

**TOWN OF PLYMOUTH CAPITAL IMPROVEMENT PLAN REQUEST
FY24 FALL ANNUAL TOWN MEETING**

Department: Marine and Environmental Affairs	Priority #:	1
Project Title and Description: Engineering and Permitting for Rehabilitation of Store Pond	Total Project Cost:	\$246,300

Department/Division Head: David Gould

Check if project is: New ☒ Resubmitted ☐ **Cost estimate was developed:** Internally ☐ Externally ☒

For project re-submittals, list prior year(s):

List any funding sources and amounts already granted: 50% of costs (\$123,150) to come from Environmental Affairs Fund

Basis of Estimated Costs (attach additional information if available)			If project has impact on 5 Year Plan and future operating budgets, insert estimated amounts.		
Capital:	Cost	Comments	Fiscal Year:	Capital	Operations & Maintenance
Planning and Design	\$246,300		FY23		
Labor and Materials			FY24		
Administration			FY25		
Land Acquisition			FY26		
Equipment			FY27		
Other					
Contingency					
Total Capital	\$246,300				

Project Justification and Objective: _____

This project would provide the engineering, geotechnical services and permitting work to undertake improvements to the Store Pond Dam and replace the culvert under Court Street that discharges to Cordage Park. This work would bring the structure into compliance with the MA Office of Dam Safety regulations.

For Capital Project Requests:

Will this project be phased over more than one fiscal year? If yes, enter it on the 5 Year Plan Yes ☐ No ☒
Can this project be phased over more than one fiscal year? Yes ☐ No ☒

For Capital Equipment Requests:

☐ Check if equipment requested is replacement and enter the year, make & model, VIN and present condition of existing equipment

What is the expected lifespan of this new/replacement equipment: _____

Attach backup information, estimates, or justification to support this request.

Scope of Services

Store Pond Dam National ID No. MA02462 Plymouth, Massachusetts

SLR #141.11982.P0011

Project Understanding

SLR International Corporation (SLR) is pleased to present our proposal to prepare engineering and design services for Store Pond dam. SLR recently prepared engineering design drawings and provided construction observation for the repairs to Sawmill (also known as Russell) Pond dam, which is located upstream of Store Pond on the same unnamed watercourse.

Store (also known as Spooner) Pond dam (MAID#02462) is located to the north of Spooner Street and northeast of Sawmill Pond in North Plymouth. Flow out of Sawmill Pond dam flows slightly northeasterly along Bourne Street before turning north in an underground conduit that daylights on the north side of Spooner Street and flows approximately 75 feet into Store Pond. The earth embankment dam is coincident with Court Street (Route 3A) and is located approximately 2,000 feet upstream of the outfall at the coast located between Plymouth Harbor and Kingston Bay. The outlet to Sawmill Pond flows under Court Street in a culvert before flowing into Cordage Pond before discharging into Cape Cod Bay. Tighe & Bond, Inc. prepared a Phase I inspection/evaluation report for Store Pond dam dated December 5, 2017. SLR also performed a Phase I inspection/evaluation report dated December 19, 2022. The dam is classified as a “Small” size dam and a Significant Hazard (Class II) Potential dam. The overall condition of Store Pond was assessed as “Satisfactory” in the same Phase I reports. SLR also prepared an Emergency Action Plan for Store Pond dated March 19, 2020, which was submitted and is on file with the Office of Dam Safety (ODS).

SLR is pleased to present our proposal to provide engineering and related design services to further assess the condition, recommend improvements, and prepare final rehabilitation design plans to Store Pond dam. It is our understanding that the following services are required:

- A Phase II inspection and investigation, pursuant to the following outline:
 - Review of existing information
 - Performance of subsurface explorations
 - Performance of a topographic survey and wetlands delineation
 - Performance of stability and seepage analyses
 - Performance of a detailed hydrologic and hydraulic analysis (H&H)
 - Development of alternatives with conceptual designs
 - Preparation of a Phase II report to be submitted to ODS
- Final Design – Based upon the results of the Phase II inspection, final design of the following elements is anticipated:
 - Place riprap along the upstream face of the embankment.

- Construct a cutoff or wall to prevent unraveling of the surface during an overtopping event.
- Construct a new overflow outlet structure capable of passing the Spillway Design Storm.
- Construct a new culvert under Court Street to replace the current culvert, which is likely undersized and a combination of a stone box culvert and a pipe.

A Phase II inspection and investigation will be performed to evaluate the structural integrity and spillway adequacy of the dam and to develop/implement a plan to bring the dam into compliance with dam safety regulations. The Phase II submittal will provide a proposed time line for final design, permitting, and construction of the selected repairs.

SLR proposes to perform the following scope of work:

Scope of Services

Task 1 – Phase II Inspection and Investigation

Using the ODS Phase II Inspection and Investigation outline, SLR will perform the following Phase II services:

- 1.1 Review and summarize the existing inspection report information.
- 1.2 Utilize the recently completed Phase I Surface Condition Inspection Report dated December 19, 2022, to document any observed changes.
- 1.3 Prepare a focused subsurface exploration plan and then execute the plan that will include the advancement of three test borings within the dam.

Explorations will be advanced using a truck-mounted drill rig and standard hollow-stem auger (HSA) test boring drilling techniques. Standard Penetration Tests (SPTs) will be performed in general accordance with American Society of Testing and Materials (ASTM) D 1586 in each test boring, with split-spoon samples recovered at 5-foot intervals or at each change in soil stratigraphy, whichever is more frequent. The SPT consists of driving a 1-3/8-inch-inside-diameter split-spoon sampler with a 140-pound hammer falling 30 inches. The blows for each 6 inches of penetration are recorded for a total of 18 or 24 inches. Rock coring or coring through obstructions is not included in our current proposal.

Additional sampling using larger-diameter split-spoon samplers with liners as needed will also be performed to obtain the in-situ density of select subsurface materials. This information will be used to reconstitute bulk samples in the laboratory to the approximate in-situ densities so that direct shear testing can be performed on the reconstituted samples to obtain shear strength parameters for slope stability analysis.

Boring depths of about 20± feet below the top of the embankment are planned to coincide with about 10± feet of penetration below the bottom of the dam.

Up to six retrieved soil samples will be obtained for laboratory testing that will include gradation tests per ASTM D422/D1140. Additional tests will include moisture, density, and direct shear testing. Depending on the material types recovered, other tests such as Atterberg limits and organic content may also be included. Test results will aid in classifying the embankment and foundation soils with respect to estimating various engineering parameters. Permeability parameters will be based on material gradation-based correlations.



Explorations will be performed under the observation of an SLR geologist or geotechnical engineer. Soil samples from the test borings will be classified in the field by SLR in general accordance with the Burmister Soil Classification System. A written drilling log and well log will be completed by SLR and will identify the overburden embankment and foundation soils.

- 1.4 Perform a wetlands delineation of the project area to include upstream and downstream areas. The wetland delineation will be performed by a professional wetland scientist. The survey will be completed in accordance with the 1987 United States Army Corps of Engineers (USACE) *Wetland Delineation Manual*, Technical Report Y-87-1. The delineation will be based on the location of hydrophytic vegetation, hydric soils, and hydrologic conditions, primary or secondary as indicative of a jurisdictional wetland. The area to be delineated will be immediately around the dam and abutment areas and will not extend more than 200 feet upstream or downstream of these structures. Wetlands flagging will be pink-and-black-striped surveyor tape with the date of the delineation, flag number, and delineator indicated on each flag. A locus map of the delineated wetlands will be provided for guidance in locating the wetland flags and documenting their location during the topographic survey.

In addition, a Wetland Technical Memorandum will be prepared identifying the type of each wetland delineated, as well as a Wetland Functions and Values assessment, using the USACE, New England District *The Highway Methodology Workbook*, as revised 1999. The Functions and Values Assessment will be provided for use in the Wetlands Permit Application.

Concurrent with this task, SLR will run a U.S. Fish & Wildlife Services IPaC website model to identify the project's location as potential habitat for any federally listed threatened species, such as the northern long-eared bat, that may require additional and specialized surveys.

- 1.5 Prepare a topographic survey and locate the dam embankments, abutments, and upstream and downstream areas. The survey will include documenting the alignment and invert elevations of the outlet structure components. SLR understands that the earth embankment is coincident with Court Street, which has a sag vertical curve along the roadway horizontal alignment. Therefore, the crest is not a uniform elevation at the crest. The existing spillway configuration consists of a stop-log-controlled drop inlet with an upstream vertical trash rack. The drop inlet structure conveys flows into a stone masonry culvert that transitions into a 36-inch-diameter concrete outfall pipe and discharges upstream of Cordage Pond. The condition and configuration of the transition from stone culvert to round pipe under the roadway is unknown.

An existing conditions plan will be prepared that will serve as the basis for the various engineering analyses from which conceptual design alternatives and ultimately final design will be formulated.

- 1.6 Perform stability and seepage analyses based on the Task 1.3 subsurface explorations test results and the topographic survey. The seepage analyses will be performed using *SLIDE2* by RocScience, which uses a finite element model of steady state seepage conditions. Alternatively, flow net theory may be used to construct equipotential flow paths and head drops through the embankment and foundation materials. Stability analyses of the earth embankments will be performed using the computer software program *SLIDE2*, which is an interactive equilibrium slope stability analysis of various failure geometries, including circular, block, or random as appropriate.



Based on the seepage and stability analytical results, conceptual methods for controlling seepage and increasing stability as necessary will be developed for later use in the final design of project modifications. This will include the need for filter drains to prevent internal erosion and piping or other mechanisms to reduce head pressure within the embankment soils. The conditions with the seepage control measures in place will be reanalyzed to verify adequate safety and seepage control performance under various design conditions, including static, pseudostatic, and rapid drawdown.

- 1.7 Perform Hydrologic and Hydraulic analyses to assess existing spillway capacity and to determine modification alternatives that would be necessary to increase spillway capacity to accommodate the Spillway Design Flood (SDF).

We anticipate working closely with the Town of Plymouth (Town) and the ODS while developing the components of the detailed H&H analyses to gain initial feedback prior to moving forward with subsequent tasks and to ensure that we are meeting the expectations of the Town of Plymouth and the ODS throughout the project.

SLR will develop a detailed hydrologic study to include analysis of the Store Pond dam watershed. The hydrologic input data will be based on land use/land cover or considerations effecting hydrology. Rainfall depths available through the Northeast Regional Climate Center (NRCC) as well as depths published by the National Oceanic and Atmospheric Administration (NOAA) in Atlas 14 will be used to compute inflow and outflow hydrographs. We anticipate using a Type-III rainfall distribution with a 24- hour duration to develop hydrographs for the 100-year storm event. The detailed hydrologic analysis will be conducted using the *HydroCAD* modeling software.

Subsequently, SLR will conduct a hydraulic analysis to determine the outlet capacity of the existing spillway configuration of the Store Pond dam. If the outlet capacity of the existing spillway is found to be deficient, conceptual design of up to three alternatives will be evaluated to modify the spillway and dam to increase the spillway capacity until ODS regulations are met.

SLR will prepare a summary of the detailed H&H analyses to be included in the overall Phase II report. The H&H section of the report will provide details regarding the analyses performed and assumptions made to conduct the analyses and will discuss the data and methods used to develop the detailed models, the conceptual design of spillway improvements to meet ODS regulations, and a summary of results. Detailed results and input data will be provided in the Appendix.

- 1.8 Based on the stability, seepage, and H&H analyses, SLR will develop and present up to three conceptual designs, including associated estimated design, permitting, and construction costs to achieve compliance with Chapter 253, Section 44-48 and 302 CMR 10.00 Dam Safety Regulations.
- 1.9 A dam assessment report will be prepared to include the various analyses and evaluations that will include the following components:
- Topographic survey
 - Wetlands survey results
 - H&H analyses
 - Conceptual modifications to the dam/spillway necessary to pass the SDF



- Seepage and stability analyses with conceptual elements as necessary to control seepage and/or improve stability, depending upon the proposed dam/spillway modifications
- Development of opinions of probable costs for recommended improvements

Task 2 – Final Design and Permitting

At this time, SLR assumes that replacement of the culvert downstream of the dam will not be required to meet the USACE stream crossing standards because the watercourse is likely not considered navigable by the USACE and, as such, would not be subject to their permitting requirements. Similarly, a Massachusetts Department of Environmental Protection (MADEP) Chapter 91 waterways license would not be triggered because of the navigability issues of the watercourse. Based on SLR's review of the MEPA threshold triggers, the contemplated rehabilitation measures to the dam and replacement of the culvert do not appear to trigger the need for a MEPA EENF.

- 2.1 SLR will contact the USACE and MADEP regarding navigable waterway jurisdiction to confirm the assumptions noted above.
- 2.2 Massachusetts Historical Commission Notification – SLR will prepare and submit a Massachusetts Historical Commission Project Notification Form for the project based on the data we have previously obtained and the proposed improvements to the dam.
- 2.3 Massachusetts Environmental and Historic Preservation (EHP) Screening Form – In order to request a Massachusetts EHP review, it is necessary to first complete and submit a Department of Homeland Security (DHS) and Federal Emergency Management Agency (FEMA) Environmental and Historic Preservation Screening Form. These forms will be prepared based on the data we have previously obtained and the proposed improvements to the dam.
- 2.4 Massachusetts Endangered Species Review – SLR will contact Massachusetts Natural Heritage & Endangered Species Program (NHESP) personnel with respect to determining if estimated or priority habitat for listed species exists on or near the project site. We will work with NHESP to mitigate any conditions whereby listed species may be impacted by the proposed rehabilitation activities.
- 2.5 Regulatory Permitting Assistance – Permit Application Preparation – Assist the Town in preparing application forms and supporting documentation. The following permits are anticipated, and a permit process and schedule is presented below:
 - Certificate of Appropriateness – Plymouth Historic District Commission – Prepare and submit an application (including necessary accompanying materials) to the Plymouth Historic District Commission. For this permit application, the design plan format will be modified as required to meet the commission's plan submittal guidelines. It is assumed that Town staff will attend any Historic Commission meetings. This task excludes attendance by SLR staff at any meetings.
 - Section 404 Permit – United States Army Corps of Engineers (USACE) – Prepare and submit a Self-Verification Notification Form (SVNF) for General Permit (GP) No. 2 Repair, Replacement, and Maintenance of Authorized Structures and Fills with required supporting materials to the New England District USACE office in Concord, Massachusetts.
 - Jurisdictional Determination, Chapter 253 Permit Part A – A Chapter 253 Permit Part A is required to determine if the proposed improvements will fall within the jurisdiction of Massachusetts General Law (MGL) Chapter 253. At this time, it is considered



- likely that the proposed improvements will be considered jurisdictional, thus requiring that a Chapter 253 Permit Part B permit (full permit application and design report) will be required.
- Wetlands Protection Act (WPA) Notice of Intent (NOI) – Massachusetts Department of Environmental Protection (DEP) and Plymouth Conservation Commission – Prepare and submit a WPA NOI (including necessary accompanying materials) to the Plymouth Conservation Commission and Massachusetts DEP. This task includes abutter notification and production and distribution of the required number of copies of the NOI to the Plymouth Conservation Commission and DEP. It is assumed that Town staff will attend any Conservation Commission site visits or public hearings. This task excludes attendance by SLR staff at any meetings.

Please note that the permits listed above are based on the limited design information and assumptions to date. If during the design development it is found that dredging of more than 100 cubic yards of land under water, that the watercourse is deemed navigable or permanent filling of greater than 1,000 square feet of federal watercourses and/or wetlands is required, then additional permits will be required from both federal and state agencies. These permits may include MEPA EENF, Massachusetts DEP 401 Water Quality Certificate, Chapter 91 Waterways license, and USACE Pre-Construction Notification GP 18. If these permits are required, the preparation of said permits will be completed under a separate negotiated contract.

Permit Process and Order of Schedule

The following provides the order in which SLR and the Town will submit the necessary permit applications.

1. Plymouth Historic District Commission Application – 1 month
2. USACE Section 404 – SVNF GP 2 Permit Application (submit concurrently with Chapter 253 ODS) – 2 to 3 months
3. Massachusetts DEP and Plymouth Con Com NOI (will be submitted following USACE approval) – 2 months

The permit schedule presented above assumes that several of the permit applications will be submitted concurrently and is subject to change based on regulatory agency comments and permit review schedule. For this project, it is anticipated that obtaining the permits will take approximately 4 to 6 months.

Please note that this scope of services assumes that the contractor will be responsible for preparing and submitting a National Pollutant Discharge Elimination System Stormwater Pollution Prevention Plan, Construction Dewatering Permit, and any other construction-related permits that may be required.

- 2.6 Semi-Final Design (90%) of Improvements to the Dam – Final design of the proposed improvements will likely include upstream embankment riprap armor protection, repairs or replacement of the low-level outlet and culvert under Court Streett, and/or other improvements to the dam will be performed. It is anticipated that the final design drawings will consist of the following:

- Title sheet
- Beginning and end of project and project limit lines
- Existing conditions, including titles of adjacent roadways and watercourses; location of utilities, drainage facilities, and associated appurtenances; designated wetlands; and property lines and related information compiled from existing maps and records



- Proposed improvements, including plan view, sections, and details as well as construction control points
- Proposed grading
- Proposed plan, cross section, and elevation of the culvert
- Proposed staging and maintenance and protection of traffic plan or detour plan
- Utility relocations
- Typical cross sections
- Proposed planting/restoration plans
- Proposed water control during construction
- Standard design details
- Special design details
- Proposed soil erosion and sedimentation controls
- Sequence of construction

Technical notes will be incorporated on each plan sheet as necessary. One set of draft drawings will be submitted to you for review and approval. Upon discussion of any comments you may have and incorporating any revisions, SLR will then finalize the plans.

- 2.7 Technical Specifications – SLR will prepare a set of technical specifications suitable to describe the elements of the project and for solicitation of bids to qualified contractors.
- 2.8 Final Design (100%) – Prepare and submit Final Design (100%) plans and technical specifications. The final design will include final design drawings and engineers opinion of probable construction cost. The plans will be signed and sealed by a professional engineer who is licensed in the Commonwealth of Massachusetts. It is understood that the gap between 90% and 100% design submissions should be limited to the incorporation of the final comments and should not require any additional design development.
- 2.9 Meetings – It is anticipated that six meetings will be required for the various permits at the various regulatory offices. SLR will prepare and present the listed permit applications on your behalf when requested.

Task 3 – Construction Bid-Phase Services

- 3.1 Bid Documents and Specifications – Develop a single bid package with technical specifications. Prepare supporting information for the front-end specifications (bid form, conditions of the contract, and forms of agreement). It is assumed that the Town will provide sample front-end documents to incorporate into the typical format.
- 3.2 Bidding Assistance – Provide bid-phase assistance, which will include the following:
- Distribute solicitation to bid via electronic formats, including newspaper bid advertisement.
 - Prepare for and attend a prebid conference/site walk with prospective bidders to review sequence, methods, and other variables crucial to the attainment of the project goals. Prepare and distribute meeting minutes. Notice the prebid meeting through the Town's typical notice publications.
 - Respond to inquiries from potential bidders and issue addenda as necessary. Copy Town and MassDOT on all correspondence and communications.



- Develop a bid tabulation.
- Communicate with the Town, MassDOT, and project partners to discuss bids.
- Assist the Town in completing final contracting

Professional Fees

The above work is proposed to be completed for the following fees, all of which are lump sum except for direct expenses, which would be invoiced as incurred.

Task 1.0 – Phase II Inspection and Investigation	\$115,600
Task 2.0 – Final Design	\$100,500
Task 3.0 – Construction Bid-Phase Services	\$14,900
Direct Expenses.....	<u>\$15,300</u>
Total	\$246,300

Exclusions and Limitations

Please note that in submitting this proposal we cannot guarantee that the proposed project will receive all necessary permit approvals.

The following work is not included in this scope of services:

1. Design of roadway improvements
2. FEMA coordination, permitting, or certification
3. Environmental/chemical testing of disturbed soils or sediments
4. Design changes or additional alternatives assessment beyond that described in the scope of services
5. Payment of regulatory permit fees
6. Attendance at additional meetings beyond those indicated above
7. Construction-phase services, inspections, or testing
8. Preparation of record drawings after construction
9. It is assumed that the Town will provide necessary police or traffic controls for geotechnical borings or other work within Court Street.
10. It is assumed that the Town will remove guiderail or fencing to provide access to the dam or to perform geotechnical borings.

Such additional services can be provided upon request via supplemental agreement with SLR once agreed to.

