantee that every bird on this list will be found in your project area. To see exact locations of where birders and the general public have sighted birds in and around your project area, visit the [E-bird data mapping tool](#) (Tip: enter your location, desired date range and a species on your list). For projects that occur off the Atlantic Coast, additional maps and models detailing the relative occurrence and abundance of bird species on your

list are available. Links to additional information about Atlantic Coast birds, and other important information about your migratory bird list, including how to properly interpret and use your migratory bird report, can be found [below](#).

For guidance on when to schedule activities or implement avoidance and minimization measures to reduce impacts to migratory birds on your list, click on the PROBABILITY OF PRESENCE SUMMARY at the top of your list to see when these birds are most likely to be present and breeding in your project area.

NAME

BREEDING SEASON (IF A BREEDING SEASON IS INDICATED FOR A BIRD ON YOUR LIST, THE BIRD MAY BREED IN YOUR PROJECT AREA SOMETIME WITHIN THE TIMEFRAME SPECIFIED, WHICH IS A VERY LIBERAL ESTIMATE OF THE DATES INSIDE WHICH THE BIRD BREEDS ACROSS ITS ENTIRE RANGE. "BREEDS ELSEWHERE" INDICATES THAT THE BIRD DOES NOT LIKELY BREED IN YOUR PROJECT AREA.)

American Oystercatcher *Haematopus palliatus*

This is a Bird of Conservation Concern (BCC) throughout its range in the continental USA and Alaska.

<https://ecos.fws.gov/ecp/species/8935>

Breeds Apr 15 to Aug 31

Bald Eagle *Haliaeetus leucocephalus*

This is not a Bird of Conservation Concern (BCC) in this area, but warrants attention because of the Eagle Act or for potential susceptibilities in offshore areas from certain types of development or activities.

<https://ecos.fws.gov/ecp/species/1626>

Breeds Oct 15 to Aug 31

Black Skimmer *Rynchops niger*

This is a Bird of Conservation Concern (BCC) throughout its range in the continental USA and Alaska.

<https://ecos.fws.gov/ecp/species/5234>

Breeds May 20 to Sep 15

Black-billed Cuckoo *Coccyzus erythrophthalmus*

This is a Bird of Conservation Concern (BCC) throughout its range in the continental USA and Alaska.

<https://ecos.fws.gov/ecp/species/9399>

Breeds May 15 to Oct 10

Bobolink *Dolichonyx oryzivorus*

This is a Bird of Conservation Concern (BCC) throughout its range in the continental USA and Alaska.

Breeds May 20 to Jul 31

<p>Buff-breasted Sandpiper <i>Calidris subruficollis</i> This is a Bird of Conservation Concern (BCC) throughout its range in the continental USA and Alaska. https://ecos.fws.gov/ecp/species/9488</p>	Breeds elsewhere
<p>Canada Warbler <i>Cardellina canadensis</i> This is a Bird of Conservation Concern (BCC) throughout its range in the continental USA and Alaska.</p>	Breeds May 20 to Aug 10
<p>Cerulean Warbler <i>Dendroica cerulea</i> This is a Bird of Conservation Concern (BCC) throughout its range in the continental USA and Alaska. https://ecos.fws.gov/ecp/species/2974</p>	Breeds Apr 29 to Jul 20
<p>Dunlin <i>Calidris alpina arctica</i> This is a Bird of Conservation Concern (BCC) only in particular Bird Conservation Regions (BCRs) in the continental USA</p>	Breeds elsewhere
<p>Evening Grosbeak <i>Coccothraustes vespertinus</i> This is a Bird of Conservation Concern (BCC) throughout its range in the continental USA and Alaska.</p>	Breeds elsewhere
<p>Kentucky Warbler <i>Oporornis formosus</i> This is a Bird of Conservation Concern (BCC) throughout its range in the continental USA and Alaska.</p>	Breeds Apr 20 to Aug 20
<p>King Rail <i>Rallus elegans</i> This is a Bird of Conservation Concern (BCC) throughout its range in the continental USA and Alaska. https://ecos.fws.gov/ecp/species/8936</p>	Breeds May 1 to Sep 5
<p>Least Tern <i>Sterna antillarum</i> This is a Bird of Conservation Concern (BCC) only in particular Bird Conservation Regions (BCRs) in the continental USA</p>	Breeds Apr 20 to Sep 10
<p>Lesser Yellowlegs <i>Tringa flavipes</i> This is a Bird of Conservation Concern (BCC) throughout its range in the continental USA and Alaska. https://ecos.fws.gov/ecp/species/9679</p>	Breeds elsewhere
<p>Long-eared Owl <i>asio otus</i> This is a Bird of Conservation Concern (BCC) throughout its range in the continental USA and Alaska. https://ecos.fws.gov/ecp/species/3631</p>	Breeds elsewhere

<p>Nelson's Sparrow <i>Ammodramus nelsoni</i> This is a Bird of Conservation Concern (BCC) throughout its range in the continental USA and Alaska.</p>	<p>Breeds May 15 to Sep 5</p>
<p>Prairie Warbler <i>Dendroica discolor</i> This is a Bird of Conservation Concern (BCC) throughout its range in the continental USA and Alaska.</p>	<p>Breeds May 1 to Jul 31</p>
<p>Prothonotary Warbler <i>Protonotaria citrea</i> This is a Bird of Conservation Concern (BCC) throughout its range in the continental USA and Alaska.</p>	<p>Breeds Apr 1 to Jul 31</p>
<p>Purple Sandpiper <i>Calidris maritima</i> This is a Bird of Conservation Concern (BCC) throughout its range in the continental USA and Alaska.</p>	<p>Breeds elsewhere</p>
<p>Red-headed Woodpecker <i>Melanerpes erythrocephalus</i> This is a Bird of Conservation Concern (BCC) throughout its range in the continental USA and Alaska.</p>	<p>Breeds May 10 to Sep 10</p>
<p>Red-throated Loon <i>Gavia stellata</i> This is a Bird of Conservation Concern (BCC) throughout its range in the continental USA and Alaska.</p>	<p>Breeds elsewhere</p>
<p>Ruddy Turnstone <i>Arenaria interpres morinella</i> This is a Bird of Conservation Concern (BCC) only in particular Bird Conservation Regions (BCRs) in the continental USA</p>	<p>Breeds elsewhere</p>
<p>Rusty Blackbird <i>Euphagus carolinus</i> This is a Bird of Conservation Concern (BCC) throughout its range in the continental USA and Alaska.</p>	<p>Breeds elsewhere</p>
<p>Saltmarsh Sparrow <i>Ammodramus caudacutus</i> This is a Bird of Conservation Concern (BCC) throughout its range in the continental USA and Alaska.</p>	<p>Breeds May 15 to Sep 5</p>
<p>Seaside Sparrow <i>Ammodramus maritimus</i> This is a Bird of Conservation Concern (BCC) throughout its range in the continental USA and Alaska.</p>	<p>Breeds May 10 to Aug 20</p>
<p>Semipalmated Sandpiper <i>Calidris pusilla</i> This is a Bird of Conservation Concern (BCC) throughout its range in the continental USA and Alaska.</p>	<p>Breeds elsewhere</p>

Short-billed Dowitcher *Limnodromus griseus*

Breeds elsewhere

This is a Bird of Conservation Concern (BCC) throughout its range in the continental USA and Alaska.

<https://ecos.fws.gov/ecp/species/9480>

Snowy Owl *Bubo scandiacus*

Breeds elsewhere

This is a Bird of Conservation Concern (BCC) throughout its range in the continental USA and Alaska.

Whimbrel *Numenius phaeopus*

Breeds elsewhere

This is a Bird of Conservation Concern (BCC) throughout its range in the continental USA and Alaska.

<https://ecos.fws.gov/ecp/species/9483>

Willet *Tringa semipalmata*

Breeds Apr 20 to Aug 5

This is a Bird of Conservation Concern (BCC) throughout its range in the continental USA and Alaska.

Wood Thrush *Hylocichla mustelina*

Breeds May 10 to Aug 31

This is a Bird of Conservation Concern (BCC) throughout its range in the continental USA and Alaska.

Tell me more about conservation measures I can implement to avoid or minimize impacts to migratory birds.

[Nationwide Conservation Measures](#) describes measures that can help avoid and minimize impacts to all birds at any location year round. Implementation of these measures is particularly important when birds are most likely to occur in the project area. When birds may be breeding in the area, identifying the locations of any active nests and avoiding their destruction is a very helpful impact minimization measure. To see when birds are most likely to occur and be breeding in your project area, view the Probability of Presence Summary. [Additional measures](#) and/or [permits](#) may be advisable depending on the type of activity you are conducting and the type of infrastructure or bird species present on your project site.

What does IPaC use to generate the migratory birds potentially occurring in my specified location?

The Migratory Bird Resource List is comprised of USFWS [Birds of Conservation Concern \(BCC\)](#) and other species that may warrant special attention in your project location.

The migratory bird list generated for your project is derived from data provided by the [Avian Knowledge Network \(AKN\)](#). The AKN data is based on a growing collection of [survey, banding, and citizen science datasets](#) and is queried and filtered to return a list of those birds reported as occurring in the 10km grid cell(s) which your project intersects, and that have been identified as warranting special attention because they are a BCC species in that area, an eagle ([Eagle Act](#) requirements may apply), or a species that has a particular vulnerability to offshore activities or development.

Again, the Migratory Bird Resource list includes only a subset of birds that may occur in your project area. It is not representative of all birds that may occur in your project area. To get a list of all birds potentially present in your project area, please visit the [E-bird Explore Data Tool](#).

What does IPaC use to generate the probability of presence graphs for the migratory birds potentially occurring in my specified location?

The probability of presence graphs associated with your migratory bird list are based on data provided by the [Avian Knowledge Network \(AKN\)](#). This data is derived from a growing collection of [survey, banding, and citizen science datasets](#).

Probability of presence data is continuously being updated as new and better information becomes available. To learn more about how the probability of presence graphs are produced and how to interpret them, go to the Probability of Presence Summary and then click on the "Tell me about these graphs" link.

How do I know if a bird is breeding, wintering, migrating or present year-round in my project area?

To see what part of a particular bird's range your project area falls within (i.e. breeding, wintering, migrating or year-round), you may refer to the following resources: [The Cornell Lab of Ornithology All About Birds Bird Guide](#), or (if you are unsuccessful in locating the bird of interest there), the [Cornell Lab of Ornithology Neotropical Birds guide](#). If a bird on your migratory bird species list has a breeding season associated with it, if that bird does occur in your project area, there may be nests present at some point within the timeframe specified. If "Breeds elsewhere" is indicated, then the bird likely does not breed in your project area.

What are the levels of concern for migratory birds?

Migratory birds delivered through IPaC fall into the following distinct categories of concern:

1. "BCC Rangewide" birds are [Birds of Conservation Concern](#) (BCC) that are of concern throughout their range anywhere within the USA (including Hawaii, the Pacific Islands, Puerto Rico, and the Virgin Islands);
2. "BCC - BCR" birds are BCCs that are of concern only in particular Bird Conservation Regions (BCRs) in the continental USA; and
3. "Non-BCC - Vulnerable" birds are not BCC species in your project area, but appear on your list either because of the [Eagle Act](#) requirements (for eagles) or (for non-eagles) potential susceptibilities in offshore areas from certain types of development or activities (e.g. offshore energy development or longline fishing).

Although it is important to try to avoid and minimize impacts to all birds, efforts should be made, in particular, to avoid and minimize impacts to the birds on this list, especially eagles and BCC species of rangewide concern. For more information on conservation measures you can implement to help avoid and minimize migratory bird impacts and requirements for eagles, please see the FAQs for these topics.

Details about birds that are potentially affected by offshore projects

For additional details about the relative occurrence and abundance of both individual bird species and groups of bird species within your project area off the Atlantic Coast, please visit the [Northeast Ocean Data Portal](#). The Portal also offers data and information about other taxa besides birds that may be helpful to you in your project review. Alternately, you may download the bird model results files underlying the portal maps through the [NOAA NCCOS Integrative Statistical Modeling and Predictive Mapping of Marine Bird Distributions and Abundance on the Atlantic Outer Continental Shelf](#) project webpage.

Bird tracking data can also provide additional details about occurrence and habitat use throughout the year, including migration. Models relying on survey data may not include this information. For additional information on marine bird tracking data, see the [Diving Bird Study](#) and the [nanotag studies](#) or contact [Caleb Spiegel](#) or [Pam Loring](#).

What if I have eagles on my list?

If your project has the potential to disturb or kill eagles, you may need to [obtain a permit](#) to avoid violating the Eagle Act should such impacts occur.

Proper Interpretation and Use of Your Migratory Bird Report

The migratory bird list generated is not a list of all birds in your project area, only a subset of birds of priority concern. To learn more about how your list is generated, and see options for identifying what other birds may be in your project area, please see the FAQ "What does IPaC use to generate the migratory birds potentially occurring in my specified location". Please be aware this report provides the "probability of presence" of birds within the 10 km grid cell(s) that overlap your project; not your exact project footprint. On the graphs provided, please also look carefully at the survey effort (indicated by the black vertical bar) and for the existence of the "no data" indicator (a red horizontal bar). A high survey effort is the key component. If the survey effort is high, then the probability of presence score can be viewed as more dependable. In contrast, a low survey effort bar or no data bar means a lack of data and, therefore, a lack of certainty about presence of the species. This list is not perfect; it is simply a starting point for identifying what birds of concern have the potential to be in your project area, when they might be there, and if they might be breeding (which means nests might be present). The list helps you know what to look for to confirm presence, and helps guide you in knowing when to implement conservation measures to avoid or minimize potential impacts from your project activities, should presence be confirmed. To learn more about conservation measures, visit the FAQ "Tell me about conservation measures I can implement to avoid or minimize impacts to migratory birds" at the bottom of your migratory bird trust resources page.

Facilities

National Wildlife Refuge lands

Any activity proposed on lands managed by the [National Wildlife Refuge](#) system must undergo a 'Compatibility Determination' conducted by the Refuge. Please contact the individual Refuges to discuss any questions or concerns.

THERE ARE NO REFUGE LANDS AT THIS LOCATION.

Fish hatcheries

THERE ARE NO FISH HATCHERIES AT THIS LOCATION.

Wetlands in the National Wetlands Inventory

Impacts to [NWI wetlands](#) and other aquatic habitats may be subject to regulation under Section 404 of the Clean Water Act, or other State/Federal statutes.

For more information please contact the Regulatory Program of the local [U.S. Army Corps of Engineers District](#).

Please note that the NWI data being shown may be out of date. We are currently working to update our NWI data set. We recommend you verify these results with a site visit to determine the actual extent of wetlands on site.

This location overlaps the following wetlands:

ESTUARINE AND MARINE DEEPWATER

[E1UBLx](#)

ESTUARINE AND MARINE WETLAND

[E2USN](#)

FRESHWATER EMERGENT WETLAND

[PEM1E](#)

[PEM1Es](#)

[PEM1Ed](#)

[PEM1/5Ed](#)

[PEM1Ad](#)

[PEM5Ed](#)

[PEM1Cd](#)

FRESHWATER POND

[PUBFx](#)

RIVERINE

[R2UBH](#)

[R2UBHx](#)

[R5UBH](#)

[R4SBCx](#)

A full description for each wetland code can be found at the [National Wetlands Inventory website](#)

Data limitations

The Service's objective of mapping wetlands and deepwater habitats is to produce reconnaissance level information on the location, type and size of these resources. The maps are prepared from the analysis of high altitude imagery. Wetlands are identified based on vegetation, visible hydrology and geography. A margin of error is inherent in the use of imagery; thus, detailed on-the-ground inspection of any particular site may result in revision of the wetland boundaries or classification established through image analysis.

The accuracy of image interpretation depends on the quality of the imagery, the experience of the image analysts, the amount and quality of the collateral data and the amount of ground truth verification work conducted. Metadata should be consulted to determine the date of the source imagery used and any mapping problems.

Wetlands or other mapped features may have changed since the date of the imagery or field work. There may be occasional differences in polygon boundaries or classifications between the information depicted on the map and the actual conditions on site.

Data exclusions

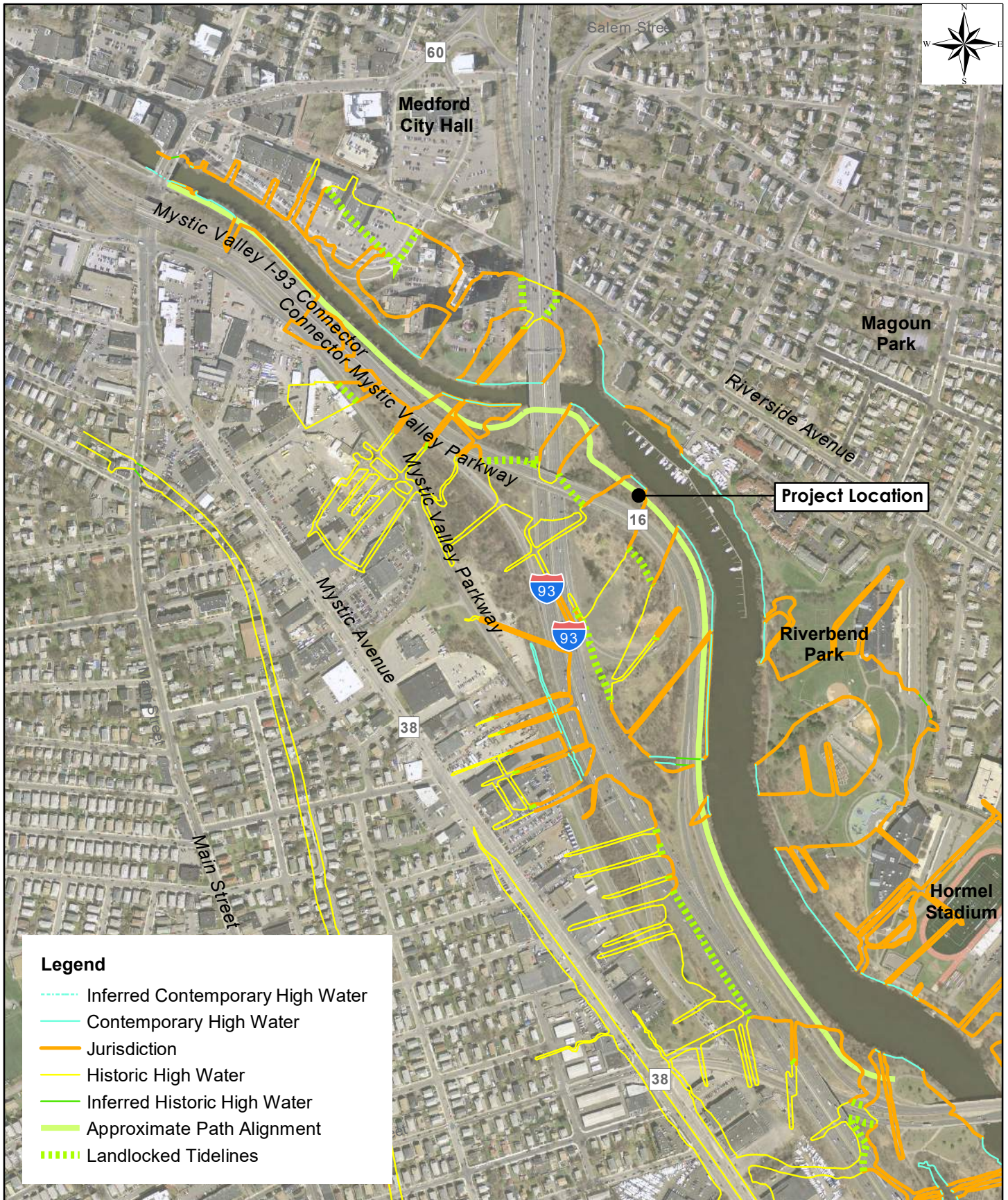
Certain wetland habitats are excluded from the National mapping program because of the limitations of aerial imagery as the primary data source used to detect wetlands. These habitats include seagrasses or submerged aquatic vegetation that are found in the intertidal and subtidal zones of estuaries and nearshore coastal waters. Some deepwater reef communities (coral or tubercid worm reefs) have also been excluded from the inventory. These habitats, because of their depth, go undetected by aerial imagery.

Data precautions

Federal, state, and local regulatory agencies with jurisdiction over wetlands may define and describe wetlands in a different manner than that used in this inventory. There is no attempt, in either the design or products of this

inventory, to define the limits of proprietary jurisdiction of any Federal, state, or local government or to establish the geographical scope of the regulatory programs of government agencies. Persons intending to engage in activities involving modifications within or adjacent to wetland areas should seek the advice of appropriate federal, state, or local agencies concerning specified agency regulatory programs and proprietary jurisdictions that may affect such activities.

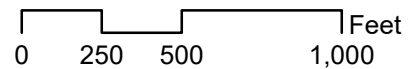
NOT FOR CONSULTATION

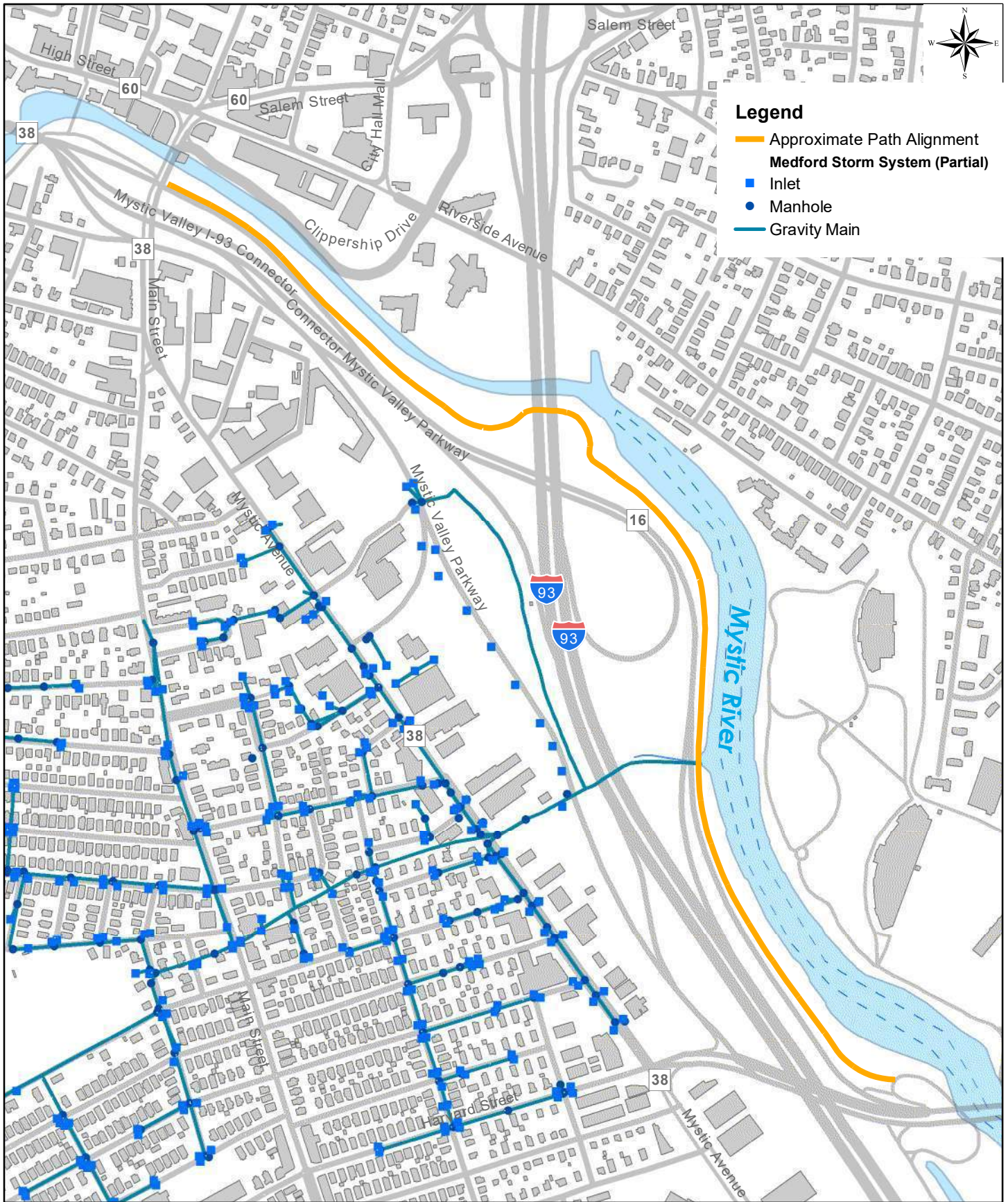


Map A7: Chapter 91 Jurisdiction

South Medford Connector
Medford, MA

Data Source: MassGIS
Nitsch Project #12626.2

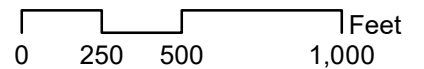




Map A8: City of Medford Storm System

South Medford Connector
Medford, MA

Data Source: MassGIS
Nitsch Project #12626.2





Map A9
Regional Map (Mystic Greenways)

MYSTIC GREENWAYS VISION
 Existing ———
 In-Progress - - - -
 Envisioned ·····





Map A10: Project Location

Mystic Greenways - South Medford Connector
Medford, MA

Data Source: MassGIS, FEMA
Nitsch Project # 12626.2

Legend

Flood Zone Hazard Areas

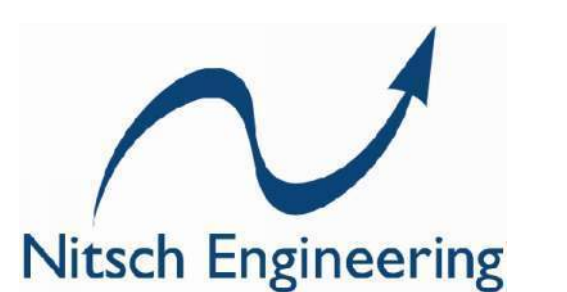
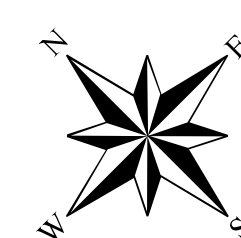
- Flood Zone Designations**
- A: 1% Chane of Annual Flooding, no BFE
 - AE: 1% Annual Chance of Flooding, with BFE
 - AE: Regulatory Floodway
 - X: 0.2% Annual Chance of Flooding
 - X: Area of Minimal Flood Hazard

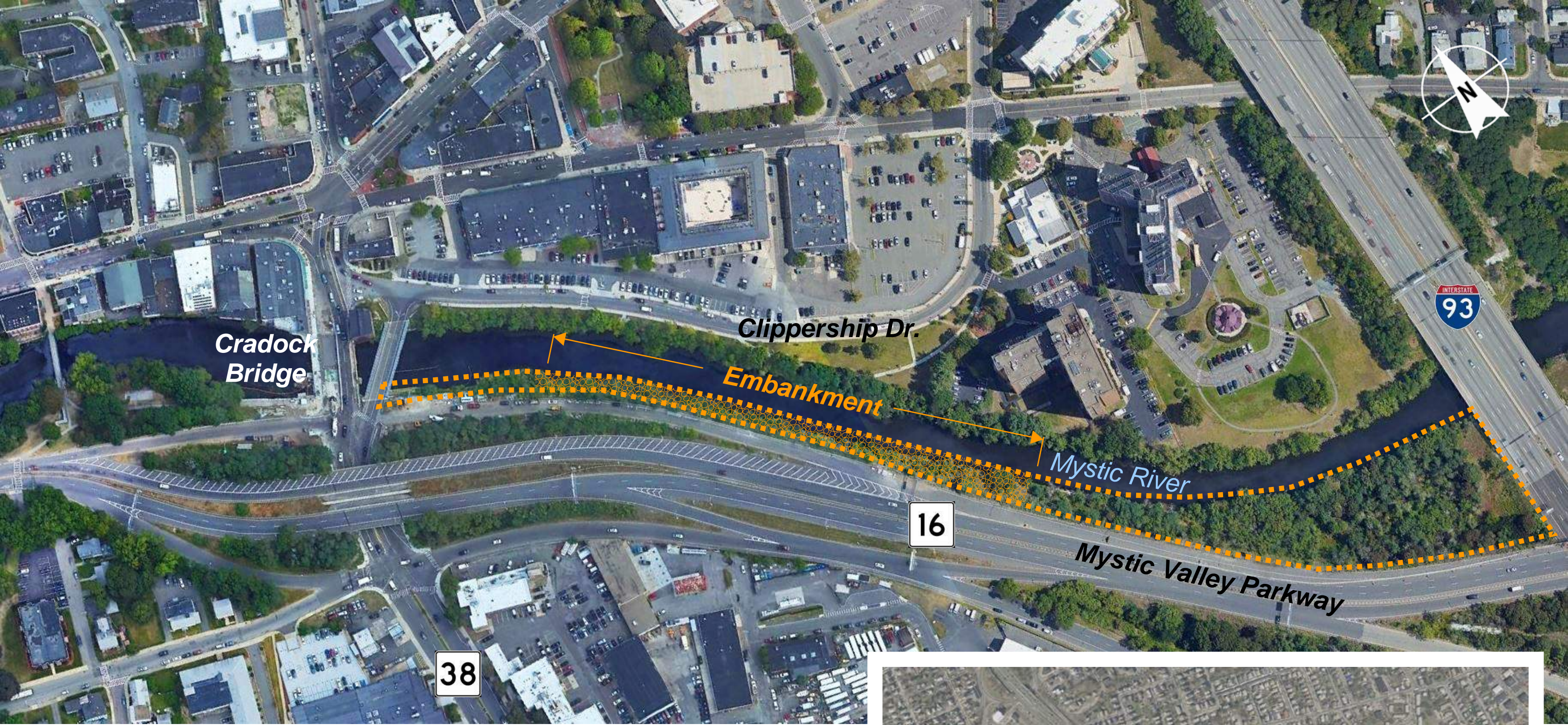
MassDOT Major Roads

- Administrative Type**
- Interstate
 - State Route



Scale: 1" = 200'





Map A11-A
South Medford Connector
Segment A





Map A11-B
South Medford Connector
Segment B





Map A11-C
 South Medford Connector
 Segment C



Figure A12-A
South Medford Connector Visualization 1



Figure A12-B
South Medford Connector Visualization 2

APPENDIX B

Phase I Environmental Site Assessment

(Note: Full Environmental Site Assessment with Appendices available upon request)

**PHASE I ENVIRONMENTAL SITE ASSESSMENT
CRADDOCK BRIDGE TO WELLINGTON BRIDGE
MYSTIC RIVER PATH EXTENSION
SOUTH MEDFORD CONNECTOR
MEDFORD, MASSACHUSETTS**

Prepared for:

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

Prepared by:

TRACEY Environmental Consulting, LLC
29 Cushing Avenue
Hingham, Massachusetts 02043

May 2018

Project 18-081



May 22, 2018
Project No. 18-081

Nitsch Engineering
2 Center Plaza, Suite 430
Boston, MA 02108
Attention: Mr. Scott Turner, PE, AICP

Re: Historical Environmental Review
South Medford Connector
Mystic River Path Extension
Craddock Bridge to Wellington Bridge
Medford, MA

Dear Scott:

TRACEY Environmental Consulting, LLC (TRACEY) is pleased to submit this Phase I Environmental Site Assessment (ESA) report for the above referenced property in Medford, Massachusetts. The purpose of the Phase I ESA is to evaluate whether current or historical operations may have impacted the Property and to assist you in identifying "recognized environmental conditions" (RECs) as defined in the American Society of Testing and Materials (ASTM) Designation E1527-13, "Standard Practice for Environmental Site Assessments: Phase I Environmental Assessment Process."

I declare that, to the best of my professional knowledge and belief, I meet the definition of Environmental Professional as defined in §312.10 of this part [40 CFR Part 312]. Copies of my resume and my LSP license are located in Appendix G for review. Further, I have the specific qualifications based on education, training, and experience to assess a property of the nature, history, and setting of the South Medford Connector, along the Mystic River, from Craddock Bridge to Wellington Bridge in Medford, Massachusetts. I have developed and performed the all appropriate inquiries in conformance with the standards and practices set forth in 40 CFR Part 312.

If you have any questions regarding this report, please contact TRACEY at (781) 726-2519.

Sincerely,

TRACEY Environmental Consulting LLC

A handwritten signature in black ink that reads "James P. Murphy". The signature is written in a cursive style.

James P. Murphy, L.S.P.
Principal

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APPENDIX C	EDR Report
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APPENDIX E	Aerial Photographs & Historical USGS Topographic Maps
APPENDIX F	Property Reconnaissance Photographs
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EXECUTIVE SUMMARY

TRACEY Environmental Consulting, LLC (TRACEY) was retained by Nitsch Engineering (Nitsch) to conduct a Phase I Environmental Site Assessment (ESA) in accordance with American Society of Testing and Materials (ASTM) Standard Practice for Environmental Site Assessments process E1527-13 for the land located on the south side of the Mystic River between Braddock Bridge and the Wellington Bridge (the “Property”) in Medford, Massachusetts. The land is also identified as the South Medford Connector.

TRACEY has performed a Phase I ESA in conformance with the scope and limitations of ASTM Practice E1527 for the Property. Any exceptions to, or deletions from this practice are described in Section 1.4 of this report.

Based upon the tasks conducted for this Phase I ESA, TRACEY did not identify any recognized environmental conditions (RECs) for the Property.

**PHASE I ENVIRONMENTAL SITE ASSESSMENT
CRADDOCK BRIDGE TO WELLINGTON BRIDGE
MYSTIC RIVER PATH EXTENSION
SOUTH MEDFORD CONNECTOR
MEDFORD, MASSACHUSETTS**

1.0 INTRODUCTION

1.1 PURPOSE

TRACEY Environmental Consulting LLC (TRACEY) was retained by Nitsch to conduct a Phase I Environmental Site Assessment (Phase I ESA) at

This Phase I ESA was performed to evaluate the possible presence of recognized environmental conditions (RECs), which are defined in American Society of Testing and Materials (ASTM) Process E1527-13 as “the presence or likely presence of hazardous substances or petroleum products on a property under conditions that indicate an existing release, a past release, or a material threat of a release of hazardous substances or petroleum products into structures on the property or into the ground, groundwater, or surface water of the property.” According to ASTM E1527, the term RECs is not intended to include de minimis conditions that generally do not present a material risk of harm to public health or the environment and that generally would not be the subject of an enforcement action if brought to the attention of appropriate governmental authorities.

1.2 SCOPE OF SERVICES/METHODOLOGY

TRACEY developed and performed this Phase I ESA in general conformance with the standards and practices set forth in ASTM Process E1527 and the proposal executed by TRACEY and Nitsch (on April 4, 2018). TRACEY’s scope of services included:

- a visual reconnaissance of the Property to evaluate the potential for releases of hazardous materials and/or petroleum products at the Property;
- a visual review of adjoining properties from the Property, public rights-of-way or other public vantage points, and drive-by observations of the surrounding properties;
- interviews with people familiar with the Property, as available;

- a review of regulatory and local agency files, as available;
- a review of historical documents, as necessary and feasible, to establish the Property use history;
- a review of a database search utilizing Environmental Data Resources Inc. Environmental Data Report (EDR Report) to obtain information regarding oil and hazardous material (OHM) storage, handling, and releases at the Property and the abutting properties; and,
- prepare a report summarizing our findings.

1.3 SIGNIFICANT ASSUMPTIONS

TRACEY assumed that the information provided by Nitsch, the City of Medford municipal offices, people familiar with the Property, and regulatory agencies were true and reliable.

1.4 LIMITATIONS, EXCEPTIONS, DEVIATIONS & DATA GAPS

The information presented in this Phase I ESA is subject to the specific limitations and exceptions in ASTM Process E1527. Consistent with the intent of ASTM Process E1527, completion of the activities in this Phase I ESA using the identified methods is intended to constitute an assessment (as feasible and practical) of the Property evaluated and reduce uncertainty regarding the possible presence of RECs. In addition, the findings and conclusions do not constitute scientific certainties, but rather probabilities based upon our professional judgment concerning data reviewed during the course of the proposed Scope of Services (Section 1.2). TRACEY cannot represent that the Property does not contain hazardous materials or other latent environmental conditions beyond those detected or observed by TRACEY during this investigation. Should additional information regarding the Property become available in the future, the findings of this Phase I ESA should be reevaluated by TRACEY or another qualified environmental professional.

The findings presented in this Phase I ESA are based upon the Scope of Services, information obtained through the performance of these services, and the schedule as agreed upon by TRACEY and Nitsch for whom this report was prepared. To the extent that TRACEY relied upon information prepared by other parties not under contract to TRACEY, TRACEY makes no

representation as to the accuracy or completeness of such information. Only the party for whom this Phase I ESA report was originally prepared, and other specifically named parties, may make use of and rely upon the information in this Phase I ESA, for a period not to exceed 180 days in accordance with the ASTM “Standard Practice for Environmental Site Assessments: Phase I ESA Process” E1527. After 180 days, this report and information contained herein is considered to be invalid, and should be updated in accordance with ASTM Process E1527.

The findings presented in this Phase I ESA report apply solely to the Property’s conditions existing at the time when TRACEY’s assessment was performed. Furthermore, nothing contained in this document shall relieve other parties of their responsibility to abide by contract documents and all applicable laws, codes, regulations, or standards.

“Data Gaps” and other “Limitations” identified during this Phase I ESA include:

- prior owners of the Property were not interviewed.

1.5 SPECIAL TERMS AND CONDITIONS

The Scope of Work for this Phase I ESA on the Property did not include:

- (a) analytical testing for the potential presence of polychlorinated biphenyls (PCBs);
- (b) analytical testing for natural hazards such as naturally-occurring asbestos, methane gas, or radon;
- (c) analytical testing and evaluation of the potential presence of radionuclides;
- (d) an evaluation of nonchemical hazards such as the potential for damage from earthquakes or floods;
- or (e) a health-based risk assessment.

1.6 USER RELIANCE

This Phase I ESA is for the exclusive use of Nitsch, its subsidiaries, successors and assigns, and counsel. Use of this Phase I ESA by any other party shall be at such party’s sole risk, unless specifically authorized by TRACEY.

2.0 PROPERTY AND ABUTTING PROPERTIES

2.1 GENERAL

Information regarding the current Property's conditions was obtained from the City of Medford municipal offices and from Property visits conducted by TRACEY in April and May, 2018.

Assessor information for the Property is found in Appendix B.

South Medford Connector

Property Location:	South Bank of the Mystic River
Map/Lot:	See Section 3.2.2 and Appendix B
Property Owner:	Commonwealth of Massachusetts
Property Occupant:	Undeveloped
Year Ownership Acquired:	N/A
Year Built:	N/A
Zoning:	Open Space
Approximate Lot Size:	N/A
Current Land Use:	Undeveloped

2.2 GEOGRAPHIC LOCATION

The Property is located in the central section of Medford, Massachusetts along the Mystic River, which bisects the city as it flows southeasterly towards Boston. Based on the historic topographic Maps, the Property is located within the original meandering boundaries of the Mystic River, when it was tidal with marshlands, and the width approached ½ mile.

The Property is directly exposed to the Mystic River to the north and east, as the river flows and bends to the southeast, while the opposite side of the Property is nearly sealed off by the existing elevated roadways of I-93 and Route 16, the Mystic Valley Parkway.

The approximate location of the Property is illustrated on Figure 1, which was created from the Boston North, Massachusetts US Geological Survey (USGS) Topographic Quadrangle Map, published in 1985. The latitude and longitude coordinates of the Property vary as the Property extends over approximately one mile. For the EDR database study, a point near the middle of the Property was selected, near the I-93 Overpass; at that point, the latitude and longitude are approximately 42.415 N and 71.1036 W, respectively.

2.3 ENVIRONMENTAL SETTING

The Property consists of Open Space, along a one mile stretch of the Mystic River, the centerpiece of the Mystic River Watershed, which covers nearly 76 square miles in eastern Massachusetts. Where once the river flowed and meandered with the tides, and flooded the banks during storms, changes were made in the 1950s and 1960s that created a freshwater environment. The river was narrowed, artificial banks were built, the marshlands were dredged and filled with sand and gravel to create the base for concrete foundations of an elevated highway system (I-93) that crossed the Mystic and then followed the southeast trend towards Boston.

The Property generally stays several feet above the river elevation, and the width and slope of the open space varies depending on the distance from the nearby roads. Farther north, toward the upstream end of this section of the Mystic, the Property rises higher above the water, as shown in the photographs near Craddock Bridge in Appendix F.

Information provided through MassGIS indicates the northern half of the Property is within Medium Yield or greater aquifer, however it is designated as a Non Potential Drinking Water Source Area due to its history of extensive development and population. The Property is also designated as Protected Open Space and falls within the 100 year Floodplain area.

The elevation of the north end of the Property appears to be approximately 10 feet, with that elevation probably determined once Craddock Bridge was constructed. The remainder of the Property alternates from being part of the tidal marsh or the meandering river in the historic topographic maps (Appendix E), as the river meandered prior to the construction of I-93.

2.4 PROPERTY FEATURES

Property feature information was established from municipal file review, topographic information, aerial photographs, and site reconnaissance. As stated previously, the property is undeveloped, and the primary features of the Property are the adjacent Mystic River, the elevated roadway system (I-93 and Route 16), and variable vegetation, growing organically along the river.

2.4.1 Structures and Improvements

Historical Sanborn Maps were not available for the Property, however historical topographic maps and aerial photographs provide great detail as the Property was created during the construction of the I-93 roadway. No substantial structures or improvements are located on the Property, although the roadway system is an intrinsic part of the Property. No other above ground structures are noted on the Property. Historical topographic Maps and aerial photographs are in Appendices E, for review.

2.4.2 Roads/Access

Access to the Property is by foot only, as the elevated roadways are not for local driving.

2.4.3 Heating Source

There are no buildings on the Property.

2.4.4 Sanitary Sewer Disposal

The Property is not developed.

2.4.5 Water Supply

The Property is not developed and there is no water supply.

2.4.6 Storm Drains

Storm system drainage was noted on the Property, as shown in several of the reconnaissance photographs in Appendix F.

2.4.7 Transformers

Transformers were not observed during the site visit.

2.4.8 Aboveground and Underground Storage Tanks

No records of tanks existing at the Property were indicated by the information reviewed by TRACEY.

2.5 ENVIRONMENTAL PERMITS AND/OR VIOLATIONS

No current or active violations were made available to TRACEY.

2.6 SURROUNDING PROPERTIES

The following properties abut the disposal site:

- To the north and east is the Mystic River. Beyond the river are residential, athletic, and educational properties; and,
- To the south and west are Route 16 North (Mystic Valley Parkway) and I-93. Main Street and Craddock Bridge are at the extreme west end of the Property.

2.7 HISTORICAL ENVIRONMENTAL REPORTS

There were no prior environmental reports made available to TRACEY.

2.8 ASTM QUESTIONNAIRES

An environmental questionnaire was not completed for the Property.

3.0 PROPERTY RESEARCH

3.1 HISTORICAL INFORMATION

3.1.1 Sanborn Fire Insurance Maps

Sanborn Fire Insurance Maps (Sanborn Maps) were not available for the Property. The Sanborn report from EDR is attached in Appendix D.

3.1.2 Historical Topographic Maps

EDR also provided USGS topographic maps of the Property for review for the following years – 1893, 1903, 1943/1944, 1946, 1947, 1949, 1956, 1971, 1979, 1985, and 2012. The 11 topographic maps are identified as the following: Boston, Boston North, and Lexington. The maps are shown in Appendix E for review and comparison to the current Locus Map (Figure 1).

- 1893: The Mystic River and tidal marsh are depicted as stretching from Mystic Ave (SW) to Riverside Ave (NE). A large track exists at “Mystic Park” west of Mystic Ave.
- 1892: Not much change is readily noted.
- 1943, 1944: The greatest changes are the roadway crossing the Mystic River east of the Property, and the development of the land where the former “Mystic Park” existed, southwest of the Property.
- 1946: Not much has changed, but the topographic map is colorized.
- 1947: The color schemes have changed, with pink to show areas of development, and green as undeveloped.
- 1949: No changes noted to the Property.
- 1956: No changes noted to the Property.
- 1971: Significant changes include the roadway system was developed, including I-93 from the north to south, and Route 16 on-ramp/off-ramp with I-93.
- 1979: Increased development along the Mystic River, especially north of the river.
- 1985: No changes noted to the Property.
- 2012: No changes noted to the Property, as the structures are not indicated on this map, just roads and streets.

3.1.3 Historical Aerial Photographs

Eleven historical aerial photographs were available for the Property from EDR, they included: 1939, 1952, 1955, 1962, 1969, 1970, 1978, 1980, 1985, 1995, and 2010. TRACEY reviewed the aerials and found several key photographs depicting the changes to the Mystic River, including the 1962 photograph. This aerial photograph catches a glimpse of the tremendous alteration that occurred for the creation of I-93. The following are chronological descriptions of the aerials.

- 1939: The Property is pictured in the winter, covered with snow and ice. The outline of the meandering river is visible, with an oxbow frozen over due to lack of water flow, east of the Property. There are tracks in the snow within the river floodplain, indicating some mechanized working of the land.
- 1952: The Mystic River is clearly visible with water. The Oxbow section described in 1939 appears to have been partially filled in. Also, structures have been built east of the Property within the traditional northern bank of the river. Signs of filling the tidal area appear at the east of the southern end of the Property. Several buildings and businesses have developed along the River, and the development of the Mystic Parkway has begun, west of the Property.
- 1955: Conditions appear similar to 1952, with the Mystic Parkway completed, and cars are visible. The lower oxbow is full of water.
- 1962: The construction of I-93 is just reaching the Mystic River in this photo! The constructed portion to the north is just visible, while filling operations of sand and gravel are well underway across the midsection of the Property. The Mystic River is in the process of being filled in and narrowed. A section of the I-93 overpass may be visible near the center of this photograph. The oxbow area mentioned previously is now a large area of water, potentially water storage in conjunction with the filling operation.
- 1969: The roadway construction is complete and in use; I-93, Route 16 (Mystic Parkway), and the overpass described earlier. The rerouting of the Mystic River is also complete. Development on the new waterfront property is starting. The culvert that earmarks the transition from Segment B to Segment C is clearly visible.
- 1970: The Riverside Yacht Club, visible in 1969, is in full use.
- 1978: No extensive differences are noted from 1970.

- 1980: The high-rise residential development north of the Mystic has been constructed.
- 1985: Redevelopment of the facilities along the southern section of the Mystic River, across the river to the north, is clearly visible. Much of it may have started in 1980.
- 1995: No significant changes are noted to the Property of the surrounding area.
- 2010: Vegetation on the Property appears more developed and in greater density. The athletic fields and building across the river are completed.

3.1.4 City Directories

Historical City directories were provided to TRACEY by EDR for Ship Ave, across the Mystic River from the Property, between 1971 and 2014. In general, the addresses listed along this section of Ship Ave are residential with a few businesses mixed in, including the Riverside Yacht Club. There are some single family addresses, several addresses with multiple names, and the condominiums mentioned in 1980 list dozens of names.

3.2 MUNICIPAL FILE REVIEW

Pertinent information regarding the Property was requested for review at the following City of Medford municipal offices: City Clerk, Assessors, Fire Prevention Department, Energy and Environment Department, Health Department, and Department of Public Works. Additionally, information obtained from municipal, regional, and state offices for the Property and surrounding properties are summarized in the following sections and included in Appendix B.

3.2.1 City Clerk's Office

No records were reviewed by TRACEY at the City Clerk's office for the Property.

3.2.2 Assessors Department

TRACEY reviewed the Medford Assessors office maps, which indicated the Property was found on several maps as the Mystic River flows southeasterly through Medford. Copies of the following maps were provided by the Assessors office and are located in Appendix B, for review: M-8, M-9, N-10, P-11, Q-10, and R-10. The Assessors office was unable to provide an estimate of the size of the Property. The Property is listed as owned by the Commonwealth of Massachusetts.

TRACEY did not visit the Registry of Deeds for further property ownership research as part of this study.

3.2.3 Fire Prevention Department

Records at the Medford Fire Department regarding the Property were requested by TRACEY in April, 2018. No Fire Department records were made available to TRACEY for this property, as the Property did not have a listed address.

3.2.4 Energy and Environment Department

TRACEY met with Mr. Denis MacDougall of the Medford Conservation Commission, which is part of the Energy and Environment (E&E) Department, to discuss the history of the Mystic River, nearby contaminated properties, storm water control measures that limit flooding, and the overall health of the Mystic. Mr. MacDougall stated there were no known issues for the Property.

3.2.5 Department of Health

TRACEY contacted the Medford Health Department regarding potential environmental issues, and were informed about various debris and trash in the area, as well as makeshift housing that occurs on the Property. TRACEY was referred to the Medford Housing Authority.

3.2.6 Water & Sewer Division of the DPW

Information reviewed through the Medford Department of Public Works (DPW) and in discussions with the E&E Department indicate that there is no public water or sewer available on the Property.

3.2.7 Massachusetts Department of Conservation and Recreation (DCR)

TRACEY contacted the Massachusetts Department of Conservation and Recreation (DCR) for specific information regarding the Property. DCR Operations was not aware of specific issues related to the Property and referred TRACEY to the Engineering & Planning department within

DCR. At the time of publishing the report, DCR has not provided a response to TRACEY's inquiries. Should the Engineering & Planning department respond to TRACEY, we will provide a follow up document to Nitsch summarizing their response.

3.2.8 Massachusetts Department of Transportation (DOT)

TRACEY contacted the Massachusetts Department of Transportation (MassDOT) for information regarding the operations that were completed circa 1962 (as described in Section 3.1.3 Historical Aerial Photographs), when the Mystic River was rerouted and I-93 was developed. TRACEY corresponded and discussed the Property with various sections of MassDOT, including Plans & Records, Stormwater Program, and Environmental Services.

MassDOT records did not indicate specific information regarding the filling in of the Mystic River that occurred during the development of I-93 or the materials used to create the existing embankments of the current Mystic River. Additional internal searches completed by MassDOT personnel (Environmental Services) did not discover additional information regarding the historical fill used in the area of the Property.

4.0 DATABASE SEARCH

4.1 GENERAL

TRACEY reviewed regulatory information for the Property and surrounding area using an EDR Report dated April 6, 2018 (Appendix C). Due to the location of the Property, within a major historical industrial area in a city that was one of the earliest established in Massachusetts, TRACEY focused the EDR database review to one-quarter mile of the Property boundary, as it arches southeast along the southern bank of the Mystic River, from Craddock Bridge (at Main Street) to Wellington Bridge (at Route 16). The EDR report provides information regarding the use and storage of Oil and Hazardous Materials (OHM) and releases of OHM to the environment reported in federal and state databases.

TRACEY's review of the Detail Map indicates the Property is not identified as a disposal site, although there are more than 200 data records, or sites, within the limited area of review. The EDR Detail Map is included as Figure No. 3, which highlights the frequency to near saturation of data points near the Property, with nearly all of them at a higher elevation (and potentially upgradient) than the Property. In addition to the sites, the map indicates locations of sensitive receptors (schools, healthcare), which are densely located north of the west end of the Property, across the Mystic River. In general, the majority of the identified sites are south of the river, with the greatest number of sites and sensitive receptors located in Segment A, between Craddock Bridge and I-93. The number of sites and receptors decrease significantly on the north side of the river; in Segment B (I-93 to the Culvert Crossing); and, Segment C (the Culvert Crossing to Route 16), as depicted on the Site Plan, Figure No. 2.

Orphan sites generally represent spills that occur where a specific address is not readily available or required information is missing. TRACEY reviewed the 51 orphan sites, including the specific details that were available through the active data base links provided by EDR. Some of the spills were located on the Mystic River, including a 48' vessel sinking at the Riverside Yacht Club on the north side of the Mystic in 2008, a release of hydraulic oil in 2015, as well as a permit for the ongoing "Mystic Crossing" project established in August 2017. Several roadway spills were also noted within the orphan list; none are expected to impact the Property.

Despite the high frequency of nearby spills and sites indicated by the EDR database search, the spill locations and industrial businesses identified are not expected to significantly impact the Property and the anticipated shallow earthwork for the proposed pathway. The spills reviewed by TRACEY were generally remediated to a permanent solution or limited to the point where they were no longer causing new impacts to the environment. Further, the history and location of the Property identify very few upgradient areas that represent potential sources of concern for the Property.

More than two-thirds of the Property was created during the 1960s as part of the Route I-93 construction. The 1962 aerial photograph depicts the project in progress, which included filling the meandering Mystic River, resulting in a narrow, controlled river, as it is today. Soils were imported to build the land for highway foundations, as well as the auxiliary road systems. Therefore, none of Medford's industrial history, which started in the 17th Century, took place on the Property. In addition to creating the Property, the newly constructed road system provided a barrier to isolate the Property and minimize the risk of contamination during the past five decades.

Furthermore, the Amelia Earhart Dam constructed downstream of the Property in 1966, controls potential flooding from severe storms, to maintain a relative steady flow of the Mystic River. Between the development of Route I-93 and the downstream dam, the once brackish, meandering Mystic River was transformed into a narrow, straighter, freshwater basin with a stable elevation and controllable flow. So, any potential OHM carried by the river during severe storms and expected flooding, would not overflow the banks and impact the Property.

SUMMARY OF DATABASES SEARCHED AND RESULTS

Database	Search Radius	Target Property	0 – 1/8 mile	1/8 – 1/4 mile
NPL	1/4 mile	No	0	0
Delisted NPL	1/4 mile	No	0	0
CERCLIS	1/4 mile	No	0	0
NFRAP	1/4 mile	No	1	0
RCRA COR ACT	1/4 mile	No	0	0
RCRA Non Gen	1/4 mile	No	6	13
RCRA-CESQ	1/4 mile	No	4	8
RCRA L/S GEN	1/4 mile	No	2	3
Federal Brownfield	1/4 mile	No	0	0
Federal IC/EC	1/4 mile	No	0	0
ERNS	1/4 mile	No	2	7
FINDS	1/4 mile	No	24	52
State/Tribal SHWS	1/4 mile	No	30	26
HW GEN	1/4 mile	No	11	30
State/Tribal SWL	1/4 mile	No	0	0
State/Tribal LUST/LAST	1/4 mile	No	6	19
State/Tribal UST/AST	1/4 mile	No	10	17
State/Tribal EC/IC	1/4 mile	No	5	8
EDR Hist Auto Stat	1/4 mile	No	3	-
EDR Hist Cleaner	1/4 mile	No	3	-
State/Tribal Brownfields	1/4 mile	No	0	0
Orphan (51)	NA	No	-	-

NOTES:

1. NPL = National Priority List.
2. FINDS = Facility Index System of EPA Regulated or Monitored Facilities
3. CERCLIS = Comprehensive Environmental Response Compensation and Liability (Act) Information System.
4. NFRAP = No Further Remedial Action Planned.
5. RCRA COR ACT = Resource Conservation and Recovery Act Corrective Action Facilities.
6. RCRA-CESQ = Conditionally Exempt Small Quantity Generators.
7. RCRA L/S GEN = Resource Conservation and Recovery Act Large or Small Quantity Generator.
8. EC = Engineering Controls; IC = Institutional Controls.
9. HW GEN = Hazardous Waste Generator.
10. SHWS = State Hazardous Waste Site.
11. VCP = Voluntary Cleanup Program.
12. LUST/LAST = Leaking Underground/Aboveground Storage Tank.
13. EDR Hist Auto Stat = Historic Records indicate Automobile Stations Present.
14. Orphans = Non-Geocoded, Unknown Location.
15. NR = Not Researched; NA = Not Available.
16. * = EDR Report does not agree with other historical evidence and records.

4.2 FEDERAL DATABASES

The EDR database search identified a significant number of listings in the federal databases within the search radius, which was limited by TRACEY to extend ¼ mile from the Property. A summary of the EDR database listings are presented in the previous table, as well as in Sections 4.2.1 through 4.2.10.

4.2.1 National Priority List (NPL) Sites: Final, Proposed, or Delisted

NPL Sites are the United States Environmental Protection Agency's (USEPA's) list of Superfund sites subject to the Comprehensive Environmental Response Compensation and Liability Act (CERCLA). NPL sites are classified as final, proposed, or delisted. The EDR database search did not identify any Sites within ¼ mile of the Property.

4.2.2 Facility Index System Regulated or Monitored Facilities Sites

The EDR database search did not identify the Property as a FINDS site, yet 76 locations were identified within ¼ mile of the Property.

4.2.3 CERCLIS

CERCLIS is the USEPA's list of potential Superfund sites currently or previously investigated for release or threatened release of hazardous waste materials. The EDR database search did not identify any CERCLIS listings within ¼ mile of the Property.

4.2.4 No Further Remedial Action Planned

US EPA's NFRAP list identifies potential Superfund sites currently or previously investigated for release or threatened release of hazardous waste materials and where there further actions are not planned. The EDR database search identified one NFRAP sites within ¼ mile of the Property.

4.2.5 Resource Conservation and Recovery Act Corrective Action Facilities

The USEPA's list of registered generators of hazardous waste that are subject to the Corrective Action requirements of RCRA for the investigation and remediation of releases of hazardous waste or where Corrective Action has been imposed by the USEPA for non-compliance with RCRA laws and guidelines. The EDR database search did not identify any RCRA COR ACT facilities at or within ¼ mile of the Property.

4.2.6 RCRA Treatment, Storage, or Disposal Facilities

The USEPA's list of registered generators of hazardous waste is classified as TSD facilities. These locations and their operators are permitted to treat and/or dispose of hazardous wastes and/or to store large quantities (permit-dependent) of hazardous waste. The EDR database search did not identify RCRA TSD facilities within ¼ mile of the Property.

4.2.7 RCRA Generators

The USEPA's RCRA Generators list identifies registered generators of hazardous waste regardless of the quantity of hazardous material handled. The USEPA subdivides these generators as large quantity generators (LQG), small quantity generators (SQG), conditionally exempt (CESQG), and very small quantity generators (VSQG). The EDR database search identified 17 RCRA Generators within ¼ mile of the Property.

4.2.8 RCRA NonGenerators

The USEPA's RCRA NonGenerators list identifies registered handlers of hazardous waste that do not generate RCRA waste. The EDR database search identified nineteen RCRA Non Gen within ¼ mile of the Property.

4.2.9 Federal Institutional Controls and Engineering Controls/Brownfield

The USEPA's list of Federal ICs (e.g., deed restriction, activity and use limitation, etc.) and ECs (e.g., landfill cap, etc.) are included in a database used to collect, track, and update information pertaining to the USEPA Brownfields Grant Program. The Brownfields Management System
May 22, 2018

(BMS) provides assessment, cleanup and redevelopment information as it relates to areas served/jurisdictions, grants, and property. The EDR database search did not identify any properties subject to Federal IC/ECs or Brownfields within ¼ mile of the Property.

4.2.10 Emergency Response Notification System (ERNS)

ERNS records and stores information on reported releases of oil and hazardous substances. The Property is not listed under this system; there were nine releases within ¼ mile of the Property.

4.3 STATE RECORDS

4.3.1 State Hazardous Waste Site (SHWS)

According to the database record, the Property is not listed in the EDR database 56 sites are listed within ¼ mile of the Property. None of the sites reviewed are expected to impact the Property, due to the creation of the Property during the 1960's, the type of contaminant released into the environment, or the remediation activities conducted as a response measure.

4.3.2 Solid Waste Landfills

The Solid Waste Landfill (SWL) database includes a list of state-permitted active SWLs. Inactive landfills may also be included if the information was available to EDR and may or may not be mapped. Native American tribal designated landfills for tribal reservations located in the state may also be included, if available. The EDR database search did not identify any SWLs within ¼ mile of the Property.

4.3.3 Leaking USTs (LUSTs) and Leaking ASTs (LASTs)

The LUST and LAST databases are a state's lists of USTs and ASTs that have been reported as leaking. The Commonwealth of Massachusetts does not maintain a separate leaking UST or AST database; records of leaking USTs and ASTs are included in the state sites or spills listings. Native American tribal designated leaking USTs for tribal reservations located in the state may be included, if available. The EDR database search identified 25 LUSTs/LASTs within ¼ mile from the Property.

4.3.4 State USTs and ASTs

The State USTs and ASTs database includes a list of state-registered USTs, and ASTs if the AST data is included as a part of the UST database. Native American tribal designated USTs for tribal reservations located in the state are also included, if available. The EDR database search identified 27 USTs or ASTs within ¼ mile of the Property.

4.3.5 Tier 2

The Property is not listed as a Tier 2 site.

4.3.6 State Brownfields

The State Brownfields list is a database of state designated Brownfield sites if the state maintains a Brownfield program and if a database available. Included, if available, are Native American tribal designated Brownfield sites for tribal reservations located in the state. The EDR database search did not identify any Brownfields located within ¼ mile of the Property.

4.3.7 State Dry Cleaners

The State Dry Cleaners list is a database of state designated Dry Cleaners sites if a database is available. No Dry Cleaners were identified within ¼ mile of the Property.

4.3.8 EDR Historic Auto Stations

EDR reviewed various sources to develop an opinion whether the Property may have once operated as a gasoline or filling station. The EDR database search identified three Historic Auto Stations located within ¼ mile of the Property.

4.4 Non-Geocoded or Orphaned Properties

The “Sites Summary Report” section of the EDR Report includes sites that could not be properly located because of inadequate information provided by the reporting agency. Fifty-one locations are listed as non-geocoded/orphaned sites by the EDR Report. Many of the orphaned sites reference the Mystic River, I-93, and roads near the Property (Mystic Ave, Mystic River Parkway, Main Street, Riverside Ave, Clipper Ship Drive), however, as discussed in Section 4.1, none of the orphaned sites are expected to significantly impact the Property.

5.0 PROPERTY RECONNAISSANCE

5.1 INTRODUCTION

TRACEY personnel conducted reconnaissance activities at the Property in April and May, 2018. This work consisted of a site reconnaissance, taking photographs of the undeveloped Property, and observing the abutting properties. Appendix F contains photographs of the Property.

5.2 OBSERVATIONS

- The Property is approximately a one mile strip of land on the southern bank of the Mystic River. The northwest point of the Property starts at Craddock Bridge and Main Street, adjacent to the Route 16 off ramp, and heads eastward to I-93. The Property continues underneath the I-93, and then between the Mystic Valley Parkway and the river, until it terminates at an existing path, near Route 16, where Route 16 crosses the Mystic River.
- The northern section of the Property is occupied by an active construction site as part of the redevelopment of Craddock Bridge, Main Street, where it crosses over the Mystic River. South of the construction area, the Property is steeply sloping and densely vegetated. A boom is placed on the river at the bridge, to collect oils that may be spilled during the construction, as shown in the photographs in Appendix F.
- South of the Route 16 off ramp, the Property is more accessible, less overgrown, with a wider section of land between the river bank and Route 16, which crosses over I-93. The Property continues underneath Route I-93, then crosses over a wide, open section of land south of the Mystic River, as depicted in the site photographs.
- The Riverside Yacht Club is opposite the Property east of the I-93 Underpass, including a long dock system that follows the path of the river. One of the releases reviewed in the EDR database was a 48' boat that was sinking in 2008. Opposite the yacht club, on the Property, is a small encampment; it is unknown if the area is regularly occupied, although a small shelter covering stacked firewood was noted along the slope north of Route 16.

- Minor debris including televisions, cans, and trash were observed along the Property. Several storm drains were noted emptying from the adjacent roadways onto the Property. A large concrete and metal culvert exists at the Segment B to Segment C section of the Property.
- The elevation of the Property is within a few feet of the river at the east end, while it is several feet higher than the river at the west end by Craddock Bridge.

5.3 OTHER OBSERVATIONS

5.3.1 Stressed Vegetation

TRACEY did not identify evidence areas of stressed vegetation.

5.3.2 Solid Waste and Trash Disposal

TRACEY observed a few areas of the Property with minor amounts of solid waste, debris or trash.

5.3.3 Pits, Ponds, or Lagoons

TRACEY did not observe pits, ponds, or lagoons on the Property.

5.3.4 Hazardous Substances and Petroleum Products

TRACEY did not observe hazardous substances or petroleum products on the Property.

5.3.5 Storage Tanks

No storage tanks were observed on the Property.

5.3.6 Odors

No strong, pungent, chemical, or noxious odors potentially attributable to releases of OHM were noted during the Property reconnaissance activities.

5.3.7 Pools of Liquid

Pools of liquid potentially attributable to releases of OHM were not observed at the Property.

5.3.8 Drums

No drums were noted during TRACEY's reconnaissance activities in April and May, 2018.

5.3.9 Unidentified Substance Containers

TRACEY did not observe evidence of open or damaged containers of unidentified substances during the reconnaissance activities in April and May, 2018.

5.3.10 Stained Soil or Pavement

TRACEY did not observe evidence of stained soil or pavement on the Property.

5.3.11 Monitoring Wells

TRACEY did not observe monitoring wells on the Property.

5.3.12 Waste Water

No waste water generating operations were noted at the facility.

5.3.13 Septic Systems

No septic systems are known to exist on the Property.

5.3.14 PCBs

TRACEY did not observe sources of oil that may contain PCBs during the April, 2018 Property reconnaissance.

5.3.15 Interviews With Past Owners

TRACEY did not interview past owners.

6.0 SUMMARY OF FINDINGS

6.1 OVERVIEW

TRACEY completed a Phase I ESA for Nitsch at the Property located on the south bank of the Mystic River, between Craddock Bridge and Wellington Bridge at Route 16, shown on the Medford Assessors in Medford, Massachusetts. The Property is developed as a riverbank, generally without structures, except for the Route I-93 Overpass. Medford Assessors records indicate the Property is owned by the Commonwealth of Massachusetts and controlled by the Department of Conservation & Recreation (DCR). The Property is located on portions of several Medford Assessors maps that are found in Appendix B. The parcel is considered Open Space.

6.2 VAPOR MIGRATION

The documented releases within ¼ mile of the Property are not expected to create a condition of vapor migration at the Property. Based on the distances to the Property and the types of releases, and the response actions completed, TRACEY does not anticipate potential indoor air quality impacts via vapor intrusion pathways. There are no buildings on the Property.

6.3 SUMMARY OF FINDINGS

TRACEY conducted reconnaissance activities at the Property, reviewed files maintained by the City of Medford municipal offices, reviewed historical information, and reviewed on-line databases to evaluate environmental conditions at the Property.

The following summarizes findings of the Phase I ESA activities:

- No releases or response actions are connected to the Property according to state records at MassDEP and no additional research is recommended by TRACEY.

6.4 RECOGNIZED ENVIRONMENTAL CONDITIONS

Based upon the tasks conducted for this Phase I ESA, TRACEY did not identify any recognized environmental conditions (RECs) for the Property.

7.0 REFERENCES

City of Medford website (www.medfordma.org);

EDR Environmental Report dated April 6, 2018;

Massachusetts Environmental Trust website (www.mass.gov/massachusetts-environmental-trust);

MassGIS website (<http://www.mass.gov/mgis/mapping.htm>);

Municipal or regional offices visited/phoned/or researched on-line during the file review in April and May 2018 include:

- City of Medford, Assessors Department;
- City of Medford, City Clerk's Office;
- City of Medford, Department of Health;
- City of Medford, Energy & Environment Department;
- City of Medford, Fire Prevention Department;
- City of Medford, Historical Society & Museum;
- City of Medford, Water & Sewer Division of the DPW;
- City of Medford, Zoning Map;

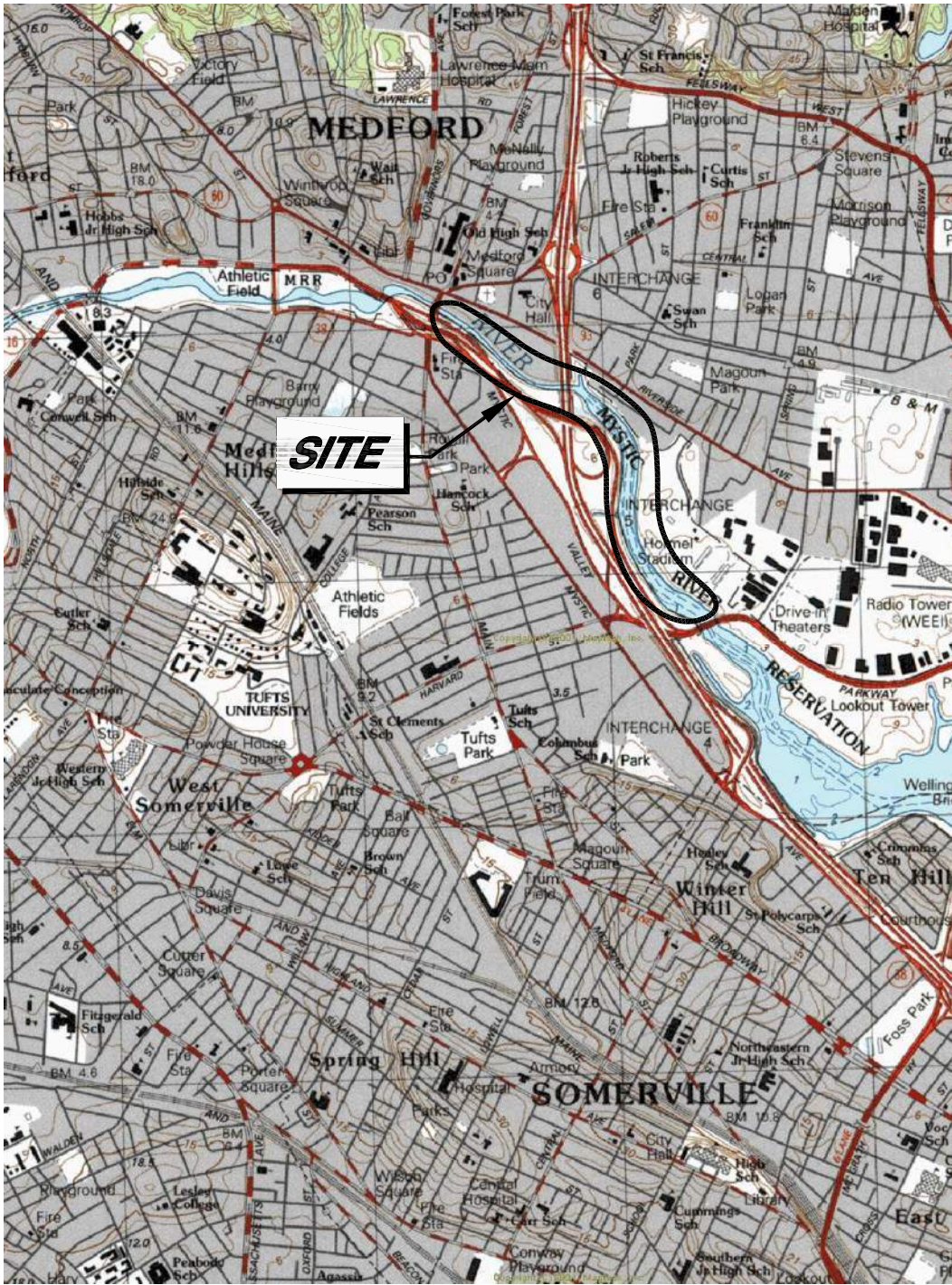
- Massachusetts Department of Conservation & Recreation (DCR)
 - Operations
 - Planning & Engineering

- Massachusetts Department of Transportation (DOT)
 - Environmental Services
 - Plans & Records
 - Stormwater Program

The Metropolitan Area Planning Council (MAPC) website (www.mapc.org/river-routes); and,

The Mystic River Watershed Association (MyRWA) website (www.mysticriver.org).

FIGURES



TRACEY
 Environmental
 Consulting LLC
 29 Cushing Avenue
 Hingham, MA 02043
 781 726 2519

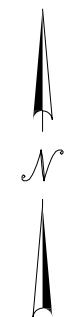
REV No.	DATE	INT.	- DESCRIPTION -

DRAWN BY: JJP REVIEWED BY: JIM
 DATE: 5/27/2018 JOB No. 18-081

SOUTH MEDFORD CONNECTOR ALONG THE MYSTIC RIVER
MEDFORD, MA
LOCUS PLAN
 SOURCE
 1885 USGS BOSTON NORTH, MA QUADRANGLE MAP
 (NOT TO SCALE)

FIGURE No. 1





NOTES:
 1. BASE MAP DEVELOPED FROM PLAN BY MASS GIS OLIVER.

TRACEY
 Environmental Consulting LLC
 29 Cushing Avenue
 Hingham, MA 02043
 781 726 2519

REV No.	DATE	INT.	- DESCRIPTION -

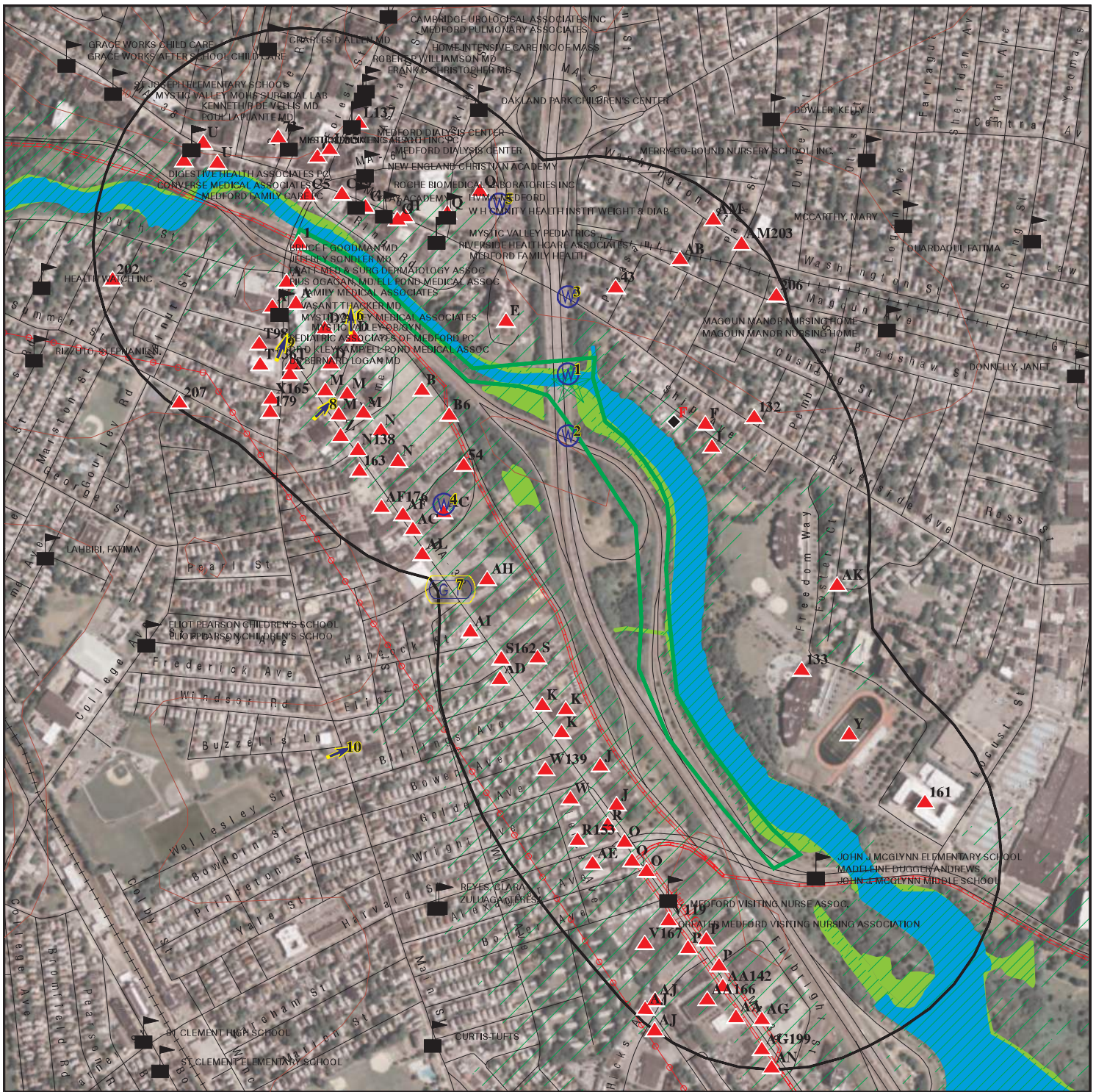
DRAWN BY: JJP REVIEWED BY: JIM
 DATE: 5/26/2018 SCALE: 1"=60' JOB No. 18-081
















SOUTH MEDFORD CONNECTOR ALONG THE MYSTIC RIVER
 MEDFORD, MA

SITE PLAN

FIGURE No.2

DETAIL MAP - 5249929.2S



-  Target Property
-  Sites at elevations higher than or equal to the target property
-  Sites at elevations lower than the target property
-  Manufactured Gas Plants
-  Sensitive Receptors
-  National Priority List Sites
-  Dept. Defense Sites
-  Indian Reservations BIA
-  Power transmission lines
-  Pipelines
-  100-year flood zone
-  500-year flood zone
-  National Wetland Inventory
-  State Wetlands
-  Areas of Critical Environmental Concern

This report includes Interactive Map Layers to display and/or hide map information. The legend includes only those icons for the default map view.

<p>SITE NAME: Mystic River Path Extension ADDRESS: Mystic River Path Extension Medford MA 02155 LAT/LONG: 42.414657 / 71.103597</p>	<p>CLIENT: Tracey Environmental CONTACT: Jim Murphy INQUIRY #: 5249929.2s DATE: April 06, 2018 1:03 pm</p>
FIGURE 3	

MassDEP - Bureau of Waste Site Cleanup

Phase 1 Site Assessment Map: 500 feet & 0.5 Mile Radii

Site Information:

**SOUTH MEDFORD PATH ALONG THE MISTIC RIVER
MEDFORD, MA**

NAD83 UTM Meters:

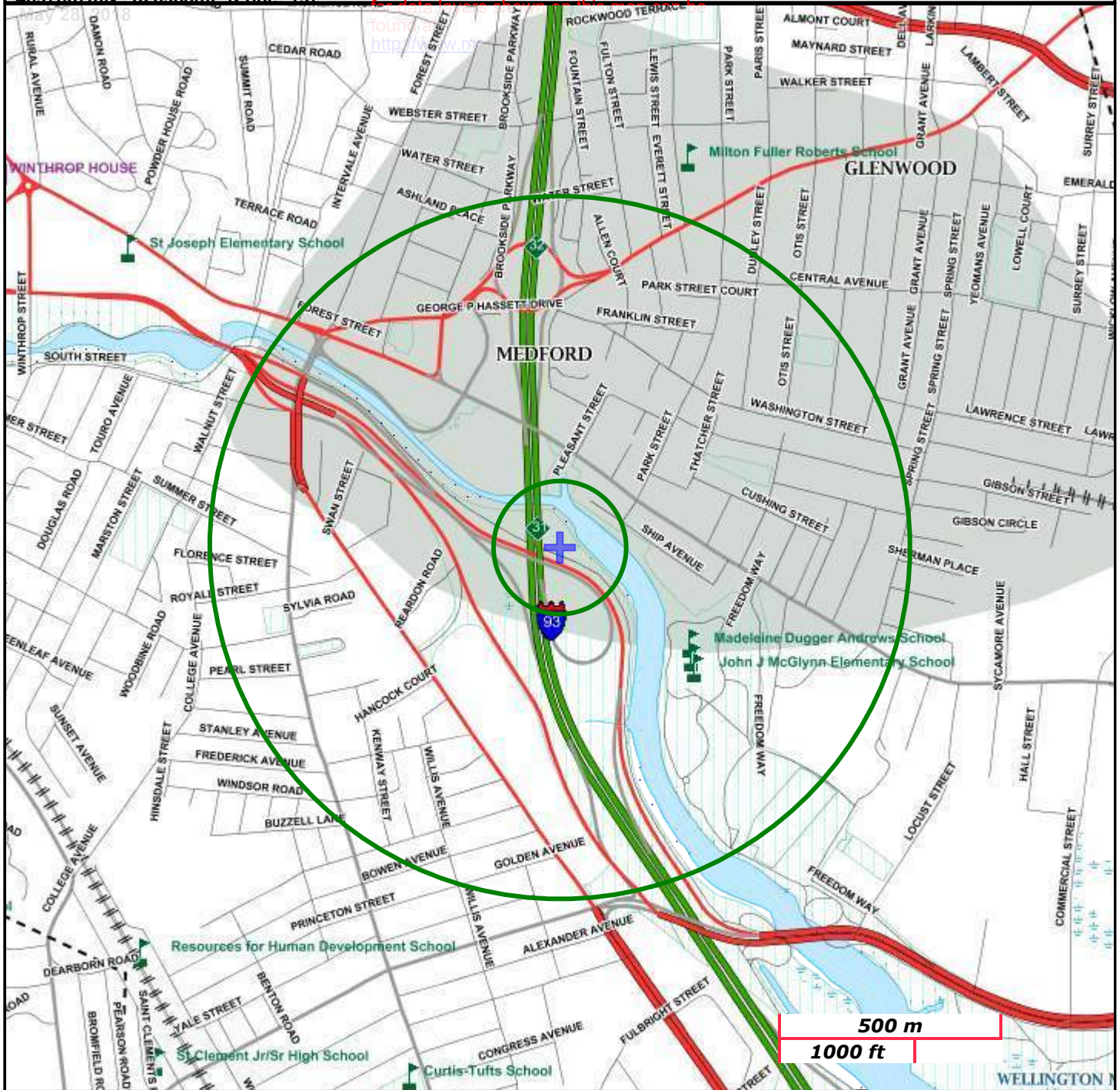
4697867mN 326953mE (Zone: 19)

The information shown is the best available at the date of printing. However, it may be incomplete. The responsible party and LSP are ultimately responsible for ascertaining the true conditions surrounding the site. Metadata



MassDEP

Commonwealth of Massachusetts
Department of Environmental Protection



Roads: Limited Access, Divided, Other Hwy, Major Road, Minor Road, Track, Trail	PWS Protection Areas: Zone II, IWPA, Zone A		
Boundaries: Town, County, DEP Region; Train; Powerline; Pipeline; Aqueduct	Hydrography: Open Water, PWS Reservoir, Tidal Flat		
Basins: Major, PWS; Streams: Perennial, Intermittent, Man Made Shore, Dam	Wetlands: Freshwater, Saltwater, Cranberry Bog		
Aquifers: Medium Yield, High Yield, EPA Sole Source	FEMA 100yr Floodplain; Protected Open Space; ACEC		
Non Potential Drinking Water Source Area: Medium, High (Yield)	Est. Rare Wetland Wildlife Hab; Vernal Pool: Cert., Potential		
	Solid Waste Landfill; PWS: Com. GW, SW, Emerg., Non-Com		

FIGURE 4

APPENDIX C
Conceptual Cost Estimate (VJ Associates)



ASSOCIATES

35 HIGHLAND CIRCLE, NEEDHAM, MASSACHUSETTS

CONCEPT ESTIMATE
SOUTH MEDFORD CONNECTOR PATH
MEDFORD, MA

Provided for: Nitsch Engineering

07/03/18



CONCEPT ESTIMATE
SOUTH MEDFORD CONNECTOR PATH
MEDFORD, MA

Provided for: Nitsch Engineering

BASIS OF ESTIMATE

The estimate is based on the Concept drawings and documents prepared by Nitsch Engineering, issued scope of work June 11, 2018.

Qualifications / Clarifications:

- 1 Labor costs included at local union rates.
- 2 All work shall occur during normal hours
- 3 The following mark ups are used:

Estimating Contingency	5.00%
General Conditions	8.00%
Escalation to Construction Mid-Point	10.41%
Construction start:	June-2020
Construction duration:	6 months
Construction mid-point:	September-2020
Construction end:	December-2020
- 4 The estimate assumes all long-lead items can be purchased to meet schedule requirements.
- 5 The estimate is based on the premise that the design will meet all codes, laws, ordinances, rules, & regulations in effect at the time that the estimate was prepared. The estimate shall be adjusted should any discrepancies between design and the aforementioned codes, laws or ordinances result in, or require, an increase in the cost of the work.

The estimate excludes the following:

- 1 A-E Fees
- 2 Overtime
- 3 Hazardous materials abatement
- 4 Working in contaminated soils
- 5 Builder's Risk Insurance
- 6 Third party commissioning costs
- 7 Work associated with the removal or remediation of contaminated soils, underpinning of existing foundations, unsuitable soil, unidentified underground obstructions or any other unsuitable materials including the haul in of replacement material.



CONCEPT ESTIMATE
SOUTH MEDFORD CONNECTOR PATH
MEDFORD, MA

Provided for: Nitsch Engineering

CSI SUMMARY

CSI CODE	DESCRIPTION	A2/A5	A2	A5	A0
310000	EARTHWORK	\$ -	\$ -	\$ -	\$ -
311000	Site Clearing	\$ 34,680	\$ 34,680	\$ 34,680	\$ 31,200
312000	Earth Moving	\$ 186,912	\$ 186,912	\$ 198,764	\$ 236,732
312319	Dewatering	\$ 80,000	\$ 80,000	\$ 80,000	\$ -
312500	Erosion & Sedimentation Controls	\$ 289,000	\$ 289,000	\$ 249,000	\$ 261,500
315000	Excavation Support & Protection	\$ 1,440,000	\$ 1,440,000	\$ 2,196,000	\$ 125,000
320000	EXTERIOR IMPROVEMENTS	\$ -	\$ -	\$ -	\$ -
320505	Selective Demolition for Ext. Improvements	\$ 86,700	\$ 86,700	\$ 86,700	\$ 84,710
321300	Rigid Paving	\$ 249,000	\$ 249,000	\$ 289,000	\$ 260,000
321400	Unit Paving	\$ -	\$ -	\$ -	\$ -
321500	Aggregate Surfacing	\$ 19,920	\$ 19,920	\$ 19,920	\$ 20,800
323300	Site Furnishings	\$ 2,463,000	\$ 3,371,700	\$ 2,351,000	\$ 269,500
329000	Planting	\$ 25,000	\$ 25,000	\$ 25,000	\$ 42,407
330000	UTILITIES	\$ -	\$ -	\$ -	\$ -
331000	Water Utilities	\$ -	\$ -	\$ -	\$ -
333000	Sanitary Sewerage Utilities	\$ -	\$ -	\$ -	\$ -
334000	Storm Drainage Utilities	\$ 143,865	\$ 143,865	\$ 143,865	\$ 143,865
335000	Fuel Distribution Utilities	\$ -	\$ -	\$ -	\$ -
337000	Electrical Utilities	\$ 12,000	\$ 12,000	\$ 12,000	\$ 12,000
TOTAL TRADE COSTS BUILDING & SITE		\$ 5,030,077	\$ 5,938,777	\$ 5,685,929	\$ 1,487,714
MARKUPS					
10.00%	Design Contingency	\$ 503,008	\$ 593,878	\$ 568,593	\$ 148,771
5.00%	Estimating Contingency	\$ 251,504	\$ 296,939	\$ 284,296	\$ 74,386
8.00%	General Conditions	\$ 462,767	\$ 546,367	\$ 523,105	\$ 136,870
6.00%	General Requirements	\$ 374,841	\$ 442,558	\$ 423,715	\$ 110,864
3.50%	Insurance & Bonds	\$ 231,777	\$ 273,648	\$ 261,997	\$ 68,551
1.00%	Building/Site Permit	\$ 68,540	\$ 80,922	\$ 77,476	\$ 20,272
4.00%	Contractor's (CM/GC) Fee	\$ 276,901	\$ 326,924	\$ 313,005	\$ 81,897
SUBTOTAL BEFORE CONTINGENCIES		\$ 7,199,414	\$ 8,500,012	\$ 8,138,117	\$ 2,129,325
CONTINGENCIES					
5.00%	Construction Contingency	\$ 359,971	\$ 425,001	\$ 406,906	\$ 106,466
10.41%	Escalation to Construction Mid-Point	\$ 786,994	\$ 929,167	\$ 889,607	\$ 232,764
TOTAL ECC WITH CONTINGENCIES		\$ 8,346,379	\$ 9,854,180	\$ 9,434,631	\$ 2,468,556
ALTERNATES					
ALT 1	Alignment 1 Location B - Culvert Outfall - Option B3	\$ 309,458	\$ -	\$ -	\$ -
ALT 2	Alignment 1 Location B - Culvert Outfall - Option B2	\$ 134,187	\$ -	\$ -	\$ -
ALT 3	Lighting Along Path	\$ 776,218	\$ -	\$ -	\$ -
ALT 4	Provide User Amenities	\$ 26,383	\$ -	\$ -	\$ -
ALT 5	Provide CIP concrete retaining wall ILO of precast block wall @ River Side Alignment 3	\$ 557,523	\$ -	\$ -	\$ -

ALTERNATIVE DESCRIPTIONS:

A0 – Ramp Closed, Path on Ramp

A2 – Ramp Open, Path Elevated on Piles

A5 – Ramp Open, Path Elevated with Mid-Height Retaining Walls Along Rt. 16

A2/A5 – Ramp Open, Path Elevated on Piles and Low Retaining Wall Along Rt. 16



CONCEPT ESTIMATE
SOUTH MEDFORD CONNECTOR PATH
MEDFORD, MA

Provided for: Nitsch Engineering

ALTERNATIVE A2/A5
Ramp Open, Path Elevated on Piles and Low Retaining Wall
Along Rt. 16

LINE	CODE	DESCRIPTION	QTY	UNIT	RATE	ASSEMBLY COST
001	310000	EARTH WORK				
002	311000	Site Clearing				
003		Misc. site clearing as required, allowance	5,780	LF	\$ 6.00	\$ 34,680
004					SUBTOTAL	\$ 34,680
005	312000	Earth Moving				
006		Excavation & backfill as required, structured path	800	LF	\$ 144.00	\$ 115,200
007		Excavation & backfill as required, grade	4,980	LF	\$ 14.40	\$ 71,712
008					SUBTOTAL	\$ 186,912
009	312319	Dewatering				
010		Dewatering as required @ structured path, allowance	800	LF	\$ 100.00	\$ 80,000
011					SUBTOTAL	\$ 80,000
012	312500	Erosion & Sedimentation Controls				
013		Erosion controls as required @ structured path, allowance	800	LF	\$ 50.00	\$ 40,000
014		Erosion controls as required @ grade, allowance	4,980	LF	\$ 50.00	\$ 249,000
015					SUBTOTAL	\$ 289,000
016	315000	Excavation Support & Protection				
017		Sheet Pile for Support of Excavation, 30'H Allowance	800	LF	\$ 1,800.00	\$ 1,440,000
018					SUBTOTAL	\$ 1,440,000
019	320000	EXTERIOR IMPROVEMENTS				
020	320505	Selective Demolition for Ext. Improvements				
021		Misc. site demo / hardscape as required, allowance	5,780	LF	\$ 15.00	\$ 86,700
022					SUBTOTAL	\$ 86,700
023	321300	Rigid Paving				
024		Bituminous concrete pavement path on grade, 10'W (not on structure)	4,980	LF	\$ 50.00	\$ 249,000
025					SUBTOTAL	\$ 249,000
026	321500	Aggregate Surfacing				
027		Aggregate shoulder, 1'W both sides	4,980	LF	\$ 4.00	\$ 19,920
028					SUBTOTAL	\$ 19,920
029	323300	Site Furnishings				
030		Railing, pressure treated post & rail wooden railing @ Path on Grade	1,000	LF	\$ 50.00	\$ 50,000
031		Location A - Structure @ Route 16 Exit Ramp	800	LF		
032		Precast concrete panel, 11' - 3"W (non slip surface path on structure)	800	LF	\$ 1,500.00	\$ 1,200,000
033		Retaining wall, 4'H, southern side	800	LF	\$ 340.00	\$ 272,000
034		Grade beam, southern side, 4'-6"W x 1'-0"D	800	LF	\$ 270.00	\$ 216,000
035		Helical piles, river side (assume 10' O.C., assume 65' D requirement)	800	LF	\$ 700.00	\$ 560,000
036		Wire/mesh with PT wooden top rail & kick guard	800	LF	\$ 175.00	\$ 140,000
037		Removal & resetting DCR light posts, electric & guard rail barrier	5	EA	\$ 5,000.00	\$ 25,000
038					SUBTOTAL	\$ 2,463,000
039	329000	Planting				
040		4" B&B Trees	20	EA	\$ 1,250.00	\$ 25,000
041					SUBTOTAL	\$ 25,000



CONCEPT ESTIMATE
 SOUTH MEDFORD CONNECTOR PATH
 MEDFORD, MA

Provided for: Nitsch Engineering

ALTERNATIVE A2/A5
 Ramp Open, Path Elevated on Piles and Low Retaining Wall
 Along Rt. 16

LINE	CODE	DESCRIPTION	QTY	UNIT	RATE	ASSEMBLY COST
042	330000	UTILITIES				
043	331000	Water Utilities				
044		No work in this section				
045						SUBTOTAL
						\$ -
046	333000	Sanitary Sewerage Utilities				
047		No work in this section				
048						SUBTOTAL
						\$ -
049	334000	Storm Drainage Utilities				
050		Modify existing stormwater outfalls	9	EA		
051		Extend 12" CPP Piping 20'	9	EA	\$ 3,200.00	\$ 28,800
052		(1) Nyloplast drainage structure	9	EA	\$ 6,000.00	\$ 54,000
053		Excavation	9	EA	\$ 5,340.00	\$ 48,060
054		10 CY of clean aggregate fill	9	EA	\$ 1,000.00	\$ 9,000
055		Rip rap pool on outfall side for each	9	EA	\$ 445.00	\$ 4,005
056						SUBTOTAL
						\$ 143,865
057	335000	Fuel Distribution Utilities				
058		No work in this section				
059						SUBTOTAL
						\$ -
060	337000	Electrical Utilities				
061		Lighting under bridge underpasses	2	LOC	\$ 6,000.00	\$ 12,000
062						SUBTOTAL
						\$ 12,000
063						
064						
TOTAL TRADE COSTS						\$ 5,030,077



CONCEPT ESTIMATE
SOUTH MEDFORD CONNECTOR PATH
MEDFORD, MA

Provided for: Nitsch Engineering

ALTERNATIVE A2
Ramp Open, Path Elevated on Piles

LINE	CODE	DESCRIPTION	QTY	UNIT	RATE	ASSEMBLY COST
001	310000	EARTH WORK				
002	311000	Site Clearing				
003		Misc. site clearing as required	5,780	LF	\$ 6.00	\$ 34,680
004					SUBTOTAL	\$ 34,680
005	312000	Earth Moving				
006		Excavation & backfill as required, structured path	800	LF	\$ 144.00	\$ 115,200
007		Excavation & backfill as required, grade	4,980	LF	\$ 14.40	\$ 71,712
008					SUBTOTAL	\$ 186,912
009	312319	Dewatering				
010		Dewatering as required @ structured path, allowance	1	LS	\$ 80,000.00	\$ 80,000
011					SUBTOTAL	\$ 80,000
012	312500	Erosion & Sedimentation Controls				
013		Erosion controls as required @ structured path, allowance	1	LS	\$ 40,000.00	\$ 40,000
014		Erosion controls as required @ grade, allowance	4,980	LF	\$ 50.00	\$ 249,000
015					SUBTOTAL	\$ 289,000
016	315000	Excavation Support & Protection				
017		Sheet Pile for Support of Excavation, 30'H Allowance	800	LF	\$ 1,800.00	\$ 1,440,000
018					SUBTOTAL	\$ 1,440,000
019	320000	EXTERIOR IMPROVEMENTS				
020	320505	Selective Demolition for Ext. Improvements				
021		Misc. site demo / hardscape as required, allowance	5,780	LF	\$ 15.00	\$ 86,700
022					SUBTOTAL	\$ 86,700
023	321300	Rigid Paving				
024		Bituminous concrete pavement path on grade, 10'W (not on structure)	4,980	LF	\$ 50.00	\$ 249,000
025					SUBTOTAL	\$ 249,000
026	321500	Aggregate Surfacing				
027		Aggregate shoulder, 1'W both sides	4,980	LF	\$ 4.00	\$ 19,920
028					SUBTOTAL	\$ 19,920
029	323300	Site Furnishings				
030		Railing, pressure treated post & rail wooden railing @ Path on Grade	1,000	LF	\$ 50.00	\$ 50,000
031		Location A - Structure @ Route 16 Exit Ramp	800	LF		
032		Precast concrete panel, 11' - 3"W (non slip surface path on structure)	800	LF	\$ 1,500.00	\$ 1,200,000
033		Retaining wall, 2'H, southern side	800	LF	\$ 120.00	\$ 96,000
034		Grade beam, southern side, 3'-0"W x 1'-0"D	800	LF	\$ 180.00	\$ 144,000
035		Concrete piers 12'W, river side (assume 10' O.C.)	800	LF	\$ 250.00	\$ 200,000
036		Pile Cap 6'-0" x 6'-0" x 1'-3"	800	LF	\$ 299.00	\$ 239,200
037		Helical piles, river side (assume 10' O.C., assume 2 pile per footing, assume 65' D requirement)	800	LF	\$ 1,400.00	\$ 1,120,000
038		Wire/mesh with PT wooden top rail & kick guard	800	LF	\$ 175.00	\$ 140,000
039		Removal & resetting DCR light posts, electric & guard rail barrier	5	EA	\$ 5,000.00	\$ 25,000
040		Vehicular barriers w/ fencing (Snow Fence)	900	LF	\$ 175.00	\$ 157,500
041					SUBTOTAL	\$ 3,371,700



CONCEPT ESTIMATE
 SOUTH MEDFORD CONNECTOR PATH
 MEDFORD, MA

July 3, 2018

Provided for: Nitsch Engineering

ALTERNATIVE A2
Ramp Open, Path Elevated on Piles

LINE	CODE	DESCRIPTION	QTY	UNIT	RATE	ASSEMBLY COST
042	329000	Planting				
043		4" B&B Trees	20	EA	\$ 1,250.00	\$ 25,000
044					SUBTOTAL	\$ 25,000
045	330000	UTILITIES				
046	331000	Water Utilities				
047		No work in this section				
048					SUBTOTAL	\$ -
049	333000	Sanitary Sewerage Utilities				
050		No work in this section				
051					SUBTOTAL	\$ -
052	334000	Storm Drainage Utilities				
053		Modify existing stormwater outfalls	9	EA		
054		Extend 12" CPP Piping 20'	9	EA	\$ 3,200.00	\$ 28,800
055		(1) Nyloplast drainage structure	9	EA	\$ 6,000.00	\$ 54,000
056		Excavation	9	EA	\$ 5,340.00	\$ 48,060
057		10 CY of clean aggregate fill	9	EA	\$ 1,000.00	\$ 9,000
058		Rip rap pool on outfall side for each	9	EA	\$ 445.00	\$ 4,005
059					SUBTOTAL	\$ 143,865
060	335000	Fuel Distribution Utilities				
061		No work in this section				
062					SUBTOTAL	\$ -
063	337000	Electrical Utilities				
064		Lighting under bridge underpasses	2	LOC	\$ 6,000.00	\$ 12,000
065					SUBTOTAL	\$ 12,000
066						
067						
TOTAL TRADE COSTS						\$ 5,938,777



CONCEPT ESTIMATE
SOUTH MEDFORD CONNECTOR PATH
MEDFORD, MA

Provided for: Nitsch Engineering

ALTERNATIVE A5
Ramp Open, Path Elevated with Mid-Height
Retaining Walls Along Rt. 16

LINE	CODE	DESCRIPTION	QTY	UNIT	RATE	ASSEMBLY COST
001	310000	EARTH WORK				
002	311000	Site Clearing				
003		Misc. site clearing as required	5,780	LF	\$ 6.00	\$ 34,680
004					SUBTOTAL	\$ 34,680
005	312000	Earth Moving				
006		Excavation & backfill as required, structured path	800	LF	\$ 144.00	\$ 115,200
007		Excavation & backfill as required, grade	4,980	LF	\$ 14.40	\$ 71,712
008		Structural fill beneath path	1,600	CF	\$ 7.41	\$ 11,852
009					SUBTOTAL	\$ 198,764
010	312319	Dewatering				
011		Dewatering as required @ structured path, allowance	1	LS	\$ 80,000.00	\$ 80,000
012					SUBTOTAL	\$ 80,000
013	312500	Erosion & Sedimentation Controls				
014		Erosion controls as required @ grade, allowance	4,980	LF	\$ 50.00	\$ 249,000
015					SUBTOTAL	\$ 249,000
016	315000	Excavation Support & Protection				
017		Sheet Pile for Support of Excavation, 30'H Allowance	800	LF	\$ 1,800.00	\$ 1,440,000
018		Cofferdam required @ Retaining wall, river side	840	LF	\$ 900.00	\$ 756,000
019					SUBTOTAL	\$ 2,196,000
020	320000	EXTERIOR IMPROVEMENTS				
021	320505	Selective Demolition for Ext. Improvements				
022		Misc. site demo / hardscape as required, allowance	5,780	LF	\$ 15.00	\$ 86,700
023					SUBTOTAL	\$ 86,700
024	321300	Rigid Paving				
025		Bituminous concrete pavement path on grade, 10'W (not on structure)	4,980	LF	\$ 50.00	\$ 249,000
026		Location A - Structure @ Route 16 Exit Ramp	800	LF		
027		Bituminous concrete path	800	LF	\$ 50.00	\$ 40,000
028					SUBTOTAL	\$ 289,000
029	321500	Aggregate Surfacing				
030		Aggregate shoulder, 1'W both sides	4,980	LF	\$ 4.00	\$ 19,920
031					SUBTOTAL	\$ 19,920
032	323300	Site Furnishings				
033		Railing, pressure treated post & rail wooden railing @ Path on Grade	1,000	LF	\$ 50.00	\$ 50,000
034		Location A - Structure @ Route 16 Exit Ramp	800	LF		
035		Retaining wall precast block 5'H, southern side	800	LF	\$ 430.00	\$ 344,000
036		Grade beam, southern side, 3'-0"W x 1'-0"D	800	LF	\$ 180.00	\$ 144,000
037		Retaining wall precast block 6'H, river side	800	LF	\$ 510.00	\$ 408,000
038		Grade beam, river side, 6'-0"W x 2'-0"D	800	LF	\$ 850.00	\$ 680,000
039		Helical piles, river side (assume 10' O.C., assume 65' D requirement)	800	LF	\$ 700.00	\$ 560,000
040		Wire/mesh with PT wooden top rail & kick guard	800	LF	\$ 175.00	\$ 140,000
041		Removal & resetting DCR light posts, electric & guard rail barrier	5	EA	\$ 5,000.00	\$ 25,000
042					SUBTOTAL	\$ 2,351,000
043	329000	Planting				
044		4" B&B Trees	20	EA	\$ 1,250.00	\$ 25,000
045					SUBTOTAL	\$ 25,000



CONCEPT ESTIMATE
 SOUTH MEDFORD CONNECTOR PATH
 MEDFORD, MA

Provided for: Nitsch Engineering

ALTERNATIVE A5
 Ramp Open, Path Elevated with Mid-Height
 Retaining Walls Along Rt. 16

LINE	CODE	DESCRIPTION	QTY	UNIT	RATE	ASSEMBLY COST
046	330000	UTILITIES				
047	331000	Water Utilities				
048		No work in this section				
049						SUBTOTAL
						\$ -
050	333000	Sanitary Sewerage Utilities				
051		No work in this section				
052						SUBTOTAL
						\$ -
053	334000	Storm Drainage Utilities				
054		Modify existing stormwater outfalls	9	EA		
055		Extend 12" CPP Piping 20'	9	EA	\$ 3,200.00	\$ 28,800
056		(1) Nyloplast drainage structure	9	EA	\$ 6,000.00	\$ 54,000
057		Excavation	9	EA	\$ 5,340.00	\$ 48,060
058		10 CY of clean aggregate fill	9	EA	\$ 1,000.00	\$ 9,000
059		Rip rap pool on outfall side for each	9	EA	\$ 445.00	\$ 4,005
060						SUBTOTAL
						\$ 143,865
061	335000	Fuel Distribution Utilities				
062		No work in this section				
063						SUBTOTAL
						\$ -
064	337000	Electrical Utilities				
065		Lighting under bridge underpasses	2	LOC	\$ 6,000.00	\$ 12,000
066						SUBTOTAL
						\$ 12,000
067						
068						
TOTAL TRADE COSTS						\$ 5,685,929



CONCEPT ESTIMATE
SOUTH MEDFORD CONNECTOR PATH
MEDFORD, MA

Provided for: Nitsch Engineering

ALTERNATIVE A0
Ramp Closed, Path on Ramp

LINE	CODE	DESCRIPTION	QTY	UNIT	RATE	ASSEMBLY COST
001	310000	EARTH WORK				
002	311000	Site Clearing				
003		Misc. site clearing as required, allowance	5,200	LF	\$ 6.00	\$ 31,200
004					SUBTOTAL	\$ 31,200
005	312000	Earth Moving				
006		Excavation & backfill as required, grade	4,980	LF	\$ 14.40	\$ 71,712
007		Excavation & backfill as required, path ramp	220	LF	\$ 14.40	\$ 3,168
008		Structural Fill @ Path Ramp	450	CY	\$ 200.00	\$ 90,000
009		Structural Fill @ Path Ramp Guard Rail Base	81	CY	\$ 200.00	\$ 16,296
010		Remove & reset stone slope stablization @ Path Ramp	185	CY	\$ 300.00	\$ 55,556
011					SUBTOTAL	\$ 236,732
012	312319	Dewatering				
013		No work in this section				
014					SUBTOTAL	\$ -
015	312500	Erosion & Sedimentation Controls				
016		Erosion controls as required @ path ramp allowance	250	LF	\$ 50.00	\$ 12,500
017		Erosion controls as required @ grade, allowance	4,980	LF	\$ 50.00	\$ 249,000
018					SUBTOTAL	\$ 261,500
019	315000	Excavation Support & Protection				
020		Earth Retention as required @ Path Ramp	250	LF	\$ 500.00	\$ 125,000
021					SUBTOTAL	\$ 125,000
022	320000	EXTERIOR IMPROVEMENTS				
023	320505	Selective Demolition for Ext. Improvements				
024		Demo existing metal guardrail @ Exit Ramp	850	LF	\$ 5.00	\$ 4,250
025		Demo existing asphalt @ Exit Ramp	20,000	SF	\$ 2.00	\$ 40,000
026		Misc. site demo / hardscape as required, allowance	5,780	LF	\$ 7.00	\$ 40,460
027					SUBTOTAL	\$ 84,710
028	321300	Rigid Paving				
029		Bituminous concrete pavement path on grade, 10'W (not on structure)	4,980	LF	\$ 50.00	\$ 249,000
030		Bituminous concrete pavement path on grade, 10'W @ Path Ramp	220	LF	\$ 50.00	\$ 11,000
031					SUBTOTAL	\$ 260,000
032	321500	Aggregate Surfacing				
033		Aggregate shoulder, 1'W both sides @ Alignment	4,980	LF	\$ 4.00	\$ 19,920
034		Aggregate shoulder, 1'W both sides @ Path Ramp	220	LF	\$ 4.00	\$ 880
035					SUBTOTAL	\$ 20,800
036	323300	Site Furnishings				
037		Railing, pressure treated post & rail wooden railing @ Path on Grade	1,000	LF	\$ 50.00	\$ 50,000
038		Path Ramp	800	LF		
039		Wire/mesh with PT wooden top rail & kick guard	200	LF	\$ 175.00	\$ 35,000
040		Removal & resetting DCR light posts, electric & guard rail barrier	5	EA	\$ 5,000.00	\$ 25,000
041		Exit Ramp	800	LF		
042		Thermo plastic 4" white paint	2,000	LF	\$ 1.00	\$ 2,000
043		Vehicular barriers w/ fencing (Snow Fence)	900	LF	\$ 175.00	\$ 157,500
044					SUBTOTAL	\$ 269,500



CONCEPT ESTIMATE
SOUTH MEDFORD CONNECTOR PATH
MEDFORD, MA

July 3, 2018

Provided for: Nitsch Engineering

ALTERNATIVE A0
Ramp Closed, Path on Ramp

LINE	CODE	DESCRIPTION	QTY	UNIT	RATE	ASSEMBLY COST
045	329000	Planting				
046		4" B&B Trees	20	EA	\$ 1,250.00	\$ 25,000
047		Exit Ramp	800	LF		
048		Loam for grassed area	370	CY	\$ 20.00	\$ 7,407
049		Grass Seed	20,000	SF	\$ 0.50	\$ 10,000
050					SUBTOTAL	\$ 42,407
051	330000	UTILITIES				
052	331000	Water Utilities				
053		No work in this section				
054					SUBTOTAL	\$ -
055	333000	Sanitary Sewerage Utilities				
056		No work in this section				
057					SUBTOTAL	\$ -
058	334000	Storm Drainage Utilities				
059		Modify existing stormwater outfalls	9	EA		
060		Extend 12" CPP Piping 20'	9	EA	\$ 3,200.00	\$ 28,800
061		(1) Nyloplast drainage structure	9	EA	\$ 6,000.00	\$ 54,000
062		Excavation	9	EA	\$ 5,340.00	\$ 48,060
063		10 CY of clean aggregate fill	9	EA	\$ 1,000.00	\$ 9,000
064		Rip rap pool on outfall side for each	9	EA	\$ 445.00	\$ 4,005
065					SUBTOTAL	\$ 143,865
066	335000	Fuel Distribution Utilities				
067		No work in this section				
068					SUBTOTAL	\$ -
069	337000	Electrical Utilities				
070		Lighting under bridge underpasses	2	LOC	\$ 6,000.00	\$ 12,000
071					SUBTOTAL	\$ 12,000
072						
073						
TOTAL TRADE COSTS						\$ 1,487,714



CONCEPT ESTIMATE
SOUTH MEDFORD CONNECTOR PATH
MEDFORD, MA

July 3, 2018

Provided for: Nitsch Engineering

ALTERNATES

ALT#	DESCRIPTION	QTY	UNIT	RATE	ASSEMBLY COST
ALT1	Alignment 1 Location B - Culvert Outfall - Option B3				
	Structured path over the outfall @ Location B	50	LF	\$ -	\$ -
	Bridge Structure, 12'W	50	LF	\$ 2,400.00	\$ 120,000
	PT boardwalk lumber decking	50	LF	\$ 180.00	\$ 9,000
	Helical piles, river side (assume 10' O.C., assume 65' D requirement)	50	LF	\$ 700.00	\$ 35,000
	Wire/mesh with PT wooden top rail, kick guard, handrail	100	LF	\$ 225.00	\$ 22,500
	SUBTOTAL			\$	186,500.00
	0.66 MARKUP			\$	122,958.43
	ADD TOTAL			\$	309,458.43
ALT2	Alignment 1 Location B - Culvert Outfall - Option B2				
	Path on top of existing culvert	30	LF	\$ -	\$ -
	Bituminous concrete path	30	LF	\$ 50.00	\$ 1,500
	Aggregate subbase	30	LF	\$ 24.00	\$ 720
	10' transition spans from terra-firma to culvert	2	EA	\$ -	\$ -
	Bridge Structure, 12'W (2) 10' Spans	20	LF	\$ 2,400.00	\$ 48,000
	Concrete Kneewall	20	LF	\$ 600.00	\$ 12,000
	PT boardwalk lumber decking	20	LF	\$ 180.00	\$ 3,600
	Wire/mesh with PT wooden top rail, & kick guard	50	LF	\$ 175.00	\$ 8,750
	Steel mesh grates, 9'-0" x 3'-6"	2	EA	\$ 3,150.00	\$ 6,300
	SUBTOTAL			\$	80,870.00
	0.66 MARKUP			\$	53,317.15
	ADD TOTAL			\$	134,187.15
ALT3	Lighting Along Path				
	Lighting, 12' Post & Light Fixture, 30' O.C.	134	EA	\$ 1,700.00	\$ 227,800
	Wiring & Conduit, with excavation & backfill	4000	LF	\$ 60.00	\$ 240,000
	SUBTOTAL			\$	467,800.00
	0.66 MARKUP			\$	308,417.97
	ADD TOTAL			\$	776,217.97
	*ADDED COST FOR ALL ALTERNATIVES				
ALT4	Provide User Amenities				
	Benches w/ footings	4	EA	\$ 2,500.00	\$ 10,000
	Bike racks, U Shaped w/ footings	6	EA	\$ 700.00	\$ 4,200
	Trash Receptacles	2	EA	\$ 650.00	\$ 1,300
	Wayfinding Signs	2	EA	\$ 200.00	\$ 400
	SUBTOTAL			\$	15,900.00
	0.66 MARKUP			\$	10,482.78
	ADD TOTAL			\$	26,382.78
	*ADDED COST FOR ALL ALTERNATIVES				
ALT5	Provide CIP concrete retaining wall ILO of precast block wall @ River Side Alignment 3				
	Delete Retaining wall precast block 5'H, southern side	(800)	LF	\$ 430.00	\$ (344,000)
	Add Cast in place concrete retaining wall, 6'H x 2'T	800	LF	\$ 850.00	\$ 680,000
	SUBTOTAL			\$	336,000.00
	0.66 MARKUP			\$	221,522.96
	ADD TOTAL			\$	557,522.96
	*ADDED COST FOR ALTERNATIVE A5 ONLY				

APPENDIX D
Stakeholder Meeting Presentations and Meeting Notes

MYSTIC GREENWAYS

SOUTH MEDFORD CONNECTOR

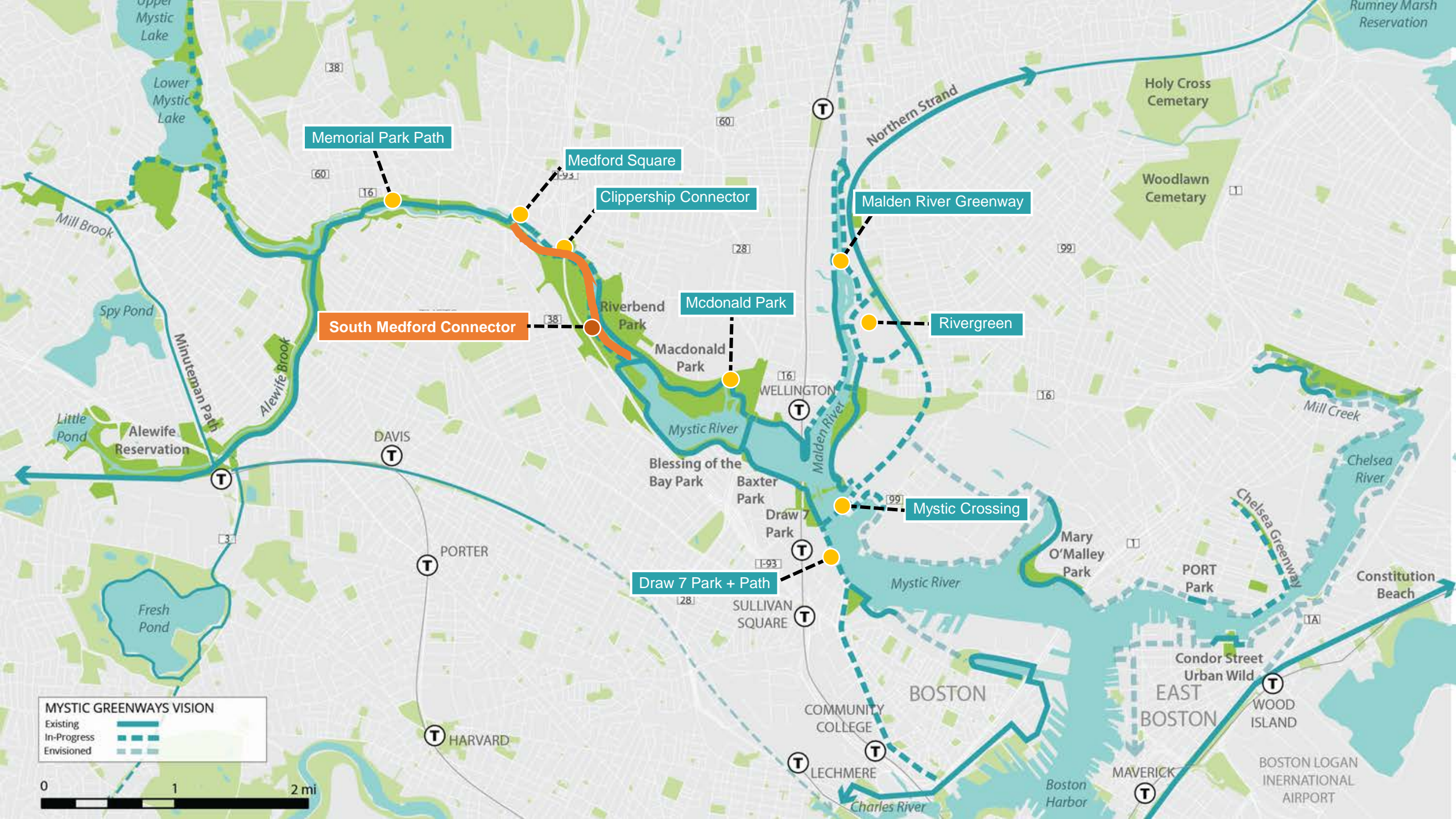
Kickoff Meeting
March 21, 2018
Stakeholder Meeting #1





Agenda

- Welcome & Introductions
- Mystic Greenways & South Medford Connector Project Overview
- Preliminary Schedule Discussion
- Existing Conditions
- Deliverables
- Key Considerations & Next Steps



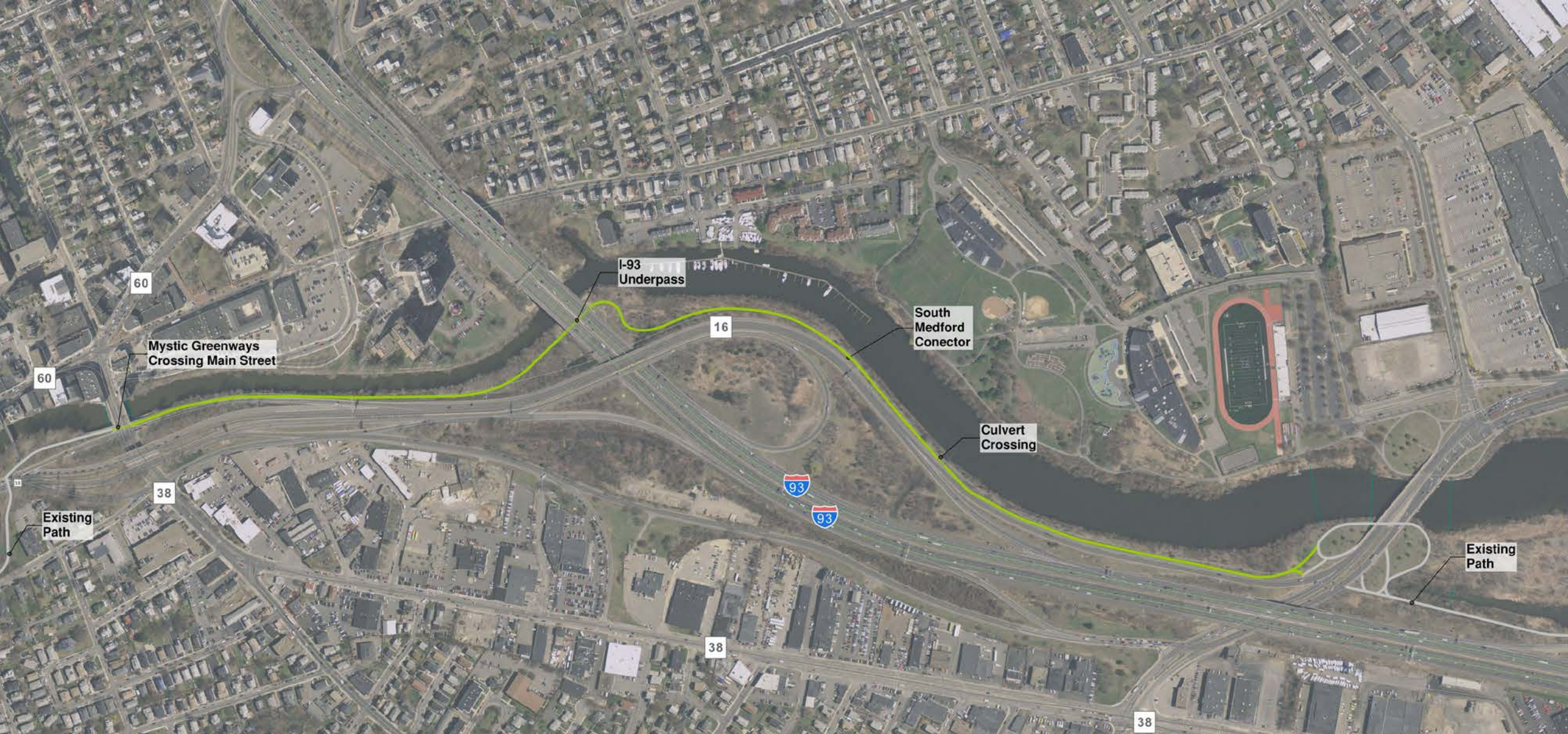
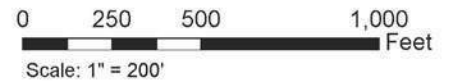
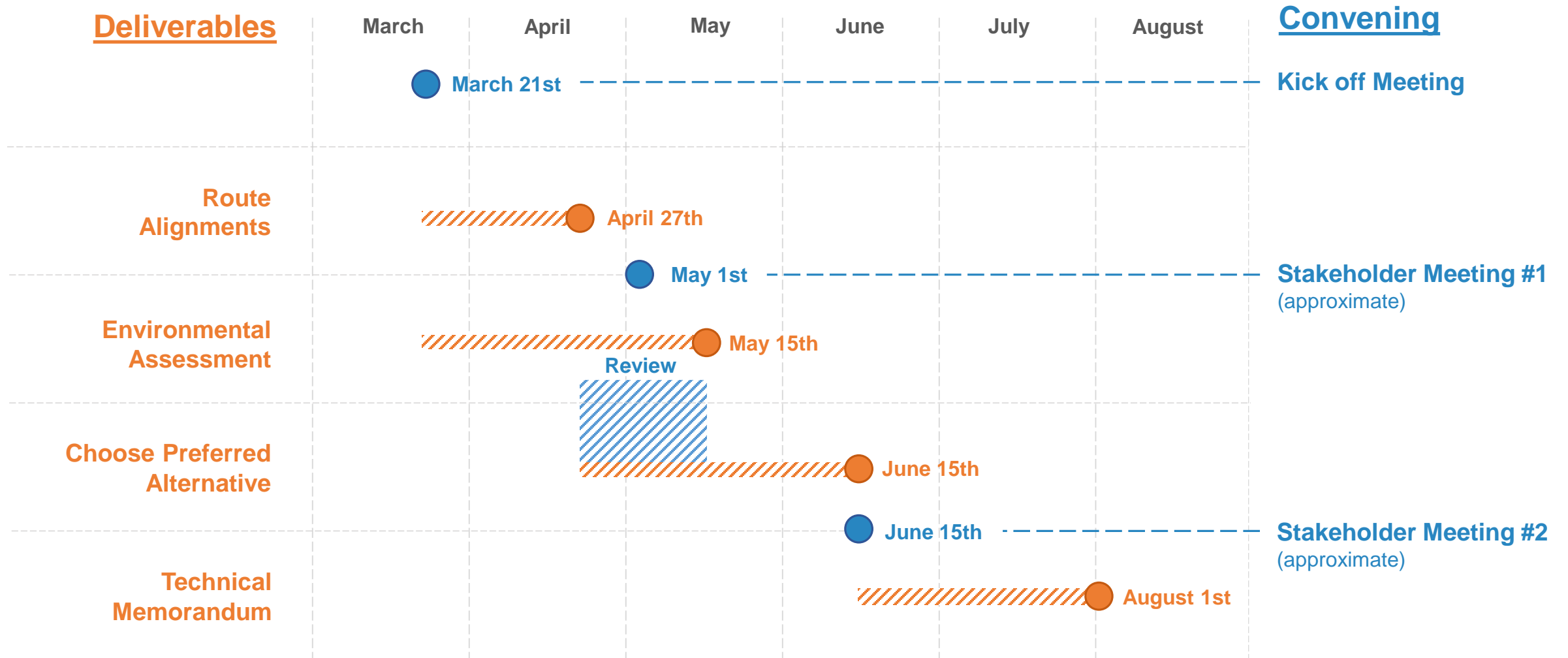


Figure 1: Project Location
Mystic Greenways - South Medford Connector
Medford, MA



Preliminary Schedule (For Discussion)

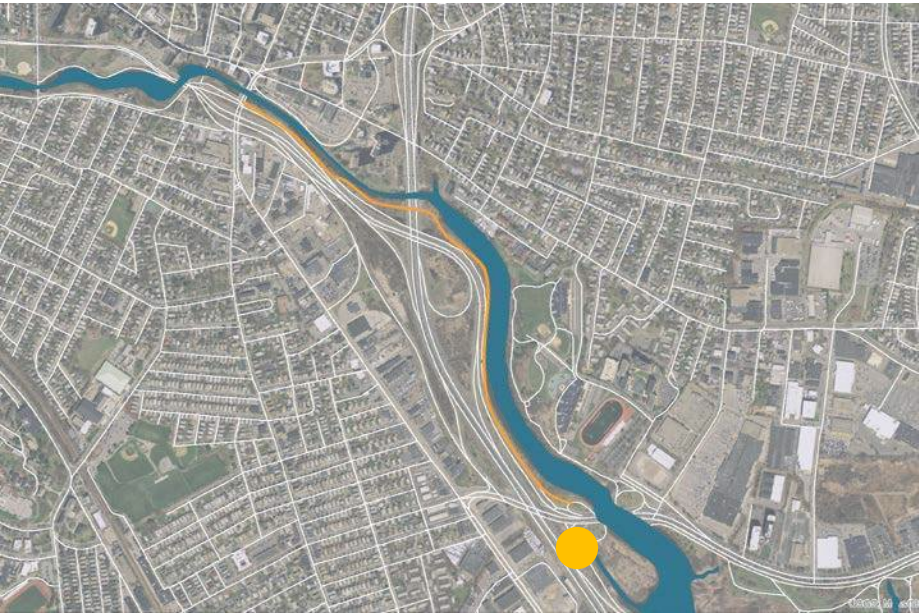


Existing Conditions



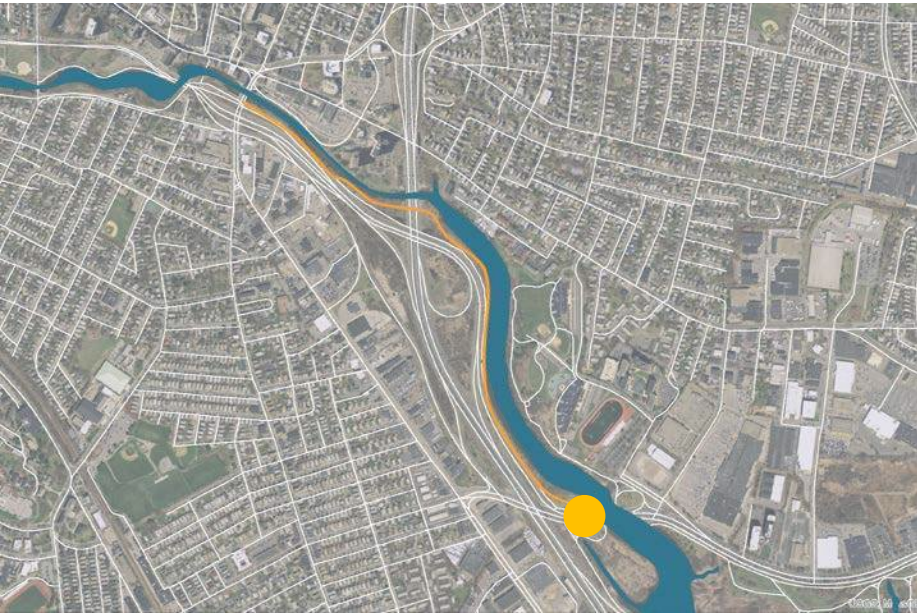
Existing Conditions

Existing DCR path at southern end with sand runoff and erosion



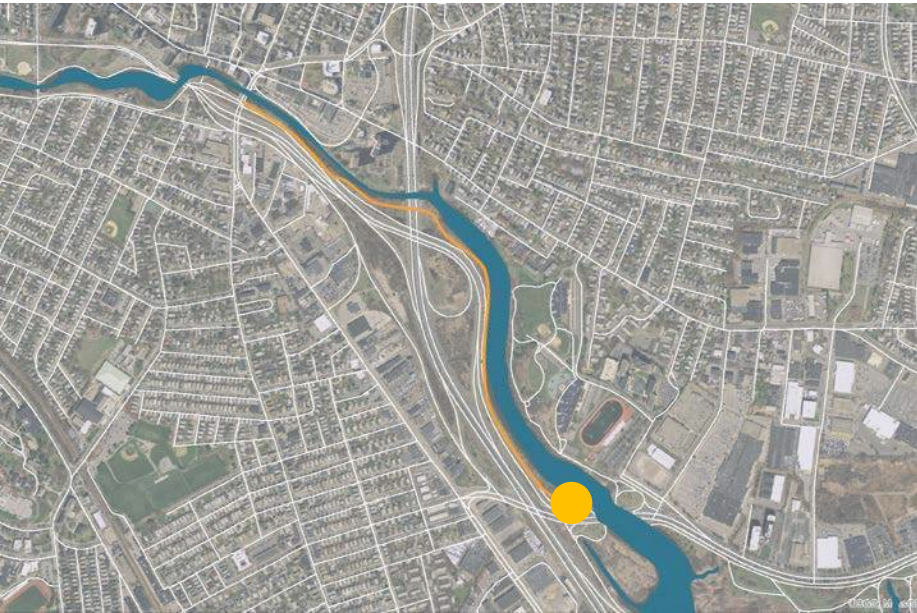
Existing Conditions

Route 16 Underpass



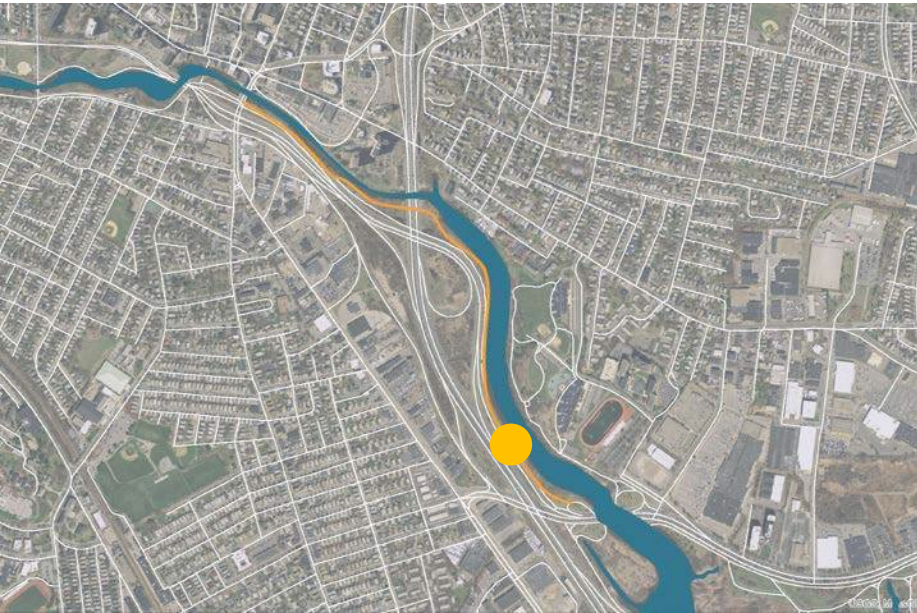
Existing Conditions

Connection to DCR Path at
Route 16 Bridge



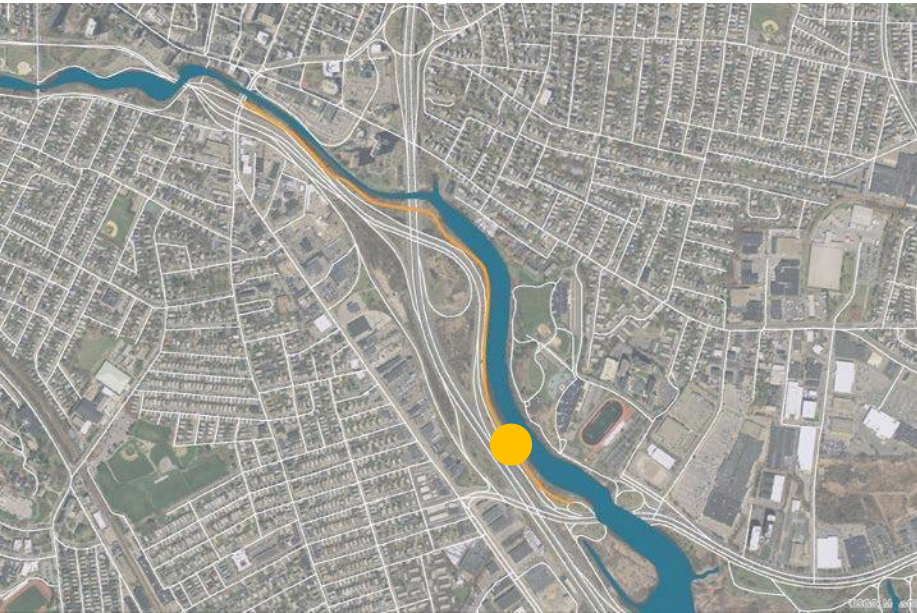
Existing Conditions

Slope to Plateau from Route 16
down to Mystic River



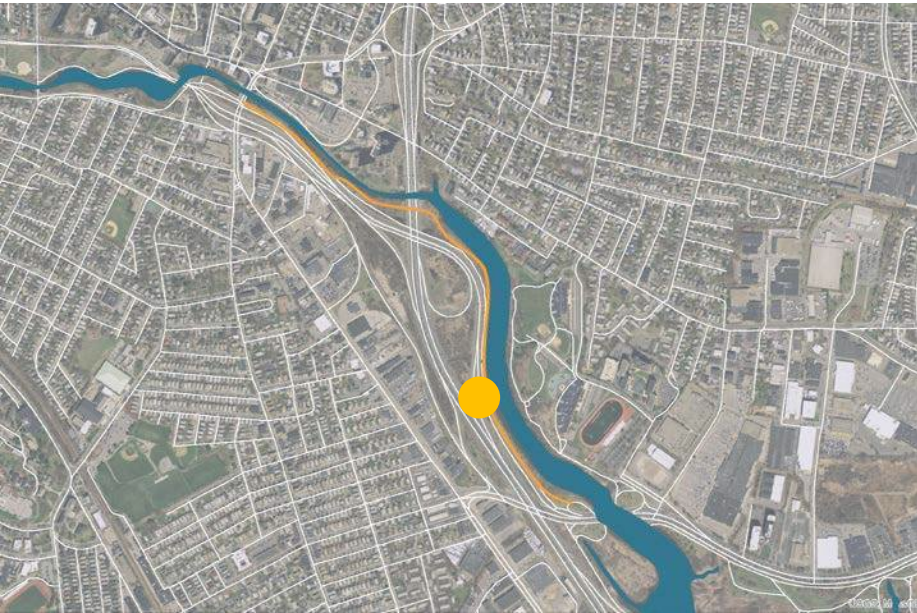
Existing Conditions

Route 16 On Ramp storm drain outfall



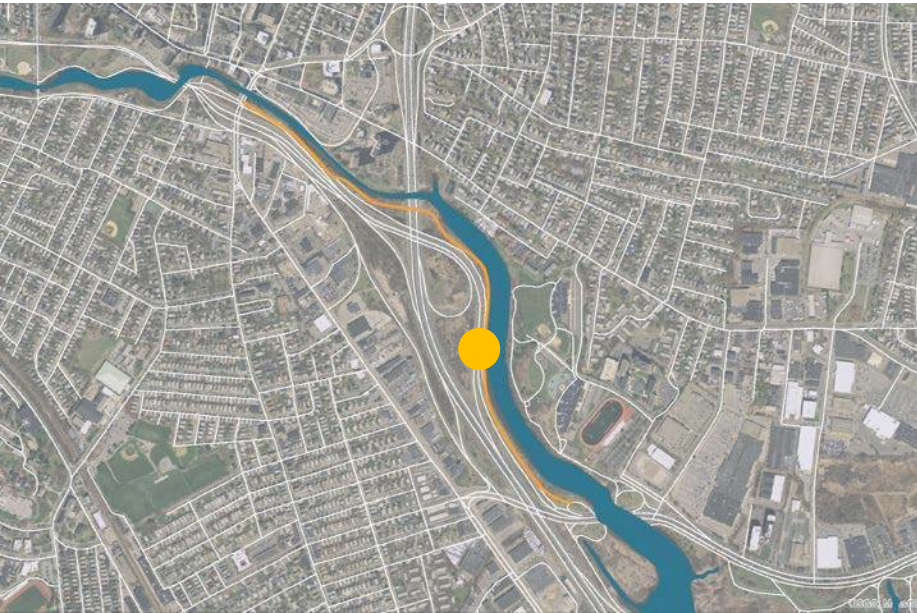
Existing Conditions

Route 16 On Ramp storm
drain outfall



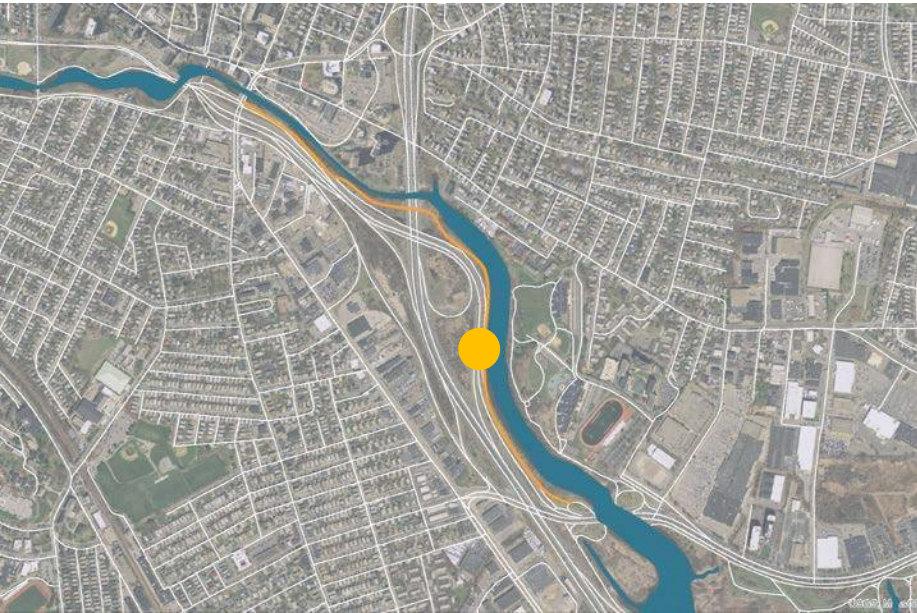
Existing Conditions

Drainage culvert under Route 16 and Interstate 93



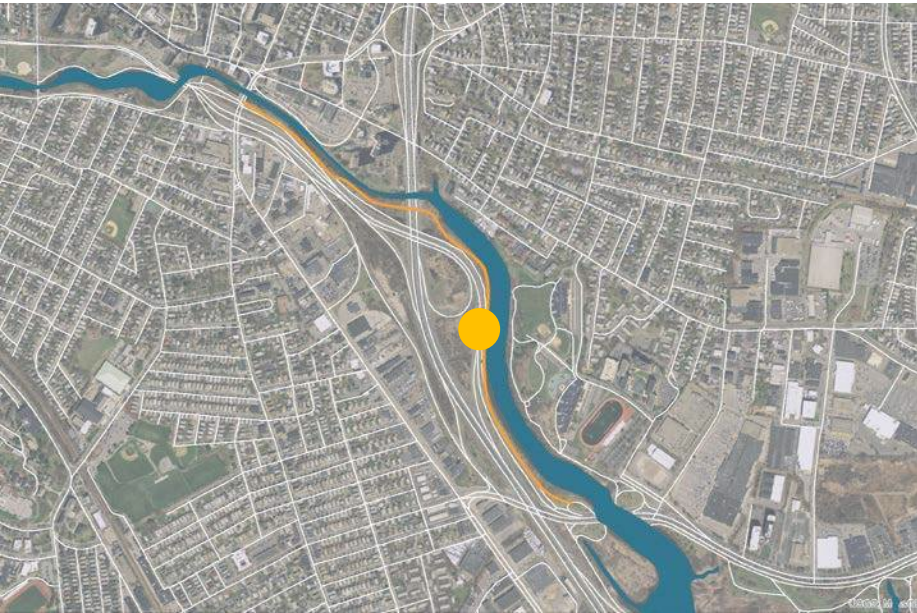
Existing Conditions

Drainage culvert under Route 16 and Interstate 93



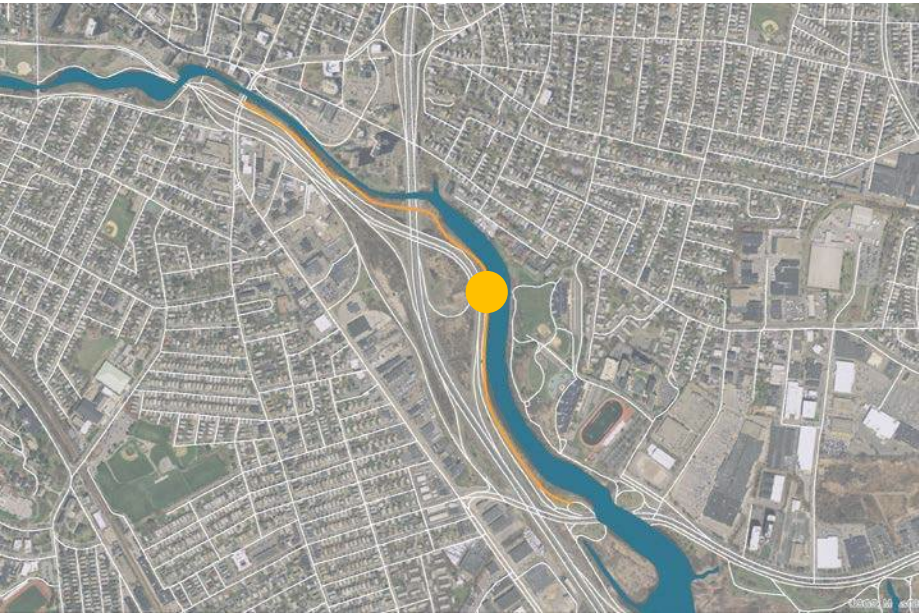
Existing Conditions

Mass Highway Survey Bound



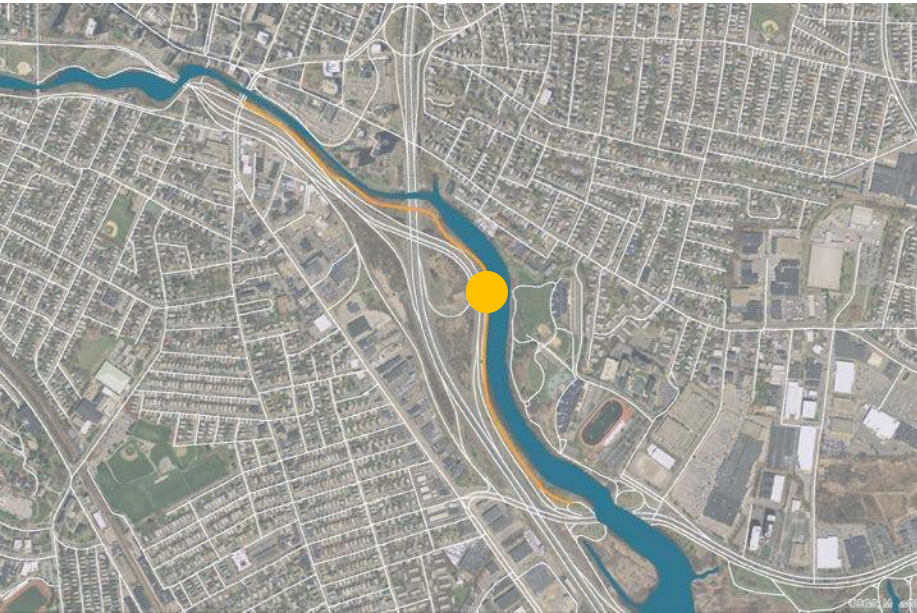
Existing Conditions

Slope from Route 16 On-Ramp to Mystic River



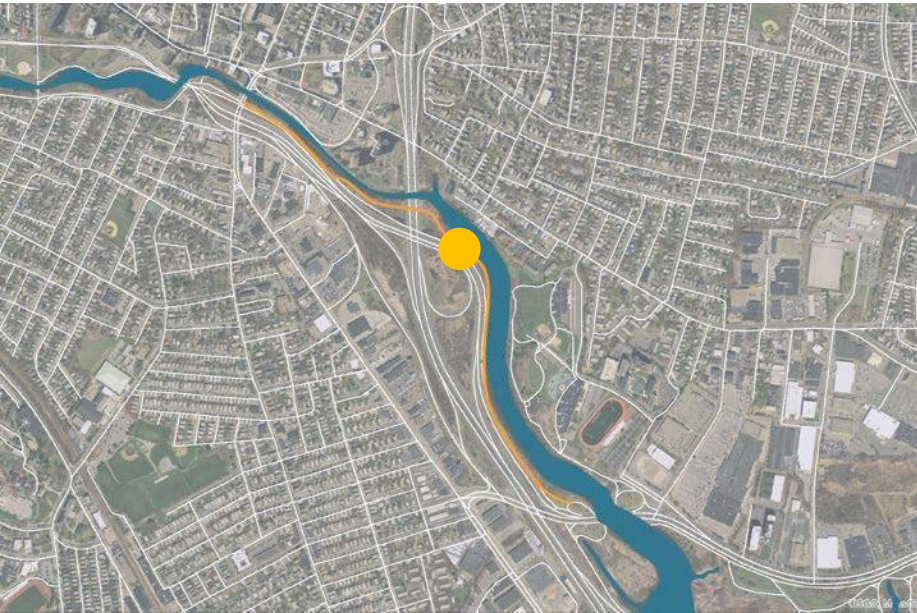
Existing Conditions

Slope from Route 16 On-Ramp to Mystic River



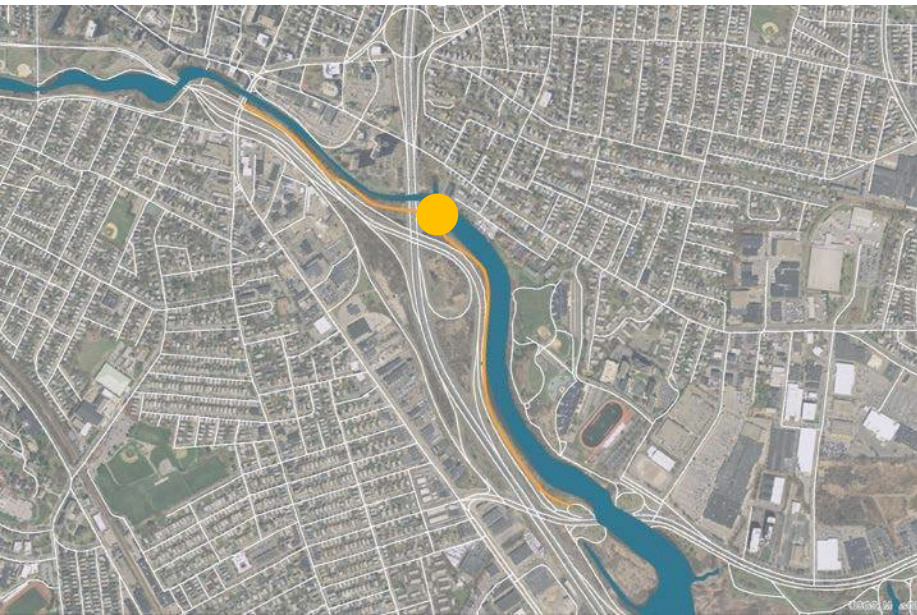
Existing Conditions

Informal Encampment



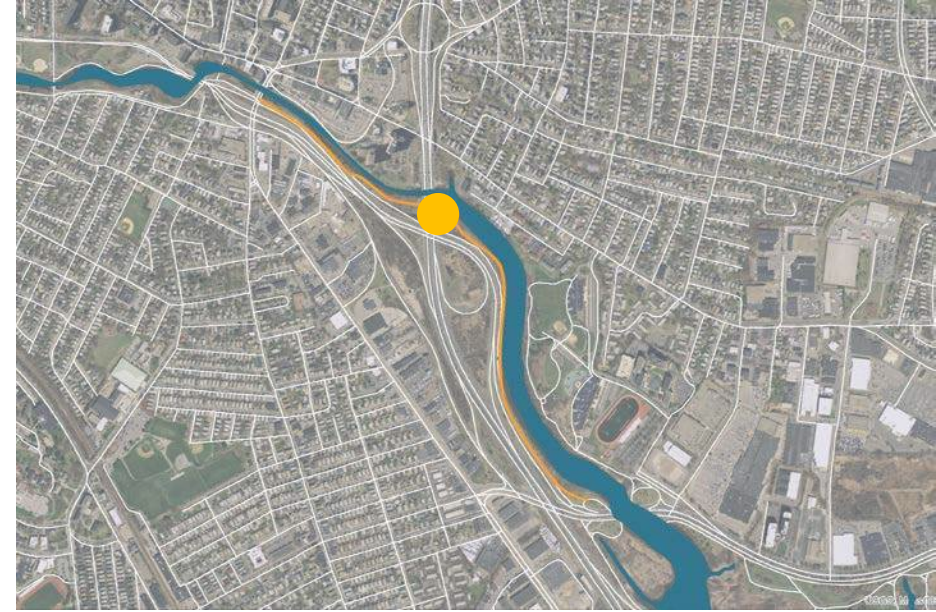
Existing Conditions

Interstate 93 Underpass



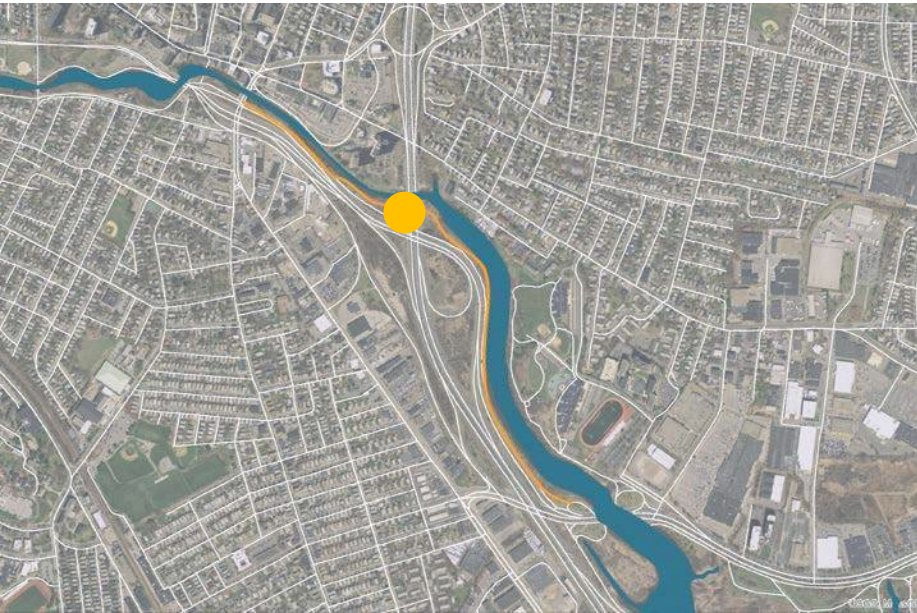
Existing Conditions

Interstate 93 Underpass



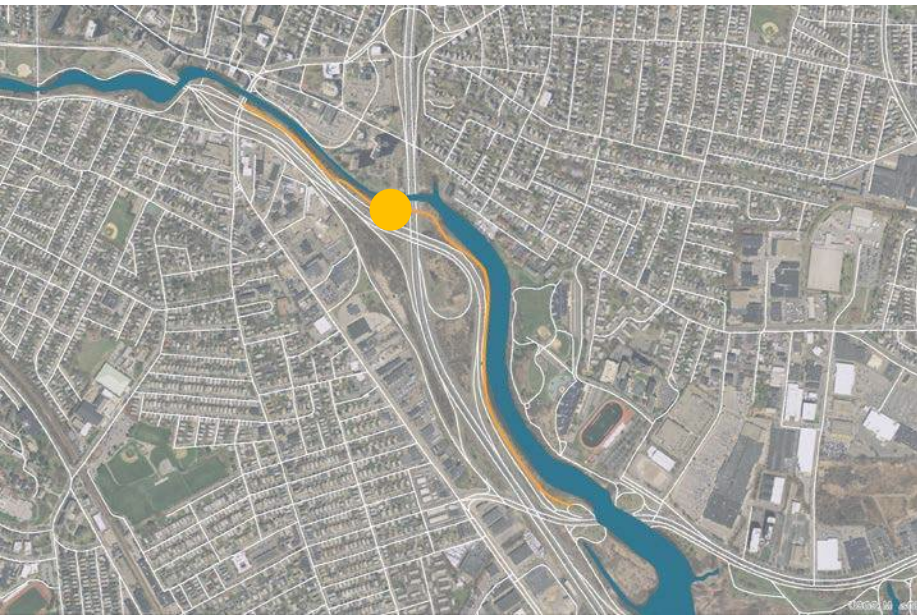
Existing Conditions

Clearing west of Interstate 93
Underpass north of Route 16



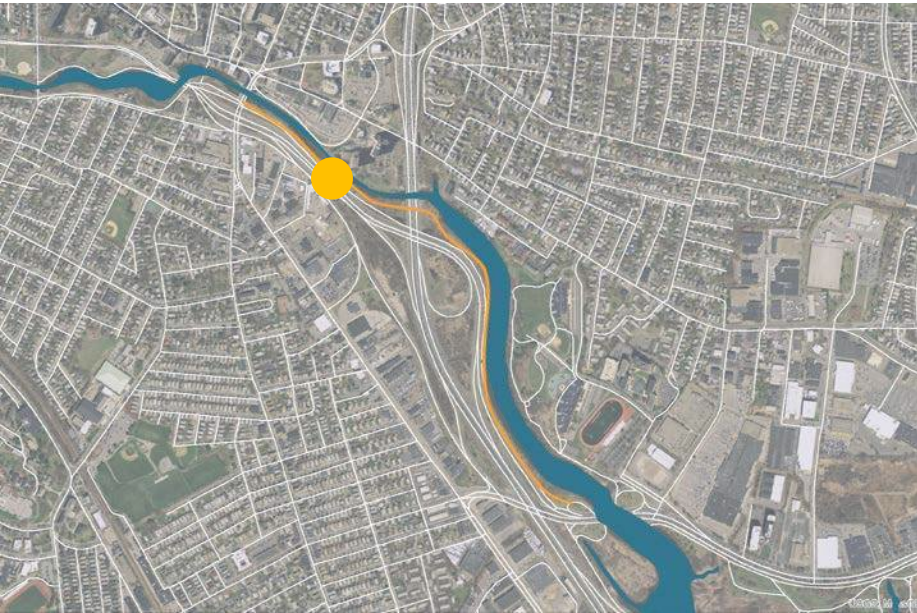
Existing Conditions

Clearing west of Interstate 93
Underpass north of Route 16



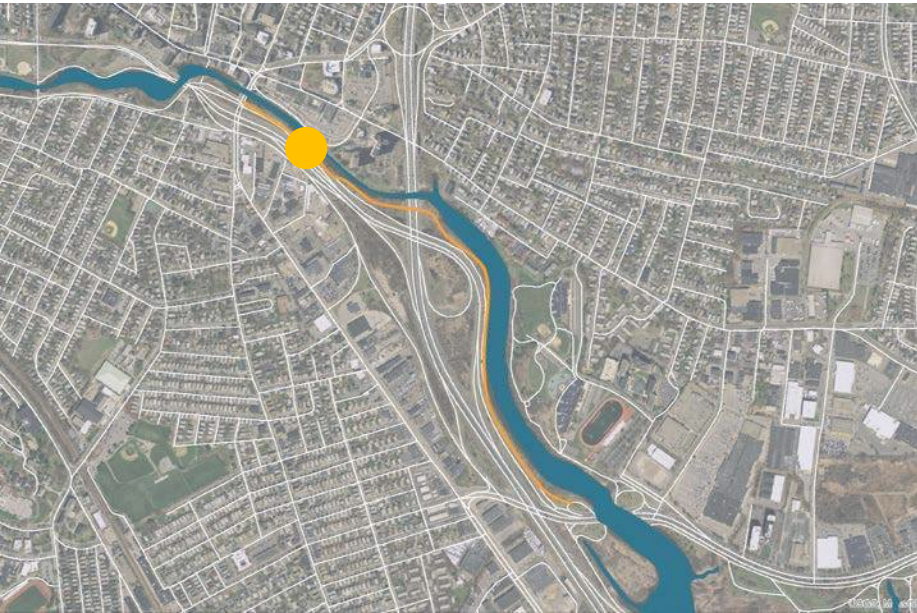
Existing Conditions

Slope west between of Route 16 and Mystic River



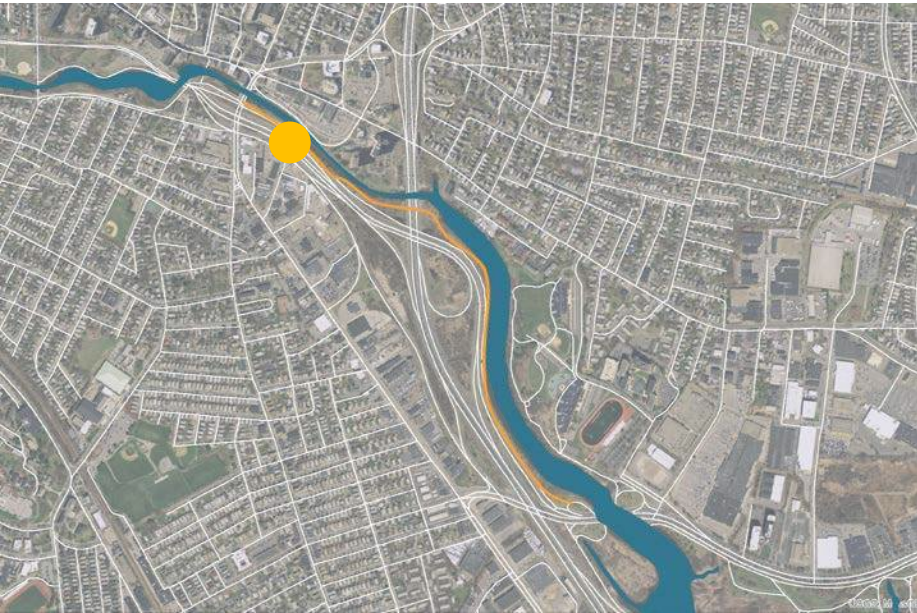
Existing Conditions

Route 16 Exit Ramp (Closed)



Existing Conditions

Route 16 Exit Ramp (Closed)





Deliverables

Phase 1

- Project Kickoff Meeting
- Route Alignments
- Environmental Review
- Preferred Alternative
- Technical Memorandum
- Stakeholder Meetings – 2 Meetings

Phase 2 (Pending 2018 Grant Funding)

- Final Design (Construction Documents)
- Permitting

Key Considerations & Next Steps

- **Property Ownership**
 - *MassDOT Easement on DCR owned land??*
 - *Other Jurisdictions*
- **Site Remediation/Contamination**
- **Route 16 Off-Ramp connection**
- **Stormwater Culvert Info/Drawings**
- **Permitting**
- **Path Materials and Design Guidelines**
 - *(Asphalt? Lighting?)*
- **Emergency Vehicle Access**
- **Cost Considerations**
 - *(Structural Improvements?)*
- **Others?**

Next Steps

- MassDOT/DCR to provide record information on parcels and adjacent land
- Parcel/Easement information on off
- Nitsch to start work on preliminary alignment options and drainage area for existing stormwater outfalls
- Reconvene April 27, 2018

Stakeholder Meeting #1

MEETING NOTES FOR SOUTH MEDFORD CONNECTOR PROJECT KICK-OFF MEETING

Date: March 21, 2018
Location: Medford City Hall
Project: South Medford Connector
Nitsch Project #: 12626

MEETING ATTENDEES

- Amber Christoffersen, Mystic River Watershed Association (MyRWA)
- Alicia Hunt, City of Medford
- Joe Delaney, Massachusetts Gaming Commission
- Connie Raphael, MassDOT District 4
- David Loutzenheiser, Metropolitan Area Planning Council (MAPC)
- Karl Haglund, Massachusetts Department of Conservation and Recreation (DCR)
- Scott Turner, Nitsch Engineering
- Brian Creamer, Nitsch Engineering
- Jennifer Johnson, Nitsch Engineering

INTRODUCTIONS / ROLES

- Alicia is point of contact for the City of Medford
- Amber will be serving as Project Manager on behalf of the City of Medford
- Brian and Jenn will be direct contacts for Nitsch
- Connie indicated that Pete Sutton would be MassDOT contact for this project
- Alicia suggested adding a point person from the Medford bicycle commission to the stakeholders group.

Brian Creamer from Nitsch Engineering and Amber Christoffersen from MyRWA provided a general overview of the project including proposed project schedule, a review of existing conditions observed during the site walk, and general issues to be considered as part of the study.

INITIAL PROJECT WALK-THROUGH AND THOUGHTS FROM STAKEHOLDER GROUP

Property Ownership and Permitting

- The project site consists of land owned by both DCR and MassDOT. The Nitsch Team will research existing property line plans – if available – provided by MassDOT and/or DCR. Massachusetts Highway Bounds were observed during the site walk, implying there are multiple property owners near the project site.
- It will be possible to construct the project on MassDOT property. Depending on the proposed work within MassDOT property, there may be multiple permits and processes to navigate. The Nitsch Team will review these as part of the Feasibility Study. The permitting and approval process with MassDOT will be different if MassDOT is financing the project.
- A maintenance agreement may be required between MassDOT and DCR. This will be evaluated as the project progresses and a final layout is accepted.
- DCR regularly plows their paths near the project site.

- The Nitsch Team will identify potential environmental permits that may be required for the proposed greenway based on the conceptual layout, including the Wetlands Protection Act, Chapter 91, and Army Corps of Engineers. The feasibility study will include an outline of each process, application requirements, and typical permit timeframe.

Design Considerations

- The Clippership Connector is being designed/constructed on the north side of the Mystic River.
- DCR will provide lighting along the other side of the I-93 underpass for Clippership Connector. The South Medford Connector will also have lighting. The underpass below Route 16 should also have lighting.
- A primary consideration for construction of the South Medford Connector is to provide a route for bike commuters.
- The team discussed the power source for any lights provided on the South Medford Connector. There is electrical service along the highway. Any proposed lighting along the South Medford Connector may be connected to the highway's electrical service.
- The proposed lighting should consider environmental impacts with safety. The team should evaluate how much spillover occurs from abutting roadways. DCR generally looks to achieve a low level of light everywhere, similar to Paul Revere Park. Timing/sensors may be used to achieve lighting when needed, such as during peak commuting hours. The Nitsch Team will evaluate lighting alternatives in the Feasibility Study.
- The shared use path will be in the vicinity of multiple existing drainage culverts, including one large box culvert. Additional information on these culverts is needed. The Feasibility Study will review options for these areas, including extending existing culverts beneath the proposed path, minimizing impacts to existing structures, incorporating seating areas, and adding stormwater treatment if appropriate.
- The project should seek to minimize loss of larger trees (>12 inches dia.) and will add native trees.
- The project should consider the future condition including potential sea level rise/storm surge/floodplain impacts. Project design should consider absorption of more runoff and flood waters.
- The project should consider noise attenuation from nearby roadways, either through physical barriers or vegetative screening.
- The Route 16 ramp that was closed for the Cradock Bridge construction project is currently intended to be reopened by MassDOT. A traffic study would be required to determine if the ramp could remain permanently closed. Cradock Bridge is currently anticipated to be closed another year. The Nitsch Team will check with MassDOT on Route 16 Exit Ramp (Off-Ramp) to Main Street.
- There is no significant pedestrian/bicycle traffic at the Route 16 Exit Ramp to Main Street at Cradock Bridge. There are no pedestrian/bicycle facilities in this area.
- The Route 16 ramp is located at a pinch-point for the South Medford Connector, where there is very little space between the edge of the roadway and the river. As part of the Feasibility Study, Nitsch will evaluate design alternatives for both open and closed ramp scenarios. Under the open ramp scenario, the ability to fit the path along with adequate traffic lands on the Route 16 Exit Ramp to Main Street should be considered. Any path that is constructed on the existing ramp will need to include separation/protection from vehicular traffic.
- The Nitsch Team will consider whether additional access points will be required along the South Medford Connector. This 1-mile stretch has access at the bridges on either end, but nothing in

between. MassDOT does not want to introduce access from Route 16. The team will consider alternatives to new access points, including rest areas and signage, in the Feasibility Study. The Nitsch Team will also look at precedents of other trails with longer sections without access points including Minuteman Bike Trail over Route 128, DCR Path along Mystic River south from Route 16 Bridge to the Blessing of the Bay Boathouse, and others.

- Emergency vehicle access to the South Medford Connector is needed. Currently, the path is anticipated to be 10-foot wide, which is adequate for most vehicles.
- The South Medford Connector pavement surface material could be asphalt, stabilized stone dust, or porous asphalt. Standard stone dust is not preferred because it has the potential for erosion. The stabilized stone dust has been used on the Perkins Braille Trail. Fresh Pond Bike Path is asphalt. The team will evaluate material alternatives in the Feasibility Study.

OTHER

- The Nitsch Team delivered a revised proposal for the study at the end of the meeting.

SUMMARY OF ACTION ITEMS

- The Nitsch Team will coordinate with Medford, DCR, and MassDOT to obtain record documents for the project site and surrounding areas.
- The Nitsch Team will begin evaluating route alternatives for presentation at the next meeting.
- Next meeting is May 9, 2018, 10:30-12. Amber will send an invite.

If any of the attendees feel these Meeting Minutes do not accurately reflect the discussions, please notify the writer within one (1) week of receipt. Nitsch Engineering will determine if edits will be made and, if so, the Minutes will be reissued.

Prepared by: Jennifer Johnson and Brian Creamer

JLJ/bfc/sdt

cc: All Attendees

MYSTIC GREENWAYS

SOUTH MEDFORD CONNECTOR

Stakeholder Meeting #2

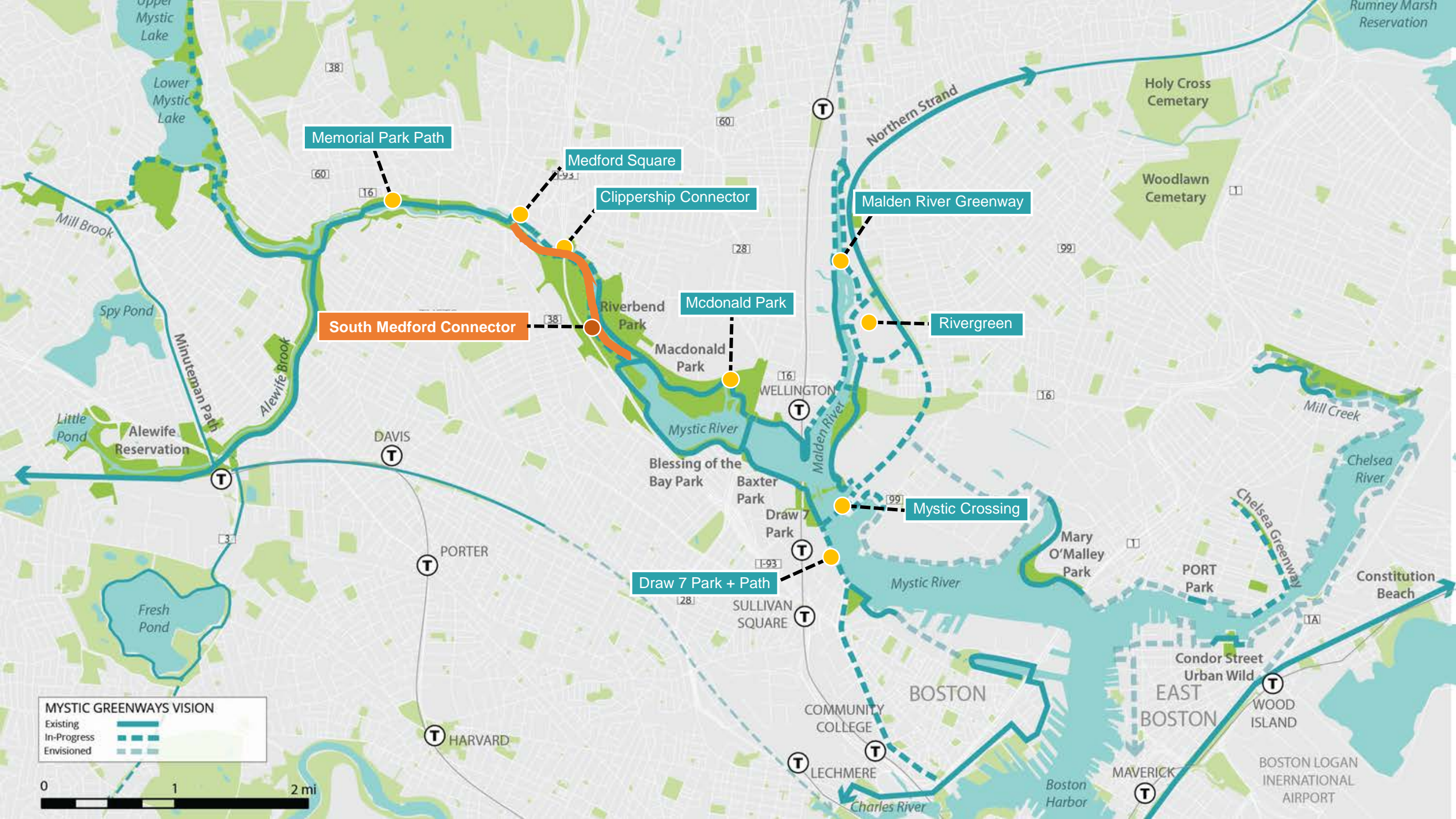
May 9, 2018





Agenda

- Welcome & Introductions
- Mystic Greenways & South Medford Connector Project Status Update
- Schedule Update
- Route Alignments
- Cross Section Alternatives and Discussion
- Next Steps



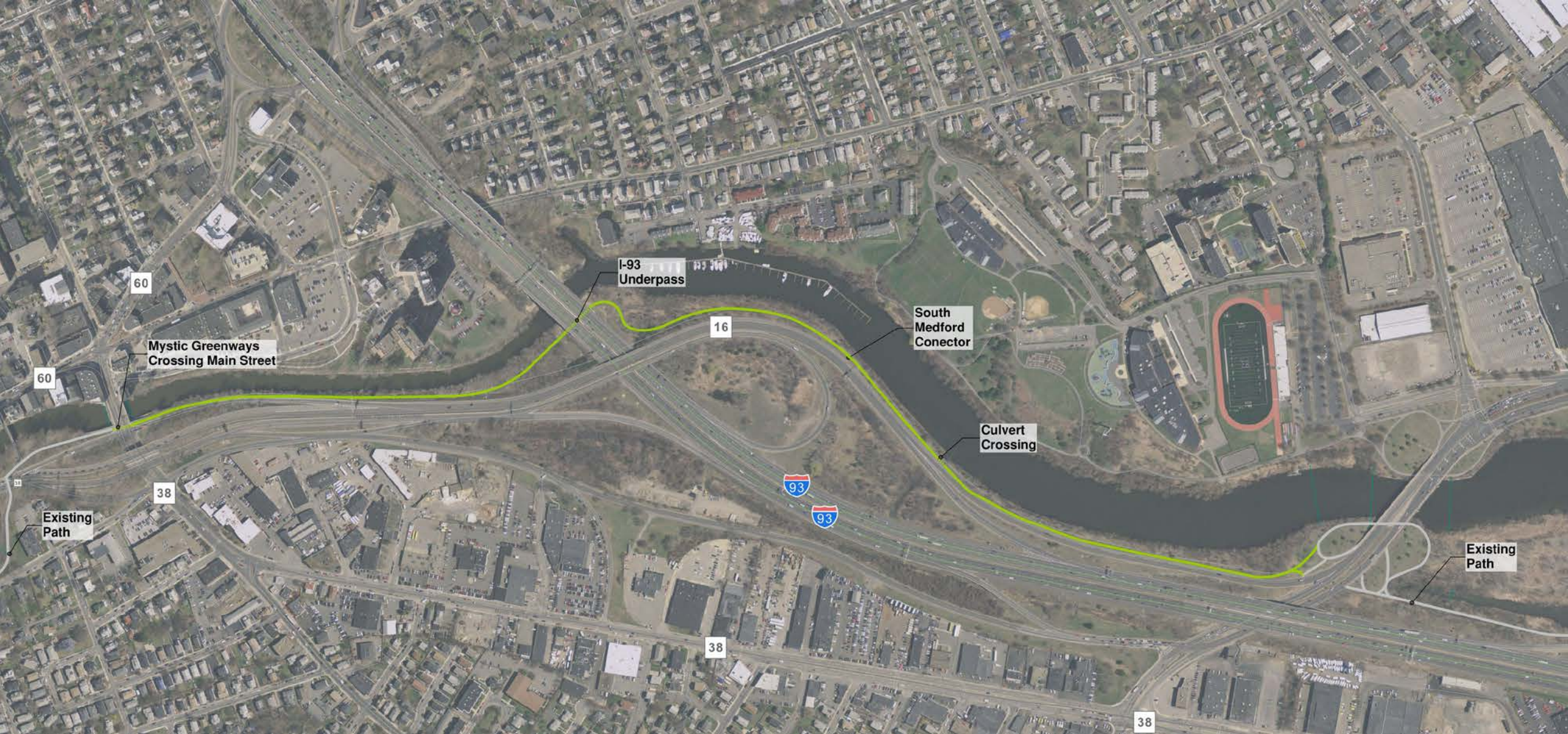
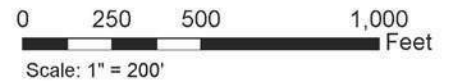


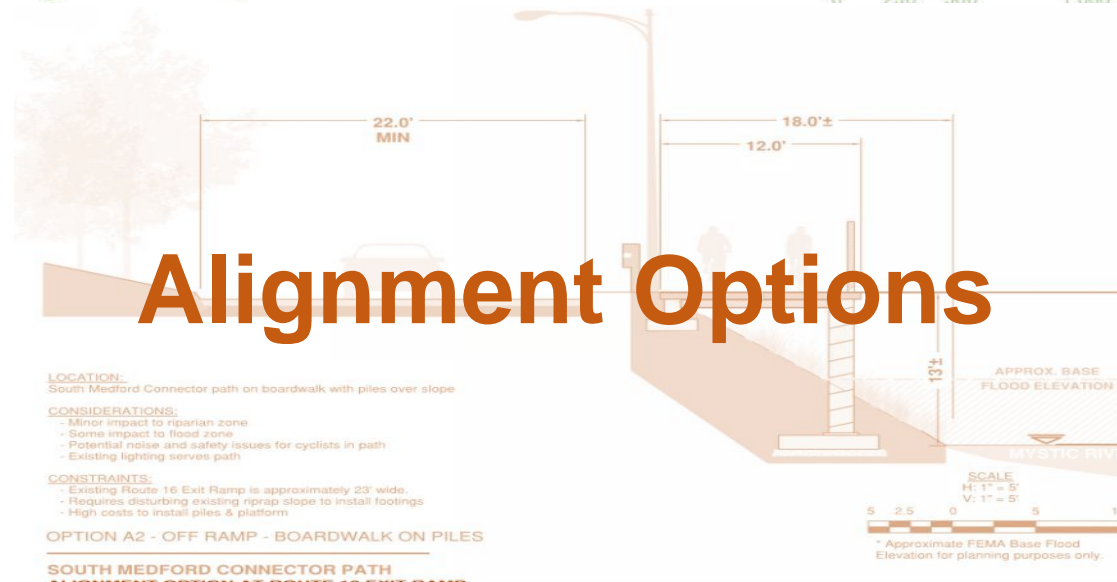
Figure 1: Project Location
 Mystic Greenways - South Medford Connector
 Medford, MA



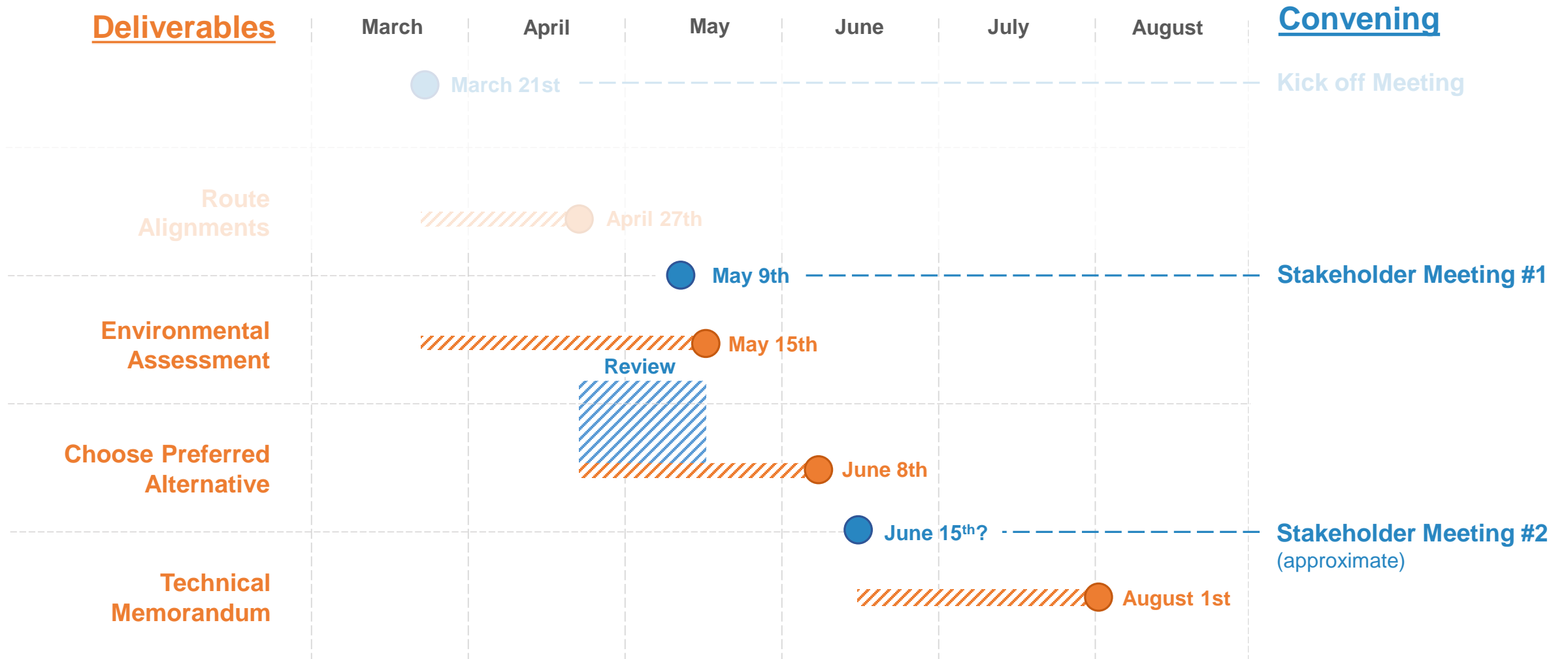
Project Status Update



Figure A: Chapter 91 Jurisdiction



Schedule Update



Route Alignment



Locus Map



Figure 1: Project Location
 Mystic Greenways - South Medford Connector
 Medford, MA

Data Source: MassGIS, FEMA
 Nitsch Project # 12071.1P

Legend

Town Boundary

Flood Zone Hazard Areas

Flood Zone Designations

- A: 1% Chane of Annual Flooding, no BFE
- AE: 1% Annual Chance of Flooding, with BFE
- AE: Regulatory Floodway
- X: 0.2% Annual Chance of Flooding
- X: Area of Minimal Flood Hazard

MassDOT Major Roads

- Interstate
- State Route

Vegetation Clearing + Vista Location

0 250 500 1,000
 Feet

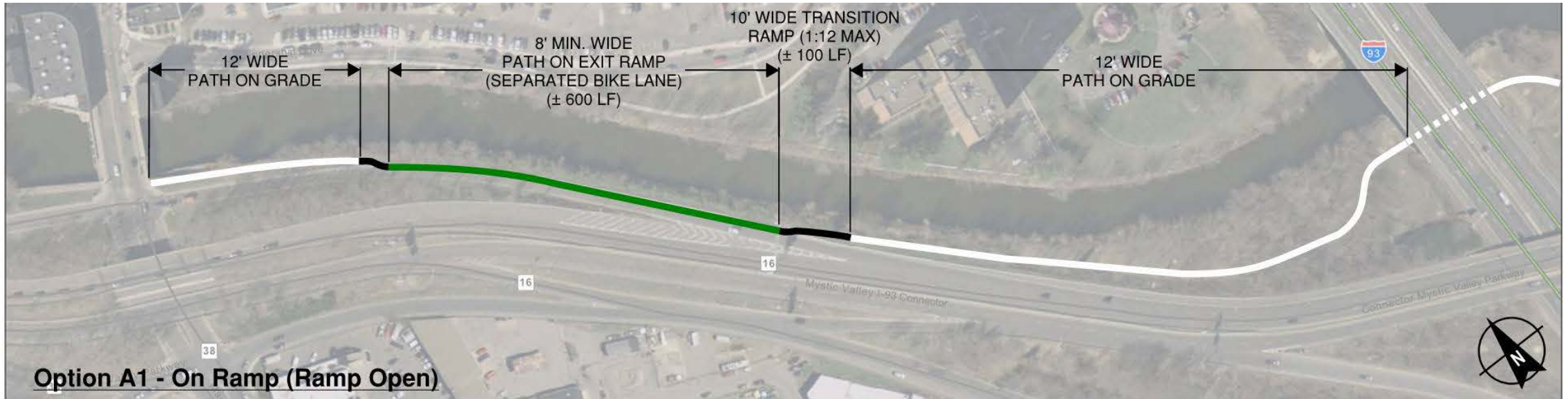
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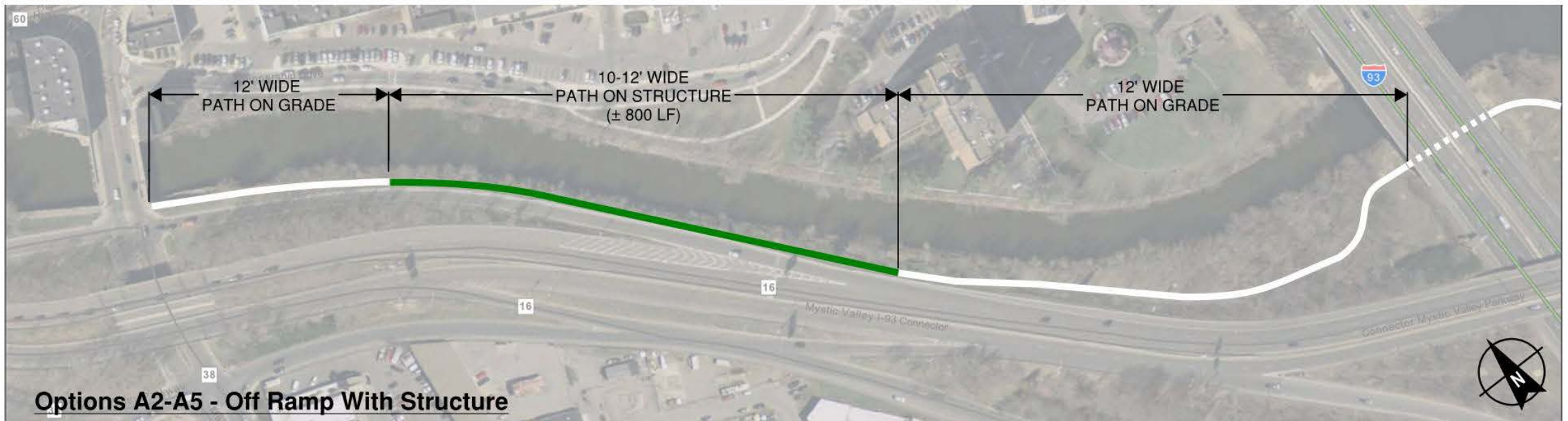
EXIT
↑



Route Alignments – Location A

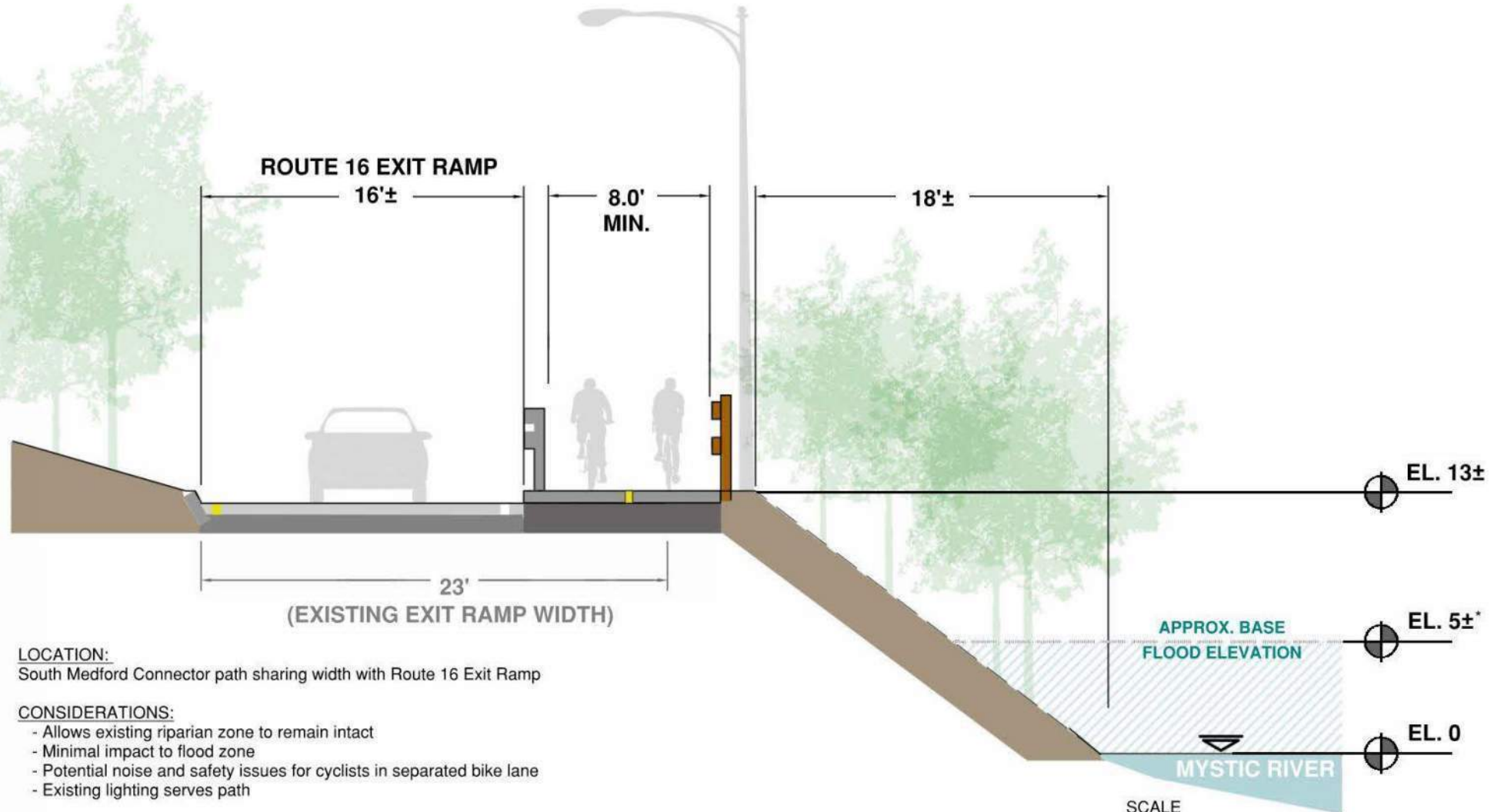


Option A1 - On Ramp (Ramp Open)



Options A2-A5 - Off Ramp With Structure

Option A1 – On Ramp (Ramp Open)



LOCATION:

South Medford Connector path sharing width with Route 16 Exit Ramp

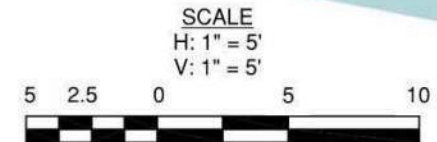
CONSIDERATIONS:

- Allows existing riparian zone to remain intact
- Minimal impact to flood zone
- Potential noise and safety issues for cyclists in separated bike lane
- Existing lighting serves path

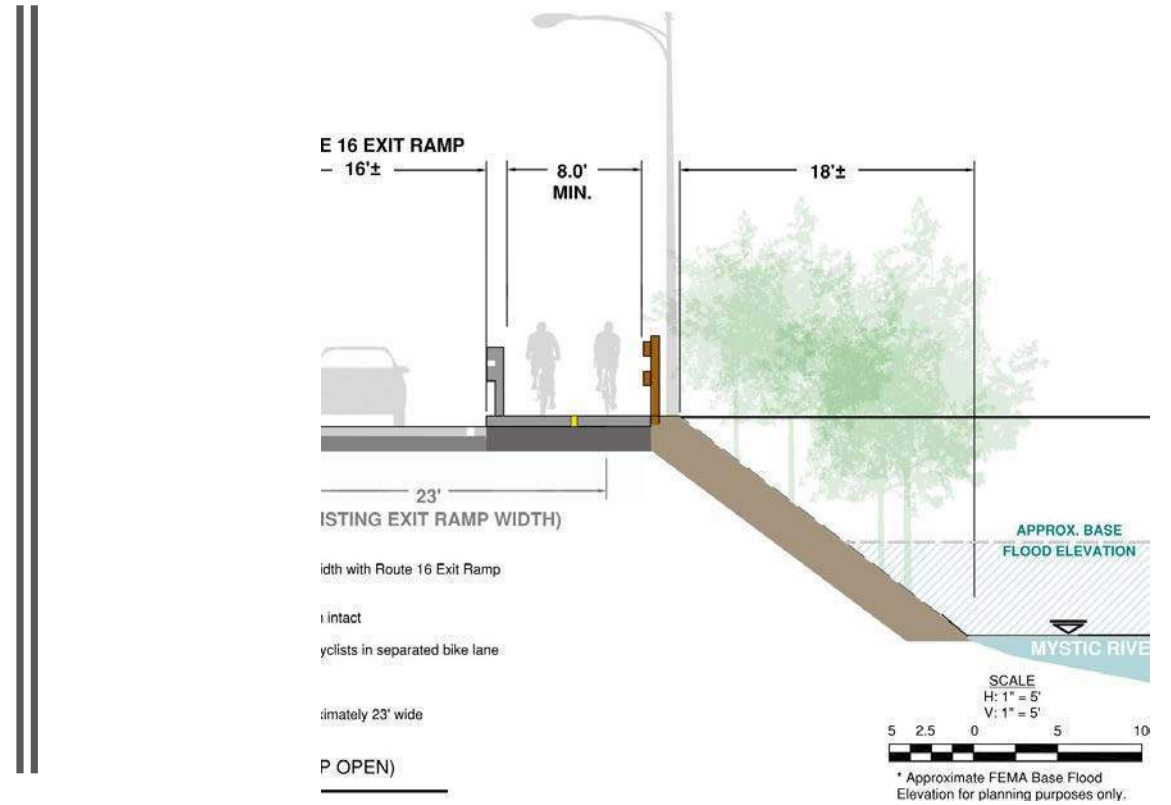
CONSTRAINTS:

- Existing Route 16 Exit Ramp is approximately 23' wide
- Requires relocating guard rail

OPTION A1 - ON RAMP (RAMP OPEN)

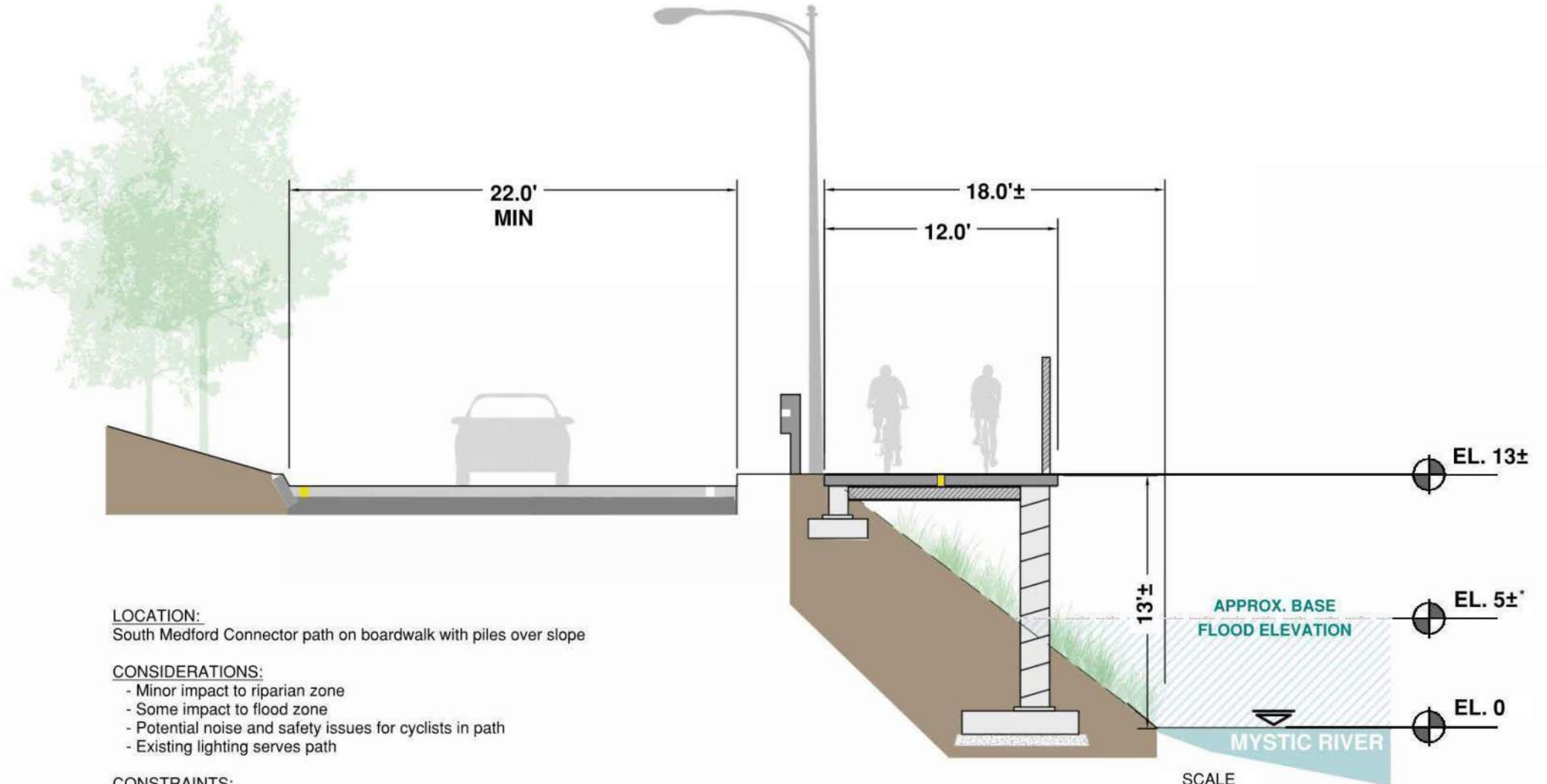


* Approximate FEMA Base Flood Elevation for planning purposes only.



Precedent: Hawthorne Bridge, Portland OR

Option A2 – Off Ramp – Structure on Piers/Piles



LOCATION:

South Medford Connector path on boardwalk with piles over slope

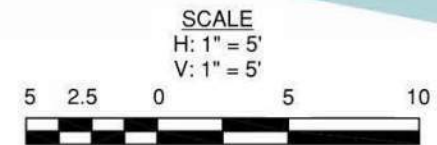
CONSIDERATIONS:

- Minor impact to riparian zone
- Some impact to flood zone
- Potential noise and safety issues for cyclists in path
- Existing lighting serves path

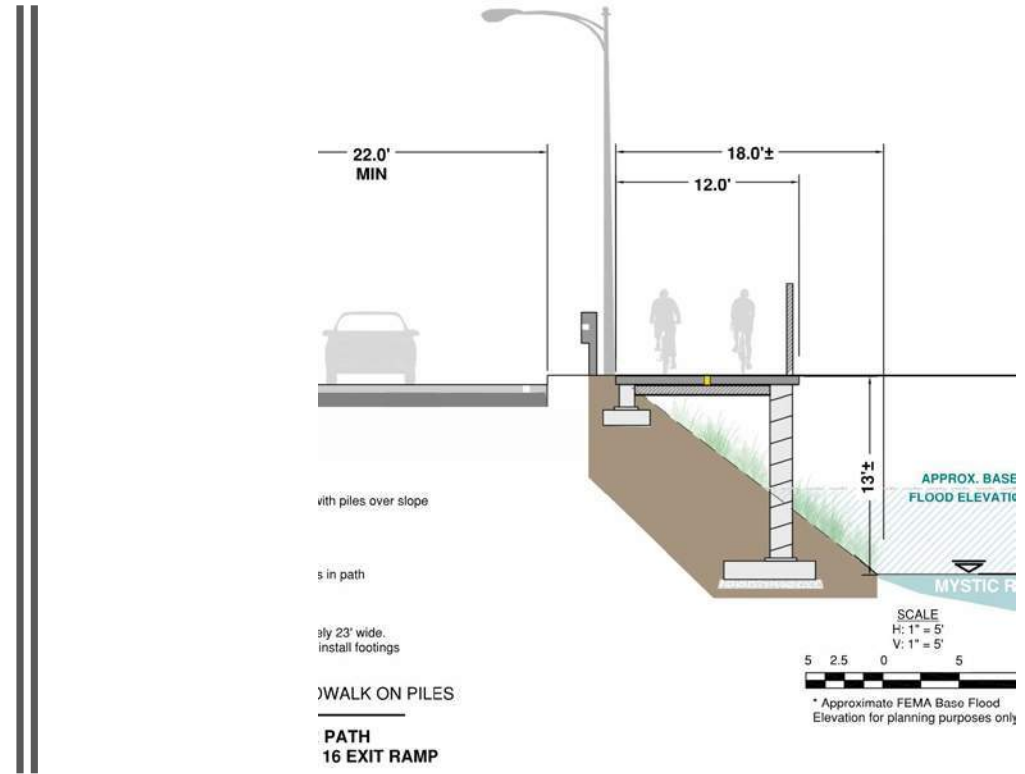
CONSTRAINTS:

- Existing Route 16 Exit Ramp is approximately 23' wide.
- Requires disturbing existing riprap slope to install footings
- High costs to install piles & platform

OPTION A2 - OFF RAMP - BOARDWALK ON PILES

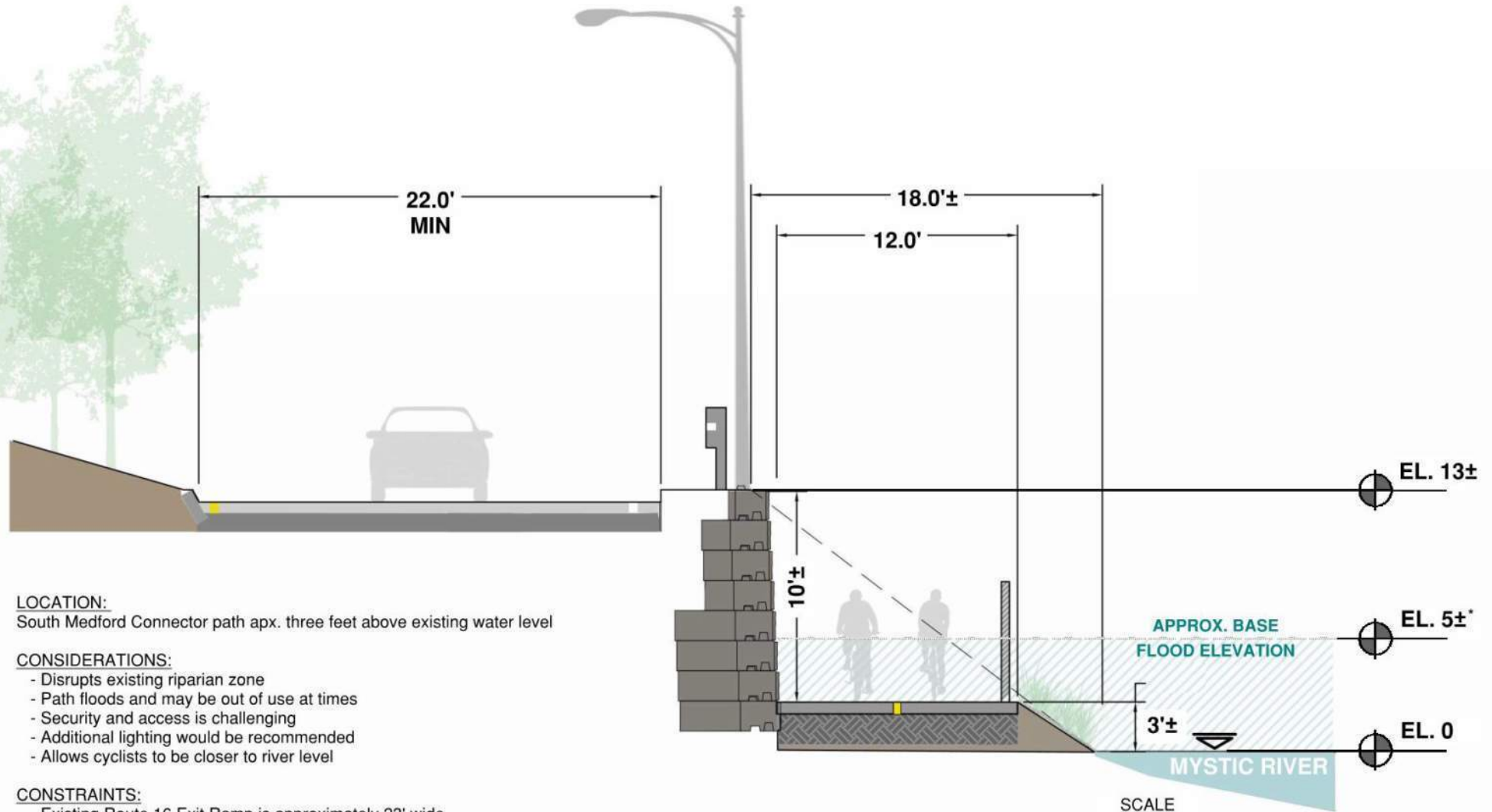


* Approximate FEMA Base Flood Elevation for planning purposes only.



Precedent: Neponset River Trail at Mattapan Square MBTA Station

Option A3 – Off Ramp – Retaining Wall (Low)



LOCATION:

South Medford Connector path apx. three feet above existing water level

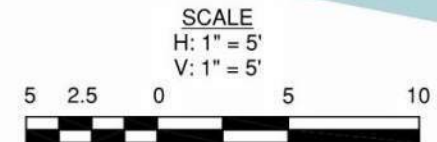
CONSIDERATIONS:

- Disrupts existing riparian zone
- Path floods and may be out of use at times
- Security and access is challenging
- Additional lighting would be recommended
- Allows cyclists to be closer to river level

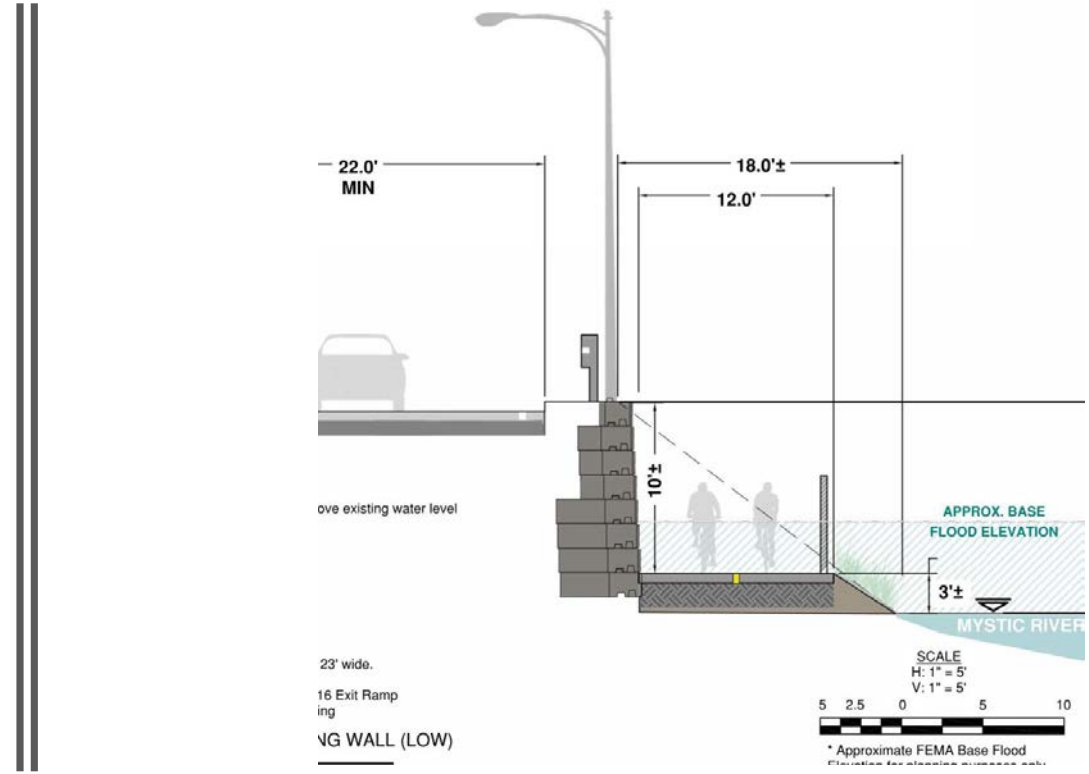
CONSTRAINTS:

- Existing Route 16 Exit Ramp is approximately 23' wide.
- Cost of retaining wall substantial
- Difficult construction, need to shore up Route 16 Exit Ramp
- Requires resetting guard rail and existing lighting

OPTION A3 - OFF RAMP - RETAINING WALL (LOW)

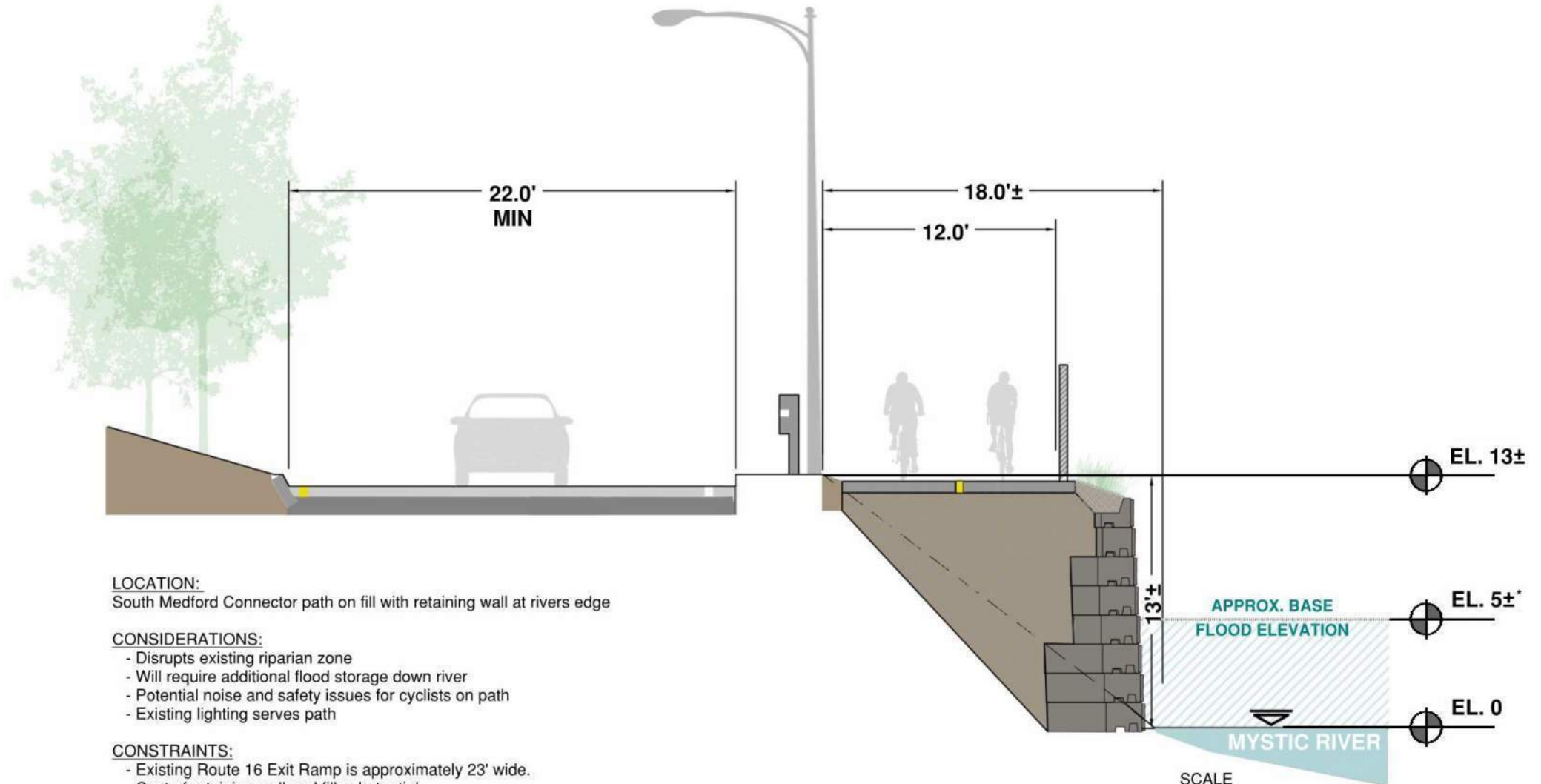


* Approximate FEMA Base Flood Elevation for planning purposes only.



Precedent: Allegheny Riverfront Park, Pittsburgh, PA

Option A4 – Off Ramp – Retaining Wall (High)



LOCATION:

South Medford Connector path on fill with retaining wall at rivers edge

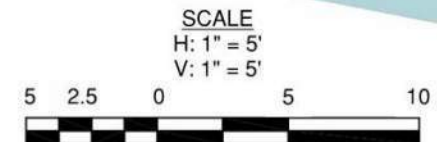
CONSIDERATIONS:

- Disrupts existing riparian zone
- Will require additional flood storage down river
- Potential noise and safety issues for cyclists on path
- Existing lighting serves path

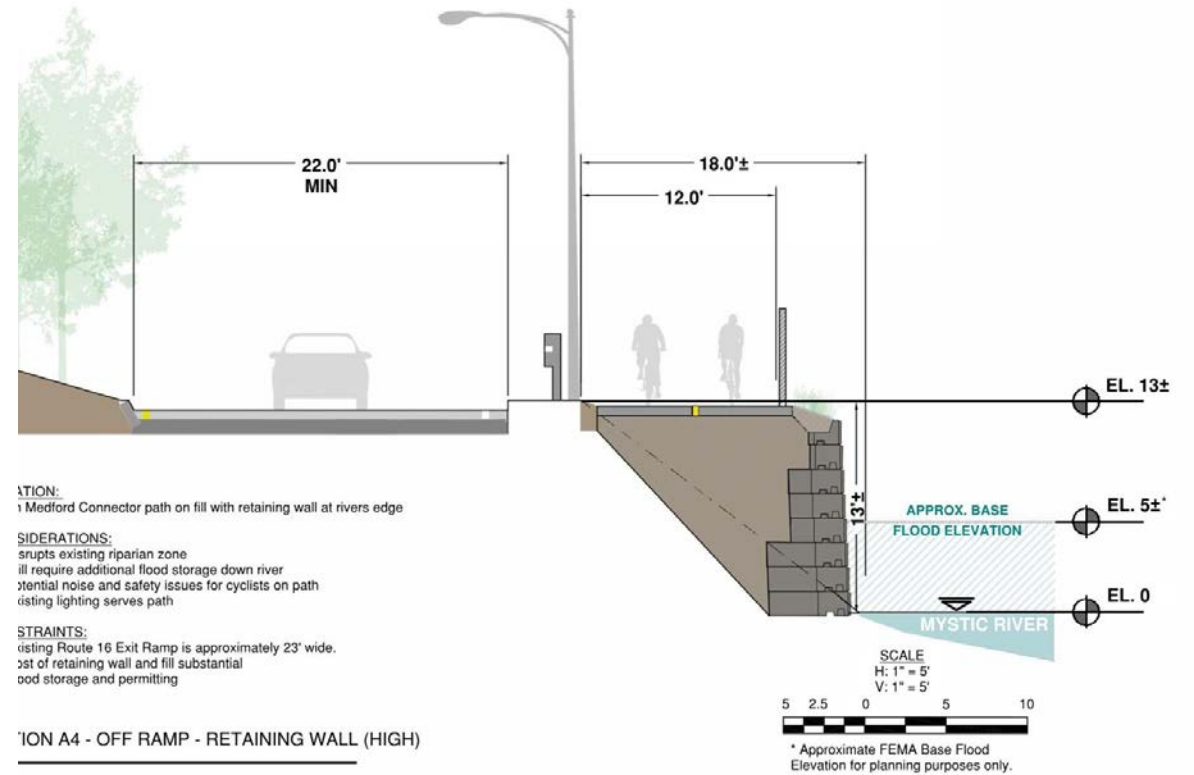
CONSTRAINTS:

- Existing Route 16 Exit Ramp is approximately 23' wide.
- Cost of retaining wall and fill substantial
- Flood storage and permitting

OPTION A4 - OFF RAMP - RETAINING WALL (HIGH)

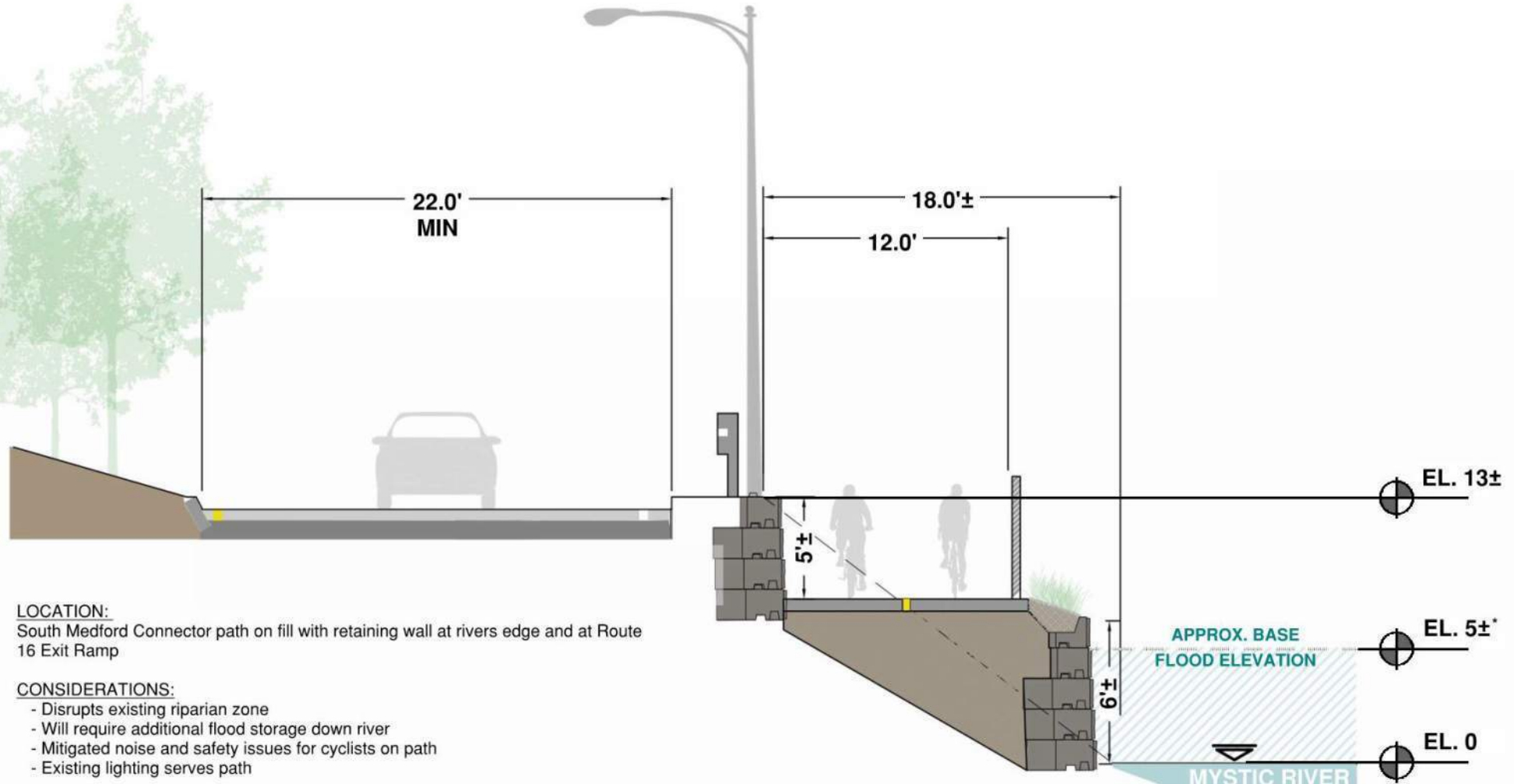


* Approximate FEMA Base Flood Elevation for planning purposes only.



Precedent: Neponset River Trail at Truman Parkway, Milton, MA

Option A5 – Off Ramp – Retaining Wall (Mid)



LOCATION:

South Medford Connector path on fill with retaining wall at rivers edge and at Route 16 Exit Ramp

CONSIDERATIONS:

- Disrupts existing riparian zone
- Will require additional flood storage down river
- Mitigated noise and safety issues for cyclists on path
- Existing lighting serves path

CONSTRAINTS:

- Existing Route 16 Exit Ramp is approximately 23' wide.
- Cost of retaining wall and fill substantial
- Flood storage and permitting

OPTION A5 - OFF RAMP - RETAINING WALL (MID)

* Approximate FEMA Base Flood Elevation for planning purposes only.

Route Alignment Option Matrix

Segment A - Route 16 Exit Ramp Options Matrix

		Low Impact	Low Cost	Typical Construction	Typical O & M	Unique/ Memorable Experience	Typical Permitting
		Neutral	Medium Cost	Neutral	Neutral	Neutral	Neutral
		High Impact	High Cost	Complex Construction	Complex O & M	Challenging Experience	Complex Permitting
Item	Considerations	Site Disturbance	Cost	Ease of Construction	O & M	User Experience	Permitting Constraints
Option A 1 On Ramp (Ramp Open)	Narrows existing highway exit ramp to allow for shared-use path within exit ramp. Could be 8' width. Requires minimal work on existing slope	Low Impact	Low Cost	Typical Construction	Typical O & M	Unique/ Memorable Experience	Typical Permitting
Option A 2 Off Ramp - Boardwalk on Piles	Column on piles or spread footing. Could use precast 12' wide prestressed bridge unit with central stem-pier on single footing. Could selectively remove existing boulders on slope	Neutral	Medium Cost	Neutral	Neutral	Neutral	Neutral
Option A 3 Off Ramp - Retaining Wall - Low	Would likely require resetting of existing light post footings and shoring on both exit ramp and river sides.	High Impact	High Cost	Complex Construction	Complex O & M	Challenging Experience	Complex Permitting
Option A 4 Off Ramp - Retaining Wall - High	Substantial cost of retaining wall, excavation and fill along with permitting implications.	High Impact	High Cost	Complex Construction	Complex O & M	Challenging Experience	Complex Permitting
Option A 5 Off Ramp - Retaining Wall - Mid	Some savings in wall cost, but would still require shoring on the river side and substantial excavation to get footing installed.	High Impact	High Cost	Complex Construction	Complex O & M	Challenging Experience	Complex Permitting

Locus Map



Figure 1: Project Location
 Mystic Greenways - South Medford Connector
 Medford, MA

Data Source: MassGIS, FEMA
 Nitsch Project # 12071.1P

Legend

Town Boundary

Flood Zone Hazard Areas

Flood Zone Designations

- A: 1% Chane of Annual Flooding, no BFE
- AE: 1% Annual Chance of Flooding, with BFE
- AE: Regulatory Floodway
- X: 0.2% Annual Chance of Flooding
- X: Area of Minimal Flood Hazard

MassDOT Major Roads

Administrative Type

- Interstate
- State Route

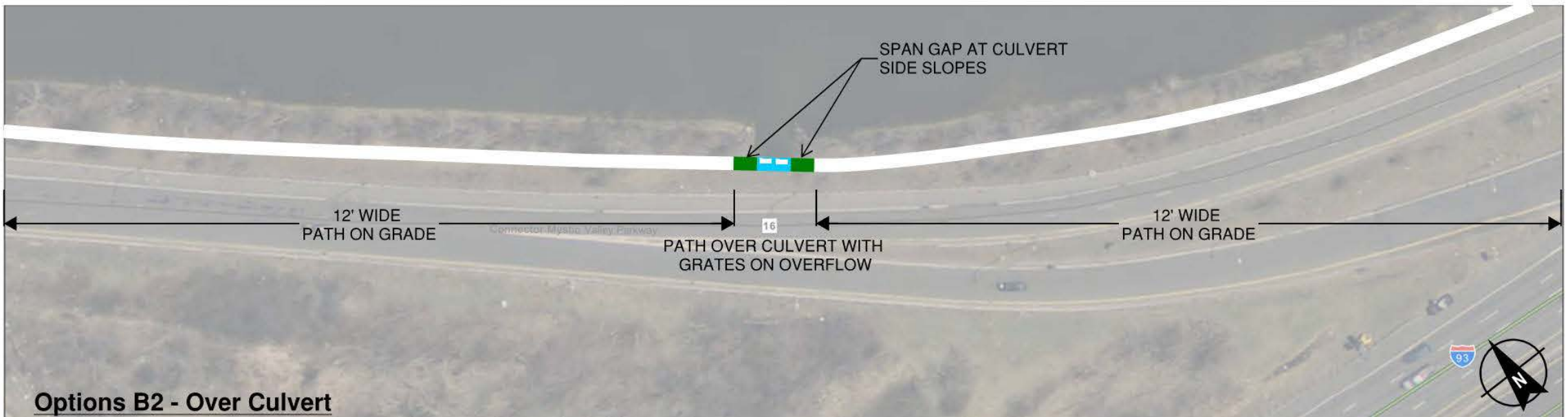
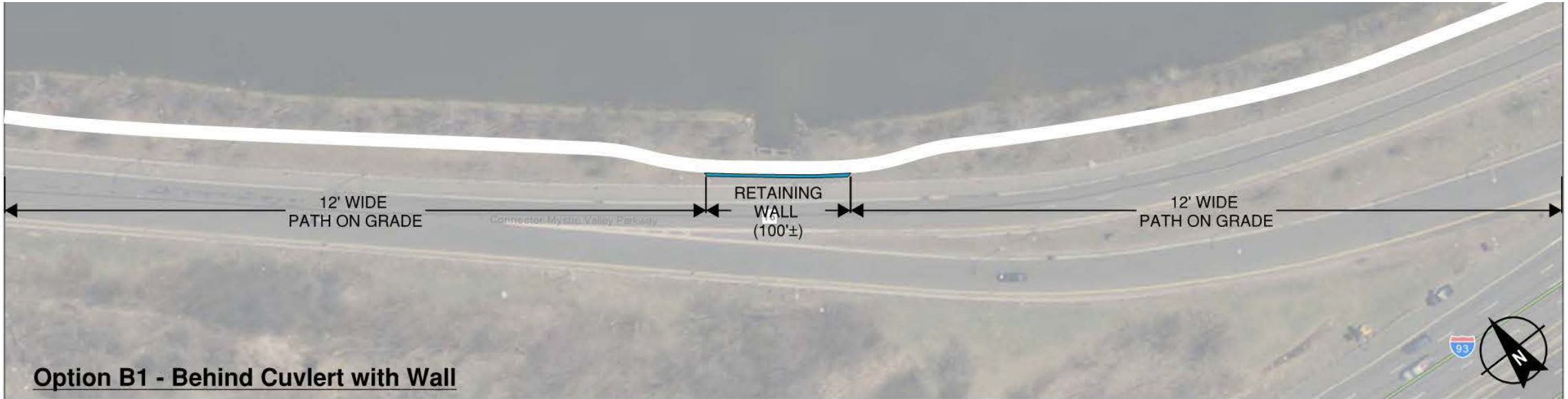
Vegetation Clearing + Vista Location

0 250 500 1,000
 Feet

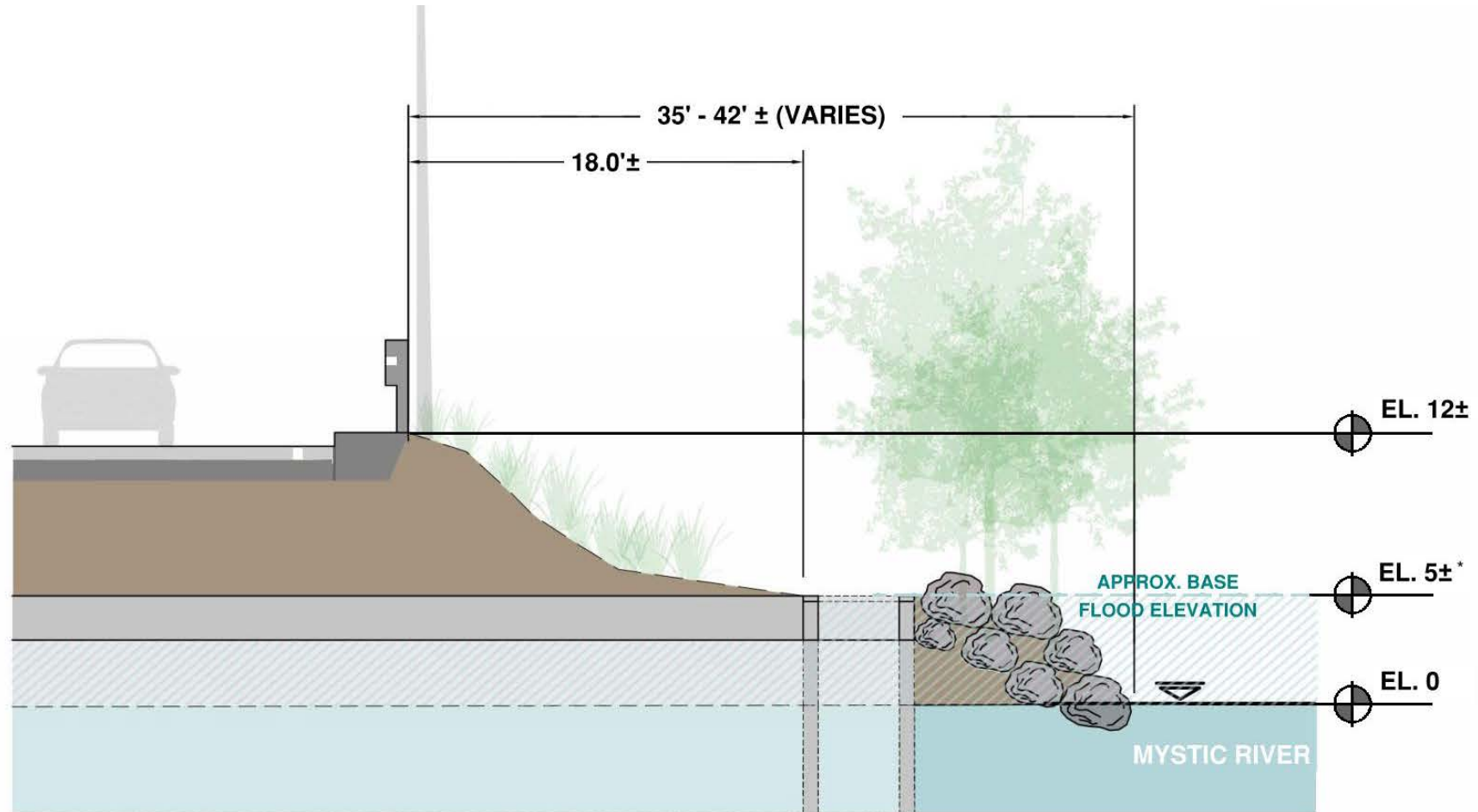
Scale: 1" = 200'



Route Alignments – Location B

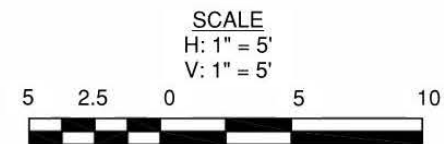


Location B – Existing Cross Section at Culvert



EXISTING CONDITIONS AT CULVERT

**SOUTH MEDFORD CONNECTOR PATH
ALIGNMENT OPTION AT DRAINAGE CULVERT**



* Approximate FEMA Base Flood
Elevation for planning purposes only.

Option B1 – Path Behind Culvert with Wall

LOCATION:

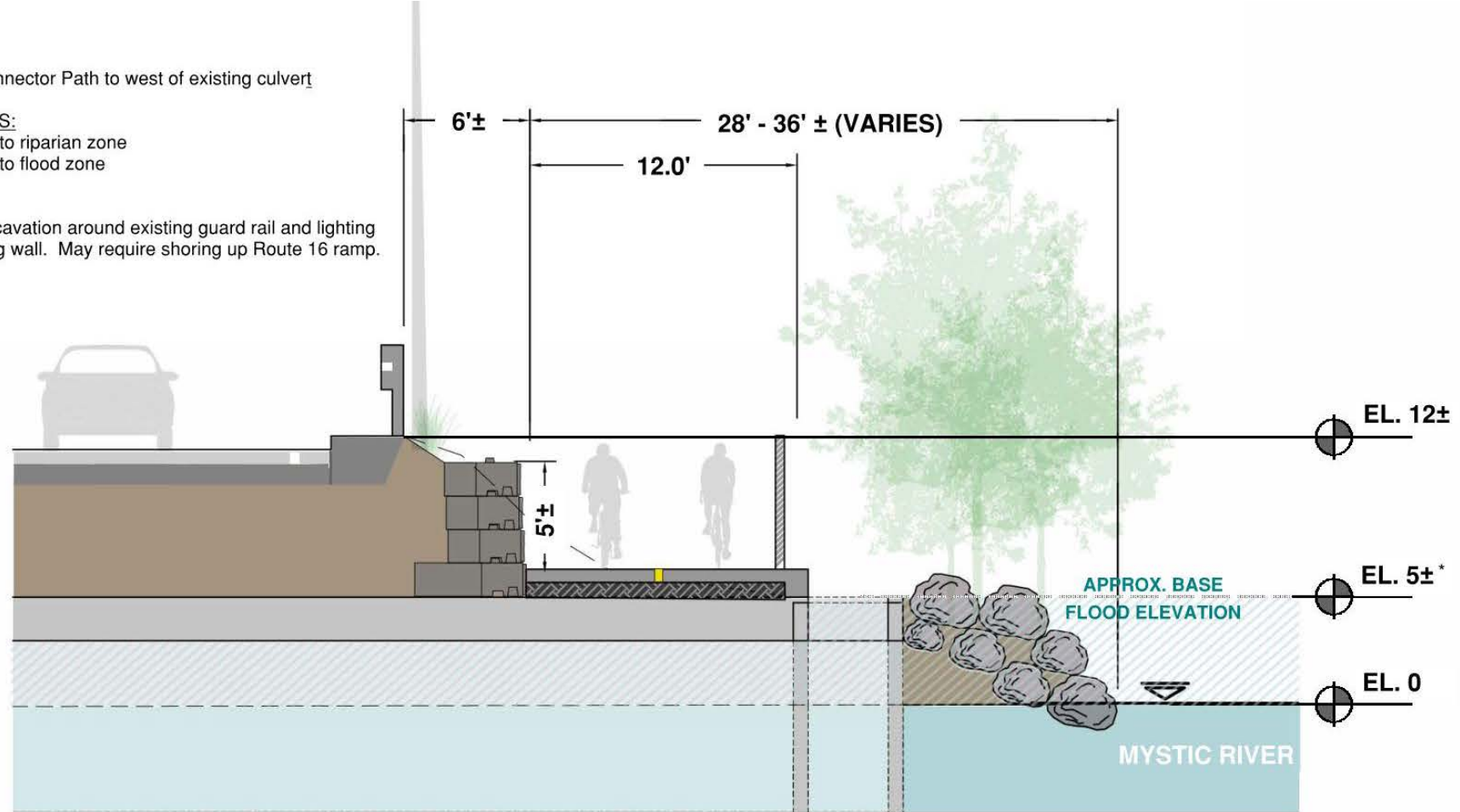
South Medford Connector Path to west of existing culvert

CONSIDERATIONS:

- Minimal impact to riparian zone
- Minimal impact to flood zone

CONSTRAINTS:

- May require excavation around existing guard rail and lighting
- Cost of retaining wall. May require shoring up Route 16 ramp.



OPTION B1 - PATH BEHIND CULVERT WITH WALL

**SOUTH MEDFORD CONNECTOR PATH
ALIGNMENT OPTION AT DRAINAGE CULVERT**

SCALE

H: 1" = 5'

V: 1" = 5'

5 2.5 0 5 10



* Approximate FEMA Base Flood Elevation for planning purposes only.

Option B2 – Path over Culvert with Grates

LOCATION:

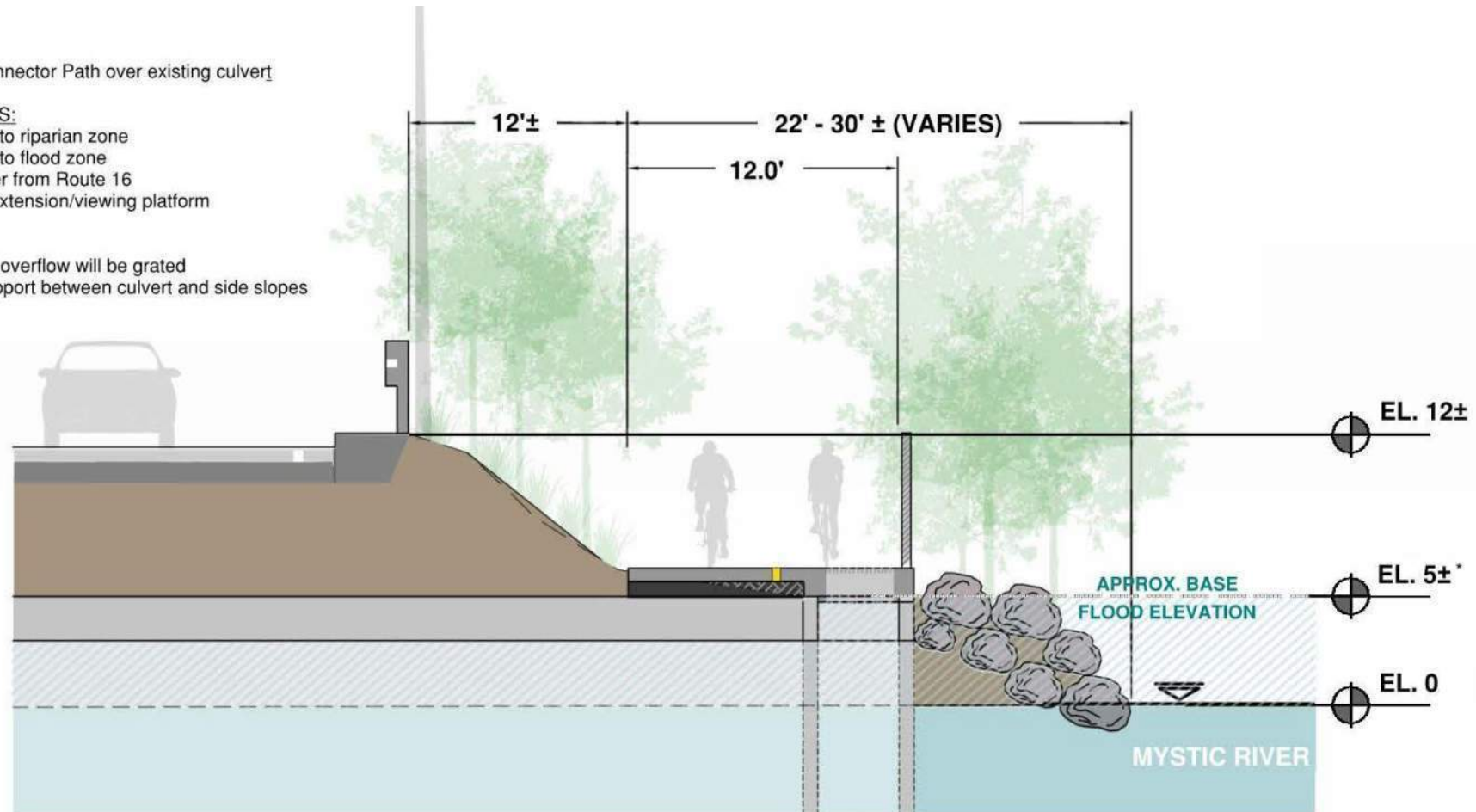
South Medford Connector Path over existing culvert

CONSIDERATIONS:

- Minimal impact to riparian zone
- Minimal impact to flood zone
- Vegetated buffer from Route 16
- Potential path extension/viewing platform

CONSTRAINTS:

- Existing culvert overflow will be grated
- Will require support between culvert and side slopes



OPTION B2 - PATH OVER CULVERT WITH GRATES

**SOUTH MEDFORD CONNECTOR PATH
ALIGNMENT OPTION AT DRAINAGE CULVERT**

SCALE

H: 1" = 5'

V: 1" = 5'

5 2.5 0 5 10



* Approximate FEMA Base Flood Elevation for planning purposes only.

Route Alignment Option Matrix

Segment A - Route 16 Exit Ramp Options Matrix		Low Impact	Low Cost	Typical Construction	Typical O & M	Unique/ Memorable Experience	Typical Permitting
		Neutral	Medium Cost	Neutral	Neutral	Neutral	Neutral
		High Impact	High Cost	Complex Construction	Complex O & M	Challenging Experience	Complex Permitting
Item	Considerations	Site Disturbance	Cost	Ease of Construction	O & M	User Experience	Permitting Constraints
Option B 1	Behind Culvert with Wall	Some costs associated with section of retaining wall on highway side, should avoid existing light pole footings					
Option B 2	Over Culvert with Grates	Would require small base on land side and a beam connecting to existing culvert structure. Would also require grating for overflows from existing culvert.					

Deliverables

Phase 1

- ✓ Project Kickoff Meeting (March 21, 2018)
- ✓ Route Alignments
 - Environmental Review
 - Preferred Alternative
 - Technical Memorandum
 - Stakeholder Meetings – 2 Meetings

Phase 2 (Pending 2018 Grant Funding)

- Final Design (Construction Documents)
- Permitting

Next Steps

- Refine three alignment options based on today's input
- Finalize Environmental Review
- **Select Preferred Alternative**
 - *Distribute ahead of next meeting*
 - *Perform Permitting Analysis*
 - *Develop Conceptual Cost Estimate*
- **Reconvene**
 - *Meeting set for June 20th, 2018*

Stakeholder Meeting #2

MEETING NOTES FOR SOUTH MEDFORD CONNECTOR PROJECT STAKEHOLDER MEETING #2

Date: May 09, 2018
Location: Medford City Hall
Project: South Medford Connector
Nitsch Project #: 12626.2

MEETING ATTENDEES

- Amber Christoffersen, Mystic River Watershed Association (MyRWA)
- Alicia Hunt, City of Medford
- Connie Raphael, MassDOT District 4
- Todd Blake, City of Medford Traffic Engineer
- David Loutzenheiser, Metropolitan Area Planning Council (MAPC)
- Karl Haglund, Massachusetts Department of Conservation and Recreation (DCR)
- Ginna Johnson, Massachusetts Department of Conservation and Recreation (DCR)
- Brian Creamer, Nitsch Engineering
- Jennifer Johnson, Nitsch Engineering

GAMING COMMISSION/FUNDING OUTLOOK

- Joe Delaney from the Gaming Commission couldn't attend the meeting but should continue to be included on the circulation list for notes and future materials.
- Gaming Commission capital funding should be available in 2019 or when the Everett casino opens. Capital funding could potentially pay for the construction of this project. Projects that are shovel ready will be given preference for funding.
- Alicia received questions on the 'Round 2' Planning Funding (2018 Transportation Planning Grant).
 - Alicia will request in writing from Gaming Commission and will circulate to team.
 - We may need to adjust this project's schedule and/or deliverables to meet Gaming Commission needs for a 2018 Planning Grant. Depending on the questions from the Gaming Commission, a memo might be needed to supplement 2018 planning grant application
- Alicia indicated that a memo prepared by Nitsch Engineering may be required to bring to a Gaming Commission meeting to provide some more detail on the 2018 Transportation Planning Grant application.
- A Central Transportation Planning Staff (CTPS) study would be required in order to close the Route 16 exit ramp. CTPS is a sister agency to the Metropolitan Area Planning Council (MAPC). Alicia indicated that keeping the exit ramp closed should remain as an option for consideration in this preliminary study. It is important for the study to acknowledge that having the ramp remain closed was examined as part of this study.

PROJECT OVERVIEW

- Brian (Nitsch) and Amber provided a general overview of the project including proposed project schedule, and a review of the work performed to date.
- Jenn (Nitsch) indicated that the purpose of the meeting was to review path alignment alternatives and receive feedback from the stakeholders in attendance.

Following this meeting, Nitsch will refine the alternatives into a preferred alignment with two alternatives.

REVIEW OF ROUTE ALIGNMENT ALTERNATIVES AND INPUT FROM STAKEHOLDER GROUP

- Please see the attached presentation slides for alignment alternatives.

Location A (Route 16 Exit Ramp)

- Brian (Nitsch) provided a summary of the alternative horizontal and vertical alignments at the Route 16 exit ramp, which includes five Options designated A1-A5.

Option A1 – Ramp Open, Bike Lane/Path Adjacent to Vehicular Traffic

- Connie (MassDOT) indicated that safety of path users is a concern for constructing the path on the on-ramp due to the speed of vehicles on the exit ramp. A minimum ramp pavement width of two feet is required for vehicular access. This minimum width would not be met if a bicycle lane is added within the existing ramp. Therefore, Option 1A is not MassDOT's preferred option.
- The group discussed the implications of snow plowing and snow removal for the path if the path is located on the ramp. If Option A1 were constructed, there would be minimal space between the vehicular travel lane and the bicycle path which would not allow for snow to be plowed without impacting the path.
- The technical memo prepared by Nitsch Engineering will maintain an alternative that considers keeping the ramp closed so that it can be referenced in the future by Medford or MassDOT.
- Ginna (DCR) suggested an alternative that includes narrowing Route 16 it crosses the Route 38 and potentially continuing the path over Route 38 rather than continuing the path exit ramp along the ramp. Users of the path would have to cross the exit ramp under this scenario. This could be a dangerous condition for users of the path.

Option A2 – Structure on Piers/Piles

- All meeting attendees liked this option, but designs should be mindful of horizontal separation from exit ramp.
- The Alewife Greenway was discussed as a precedent path at locations where the path is supported by piles.
- As a modified alternative, Nitsch will consider lowering the boardwalk/structure to reduce structure height.

Options A3 – A5 – High, Low, and Mid-Height Elevation Path

- The high, low and mid- options (Options A3, A4 and A5) are referencing the height of proposed path relative to the elevation of the existing route 16 exit ramp. Option A3 shows the elevation of the path approximately ten feet below the elevation of the exit ramp. Option A4 shows the elevation of the proposed path at approximately the same height as the exit ramp, and Option A5 shows the path at approximately five feet below the elevation of the exit ramp. MassDOT indicated concerns with structural implications and shoring required to construct retaining walls close to the ramp. Protecting and/or constructing light pole bases will also need to be considered for Options A3-A5.
- These options should keep existing light pole bases in place or integrate into new wall if selected.

- Retaining Wall (Low) option (A3) is not preferred by DCR because the wall – and the path - will be shaded and there is the potential for moss growth. Snow clearing operations from the Route 16 exit ramp could push snow over the wall and onto the path.
- As a modified alternative, Nitsch will consider a hybrid of Option A2 (piles) and Option A5 (mid-wall).

General Discussion of Location A Alternatives

- Resilience should be integrated within the path route memo. The team should understand and design for future flood scenarios.
- The following preferred options for Location A will be further explored by Nitsch and discussed in more detail in the Technical Memorandum:
 - Option A2/A5 hybrid variation with columns and low wall
 - Option A2 on columns
 - Option A0 - Scenario where ramp is closed and path can utilize existing impervious area. A0 should be described as an option above.

Location B (Large Drainage Culverts and Associated Outfall)

- Brian (Nitsch) provided a summary of the alternative horizontal and vertical alignments of the path at the large drainage culverts. These alignments include Options B1 and B2.
 - Option B1 locates the path south of the exposed concrete outfall and requires a retaining wall where the path is closest to Route 16.
 - Option B2 locates the path over the exposed concrete outfall of the culverts and requires structural spanning of the approaches on either side of the culvert
- Attendees agreed that both alternatives could be viable, but selection of a preferred alternative would require additional investigation into the existing culvert. Information including the culvert inverts and wall thickness will inform feasibility of constructing over the culvert. Nitsch will coordinate with the City of Medford GIS specialist to obtain records on the culvert.
- DCR noted that the structural footing for the retaining wall in Option B1 may conflict with the culverts.
- Amber (MyRWA) suggested a small wooded bridge similar to the one found in the southeastern corner of Torbert MacDonald Park adjacent to the Fellsway opposite Station Landing. This small bridge could span the culvert in its entirety. This approach would avoid potential impacts to the culvert.

Action Items/Next Steps

- The Nitsch Team will coordinate with Medford, DCR, and MassDOT to obtain any outstanding/additional record documents for the project site and surrounding areas if needed.
- The Nitsch Team will begin refining route alternatives and recommending a preferred alternate for presentation at the next meeting.
- The Nitsch Team has reached out to City of Medford for GIS information on existing drainage system.
- Next meeting is June 20, 2018, 10:30-12. Amber (MyRWA) has sent an invite.

South Medford Connector: Nitsch Project #12626
May 21, 2018
Page 4 of 5

If any of the attendees feel these Meeting Minutes do not accurately reflect the discussions, please notify the writer within one (1) week of receipt. Nitsch Engineering will determine if edits will be made and, if so, the Minutes will be reissued.

Prepared by: Jennifer Johnson and Brian Creamer

JLJ/BFC

cc: All Attendees

MYSTIC GREENWAYS

SOUTH MEDFORD CONNECTOR

Stakeholder Meeting #3

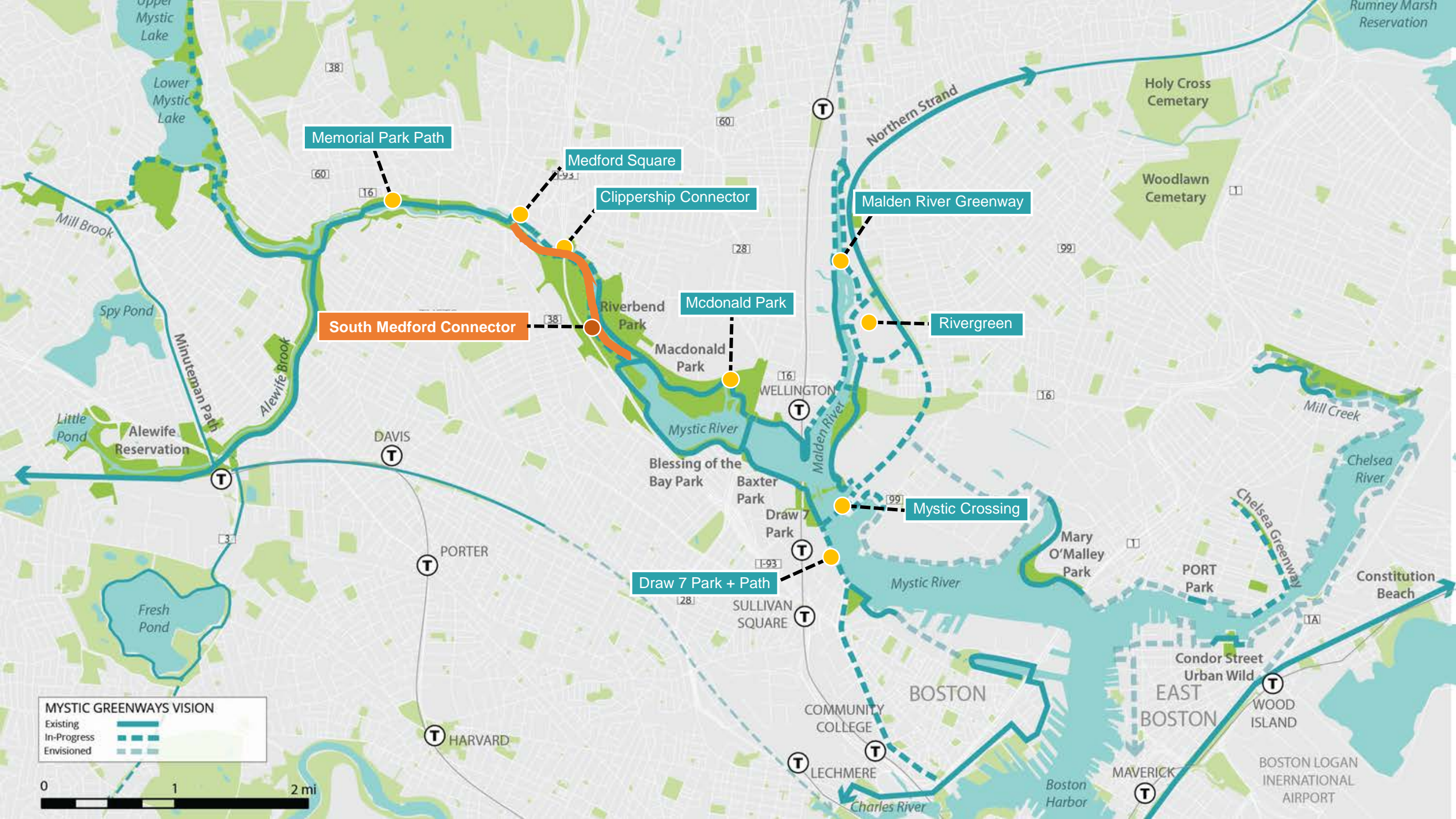
June 20, 2018



Nitsch Engineering

Agenda

- Welcome & Introductions
- Phase I Site Assessment Results
- Review of Selected Alternatives
 - Preliminary Permitting Assessment
 - Preliminary Cost Estimate
- Schedule and Next Steps



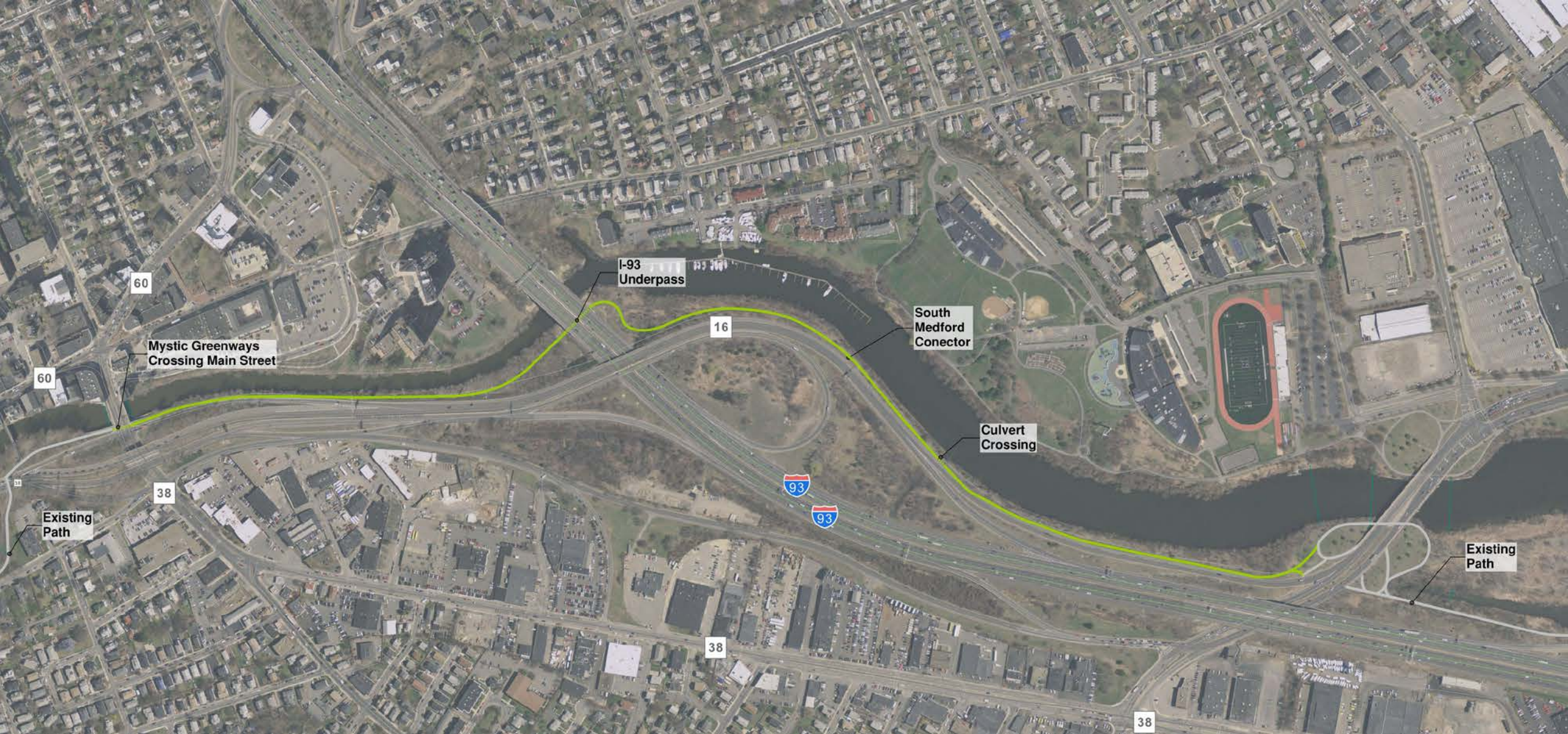
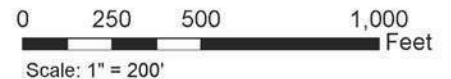


Figure 1: Project Location
 Mystic Greenways - South Medford Connector
 Medford, MA



Phase I Environmental Site Assessment



Phase I Site Assessment Results

Performed to evaluate the possible presence of **recognized environmental conditions (RECs)** which are defined as *“the presence or likely presence of hazardous substances or petroleum products on a property under conditions that indicate an existing release, a past release, or a material threat of a release of hazardous substances or petroleum products into structures on the property or into the ground, groundwater, or surface water of the property.”*



Phase I Site Assessment Results

- **No releases or response actions** are connected to the Property according to state records at MassDEP and no additional research is recommended.
- TRACEY **did not identify any RECs** for the Property.
- MassDOT records did not indicate specific information regarding the filling in of the Mystic River that occurred during the development of I-93 or the materials used to create the existing embankments of the current Mystic River.

Selected Alternatives



Locus Map



Figure 1: Project Location
 Mystic Greenways - South Medford Connector
 Medford, MA

Data Source: MassGIS, FEMA
 Nitsch Project # 12071.1P

Legend

Town Boundary

Flood Zone Hazard Areas

Flood Zone Designations

- A: 1% Chane of Annual Flooding, no BFE
- AE: 1% Annual Chance of Flooding, with BFE
- AE: Regulatory Floodway
- X: 0.2% Annual Chance of Flooding
- X: Area of Minimal Flood Hazard

MassDOT Major Roads

- Interstate
- State Route

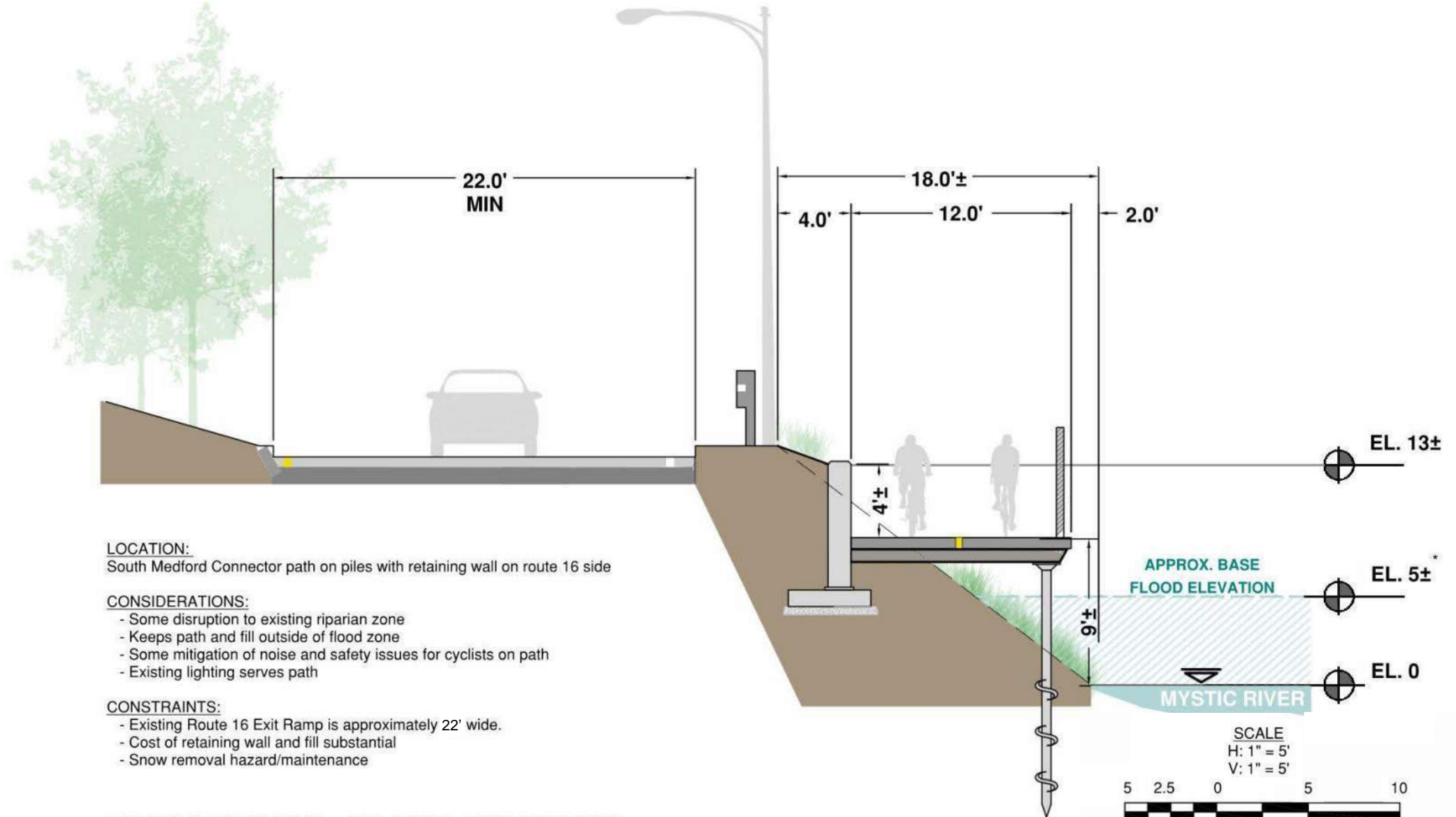
Vegetation Clearing + Vista Location

0 250 500 1,000
 Feet

Scale: 1" = 200'



Option A2/A5 Hybrid – Off Ramp – Piers (Mid)



LOCATION:

South Medford Connector path on piles with retaining wall on route 16 side

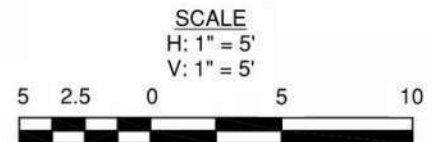
CONSIDERATIONS:

- Some disruption to existing riparian zone
- Keeps path and fill outside of flood zone
- Some mitigation of noise and safety issues for cyclists on path
- Existing lighting serves path

CONSTRAINTS:

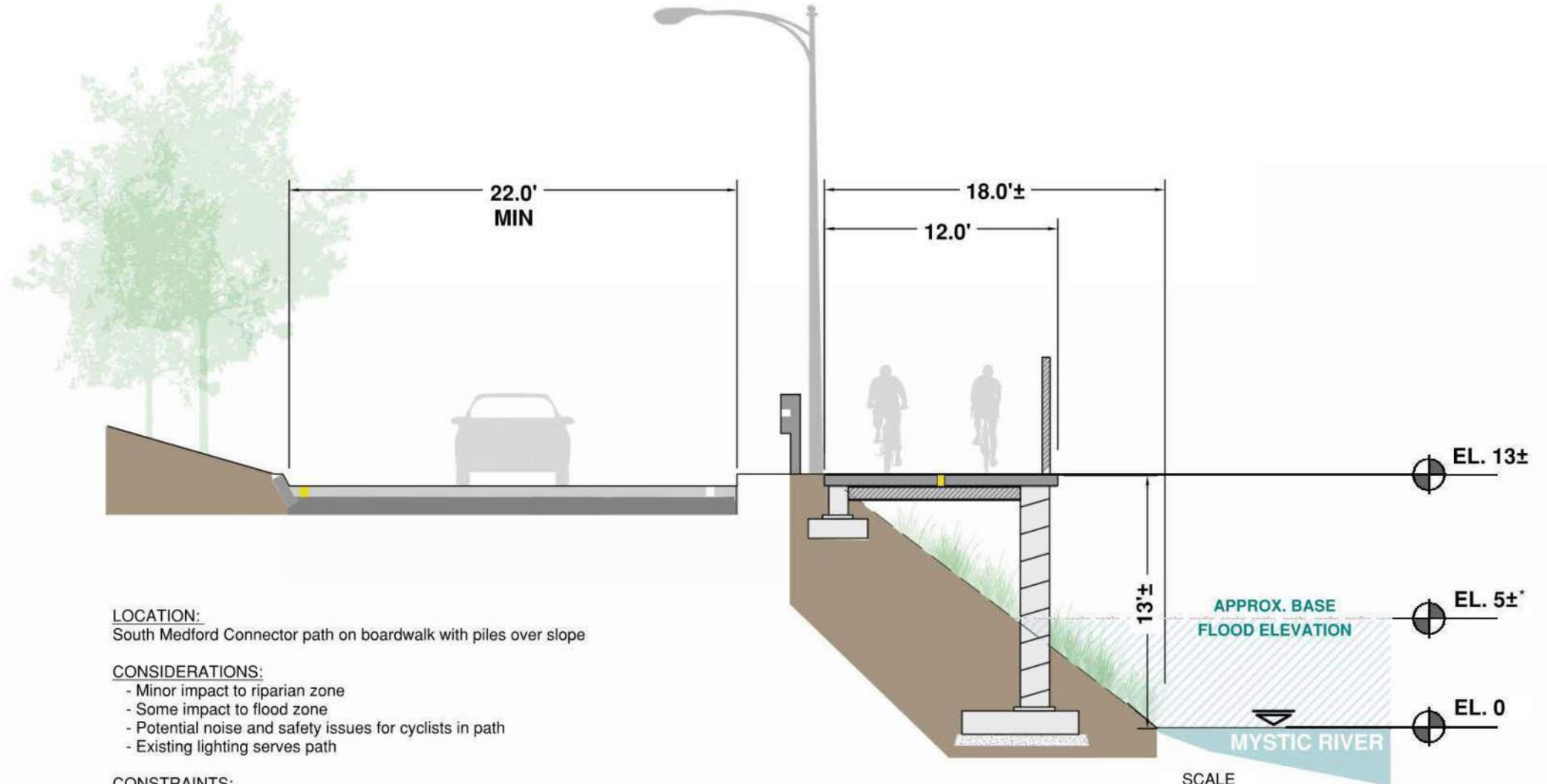
- Existing Route 16 Exit Ramp is approximately 22' wide.
- Cost of retaining wall and fill substantial
- Snow removal hazard/maintenance

OPTION A2/A5 HYBRID - OFF RAMP - PIER/PILE (MID)



* Approximate FEMA Base Flood Elevation for planning purposes only.

Option A2 – Off Ramp – Structure on Piers/Piles



LOCATION:

South Medford Connector path on boardwalk with piles over slope

CONSIDERATIONS:

- Minor impact to riparian zone
- Some impact to flood zone
- Potential noise and safety issues for cyclists in path
- Existing lighting serves path

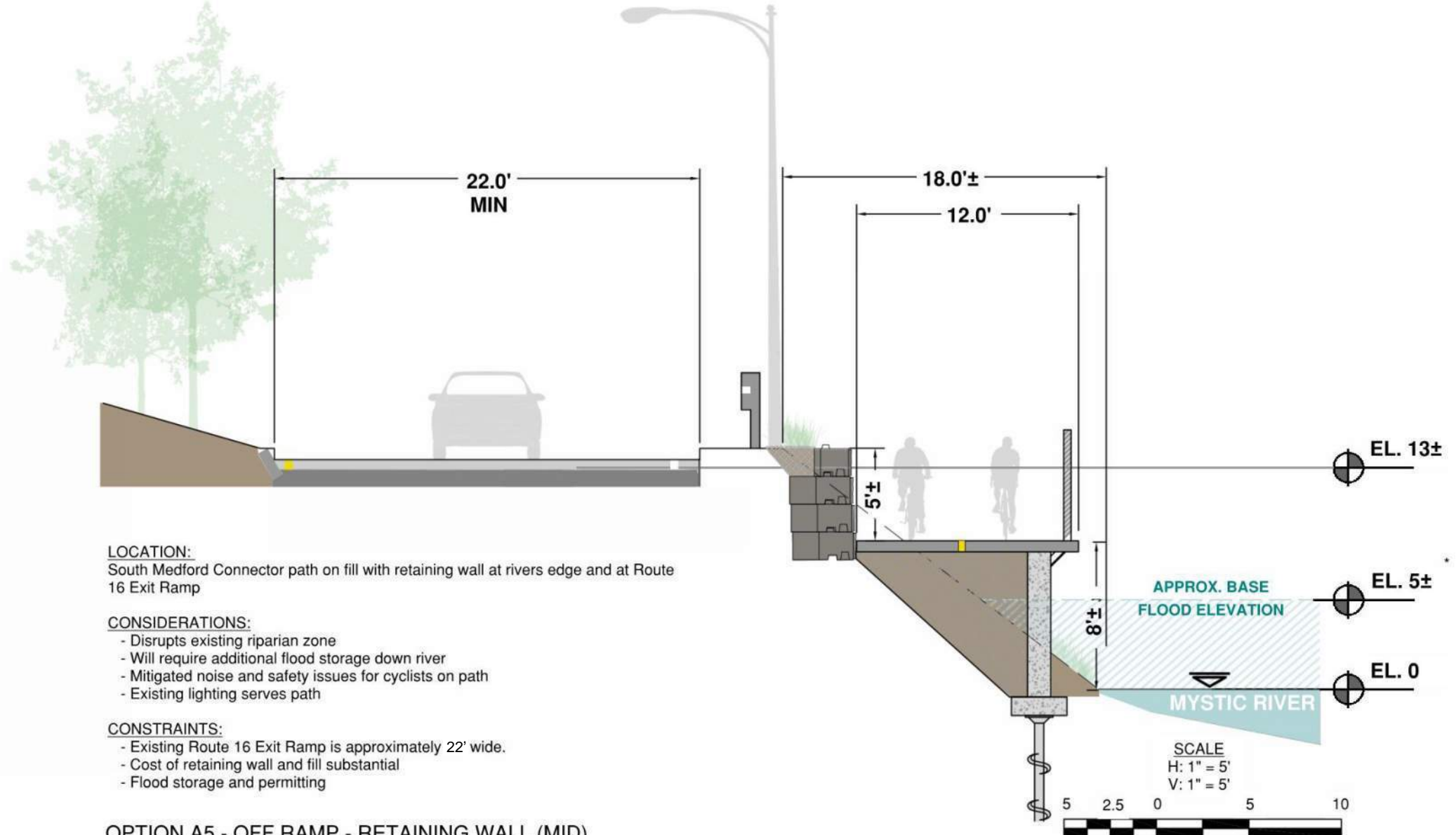
CONSTRAINTS:

- Existing Route 16 Exit Ramp is approximately 22' wide.
- Requires disturbing existing riprap slope to install footings
- High costs to install piles & platform

OPTION A2 - OFF RAMP - BOARDWALK ON PILES

* Approximate FEMA Base Flood Elevation for planning purposes only.

Option A5 – Off Ramp – Retaining Wall (Mid)



LOCATION:

South Medford Connector path on fill with retaining wall at rivers edge and at Route 16 Exit Ramp

CONSIDERATIONS:

- Disrupts existing riparian zone
- Will require additional flood storage down river
- Mitigated noise and safety issues for cyclists on path
- Existing lighting serves path

CONSTRAINTS:

- Existing Route 16 Exit Ramp is approximately 22' wide.
- Cost of retaining wall and fill substantial
- Flood storage and permitting

OPTION A5 - OFF RAMP - RETAINING WALL (MID)

* Approximate FEMA Base Flood Elevation for planning purposes only.

Locus Map



Figure 1: Project Location
 Mystic Greenways - South Medford Connector
 Medford, MA

Data Source: MassGIS, FEMA
 Nitsch Project # 12071.1P

Legend

Town Boundary

Flood Zone Hazard Areas

Flood Zone Designations

- A: 1% Chane of Annual Flooding, no BFE
- AE: 1% Annual Chance of Flooding, with BFE
- AE: Regulatory Floodway
- X: 0.2% Annual Chance of Flooding
- X: Area of Minimal Flood Hazard

MassDOT Major Roads

Administrative Type

- Interstate
- State Route
- Vegetation Clearing + Vista Location

0 250 500 1,000
 Feet

Scale: 1" = 200'



Option B2 – Path over Culvert with Grates

LOCATION:

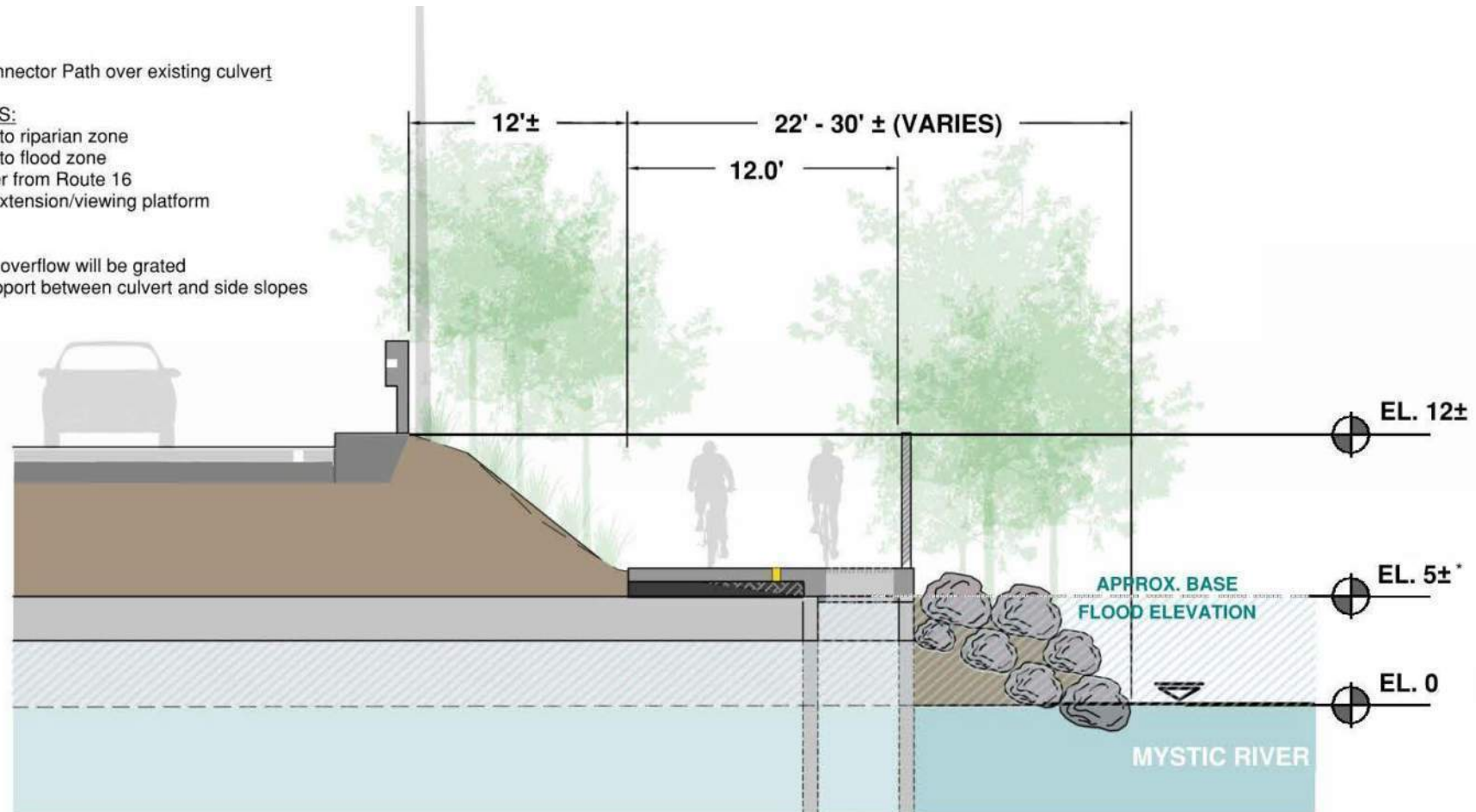
South Medford Connector Path over existing culvert

CONSIDERATIONS:

- Minimal impact to riparian zone
- Minimal impact to flood zone
- Vegetated buffer from Route 16
- Potential path extension/viewing platform

CONSTRAINTS:

- Existing culvert overflow will be grated
- Will require support between culvert and side slopes



OPTION B2 - PATH OVER CULVERT WITH GRATES

**SOUTH MEDFORD CONNECTOR PATH
ALIGNMENT OPTION AT DRAINAGE CULVERT**

SCALE

H: 1" = 5'

V: 1" = 5'



* Approximate FEMA Base Flood Elevation for planning purposes only.

Option B3 – Path bridge over Culvert

LOCATION:

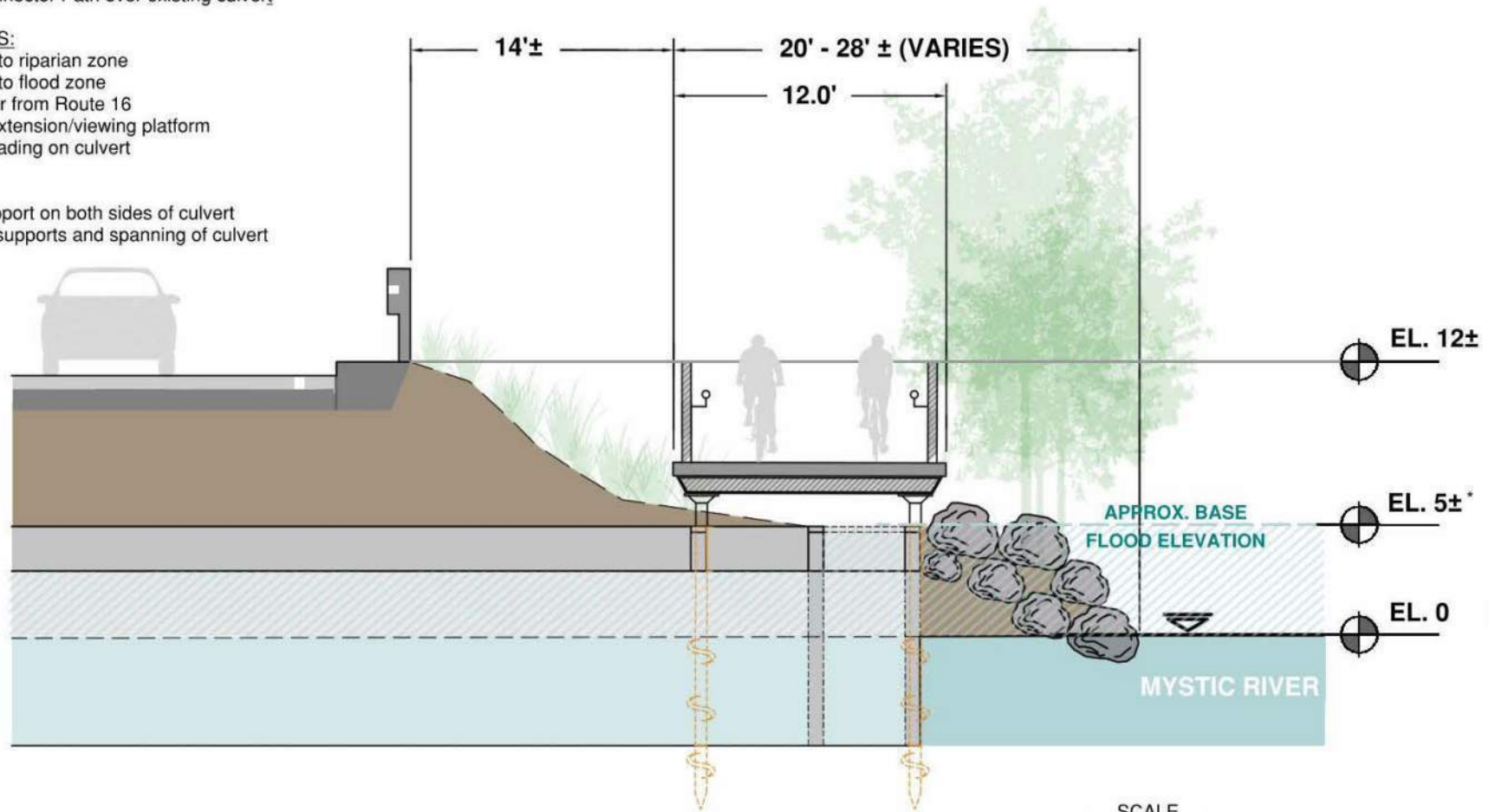
South Medford Connector Path over existing culvert

CONSIDERATIONS:

- Minimal impact to riparian zone
- Minimal impact to flood zone
- Vegetated buffer from Route 16
- Potential path extension/viewing platform
- No additional loading on culvert

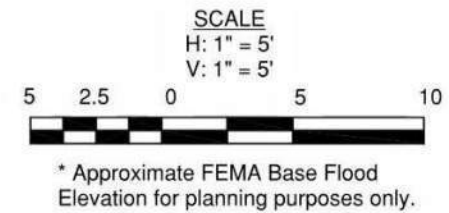
CONSTRAINTS:

- Will require support on both sides of culvert
- Helical piles or supports and spanning of culvert



OPTION B3 - PATH BRIDGING CULVERT

**SOUTH MEDFORD CONNECTOR PATH
ALIGNMENT OPTION AT DRAINAGE CULVERT**



Limitations and Uncertainties

- CTPS Traffic Study
- Soils and Subgrade Conditions
 - Structural Bearing Capacity – *Geotechnical Evaluation Required*
 - Environmental Hazards – *Status of Fill*
- Property and Project Ownership
- Exact Location of Flood, Wetland, and Water Resource Area Boundaries
 - *Wetland Evaluation and Survey Required*



Preliminary Permitting Assessment

- Environmental
 - Floodplain Considerations
 - Wetlands Protection Act / Medford Wetlands Ordinance
 - Chapter 91
 - MEPA
 - Army Corps of Engineers – Massachusetts General Permit
- MassDOT Permitting



Permitting – Floodplain Considerations



- Floodplain vs. Regulatory Floodway

Preliminary Permitting Summary

			State				Federal
			Wetlands Protection Act/ Medford Ordinance	Chapter 91	MEPA	MassDOT/ FHWA	Army Corps
Location A	A2/A5 Hybrid	Path at Mid Elevation – Structure on Piers/Piles	✓	✓		✓	
	A2	Path at Ramp Elevation – Structure on Piers/Piles	✓	✓		✓	
	A5	Path at Mid Elevation – Structure on Fill (walls)	✓	✓	?	✓	?
	A0	Path at ramp elevation – Ramp closed	✓	✓		✓	
Location B	B2	Path on culvert with grates	✓	✓		✓	
	B3	Path over culvert with bridge	✓	✓		✓	

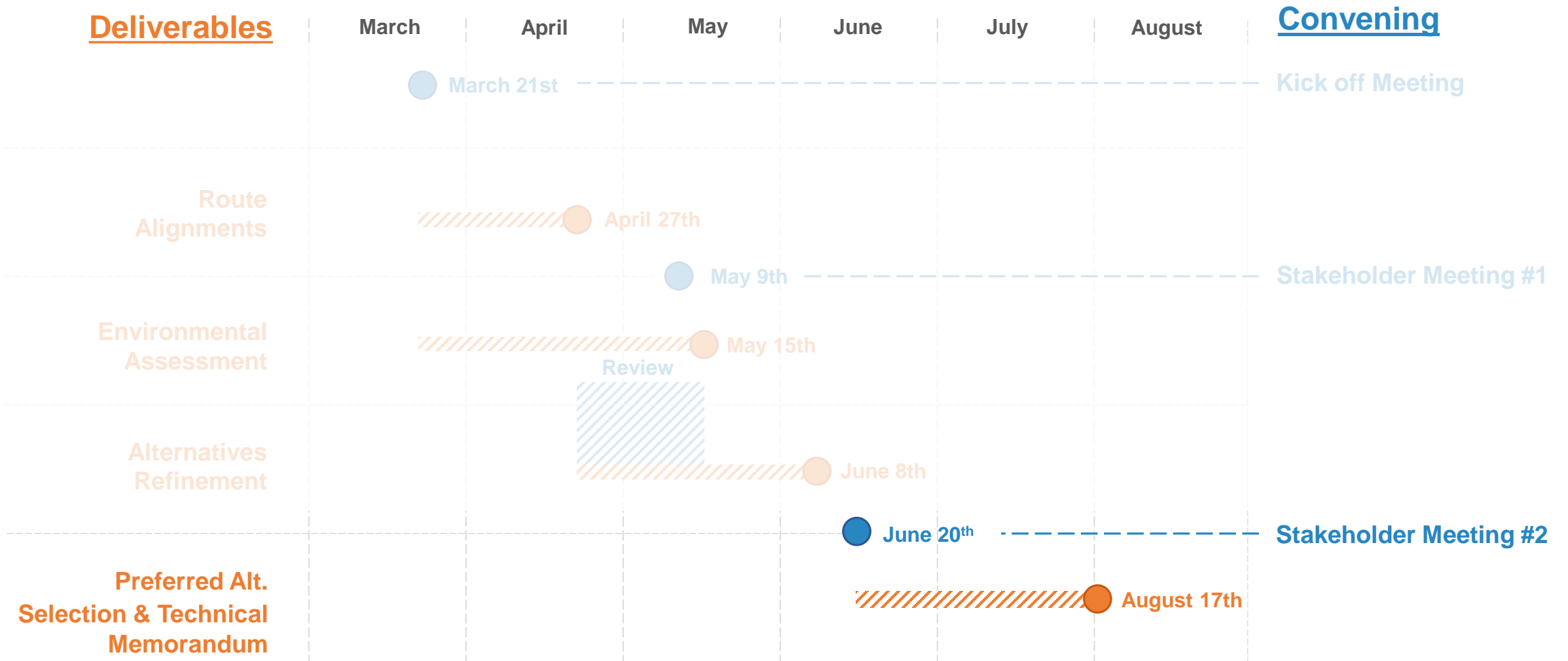
Preliminary Cost Estimate

	Alternative A2/A5 Hybrid	Alternative A2	Alternative A5
Path on Grade (4,980 LF) with Furnishings	\$1,610,677	\$1,610,777	\$1,610,777
Path on Structure (800 LF) "A Alternatives"	\$3,903,000	\$4,654,200	\$4,883,000
General Conditions/Contingencies	\$3,635,203	\$4,130,465	\$4,300,978
Subtotal	\$9,148,880	\$10,395,442	\$10,794,755
Outfall-B2	\$134,187	\$134,187	\$134,187
Outfall-B3	\$309,458	\$309,458	\$309,458
Total – Low (Total + B2)	\$9,283,067	\$10,529,629	\$10,928,942
Total – High (Total + B3)	\$9,458,338	\$10,704,900	\$11,104,213

Cost Critical Items

- Concept-based pricing require assumptions for lighting, furnishings, plantings
- Cost of shoring and structure for “A” alternatives
- Environmental mitigation not included
- Remediation of hazardous material not included
- Increased cost for work directly along river for A5 alternative

Schedule Update



Deliverables

Phase 1

- ✓ Project Kickoff Meeting (March 21, 2018)
- ✓ Route Alignments
- ✓ Environmental Review
 - Preferred Alternative
 - Technical Memorandum
- ✓ Stakeholder Meetings – 2 Meetings

✓ Phase 2 (Pending 2018 Grant Funding)

- Final Design (Construction Documents)
- Permitting



Next Steps

- **Select Preferred Alternative**
 - *Finalize Permitting Analysis*
 - *Refine Conceptual Cost Estimate*
- **Finalize Feasibility Study**

Stakeholder Meeting #3

MEETING NOTES FOR SOUTH MEDFORD CONNECTOR PROJECT STAKEHOLDER MEETING #3

Date: June 20, 2018
Location: Medford City Hall
Project: South Medford Connector
Nitsch Project #: 12626.2

MEETING ATTENDEES

- Amber Christoffersen, Mystic River Watershed Association (MyRWA)
- Dana Mills, Mystic river Watershed Association (MyRWA)
- Alicia Hunt, City of Medford
- Connie Raphael, MassDOT District 4
- Todd Blake, City of Medford Traffic Engineer
- David Loutzenheiser, Metropolitan Area Planning Council (MAPC)
- Karl Haglund, Massachusetts Department of Conservation and Recreation (DCR)
- John Ziemba, Massachusetts Gaming Commission
- Brian Creamer, Nitsch Engineering
- Jennifer Johnson, Nitsch Engineering
- Scott Turner, Nitsch Engineering

MEETING OVERVIEW

Note: See attached presentation slides for alignment locus plan and cross sections.

- Jenn provided a general overview of the project, including proposed project schedule and the work performed to date.
- Jenn indicated that the purpose of the meeting was to review selected alternatives, the preliminary permitting assessment, and the preliminary cost estimate and to determine which alternative(s) should move forward as the preferred alternative.
- Jenn and Scott gave an overview of the Phase I Environmental Site Assessment, prepared by TRACEY Environmental.
 - No releases or response actions are connected to the path corridor according to MassDEP records and no additional research is recommended
 - No Recognized Environmental Conditions (REC) were identified on the path corridor.
 - Scott pointed out that MassDOT records did not include the source or specific information regarding the fill that occurred during the development of I-93 or the materials used to create the existing embankments of the current Mystic River.
- Jenn gave an assessment of permitting implications associated with the path, including the permits under the Wetlands Protection Act, Chapter 91, MEPA, Army Corps of Engineers, and MassDOT.
- Scott and Jenn presented cost estimates for three (3) "A" alternatives (A2/A5 hybrid, A2 and A5), which were prepared by VJ Associates. These alternatives include estimated pricing for 4,980 LF of path on grade, 800 LF of path on structure, and general conditions/contingencies. A high/low price range was provided based on the two (2) alternative options at location B (B2/B3).

REVIEW OF ROUTE SELECTED ALTERNATIVES AND INPUT FROM STAKEHOLDER GROUP

- Jenn reviewed three alignments at Location A which are on structure and have the Route 16 exit ramp open to vehicular traffic: Alignments A5, A2/A5 Hybrid, and A2.

Alignment A5 – Mid Level Path with Walls along Route 16 Ramp and Mystic River

- The stakeholder group discussed that this alternative offered similar benefits to Alignment A2/A5 hybrid, but was more expensive and had more unknowns due to the potential for filling within the floodway.
- **Takeaway: This alignment was not considered favorable due to its higher cost, challenging design and permitting constraints. This option will not be considered further but will be noted in the Technical Memorandum as an alternative that was reviewed during the conceptual design process.**

Alternative A2/A5 Hybrid - Mid Level Path with Wall along Route 16 Ramp and Pile Supports along Mystic River

- This was preferred over the A5 alternative because it was less expensive and didn't require construction as close to the River. Also, the construction of piers rather than a wall would be easier and require less work in wet conditions.
- David and Karl agreed that Alternative A2/A5 was acceptable, but having the path at the same elevation as the highway exit ramp (i.e. Alternative A2) was preferable for cyclist safety.
- **Takeaway: This alternative was considered favorable by some attendees as it mitigated noise and was the lowest cost option, however, the safety and experiential challenges of having the path lower than the exit ramp deemed it to be not as favorable as Alternative A2.**

Figure 1: Snow Fence



Alignment A2 – Path Matching Elevation of Route 16 Exit Ramp with Pile Supports

- Connie discussed MassDOT design considerations, which include a minimum of six (6) feet of horizontal separation from the Route 16 exit ramp with a permanent snow fence barrier between the vehicular lane and the path. Whittier Bridge in Amesbury/Newburyport was noted as an example of a structure that includes snow fence and a barrier for a shared use path.
- David noted the Alewife boardwalk in Cambridge as an example of an existing path which is adjacent to a roadway and has a railing, but does not have a snow fence.
- **Takeaway: This alignment was considered favorable by most attendees and was selected as the preferred alternative ahead of Alternatives A5 and A2/A5 hybrid at the end of the meeting. Therefore, Nitsch will refine the pricing for this alternative, along with pricing for Alternative A0 (path on closed ramp) for future City of Medford discussions and the technical memorandum that serves as the final deliverable for the conceptual design phase of this project.**

Figure 2: Alewife Linear Path at Alewife Station Access Road



Alignment A0 – Closed Route 16 Ramp

- Alicia requested that Nitsch provide pricing for the A0 alternative so that there will be a comparison against the other “A” alternatives that require structure.
- Connie indicated that if the path were to transition onto a closed exit ramp, the design should include consideration of the conversion of the ramp from a vehicular ramp to a path/park area. Design elements would include barriers between Route 16 and the ramp and potentially removing some of the existing paving.
- Alicia indicated that all existing pavement might not need to be removed immediately and that a wider bike path on the existing ramp with new pavement striping might suffice for now, with future improvements to come incrementally over time.
- Connie indicated that a federal highway closure permit application process would be required to close the ramp because the ramp is part of the federal highway layout.

GENERAL DISCUSSION

- **Craddock Bridge Opening**
 - Todd indicated that the Craddock Bridge has re-opened and that opening of the Route 16 exit ramp is anticipated in late Fall 2018.
- **Route 16 Exit Ramp Change from Federal to State Interchange**
 - Scott asked if there was any variability in the 22-foot minimum width requirement on the exit ramp.
 - Connie indicated that there was no variability as it is a federal highway interchange, controlled by the Federal Highway Administration (FHWA) and must meet their standards. She also indicated that this interchange was constructed as a highway interchange with the expectation that it would connect to an un-built Route 3 which would have gone through Woburn and Winchester.
 - Alicia and Scott discussed if it was possible, to change the route 16 interchange from a federal highway interchange, to a state highway controlled interchange, and if that would change the requirement for the exit ramp being 22 feet wide.
 - Connie indicated that this would also require a separate conversation with FHWA and is possible, but would be a lengthy process and would likely occur separate from the path project.
- Scott asked Alicia or others familiar with Medford traffic conditions if the ramp being closed for the last few years has meant an increase in complaints/comments from the residents. Alicia did not know for sure, but did not believe there have been m Nitsch will provide a summary of the priority tasks for

the 2018 Gaming Commission Transportation Planning Grant application scope. This will likely include geotechnical testing so that the conceptual designs and associated pricing can be refined for a more accurate understanding of project scope and fee.

- any complaints.

CTPS Traffic Study

- Connie discussed the Recommendations from the CTPS Medford Square traffic study, which were released on 6/19/2018. Nitsch will request the Study from Alicia and Todd and will circulate to meeting attendees.
- The CTPS study does not recommend the route 16 exit ramp be closed to vehicular traffic. It recommends adding signalization to the intersection of the ramp and Main Street.
- The CTPS draft traffic study should be available later this summer, and a final report is expected sometime around the first of October.
- Connie indicated that the CTPS recommendations included a recommendation for signalizing the exit ramp once it is re-opened to allow for a pedestrian and cycling crossing on the southern side of the Cradock Bridge.

Capital Funding

- During the permitting discussion, Alicia asked if this portion of the Mystic River is within Army Corps of Engineers (ACOE) jurisdiction. She indicated that there has been on-going discussions that Nitsch should review to confirm jurisdiction, for permitting and potentially as a funding source for the project. If it is under ACOE jurisdiction, there could be an opportunity for an ACOE funding source for construction capital.
- Capital funding sources were discussed by the stakeholder group. John indicated that while the gaming commission is not currently distributing project capital funding, it may in the future, and could be considered as an option for a portion of the project funding source.
- Alicia noted a federal grant program funded by the National Park Service (Outdoor Recreation Legacy Partnership - ORLP grant) may also provide funding

2018 Gaming Commission Transportation Planning Grant application scope

- The project has been awarded funding for the next phase of site assessment and design, which currently includes geotechnical investigation, wetlands delineation, survey, Preliminary and Final design development phases, and permitting.
- Alicia and John discussed the 2018 Gaming Commission Transportation Planning grant scope and Alicia expressed that it may make more sense to hold off on engineering design documents if the cost of the structured portion of the project makes the funding infeasible.
- Alicia would like to consider, if the costs make sense, having the engineering design be done for the A0 option with the ramp closed, which could be held until federal highway request occurs.
- Jenn noted that some of the first steps proposed in the next phase, including the geotechnical assessment, may have a big impact on the design and construction and would assist the City in making a more informed decision.
- Alicia requested that Nitsch provide a summary of the prioritized scope items for consideration.

NEXT STEPS

- Alicia indicated that the next step would be a meeting with Mayor Burke to review the South Medford Connector project. She would specifically like to present the two Alternatives, A0 (Ramp Closed, Path on Ramp) and A2 (Ramp Open, Path Adjacent) and the preliminary pricing for each.
- Nitsch will provide a concept and preliminary pricing for the A0 alignment which assumes the path will transition from at-grade to the west of I-93 onto the Route 16 exit ramp and has the exit ramp closed

South Medford Connector: Nitsch Project #12626.2
Stakeholder Meeting - June 20, 2018
Page 5 of 5

to vehicles. This will be provided to the City within the next two weeks so that it can be presented to the Mayor Burke during the meeting tentatively scheduled for mid-July.

- Nitsch anticipates that a draft of the final feasibility study would be ready in early August, with the understanding that the conceptual design and pricing of Alternative A0 could shift that timeline slightly. Final recommendations and report are planned to be completed by early September.

Prepared by: Jennifer Johnson and Brian Creamer

JLJ/BFC

cc: All Attendees

APPENDIX E

Referenced Documents

Referenced Documents

Nitsch Engineering reviewed the following reports and studies as part of their analysis:

- **Medford Square Master Plan**, prepared by Sasaki Associates, Inc., Abramson & Associates, Howard/Stein-Hudson Associates, Inc. and Todreas Hanley Associates, November 2005
- **Medford Square and the Mystic River: Reconnection, Revitalization, Redevelopment**, prepared by Massachusetts Institute of Technology Department of Urban Studies and Planning, Community Growth and Land Use Planning, Fall 2006.
- **Mystic River Master Plan**, prepared by the Massachusetts Department of Conservation and Recreation, Crosby Schlessinger, Smallridge, LLC, AECOM, Boetler & Associates, November 2009.
- **The Lower Mystic River Corridor Strategy: Working Together to Achieve the Full Potential of the Lower Mystic**, prepared by Metropolitan Area Planning Council (MAPC), June 2009.
- **Medford Square Garage Feasibility Study**, prepared by MassDevelopment, Utile, Inc., Nelson\Nygaard Consulting Associates, 2010.
- **Medford Square Master Plan (Draft Final Report)**, prepared by Metropolitan Area Planning Council (MAPC), August 2017.
- **Mystic Avenue Rezoning Study**, prepared by Metropolitan Area Planning Council (MAPC), March 2018.

Nitsch Engineering reviewed the following plans as part of their analysis:

- **The Commonwealth of Massachusetts Department of Public Works Plan and Profile of State Highway in the City of Medford, Middlesex County, Federal Aid Project**, prepared by Parsons, Brinkerhoff, Quade & Douglas Engineers, Revision 2, Dated January 19, 1962. (MassDOT # 5543)
- **Proposed Bridge, I-93 over Two Penny Brook – Culvert B Ramps H & J over Two Penny Brook – Culvert A**, Office of Department of Public Works, prepared by Parsons, Brinkerhoff, Quade & Douglas Engineers, Dated June 1960 (MassDOT # M-12-40 & M-12-41).
- **Proposed Bridge Rehabilitation Route 38 over Mystic River**, prepared by AECOM for Massachusetts Department of Transportation – Highway Division, addendum #6 dated February 6, 2015 (MassDOT # 604716).
- **Revised Signage & Pavement Marking Plans - Proposed Bridge Rehabilitation Route 38 over Mystic River**, prepared by AECOM for Massachusetts Department of Transportation – Highway Division, dated August 8, 2013 (MassDOT # 604716).

Design guidelines:

- **AASHTO Guide for the Development of Bicycle Facilities Chapter 5: Design of Shared Use Paths** (2012)
- **Massachusetts Department of Transportation (MassDOT) Project Development and Design Guide** Chapter 11: Shared Use Path and Greenways (2006)
- **United States Access Board Proposed Accessibility Guidelines for Pedestrian Facilities in the Public Right-of-Way: Proposed Technical Provisions Applicable to Shared Use Paths** (2013)

APPENDIX F
Interagency Meeting Minutes – Status of Route 16 Exit Ramp

Mayor of Medford Meeting re: Route 16 Exit Ramp Closure

July 26th, 2:00 pm

Attendees

Alicia Hunt, Director of Energy and the Environment, City of Medford
Amber Christoffersen, Mystic River Watershed Association
Brian Kerins, DPW, City of Medford
Chen-Yuan Wang, Chief Transportation Planner, Central Transportation Planning Staff
Connie Raphael, District 4, MassDOT
Frank Syzinski, District 4, MassDOT
Ginna Johnson, Planning and Design, DCR
Karl Haglund, Planning and Design, DCR
Mark Abbott, Group Manager, Central Transportation Planning Staff
Mayor Stephanie Burke, City of Medford
Michelle Danila, Complete Streets Engineer, MassDOT
Paul Stedman District Highway Director, MassDOT
Pete Sutton, Bike and Pedestrian Coordinator, MassDOT
Todd Blake, Transportation Engineer, City of Medford

Meeting Notes

- Off ramp from Route 16 into Medford Square has been closed for several years
- The Mayor: the intersection at the end of the ramp and Main St is very unsafe, there are no lights at the intersection, we've seen a major safety benefit to having it closed. The exit ramp is being explored as a route alternative for part of the South Medford Connector shared-use path to avoid the \$6-7M in additional costs of structure in the Mystic River
- MassDOT confirmed verbally that the off-ramp is indeed a MassDOT ramp; the data in the online tool is incorrect. The ramp does not show as NHTS in the tool, but they need to confirm this.
- The Federal Highway Administration (FHWA) needs to be included in the conversation. They would determine what data is collected to inform the scope of the traffic study. They would want to know the impacts on other 93 exists if the ramp closes.
- The signal at the footbridge, across Route 16: Medford wants the signal to be pedestrian-activated rather than "timed to create frequent stops." While owned by DOT, it is maintained by DCR. DCR and MassDOT agreed to confirm responsibility and both entities are in favor of pedestrian only, so they'll figure out how to do it and make the change.
- Per CTPS there are no substantial pre-closure counts, only limited data from before - no ATR counts for the ramp.
- Medford proposed doing counts before re-opening the ramp as Phase 1 of a study. Who pays for/collects this count data is still undetermined.
- "Interchange modification report" - depends on whether or not it's FHWA

- MassDOT asked about community support for closing the ramp. The Mayor referred to public meetings related to Medford Square planning and the transition team report, businesses seem to be open to keeping ramp closed. There was also resident support for bringing 16 to street level, which we realize would be a much bigger study. That would be on the size of McGrath and Washington St - huge intersection.
- As part of the Cradock Bridge project, MassDOT is currently expecting to reopen the ramp at the end of October - to keep it closed long enough for a study, they'd have to understand modifications to the current project (as the current contractor has the ramp opening in their contract) and then how would they re-open it.
- Need to determine where we want traffic counts, but Medford would like to see counts done in September.
- Ginna Johnson from DCR is in favor of closing ramp - they briefed the Deputy Chief Engineer, Division of Planning and Engineering, Jeff Parenti. They support road diets and multi-use trails - they had concerns about a cantilevered trail and they think it would be a great opportunity to move the trail off the environmentally-sensitive areas.
- DCR would like to look at signal programs at Winthrop and Mystic to improve the queueing. They are very interested in seeing this study move forward. There's a lot of open space in this area that they feel there should be accessible to the public and feel that the road should operate more like a parkway, not a highway.
- Todd Blake from Medford raised the question of raising the truck ban on part of Route 16. Rt 16 is 4 lanes in Somerville and 2 lanes in Medford. We believe that there are more cars staying on Rt16 and looping back on Winthrop and High than there are those who get off early and come up Rt38.
- CTPS study of Medford Sq. had an Alt. (Alt. 2) to widen Route 16, near Winthrop Street. Todd inquiring about 4 lanes here but may only need restriping effort versus widening (4 lanes from Rte. 2 to Auburn St.). The bottle neck of 4 lanes (2 ea. dir. West of Auburn St.) to 2 lanes (1 ea. dir. East of Auburn St.) leads to pushing traffic to South Street to by-pass queueing on Rte. 16.
- MassDOT would be interested in re-striping Route 16 to be just 2 lanes (this is in reference to Route 16 WB over I-93, (east of the Rte. 16 off-ramp) leading up to the subject ramp).
- South St and Main St has a very high crash rate and the temporary light has created a gap that has lowered the crash rate.
- Michelle Danila with MassDOT will take next step on getting FHWA involved. This needs to happen before data collection decision for traffic study is made. Todd will be the point of contact from the city.