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Appendix A: Pawtucket Falls Overlook

Existing Design Plan Review and Preparation for MassDOT 25%-75%-100% Highway Design Review

Technical Scope of Work

The City is seeking services to assist with advancing portions of the Pawtucket Falls Overlook project through the Massachusetts Department of Transportation (MassDOT) Project Design and Environmental process as detailed in the Project Development and Design Guide as amended, resulting in a 100 percent Plans, Specifications, and Estimates (PS&E) design package. Existing design plans must be reviewed for outstanding issues and prepared to meet MassDOT 25%, 75%, and 100% review bid document standards. Tasks for completing this project are detailed in Schedule 1: Scope of Work

Pawtucket Falls Overlook Project Description

Since the early 1990s, the Lowell National Historical Park (LNHP) and the City of Lowell have been engaged in the development of an interconnected system of pedestrian walkways along the historic Lowell Canal System and along the Merrimack River, from its confluence with the Concord River upstream to the Pawtucket Falls. Only about a mile of that seven-mile long system remains to be put in place.

The Massachusetts Department of Conservation and Recreation (DCR) developed the Vandenberg Esplanade on the riverfront, a short distance above Pawtucket Falls in the late 1970s and early 1980s. This mile-long promenade is exceedingly popular, providing a readily visible recreational walking facility with convenient parking for its users at either end.

Separated by about 5/8 miles of riverfront near the historic Pawtucket Falls, the Vandenberg Esplanade and the Lowell Canalway and Riverwalk system are not currently linked via a user-friendly pedestrian pathway. Current and future users of each amenity would benefit if such a connection was established and the viewing of the Falls was improved.

Virtually all of the riparian land over which much of this pedestrian connection would be routed is owned by DCR, with a small portion at the far end downstream owned by the City. The project as proposed would be comprised of three distinct linear sections. The first section would start at the easterly (downstream) end of the Vandenberg Esplanade at the former Bath House, and extend for about 1,200 feet on a new pathway through existing undeveloped State park land. This section would include a pedestrian bridge over the mouth of Clay Pit Brook, and would intersect the existing sidewalk on the State Highway right-of-way, just before the mouth of Flagg Meadow Brook.

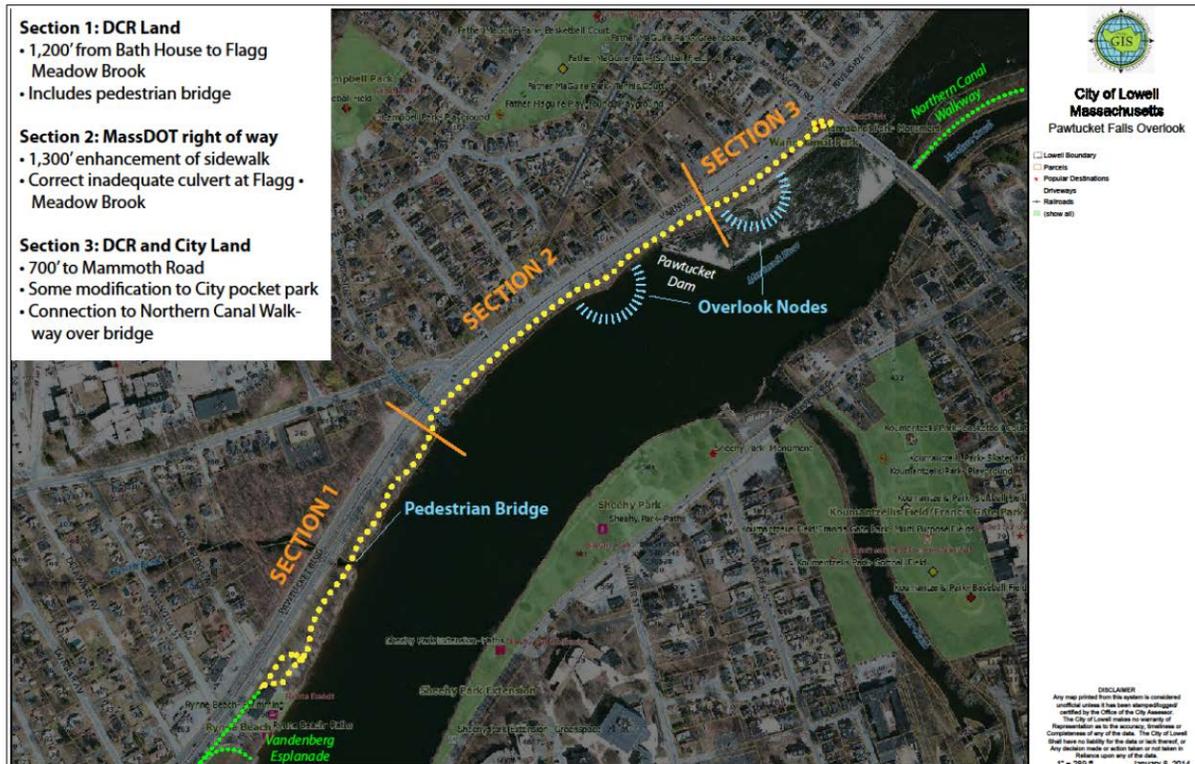
There, the riparian DCR land narrows as it nears the westerly abutment of Pawtucket Dam at the head of the Falls, necessitating a second section of about 1,300 feet that would consist of an enhancement of the existing sidewalk on the State highway right-of-way. The development of this section would include improvements to the pedestrian crossing of Flagg Meadow Brook, within the highway right-of-way, due to the current lack of retained bank on one side of the culvert.

After traversing that narrow second section, the third section would diverge from the highway sidewalk on to DCR land, and follow the existing river wall for some 700 feet to the project's terminus on City land at the approach to the School Street (O'Donnell) Bridge. Connections to the Canalway and the Riverwalk can be made just across that river crossing.

The new walkway design follows the standards and design character of the existing Vandenberg Esplanade. The walking surface, benches, and light fixtures would duplicate or emulate those previously used (if included within the final design). The pedestrian bridge would be a prefabricated steel pony truss near the level of the adjacent highway to allow maximum clearance in high water events. Steel pedestrian guard railings or improved fencing would be required along the river retaining walls within the second and third sections.

Two new overlook nodes that would provide views of the river above and below the falls, one each on the second and third sections, are proposed. These areas would provide seated viewing over the pedestrian railing. At the School Street Bridge terminus, the existing monument plaza would be reworked to include some additional seating. The existing sidewalk along the river is currently not handicapped accessible from the O'Donnell Bridge end, but would be made so via a sloping sidewalk from the bridge node. Existing lawn areas and park shade trees would be essentially retained, with some provision for new trees and shrubs in critical locations.

Pawtucket Falls Overlook Project Map



Existing Design Plan Review and Preparation for MassDOT 25%-75%-100% Highway Design Review Project Description

A preliminary conceptual design has been created for all three sections of the Project. MassDOT has agreed to fold the design that falls within its layout, including headwall and wingwall reconstruction at a culvert at Flagg Meadow Brook, regardless of whether it falls partially or wholly outside the layout, into the design and engineering of the Route 113/VFW Highway reconstruction project. The state right-of-way runs along the western edge of the Pawtucket Falls Overlook project area.

For the remaining area that falls outside of the MassDOT layout (**Project Area**), the City requires Engineering and Design services to prepare complete design submittal packages for MassDOT 25%, 75%, and 100% review based on the existing conceptual plans. Accomplishing this task requires design of certain elements such as electrical engineering, a review of the plans against MassDOT's project design guidelines, and a conversion of plans to MassDOT standards. All tasks apply only to the **Project Area** (The portion of the overall project that falls outside the MassDOT layout on City or Massachusetts DCR land).

The project's ultimate goal is to ensure that the project is eligible for programming on the Massachusetts State Transportation Improvement Program (STIP) and maintain eligibility for regional and/or statewide Congestion Mitigation and Air Quality (CMAQ) funding and/or other federal funding sources.

Elements to be provided by the Project Review Team or MassDOT are enumerated after the Scope of Work in Schedule 2.

Schedule 1: Scope of Work

- 1. Phase 1a: Prepare and submit complete 25% Review PS&E Package including all required materials to Massachusetts Department of Transportation**
 - a. Conduct three (3) stakeholder meetings with Project Review Team (City of Lowell, Massachusetts Department of Conservation and Recreation (DCR), Massachusetts Department of Transportation (MassDOT), National Park Service, Lowell National Historical Park (LNHP), and Northern Middlesex Council of Governments (NMCOG)). Meetings will be held at project kick-off, a progress meeting during design, and a review meeting before submission to MassDOT.
 - b. Review existing survey information, base plans, and profiles for quality of survey within Project Area. *See Appendix B, section 303.*
 - c. In coordination with Project Review Team, review and modify the following plan and design elements if necessary:
 - i. Landscape, lighting, and pedestrian amenity design and siting (Lamp and bench design will provided by NPS).
 - ii. Review existing design plans to identify any other unfinished design elements and create conceptual designs for these elements.

- iii. Modify or create conceptual designs for any unforeseen issues that develop during design process.
- d. Coordinate with MassDOT regarding the adjacent Lowell VFW Resurfacing and Related Work roadway design (Project Info number 605966) especially as it relates to the sidewalk work, including but not limited to:
 - i. Complete a structural analysis to assess the retaining wall in Section 2 and engineering and design of any necessary improvements.
 - ii. Complete engineering and design for siting and attachment of handrails/fencing in Section 2 along or atop the retaining wall (Design and specifications of handrails/fencing to be provided by NPS), including capping retaining wall if necessary..
 - iii. Coordinate with MassDOT to ensure Pawtucket Falls Overlook Project Area boundaries (All project components outside MassDOT layout except Flagg Meadow Brook culvert headwall and wingwalls) align with MassDOT Resurfacing & Related Work on Route 113/VFW Highway Project and assist with coordination related to scheduling, design, and construction phasing.
- e. Review complete design plans of Project Area, including preliminary pavement design, typical cross-sections, and horizontal and vertical geometries to ensure they are consistent with MassDOT design guidelines and make any changes as necessary, including completing the 25% Highway Design Review checklist. *See Appendix B, sections 306-318 as applicable to an off-road multi-use path.*
- f. Assist Project Review Team with Right of Way process, including noting where existing right-of-way needs to be altered, providing Layout Plans and order of taking, or other tasks as needed. *See Appendix B, Sections 501-504.*
- g. Complete constructability review to ensure that the project does not present any unusual matters that would unduly increase the cost of the project or present potential scheduling delays. *See Appendix B, section 324.*
- h. Complete Quality Control review to ensure all aspects of information to be presented to MassDOT are prepared in accordance with MassDOT Highway Design Manual, Standard Specifications for Highways and Bridges and the most recent Supplemental Specifications, Standard Nomenclature and Engineering Directions as applicable. *See Appendix B, section 325.*
- i. Prepare design plans of Project Area for 25% review following MassDOT CAD standards (found at

<http://www.massdot.state.ma.us/highway/DoingBusinessWithUs/DesignEngineering/CADStandards.aspx>):

- i. Convert objects to Civil 3D.
 - ii. Save dwg, dwf, and pdf files with required folder structure and naming conventions.
 - iii. Convert to proper scale.
 - iv. Convert to proper font, text, dimension, and multileader styles, symbol and block styles, line types, and hatching types.
 - v. Use proper layer naming standards.
 - vi. Use pre-defined layout sheets to create paper space layouts.
- j. Review existing design plans to ensure that the information submitted to MassDOT at the 25% stage is in accordance with the requirements of Engineering Directive E-02-005, Early Environmental Coordination for Design Projects. Ensure they are compliant with MassDOT "Plan Requirements" for Section 91 review and make any changes as necessary. *See Appendix B, section 151.*
- k. Draft Functional Design Report (FDR) for the project and complete 25% Traffic Engineering Review checklist. FDR should include: Existing conditions, traffic volumes, transit, safety analysis, and proposed improvements. *See Appendix B, section 201-207 as applicable to an off-road multi-use path.*
- l. Draft Design Exception report, including evaluation of the 13 controlling criteria in the MassHighway Design Manual and evaluation if any design exceptions from AASHTO policy are necessary. *See Appendix B, section 221-223 as applicable to an off-road multi-use path.*
- m. Submit complete 25% Review PS&E Project as approved by MassDOT.
- n. Attend all public hearings related to project. *See Appendix B, section 351-353 as applicable.*

2. Phase 1b: Prepare and submit complete Geotechnical Report, Structural Investigation, and Bridge Sketch Plans for pedestrian bridge over Clay Pit Brook

- a. Prepare Geotechnical Report:
 - i. Research available subsurface data and do field reconnaissance for pedestrian bridge over Clay Pit Brook and adjacent conditions. *See Appendix B, section 601-602 and 701.*

- ii. Prepare a subsurface investigation plan in accordance with Bridge Manual, submit for review, and revise and resubmit. *See Appendix B, section 603.*
 - iii. Complete office studies, analysis, and testing; prepare and edit a geotechnical report; and coordinate with MassDOT and Project Review Team as needed. *See Appendix B, section 604-606.*
 - iv. Prepare and finalize geotechnical details and items for the plans, specifications, and estimates. *See Appendix B, section 607.*
- b. Prepare Structural Investigation and Bridge Type Report:
- i. Collaborate with the designer and Review Team to determine bridge configuration, determine feasible bridge types, complete comparative design and cost analysis, and complete a preliminary structures report and type study report. *See Appendix B, section 702-706.*
 - ii. Coordinate with MassDOT and Project Review Team as needed and respond to MassDOT comments. *See Appendix B, section 707.*
- c. Complete Bridge Sketch Plans:
- i. Establish boring locations, coordinating with geotechnical effort; prepare hydraulics report; and prepare bridge sketch plans in accordance with MassDOT Bridge Manual. *See Appendix B, sections 711-713.*
 - ii. Participate in reviews, prepare responses to comments and revisions as necessary; coordinate with soils testing program and during the preparation of the soils and foundation reports by geotechnical staff or sub-consultant; review bridge boring logs, foundation reports, and calculate geometric design. *See Appendix B, section 714.*
 - iii. Complete constructability review of bridge. *See Appendix B, section 715.*
- 3. Phase 2a: Prepare and submit complete 75% Review PS&E Package including all required materials to Massachusetts Department of Transportation**
- a. Conduct stakeholder meetings or site visits with Project Review Team, MassDOT, or other groups as necessary. *See Appendix B, section 402-403.*
 - b. Respond to MassDOT 25% comments with a formal written response and by refining horizontal and vertical geometry. *See Appendix B, sections 401 and 405 – 407.*
 - c. Assist and participate in utility coordination facilitated by Project Review Team if needed. *See Appendix B, section 404.*

- d. Develop, design, or finalize and plot typical cross-sections, layout and easements, construction plans, grading and tie plans, drainage design, required signage, pavement design, electrical design and engineering for pedestrian lamps, landscaping, erosion control and special provisions as needed. *See Appendix B, sections 408-422 and 424 as applicable to an off-road multi-use path.*
- e. Update cost estimates based on the latest edition of the Standard Nomenclature. *See Appendix B, 423.*
- f. Perform an independent Constructability and Quality Control review of the project by an experienced engineer who is not involved in the preparation of the contract documents. *See Appendix B, section 425.*
- g. Assist with NEPA/MEPA permit process as needed.
- h. Submit complete 75% Review PS&E Project as approved by MassDOT.

4. Phase 2b: Complete Final Bridge Design

- a. Prepare design calculations and perform independent design check of all calculations for all superstructure design components in accordance with the MassDOT Bridge Manual. *See Appendix B, section 751.*
- b. Prepare design calculation and perform an independent design check of all calculations for all substructure design component including any cofferdams and permanent support systems for excavation in accordance with the MassDOT Bridge Manual. *See Appendix B, section 752.*
- c. Prepare design calculations and perform an independent design check of all calculations for bridge geometries including, framing, layout, critical clearance and elevation of footings, layout and ties, etc. *See Appendix B, section 753.*
- d. Prepare structural drawings in accordance with MassDOT Bridge Manual and check drawings for content and accuracy. *See Appendix B, section 754.*
- e. Prepare and submit the first copy of the final plans for a first MassDOT and Review Team review and subsequent resolution resulting from MassDOT comments and recommendations. *See Appendix B, section 755.*
- f. Prepare two sets of independent quantity calculations of bridge items and cost estimates for the bridge structures. *See Appendix B, section 756.*
- g. Prepare bridge special provisions in accordance with the MHD Bridge Manual. *See Appendix B, section 757.*

- h. Prepare and submit copies of the bridge PS&E package for a second MassDOT and Review Team review and subsequent resolution of MassDOT comments and recommendations. *See Appendix B, section 758.*
- i. Submit updated copies of bridge PS&E for FHWA review and resolution of all related FHWA comments. *See Appendix B, section 759.*
- j. Coordinate with MassDOT and Project Review Team as needed and respond to MassDOT comments. *See Appendix B, section 760.*
- k. Perform an independent Constructability and Quality Control review of the project by an experienced engineer who is not involved in the preparation of the contract documents. *See Appendix B, section 761.*

5. Phase 3: Prepare and submit complete final 100% Review PS&E Package including all required materials to Massachusetts Department of Transportation

- a. Conduct stakeholder meetings with Project Review Team as necessary.
- b. Respond to MassDOT 75% comments with a formal written response. *See Appendix B, section 451.*
- c. Finalize construction plans and cost estimates. *See Appendix B, sections 452-454.*
- d. Perform an independent Constructability and Quality Control review of the project by an experienced engineer who is not involved in the preparation of the contract documents. *See Appendix B, section 455.*
- e. Assist with NEPA/MEPA permit process and final obtaining of permits as needed.
- f. Submit complete 100% PS&E documents ready for bid as approved by MassDOT.

6. Phase 4: Respond to 100% Review and provide Construction Phase engineering services as necessary

- a. Respond to MassDOT 100% comments with a formal written response. *See Appendix B, section 801.*
- b. Finalize plans, specification, and estimate to ensure all comments from 100% review are addressed and prepare Detail Sheets in accordance with Chapter 13 of the Highway Design Manual and combine Pathway and Bridge designs. *See Appendix B, section 802-804.*
- c. Perform an independent Quality Control review of the project by an experienced engineer who is not involved in the preparation of the contract documents. *See Appendix B, section 805.*

- d. Prepare a value engineering report that contains recommendations that will reduce the overall project cost without sacrificing safety or environmental project attributes. *See Appendix B, section 806.*
- e. Conduct full on-site inspections during subsurface operations. *See Appendix B, section 901.*
- f. Participate in pre-bid and pre-construction conferences, answering questions with written responses when necessary. *See Appendix B, sections 902-903.*
- g. Review lighting, sign, and bridge and wall structural shop drawings. *See Appendix B, sections 904-905.*
- h. Review and approve bridge erection procedures. *See Appendix B, section 906.*
- i. Provide assistance to MassDOT in interpreting the contract documents. Includes field visits to the construction site during all phases of construction as necessary. *See Appendix B, section 907.*
- j. Provide a resolution to foundation issues during all phases of construction. *See Appendix B, section 908.*
- k. Visit project site and evaluate bridge structure for conformance to the contract documents. Take photographs of completed structure. Prepare Bridge Rating Report. *See appendix B, section 909.*

Schedule 2: To be Provided by Other Parties**1. To be Provided by Massachusetts DCR**

- a. Review of all PS&E packages.
- b. Supplying construction easements to MassDOT in all sections and permanent sidewalk easements to MassDOT in sections 2 and 3.

2. To be Provided by City:

- a. Review of all PS&E packages.
- b. Assistance in securing construction and permanent sidewalk easements from DCR to MassDOT.

3. To be Provided by NPS:

- a. Review of all PS&E packages.
- b. Design plans and standards for lamps, benches, and handrail.
- c. CAD and PDF files of existing Pawtucket Falls Overlook design plans and standards, compilation of all available documents of existing features, surveys, planned projects in area, and right of way research. *See Appendix B, section 301.*
- d. Assistance with early and ongoing utility coordination. *See Appendix B, section 302, 404.*
- e. Assistance in securing construction and permanent sidewalk easements from DCR to MassDOT and establishing Right of Way where necessary. *See Appendix B, section 501-504.*
- f. Complete Early Environmental Coordination 25% Design Submission Checklist, including tasks described Appendix B, sections 152-180 and 323 as applicable.

4. To be Provided by MassDOT:

- a. Engineering and design for ADA-accessible sidewalk with 5' cross section in Section 2.
- b. Structural analysis to assess Clay Pit Brook culvert and Flagg Meadow Brook culvert, with special attention to Flagg Meadow Brook culvert headwall and both wingwalls, and engineering and design of any necessary repairs or reconstruction.
- c. Mitigation or other work related to retaining wall/concrete slab near School Street intersection.

- d. Engineering and design of solution to safety issue caused by sharp crash-resistant traffic barriers on sidewalk in Section 2 including consideration of narrower traffic barriers