

ATTACHMENT A TO RFQ/P SCOPE OF SERVICES

INTRODUCTION

Bullough's Pond Dam is an approximately 225-foot long, 14.5-foot high earthen embankment. The dam is currently an intermediate size, significant hazard potential structure. Previous dam safety engineering services for the City have recently been performed, including 1) an Emergency Action Plan (EAP) required by Dam Safety Regulations; 2) Follow-up inspections necessitated by a prior Poor Condition rating, and 3) a Phase II investigation, evaluation and report. The findings, *and a recommendation*, of the Phase II Report inform the scope of services requested below. The City of Newton seeks to evaluate additional alternative recommendations beyond those presented in the Phase II report.

The top of Bullough's Pond Dam embankment is asphalt-paved Dexter Road with a bridge over the spillway. The upstream and downstream slopes are grassed and heavily vegetated with woody brush and trees. The embankment slopes are inclined at approximately 2 horizontal to 1 vertical (2H:1V) on both the upstream and downstream sides, with locally steeper upstream slopes where scarping has occurred near the normal pool level. There is an apparent roadway drainpipe outlet on the downstream embankment and another apparent drain outlet along the right abutment downstream of the spillway. According to historic drawings, a concrete core wall is present along the length of the dam embankment. The core wall was probed during the Phase II investigations.

The water level in Bullough's Pond is maintained via an uncontrolled 35-foot-long spillway located upstream of the Dexter Road bridge. An additional downstream weir is located below the bridge. Low flows can be passed via two gated 24-inch diameter cast iron low-level outlet pipes located toward the left (west) end of the embankment. The gates valves are located in a vault in the upstream slope and are exercised by City personnel on a yearly basis.

Based on prior inspections by others, the dam was judged to be in overall Poor condition. In response to the Poor condition rating, the Massachusetts Department of Conservation and Recreation, Office of Dam Safety (DCR or ODS) issued a Certificate of Non-Compliance and Dam Safety Order dated July 16, 2018. The DCR Order required the City to complete follow-up inspections at six-month intervals, a Phase II Inspection and Investigation (Phase II evaluation), and rehabilitate the dam to bring it into compliance with current dam safety regulations. The Phase II evaluation confirmed the condition of the dam and identified the following specific deficiencies, which were generally consistent with previous inspections:

- Inadequate minimum freeboard during the Spillway Design Flood (SDF) and the potential for embankment overtopping.
- Inadequate calculated factors of safety for embankment seepage stability and slope stability.
- Unwanted vegetation in areas of the dam including large trees along the downstream slope.
- Scarping along the upstream slope and bare soils prone to erosion along the downstream slope.
- Deterioration/potentially unstable headwall at the downstream end of the low-level outlet.
- Areas of scour along the downstream channel including at the low-level outlet headwall and along the left and right banks.
- Mortar missing from some of the spillway training wall joints.

The Phase II report presented several alternatives to repair the above deficiencies and bring the dam into compliance with current dam safety regulations. One repair alternative (Alternative 5) includes protecting

the embankment against overtopping during the SDF while mitigating potential erosion and scour failure of the embankment. Repairs associated with this alternative include:

- Removal of trees and vegetation on the upstream and downstream slopes. Removal of all roots/root balls associated with trees and vegetation and backfilling resulting voids with compacted sand/gravel.
- Regrading and armoring of the upstream slope with riprap to increase slope stability and reduce erosion (scarping) along the normal water elevation.
- Flattening and armoring of the downstream slope to increase slope stability and provide erosion protection during an overtopping event.

The Bullough's Pond Dam, built in 1664, is assumed to be the second-oldest, still existing and working dam in Massachusetts, and has great significance in the history of colonial New England. The dam was built to power a colonial gristmill and some of the original mill stonework remains on the historic site in the Laundry Brook Forest, immediately adjacent to the dam. It is reported that this 356-year-old dam has never been breached, nor overtopped, despite having been forested for much of its history. The Laundry Brook Forest, immediately adjacent to the dam is an area of great natural beauty. Because of the historic and environmental importance of the dam and the adjacent forest, the City of Newton now seeks proposals that will satisfy ODS dam safety requirements, while protecting the historic site and landscape of the Bullough's Pond dam and Laundry Brook Forest.

The consultant shall meet with members of the Department of Public Works with the Bullough's Pond Association, the Department of Parks and Recreation (including the Tree Warden), the City Council, the Conservation Commission Agent and the Conservation Commission. The objective is to minimize site disturbance as feasible (e.g., the removal of trees) within the dam embankment and downstream areas to the maximum extent possible and to preserve the historical nature of this site.

- Additional engineering investigations and analyses are necessary to meet ODS dam safety requirements. Alternative recommendations might include the following:
 - Regrading,
 - Hydrology and hydraulics for the appropriate SDF,
 - Seepage filter materials and configuration,
 - Low-level outlet (LLO) improvements including gate replacement and pipe lining, and repairs to the concrete and stone masonry components of the dam.

The consultant will use the flow depths and velocities predicted by the additional hydraulics and hydrology (H&H) analyses to refine the recommendations regarding armoring methods described in the Phase II Report. Improvements to the downstream slope will also include a purpose-designed mineral filter and seepage collection (i.e., pipes), if feasible, based on elevations and potential drainpipe outfall locations. Examples follow.

- Upward extension of the core wall to help address seepage instability.
- Armoring of the downstream channel to mitigate erosion, including at the right groin, portions of the outlet channel, and along the toe of the downstream slope.
- Lining of the two low-level outlet pipes and replacement of the two existing 24-inch gate valves. It is assumed the two gates will be replaced "in-kind."
- Repointing of existing training walls and bridge abutment walls.

The City of Newton requests that alternative recommendations include the least intrusive, most natural-looking ways of addressing the dam deficiency.

Final design will include considerations such as construction site access and staging areas at the site. Permitting requirements will be verified and permit applications will be prepared and submitted on behalf of the City as described in the following Scope of Services. Items to be provided by the City are noted as follows; costs for these items shall not be included in the proposer's cost proposal.

City Provided Tasks:

- The City will provide the location of above- and below-ground utilities, City-owned property boundaries (and easements) at and adjacent to the site to support the final design effort in AutoCAD format. This is particularly important for the property boundary at the right abutment where erosion protection may be installed at or near the property boundary.
- CCTV inspection of low-level outlet drain pipes.
- Pumping excess water from the existing gate chamber.
- Operation of existing gate valves to lower the water level in the pond.
- Provision of a boat (by Newton Fire Department) for additional probes in the pond (if necessary).
- Provision of all topographic survey and city right of way property boundary survey, in AutoCAD format.
- Wetland flagging for topographic survey.
- Newton DPW personnel will perform a video inspection of the existing LLO discharge pipes downstream of the gates.
- Bid document up front provisions, including prevailing wage rates.

SCOPE OF SERVICES

The consultant shall propose the scope of services described below to address the above deficiencies and help bring the dam into compliance with current dam safety regulations. The proposed scope includes preparation of an Alternative Recommendations Evaluation Report, permitting, preliminary and final design, preparation of bid documents, and bidding assistance. A scope of work for engineering services during construction (by contract amendment) may be developed once the elements of the design are better defined during final design.

TASK 1 – PROJECT KICK OFF MEETING

Upon notice to proceed, consultant will meet with City personnel at a kick-off meeting to discuss various technical and project management issues.

As part of this Task, consultant shall make a brief visit to the dam site to observe current conditions and discuss the various deficiencies, associated rehabilitation design concepts, and site access and staging areas for construction.

TASK 2 – ADDITIONAL FIELD INVESTIGATIONS AND LABORATORY TESTING

Prior to proposed field activities, consultant shall prepare a site-specific health and safety plan (HASP) for employees' use in the field. The HASP shall include procedures per the Commonwealth of Massachusetts COVID-19 guidelines and procedures for all construction sites and workers at all public work facilities.

Consultant shall conduct the following site visits and investigations, to support final design efforts:

- One half-day site visit to complete additional (hand-excavated) subsurface investigations to explore the thickness of topsoil in areas to be stripped during construction and to obtain samples to support the downstream slope filter design.
- Probes for soft sediment thickness in upstream areas to support design of upstream slope improvements and evaluation of dewatering options.

- Sediment samples and analysis to support soil/sediment management for work on the upstream slope.
- The city DPW personnel will perform a video inspection of the existing LLO discharge pipes downstream of the gates.
- One site visit to observe the existing condition and configuration of the existing LLO gate valves.

TASK 3 – ADDITIONAL ENGINEERING ANALYSES, DESIGN COMPUTATIONS, AND ALTERNATIVE RECOMMENDATIONS EVALUATION REPORT AND DESIGN REPORT
 Consultant will complete additional engineering analyses to support final design and preparation of design drawings and specifications for dam rehabilitation as follows:

- Slope stability and seepage analyses to confirm the final design geometry and physical requirements of the proposed embankment cross-section including slope inclinations, filter/drain configuration, and core wall extension.
- Final selection and sizing of an armoring alternative, if necessary. As part of this sub-task, consultant shall develop alternatives for the current 100-year SDF, along with conceptual premium pricing to help the City select a technically feasible, and historically, aesthetically and financially appropriate armoring alternative, where needed.
- Maintenance and/or improvement of the existing footpath from the dam to the Walnut Street bridge.
- The above analyses will be documented in a design report that will be submitted with the permit applications as described below.

TASK 4 – PRELIMINARY AND FINAL DESIGN AND DEVELOPMENT OF PLANS AND SPECIFICATIONS

Consultant should consider designing embankment improvements and repairs to the LLO and training walls including overtopping and slope protection, grading and drainage features for the downstream slope, LLO improvements including relining and gate replacement or rehabilitation, and other civil design elements of the project as generally discussed in the Phase II Report and Task 1 project kickoff. Consultant shall prepare preliminary design plans, technical specifications, and an updated opinion of probable construction costs for the proposed dam rehabilitation for review by the City. The City will prepare up-front boilerplate (e.g., bid instructions, agreement, insurance and bonding requirements) and the consultant will provide technical specification sections.

Consultant shall develop bidder qualification requirements to be integrated with the City's up-front bid instructions. The intent of the bidder qualification requirements will be to solicit bids from Contractors that are experienced, qualified, and have successfully completed similar dam rehabilitation projects.

Following input from City, consultant will finalize the design plans and technical specifications for permit filing and bidding. The design report included in Task 3, above, and the final drawings and technical specifications prepared under Task 4 will serve as the primary document for submission with the Chapter 253 permit application package. At the 25 and 100 percent stages, consultant shall also provide an engineer's estimates for proposed construction costs. Cost estimates will be based on quantity take-offs and on unit prices based on recent experience with other dam rehabilitation projects, published Mass DOT Bid tabulations, and general cost estimating guidance. This project will be bid under MGL Ch. 30 § 39M.

Consultant shall develop specifications suitable for bidding and construction purposes for the rehabilitation of the dam. Consultant shall prepare technical specifications for the project to describe the work and the basis of measurement and payment for individual pay items.

Two (2) hard copies of the final contract plans and technical specifications will be stamped and signed by a Professional Engineer licensed in the Commonwealth of Massachusetts. Consultant shall provide the

City with electronic versions of the final plans and technical specifications for inclusion in the City-prepared contract document package.

Deliverables:

- Alternative Recommendations Evaluation Report (pdf version)
- Design Report (pdf versions).
- Draft Technical Specifications and Drawings (pdf version).
- Final Technical Specifications and Drawings (2 hard copies, pdf version).
- Engineers Cost Estimate (opinion of probable construction cost) at 25 and 100 percent (pdf versions).
- Engineers estimate for on-site resident engineer representation services during construction.

TASK 5 – OPERATIONS AND MAINTENANCE (O&M) PLAN

Consultant shall prepare an Operation and Maintenance (O&M) plan for future dam operation. The O&M plan will indicate routine maintenance items including measures to control any unwanted vegetation on the dam, recommended observations for seepage, erosion and other indicators of stability problems with the embankment portions of the dam, recommended instrumentation (if applicable), and LLO operation and maintenance recommendations. An O&M plan will be required as part of the Chapter 253 Dam Safety Permit described below.

TASK 6 – ENVIRONMENTAL PERMITTING ASSISTANCE

Consultant shall prepare permit applications and supporting documents on behalf of the City for required construction permits for Bullough's Pond Dam. The City will provide property information (book and page) for the site. The consultant will provide any field assessments (i.e., additional wetland delineation or wildlife assessments) required for permit submission not included in Task 2, above. The following permits will be required for rehabilitation of Bullough's Pond Dam:

- Wetland Protection Act (WPA) Order of Conditions (Newton Conservation Commission / MaDEP) – Consultant shall prepare a Notice of Intent (NOI) requesting a full Order of Conditions (OOC) authorizing the rehabilitation of the Dam under the WPA and City Wetland ordinance. The application will be filed with the City of Newton Conservation Commission. The consultant will notify all abutters and the Bullough's Pond Association Board of Directors and ensure that all requirements under the Wetland Protection Act are met. "Limited project status" will be sought. Consultant shall attend one site visit and up to two virtual public hearings with the Conservation Commission to discuss the permit application. For budgeting purposes, assume that, following submittal of the NOI to the City, consultant will need to respond to one round of comments.
- Chapter 253 Dam Safety Repair Permit (Office of Dam Safety) – Consultant shall prepare and submit an application for repair of the dam to ODS. The finalized design report, drawings, technical specifications, and O&M plan will be used to support this permit application.
- Project Notification Form (Massachusetts Historical Commission) – Because the project will require a state permit (Chapter 253), a Project Notification Form (PNF) will need to be filed with the Massachusetts Historic Commission (MHC) in accordance with 950 CMR 71.00.
- Chapter 91 Waterways Office Notification Letter (MassDEP) – City has reviewed the project in reference to Massachusetts Waterways Regulations. It is the City's opinion that any proposed activities at the dam do not require a Chapter 91 license or permit, as per the provisions contained 310 CMR 9.05(3)(g)(4) of the Chapter 91 regulations. Rehabilitation of the upstream slope of the dam is anticipated to be generally within the current footprint and will not adversely affect navigation. However, it is noted that this structure is unlikely to have been licensed in the past and the DEP may take this opportunity to

request the City obtain a license. At this stage, consultant shall prepare and submit a notification letter or Chapter 91 Request for Determination of Applicability (RDA) to the DEP Waterways office.

- Section 401 Water Quality Certification (MassDEP) – MassDEP will require a Water Quality Certification (WQC) for dredging below the water table or within wetlands. At this time, city anticipates some dredging along the upstream face of the dam may be needed to facilitate placement of protective materials. Additionally, dredging activities may be needed along portions of the embankment toe and discharge channel to place protective materials. City may consider dredging the entire pond area.

- Section 404 Permit (US Army Corps of Engineers) – This project will require a Pre-Construction Notice (PCN) under Massachusetts General Permit Nos. 1 and 14. Consultant will consult with the US Army Corps of Engineers (USACE). Consultant will prepare and submit a PCN Form under the applicable General Permits.

- Massachusetts Environmental Policy Act (MEPA) approval – City does not currently anticipate that the dam rehabilitation project will exceed any MEPA thresholds for a mandatory Environmental Notification Form (ENF) and/or Environmental Impact Report (EIR). The consultant shall coordinate with the MEPA office to ascertain MEPA jurisdiction of the proposed rehabilitation project.

City's understanding of permitting requirements and scope are based on the following assumptions:

- The existing delineation of Wetlands Protection Act resource areas within the project limits by the Newton Conservation Agent are accepted as jurisdictional boundaries and will be used for impact assessment purposes. Information collected during the delineation, including data sheets, photographs and a written narrative describing each resource area assessed, will be provided by the consultant for use in preparation of the NOI and USACE 404 PCN documents.
- All public hearings and coordination meetings will be conducted by video conferencing and will not require travel.
- The City will sign the permit applications and pay permitting and advertising fees. These fees shall not be included in this budget.
- Permitting services do not include wetland construction monitoring or post-construction monitoring assessment and reporting.

Deliverables:

- Draft Permit applications (.pdf version of each permit).
- Final Permit applications (.pdf version of each permit for submittal to appropriate agencies).

Public Outreach: To help engage the public, consultant shall prepare an informational package with preliminary designs for the City to distribute to the City Council, the Conservation Commission, the Parks, Recreation & Culture Commission, abutters, and the Bullough's Pond Association (BPA) and to solicit public feedback. Consultant shall budget for attendance at up to three (3) public meetings to present the project.

TASK 7 – CONSTRUCTION BID PHASE ASSISTANCE

Consultant shall assist the City in the bidding process by (1) attending a pre-bid meeting at the site; (2) considering bid-phase questions and issuing up to two Clarifications or Addendums; (3) tabulating the bids; (4) checking references of the selected bidder; (5) issuing an opinion memorandum regarding the responsiveness of the bidders and a recommendation regarding the acceptance of the apparent low bidder.

TASK 8 – PROJECT MANAGEMENT

This task will encompass consultant's efforts to manage the project, coordinate with City staff, and report on project progress to City management, including:

- Project Management – Review of schedule, deliverables, and budget.
- Design Phase Project Meetings – Consultant shall budget for attendance at up to three (3) meetings with the City to review plans or discuss project progress, including at the conclusion of the investigatory phase.
- Budget Management & Reporting – Consultant shall regularly provide the City with updates on the project budget as part of monthly progress reports / invoices.

TASK 9 – ADDITIONAL FOLLOW-UP INSPECTIONS

The July 2018 DCR Certificate of Non-Compliance and Dam Safety Order requires Follow-Up Inspections at a 6-month frequency until repairs are complete. The most recent Follow-Up Inspection was performed in April of 2020. Additional Follow-Up Inspections will be required by ODS at 6-month intervals. These inspections will be performed by a registered professional engineer experienced in dam engineering. For budgeting purposes, consultant shall assume four additional Follow Up Inspections will be required at 6-month intervals. Please note that depending on the design, permitting and construction durations, additional Follow-Up Inspections may be necessary.

BASIS OF BILLINGS

Billings shall be based on actual accrued time and material basis in accordance with the proposed Schedule of Fees. Estimated budgets, by task, for the Scope of Services described above shall be proposed. Consultant shall include a budget contingency of \$20,000 for additional permit applications.

PROPOSED PROJECT SCHEDULE Consultant shall work to the following schedule:

- Notice to Proceed April 2021
- Kick-off Meeting April 2021
- Additional Field investigations spring/summer 2021
- Additional Engineering Analyses and Design Computations summer/fall 2021
- 25% Design Plans Complete; Permit Applications Submitted fall/winter 2021
- Final Plans and Specification Complete fall 2022
- Final Permits Applications Submitted winter 2022