Commonwealth of Massachusetts
Executive Office of Energy & Environmental Affairs

Department of Environmental Protection
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February 8, 2024

James J. Fiorentini
4 Summer Street
Haverhill, MA 01830

DEP WQC AUTHORIZATION #
23-WW26-0006-APP
MassDEP File #s 033-1551, 033-1552
ACOE Project No. NAE-2022-00119
401 WQC Application Completion on 7/21/23

RE: Application for: COMBINED PERMIT – BRP WW 26
401 WATER QUALITY CERTIFICATION FOR MAJOR DREDGING AND FOR MAJOR FILL AND EXCAVATION PROJECT

AT: Little River Dam Removal and River Restoration Project, Haverhill, MA
Merrimack River Basin Drainage Area

Dear Mr. Fiorentini:

The Department of Environmental Protection ("MassDEP") has reviewed your application for a Combined 401 Water Quality Certification for Minor Dredging and Major Fill and Excavation ("Combined Permit"), as referenced above and is basing its certification upon an evaluation of the information contained in the application which is relevant to water quality considerations. In accordance with the provisions of Section 401 of the Federal Clean Water Act (33 U.S.C. § 1251 *et seq*.), M.G.L. c. 21, §§ 26-53, and 314 CMR 9.00, MassDEP has determined there is reasonable assurance the project or activity, as conditioned herein, will be conducted in a manner which will not violate applicable water quality standards (314 CMR 4.00) and other appropriate requirements of state law.

The waters of the Little River, which is part of the Merrimack River Basin Drainage Area, is designated in the Massachusetts Surface Water Quality Standards as B. These waters are designated as a "habitat for fish, other aquatic life, and wildlife, including for their reproduction, migration, growth and other critical functions, and for primary and secondary contact recreation." Anti-degradation provisions of these Standards require that "existing uses and the level of water quality necessary to protect the existing uses shall be maintained and protected."

The proposed project consists of the removal of Little River Dam, and associated river restoration and recreational improvements located on the Little River in Haverhill, MA. The proposed project is intended to provide ecological and community benefits by allowing the river to revert to a natural unobstructed flow, while increasing climate resilience. The proposed removal of the Little River Dam includes demolition of 65 feet of the 75-foot-long dam, to be removed to a minimum of 2 feet below the proposed channel elevation. In addition to dam removal, site features will be installed to further promote an ecologically diverse habitat appropriate for fish migration and spawning, as well as terrestrial habitat.

A total of approximately 10,680 cubic yards of dredged material is anticipated to be generated from the Little River, with dredged material being managed the following ways: 1) beneficially reused within the existing river channel for creation of a new channel and banks, 2) removed for off-site disposal, 3) allowed to naturally migrate downstream.

Up to 8,000 cubic yard of contaminated sediment is anticipated to be generated and disposed of offsite.[1,2] Sediment from the following areas will not be reused onsite nor released downstream.

- **SED-19 sample area:** lead and PAHs-impacted sediment, landfill disposal, area to be delineated during restoration activities as further discussed in Condition #12
- **Transect #2 sample area:** PCB and PAHs-impacted sediment, disposal options not yet determined, limits as described and in accordance with the documents and plans cited in Condition #4
- **SED-4 sample area:** lead-impacted sediment, landfill disposal, area extending to nearest sample locations
- **Transect #7 sample area,** lead-impacted sediment, landfill disposal, area extending to nearest sample locations

Once removed, the dredged material will be placed at one of the following locations and allowed to dewater; the G&C Concrete Construction, Inc property located at 30 Stevens Street, on the Stevens Street Mill Property, or on City property at the back of Cashman's Field. Once the dredged material is sufficiently dewatered, the material will be transported offsite.

Approximately 2,320 cubic yards of the remaining dredged materials will be beneficially reused onsite as part of the ecological restoration for creation of a new channel and banks, and approximately 360 cubic yards of the remaining excess dredged materials which are not needed for onsite reuse is anticipated to be released and redistributed downstream.

Sediment Chemistry Results: Samples were collected from locations upstream of the project area, from within the project area, and downstream of project area above and below the confluence of the Merrimack River. The sediment sample analytical results were compared Reportable Concentration ("RC") S-1 and RCS-2 criteria of the

1 Letter from Fuss & O'Neill to Kenneth Alepidis of MassDEP, dated July 21, 2023
2 Email correspondence between Matthew Kissane of Fuss & O'Neill with Kenneth Alepidis of MassDEP, dated December 21, 2023.

Massachusetts Contingency Plan ("MCP") and compared to Background Levels of PAHs and Metals in Soil levels included in the 2002 MassDEP Technical Update.

Results of the sediment samples analyzed indicated the presence of polycyclic aromatic hydrocarbon (PAHs), metals, polychlorinated biphenyls (PCBs), and Extractable Hydrocarbons (EPHs) in concentrations above the RCS-1 criteria.

Public Notice: The Combined Permit Application public notice was published in the Eagle Tribune newspaper on Wednesday, April 14, 2022. No comments were received by MassDEP during the 21-day public comment period pursuant to 314 CMR 9.05(3)(e), which ended on May 5, 2023.

Section 61 Findings: Pursuant to M.G.L. Chapter 30, Sections 61 to 62H inclusive [the Massachusetts Environmental Policy Act ("MEPA")], the project, as referenced in the Water Quality Certification Application, #23-WW26-0006-APP, was required to file an Expanded Environmental Notification Form (EENF). The City of Haverhill (the City) filed the EENF for construction of the project under EEA #16601. The EENF was noticed in the Environmental Monitor on September 9, 2022. In the Certificate of the Secretary of Energy and Environmental Affairs on the Expanded Environmental Notification Form, issued on October 18, 2022, the Secretary of Energy and Environmental Affairs (the Secretary) indicated that based on review of the EENF and consultation with Agencies, the Proponent was allowed to submit a Single Environmental Impact Report (SEIR) in lieu of a Draft and Final EIR.

The City subsequently filed the SEIR for construction of the project, which was noticed in the Environmental Monitor on February 24, 2023. In the Certificate of the Secretary of Energy and Environmental Affairs on the Single Environmental Impact Report, issued on April 3, 2023, the Secretary determined that "the SEIR adequately and properly complies with MEPA and its implementing regulations."

Therefore, based on information currently in the record, MassDEP grants a Combined 401 WQC for this project subject to the following conditions to maintain or attain water quality, to minimize any damage to the environment that may result from the project, and to ensure compliance with appropriate provisions of state law. MassDEP certifies that there is reasonable assurance the project or activity, as conditioned herein, will be conducted in a manner which will not violate applicable water quality standards (314 CMR 4.00) and other appropriate requirements of state law.

1. Pursuant to 314 CMR 9.01(3), the Contractor shall take all steps necessary to assure that the proposed activities will be conducted in a manner that will avoid violations of the anti-degradation provisions of the Massachusetts Surface Water Quality Standards that protect all waters, including wetlands (314 CMR 4.00). This condition is necessary to assure that any discharge from the project complies with the Massachusetts Surface Water Quality Standards, as provided in 314 CMR 9.00,

to protect the public health and restore and maintain the chemical, physical, and biological integrity of the water resources of the Commonwealth.

2. Prior to the start of work, or for any portion of the work thereafter, MassDEP shall be notified of any change(s) in the proposed project or plans that may affect waters or wetlands. MassDEP will determine whether the change(s) requires a revision to this Certification. This condition, pursuant to 314 CMR 9.07(1) and 314 CMR 9.09(2), is necessary to protect the public health and restore and maintain the chemical, physical, and biological integrity of the water resources of the Commonwealth.

3. As provided by 314 CMR 9.09(1), dredging and filling in accordance with this Certification may begin following the 21-day appeal period and once all other permits have been received. This condition is necessary to protect the public health and restore and maintain the chemical, physical, and biological integrity of the water resources of the Commonwealth.

4. Pursuant to 314 CMR 9.05(1), all work shall be performed in accordance with the following documents and plans. This condition is necessary as these documents outline how the execution of the project will meet the criteria of 314 CMR 9.07 and thereby protecting water quality and preventing degradation to wetlands and waters.

    - Application for Combined Permit, Accela Application #23-WW26-0006-APP, dated April 11, 2023, with attachments.

    - Plans entitled “Preliminary Design Development Plans, Little River Dam Removal and River Restoration Project, Haverhill, Massachusetts,” consisting of 38 sheets, various scales, dated June 30, 2022, prepared by Fuss & O’Neill.

      MassDEP shall be notified if there are modifications and or deletions of work as specified in the plans. Depending on the nature and the scope of any change, approval by the Department may be required.

    - Letter from Fuss & O’Neill to Kenneth Alepidis of MassDEP, dated July 21, 2023, providing project review question responses and additional project details.

    - Email correspondence between Matthew Kissane of Fuss & O’Neill with Kenneth Alepidis of MassDEP, dated December 21, 2023, providing project review question responses and additional project details.

    - Letter from Forest Schenk of the Massachusetts Division of Marine Fisheries (DMF) to the Haverhill Conservation Commission, dated November 10, 2022, providing project review responses and recommendations.

5. As provided by 314 CMR 9.05(4), the Department shall be notified, attention Kenneth Alepidis (kenneth.alepidis@mass.gov), one week prior to the start of in-water work so that Department staff may inspect the work for compliance with the terms and conditions of this Certification. This condition is necessary to ensure that construction practices are implemented in such a manner as to prevent degradation to wetlands and waters of the Commonwealth.

6. Pursuant to 314 CMR 9.05(4), the applicant and its contractor shall allow agents of the Department to enter the project sites to verify compliance with the conditions of this Certification. This condition is necessary to ensure that construction practices are implemented in such a manner as to prevent degradation to wetlands and waters of the Commonwealth.

7. Pursuant to 314 CMR 9.09(1), the term of the 401 WQC remains in effect for the same duration as the federal permit that requires it. This condition is necessary to ensure that construction practices are implemented in such a manner as to prevent degradation to wetlands and waters of the Commonwealth.

8. Future maintenance dredging is not authorized under this Combined 401 WQC. Pursuant to 314 CMR 9.04(5), the project does not qualify for the routine maintenance exemption. This condition is necessary to ensure that the chemical, physical and biological integrity of wetlands and waters of the Commonwealth are protected.

9. In order to be compatible with the fish passage requirements of this fish run and to further minimize potential adverse effects of the project, the time-of-year (TOY) restrictions for dredging, dewatering and associated activities is summarized below.[3] This condition is necessary to protect water quality by ensuring that the project proponent is using planning and construction practices that will maintain the aquatic resource functions and values.

    - All in-water, silt-producing work shall occur outside of a time of year restriction period of March 1 to June 30 for the purpose of minimizing impacts to diadromous fish resources in the adjacent Merrimack River from sedimentation and turbidity.

    - All in-water work be sequenced to occur during periods of low flow stream conditions in the Little River (i.e. July 1 – October 31).

10. In accordance with 314 CMR 9.07(1) and 314 CMR9.07(3), Best Management Practices (BMPs) such a temporary cofferdam to be installed segregating the work area from the rest of the river, and such as a silt curtain to be deployed downstream

3 Letter from Forest Schenk of the Massachusetts Division of Marine Fisheries (DMF) to the Haverhill Conservation Commission, dated November 10, 2022.

of the proposed work area to minimize turbidity. At a minimum, the silt curtain shall be bottom weighted to minimize the degree of lifting/flailing or billowing and shall be of suitable material /grade appropriate based on the velocity of the current at the site. This condition is necessary to ensure that construction practices are implemented in such a manner as to prevent degradation to wetlands and waters. It is also necessary to minimize turbidity and sediment caused by construction activities, protecting water quality.

11. Best Management Practices (BMPs) shall be deployed to minimize turbidity during temporary cofferdam construction. At a minimum, silt curtain shall be used to control turbidity downstream of the proposed work area. Water quality nearby the construction areas such as turbidity (NTU) shall be monitored during before, during, and after cofferdam construction to ensure that water quality standards are met. Turbidity monitoring data shall be kept on site and available for MassDEP review upon request. This condition is necessary to minimize turbidity and sediment caused by construction activities. It is necessary to ensure that water quality is not degraded, and biology of the waters are not negatively impacted by potential discharges.

12. At the lead and PAH-impacted sediment area characterized by the SED-19 sample, additional sampling and characterization is required to delineate the limits of the impacted sediment. A minimum of two sediment samples shall be collected from in-situ sediment present at the SED-19 area for delineation: one upstream and one downstream of the original SED-19 sample location. Samples shall be collected to the depth of proposed sediment removal, for analysis of PAHs and lead. Additional samples may be collected to further refine the limits of the lead and PAHs-impacted sediment in that area.

    Sampling data including a plan of the sample locations, sampling methods and depths, and laboratory QA/QC data shall be provided to MassDEP, attention Kenneth Alepidis (kenneth.alepidis@mass.gov) within 48 hours once available from the analytical laboratory, for review. Results of the chemical analysis shall be compared to the reuse levels in Policy COMM-97-001- Reuse and Disposal of Contaminated Soil at Massachusetts Landfills for reuse as landfill daily cover and to the MCP RCS-1 criteria. MassDEP will review the data to determine limits of the lead and PAH-impacted sediment area at the SED-19 location which will require offsite disposal. Under no circumstances shall the SED-19 sample area material be dredged or transported until MassDEP has reviewed and approved the data and the disposal plan.

13. In accordance with 314 CMR 9.07(1), during dredging and filling operations, measures shall be made to avoid the potential spread of aquatic invasive species to other waterbodies. Appropriate invasive species decontamination protocols shall be reviewed and applied, as required. All vehicles, equipment and tools that have direct contact with invasive species shall be cleaned before leaving the project areas. Under no circumstances shall sediment with invasive species seeds or rhizomes be

reused or transported. This condition is necessary to prevent the spread or introduction of invasive species which would affect water quality and biological resources. It is necessary to sustain aquatic resource functions, as well as characteristics and health of the waters.

14. If invasive species along part of the project areas are found, they shall be removed and shall be replaced with native herbaceous and shrub vegetation. During replanting, precautions will be taken to minimize the introduction of invasive species, including requiring the use of certified clean, weed-free soils, and equipment to reduce the risk of introducing non-native invasive species at site. This condition is necessary to prevent the spread or introduction of invasive species which would affect water quality and biological resources. It is necessary to sustain aquatic resource functions, as well as characteristics and health of the waters.

15. In accordance with 314 CMR 9.06(6)(a)8., the Applicant shall utilize stabilized construction entrances, vehicle wash down pads, perimeter erosion controls, and re-vegetation of disturbed areas with native plantings and seed mixes in accordance with project plans to minimize potential water quality impact resulting from construction activities. This condition is necessary to ensure that construction practices are implemented in such a manner as to prevent degradation to wetlands and waters. It is also necessary to ensure that impacts to wetlands and waters are appropriately mitigated.

16. Best Management Practices shall be employed by the Contractor to protect resource areas located adjacent to the proposed staging/temporary dredged material stockpiling and dewatering areas. Sediment stockpiles shall be constructed in accordance with the MassDEP approved project plans, stabilized, bottom-lined and securely covered with wind tear resistance tarpaulin, polyethylene sheeting or similar impermeable material at all times, and properly labeled. Stockpile covers shall be securely weighed down. Stockpiles shall also be secured to restrict access by the public and shall be set back at least 10-feet from temporary construction access roads or other areas and activities which could disturb the stockpiles and associated erosion controls. Inspection of the sediment containment and dewatering location and associated erosion controls shall be conducted daily and more frequently immediately before, during and after all precipitation and storm events. Any observed deficiency shall be corrected or repaired in a timely manner.

17. Pursuant to 314 CMR 9.09(1), in case of a precipitation or storm event, the site shall be secured beforehand in such a way as to protect resource areas and waters on site and downstream of the site, including covering of stockpiles of dredged material; inspection of erosion and sedimentation controls and correction as needed; and removal of any debris, equipment, materials, etc. that could potentially enter the waters on-site. Sediment stockpile areas shall be inspected immediately prior to, during and immediately after all precipitation and storm events. Any observed deficiency shall be corrected or repaired in a timely manner to prevent discharge

from the stockpiled material. If stormwater runoff and erosion is observed from stockpiled dredged material, additional erosion and/or damage prevention controls measures shall be implemented. This condition is necessary to minimize stormwater runoff and erosion from impacting wetland resources.

18. Dredging, stockpiling of dredged material, and offsite transport of dredged material shall be sequenced and conducted in a manner to limit stockpiling time. Sediment characterized as having concentrations exceeding the RCS-1 criteria shall not be stockpiled at the site longer than 90-days from the date of generation.

19. All sedimentation barriers shall be maintained in good repair until all disturbed areas have been fully stabilized with vegetation or other means. At no time shall sediments be deposited in a wetland or water body, except as described in the documents and plans cited in Condition # 4. During construction, the applicant or his/her designee shall inspect the erosion controls on a daily basis and shall remove accumulated sediments as needed. The applicant shall immediately control any erosion problems that occur at the site and shall also immediately notify MassDEP, which reserves the right to require additional erosion and/or damage prevention controls it may deem necessary. Sedimentation barriers shall serve as the limit of work unless another limit of work line has been approved by MassDEP pursuant to this 401 WQC. Pursuant to 314 CMR 9.06(6)(a)8., this condition is necessary to avoid and minimize adverse construction impacts to wetlands and waters of the Commonwealth.

20. In accordance with 314 CMR 9.07(1), no later than 21 days prior to commencement of dredging activity, a dredged material dewatering plan shall be submitted to MassDEP for review and approval. At a minimum, the dewatering plan shall include but not be limited to the type of containment, method of dewatering (i.e. mechanical or by gravity), method of collecting the dewatered effluent and method of disposal.

21. No later than 21 days prior to commencement of dredging activity, a construction phase water control plan shall be submitted to MassDEP for review and written approval if it differs from the proposed plan referenced in Condition # 4. Pursuant to 314 CMR 9.06(1)(c)4.c. and 9.07(1)(b)4.c., this condition is necessary to avoid and minimize adverse construction impacts to wetlands and waters of the Commonwealth.

22. Flow to the downstream channel shall be maintained throughout construction of the project via cofferdam construction and phased approach as described in and in accordance with the documents and plans cited in Condition # 4. As provided by 314 CMR 9.09(1), this condition is necessary to protect the public health and restore and maintain the chemical, physical, and biological integrity of the water resources of the Commonwealth. Pursuant to 314 CMR 9.07(1)(c), this condition is necessary to ensure that construction will be conducted in a manner that will not reduce or alter the habitat functions of the affected wetlands and waters of the Commonwealth.

23. Any approved discharge of water shall be controlled so that no scouring shall occur. This condition is necessary to adequately minimize and contain runoff water and material from the dredged material dewatering process to protect the waters. It is also necessary to ensure that water quality is not degraded, and biological resources are not negatively impacted by potential discharges.

24. The wetland restoration areas shall be constructed and monitored as described in and in accordance with the documents and plans cited in Condition # 4. Pursuant to 314 CMR 9.06(2)(a), this condition is necessary to ensure that wetlands of the Commonwealth are restored.

25. All sediment management activities authorized by this Combined 401 WQC shall be conducted under the supervision of a Licensed Site Professional ("LSP"). Pursuant to 314 CMR 9.02, this condition is necessary to ensure that the management of the contaminated sediment is overseen by a Qualified Environmental Professional.

26. A Health & Safety Plan shall be required for handling of sediment which has been characterized as exceeding MCP RCS-1 criteria. A copy shall be provided to the Department within six weeks of the effective of this Certification or two weeks prior to the commencement of the dredging operation whichever comes first.

27. Pursuant to 314 CMR 9.07(1), 314CMR9.07(5), 9.07(9), and 314 CMR 9.07(13)(b), MassDEP shall be notified in writing of the name and location of the upland licensed facilities accepting the dredged material for disposal or reuse for review and approval. If the licensed facility is located out of state, documentation shall be provided to MassDEP that the dredged material disposal/reuse has been approved and will be accepted by the receiving State in accordance with 314 CMR 9.07(13)(b). The dredged material shall not be transported to the facility without concurrence of MassDEP.

28. Transportation and disposal of the dredged material shall be overseen by the LSP of record. In accordance with 314 CMR 9.07(5), a Bills-of-Lading (BOL) or a Material Shipping Record (MSR) shall be used to track the dredged material to the proposed intermediate (stockpiling /dewatering) facility. A fully executed copy of the BOL or MSR shall be provided to MassDEP within 30 days of final shipment to the reused location or facility. Pursuant to 314 CMR 9.07(5), this condition is necessary to maintain a record of the dredged material for reference and to ensure accountability in its transportation. This assists in the protection of health, safety, public welfare, and the environment from any potential hazards during transportation. This condition is necessary to maintain a record of the dredged material for to ensure that dredge material disposal will not adversely affect any wetlands or waters.

29. In accordance with 314 CMR 9.07(5), Best Management Practices (BMPs) shall be implemented during transportation of the dredged material to the licensed receiving facility. At a minimum, when transported upon public roadways, all dredged material

shall have no free liquid as determined by the Paint Filter Test or other suitably analogous methodology acceptable to MassDEP, and a tarpaulin or other means shall be used to cover the dredged material during transport. This condition is necessary to protect surrounding area water quality during transportation. These practices help to avoid fugitive dust and siltation into wetland resources and waters.

30. Pursuant to 314 CMR 9.06, disposal of any volume of dredged material at any location in tidal waters, other than as approved herein, is not authorized by this 401 Water Quality Certification, and would require a request for amendment that would be subject to approval by MassDEP and the Massachusetts Coastal Zone Management office. This condition is necessary to prevent any pollution of tidal water resources by discharge of dredged material.

31. All equipment/machinery shall be stored outside above the High Water Mark ("HWM") and any wetland resource areas when not in use. Pursuant to 314 CMR 9.06(6)(a)8. this condition is necessary to avoid and minimize adverse construction impacts to wetlands and waters of the Commonwealth.

32. Pursuant to 314 CMR 9.06(6)(a)8., storing, servicing, or cleaning of equipment, including but not limited to fueling, changing, adding, or applying lubricants or hydraulic fluids, or washing/rinsing of trucks or equipment, shall be performed outside wetland resource areas. This condition ensures that no hazardous materials from equipment are inadvertently discharged into the water resource area in which construction is occurring, which would otherwise degrade water quality.

33. Pursuant to 314 CMR 9.06(6)(a)8. during the project period, there shall be no discharge or spillage of fuel, oil, or other pollutants, including sediments, onto any part of the site. The applicant shall take all reasonable precautions to prevent the release of pollutants by ignorance, accident, or vandalism. This condition is necessary to ensure that construction practices are implemented in such a manner as to prevent degradation to wetlands and waters.

34. In accordance with 314 CMR 9.09(1) and 314 CMR 9.06(6)(a)8., no later than four weeks after issuance of this water quality certification, the applicant shall submit a notification procedure outlining the reporting process to MassDEP for incidents relating to dredging activities that impact surrounding resource areas and habitats including, but not limited to, observed dead or distressed fish or other aquatic organisms, observed oily sheen on the surface of the water, a sediment spill, a turbidity plume beyond the deployed BMPs, and a barge or equipment accident/spill. If at any time during implementation of the project such an incident occurs, the applicant shall immediately notify MassDEP and all site related activities impacting the water shall cease until the source of the problem is identified and adequate mitigating measures are deployed to the satisfaction of MassDEP. This condition is necessary to protect water quality because it ensures that the project proponent is

using proper monitoring and construction practices that will maintain the integrity of the site hydrology and maintain the aquatic resource functions and values.

35. Upon completion of the project, remnants of project debris such as dewatering structures, cofferdams, turbidity curtains, coir logs, coir matting, sediment control barrier components, sediment traps, etc. shall be removed and disposed of appropriately at an offsite facility. This condition is necessary to prevent degradation to wetlands and waters.

36. Pursuant to 314 CMR 9.07(1) within 30 days of completion of the dredging at Little River Dam Removal and River Restoration Project in Haverhill, the applicant shall provide a set of construction photographs depicting pre-, during, and post-dredging and filling activities to the Wetlands Program in the Boston Office, Attn: Kenneth Alepidis. The photographs shall be marked or labeled with the WQC transmittal number and wetlands file number of the project. This condition is necessary to ensure that water quality requirements are met. It is necessary to ensure the project proponent uses planning and construction practices that maintain the integrity of the site hydrology and maintain the aquatic resource functions and values.

Failure to comply with this Combined 401 WQC is grounds for enforcement, including civil and criminal penalties, under M.G.L. c. 21, § 42, 314 CMR 9.00, M.G.L. c. 21A, § 16, 310 CMR 5.00, or other possible actions/penalties as authorized by the General Laws of the Commonwealth.

This Combined 401 WQC does not relieve the applicant of the obligation to comply with other appropriate state or federal statutes or regulations. Any changes made to the project as described in the previously submitted Combined Permit Application or supplemental documents will require further notification to and, if an amendment is required, approval by MassDEP.

NOTICE OF APPEAL RIGHTS

Certain persons shall have a right to request an adjudicatory hearing concerning 401 WQCs by MassDEP when an application is required:

a. the applicant or property owner;
b. any person aggrieved by the decision who has submitted written comments during the public comment period;
c. any ten persons of the Commonwealth pursuant to M.G.L. c. 30A where a group member has submitted written comments during the public comment period; or
d. any governmental body or private organization with a mandate to protect the environment, which has submitted written comments during the public comment period.

Any person aggrieved, any ten (10) persons of the Commonwealth, or a governmental body or private organization with a mandate to protect the environment may appeal without having submitted written comments during the public comment period only when the claim is based on new substantive issues arising from material changes to the scope or impact of the activity and not apparent at the time of public notice. To request an adjudicatory hearing pursuant to M.G.L. c. 30A, § 10, a Notice of Claim must be made in writing, provided that the request is made by certified mail or hand delivery to MassDEP, with the appropriate filing fee specified within 310 CMR 4.10 along with a DEP Fee Transmittal Form within twenty-one 21 days from the date of issuance of this Certificate.

Case Administrator
Massachusetts Department of Environmental Protection
Office of Appeals and Dispute Resolution
100 Cambridge Street, Suite 900
Boston, MA 02114

A copy of the request shall at the same time be sent by certified mail or hand delivery to the issuing office of the Wetlands Program at:

Department of Environmental Protection
100 Cambridge Street, Suite 900
Boston, MA 02114

A Notice of Claim for Adjudicatory Hearing shall comply with MassDEP's Rules for Adjudicatory Proceedings, 310 CMR 1.01(6), and shall contain the following information pursuant to 314 CMR 9.10(3):

a. the Combined Permit Authorization Number;
b. the complete name of the applicant and address of the project;
c. the complete name, address, and fax and telephone numbers of the party filing the request, and, if represented by counsel or other representative, the name, fax and telephone numbers, and address of the attorney;
d. if claiming to be a party aggrieved, the specific facts that demonstrate that the party satisfies the definition of "aggrieved person" found at 314 CMR 9.02;
e. a clear and concise statement that an adjudicatory hearing is being requested;
f. a clear and concise statement of (1) the facts which are grounds for the proceedings, (2) the objections to this Certificate, including specifically the manner in which it is alleged to be inconsistent with the MassDEP's Water Quality Regulations, 314 CMR 9.00, and (3) the relief sought through the adjudicatory hearing, including specifically the changes desired in the final written 401 WQC; and
g. a statement that a copy of the request has been sent by certified mail or hand delivery to the applicant, the owner (if different from the applicant), the conservation commission of the city or town where the activity will occur, the

Department of Conservation and Recreation (when the certificate concerns projects in Areas of Critical Environmental Concern), the public or private water supplier where the project is located (when the certificate concerns projects in Outstanding Resource Waters), and any other entity with responsibility for the resource where the project is located.

The hearing request along with a DEP Fee Transmittal Form and a valid check or money order payable to the Commonwealth of Massachusetts in the amount of one hundred dollars ($100) must be mailed to:

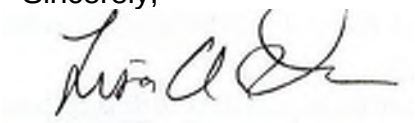
Commonwealth of Massachusetts
Department of Environmental Protection
Commonwealth Master Lockbox
PO Box 4062
Boston, MA 02211

The request will be dismissed if the filing fee is not paid, unless the appellant is exempt or granted a waiver. The filing fee is not required if the appellant is a city or town (or municipal agency), county, or district of the Commonwealth of Massachusetts, or a municipal housing authority. MassDEP may waive the adjudicatory hearing filing fee pursuant to 310 CMR 4.06(2) for a person who shows that paying the fee will create an undue financial hardship. A person seeking a waiver must file an affidavit setting forth the facts believed to support the claim of undue financial hardship together with the hearing request as provided above.

Failure to comply with this certification is grounds for enforcement, including civil and criminal penalties, under MGL c.21 §42, 314 CMR 9.00, MGL c. 21A §16, 310 CMR 5.00, or other possible actions/penalties as authorized by the General Laws of the Commonwealth.

Should you have any questions relative to this Combined 401 WQC, please contact Kenneth Alepidis at kenneth.alepidis@mass.gov.

Sincerely,

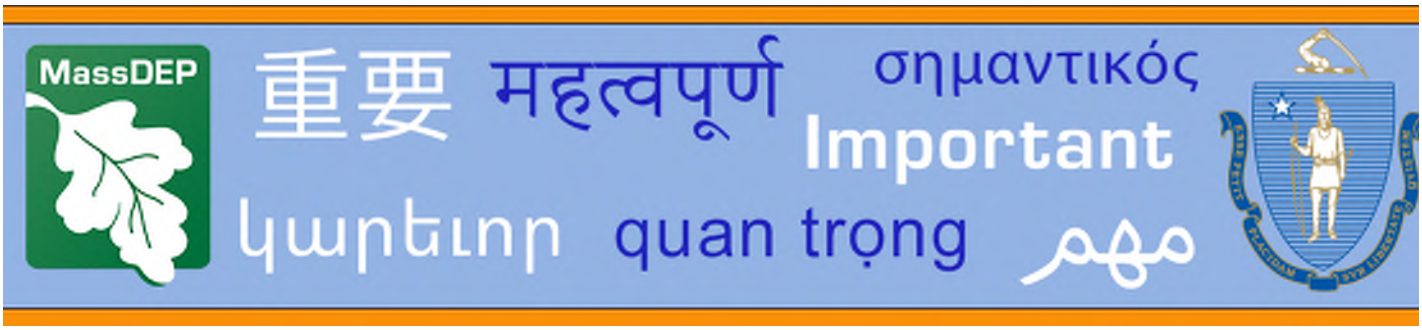


Lisa Rhodes
Wetlands Program Chief

ecc: Rober E. Moore, Jr., Haverhill Conservation Commission, City of Haverhill, 4 Summer St # 210, Haverhill, MA 01830, rmoore@cityofhaverhill.com
April Doroski, Fuss & O'Neill, 1550 Main Street, Springfield, MA, 01830

Kyle Lally, Jill Provencal, MassDEP Northeast Regional Office, 150 Presidential Way, Woburn, MA 01801
Paul Maniccia, Department of the Army, New England District, Corps of Engineers, 696 Virginia Road, Concord, MA 01742-2751
Forest Schenk, Massachusetts Division of Marine Fisheries, 30 Emerson Avenue, Gloucester, MA 01930
Edward Reiner and Rachel Croy, US EPA, 5 Post Office Square, Suite 100, Boston, MA 02109
Sean Duffey, Office of Coastal Zone 251 Causeway Street, Suite 800, Boston, MA 02114

attachments: Communication for Non-English Speaking Parties document
Plans of Record



Communication for Non-English-Speaking Parties

This document is important and should be translated immediately.

If you need this document translated, please contact MassDEP's Director of Environmental Justice at the telephone number listed below.

Español Spanish

Este documento es importante y debe ser traducido inmediatamente. Si necesita traducir este documento, póngase en contacto con el Director de Justicia Ambiental de MassDEP (*MassDEP's Director of Environmental Justice*) en el número de teléfono que figura más abajo.

Português Portuguese

Este documento é importante e deve ser traduzido imediatamente. Se você precisar traduzir este documento, entre em contato com o Diretor de Justiça Ambiental do MassDEP no número de telefone listado abaixo.

繁體中文 Chinese Traditional

本文檔很重要，需要即刻進行翻譯。
如需對本文檔進行翻譯，請透過如下列示電話號碼與 MassDEP 的環境司法總監聯絡。

简体中文 Chinese Simplified

这份文件非常重要，需要立即翻译。
如果您需要翻译这份文件，请通过下方电话与 MassDEP 环境司法主任联系。

Ayisyen Kreyòl Haitian Creole

Dokiman sa a enpòtan epi yo ta dwe tradui l imedyatman. Si w bezwen tradui dokiman sa a, tanpri kontakte Direktè. Jistis Anviwònmantal MassDEP a nan nimewo telefòn ki endike anba a.

Việt Vietnamese

Tài liệu này và quan trọng và phải được dịch ngay. Nếu quý vị cần bản dịch của tài liệu này, vui lòng liên hệ với Giám Đốc Phòng Công Lý Môi Trường của MassDEP theo số điện thoại được liệt kê bên dưới.

ប្រទេសកម្ពុជា Khmer/Cambodian

ឯកសារនេះមានសារៈសំខាន់
ហើយគប្បីតួរត្រូវបានបកប្រែភ្លាមៗ។
ប្រសិនបើអ្នកត្រូវការអោយឯកសារនេះបកប្រែ
សូមទាក់ទងនាយកផ្នែកយុត្តិធម៌បរិស្ថានរបស់
MassDEPតាមរយៈលេខទូរស័ព្ទដែលបានរាយដូចខាងក្រោម។

Kriolu Kabuverdianu Cape Verdean

Es dokumentu sta important i tenki ser tradusidu immediatamenti. Se nho ta presisa ke es dokumentu sta tradisidu, por favor kontata O Diretor di Justisia di Environman di DEP ku es numero di telifoni menxionadu di baixo.

Contact Deneen Simpson 857-406-0738
Massachusetts Department of Environmental Protection
100 Cambridge Street 9th Floor Boston, MA 02114
TTY# MassRelay Service 1-800-439-2370 • https://www.mass.gov/environmental-justice
(Version revised 8.2.2023) 310 CMR 1.03(5)(a)

Русский Russian

Это чрезвычайно важный документ, и он должен быть немедленно переведен. Если вам нужен перевод этого документа, обратитесь к директору Департамента экологического правосудия MassDEP (MassDEP's Director of Environmental Justice) по телефону, указанному ниже.

العربية Arabic

هذه الوثيقة مهمة وتجب ترجمتها على الفور.

إذا كنت بحاجة إلى ترجمة هذه الوثيقة، فيرجى الاتصال بمدير العدالة البيئية في MassDEP على رقم الهاتف المذكور أدناه.

한국어 Korean

이 문서는 중대하므로 즉시 번역되어야 합니다.
본 문서 번역이 필요하신 경우, 매사추세츠 환경보호부의 "환경정의" 담당자 분께 문의하십시오. 전화번호는 아래와 같습니다.

հայերեն Armenian

Այս փաստաթուղթը կարևոր է, և պետք է անհապաղ թարգմանել այն:
Եթե Ձեզ անհրաժեշտ է թարգմանել այս փաստաթուղթը, դիմեք Մասաչուսեթսի շրջակա միջավայրի պահպանության նախարարության (MassDEP) Բնապահպանական հարցերով արդարադատության ղեկավարին (Director of Environmental Justice)՝ ստորև նշված հեռախոսահամարով

فارسی Farsi Persian

این نوشتار بسیار مهمی است و باید فوراً ترجمه شود.
اگر نیاز به ترجمه این نوشتار دارید لطفاً با مدیر عدالت محیط زیستی MassDEP در شماره تلفن ذکر شده زیر تماس بگیرید.

Français French

Ce document est important et doit être traduit immédiatement. Si vous avez besoin d'une traduction de ce document, veuillez contacter le directeur de la justice environnementale du MassDEP au numéro de téléphone indiqué ci-dessous.

Deutsch German

Dieses Dokument ist wichtig und muss sofort übersetzt werden. Wenn Sie eine Übersetzung dieses Dokuments benötigen, wenden Sie sich bitte an MassDEP's Director of Environmental Justice *(Direktor für Umweltgerechtigkeit in Massachusetts)* unter der unten angegebenen Telefonnummer.

Ελληνική Greek

Το έγγραφο αυτό είναι πολύ σημαντικό και πρέπει να μεταφραστεί αμέσως. Αν χρειάζεστε μετάφραση του εγγράφου αυτού, παρακαλώ επικοινωνήστε με τον Διευθυντή του Τμήματος Περιβαλλοντικής Δικαιοσύνης της Μασαχουσέτης στον αριθμό τηλεφώνου που αναγράφεται παρακάτω

Italiano Italian

Questo documento è importante e deve essere tradotto immediatamente. Se hai bisogno di tradurre questo documento, contatta il Direttore della Giustizia Ambientale di MassDEP al numero di telefono sotto indicato.

Język Polski Polish

Ten dokument jest ważny i powinien zostać niezwłocznie przetłumaczony. Jeśli potrzebne jest tłumaczenie tego dokumentu, należy skontaktować się z dyrektorem ds. sprawiedliwości środowiskowej MassDEP pod numerem telefonu podanym poniżej.

हिन्दी Hindi

यह दस्तावेज महत्वपूर्ण है और इसका अनुवाद तुरंत किया जाना चाहिए। यदि आपको इस दस्तावेज का अनुवाद कराने की जरूरत है, तो कृपया नीचे दिए गए टेलीफोन नंबर पर MassDEP के पर्यावरणीय न्याय निदेशक से संपर्क करें।

Contact Deneen Simpson 857-406-0738
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LITTLE RIVER DAM REMOVAL AND RIVER RESTORATION

HAVERHILL · MASSACHUSETTS

PRELIMINARY DESIGN DEVELOPMENT PLANS

JUNE 30, 2022

PREPARED FOR

CITY OF HAVERHILL
DEPT. OF PUBLIC WORKS
500 PRIMROSE STREET
HAVERHILL, MA 01830-2660

PREPARED BY

FUSS & O'NEILL
1550 MAIN STREET, SUITE 400
SPRINGFIELD, MA 01103
413.452.0445
www.fando.com

SHEET INDEX

PROJECT TEAM

MUNICIPAL VULNERABILITY PREPAREDNESS PROGRAM (MVP)
MASSACHUSETTS EXECUTIVE OFFICE OF ENERGY AND ENVIRONMENTAL AFFAIRS
SALTONSTALL BUILDING
100 CAMBRIDGE STREET SUITE 900
BOSTON, MA 02114
617.626.1000

O'REILLY, TALBOT & OKUN ENGINEERING ASSOCIATES
293 BRIDGE STREET SUITE 500
SPRINGFIELD, MA 01103
413.788.6222

TG & B MARINE SERVICES, INC.
P.O. BOX 767
NORTH FALMOUTH, MA 02556-0767
508.326.3685

LOCATION MAP
SCALE: 1" = 2,000'

PROJ. No.: 20170390.U30
DATE: JUNE 2022

GI-001

LEGEND

EXIST	PROP	
		PROPERTY LINE/RIGHT-OF-WAY
		CENTERLINE
	LOD	LIMIT OF DISTURBANCE
		EASEMENT
10+00	10+00	BASELINE
		GRAVEL ROAD
		EDGE OF PAVEMENT
		VERT. GRAN. CURB
		SAW CUT
	MATCHLINE SEE SHEET 2 OF 2	MATCH LINE
		FEMA FLOODWAY
		100-YEAR FLOOD ELEVATION
		500-YEAR FLOOD ELEVATION
▲A100		WETLAND DELINEATION FLAG
		BANK/MEAN ANNUAL HIGH WATER
		BORDERING VEGETATED WETLANDS
		25' NO DISTURBANCE ZONE
		50' NO BUILD ZONE
		100' BUFFER ZONE
		200' RIVERFRONT AREA
		BASE CONDITION FLOW LIMITS / MEAN ANNUAL LOW WATER
		LITTLE RIVER DAM
		EDGE OF WATER
		BUFFER ZONE
		GUARD RAIL
		STOCKADE FENCE
		WIRE FENCE
		CHAIN LINK FENCE
		TREE LINE
		SHRUB LINE
		STONE WALL
		RETAINING WALL
2	4	MINOR CONTOUR
10	20	MAJOR CONTOUR
		BUILDING
○	○	BOLLARD
		SIGN
		CONC. PAVEMENT
	☐	NORMAL PAVEMENT
		HEAVY DUTY PAVEMENT
		ADA OR ACCESSIBLE RAMP
♿	♿	HANDICAP PARKING
♿ VAN	♿ VAN	VAN-ACCESSIBLE HANDICAP PARKING
×21.25* (X.X')		TOP OF SEDIMENT ELEVATION (DEPTH OF SEDIMENT) – APPROXIMATE FROM BOAT DEPTH MEASUREMENTS
×21.25 T		TOP OF SEDIMENT ELEVATION (FROM FIELD SURVEY)
×21.25 B		BOTTOM OF SEDIMENT ELEVATION (FROM FIELD SURVEY)
×21.25	×21.25	GROUND OR BOTTOM OF RIVER SPOT ELEVATION (FROM FIELD SURVEY)
21.25	21.25	SPOT ELEVATION w/LEADER
○		IRON PIPE
◉	◉	DRILL HOLE
○	● IP	IRON PIN
⊡	■	MONUMENT
+	+	CONTROL POINT
	🟩	WETLAND SEED MIX
	🟧	WETLAND SEED MIX AND LIVE STAKES
	🟥	CONSERVATION SEED MIX
	🟥	SEMI-SHADE SEED MIX
	🟦	SHOWY WILDFLOWER SEED MIX
	🟪	UPLAND/PARK SEED MIX

LEGEND NOTE

SYMBOLS AND LEGENDS OF PROJECT FEATURES ARE GRAPHIC REPRESENTATIONS AND ARE NOT NECESSARILY SHOWN ON THE DRAWINGS TO SCALE OR TO THEIR ACTUAL DIMENSION OR LOCATION. COORDINATE DETAIL SHEET DIMENSIONS, MANUFACTURERS' LITERATURE, SHOP DRAWINGS, AND FIELD MEASUREMENTS OF SUPPLIED PRODUCTS FOR LAYOUT OF THE PROJECT FEATURES.

EXIST	PROP	
D		DRAIN/CSO LINE
S	S	SEWER LINE
‖	‖	OVERHEAD ELECTRIC, TELEPHONE & FIRE ALARM
W	W	WATER LINE
G	G	GAS LINE
E	E	UNDERGROUND ELECTRIC
T	T	TELEPHONE LINE
C	C	CABLE TV
E/T/C	E/T/C	ELECTRIC, TELEPHONE & CABLE TV LINES
CB	CB	CATCH BASIN
DCB	DCB	DOUBLE CATCH BASIN
DI	DI	DRAIN INLET
Ⓓ DMH	Ⓓ DMH	DRAIN MANHOLE
		HEADWALL
Ⓢ SMH	Ⓢ SMH	SEWER MANHOLE
○ CO	● CO	CLEAN OUT
Ⓦ	Ⓦ	WATER MANHOLE
○ WG	● WG	WATER GATE
		FIRE HYDRANT
WM	WM	WATER METER
PIV	PIV	POST INDICATOR VALVE
Ⓦ	Ⓦ	WELL
○ GG	○ GG	GAS GATE
GM	GM	GAS METER
Ⓔ	Ⓔ	ELECTRIC MANHOLE
■	■	ELECTRIC BOX
EM	EM	ELECTRIC METER
		TRANSFORMER
☼	☼	LIGHT POST
Ⓣ	Ⓣ	TELEPHONE MANHOLE
TS	TS	TRAFFIC SIGNAL
■	■	SIGNAL BOX
FACP	FACP	FIRE ALARM CONTROL PANEL
FB	FB	FIRE ALARM BOX
		UTILITY POLE
		GUY POLE
		HAND HOLE
		PULL BOX
	SF	SILT FENCE
		BIODEGRADABLE COIR ROLLS
		TEMPORARY COFFERDAM
		CONSTRUCTION ENTRANCE/ TEMPORARY HAUL ROAD
		STAGING AREA
		TEMPORARY GRAVEL WALKWAY
	🟦	BASE CONDITION WATER LEVEL
		LOWER RIVER STABILIZATION
		UPPER RIVERBANK STABILIZATION
		GRAVEL WALKING TRAIL
		SCOUR POOL

ABBREVIATIONS

GENERAL

APPROX	APPROXIMATE
BIT	BITUMINOUS PAVEMENT
BW	BOTTOM OF WALL
CC	CONCRETE CURB
CCB	CAPE CODE BERM
ELEV	ELEVATION
EXIST	EXISTING
GC	GRANITE CURB
MAX	MAXIMUM
MIN	MINIMUM
NTS	NOT TO SCALE
PCC	PRECAST CONCRETE CURB
PROP	PROPOSED
R&D	REMOVE AND DISPOSE
R&R	REMOVE AND RESET
R&S	REMOVE AND STACK
TOS	TOP OF SLOPE
TW	TOP OF WALL
TYP	TYPICAL
VGC	VERTICAL GRANITE CURB

UTILITY

CB	CATCH BASIN
CMP	CORRUGATED METAL PIPE
CPP	CORRUGATED POLYETHYLENE PIPE
DCB	DOUBLE CATCH BASIN
DI	DUCTILE IRON PIPE
F&G	FRAME AND GRATE
F&C	FRAME AND COVER
HDPE	HIGH DENSITY POLYETHYLENE
HYD	HYDRANT
INV	INVERT ELEVATION
PVC	POLYVINYL CHLORIDE PIPE
RCP	REINFORCED CONCRETE PIPE
RD	ROOF DRAIN
SMH	SEWER MANHOLE
TSV	TAPPING SLEEVE, VALVE AND BOX
UP	UTILITY POLE

MAP NOTES AND REFERENCES

1. REFERENCES:
   A. COMMONWEALTH OF MASSACHUSETTS DEPARTMENT OF TRANSPORTATION STANDARD SPECIFICATIONS FOR HIGHWAY AND BRIDGES, 2022 EDITION, REVISIONS AND ALL CURRENT ADDENDA, ARE MADE A PART HEREOF, AS IF ATTACHED HERETO. ALL REFERENCES TO "STATE STANDARD SPECIFICATIONS" SHALL REFER TO THE LATEST EDITION OF THE COMMONWEALTH OF MASSACHUSETTS DEPARTMENT OF TRANSPORTATION STANDARD SPECIFICATIONS FOR HIGHWAYS AND BRIDGES CONSTRUCTION.
   B. THE MASSACHUSETTS DEPARTMENT OF TRANSPORTATION CONSTRUCTION STANDARD DETAILS, 2017 EDITION, AND ALL CURRENT REVISIONS, ARE MADE A PART HEREOF, AS IF ATTACHED HERETO.
   C. THE MASSACHUSETTS EROSION AND SEDIMENT CONTROL GUIDELINES FOR URBAN AND SUBURBAN AREAS, 2013 EDITION, REVISIONS AND ALL CURRENT ADDENDA, ARE MADE A PART HEREOF, AS IF ATTACHED HERETO. ALL REFERENCES TO "SOIL EROSION AND SEDIMENT CONTROL HANDBOOK" SHALL REFER TO THE LATEST EDITION OF THE MASSACHUSETTS EROSION AND SEDIMENT CONTROL GUIDELINES FOR URBAN AND SUBURBAN AREAS.
2. EXISTING CONDITIONS:
   A. SURVEY: CONTOURS SHOWN ON THIS PLAN THAT ARE OUTSIDE OF THE RIVER AND CASHMAN PARK AREA ARE APPROXIMATE ONLY AND WERE OBTAINED FROM 2013-2014 USGS LIDAR DATA OBTAINED FROM NOAA'S ONLINE DATA ACCESS VIEWER. TOPOGRAPHY WITHIN CASHMAN PARK, BATHYMETRIC SPOT ELEVATIONS (WITHIN THE RIVER), AND SEDIMENT DEPTHS (WITHIN THE RIVER) WERE OBTAINED FROM THE FOLLOWING COMBINATION OF FIELD INVESTIGATIONS AND RESEARCH:
      A.A. ELEVATIONS SHOWN WITHIN RIVER WITH ASTERISKS ARE APPROXIMATE AND WERE OBTAINED ON NOVEMBER 6, 2020 AND ON NOVEMBER 17, 2020 FROM DEPTH MEASUREMENTS TAKEN BY BOAT BY FUSS & O'NEILL AND TG&B MARINE SERVICES, INC.
      A.B. ELEVATIONS IN RIVER AND AT WINTER STREET THAT DO NOT INCLUDE ASTERISKS WERE OBTAINED FROM ACTUAL FIELD SURVEY PERFORMED BY FUSS & O'NEILL IN FALL OF 2021 AND WINTER OF 2022. ELEVATION WITH 'T' DESIGNATION REFERS TO TOP OF SEDIMENT ELEVATION; ELEVATION WITH 'B' DESIGNATION REFERS TO BOTTOM OF SEDIMENT. ELEVATIONS THAT DO NOT HAVE ASTERISKS OR 'T' OR 'B' DESIGNATION WERE ALSO OBTAINED FROM ACTUAL FIELD SURVEY.
      A.C. ELEVATION AND WETLANDS DATA WITHIN CASHMAN PARK WAS OBTAINED FROM AN EXISTING CONDITIONS SURVEY PLAN OF CASHMAN PARK, DATED JUNE 1, 2017, AND PREPARED BY SMC SURVEYING AND MAPPING CONSULTANTS.
   B. TOPOGRAPHIC INFORMATION (CONTOURS), BUILDING FOOTPRINTS, EXISTING FEATURES SHOWN OUTSIDE OF THE PROJECT'S RIGHTS OF WAY ARE APPROXIMATE ONLY AND WERE OBTAINED FROM A COMBINATION OF 2013-2014 USGS CMGP LIDAR DATA (OBTAINED FROM NOAA'S ONLINE DATA ACCESS VIEWER) AND MASSGIS DATA LAYER.
   C. WETLAND FLAGGING ALONG LITTLE RIVER WITHIN THE DIRECT PROJECT LIMITS WAS PERFORMED BY FUSS & O'NEILL, INC. (MICHAEL SOARES, WETLAND SCIENTIST) ON SEPTEMBER 27, 2021 AND APRIL 29, 2022. THE WETLAND FLAGS WERE THEN LOCATED VIA SUB-METER GPS. DUE TO SPECIFIC SITE RESTRICTIONS OR SAFETY CONCERNS, IT WAS NOT POSSIBLE TO ACCESS AND FIELD-DELINEATE SOME SEGMENTS OF RIVERBANK AND BORDERING WETLANDS. IN LOCATIONS WHERE A TYPICAL FIELD DELINEATION OF THE BANK, LUWW, AND/OR BVW WAS NOT PRACTICABLE, BOUNDARIES OF RESOURCE AREAS BETWEEN FIELD DELINEATED SEGMENTS WERE COMPLETED IN GIS THROUGH A REVIEW OF AERIAL IMAGERY (2014-2021, SPRING AND SUMMER), FEDERAL AND STATE WETLANDS MAPPING (NATIONAL WETLANDS INVENTORY AND MASS DEP, RESPECTIVELY), AND 1-FOOT CONTOURS (DERIVED FROM 2013-2014 LIDAR). STATE-REGULATED RIVERFRONT AREA IS MEASURED HORIZONTALLY FROM BANK OF LITTLE RIVER, AND STATE-REGULATED BUFFER ZONE IS MEASURED HORIZONTALLY FROM THE BOUNDARIES OF BVW IDENTIFIED AT THE SITE.
   D. ASSESSOR'S PARCELS, WETLAND BOUNDARIES (UPSTREAM OF THE MBTA BRIDGE AND THE PROJECT'S LIMIT OF DIRECT IMPACTS), POTENTIAL & CERTIFIED VERNAL POOLS, SHOWN ON THESE PLANS ARE APPROXIMATE AND WERE OBTAINED FROM MASSACHUSETTS GEOGRAPHIC INFORMATION SYSTEM (MASSGIS).
3. FLOOD ZONE:
   A. SPECIAL FLOOD HAZARD AREAS (SFHAS), INCLUDING FLOODWAY INFORMATION, SHOWN ON THIS PLAN WERE INITIALLY OBTAINED FROM FEMA FLOOD INSURANCE RATE MAP (FIRM) PANEL NUMBER 25009C0089G WITH AN EFFECTIVE DATE OF JULY 19, 2018 AND FIRM PANEL NUMBERS 25009C0087F, 25009C0086F, AND 25009C0078F WITH AN EFFECTIVE DATE OF JULY 3, 2012 FOR ESSEX COUNTY, MASSACHUSETTS. THESE FLOOD HAZARD AREAS WERE THEN MODIFIED BASED ON THE RESULTS OF MORE DETAILED TOPOGRAPHY AND A PRE-CONDITIONS (OR PRE-DAM REMOVAL) HYDRAULIC ANALYSIS PERFORMED BY FUSS & O'NEILL USING HEC-RAS. IN ORDER TO ASSESS ANTICIPATED HYDRAULIC IMPACTS AS A RESULT OF THE PROPOSED REMOVAL OF THE DAM, A POST-CONDITIONS (OR POST-DAM REMOVAL) HYDRAULIC ANALYSIS WAS ALSO PERFORMED BY FUSS & O'NEILL USING HEC-RAS. THE MODIFIED PRE-CONDITIONS SPECIAL FLOOD AREA BOUNDARIES ARE REFLECTED ON THE EXISTING CONDITIONS PLANS. THE POST-CONDITIONS (OR POST-DAM REMOVAL) SPECIAL FLOOD AREA BOUNDARIES ARE REFLECTED ON THE SITE LAYOUT AND GRADING PLANS.
4. NATURAL HERITAGE DATA:

   THERE ARE NO NHESP PRIORITY HABITATS OF RARE SPECIES, ESTIMATED HABITATS OF RARE WILDLIFE, OR NATURAL COMMUNITIES LOCATED ALONG THE LITTLE RIVER. THERE ARE ALSO NO AREAS OF CRITICAL ENVIRONMENTAL CONCERN ALONG LITTLE RIVER. THERE ARE, HOWEVER, POTENTIAL VERNAL POOLS LOCATED ALONG LITTLE RIVER TO THE SOUTH OF THE RIVER'S CROSSING WITH I-495 AND NORTH OF THE RIVER'S RAILROAD BRIDGE CROSSING. THESE POTENTIAL VERNAL POOLS WERE OBTAINED FROM MASSGIS.
5. UTILITIES:

   UTILITIES SHOWN ON THIS PLAN WERE APPROXIMATED FROM FIELD OBSERVATIONS AND A COLLECTIVE REVIEW OF THE FOLLOWING DOCUMENTS: (1) WINTER STREET AND HALE STREET SEWER DIVERSION PLAN PREPARED BY METCALF & EDDY (DATED JULY 1937), (2) FLOOD PROTECTION SYSTEM IMPROVEMENT PLANS (CWSRF-3662, IFB020-13) PREPARED BY AECOM (DATED FEBRUARY 14, 2013), AND (3) INTEGRATED FINAL COMBINED SEWER OVERFLOW LONG-TERM CONTROL PLAN AND SUPPLEMENTAL ENVIRONMENTAL IMPACT REPORT PREPARED BY CDM SMITH (DATED FEBRUARY 2017).
6. ACTIVITY AND USE LIMITATION AREAS AND UNDERGROUND STORAGE TANKS:

   ALL PROPERTIES WHERE WORK IS PROPOSED DO NOT HAVE UNDERGROUND STORAGE TANKS. HOWEVER, PARCEL 516-304-1 (93 LAFAYETTE SQUARE) IS CONSIDERED AN AUL (ACTIVITY AND USE LIMITATION) PROPERTY.

GENERAL CONSTRUCTION AND COORDINATION REQUIREMENTS

1. THE CONTRACTOR SHALL VERIFY THE LOCATION OF THE EXISTING DAM TO BE REMOVED, EXISTING ADJACENT STRUCTURES, AND THE PROPOSED LAYOUT OF THE RIVER CHANNEL IMPROVEMENTS WITH ITS RELATIONSHIP TO THE EXISTING SITE SURVEY. THE CONTRACTOR SHALL ALSO VERIFY ALL DIMENSIONS, SITE CONDITIONS, AND MATERIAL SPECIFICATIONS AND SHALL NOTIFY THE OWNER AND ENGINEER OF ANY ERRORS, OMISSIONS OR DISCREPANCIES BEFORE COMMENCING OR PROCEEDING WITH WORK.
2. THE CONTRACTOR SHALL TAKE FIELD MEASUREMENTS AS REQUIRED TO FIT THE WORK PROPERLY. RECHECK MEASUREMENTS BEFORE CONSTRUCTING EACH WORK ITEM. WHERE PORTIONS OF THE WORK ARE INDICATED TO FIT TO OTHER CONSTRUCTION, VERIFY DIMENSIONS OF OTHER CONSTRUCTION BY FIELD MEASUREMENTS BEFORE FABRICATION. COORDINATE FABRICATION SCHEDULE WITH CONSTRUCTION PROGRESS TO AVOID DELAYING THE WORK.
3. THE LOCATION OF EXISTING UTILITIES ARE APPROXIMATE, HAVE BEEN PLOTTED FROM THE LATEST AVAILABLE INFORMATION, AND MAY NOT BE ALL INCLUSIVE. THE CONTRACTOR SHALL CHECK AND VERIFY THE LOCATIONS OF ALL EXISTING UTILITIES, BOTH OVERHEAD AND UNDERGROUND, AND "DIG-SAFE" MUST BE NOTIFIED PRIOR TO COMMENCING ANY CONSTRUCTION OPERATIONS. RESTORATION AND REPAIR OF DAMAGE TO EXISTING UTILITIES SHALL BE THE RESPONSIBILITY OF THE CONTRACTOR WITH NO ADDITIONAL COST TO THE OWNER. NO EXCAVATION SHALL COMMENCE UNTIL ALL INVOLVED UTILITY COMPANIES AND/OR TOWN WHOSE FACILITIES MIGHT BE AFFECTED BY ANY WORK TO BE PERFORMED BY THE CONTRACTOR ARE NOTIFIED AT LEAST 72 HOURS IN ADVANCE. RELOCATION OF ANY UTILITIES SHALL BE AT THE OWNERS EXPENSE AND COMPLETED WITH THE UTILITY WORK. THE OWNER SHALL BE NOTIFIED AS TO THE RELOCATIONS REQUIRED PRIOR TO THE START OF CONSTRUCTION.
4. DEVIATIONS OR CHANGES FROM THESE PLANS WILL NOT BE ALLOWED UNLESS APPROVED BY THE ENGINEER/CONTRACT OWNER.
5. THE CONTRACTOR SHALL MAKE EXPLORATORY EXCAVATIONS AND LOCATE ANY EXISTING UTILITIES SUFFICIENTLY AHEAD OF CONSTRUCTION TO PERMIT REVISIONS TO PLANS IF NECESSARY. HOWEVER, EXPLORATORY EXCAVATIONS AND OTHER ACTIVITIES INVOLVING SOIL DISTURBANCES WITHIN THE RIVER OR OTHER ADJACENT WATERCOURSES SHALL BE LIMITED TO THE LOW-FLOW PERIOD (I.E. THE PERIOD FROM JULY 1 TO OCTOBER 31 OF ANY CALENDAR YEAR).
6. THE EXISTENCE AND/OR LOCATION OF UTILITIES SHOWN ON THESE PLANS MAY BE ONLY APPROXIMATELY CORRECT AND THE CONTRACTOR IS REQUIRED TO TAKE PRECAUTIONARY MEASURES TO PROTECT THE UTILITIES SHOWN HEREON AND ANY OTHER EXISTING UTILITIES NOT OF RECORD OR NOT SHOWN ON THESE PLANS. THE CONTRACTOR SHALL BE RESPONSIBLE FOR REPAIRING, AT HIS/HER EXPENSE, ANY EXISTING UTILITIES DAMAGED DURING CONSTRUCTION.
7. THE CONTRACTOR SHALL BE RESPONSIBLE FOR REPLACING, WITH MATCHING MATERIALS, ANY PAVEMENT, WALKS, CURBS, WALLS, FENCES, ETC., THAT MUST BE CUT OR THAT ARE DAMAGED DURING CONSTRUCTION.
8. THE CONTRACTOR SHALL BE RESPONSIBLE FOR OBTAINING ALL REMAINING NECESSARY PERMITS, INSPECTIONS, BONDS, ETC. AND OTHER APPROVAL RELATED ITEMS WITH THE LOCAL AND STATE/FEDERAL MUNICIPALITIES. NO CONSTRUCTION SHALL COMMENCE UNTIL SUCH PERMITS HAVE BEEN SECURED AND THE CONTRACTOR HAS SUPPLIED THE REQUIRED NOTICES.
9. WORK ON MBTA PROPERTY CAN ONLY BE UNDERTAKEN UPON RECEIPT OF A LICENSE FROM MBTA.
10. AN APPROVED SET OF PLANS AND ALL APPLICABLE PERMITS MUST BE AVAILABLE AT THE SITE THROUGH THE ENTIRE PERIOD OF CONSTRUCTION WHEN WORK IS ACTIVELY OCCURING.
11. CONTRACTOR AGREES THAT HE/SHE SHALL ASSUME SOLE AND COMPLETE RESPONSIBILITY FOR JOB SITE CONDITIONS DURING THE COURSE OF CONSTRUCTION OF THIS PROJECT, INCLUDING SAFETY OF ALL PERSONS AND PROPERTY; THAT THIS REQUIREMENT SHALL APPLY CONTINUOUSLY AND NOT BE LIMITED TO NORMAL WORKING HOURS; AND THAT THE CONTRACTOR SHALL DEFEND, INDEMNIFY AND HOLD THE CONTRACT OWNER (CITY OF HAVERHILL), PROPERTY OWNERS AND THE ENGINEER HARMLESS FROM ANY AND ALL LIABILITY, REAL AND ALLEGED, IN CONNECTION WITH THE PERFORMANCE OF WORK ON THIS PROJECT, EXCEPTING FOR LIABILITY ARISING FROM "THE SOLE NEGLIGENCE OF THE CONTRACT OWNER, PROPERTY OWNER OR THE ENGINEER."
12. PHOTOGRAPHS, VIDEOTAPING, AND SKETCHES (AS NECESSARY) MUST BE TAKEN OF ADJOINING CONSTRUCTION AND SITE IMPROVEMENTS WITHIN 200 FEET OF EXCAVATION LIMITS ASSOCIATED WITH THE DAM REMOVAL AND RIVER CHANNEL IMPROVEMENTS PRIOR TO EXCAVATION AND THE INSTALLATION OF EXCAVATION SUPPORT SYSTEMS. SUCH DOCUMENTATION SHALL ILLUSTRATE EXISTING SURFACES THAT MAY BE MISCONSTRUED AS DAMAGE CAUSED BY THIS PROJECT CONSTRUCTION OPERATIONS.
13. METHODS AND MATERIALS USED IN THE CONSTRUCTION OF IMPROVEMENTS FOR THIS PROJECT SHALL CONFORM TO THE CURRENT CONSTRUCTION STANDARDS AND SPECIFICATIONS OF THE CITY OF HAVERHILL AND THE MASSACHUSETTS DEPARTMENT OF TRANSPORTATION.
14. VERIFY SPACE REQUIREMENTS AND DIMENSIONS OF ITEMS SHOWN ON DRAWINGS. CHECK THE LOCATION, LEVEL AND GRADE, OF EVERY MAJOR ELEMENT AS THE WORK PROGRESSES.
15. ESTABLISH BENCHMARKS AND CONTROL POINTS IN ADDITION TO THOSE INDICATED TO SET LINES, GRADES, AND LEVELS AT EACH STAGE OF CONSTRUCTION. LOCATE THE WORK AND COMPONENTS OF THE WORK ACCURATELY, IN CORRECT ALIGNMENT AND ELEVATION, AS INDICATED BOUNDS OR MONUMENTATION DISTURBED DURING CONSTRUCTION SHALL BE SET OR RESET BY A PROFESSIONAL LICENSED SURVEYOR AT NO COST TO THE OWNER.
16. COMPLY WITH MANUFACTURERS' WRITTEN INSTRUCTIONS AND RECOMMENDATIONS FOR INSTALLING MATERIALS AND PRODUCTS. INSTALL PRODUCTS AT THE TIME AND UNDER CONDITIONS THAT WILL ENSURE THE BEST POSSIBLE RESULTS. MAINTAIN CONDITIONS REQUIRED FOR PRODUCT PERFORMANCE UNTIL SUBSTANTIAL COMPLETION.
17. USE PRODUCTS, CLEANERS, AND INSTALLATION MATERIALS THAT ARE NOT CONSIDERED HAZARDOUS.
18. CONTRACTOR SHALL IDENTIFY TREES TO BE REMOVED PRIOR TO CONSTRUCTION AND MARK THEM WITH CONSTRUCTION TAPE FOR REVIEW BY THE OWNER/ENGINEER. TREES AND OTHER EXISTING VEGETATION SHALL BE RETAINED WHEREVER FEASIBLE. CONTRACTOR SHALL NOT REMOVE TREES UNTIL REVIEWED AND APPROVED BY THE OWNER/ENGINEER.
19. THE CONTRACTOR SHALL RESTORE DISTURBED LANDSCAPE AREAS TO ORIGINAL CONDITION (I.E. SEEDED, SODDED, PLANTED), UNLESS OTHERWISE DIRECTED WITHIN CONTRACT DOCUMENTS.
20. ALL EXCESS EXCAVATED MATERIALS, EXCESS FILL, EXCESS CONSTRUCTION MATERIALS, DEBRIS, AND WASTE (INCLUDING IDENTIFIED CONTAMINATED SOILS WITHIN RIVER) SHALL BE REMOVED FROM THE SITE AND SHALL BE DISPOSED OF IN ACCORDANCE WITH APPLICABLE LAWS.
21. DO NOT CLOSE OR OBSTRUCT ROADWAYS, SIDEWALKS, FIRE HYDRANTS, AND UTILITIES WITHOUT APPROPRIATE PERMITS.
22. WORK IS RESTRICTED TO THE HOURS OF 7 AM TO 5 PM ON MONDAY THROUGH FRIDAY, EXCLUDING HOLIDAYS, UNLESS OTHERWISE APPROVED BY THE OWNER.
23. PRIOR TO CONSTRUCTION, ADDITIONAL CONSTRUCTION ACCESSES AND/OR CONSTRUCTION EASEMENTS NOT SHOWN ON THIS PLAN (AGREED UPON THROUGH COORDINATION BETWEEN CONTRACTOR AND PROPERTY OWNER) MUST BE GRANTED IN WRITING BY PROPERTY OWNERS.
24. STOP WORK IN THE VICINITY OF SUSPECTED CONTAMINATED SOIL, GROUNDWATER, OR OTHER MEDIA OUTSIDE OF THE AREA OF CONTAMINATED SOIL AREA IDENTIFIED WITHIN. IMMEDIATELY NOTIFY THE ENGINEER AND OWNER SO THAT APPROPRIATE TESTING AND SUBSEQUENT ACTION CAN BE TAKEN. RESUME WORK IN THE IMMEDIATE VICINITY ONLY UPON DIRECTION BY THE OWNER.

PROTECTION OF WORK REQUIREMENTS

1. THE WORK AND SITE SHALL BE PROTECTED AT ALL TIMES UNTIL FINAL ACCEPTANCE BY THE OWNER. CARE SHALL BE EXERCISED WHILE OPERATING EQUIPMENT ON, AND ADJACENT TO, THE WORK AREA. THE CONTRACTOR SHALL BE RESPONSIBLE TO ASSURE THE UTILIZED EQUIPMENT DOES NOT CAUSE DAMAGE TO EXISTING AND ADJACENT FEATURES NOT SCHEDULED FOR DEMOLITION OR REMOVAL.
2. ACCESS TO VARIOUS PORTIONS OF THE SITE SHALL BE UNDERTAKEN IN SUCH A MANNER THAT THE WORK AND SITE ARE PROTECTED AT ALL TIMES. ACCESS WAYS SHALL BE CONSTRUCTED, MAINTAINED, AND PROTECTED WITH SEDIMENT CONTROLS TO PREVENT DAMAGE FROM EROSION DURING MAJOR STORM EVENTS.
3. PLACEMENT AND COMPACTION OF FILL MATERIALS SHALL BE COMPLETED IN ACCORDANCE WITH THE PROJECT MANUAL AND IN SUCH A MANNER THAT THE WORK AND ADJACENT PROPERTIES ARE PROTECTED FROM DAMAGE AT ALL TIMES.
4. CONSTRUCT IN-RIVER IMPROVEMENTS AND MAINTAIN IN-RIVER WORK AREAS IN ACCORDANCE WITH THE PROJECT'S APPROVED WATER CONTROL & CONSTRUCTION SEQUENCING PLANS. IN THE EVENT THAT FLOOD FLOWS ARE EXPECTED TO EXCEED THE ELEVATIONS OF THE PROPOSED TEMPORARY RIVER CROSSINGS AND COFFERDAM SYSTEMS; PROTECT ANY NON-STABLE OR ERODIBLE IMPROVEMENTS USING APPROPRIATELY SIZED STONE RIPRAP MATERIAL (OR SIMILAR) AND REMOVE ALL EQUIPMENT AND PERSONNEL FROM IN-RIVER LOCATIONS.

EROSION AND SEDIMENT CONTROL

1. PRIOR TO THE COMMENCEMENT OF CONSTRUCTION ACTIVITIES, INSTALL ALL EROSION AND SEDIMENT CONTROL DEVICES AS SHOWN ON THE PLAN OR AS REQUIRED BY SITE CONDITIONS. ALL EROSION CONTROL DEVICES WILL BE MAINTAINED THROUGHOUT CONSTRUCTION.
2. DISTURBANCE OF SOIL SURFACES IS REGULATED BY STATE LAW AND LOCAL ORDINANCE. ALL WORK SHALL COMPLY WITH THESE EROSION AND SEDIMENT CONTROL NOTES AND OTHER PERMIT CONDITIONS TO PREVENT OR MINIMIZE SOIL EROSION AND SEDIMENTATION TO OFF-SITE AREAS.
3. THE CONTRACTOR SHALL COMPLY WITH THE LATEST EDITION OF THE "MASSACHUSETTS EROSION AND SEDIMENT CONTROL GUIDELINES FOR URBAN AND SUBURBAN AREAS" IN CONSTRUCTING THE EROSION AND SEDIMENT CONTROLS INDICATED ON THE PLANS. ALL EROSION AND SEDIMENT CONTROL MEASURES OR WORKS AND REHABILITATION MEASURES MUST CONFORM TO OR EXCEED THE SPECIFICATIONS OR STANDARDS SET OUT IN THIS DOCUMENT.
4. THE CONTRACTOR IS RESPONSIBLE FOR THE TIMELY INSTALLATION, INSPECTION, MAINTENANCE, AND/OR REPLACEMENT OF ALL TEMPORARY AND PERMANENT EROSION CONTROL DEVICES SHOWN ON THESE PLANS TO ENSURE PROPER OPERATION THROUGHOUT THE LIFE OF THE PROJECT. REMOVE EROSION AND SEDIMENTATION CONTROLS AFTER STABLE VEGETATIVE GROWTH IS ESTABLISHED BY THE OWNER, ENGINEER OR LANDSCAPE ARCHITECT.
5. THE CONTRACTOR SHALL INSPECT EROSION AND SEDIMENT CONTROL DEVICES ON A WEEKLY BASIS, AFTER EACH STORM EVENT, AND AT LEAST DAILY DURING PROLONGED RAINFALL. CLEAN OUT ACCUMULATED SEDIMENT BEHIND CONTROLS. REPAIR OR REPLACE CONTROLS PROMPTLY AS NEEDED. REMOVE ACCUMULATED SEDIMENT FROM BEHIND PERIMETER CONTROLS (I.E. BIODEGRADABLE COIR ROLLS AND SILT FENCING) WHEN ONE-THIRD OF THE ORIGINAL HEIGHT OF THE CONTROLS BECOME FILLED WITH SEDIMENT. DISPOSE OF REMOVED SEDIMENT IN ON-SITE FILL AREAS OR LAWFULLY OFF-SITE.
6. TREES AND OTHER EXISTING VEGETATION NOT WITHIN THE LIMITS OF DISTURBANCE SHALL BE PROTECTED FROM DAMAGE. VEGETATED AREAS AND/OR TREES DAMAGED THAT ARE NOT PLANNED FOR REMOVAL SHALL BE RESTORED TO THEIR ORIGINAL CONDITION OR BETTER TO THE SATISFACTION OF THE CITY.
7. IT SHALL BE THE CONTRACTOR'S RESPONSIBILITY TO CLEAN ROADS, CONTROL DUST, AND TAKE ALL NECESSARY MEASURES TO ENSURE THAT THE SITE AND ALL ADJACENT ROADS AND PARKING AREAS BE MAINTAINED IN A MUD- AND DUST-FREE CONDITION AT ALL TIMES THROUGHOUT THE LIFE OF THE CONTRACT. DUST CONTROL SHALL INCLUDE, BUT IS NOT LIMITED TO, WATER AND/OR CRUSHED STONE OR COARSE GRAVEL.
8. ALL PROPOSED TEMPORARY STONE CONSTRUCTION ENTRANCES SHALL BE CONSTRUCTED AS SHOWN ON THE PLANS AND DETAILS. ALL VEHICLE TRAFFIC ENTERING OR EXITING THE PROJECT SITE SHALL PASS OVER THE CONSTRUCTION ENTRANCES TO REDUCE THE TRACKING OR FLOWING OF SEDIMENT ONTO THE SURROUNDING ROADWAYS. ENTRANCES SHALL BE MAINTAINED IN A CONDITION THAT WILL PREVENT TRACKING OR FLOWING OF SEDIMENT ONTO THE SURROUNDING ROADWAYS. THIS WILL REQUIRE PERIODIC TOP DRESSING WITH ADDITIONAL STONE OR ADDITIONAL LENGTH AS CONDITIONS DEMAND AND REPAIR AND/OR CLEANOUT OF ANY MEASURES USED TO TRAP SEDIMENT. ALL SEDIMENT SPILLED, DROPPED, WASHED, OR TRACKED ONTO THE SURROUNDING ROADWAYS AND PARKING AREAS MUST BE REMOVED IMMEDIATELY. ADDITIONAL ENTRANCES FOR CONSTRUCTION PHASING SHALL BE INSTALLED AS REQUIRED TO PREVENT TRACKING OR FLOWING OF SEDIMENT ONTO ROADWAYS.
9. THE CONTRACTOR SHALL INSTALL ALL PERIMETER SEDIMENT CONTROL BARRIERS (I.E. SILT FENCE) AS SHOWN ON THE PLANS. A SILT FENCE SHALL ALSO BE INSTALLED AROUND ANY SOIL STOCKPILE AREAS.
10. TEMPORARY VEGETATIVE COVER SHALL BE ESTABLISHED IMMEDIATELY IN ANY DISTURBED AREAS THAT HAVE NOT YET REACHED FINISHED GRADE AND CONSTRUCTION IS NOT EXPECTED TO RESUME FOR MORE THAN 14 DAYS. TEMPORARY VEGETATIVE COVER SHALL CONSIST OF SHORT-TERM EROSION CONTROL SEED (SUBSECTION M6.03.1 OF THE MASSDOT STANDARD SPECIFICATIONS) FROM APRIL 1 TO JUNE 1 AND AUGUST 15 TO OCTOBER 15. MAY ALSO BE INSTALLED BETWEEN OCTOBER 15 TO MARCH 31 IF COVERED WITH TEMPORARY MULCHING. SEED AT A RATE OF 75 LBS/ACRE BY HAND.
11. PERMANENT VEGETATIVE COVER SHALL BE ESTABLISHED TO ALL DISTURBED AREAS THAT HAVE REACHED FINISHED GRADE AS SOON AS POSSIBLE, BUT NOT MORE THAN 14 DAYS AFTER THE CONSTRUCTION ACTIVITY IN THAT AREA HAS PERMANENTLY CEASED. RECOMMENDED PERMANENT SEEDING DATES ARE APRIL 1 TO JUNE 1 AND AUGUST 15 TO OCTOBER 15. REFER TO RESTORATION PLANS FOR PERMANENT VEGETATIVE COVER SEED MIXTURES AND APPLICATION RATES. ALL PLANTINGS AND SEED SHALL BE COVERED BY A ONE-YEAR WARRANTY PERIOD; RESEEDING/RE-PLANTING SHALL BE COMPLETED TO ENSURE STABLE VEGETATIVE COVER IS ESTABLISHED OVER ALL DISTURBED AREAS.
12. IF PERMANENT SEEDING CANNOT BE COMPLETED WITHIN 14 DAYS OF THE COMPLETION OF CONSTRUCTION OR WITHIN THE RECOMMENDED SEEDING DATES, TEMPORARY BIODEGRADABLE EROSION CONTROL BLANKETING (CONTAINING NO PLASTIC COMPONENTS) OR MULCHING SHALL BE SPREAD/INSTALLED OVER ALL DISTURBED AREAS TO PROTECT THE SITE UNTIL ARRIVAL OF THE NEXT RECOMMENDED SEEDING PERIOD. MULCHING OR BLANKETING SHOULD BE INSTALLED AS SOON AS POSSIBLE IF SEEDING IS INSTALLED BETWEEN OCTOBER 15 AND MARCH 31, BUT NOT MORE THAN 14 DAYS AFTER THE CONSTRUCTION ACTIVITY IN THAT AREA HAS TEMPORARILY CEASED. IF PERMANENT SEEDING IS INSTALLED IN JULY AND AUGUST, APPLY WATER TO SEEDED AREAS ON A DAILY BASIS.
13. BLANKETING OR MULCHING MUST BE INSPECTED PERIODICALLY, IN PARTICULAR AFTER RAINSTORMS, TO CHECK FOR RILL EROSION. WHERE EROSION IS OBSERVED, ADDITIONAL MULCH MUST BE APPLIED OR BLANKETING REPAIRED OR REPLACED. INSPECTIONS SHALL TAKE PLACE UNTIL VEGETATION IS THOROUGHLY ESTABLISHED.
14. INSPECT PERMANENT TURF REINFORCEMENT MATTING AT LEAST ONCE A WEEK AND WITHIN 24 HOURS OF THE END OF A STORM WITH A RAINFALL AMOUNT OF 0.5 INCH OR GREATER FOR FAILURES UNTIL THE TURF HAS BECOME ESTABLISHED. MAT FAILURE HAS OCCURRED WHEN SOILS AND/OR SEED HAVE WASHED AWAY FROM BENEATH OR WITHIN THE MAT RESULTING IN A SOIL SURFACE THAT CAN BE EXPECTED TO CONTINUE TO ERODE OR WHEN THE MAT HAS BECOME DISLODGED FROM THE SOIL SURFACE. WHEN REPETITIVE FAILURES OCCUR AT THE SAME LOCATION, REVIEW CONDITIONS AND LIMITATIONS OF TURF REINFORCEMENT MATS AND DETERMINE IF ADDITIONAL CONTROLS, (E.G. DIVERSIONS, STONE BARRIERS) ARE NEEDED TO ENSURE SUCCESS. REPAIR MAT FAILURES WITHIN ONE WORK DAY. AFTER THE TURF HAS BECOME ESTABLISHED, INSPECT ANNUALLY OR AFTER MAJOR STORM EVENTS.
15. INSPECT STONE SLOPE PROTECTION PERIODICALLY TO DETERMINE IF SCOUR HAS OCCURRED BENEATH THE STONE OR FILTER BLANKET OR DISLODGED ANY OF THE STONE OR FILTER BLANKET MATERIALS. ONCE A STONE SLOPE PROTECTION INSTALLATION HAS BEEN COMPLETED, IT SHOULD REQUIRE VERY LITTLE MAINTENANCE. PERIODIC REMOVAL OF WOODY VEGETATION (E.G. ANNUAL) MAY BE REQUIRED TO INSURE THE INTEGRITY OF THE RIPRAP. IF SLIPPAGE OR DISPLACEMENT OCCUR, CONDUCT AN ENGINEERING ANALYSIS TO DETERMINE THE CAUSE. OVERLAND WATER FLOW, EXCESSIVE SEEPAGE, DEEP SLOPE FAILURE OR SURFICIAL STRUCTURAL FAILURE SHOULD BE INVESTIGATED BY AN ENGINEER. REPAIR FAILED AREAS AND/OR IMPLEMENT ALTERNATE MEASURES TO OBTAIN STABILITY.
16. STORAGE AND DISPOSAL: MATERIALS WHICH COULD BE A POTENTIAL SOURCE OF STORMWATER POLLUTION SUCH AS GASOLINE, DIESEL FUEL, HYDRAULIC OIL, ETC., SHALL BE STORED AT THE END OF EACH DAY IN A STORAGE TRAILER OR COVERED LOCATION AND TAKEN OFF-SITE AND PROPERLY DISPOSED OF. ALL TYPES OF WASTE GENERATED AT THIS SITE SHALL BE DISPOSED OF IN A MANNER CONSISTENT WITH STATE LAW AND/OR REGULATIONS.
17. CONTROL OF ALLOWABLE NON-STORMWATER DISCHARGES: IF ALLOWABLE NON-STORM WATER DISCHARGES ARE OCCURRING AT THE SITE, SUCH DISCHARGES SHALL BE VISUALLY OBSERVED AND RECORDED AS OUTLINED BELOW. THE LIST OF EXPECTED SOURCES OF ALLOWABLE NON-STORM WATER DISCHARGES FOR THIS PROJECT ARE AS FOLLOWS: (1) DISCHARGE FROM VEHICLE WASHDOWN WHERE NO DETERGENTS ARE USED, (2) EXTERNAL BUILDING WASHDOWN WHERE NO DETERGENTS ARE USED, (3) THE USE OF WATER TO CONTROL DUST, (4) FIRE HYDRANT FLUSHINGS, (5) LAWN WATERING, (6) POTABLE WATER SOURCES INCLUDING WATERLINE FLUSHINGS, (8) IRRIGATION DRAINAGE, (9) PAVEMENT WASHWATERS WHERE SPILLS OR LEAKS OF TOXIC OR HAZARDOUS MATERIALS HAVE NOT OCCURRED (UNLESS ALL SPILLED MATERIALS HAVE BEEN REMOVED) AND WHERE NO DETERGENTS ARE USED, AND (10) FOUNDATION OR FOOTING DRAINS WHERE FLOWS ARE NOT CONTAMINATED WITH PROCESS SUCH AS SOLVENTS OR CONTAMINATED BY CONTACT WITH SOILS WHERE SPILLS OR LEAKS OF TOXIC OR HAZARDOUS MATERIALS HAS OCCURRED.
18. CONCRETE WASHOUT AREAS AND VEHICLE/EQUIPMENT FUELING ACTIVITIES SHALL BE LIMITED TO UPLAND LOCATIONS WITHIN THE PROJECT LIMIT OF DISTURBANCE THAT ARE LOCATED WITHIN A PORTION OF THE TEMPORARY STAGING AND STORAGE AREAS THAT ARE AT LEAST 50 FEET OUTSIDE OF JURISDICTIONAL WETLANDS.
19. SPILL/LEAK PROTECTION AND RESPONSE: SPILL PREVENTION AND RESPONSE EQUIPMENT SHALL BE LOCATED ON ALL CONSTRUCTION EQUIPMENT OPERATED WITHIN THE PROJECT'S LIMIT OF DISTURBANCE. DEPLOY BOOMS AND OTHER CONTAINMENT/CLEANUP MEASURES IN THE EVENT OF A SPILL OR LEAK. NOTIFY LOCAL FIRE DEPT. AND MASSDEP IMMEDIATELY OF ANY SPILLS.

SPILL PREVENTION AND RESPONSE PROCEDURE

1. CONTROL OF ALLOWABLE NON-STORMWATER DISCHARGES: IF ALLOWABLE NON-STORM WATER DISCHARGES ARE OCCURRING AT THE SITE, SUCH DISCHARGES SHALL BE VISUALLY OBSERVED AND RECORDED AS OUTLINED BELOW AND IN ACCORDANCE WITH ALL APPLICABLE PERMITS AND AUTHORITIES HAVING JURISDICTION. THE LIST OF EXPECTED SOURCES OF ALLOWABLE NON-STORM WATER DISCHARGES FOR THIS PROJECT ARE AS FOLLOWS: (1) DISCHARGE FROM VEHICLE WASHDOWN WHERE NO DETERGENTS ARE USED, (2) FIRE HYDRANT FLUSHINGS, (3) WATER USED TO CONTROL DUST, (4) POTABLE WATER INCLUDING UNCONTAMINATED WATER LINE FLUSHINGS, (5) PAVEMENT WASH WATERS, (6) UNCONTAMINATED, NON-TURBID DISCHARGES OF GROUNDWATER OR SPRING WATER, AND (7) CONSTRUCTION DEWATERING WATER DISCHARGE.
2. ANY INCIDENT OF GROUNDWATER AND SURFACE WATER CONTAMINATION RESULTING FROM THE IMPROPER DISCHARGE OF POLLUTANTS TO THE RIVER SYSTEM SHALL BE THE RESPONSIBILITY OF THE PROPERTY OWNER AS WELL AS ANY OTHER PARTIES DETERMINED TO BE RESPONSIBLE FOR THE CONTAMINATION. PURSUANT TO STATE LAWS AND REGULATIONS, THE REGULATING AGENCY MAY REQUIRE THE PROPERTY OWNER AND OTHER RESPONSIBLE PARTIES TO REMEDIATE ANY INCIDENTS THAT MAY ADVERSELY IMPACT GROUNDWATER QUALITY.
3. THE PROPERTY OWNER SHALL BE RESPONSIBLE TO REMEDIATE INCIDENTS THAT ADVERSELY IMPACT GROUNDWATER AND SURFACE WATER QUALITY.

GENERAL CONSTRUCTION SEQUENCE

1. IT IS ANTICIPATED THAT CONSTRUCTION WILL BEGIN IN JUNE OF 2023 AND END IN DECEMBER 2024. DAM REMOVAL, RIVER CHANNEL IMPROVEMENTS, SLOPE STABILIZATION, AND OTHER IN-CHANNEL MODIFICATION ACTIVITIES SHALL BE PERFORMED WITHIN THE SEASONAL LOW-FLOW PERIOD (JULY 1 – OCTOBER 31). APPROPRIATE PERMITTING AGENCIES SHALL BE NOTIFIED IF ANY IN-CHANNEL WORK BEFORE OR AFTER THIS PERIOD AT LEAST 10 CALENDAR DAYS BEFORE SUCH WORK OCCURS.
2. THE DAM REMOVAL, RIVER CHANNEL IMPROVEMENTS, AND SLOPE STABILIZATION SHALL TAKE PLACE IN THE SEQUENCE OUTLINED IN THE PROPOSED SEQUENCE OF CONSTRUCTION ON THE "WATER CONTROL & CONSTRUCTION SEQUENCING PLANS" IN ORDER TO PROVIDE CONTROL OF SEDIMENT MOVEMENT UNTIL THE DAM HAS BEEN REMOVED AND THE RIVER CHANNEL AND BANK AREAS HAVE BEEN GRADED AND STABILIZED AS SHOWN ON THE PLANS. THE GENERAL SEQUENCE FOR CONSTRUCTION IS AS FOLLOWS:
   A. CONDUCT SITE MOBILIZATION ACTIVITIES AT CASHMAN PARK. ESTABLISH TEMPORARY STAGING AND STORAGE AREAS WITHIN THE PARK IN ADDITION TO TEMPORARY CONSTRUCTION ACCESS AND PEDESTRIAN ACCESS TO PLAYGROUND AND SKATE PARK. INSTALL PERIMETER SEDIMENT CONTROL BARRIERS WITHIN PARK AS OUTLINED ON THE SITE PREPARATION AND EROSION CONTROL PLANS. ANY TEMPORARY SOIL STOCKPILE AREAS DURING CONSTRUCTION WILL ALSO BE ENCOMPASSED BY PERIMETER CONTROLS.
   B. AFTER MOBILIZING AND INSTALLING TEMPORARY EROSION CONTROL MEASURES WITHIN THE PARK, INSTALL TEMPORARY EROSION CONTROLS AT THE PORTION OF THE PARKING LOT OF PARCEL 516-304-1 (SAM'S FOOD STORE PROPERTY) WITHIN THE LIMIT OF DISTURBANCE.
   C. INSTALL THE TEMPORARY CONSTRUCTION ACCESS TO THE RIVER AT PARCEL 516-304-1, REMOVE 20-FOOT SECTION OF THE FREESTANDING PORTION OF THE PARKING LOT RETAINING WALL BEHIND THE SAM'S STORE BUILDING STRUCTURE (OR AS REQUIRED TO FACILITATE ACCESS), AND CONSTRUCT TEMPORARY STONE RIPRAP ACCESS DOWN THE SLOPE (AT 2H:1V) IN ORDER TO GAIN ACCESS TO THE IMPOUNDMENT JUST UPSTREAM OF THE DAM FROM PARCEL 516-304-1 FOR CONSTRUCTION EQUIPMENT AND/OR BARGE ACCESS TO DAM. INSTALL FLOATING TURBIDITY BARRIER JUST UPSTREAM OF THE WINTER STREET BRIDGE OPENING.
   D. INCREMENTALLY LOWER THE IMPOUNDMENT BY 12-INCHES PER DAY TO DOWN TO EL. 14.5 FEET AND REMOVE A 50-FOOT SECTION OF THE UPPER PORTION OF THE DAM DOWN TO EL. 14.5 FEET. DO NOT DISTURB SECTION OF DAM WITHIN 10-FEET OF ITS CONNECTION TO BUILDING ON RIVER LEFT AND WITHIN 10-FEET OF ITS CONNECTION TO RIVER WALL ON RIVER RIGHT.
   E. CONSTRUCT TEMPORARY RIVER CROSSING AT CASHMAN'S PARK AND THE STONE ACCESS/HAUL ROAD DOWNSTREAM TO THE AREA OF SEDIMENT CONTAMINATION. PERFORM CONTAMINATED SEDIMENT REMOVAL OPERATIONS. HAUL SEDIMENT TO CASHMAN PARK TEMPORARY SOIL STORAGE AREA FOR DEWATERING AND ULTIMATE TRANSPORT OFF-SITE.
   F. ONCE CONTAMINATED SEDIMENT HAS BEEN REMOVED GRADE CHANNEL BANKS AND CHANNEL BOTTOM IN THIS LOCATION TO PROPOSED GRADE AND STABILIZE WITH LOWER SLOPE PROTECTION AND CHANNEL BOTTOM STABILIZATION MEASURES.
   G. CONTINUE CONSTRUCTION OF STONE ACCESS/HAUL ROAD BETWEEN THE TEMPORARY RIVER CROSSING AT CASHMAN PARK AND THE UPSTREAM LIMIT OF PROPOSED CONSTRUCTION. THEN INSTALL TEMPORARY RIVER CROSSING AT UPSTREAM LIMIT OF PROJECT TO ASSIST IN CONTROLLING WATER LEVEL REDUCTIONS UPSTREAM OF THIS LOCATION (I.E. THE MBTA BRIDGE).
   H. FOLLOWING CONSTRUCTION OF THE UPSTREAM TEMPORARY RIVER CROSSING, PERFORM THE SECOND PHASE OF INCREMENTAL DAM REMOVAL. LOWER THE DAM CREST FROM EL. 14.5± FEET DOWN TO EL. 12.0±.
   I. PERFORM RIVER CHANNEL IMPROVEMENTS BETWEEN THE UPSTREAM RIVER CROSSING AND THE FORMER AREA OF SEDIMENT CONTAMINATION AS INDICATED IN THE CONTRACT DOCUMENTS INCLUDING CHANNEL REALIGNMENT, SEDIMENT EXCAVATION AND RELOCATION, GRADE CONTROL BOULDER WEIR NOS. 1 THRU 5, SCOUR POOL NOS. 1 THRU 5, LOWER AND UPPER SLOPE STABILIZATION MEASURES, FISHING PLATFORM AT CASHMAN PARK BELOW THE BANKFULL ELEVATION, AND VEGETATIVE RESTORATION MEASURES (I.E. SEEDING, AT MINIMUM, PRIOR TO END OF LOW-FLOW SEASON).
   J. AT THE END OF THE FIRST LOW FLOW SEASON, THE CONTRACTOR SHALL CEASE PHASE I IN-RIVER CONSTRUCTION ACTIVITIES AND WORK OUTSIDE OF THE RIVER. SUCH WORK MAY INCLUDE THE CONSTRUCTION OF THE UPPER PORTION OF THE RIVER WALL ALONG PARCEL 516-304-1. PEDESTRIAN BRIDGE AT CASHMAN PARK, THE GRAVEL WALKING TRAIL ON EASTERN SIDE OF RIVER, AND THE PORTION OF THE FISHING PLATFORM AND CANOE ACCESS AT CASHMAN PARK ABOVE THE MEAN LOW WATER LEVEL.
   K. AT THE START OF THE SECOND LOW-FLOW SEASON, EXTEND TEMPORARY STONE ACCESS/HAUL ROAD FROM THE SOUTHERN LIMIT OF THE PREVIOUSLY CONSTRUCTED HAUL ROAD ON RIVER LEFT DOWNSTREAM TO THE DAM.
   L. REMOVE THE REMAINING SECTION OF THE DAM DOWN TO APPROXIMATELY 2 FEET BELOW PROPOSED GRADE. TAKE CARE NOT TO REMOVE SECTIONS OF THE DAM WITHIN 10-FEET OF EXISTING BUILDING CONNECTION (ON RIVER LEFT) AND RETAINING WALL CONNECTION (ON RIVER RIGHT).
   M. RELOCATE FLOATING TURBIDITY CURTAIN TO SPAN ACROSS RIVER AT DOWNSTREAM LIMIT OF PROJECT DISTURBANCE AND INSTALL SCOUR COUNTERMEASURES BELOW THE WINTER STREET BRIDGE ALONG WITH LOW-FLOW CHANNEL ON DOWNSTREAM SIDE OF BRIDGE.
   N. CONSTRUCT NATURE-LIKE FISHWAY, RIVER WALLS, AND BANK STABILIZATION ON BOTH SIDES OF THE RIVER.
   O. PROCEED WITH IN-RIVER IMPROVEMENTS AND BANK STABILIZATION MEASURES IN UPSTREAM DIRECTION. FINISH GRADE, STABILIZE, AND RESTORE TEMPORARY HAUL ROAD AREA AS WORK PROGRESSES UPSTREAM.
   P. CONTINUE CONSTRUCTION OF IN-RIVER IMPROVEMENTS AND BANK STABILIZATION MEASURES UNTIL THEY ARE COMPLETE WITHIN THIS SECTION OF RIVER; REMOVE TEMPORARY RIVER CROSSING NEAR BENJAMIN STREET; FINISH GRADE, STABILIZE, AND RESTORE TEMPORARY HAUL ROAD AREA IN THIS SECTION; AND BEGIN CONSTRUCTION OF IN-RIVER IMPROVEMENTS AND BANK STABILIZATION MEASURES BETWEEN THE FORMER BENJAMIN TEMPORARY CROSSING AND THE FORMER SEDIMENT CONTAMINATION AREA. CONNECT IMPROVEMENTS INTO PREVIOUSLY CONSTRUCTED IMPROVEMENTS AS PART OF PHASE 1. UTILIZE TEMPORARY COFFERDAMS (LARGE SANDBAGS OR EQUAL) AND CONSTRUCTION DEWATERING PUMPS AS REQUIRED TO ISOLATE SECTIONS OF THE RIVER BETWEEN THE GRANVILLE TEMPORARY CROSSING AND THE NATURE-LIKE FISHWAY TO FACILITATE CONSTRUCTION OF IN-RIVER IMPROVEMENTS.
   Q. FINISH GRADE, STABILIZE, AND RESTORE TEMPORARY HAUL ROAD AREA UPSTREAM OF FORMER SEDIMENT CONTAMINATION AREA. REMOVE TEMPORARY RIVER CROSSING AT CASHMAN'S PARK AND RESTORE RIVER CHANNEL AREA.
   R. PERFORM ANY REMAINING RESTORATION ACTIVITIES ALONG THE RIVER.
   S. FINISH CONSTRUCTION OF RIVER OVERLOOK AREA, UPPER PORTION OF WALL, AND INSTALL STABILIZATION/RESTORATION MEASURES AT PARCEL 516-304-1. REMOVE TEMPORARY STONE CONSTRUCTION ACCESS AT THIS PARCEL AND RESTORE ANY DAMAGED PAVEMENT TO ORIGINAL CONDITIONS OR BETTER.
   T. FINISH CONSTRUCTION OF ANY IN-RIVER OR OUT-OF-RIVER IMPROVEMENTS AT CASHMAN PARK. ONCE IMPROVEMENTS HAVE BEEN ACCEPTED BY ENGINEER AND/OR OWNER, RESTORE UPLAND AREAS DISTURBED BY CONSTRUCTION WITHIN CASHMAN PARK, REMOVE EROSION CONTROLS, AND DEMOBILIZE.

No.	DATE	DESCRIPTION	DESIGNER	REVIEWER

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CITY OF HAVERHILL

GENERAL NOTES AND LEGEND

LITTLE RIVER DAM REMOVAL AND RESTORATION

HAVERHILL MASSACHUSETTS

PROJ. No.: 20170390.U30
DATE: JUNE 2022

GI-002

File: J:\DWG\P2017\0390\U30\Civil\Plan\20170390U30_GEN01.dwg Layout: 11X17-GI-002 Plotted: 2022-12-08 3:12 PM Saved: 2022-12-08 1:45 PM User: CNauman
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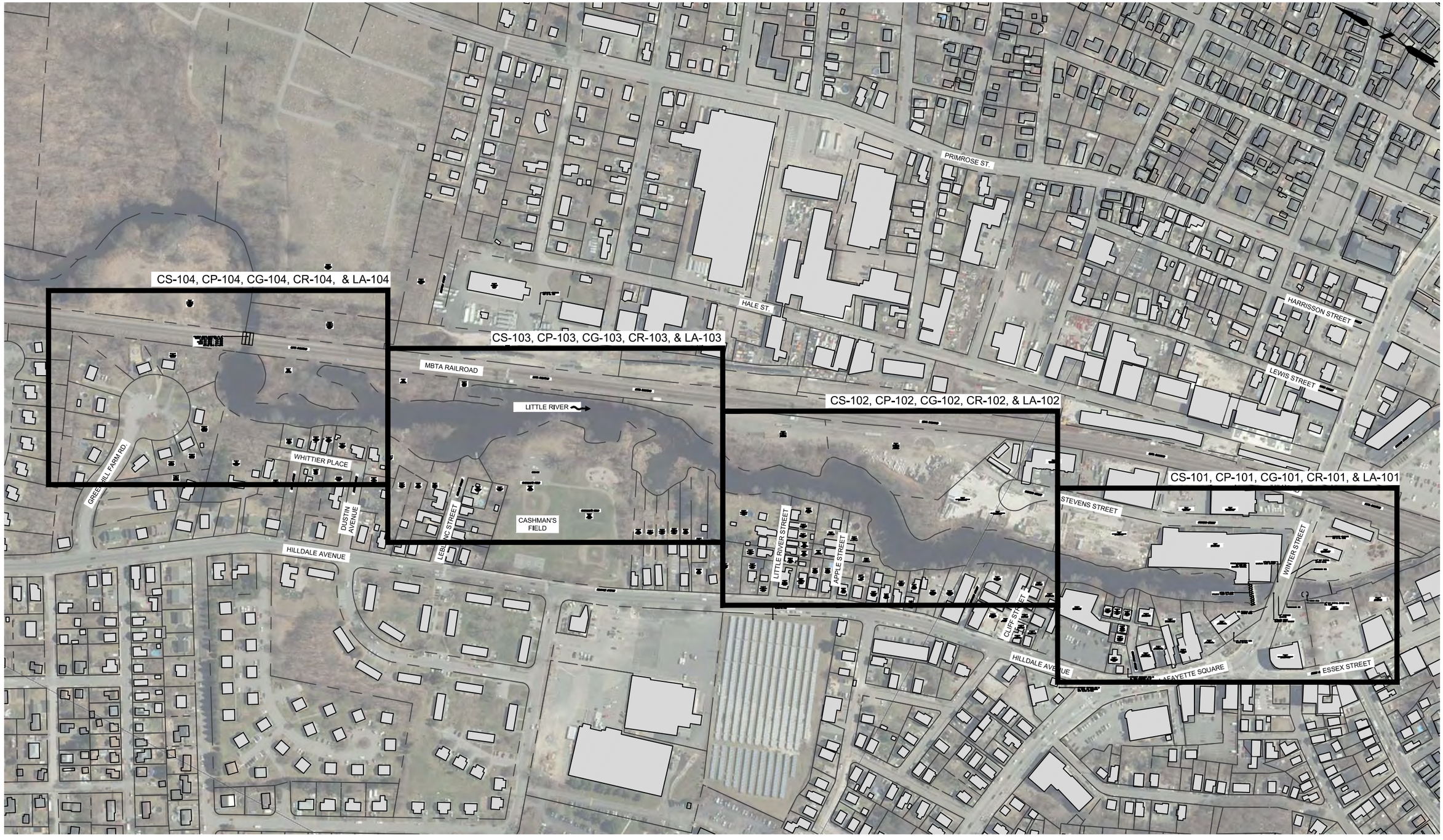

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CITY OF HAVERHILL

INDEX PLAN

LITTLE RIVER DAM REMOVAL AND RESTORATION

HAVERHILL MASSACHUSETTS

PROJ. No.: 20170390.U30
DATE: JUNE 2022

GI-003

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MATCH LINE SEE SHEET CS-102

STEVENS STREET

WINTER STREET

MBTA RAILROAD

LITTLE RIVER

LITTLE RIVER DAM
SPILLWAY CREST EL.=18.6±

FORMER/ABANDONED
12' WIDE MILL
RACEWAY CHANNEL

16'Wx8'H STONE
MASONRY ARCH CULVERT

30'Wx14'H STONE
MASONRY ARCH CULVERT

54" RCP OUTFALL
(NPDES 021H)

42" RCP OUTFALL (NPDES 038)
INV. 11.39

PROPERTY CONTAINS
UST ID No. 5252

BENCHMARK 302

BENCHMARK 301

SCOUR HOLE

21" OVERFLOW
(LR0934)

BIT. SIDEWALK AND
GRANITE CURB

AUL PROPERTY WITH
CLASS B2 RAO

200' RIVERFRONT AREA

100' BUFFER ZONE

50' NO BUILD ZONE

25' NO DISTURBANCE ZONE

LAFAYETTE SQUARE

ESSEX STREET

LEGEND:

FLOODWAY	FEMA FLOODWAY
100YR	100-YEAR FLOOD ELEVATION
500YR	500-YEAR FLOOD ELEVATION
▲A100	WETLAND DELINEATION FLAG
	BANK/MEAN ANNUAL HIGH WATER
	BORDERING VEGETATED WETLANDS
	25' NO DISTURBANCE ZONE
	50' NO BUILD ZONE
	100' BUFFER ZONE
	200' RIVERFRONT AREA
	BASE CONDITION FLOW LIMITS / MEAN ANNUAL LOW WATER
	PARCEL BOUNDARY
D	DRAIN/CSO LINE
W	WATER LINE
G	GAS LINE
E/T	ELECTRIC/TELEPHONE LINE
	CATCH BASIN
2	EXISTING GROUND OR BOTTOM OF RIVER CHANNEL CONTOUR
WG/GG	WATER GATE / GAS GATE
	TREE LINE

No.	DATE	DESCRIPTION	DESIGNER	REVIEWER

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CITY OF HAVERHILL

EXISTING CONDITIONS PLAN NO. 1

LITTLE RIVER DAM REMOVAL AND RESTORATION

HAVERHILL MASSACHUSETTS

PROJ. No.: 20170390.U30
DATE: JUNE 2022

CS-101

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MATCH LINE SEE SHEET CS-101

MBTA RAILROAD

50' NO BUILD ZONE

25' NO DISTURBANCE ZONE

100' BUFFER ZONE

200' RIVERFRONT AREA

LITTLE RIVER

LITTLE RIVER STREET

APPLE STREET

STEVENS STREET

BENJAMIN STREET

CLIFF STREET

FLOODWAY

100YR

500YR

LEGEND:

FLOODWAY	FEMA FLOODWAY
100YR	100-YEAR FLOOD ELEVATION
500YR	500-YEAR FLOOD ELEVATION
▲A100	WETLAND DELINEATION FLAG
	BANK/MEAN ANNUAL HIGH WATER
	BORDERING VEGETATED WETLANDS
	25' NO DISTURBANCE ZONE
	50' NO BUILD ZONE
	100' BUFFER ZONE
	200' RIVERFRONT AREA
	BASE CONDITION FLOW LIMITS / MEAN ANNUAL LOW WATER
	PARCEL BOUNDARY
D	DRAIN/CSO LINE
W	WATER LINE
G	GAS LINE
E/T	ELECTRIC/TELEPHONE LINE
	CATCH BASIN
2	EXISTING GROUND OR BOTTOM OF RIVER CHANNEL CONTOUR
WG / GG	WATER GATE / GAS GATE
	TREE LINE

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CITY OF HAVERHILL

EXISTING CONDITIONS PLAN NO. 2

LITTLE RIVER DAM REMOVAL AND RESTORATION

HAVERHILL MASSACHUSETTS

PROJ. No.: 20170390.U30
DATE: JUNE 2022

CS-102

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MATCH LINE SEE SHEET CS-104

MATCH LINE SEE SHEET CS-102

LITTLE RIVER

MBTA RAILROAD

MBTA RAILROAD

100' BUFFER ZONE

50' NO BUILD ZONE

25' NO DISTURBANCE ZONE

200' RIVERFRONT AREA

SKATE PARK

100' BUFFER ZONE

CASHMAN'S FIELD

CASHMAN'S FIELD

LEBLANC STREET

25' NO DISTURBANCE ZONE

50' NO BUILD ZONE

BUILDING NOT PRESENT DURING WETLAND DELINEATION ON 9/27/21

LEGEND:

FLOODWAY	FEMA FLOODWAY
100YR	100-YEAR FLOOD ELEVATION
500YR	500-YEAR FLOOD ELEVATION
▲A100	WETLAND DELINEATION FLAG
	BANK/MEAN ANNUAL HIGH WATER
	BORDERING VEGETATED WETLANDS
	25' NO DISTURBANCE ZONE
	50' NO BUILD ZONE
	100' BUFFER ZONE
	200' RIVERFRONT AREA
	BASE CONDITION FLOW LIMITS / MEAN ANNUAL LOW WATER
	PARCEL BOUNDARY
D	DRAIN/CSO LINE
W	WATER LINE
G	GAS LINE
E/T	ELECTRIC/TELEPHONE LINE
	CATCH BASIN
2	EXISTING GROUND OR BOTTOM OF RIVER CHANNEL CONTOUR
WG	WATER GATE / GAS GATE
	TREE LINE

No.	DATE	DESCRIPTION	DESIGNER	REVIEWER

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CITY OF HAVERHILL

EXISTING CONDITIONS PLAN NO. 3

LITTLE RIVER DAM REMOVAL AND RESTORATION

HAVERHILL MASSACHUSETTS

PROJ. No.: 20170390.U30
DATE: JUNE 2022

CS-103

File: J:\DWG\P2017\0390\U30\Civil\Plan\20170390U30_EXC01.dwg Layout: 11X17-CS-103 Plotted: 2022-12-08 3:14 PM Saved: 2022-11-29 3:18 PM User: CNauman
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LAYER STATE:
MS VIEW:

RAILROAD BRIDGE SUPPORTED ON 12" TIMBER PIERS FORMING THREE BAYS
LEFT BAY WIDTH – 11.0' WIDE
CENTER BAY WIDTH – 12.0' WIDE
RIGHT BAY WIDTH – 10.9' WIDE
BOTTOM BEAM EL.=22.7±

POTENTIAL ELECTRIC CABLE IN RIVER (REPORTED BY LITTLE RIVER NEIGHBORHOOD RESIDENTS)

MBTA RAILROAD

50' NO BUILD ZONE
25' NO DISTURBANCE ZONE
100' BUFFER ZONE
200' RIVERFRONT AREA

WHITTIER PLACE

MATCH LINE SEE SHEET CS-103

LEGEND:

- FLOODWAY — FEMA FLOODWAY
- 100YR — 100-YEAR FLOOD ELEVATION
- 500YR — 500-YEAR FLOOD ELEVATION
- ▲A100 — WETLAND DELINEATION FLAG
- BANK/MEAN ANNUAL HIGH WATER
- BORDERING VEGETATED WETLANDS
- 25' NO DISTURBANCE ZONE
- 50' NO BUILD ZONE
- 100' BUFFER ZONE
- 200' RIVERFRONT AREA
- BASE CONDITION FLOW LIMITS / MEAN ANNUAL LOW WATER
- PARCEL BOUNDARY
- D — DRAIN/CSO LINE
- W — WATER LINE
- G — GAS LINE
- E/T — ELECTRIC/TELEPHONE LINE
- CATCH BASIN
- 2 — EXISTING GROUND OR BOTTOM OF RIVER CHANNEL CONTOUR
- WG / GG — WATER GATE / GAS GATE
- TREE LINE

No.	DATE	DESCRIPTION	DESIGNER	REVIEWER

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CITY OF HAVERHILL

EXISTING CONDITIONS PLAN NO. 4

LITTLE RIVER DAM REMOVAL AND RESTORATION

HAVERHILL MASSACHUSETTS

PROJ. No.: 20170390.U30
DATE: JUNE 2022

CS-104

File: J:\DWG\P2017\0390\U30\Civil\Plan\20170390U30_EXC01.dwg Layout: 11X17-CS-104 Plotted: 2022-12-08 3:14 PM Saved: 2022-11-29 3:18 PM User: CNauman
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MS VIEW:

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LIMIT OF DISTURBANCE (TYP.)

TEMPORARY COFFERDAM (TYP.)

CLEARING LIMIT (TYP.)

UPPER RIVERBANK STABILIZATION AND FLOODPLAIN RESTORATION AREA (TYP.)

12" DIA. BIODEGRADABLE FIBER ROLL/VEGETATED COIR FASCINE (TYP.)

LOWER RIVER SLOPE STABILIZATION (TYP.)

TEMPORARY HAUL ROAD (TYP.)

TEMPORARY RIVER CROSSING (TYP.)

STEVENS STREET

MBTA RAILROAD

WINTER STREET

GRANVILLE STREET

LAFAYETTE SQUARE

ESSEX STREET

REMOVE AND DISPOSE OF DAM

FORMER/ABANDONED 12' WIDE MILL RACEWAY CHANNEL

16'Wx8'H STONE MASONRY ARCH CULVERT

54" RCP OUTFALL (NPDES 021H)

42" RCP OUTFALL (NPDES 038) INV. 11.39

PROPERTY CONTAINS UST ID No. 5252

BENCHMARK 302

BENCHMARK 301

SCOUR HOLE

FLOATING TYPE 3 PERMEABLE TURBIDITY BARRIER

RESTORE SIDEWALK AND GRANITE CURB TO PREVIOUS CONDITION OR BETTER. RE-USE GRANITE CURB IF POSSIBLE.

CONSTRUCTION EQUIPMENT AND STAGING AREA

AUL PROPERTY WITH CLASS B2 RAO

SILT FENCE FOR TEMPORARY STONE CONSTRUCTION ACCESS ROUTE AND STAGING AREA. RESTORE EXISTING FENCE TO PREVIOUS CONDITION OF BETTER.

PROPERTY CONTAINED USTs ID No. 5235 (REMOVED AS OF 7/30/20); FORMER AUL

NOTES:

1. IMPLEMENT AND MAINTAIN CONSTRUCTION ACCESS STABILIZATION MEASURES THROUGHOUT CONSTRUCTION. REMOVE ALL SUCH MEASURES AND STABLIZE/RESTORE ALL DISTURBED AREAS FOLLOWING CONSTRUCTION.
2. SUCH MEASURES SHALL BE COMPLETED BY THE CONTRACTOR AND ACCEPTED BY THE ENGINEER PRIOR TO INITIATION OF CONSTRUCTION ACTIVITIES.
3. REFER TO RIVER RESTORATION PLAN AND LANDSCAPE AND PLANTING PLAN FOR POST-CONSTRUCTION RESTORATION MEASURES (SEEDING AND PLANTING).
4. REFER TO WATER CONTROL AND CONSTRUCTION SEQUENCING PLAN FOR INSTALLATION OF HAUL ROADS, TEMPORARY COFFERDAMS AND FLOATING TURBIDITY CURTAIN(S).

No.	DATE	DESCRIPTION	DESIGNER	REVIEWER

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0 35 70
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CITY OF HAVERHILL

SITE PREPARATION AND EROSION CONTROL PLAN NO. 1

LITTLE RIVER DAM REMOVAL AND RESTORATION

HAVERHILL MASSACHUSETTS

PROJ. No.: 20170390.U30
DATE: JUNE 2022

CP-101

File: J:\DWG\P2017\0390\U30\Civil\Plan\20170390U30_ERO01.dwg Layout: 11X17-CP-101 Plotted: 2022-12-08 3:15 PM Saved: 2022-12-07 1:56 PM User: CNauman
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MBTA RAILROAD

AREA OF CONTAMINATED SEDIMENT TO BE REMOVED

TEMPORARY HAUL ROAD (TYP.)

TEMPORARY HAUL ROAD BUMP OUTS (TYP.)

TEMPORARY RIVER CROSSING (TYP.)

UPPER RIVERBANK STABILIZATION AND FLOODPLAIN RESTORATION AREA (TYP.)

12" DIA. BIODEGRADABLE FIBER ROLL/VEGETATED COIR FASCINE (TYP.)

LOWER RIVER SLOPE STABILIZATION (TYP.)

TEMPORARY COFFERDAM (TYP.)

CLEARING LIMIT (TYP.)

LIMIT OF DISTURBANCE (TYP.)

STONE PROTECTION AT EXISTING OUTFALL

LOD

LITTLE RIVER STREET

APPLE STREET

STEVENS STREET

BENJAMIN STREET

CLIFF STREET

No.	DATE	DESCRIPTION	DESIGNER	REVIEWER

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CITY OF HAVERHILL

SITE PREPARATION AND EROSION CONTROL PLAN NO. 2

LITTLE RIVER DAM REMOVAL AND RESTORATION

HAVERHILL MASSACHUSETTS

PROJ. No.: 20170390.U30
DATE: JUNE 2022

CP-102

File: J:\DWG\P20170390\U30\CivilPlan\20170390U30_ERO01.dwg Layout: 11X17-CP-102 Plotted: 2022-12-08 3:15 PM Saved: 2022-12-07 1:56 PM User: CNauman
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TEMPORARY COFFERDAM (TYP.)

TEMPORARY HAUL ROAD (TYP.)

MBTA RAILROAD

TEMPORARY HAUL ROAD BUMP OUTS (TYP.)

TEMPORARY RIVER CROSSING (TYP.)

UPPER RIVERBANK STABILIZATION AND FLOODPLAIN RESTORATION AREA (TYP.)

12" DIA. BIODEGRADABLE FIBER ROLL/VEGETATED COIR FASCINE (TYP.)

LOWER RIVER SLOPE STABILIZATION (TYP.)

MBTA RAILROAD

CLEARING LIMIT (TYP.)

LIMIT OF DISTURBANCE (TYP.)

MATCH LINE SEE SHEET CP-104

MATCH LINE SEE SHEET CP-102

SKATE PARK

LEBLANC STREET

CASHMAN'S FIELD

HILLDALE AVENUE

TEMPORARY 5' WIDE COMPACTED GRAVEL PEDESTRIAN WALKWAY (FOR SKATE PARK ACCESS)

REMOVE SECTION OF WOOD GUARDRAIL AND CONNECT TEMPORARY GRAVEL PEDESTRIAN WALKWAY TO EXIST. BITUMINOUS SIDEWALK; FOLLOWING CONSTRUCTION, REMOVE WALKWAY AND RESTORE DISTURBED LAWN AREAS

INSET 2

TEMPORARY 5' WIDE COMPACTED GRAVEL PEDESTRIAN WALKWAY (FOR SKATE PARK ACCESS)

MATCH LINE SEE INSET 2

SILT FENCE AND 6' HIGH TEMPORARY CHAINLINK CONSTRUCTION FENCE TO ENCOMPASS TEMPORARY STONE CONSTRUCTION ACCESS ROUTE AND STAGING AREA (TYP.)

RESTORE CHAIN LINK FENCE TO PREVIOUS CONDITION OR BETTER

CONSTRUCTION EQUIPMENT, STAGING, AND SOIL STORAGE AREAS (TYP.)

PLACE SILT FENCE AND CONSTRUCTION FENCE AROUND KAYAK/CANOE LAUNCH PATH ONLY DURING THAT PHASE OF WORK TO PRESERVE PEDESTRIAN ACCESS TO PLAYGROUNG

MATCH LINE SEE INSET 1

SILT FENCE AND 6' HIGH TEMPORARY CHAINLINK CONSTRUCTION FENCING TO SURROUND TEMPORARY STONE CONSTRUCTION ACCESS ROUTE (TYP.)

TEMPORARY 5' WIDE COMPACTED GRAVEL PEDESTRIAN WALKWAY (FOR PLAYGROUND ACCESS)

GATED ENTRANCE TO CONSTRUCTION ACCESS ROUTE; SECURE/LOCK GATES AT END OF WORK DAY

FOLLOWING CONSTRUCTION; RESTORE SIDEWALK, CURBING, GATE, WOODEN GUARDRAIL, GRAVEL WALKWAY AND DRIVEWAY TO PREVIOUS CONDITION OR BETTER

TEMPORARY STONE CONSTRUCTION ACCESS

INSET 1

No.	DATE	DESCRIPTION	DESIGNER	REVIEWER

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CITY OF HAVERHILL

SITE PREPARATION AND EROSION CONTROL PLAN NO. 3

LITTLE RIVER DAM REMOVAL AND RESTORATION

HAVERHILL MASSACHUSETTS

PROJ. No.: 20170390.U30
DATE: JUNE 2022

CP-103

File: J:\DWG\P2017\0390\U30\Civil\Plan\20170390U30_ERO01.dwg Layout: 11X17-CP-103 Plotted: 2022-12-08 3:16 PM Saved: 2022-12-07 1:56 PM User: CNauman
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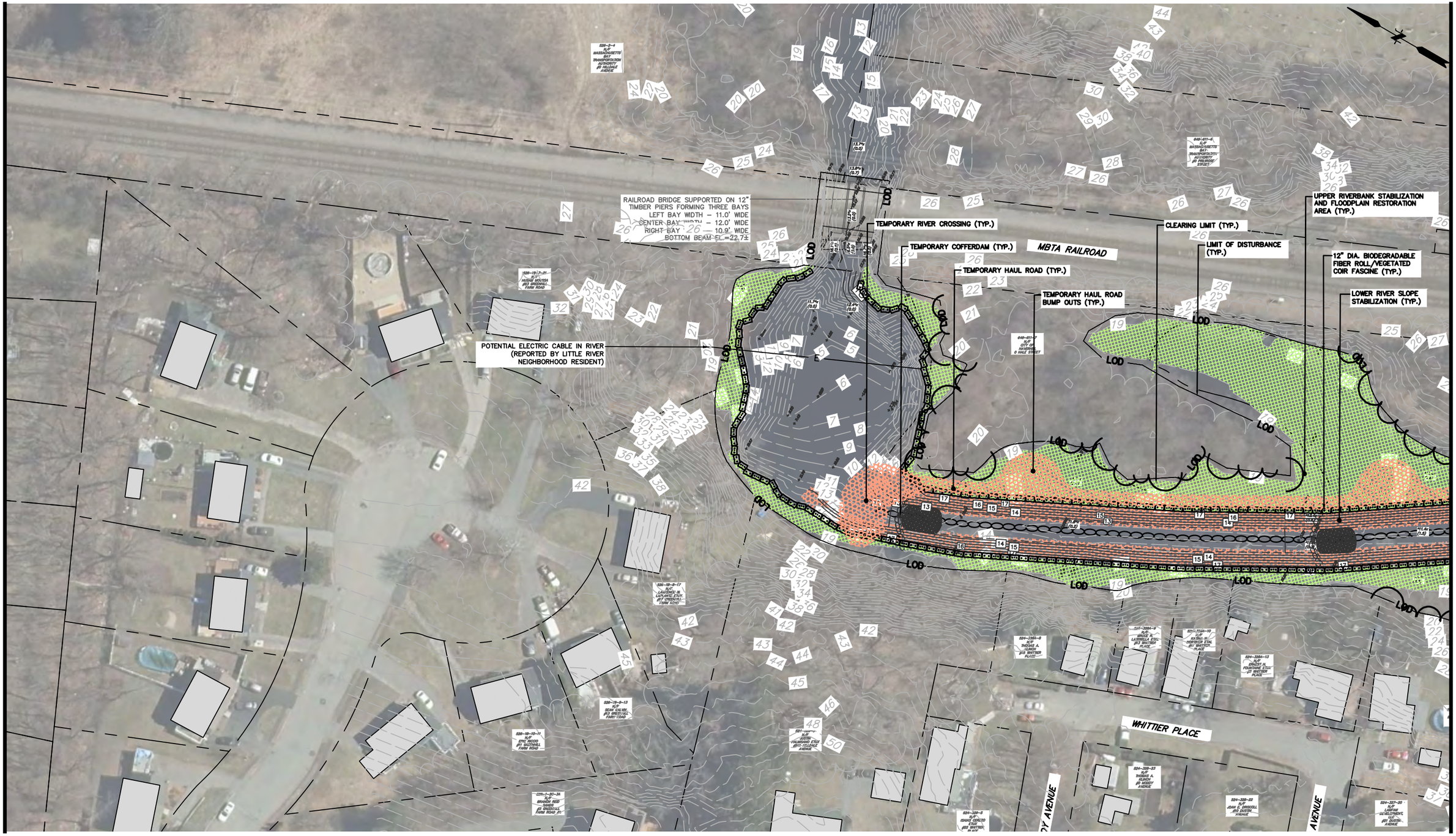

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CITY OF HAVERHILL

SITE PREPARATION AND EROSION CONTROL PLAN NO. 4

LITTLE RIVER DAM REMOVAL AND RESTORATION

HAVERHILL MASSACHUSETTS

PROJ. No.: 20170390.U30
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MATCH LINE SEE SHEET CG-102

COMPACTED GRAVEL WALKING TRAIL EL. 23.0±

UPPER RIVERBANK STABILIZATION AND FLOODPLAIN RESTORATION AREA (TYP.)

PROPOSED 100 YEAR WATER SURFACE ELEVATION (TYP.)

12" DIA. BIODEGRADABLE FIBER ROLL/VEGETATED COIR FASCINE (TYP.)

APPROXIMATE LOCATION OF PORTAGE ACCESS FOR KAYAK/CANOE

LOWER RIVER SLOPE STABILIZATION (TYP.) CHOICE OF NATURAL OR STONE TO BE DETERMINED IN THE FIELD BY THE ENGINEER, SEE CONSTRUCTION DETAILS SHEET CD-502

SIGNAGE TO PROTECT PUBLIC FROM PADDLING FURTHER DOWNSTREAM

POOL BOTTOMS AND BANKS FORMED WITH NATIVE STABLE STONE/COBBLES INFILLED WITH NATIVE SEDIMENT AND INTERSPERSED SMALL/MEDIUM BOULDERS (TYP.)

SLOPE PROTECTION RETAINING WALL (SEE STRUCTURAL PLANS AND DETAILS) TOP EL. VARIES BETWEEN EL. 18.5 TO EL 15.0 BOTTOM EL. VARIES BETWEEN EL. 14.0 TO EL 9.0

SLOPE PROTECTION RETAINING WALL (SEE STRUCTURAL PLANS AND DETAILS) TOP EL. VARIES BETWEEN EL. 25.0 TO EL 22.0 BOTTOM EL. VARIES BETWEEN EL. 17.0 TO EL. 11.5

PROPERTY CONTAINS UST ID No. 5252

PROPERTY CONTAINED USTs ID No. 5235 (REMOVED AS OF 7/30/20); FORMER AUL

54" RCP OUTFALL (NPDES 021H)

42" RCP OUTFALL (NPDES 038) INV. 11.39

BENCHMARK 302

BENCHMARK 301

MASONRY ARCH CULVERT

RACEWAY CHANNEL

BIT. SIDEWALK AND GRANITE CURB

STEVENS STREET

WINTER STREET

GRANVILLE STREET

LAFAYETTE SQUARE

ESSEX STREET

MBTA RAILROAD

LOD

100YR

E/T

G

SCALE:
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CITY OF HAVERHILL

SITE LAYOUT AND GRADING PLAN NO. 1

LITTLE RIVER DAM REMOVAL AND RESTORATION

HAVERHILL MASSACHUSETTS

PROJ. No.: 20170390.U30
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CG-101

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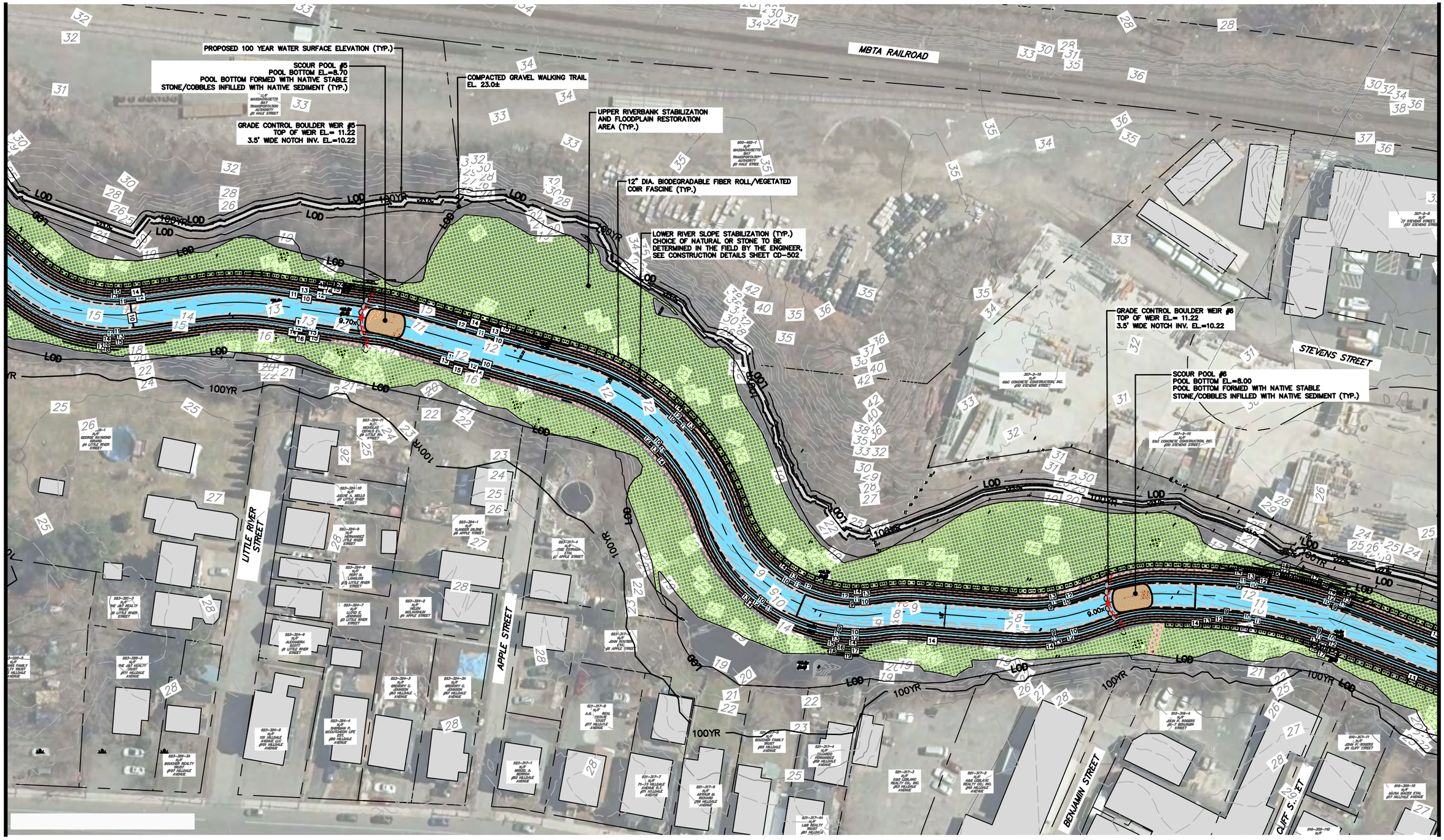

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CITY OF HAVERHILL

SITE LAYOUT AND GRADING PLAN NO. 2

LITTLE RIVER DAM REMOVAL AND RESTORATION

HAVERHILL MASSACHUSETTS

PROJ. No.: 20170390.U30
DATE: JUNE 2022

CG-102

AFTER INCREMENTAL DAM REMOVAL AND THE LOWERING OF THE IMPOUNDMENT, THE CONTRACTOR SHALL PERFORM CONFIRMATORY EXPLORATION BELOW THE MBTA BRIDGE TO DETERMINE THE EXISTING SIZE OF SCOUR-RESISTANT MATERIALS BENEATH THE BRIDGE AND EXTENT OF UNDERMINING OF THE BRIDGE'S SOUTHWEST WINGWALL; INSTALL SCOUR COUNTERMEASURES AS DIRECTED BY ENGINEER BASED ON RESULTS OF INVESTIGATION IF IT IS DETERMINED THAT EXISTING CHANNEL BOTTOM MATERIAL DOES NOT RANGE IN SIZE BETWEEN 14 TO 34 INCHES (WITH A D50 OF 18 INCHES)

RAILROAD BRIDGE SUPPORTED ON 12" TIMBER PIERS FORMING THREE BAYS
LEFT BAY WIDTH – 11.0' WIDE
CENTER BAY WIDTH – 12.0' WIDE
RIGHT BAY – 10.9' WIDE
BOTTOM BEAM EL=22.7±

POTENTIAL ELECTRIC CABLE IN RIVER (REPORTED BY LITTLE RIVER NEIGHBORHOOD RESIDENT)

PROPOSED 100 YEAR WATER SURFACE ELEVATION (TYP.)

UPPER RIVERBANK STABILIZATION AND FLOODPLAIN RESTORATION AREA (TYP.)

MBTA RAILROAD

12" DIA. BIODEGRADABLE FIBER ROLL/VEGETATED COIR FASCINE (TYP.)

LOWER RIVER SLOPE STABILIZATION (TYP.) CHOICE OF NATURAL OR STONE TO BE DETERMINED IN THE FIELD BY THE ENGINEER, SEE CONSTRUCTION DETAILS SHEET CD-502

GRADE CONTROL BOULDER WEIR #1
TOP OF WEIR EL.= 15.00
3.5' WIDE NOTCH INV. EL.=14.00

SCOUR POOL #1
POOL BOTTOM EL.=11.75
POOL BOTTOM FORMED WITH NATIVE STABLE STONE/COBBLES INFILLED WITH NATIVE SEDIMENT (TYP.)

SCOUR POOL #2
POOL BOTTOM EL.=11.2
POOL BOTTOM FORMED
STONE/COBBLES INFILL

GRADE CONTROL BOULDER WEIR #2
TOP OF WEIR EL.= 14.25
3.5' WIDE NOTCH INV. EL.=13.25

WHITTIER PLACE

MATCH LINE SEE SHEET CG-103

100YR
LOD

File: J:\DWG\P20170390\U30\Civil\Plan\20170390U30_STP01.dwg Layout: 11X17-CG-104 Plotted: 2022-12-08 3:17 PM Saved: 2022-12-08 3:11 PM User: CNauman
PC3: AUTOCAD PDF (GENERAL DOCUMENTATION).PC3 STB/CTB: FO HALF.STB
MS VIEW: LAYER STATE:

No.	DATE	DESCRIPTION	DESIGNER	REVIEWER

SCALE:
HORZ.: 1" = 70'
VERT.:
DATUM:
HORZ.: NAD83
VERT.: NAVD88
0 35 70
GRAPHIC SCALE

CITY OF HAVERHILL

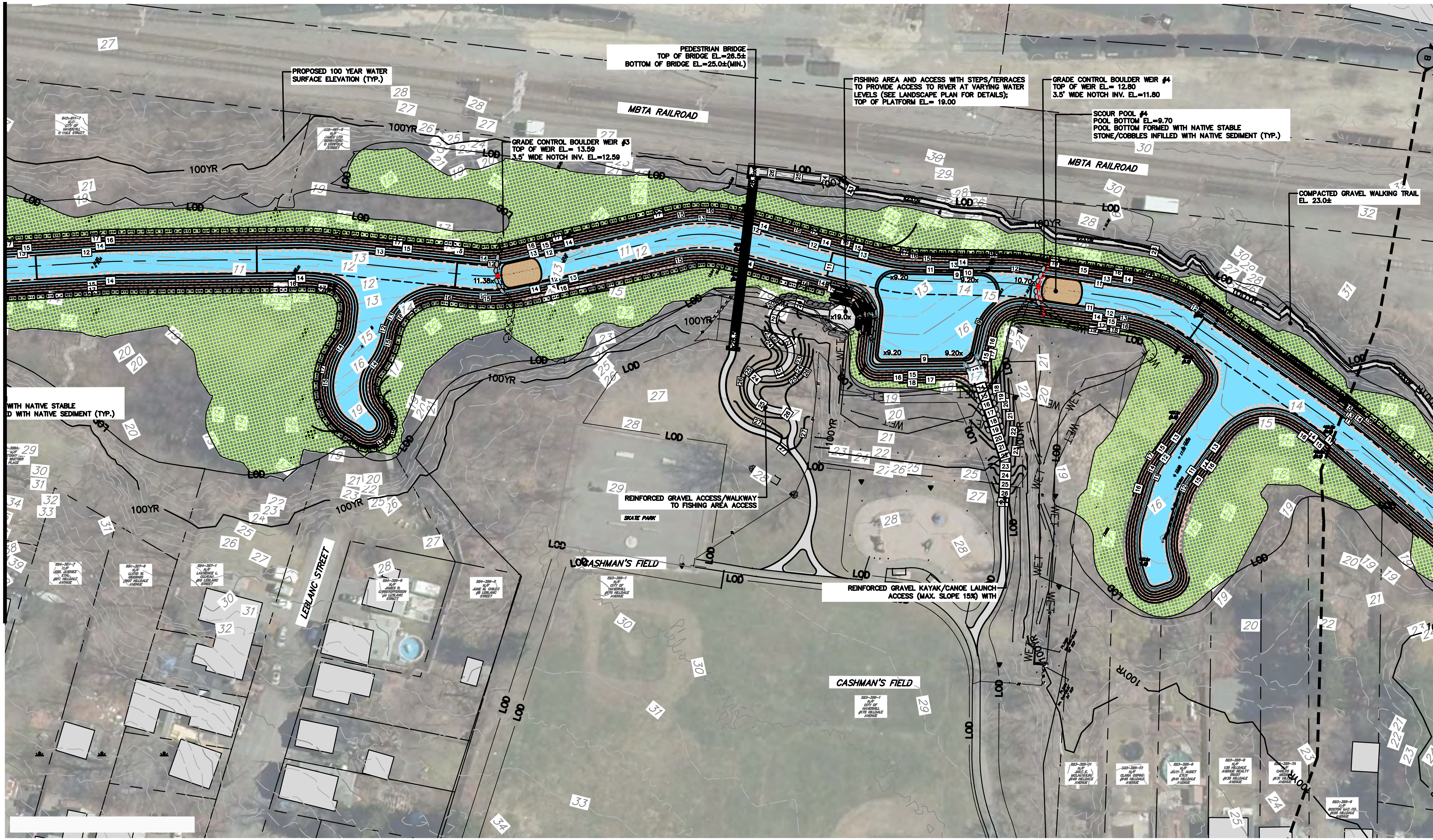
SITE LAYOUT AND GRADING PLAN NO. 4

LITTLE RIVER DAM REMOVAL AND RESTORATION

HAVERHILL MASSACHUSETTS

PROJ. No.: 20170390.U30
DATE: JUNE 2022

CG-104



PEDESTRIAN BRIDGE
TOP OF BRIDGE EL.=26.5±
BOTTOM OF BRIDGE EL.=25.0±(MIN.)
PROPOSED 100 YEAR WATER SURFACE ELEVATION (TYP.)
MBTA RAILROAD
FISHING AREA AND ACCESS WITH STEPS/TERRACES TO PROVIDE ACCESS TO RIVER AT VARYING WATER LEVELS (SEE LANDSCAPE PLAN FOR DETAILS); TOP OF PLATFORM EL.= 19.00
GRADE CONTROL BOULDER WEIR #4
TOP OF WEIR EL.= 12.80
3.5' WIDE NOTCH INV. EL.=11.80
SCOUR POOL #4
POOL BOTTOM EL.=9.70
POOL BOTTOM FORMED WITH NATIVE STABLE STONE/COBBLES INFILLED WITH NATIVE SEDIMENT (TYP.)
GRADE CONTROL BOULDER WEIR #3
TOP OF WEIR EL.= 13.59
3.5' WIDE NOTCH INV. EL.=12.59
MBTA RAILROAD
COMPACTED GRAVEL WALKING TRAIL EL. 23.0±
MATCH LINE SEE SHEET CG-104
MATCH LINE SEE SHEET CG-102
WITH NATIVE STABLE
D WITH NATIVE SEDIMENT (TYP.)
REINFORCED GRAVEL ACCESS/WALKWAY TO FISHING AREA ACCESS
SKATE PARK
CASHMAN'S FIELD
LEBLANC STREET
REINFORCED GRAVEL KAYAK/CANOE LAUNCH ACCESS (MAX. SLOPE 15%) WITH
CASHMAN'S FIELD

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GRAPHIC SCALE

CITY OF HAVERHILL

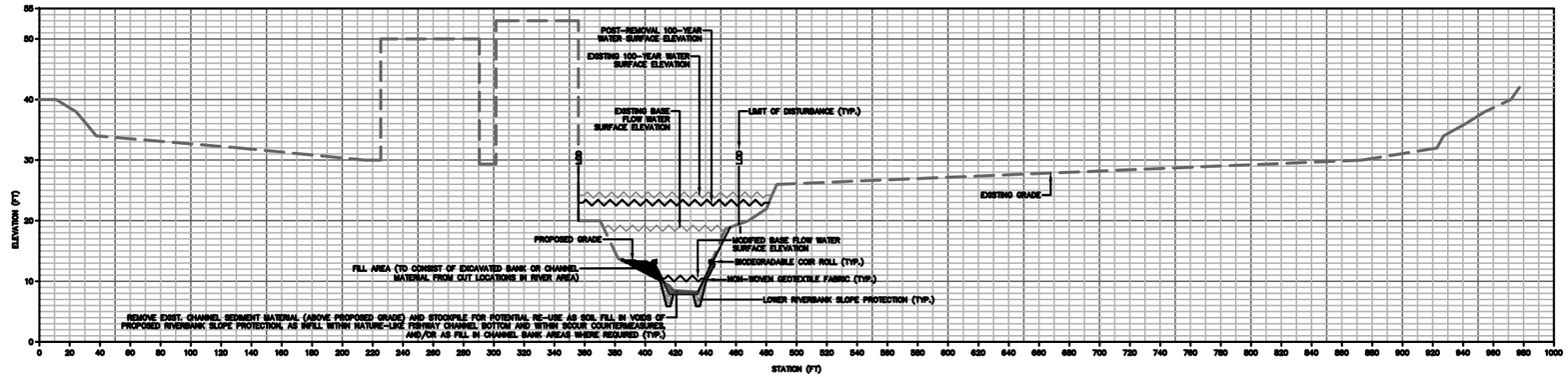
SITE LAYOUT AND GRADING PLAN NO. 3

LITTLE RIVER DAM REMOVAL AND RESTORATION

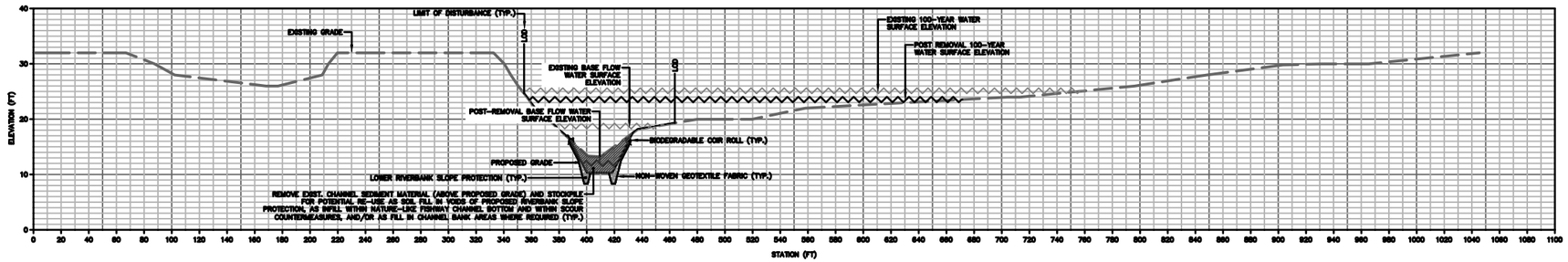
HAVERHILL MASSACHUSETTS

PROJ. No.: 20170390.U30
DATE: JUNE 2022

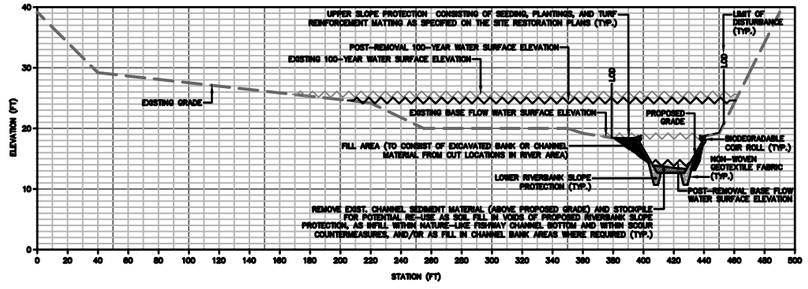
CG-103



SECTION A



SECTION B



SECTION C

No.	DATE	DESCRIPTION	DESIGNER	REVIEWER

SCALE:
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VERT.: 1" = 25'
DATUM:
HORZ.: NAD83
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GRAPHIC SCALE

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CITY OF HAVERHILL

TYPICAL CHANNEL CROSS SECTIONS

LITTLE RIVER DAM REMOVAL AND RESTORATION

HAVERHILL MASSACHUSETTS

PROJ. No.: 20170390.U30
DATE: JUNE 2022

CX-301

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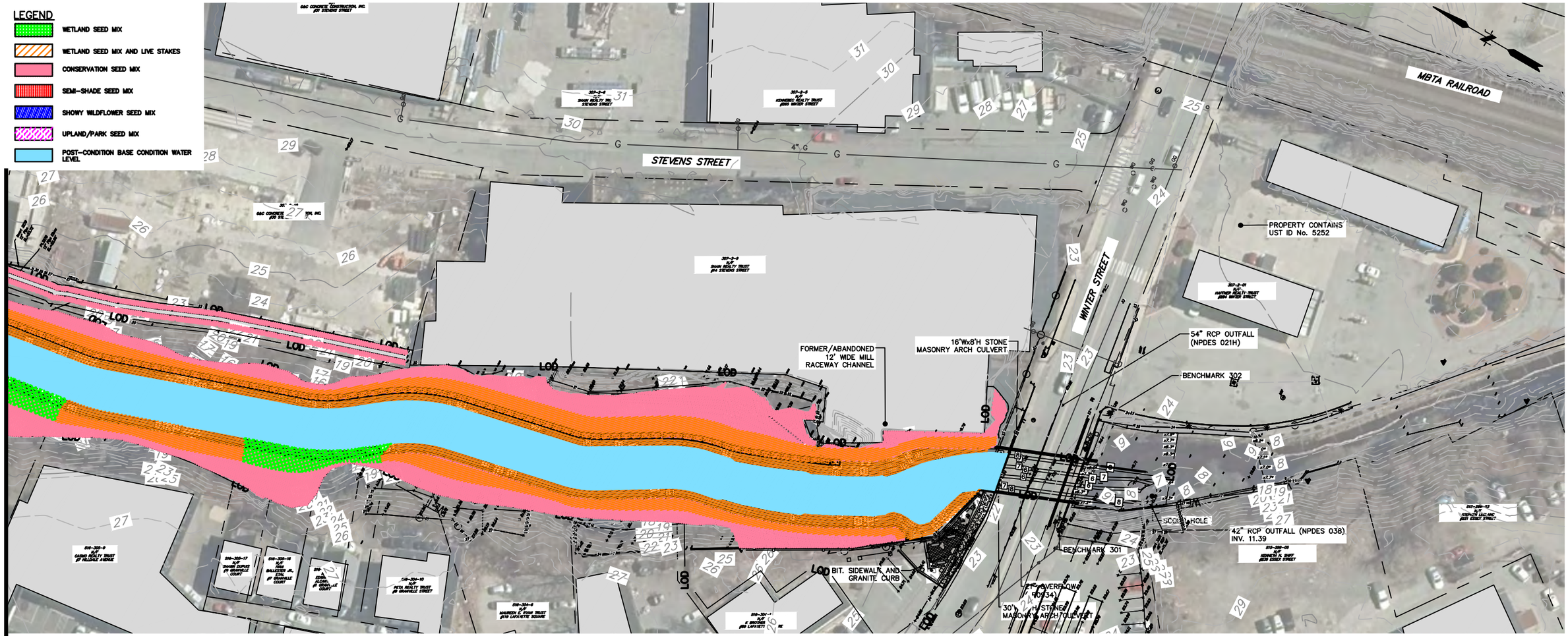

NEW ENGLAND WETMIX (WETLAND SEED MIX)

BOTANICAL NAME	COMMON NAME	IND.
CAREX VULPINOIDEA	FOX SEDGE	OBL
CAREX LURIDA	LURID SEDGE	OBL
CAREX SCOPARIA	BLUNT BROOM SEDGE	FACW
SCIRPUS ATROVIRENS	GREEN BULRUSH	OBL
POA PALUSTRIS	FOWL BLUEGRASS	FACW
CAREX LUPULINA	HOP SEDGE	OBL
BIDENS FRONDOSA	BEGGAR TICKS	FACW
VERNONIA NOVEBORACENSIS	NEW YORK IRONWEED	FACW
CAREX CRINITA	FRINGED SEDGE	OBL
JUNCUS EFFUSUS	SOFT RUSH	FACW
GLYCERIA GRANDIS	AMERICAN MANNAGRASS	OBL
EUPATORIUM MACULATUM	SPOTTED JOE PYE WEED	FACW
ASTER LATERIFLORUS	STARRED/CALICO ASTER	FACW
ASCLEPIAS INCARNATA	SWAMP MILKWEED	OBL
MIMULUS RINGENS	SQUARE STEMMED MONKEY FLOWER	OBL
IRIS VERSICOLOR	BLUE FLAG	OBL

WETLAND SEED MIX
MIXTURE: WETLAND SEED MIX
ANNUAL RYEGRASS (TEMPORARY COVER)
APPLICATION RATE: ANNUAL RYEGRASS = 25 LBS/ACRE
WETLAND SEED MIX = 18 LBS/ACRE

NEW ENGLAND CONSERVATION/WILDLIFE MIX (CONSERVATION SEED MIX)

BOTANICAL NAME	COMMON NAME	IND.
ELYMUS VIRGINICUS	VIRGINIA WILD RYE	FACW
SCHIZACHYRIUM SCOPARIUM	LITTLE BLUESTEM	FACU
ANDROPOGON GERARDII	BIG BLUESTEM	FAC
FESTUCA RUBRA	RED FESCUE	FACU
PANICUM VIRGATUM	SWITCH GRASS	FAC
CHAMAECRISTA FASCICULATA	PARTRIDGE PEA	FACU
DESMODIUM CANADENSE	SHOWY TICK TREFOIL	FAC
SORGHASTRUM NUTANS	INDIAN GRASS	UPL
ASCLEPIAS TUBEROSA	BUTTERFLY MILKWEED	NI
BIDENS FRONDOSA	BEGGAR TICKS	FACW
RUDBECKIA HIRTA	BLACK EYED SUSAN	FACU
EUPATORIUM PURPUREUM	PURPLE JOE PYE WEED	FAC
ASTER PILOSUS	HEATH OR HAIRY ASTER	UPL
SOLIDAGO JUNCEA	EARLY GOLDENROD	NI

CONSERVATION SEED MIX
MIXTURE: CONSERVATION MIX
ANNUAL RYEGRASS (TEMPORARY COVER)
APPLICATION RATE: ANNUAL RYEGRASS = 25 LBS/ACRE
CONSERVATION SEED MIX = 25 LBS/ACRE

NEW ENGLAND SEMI-SHADE GRASS AND FORBS MIX (SEMI-SHADE SEED MIX)

BOTANICAL NAME	COMMON NAME	IND.
ELYMUS VIRGINICUS	VIRGINIA WILD RYE	FACW
ELYMUS CANADENSIS	CANADA WILD RYE	FACU
FESTUCA RUBRA	RED FESCUE	FACU
CHAMAECRISTA FASCICULATA	PARTRIDGE PEA	FACU
LIATRIS SPICATA	SPIKED GAYFEATHER/MARSH BLAZING STAR	FAC
ONOCLEA SENSIBILIS	SENSITIVE FERN	FACW
ASTER PRENANTHOIDES	CROOKED ASTER	FAC
EUPATORIUM FISTULOSUM	HOLLOW-STEM JOE PYE WEED	FACW
EUPATORIUM PERFOLIATUM	BONESET	FACW
JUNCUS TENUIS	PATH RUSH	FAC

SEMI-SHADE SEED MIX
APPLICATION RATE: SEMI-SHADE SEED MIX = 30 LBS/ACRE

NEW ENGLAND SHOWY WILDFLOWER MIX (SHOWY WILDFLOWER SEED MIX)

BOTANICAL NAME	COMMON NAME	IND.
SCHIZACHYRIUM SCOPARIUM	LITTLE BLUESTEM	FACU
CHAMAECRISTA FASCICULATA	PARTRIDGE PEA	FACU
SORGHASTRUM NUTANS	INDIAN GRASS	UPL
FESTUCA RUBRA	RED FESCUE	FACU
ELYMUS CANADENSIS	CANADA WILD RYE	FACU
ELYMUS RIPARIUS	RIVERBANK WILD RYE	FACW
HELIOPSIS HELIANTHOIDES	OX EYE SUNFLOWER	UPL
COREOPSIS LANCEOLATA	LANCE LEAVED COREOPSIS	FACU
RUDBEKIA HIRTA	BLACK EYED SUSAN	FACU
LIATRIS SPICATA	SPIKED GAYFEATHER/MARSH BALZING STAR	FAC
ASCLEPIAS SYRIACA	COMMON MILKWEED	FACU
VERONIA NOVEBORACENSIS	NEW YORK IRONWEED	FACW
ASTER NOVAE-ANGLIAE	NEW ENGLAND ASTER	FACW
EUPATORIUM PURPUREUM	PURPLE JOE PYE WEED	FAC
ASCLEPIAS TUBEROSA	BUTTERFLY MILKWEED	NI
SOLIDAGO JUNCEA	EARLY GOLDENROD	
EUPATORIUM PERFOLIATUM	BONESET	FACW

SHOW WILDFLOWER SEED MIX
APPLICATION RATE: SHOWY WILDFLOWER SEED MIX = 23 LBS/ACRE

UPLAND/PARK SEED MIX
MIXTURE: SHALL BE IN ACCORDANCE WITH SECTION M.6.03.0-1 OF THE MASSDOT STANDARD SPECIFICATIONS FOR FLAT LAWN GRASS AREAS AND M6.03.0-2 FOR SLOPED LAWN GRASS AREAS.
APPLICATION RATE: 25 LBS/ACRE

RESTORATION NOTES:

1. CONSTRUCTION ACCESS ROUTES AND STAGING AREAS WITHIN CASHMAN'S PARK AREA THAT WERE PREVIOUSLY MAINTAINED AS LAWN AREA SHALL BE COVERED WITH TOPSOIL PRIOR TO SEEDING. ALL SEED MIXES SHALL BE FREE OF INVASIVE NON-NATIVE PLANT SPECIES.
2. AREAS TO BE STABILIZED BETWEEN SEPTEMBER THROUGH NOVEMBER SHALL BE OVERSEEDED WITH WINTER RYE (SECALE CEREALE).
3. STABILIZATION OF DISTURBED AREAS SHALL BE IMPLEMENTED WITHIN 14 DAYS AFTER GRADING OR CONSTRUCTION ACTIVITIES HAVE TEMPORARILY OR PERMANENTLY CEASED.
4. RESTORATION AREAS SHALL BE MULCHED WITH STRAW FOLLOWING SEEDING.

LIVE STAKE SPECIES

Select at least 4 of the following species in equal quantities

Black Willow (Salix nigra; OBL)
Silky Willow (Salix sericea; OBL)
Bebb's Willow (Salix bebbiana; FACW)
Pussy Willow (Salix discolor; FACW)
Speckled Alder (Alnus incana; FACW)
Silky Dogwood (Cornus amomum; FACW)
Red-osier Dogwood (Cornus sericea; NI)

Planting Density: 1 live stake every 3' on center.

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0 35 70
GRAPHIC SCALE

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CITY OF HAVERHILL

RIVER RESTORATION PLAN NO. 1

LITTLE RIVER DAM REMOVAL AND RESTORATION

HAVERHILL MASSACHUSETTS

PROJ. No.: 20170390.U30
DATE: JUNE 2022

CR-101

File: J:\DWG\P2017\0390\U30\Civil\Plan\20170390U30_RES01.dwg Layout: 11X17-CR-101 Plotted: 2022-12-08 3:19 PM Saved: 2022-12-07 4:02 PM User: CNauman
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LAYER STATE:
MS VIEW:

MATCH LINE SEE SHEET CR-103

MATCH LINE SEE SHEET CR-101

MBTA RAILROAD

LITTLE RIVER STREET

APPLE STREET

STEVENS STREET

BENJAMIN STREET

CLIFF STREET

LOD

FLOODWAY

100YR

500YR

A100

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CITY OF HAVERHILL

RIVER RESTORATION PLAN NO. 2

LITTLE RIVER DAM REMOVAL AND RESTORATION

HAVERHILL MASSACHUSETTS

PROJ. No.: 20170390.U30
DATE: JUNE 2022

CR-102

File: J:\DWG\P2017\0390\U30\Civil\Plan\20170390U30_RES01.dwg Layout: 11X17-CR-102 Plotted: 2022-12-08 3:19 PM Saved: 2022-12-07 4:02 PM User: CNauman
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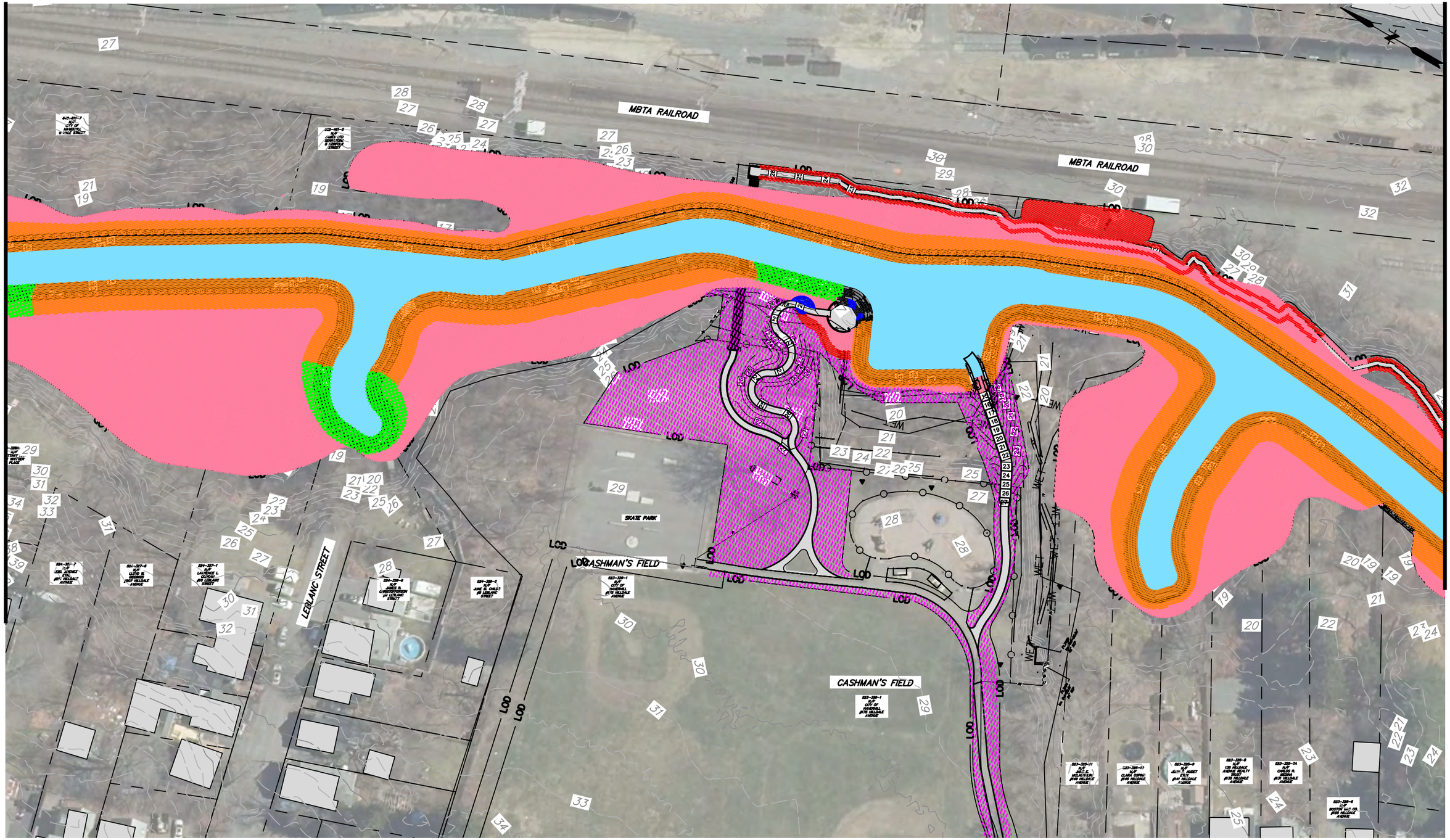

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CITY OF HAVERHILL

RIVER RESTORATION PLAN NO. 3

LITTLE RIVER DAM REMOVAL AND RESTORATION

HAVERHILL MASSACHUSETTS

PROJ. No.: 20170390.U30
DATE: JUNE 2022

CR-103

RAILROAD BRIDGE SUPPORTED ON 12" TIMBER PIERS FORMING THREE BAYS
LEFT BAY WIDTH – 11.0' WIDE
CENTER BAY WIDTH – 12.0' WIDE
RIGHT BAY WIDTH – 10.9' WIDE
BOTTOM BEAM EL.=22.7±

POTENTIAL ELECTRIC CABLE IN RIVER (REPORTED BY LITTLE RIVER NEIGHBORHOOD RESIDENT)

MBTA RAILROAD

WHITTIER PLACE

MATCH LINE SEE SHEET CR-103

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CITY OF HAVERHILL

RIVER RESTORATION PLAN NO. 4

LITTLE RIVER DAM REMOVAL AND RESTORATION

HAVERHILL MASSACHUSETTS

PROJ. No.: 20170390.U30
DATE: JUNE 2022

CR-104

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GENERAL WATER CONTROL SYSTEM NOTES:

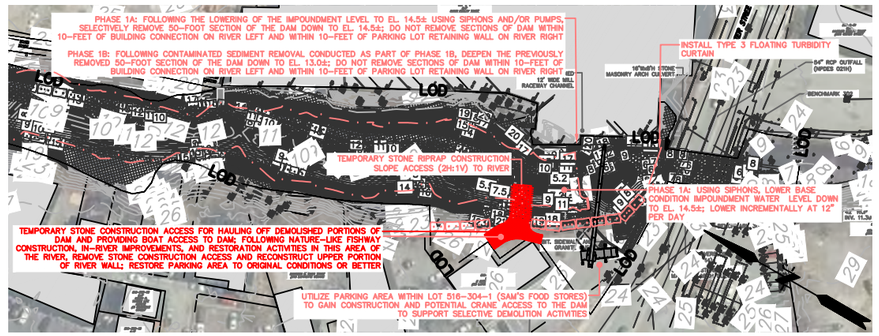
1. PRIOR TO ANY LAND DISTURBANCE ACTIVITIES, THE CONTRACTOR MUST PHYSICALLY MARK THE LIMITS OF DISTURBANCE IN ACCORDANCE WITH THE APPROVED PLANS.
2. THE TEMPORARY COFFERDAMS, RIVER CROSSINGS, AND HAUL ROADS MUST BE INSTALLED DURING THE LOW FLOW PERIOD (I.E., THE PERIOD BETWEEN JULY 1 THROUGH OCTOBER 31). COFFERDAMMED AREAS, WHERE APPLICABLE, SHALL BE MAINTAINED TO ALLOW A DRY WORKING CONDITION (NO SEDIMENT PLUME) IN THE WATERCOURSE. SOIL DISTURBANCE IN COFFERDAMMED AREAS OR THE WATERCOURSE MUST TEMPORARILY CEASE IN THE EVENT OF ANY ABNORMALLY HIGH STORMWATER RUNOFF EVENT THAT OVERTOPS THE COFFERDAMS OR TEMPORARY RIVER CROSSINGS.
3. SELECTIVE DEMOLITION/REMOVAL OF THE DAM MUST BE CONDUCTED SEQUENTIALLY TO CONTROL UPSTREAM DRAWDOWN TO NO MORE THAN TWELVE (12) INCHES PER DAY.
4. OBTAIN CONFIRMATORY ELEVATIONS OF THE RIVER CHANNEL BOTTOM ALONG THE PROPOSED ALIGNMENTS OF THE TEMPORARY COFFERDAMS AND RIVER CROSSINGS TO VERIFY EXISTING CONDITIONS AND ACTUAL COFFERDAM HEIGHTS PRIOR TO INSTALLATION.
5. THIS PLAN ILLUSTRATES ONE CONCEPTUAL APPROACH TO WATER CONTROL FOR THE PROJECT. THE CONTRACTOR SHALL SUBMIT A FINAL WATER CONTROL PLAN TO FUSS & O'NEILL AND THE MASSDEP FOR REVIEW WITH ADEQUATE TIME FOR THEIR REVIEW AND ACCEPTANCE PRIOR TO THE INITIATION OF CONSTRUCTION.
6. TEMPORARY HAUL ROADS, COFFERDAMS, TEMPORARY RIVER CROSSINGS, AND BYPASS PROVISIONS SHALL BE MAINTAINED THROUGHOUT THE CONSTRUCTION PERIOD TO ENSURE RESPECTIVE COMPONENTS FUNCTION AS INTENDED TO PROTECT ADJACENT PROPERTIES, WETLAND RESOURCES AND DOWNSTREAM WORK AREAS.

PHASE 1A:

1. AFTER MOBILIZING AT CASHMAN PARK AND INSTALLING TEMPORARY EROSION CONTROL MEASURES AT THE PORTION OF THE PARKING LOT OF PARCEL 516-304-1 (SAM'S FOOD STORE PROPERTY) AND CASHMAN PARK AREA WITHIN THE LIMIT OF DISTURBANCE, THE CONTRACTOR SHALL INSTALL FLOATING TURBIDITY BARRIER JUST UPSTREAM OF THE WINTER STREET BRIDGE OPENING. THE FLOATING TURBIDITY BARRIER MUST BE A TYPE III BARRIER CAPABLE OF PASSING FLOW VELOCITIES UP TO 5 FEET PER SECOND.
2. THE CONTRACTOR SHALL THEN INSTALL THE TEMPORARY CONSTRUCTION ACCESS TO THE RIVER AT PARCEL 516-304-1, REMOVE 20-FOOT SECTION OF THE FREESTANDING PORTION OF THE PARKING LOT RETAINING WALL BEHIND THE SAM'S STORE BUILDING STRUCTURE (OR AS REQUIRED AND APPROVED BY OWNER TO FACILITATE ACCESS), AND CONSTRUCT TEMPORARY STONE RIPRAP ACCESS DOWN THE SLOPE (AT NO STEEPER THAN 2H:1V) IN ORDER TO GAIN ACCESS TO THE IMPOUNDMENT JUST UPSTREAM OF THE DAM FROM PARCEL 516-304-1 FOR CONSTRUCTION EQUIPMENT AND/OR BARGE ACCESS TO DAM. THE STONE RIPRAP USED TO CONSTRUCT THE TEMPORARY STONE RIPRAP ACCESS SHALL BE CONSTRUCTED OF SAME STONE MATERIAL USED TO PERMANENTLY STABILIZE THE LOWER SLOPE OF THE PROPOSED RIVER CHANNEL SIDESLOPES. THIS STONE IS TO REMAIN STABLE DURING FLOOD FLOWS.
3. USING SIPHONS AND/OR PUMPS, INCREMENTALLY LOWER THE IMPOUNDMENT BY 12-INCHES PER DAY TO DOWN TO EL. 14.5 FEET. THIS SHOULD TAKE APPROXIMATELY 4 WORK DAYS ASSUMING NO SUBSTANTIAL RAINFALL EVENTS OCCUR. THIS WILL ALSO ALLOW THE NEWLY EXPOSED AREAS ALONG THE RIVER BANK TIME TO BEGIN TO DRAIN AND STABILIZE.
4. ONCE THE BASE CONDITION WATER SURFACE WITHIN THE IMPOUNDMENT HAS BEEN LOWERED TO EL. 14.5 FEET, REMOVE A 50-FOOT SECTION OF THE UPPER PORTION OF THE DAM USING BARGE MOUNTED EQUIPMENT OR BY CRANE FROM ADJACENT PARKING LOT (ON PARCEL 516-304-1) DOWN TO EL. 14.50 FEET, DO NOT DISTURB SECTION OF DAM WITHIN 10-FEET OF ITS CONNECTION TO BUILDING ON RIVER LEFT AND WITHIN 10-FEET OF ITS CONNECTION TO RIVER WALL ON RIVER RIGHT. THIS WILL BE CONSIDERED THE FIRST PHASE OF THE INCREMENTAL REMOVAL OF THE DAM. REMOVING THE DAM INCREMENTALLY WILL MINIMIZE THE POTENTIAL FOR SEDIMENT TO MOBILIZE DOWNSTREAM, ALLOW THE BED AND NEWLY EXPOSED BANKS OF THE IMPOUNDMENT AND STREAM TO DRAIN AND STABILIZE, AND PREVENT A SUDDEN RELEASE OF WATER WHICH COULD UNNECESSARILY DAMAGE DOWNSTREAM INFRASTRUCTURE AND/OR HABITAT.

PHASE 1B:

1. ONCE THE BASE FLOW CONDITION WATER SURFACE ELEVATION IS LOWERED TO APPROXIMATELY EL. 15.0 WITHIN THE ENTIRE IMPOUNDMENT FROM THE DAM UP TO THE MBTA BRIDGE, CONSTRUCT TEMPORARY RIVER CROSSING AT CASHMAN'S PARK (WITH A TOP WIDTH OF 12 FEET). THIS RIVER CROSSING WILL BE CONSTRUCTED OF STONE RIPRAP EQUIVALENT IN SIZE TO THAT USED TO STABILIZE THE LOWER SIDESLOPES OF THE PROPOSED RIVER CHANNEL. THE CROSSING WILL BE CONSTRUCTED WITH (4) 48-INCH CULVERTS THAT WILL PASS APPROXIMATELY 380 CFS AT FULL CAPACITY. THIS FLOW IS EQUIVALENT TO THE BANKFULL FLOW. BANKFULL FLOW CONDITIONS ARE APPROXIMATELY EQUIVALENT TO THE 1.5-YEAR RECURRENCE INTERVAL FLOOD EVENT. INLET CONTROL DEVICES SHALL BE INSTALLED ON UPSTREAM ENDS OF CULVERTS TO ALLOW FOR THE REGULATION OF FLOW THROUGH CULVERTS.
2. ONCE CONSTRUCTION OF THE TEMPORARY RIVER CROSSING IS COMPLETE, CONTINUE CONSTRUCTION OF A STONE ACCESS/HAUL ROAD (WITH A 10-FOOT MINIMUM TOP WIDTH) BETWEEN THE TEMPORARY RIVER CROSSING AND THE AREA OF SEDIMENT CONTAMINATION. THE TEMPORARY HAUL ROAD WILL FOLLOW THE ALIGNMENT OF THE TOP OF LEFT BANK OF THE PROPOSED RIVER CHANNEL. AS A RESULT, CONSTRUCTING THIS HAUL ROAD WILL ALSO ASSIST IN FORMING A STABLE LEFT BANK FOR THE PROPOSED RIVER CHANNEL.
3. ONCE THE HAUL ROAD HAS BEEN BUILT TO THE APPROXIMATE AREA OF SEDIMENT CONTAMINATION, CONSTRUCT A TEMPORARY RIVER CROSSING (WITH A 12-FOOT TOP WIDTH) JUST UPSTREAM OF THE AREA NEAR LITTLE RIVER STREET. THE ROAD SHALL BE CONSTRUCTED FROM THE TEMPORARY HAUL ROAD AS OPPOSED TO CONSTRUCTING FROM LITTLE RIVER STREET. THIS TEMPORARY RIVER CROSSING WILL BE CONSTRUCTED OF STONE RIPRAP EQUIVALENT IN SIZE TO THAT USED TO STABILIZE THE LOWER SIDESLOPES OF THE PROPOSED RIVER CHANNEL. THE CROSSING WILL BE CONSTRUCTED WITH (4) 48-INCH CULVERTS THAT WILL PASS APPROXIMATELY 380 CFS AT FULL CAPACITY. THE PURPOSE OF THIS CROSSING WILL BE TO GAIN ACCESS TO BOTH SIDES OF THE RIVER CHANNEL FOR SEDIMENT REMOVAL AND TO CONSTRUCT IN-CHANNEL RIVER IMPROVEMENTS.
4. USING LARGE SANDBAGS OR EQUAL, CONSTRUCT A TEMPORARY COFFERDAM DOWN THE APPROXIMATE CENTER OF THE RIVER CHANNEL BETWEEN THE TEMPORARY RIVER CROSSING AND DOWNSTREAM LIMIT OF CONTAMINATED SEDIMENT AREA. CAP/BLOCK THE INLET TO THE EASTERN CULVERTS AND ISOLATE THE EASTERN HALF OF THE RIVER USING COFFERDAM SYSTEM. ONLY ALLOW FLOW THROUGH THE WESTERN CULVERTS. INSTALL TEMPORARY DEWATERING AREA ATOP THE WESTERN HALF OF THE TEMPORARY RIVER CROSSING AND UTILIZE CONSTRUCTION DEWATERING PUMPS TO CREATE A DRY WORKING AREA WITHIN THE LIMITS OF THE COFFERDAM. PERFORM SEDIMENT REMOVAL OPERATIONS. HAUL SEDIMENT TO CASHMAN PARK TEMPORARY SOIL STORAGE AREA FOR DEWATERING AND ULTIMATE TRANSPORT OFF-SITE. THE TOP OF THE COFFERDAM SYSTEM SHALL BE SET TO PROTECT WORK AREA FOR MAXIMUM RIVER FLOWS OF UP TO APPROXIMATELY 100 CFS (OR 3-FEET FLOW DEPTH THROUGH DIVERTED HALF OF RIVER CHANNEL) AT MINIMUM WITHOUT OVERTOPPING.
5. ONCE CONTAMINATED SEDIMENT HAS BEEN REMOVED IN THE EASTERN HALF OF THE RIVER, ROUGH GRADE LEFT BANK AND CHANNEL BOTTOM IN THIS LOCATION TO PROPOSED GRADE AND STABILIZE WITH LOWER SLOPE PROTECTION AND CHANNEL BOTTOM STABILIZATION MEASURES.
6. REMOVE TEMPORARY DEWATERING AREA ON THE RIVER CROSSING AND SHIFT TO THE UPPER LEFT BANK OF RIVER AT EL. 17.5± OR ABOVE. ADJUST TEMPORARY COFFERDAM SYSTEM TO ISOLATE THE WESTERN SIDE OF RIVER. SLOWLY ALLOW FLOW THROUGH THE EASTERN CULVERTS AND CAP/BLOCK WESTERN CULVERTS. UTILIZE CONSTRUCTION DEWATERING PUMPS TO CREATE A DRY WORKING AREA WITHIN WESTERN COFFERDAMMED AREA. PERFORM SEDIMENT REMOVAL OPERATIONS IN WESTERN HALF OF RIVER. HAUL SEDIMENT TO CASHMAN PARK TEMPORARY SOIL STORAGE AREA FOR DEWATERING AND ULTIMATE TRANSPORT OFF-SITE. ONCE CONTAIMINATED SEDIMENT HAS BEEN REMOVED, ROUGH GRADE RIGHT BANK AND CHANNEL BOTTOM TO PROPOSED GRADE AND STABILIZE WITH LOWER SLOPE PROTECTION AND CHANNEL BOTTOM STABILIZATION MEASURES.
7. ONCE IN-RIVER IMPROVEMENTS ARE COMPLETE IN THIS LOCATION, REMOVE TEMPORARY COFFERDAM SYSTEM AND TEMPORARY RIVER CROSSING (WITH CULVERTS) AT LITTLE RIVER STREET AREA. STONE RIPRAP USED TO CONSTRUCT TEMPORARY RIVER CROSSING CAN BE USED ELSEWHERE AS STABILIZATION FOR LOWER RIVER CHANNEL SLOPE AND CHANNEL BOTTOM PROTECTION OF RIVER CHANNEL.



WATER CONTROL – PHASE 1A & 1B (INCREMENTAL REMOVAL OF DAM AND LOWERING OF HEADPOND)

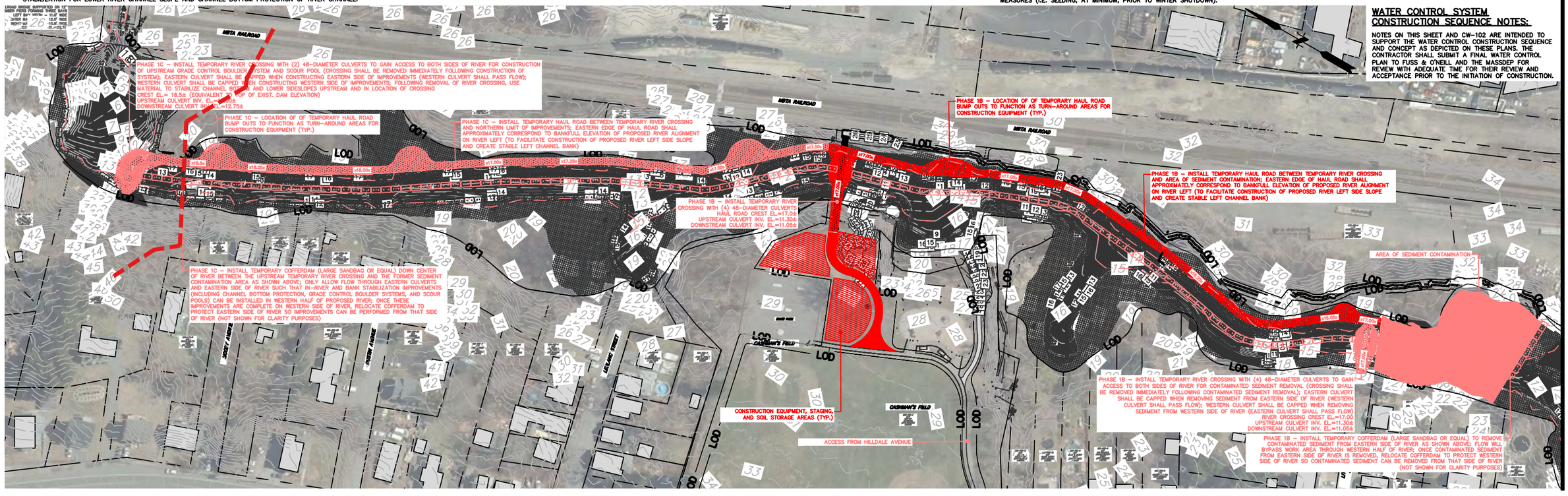
SCALE: 1"= 140'

PHASE 1C:

1. ONCE CONTAMINATED SEDIMENT HAS BEEN FULLY REMOVED, CONTINUE CONSTRUCTION OF STONE ACCESS/HAUL ROAD (WITH A 10-FOOT TOP WIDTH) BETWEEN THE TEMPORARY RIVER CROSSING AT CASHMAN PARK AND THE UPSTREAM LIMIT OF PROPOSED CONSTRUCTION. THIS PORTION OF THE TEMPORARY HAUL ROAD WILL ALSO FOLLOW THE ALIGNMENT OF THE TOP OF LEFT BANK OF THE PROPOSED RIVER CHANNEL. AS A RESULT, CONSTRUCTING THIS HAUL ROAD WILL ALSO ASSIST IN FORMING A STABLE LEFT BANK FOR THE PROPOSED RIVER CHANNEL. CONSTRUCT TEMPORARY RIVER CROSSING WITH A 12-FOOT TOP WIDTH AND WITH (4) 48-INCH CULVERTS JUST UPSTREAM OF PROPOSED UPSTREAM GRADE CONTROL BOULDER SYSTEM AND SCOUR POOL. INSTALL CULVERTS WITH INLET AND/OR OUTLET CONTROL DEVICES THAT WILL ALLOW FLOW TO BE REGULATED. CONSTRUCTING THIS SYSTEM WILL ASSIST IN MINIMIZING UPSTREAM IMPACTS DURING THIS PHASE OF CONSTRUCTION.
2. FOLLOWING CONSTRUCTION OF THE UPSTREAM TEMPORARY RIVER CROSSING, PERFORM THE SECOND PHASE OF INCREMENTAL DAM REMOVAL. LOWER THE DAM CREST FROM EL. 14.5± FEET DOWN TO EL. 12.0±. THIS WILL LOWER THE BASE FLOW CONDITION WATER SURFACE ELEVATION TO BETWEEN APPROXIMATELY EL. 12.0± AND EL. 13.5± WITHIN THE ENTIRE IMPOUNDMENT FROM THE DAM UP TO THE UPSTREAM RIVER CROSSING.
3. CONSTRUCT LARGE SANDBAG OR SIMILAR COFFERDAM SYSTEM DOWN THE APPROXIMATE CENTER OF THE RIVER CHANNEL BETWEEN THE UPSTREAM TEMPORARY RIVER CROSSING AND THE TEMPOORARY RIVER CROSSING AT CASHMAN PARK. CAP/BLOCK THE INLET TO THE EASTERN CULVERTS AND ISOLATE THE EASTERN HALF OF THE RIVER USING COFFERDAM SYSTEM. ONLY ALLOW FLOW THROUGH THE WESTERN CULVERTS. CONSTRUCT IN-RIVER IMPROVEMENTS AND LOWER BANK STABILIZATION MEASURES. CONSTRUCTING THIS SYSTEM WILL ASSIST IN MINIMIZING TEMPORARY UPSTREAM IMPACTS THROUGHOUT THE REMAINDER OF CONSTRUCTION. THE TOP OF THE COFFERDAM SYSTEM SHALL BE SET TO PROTECT WORK AREA FOR MAXIMUM RIVER FLOWS OF UP TO APPROXIMATELY 100 CFS (OR 3-FEET FLOW DEPTH THROUGH DIVERTED HALF OF RIVER CHANNEL) AT MINIMUM WITHOUT OVERTOPPING.
4. PERFORM RIVER CHANNEL IMPROVEMENTS BETWEEN THE UPSTREAM RIVER CROSSING AND THE FORMER AREA OF SEDIMENT CONTAMINATION AS INDICATED IN THE CONTRACT DOCUMENTS INCLUDING CHANNEL REALIGNMENT (INCLUDING SEDIMENT EXCAVATION AND RELOCATION), INSTALL GRADE CONTROL BOULDER WEIR NOS. 1 THRU 5, SCOUR POOL NOS. 1 THRU 5, LOWER AND UPPER SLOPE STABILIZATION MEASURES, FISHING PLATFORM AT CASHMAN PARK BELOW THE BANKFULL ELEVATION, AND VEGETATIVE RESTORATION MEASURES (I.E. SEEDING, AT MINIMUM, PRIOR TO WINTER SHUTDOWN).

WATER CONTROL SYSTEM CONSTRUCTION SEQUENCE NOTES:

NOTES ON THIS SHEET AND CW-102 ARE INTENDED TO SUPPORT THE WATER CONTROL CONSTRUCTION SEQUENCE AND CONCEPT AS DEPICTED ON THESE PLANS. THE CONTRACTOR SHALL SUBMIT A FINAL WATER CONTROL PLAN TO FUSS & O'NEILL AND THE MASSDEP FOR REVIEW WITH ADEQUATE TIME FOR THEIR REVIEW AND ACCEPTANCE PRIOR TO THE INITIATION OF CONSTRUCTION.



MATCH LINE SEE SHEET CW-102

LAYER STATE:

MS VIEW:

No.	DATE	DESCRIPTION	DESIGNER	REVIEWER

SCALE:
HORZ.: 1" = 140'
VERT.:
DATUM:
HORZ.: NAD83
VERT.: NAVD88
0 70 140
GRAPHIC SCALE

CITY OF HAVERHILL

WATER CONTROL & CONSTRUCTION SEQUENCING PLAN NO. 1

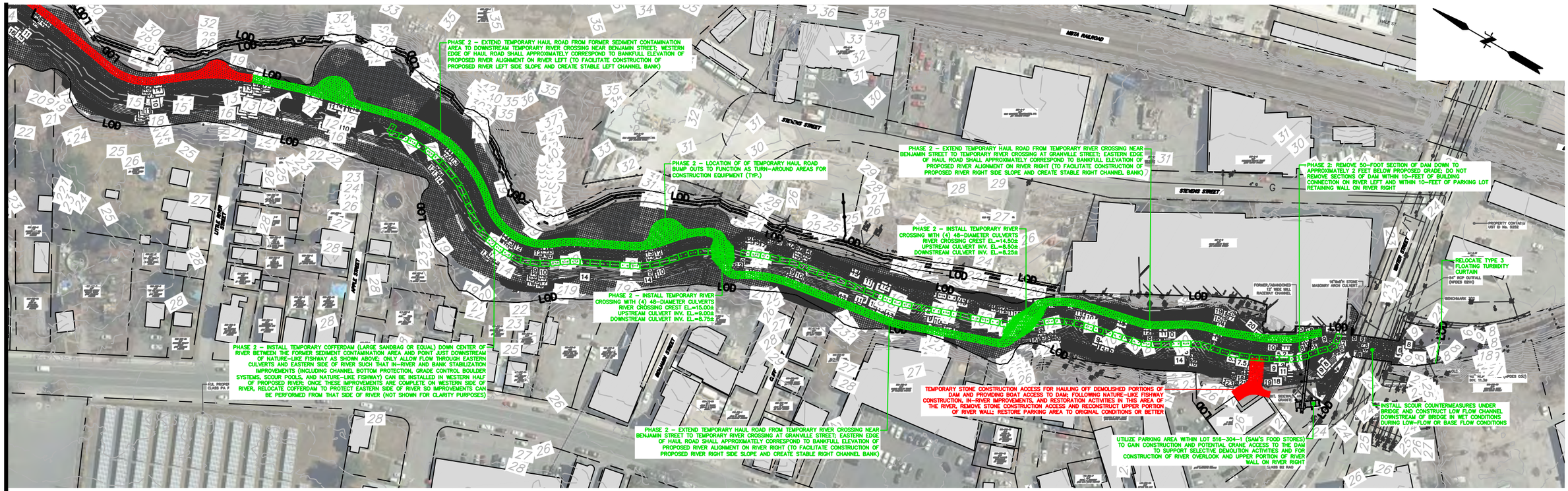
LITTLE RIVER DAM REMOVAL AND RESTORATION

HAVERHILL MASSACHUSETTS

PROJ. No.: 20170390.U30
DATE: JUNE 2022

CW-101

MATCH LINE SEE SHEET CW-101



PHASE 2 – EXTEND TEMPORARY HAUL ROAD FROM FORMER SEDIMENT CONTAMINATION AREA TO DOWNSTREAM TEMPORARY RIVER CROSSING NEAR BENJAMIN STREET; WESTERN EDGE OF HAUL ROAD SHALL APPROXIMATELY CORRESPOND TO BANKFULL ELEVATION OF PROPOSED RIVER ALIGNMENT ON RIVER LEFT (TO FACILITATE CONSTRUCTION OF PROPOSED RIVER LEFT SIDE SLOPE AND CREATE STABLE LEFT CHANNEL BANK)

PHASE 2 – LOCATION OF OF TEMPORARY HAUL ROAD BUMP OUTS TO FUNCTION AS TURN-AROUND AREAS FOR CONSTRUCTION EQUIPMENT (TYP.)

PHASE 2 – EXTEND TEMPORARY HAUL ROAD FROM TEMPORARY RIVER CROSSING NEAR BENJAMIN STREET TO TEMPORARY RIVER CROSSING AT GRANVILLE STREET; EASTERN EDGE OF HAUL ROAD SHALL APPROXIMATELY CORRESPOND TO BANKFULL ELEVATION OF PROPOSED RIVER ALIGNMENT ON RIVER RIGHT (TO FACILITATE CONSTRUCTION OF PROPOSED RIVER RIGHT SIDE SLOPE AND CREATE STABLE RIGHT CHANNEL BANK)

PHASE 2: REMOVE 50-FOOT SECTION OF DAM DOWN TO APPROXIMATELY 2 FEET BELOW PROPOSED GRADE; DO NOT REMOVE SECTIONS OF DAM WITHIN 10-FEET OF BUILDING CONNECTION ON RIVER LEFT AND WITHIN 10-FEET OF PARKING LOT RETAINING WALL ON RIVER RIGHT

PHASE 2 – INSTALL TEMPORARY RIVER CROSSING WITH (4) 48-DIAMETER CULVERTS
RIVER CROSSING CREST EL.=14.50±
UPSTREAM CULVERT INV. EL.=8.50±
DOWNSTREAM CULVERT INV. EL.=8.25±

RELOCATE TYPE 3 FLOATING TURBIDITY CURTAIN

PHASE 2 – INSTALL TEMPORARY RIVER CROSSING WITH (4) 48-DIAMETER CULVERTS
RIVER CROSSING CREST EL.=15.00±
UPSTREAM CULVERT INV. EL.=9.00±
DOWNSTREAM CULVERT INV. EL.=8.75±

PHASE 2 – INSTALL TEMPORARY COFFERDAM (LARGE SANDBAG OR EQUAL) DOWN CENTER OF RIVER BETWEEN THE FORMER SEDIMENT CONTAMINATION AREA AND POINT JUST DOWNSTREAM OF NATURE-LIKE FISHWAY AS SHOWN ABOVE; ONLY ALLOW FLOW THROUGH EASTERN CULVERTS AND EASTERN SIDE OF RIVER SUCH THAT IN-RIVER AND BANK STABILIZATION IMPROVEMENTS (INCLUDING CHANNEL BOTTOM PROTECTION, GRADE CONTROL BOULDER SYSTEMS, SCOUR POOLS, AND NATURE-LIKE FISHWAY) CAN BE INSTALLED IN WESTERN HALF OF PROPOSED RIVER; ONCE THESE IMPROVEMENTS ARE COMPLETE ON WESTERN SIDE OF RIVER, RELOCATE COFFERDAM TO PROTECT EASTERN SIDE OF RIVER SO IMPROVEMENTS CAN BE PERFORMED FROM THAT SIDE OF RIVER (NOT SHOWN FOR CLARITY PURPOSES)

TEMPORARY STONE CONSTRUCTION ACCESS FOR HAULING OFF DEMOLISHED PORTIONS OF DAM AND PROVIDING BOAT ACCESS TO DAM; FOLLOWING NATURE-LIKE FISHWAY CONSTRUCTION, IN-RIVER IMPROVEMENTS, AND RESTORATION ACTIVITIES IN THIS AREA OF THE RIVER, REMOVE STONE CONSTRUCTION ACCESS AND RECONSTRUCT UPPER PORTION OF RIVER WALL; RESTORE PARKING AREA TO ORIGINAL CONDITIONS OR BETTER

INSTALL SCOUR COUNTERMEASURES UNDER BRIDGE AND CONSTRUCT LOW FLOW CHANNEL DOWNSTREAM OF BRIDGE IN WET CONDITIONS DURING LOW-FLOW OR BASE FLOW CONDITIONS

PHASE 2 – EXTEND TEMPORARY HAUL ROAD FROM TEMPORARY RIVER CROSSING NEAR BENJAMIN STREET TO TEMPORARY RIVER CROSSING AT GRANVILLE STREET; EASTERN EDGE OF HAUL ROAD SHALL APPROXIMATELY CORRESPOND TO BANKFULL ELEVATION OF PROPOSED RIVER ALIGNMENT ON RIVER RIGHT (TO FACILITATE CONSTRUCTION OF PROPOSED RIVER RIGHT SIDE SLOPE AND CREATE STABLE RIGHT CHANNEL BANK)

UTILIZE PARKING AREA WITHIN LOT 516-304-1 (SAM'S FOOD STORES) TO GAIN CONSTRUCTION AND POTENTIAL CRANE ACCESS TO THE DAM TO SUPPORT SELECTIVE DEMOLITION ACTIVITIES AND FOR CONSTRUCTION OF RIVER OVERLOOK AND UPPER PORTION OF RIVER WALL ON RIVER RIGHT

WATER CONTROL – PHASE 2

SCALE: 1"= 140'

NOTE:
PROPOSED LAYOUT SHOWN HEREON IS APPROXIMATE ONLY AND IS INTENDED TO ONLY DEPICT RELATIVE PHASES OF WORK AND GENERAL WORK AREAS. REFER TO OTHER DRAWINGS FOR SPECIFIC WORK ACTIVITIES AND LIMITS.

OUT OF RIVER CONSTRUCTION ACTIVITIES (TO BE PERFORMED OUTSIDE OF LOW-FLOW SEASONS):

1. AT THE END OF THE LOW FLOW SEASON, THE CONTRACTOR SHALL CEASE PHASE I IN-RIVER CONSTRUCTION ACTIVITIES.
2. WORK OUTSIDE OF THE RIVER, HOWEVER, SHALL CONTINUE SUCH AS THE CONSTRUCTION OF THE UPPER PORTION OF THE RIVER WALL ALONG PARCEL 516-304-1. PEDESTRIAN BRIDGE AT CASHMAN PARK, THE GRAVEL WALKING TRAIL ON EASTERN SIDE OF RIVER, AND THE FISHING PLATFORM AT CASHMAN PARK.

PHASE 2:

1. AT THE START OF THE SECOND LOW-FLOW SEASON, EXTEND TEMPORARY STONE ACCESS/HAUL ROAD (WITH A 12-FOOT TOP WIDTH) FROM THE SOUTHERN LIMIT OF THE PREVIOUSLY CONSTRUCTED HAUL ROAD ON RIVER LEFT TO THE LOCATION OF PROPOSED TEMPORARY RIVER CROSSING NEAR BENJAMIN ROAD AS SHOWN ABOVE. THE TEMPORARY HAUL ROAD WILL FOLLOW THE ALIGNMENT OF THE TOP OF LEFT BANK OF THE PROPOSED RIVER CHANNEL. AS A RESULT, CONSTRUCTING THIS HAUL ROAD WILL ALSO ASSIST IN FORMING A STABLE LEFT BANK FOR THE PROPOSED RIVER CHANNEL.
2. CONSTRUCT TEMPORARY RIVER CROSSING NEAR BENJAMIN STREET TO FACILITATE ACCESS TO RIVER RIGHT. THIS RIVER CROSSING WILL BE CONSTRUCTED OF STONE RIPRAP EQUIVALENT IN SIZE TO THAT USED TO STABILIZE THE LOWER SIDESLOPES OF THE PROPOSED RIVER CHANNEL. THE CROSSING WILL BE CONSTRUCTED WITH (4) 48-INCH CULVERTS THAT WILL PASS APPROXIMATELY 380 CFS AT FULL CAPACITY. THIS FLOW IS EQUIVALENT TO THE BASE FLOW CONDITION AND THE BANKFULL FLOW, RESPECTIVELY.
3. ONCE CONSTRUCTION OF THE TEMPORARY RIVER CROSSING IS COMPLETE, CONTINUE CONSTRUCTION OF A STONE ACCESS/HAUL ROAD (WITH A 12-FOOT TOP WIDTH) ON RIVER RIGHT BETWEEN TO THE VICINITY OF GRANVILLE STREET. THE TEMPORARY HAUL ROAD WILL FOLLOW THE ALIGNMENT OF THE TOP OF RIGHT BANK OF THE PROPOSED RIVER CHANNEL. AS A RESULT, CONSTRUCTING THIS HAUL ROAD WILL ALSO ASSIST IN FORMING A STABLE RIGHT BANK FOR THE PROPOSED RIVER CHANNEL.
3. CONSTRUCT SECOND TEMPORARY RIVER CROSSING IN THE VICINITY OF GRANVILLE STREET THAT WILL THEN PROVIDE ACCESS BACK TO RIVER LEFT. THIS RIVER CROSSING WILL ALSO BE CONSTRUCTED OF STONE RIPRAP EQUIVALENT IN SIZE TO THAT USED TO STABILIZE THE LOWER SIDESLOPES OF THE PROPOSED RIVER CHANNEL. THE CROSSING WILL BE CONSTRUCTED WITH (4) 48-INCH CULVERTS THAT WILL PASS APPROXIMATELY 380 CFS AT FULL CAPACITY. ONCE CONSTRUCTION OF THE TEMPORARY RIVER CROSSING IS COMPLETE, CONTINUE CONSTRUCTION OF STONE ACCESS/HAUL ROAD (WITH A 12-FOOT TOP WIDTH) ON RIVER LEFT DOWN TO THE DAM. THE TEMPORARY HAUL ROAD WILL FOLLOW THE ALIGNMENT OF THE TOP OF LEFT BANK OF THE PROPOSED RIVER CHANNEL. AS A RESULT, CONSTRUCTING THIS HAUL ROAD WILL ALSO ASSIST IN FORMING A STABLE LEFT BANK FOR THE PROPOSED RIVER CHANNEL.
4. REMOVE THE REMAINING SECTION OF THE DAM DOWN TO APPROXIMATELY 2 FEET BELOW PROPOSED GRADE. TAKE CARE NOT TO REMOVE SECTIONS OF THE DAM WITHIN 10-FEET OF EXISTING BUILDING CONNECTION (ON RIVER LEFT) AND RETAINING WALL CONNECTION (ON RIVER RIGHT).
5. RELOCATE FLOATING TURBIDITY CURTAIN TO SPAN ACROSS RIVER AT DOWNSTREAM LIMIT OF PROJECT DISTURBANCE.
6. INSTALL SCOUR COUNTERMEASURES BELOW THE WINTER STREET BRIDGE BY PLACING STONE RIPRAP IN THE WET DURING NORMAL (NON-FLOOD) LOW FLOW CONDITIONS.
7. ONCE SCOUR COUNTERMEASURES ARE INSTALLED, ACCESS DOWNSTREAM SIDE OF BRIDGE BY DRIVING LOW-HEIGHT EQUIPMENT (E.G. MINI-EXCAVATOR) BENEATH BRIDGE. SHAPE LOW-FLOW CHANNEL ON DOWNSTREAM SIDE OF BRIDGE AND STABILIZE WITH STONE RIPRAP.
8. REMOVE FLOATING TURBIDITY CURTAIN AND RELOCATE BACK TO LOCATION JUST UPSTREAM OF WINTER STREET BRIDGE OPENING.
9. BEGIN CONSTRUCTION OF NATURE-LIKE FISHWAY AND RIVER WALLS ON BOTH SIDES OF THE RIVER. UTILIZE TEMPORARY COFFERDAMS (LARGE SANDBAGS OR EQUAL) AND CONSTRUCTION DEWATERING PUMPS (WITH CRUSHED STONE SUMPS) TO ISOLATE SECTIONS OF THE RIVER TO FACILITATE THE CONSTRUCTION OF IMPROVEMENTS UNDER DRY-CONDITIONS AS SHOWN ABOVE. INSTALL TEMPORARY DEWATERING AREA ON TEMPORARY HAUL ROAD IF NECESSARY (I.E. IF IT IS DETERMINED THAT TURBID WATER IS BEING DISCHARGED FROM PUMPS AND CRUSHED STONE SUMPS). NOTE THAT COFFERDAM ISOLATING THE RIVER LEFT, WHERE FLOW WOULD BE DIVERTED THROUGH RIGHT SIDE OF RIVER ONLY, IS SHOWN FOR GRAPHICAL PURPOSES ONLY TO MINIMIZE VISUAL CLUTTER. HOWEVER, THE SAME APPROACH WOULD BE APPLIED TO CONSTRUCT IN-RIVER IMPROVEMENTS ON RIVER RIGHT. FLOW WOULD THEN BYPASS THE WORK AREA ON RIVER LEFT.THE TOP OF THE COFFERDAM SYSTEM SHALL BE SET TO PROTECT WORK AREA FOR MAXIMUM RIVER FLOWS OF UP TO APPROXIMATELY 100 CFS (OR 3-FEET FLOW DEPTH THROUGH DIVERTED HALF OF RIVER CHANNEL) AT MINIMUM WITHOUT OVERTOPPING.
10. ONCE CONSTRUCTION OF THE NATURE-LIKE FISHWAY, RIVER WALL ON RIVER LEFT, LOWER PORTION OF THE RIVER WALL ON RIVER RIGHT (TO AN ELEVATION ABOVE THE BANKFULL ELEVATION), AND BANK STABILIZATION MEASURES ARE COMPLETE WITHIN THIS SECTION OF RIVER; FINISH GRADE, STABILIZE, AND RESTORE TEMPORARY HAUL ROAD AREA IN THIS LOCATION AND BEGIN CONSTRUCTION OF IN-RIVER IMPROVEMENTS AND BANK STABILIZATION MEASURES BETWEEN THE GRANVILLE TEMPORARY CROSSING AND THE NATURE-LIKE FISHWAY. UTILIZE TEMPORARY COFFERDAMS AND CONSTRUCTION DEWATERING PUMPS (WITH CRUSHED STONE SUMPS) AS REQUIRED TO ISOLATE SECTIONS OF THE RIVER BETWEEN THE GRANVILLE TEMPORARY CROSSING AND THE NATURE-LIKE FISHWAY TO FACILITATE CONSTRUCTION OF IN-RIVER IMPROVEMENTS UNDER DRY WORKING CONDITIONS. AS SHOWN IN GRAPHIC, A TEMPORARY COFFERDAM COULD BE CONSTRUCTED DOWN THE APPROXIMATE CENTER OF THE RIVER CHANNEL SO THAT IMPROVEMENTS COULD BE CONSTRUCTED ON ONE SIDE OF RIVER WHILE FLOW IS BEING DIVERTED TO OTHER SIDE OF RIVER. THE CULVERTS AT THE UPSTREAM RIVER CROSSING WOULD BE CAPPED/BLOCKED ACCORDINGLY.
11. ONCE CONSTRUCTION OF THE IN-RIVER IMPROVEMENTS AND BANK STABILIZATION MEASURES ARE COMPLETE WITHIN THIS SECTION OF RIVER; REMOVE TEMPORARY RIVER CROSSING NEAR GRANVILLE STREET; FINISH GRADE, STABILIZE, AND RESTORE TEMPORARY HAUL ROAD AREA IN THIS SECTION; AND BEGIN CONSTRUCTION OF IN-RIVER IMPROVEMENTS AND BANK STABILIZATION MEASURES BETWEEN THE FORMER GRANVILLE TEMPORARY CROSSING AND THE TEMPORARY RIVER CROSSING NEAR BENJAMIN STREET. UTILIZE TEMPORARY COFFERDAMS AND CONSTRUCTION DEWATERING PUMPS (WITH CRUSHED STONE SUMPS) AS REQUIRED TO ISOLATE SECTIONS OF THE RIVER BETWEEN THE BENJAMIN TEMPORARY CROSSING AND FORMER GRANVILLE TEMPORARY CROSSING TO FACILITATE CONSTRUCTION OF IN-RIVER IMPROVEMENTS UNDER DRY WORKING CONDITIONS. AS SHOWN IN GRAPHIC, A TEMPORARY COFFERDAM COULD BE CONSTRUCTED DOWN THE APPROXIMATE CENTER OF THE RIVER CHANNEL SO THAT IMPROVEMENTS COULD BE CONSTRUCTED ON ONE SIDE OF RIVER WHILE FLOW IS BEING DIVERTED TO OTHER SIDE OF RIVER. THE CULVERTS AT THE UPSTREAM RIVER CROSSING WOULD BE CAPPED/BLOCKED ACCORDINGLY.
11. ONCE CONSTRUCTION OF THE IN-RIVER IMPROVEMENTS AND BANK STABILIZATION MEASURES ARE COMPLETE WITHIN THIS SECTION OF RIVER; REMOVE TEMPORARY RIVER CROSSING NEAR BENJAMIN STREET; FINISH GRADE, STABILIZE, AND RESTORE TEMPORARY HAUL ROAD AREA IN THIS SECTION;AND BEGIN CONSTRUCTION OF IN-RIVER IMPROVEMENTS AND BANK STABILIZATION MEASURES BETWEEN THE FORMER BENJAMIN TEMPORARY CROSSING AND THE FORMER SEDIMENT CONTAMINATION AREA. CONNECT IMPROVEMENTS INTO PREVIOUSLY CONSTRUCTED IMPROVEMENTS AS PART OF PHASE 1. UTILIZE TEMPORARY COFFERDAMS (LARGE SANDBAGS OR EQUAL) AND CONSTRUCTION DEWATERING PUMPS AS REQUIRED TO ISOLATE SECTIONS OF THE RIVER BETWEEN THE GRANVILLE TEMPORARY CROSSING AND THE NATURE-LIKE FISHWAY TO FACILITATE CONSTRUCTION OF IN-RIVER IMPROVEMENTS.
12. FINISH GRADE, STABILIZE, AND RESTORE TEMPORARY HAUL ROAD AREA UPSTREAM OF FORMER SEDIMENT CONTAMINATION AREA. REMOVE TEMPORARY RIVER CROSSING AT CASHMAN'S PARK AND RESTORE AREA.
13. PERFORM ANY REMAINING RESTORATION ACTIVITIES ALONG THE RIVER.
14. FINISH CONSTRUCTION OF RIVER OVERLOOK AREA, UPPER PORTION OF WALL, AND INSTALL STABILIZATION/RESTORATION MEASURES AT PARCEL 516-304-1. REMOVE TEMPORARY STONE CONSTRUCTION ACCESS AT THIS PARCEL AND RESTORE ANY DAMAGED PAVEMENT TO ORIGINAL CONDITIONS OR BETTER.
15. FINISH CONSTRUCTION OF ANY IN-RIVER OR OUT-OF-RIVER IMPROVEMENTS AT CASHMAN PARK. ONCE IMPROVEMENTS HAVE BEEN ACCEPTED BY ENGINEER AND/OR OWNER, RESTORE UPLAND AREAS DISTURBED BY CONSTRUCTION WITHIN CASHMAN PARK AND DEMOBILIZE.

MS VIEW:
LAYER STATE:

No.	DATE	DESCRIPTION	DESIGNER	REVIEWER

SCALE:
HORZ.: 1" = 140'
VERT.:
DATUM:
HORZ.: NAD83
VERT.: NAVD88

0 70 140
GRAPHIC SCALE

CITY OF HAVERHILL

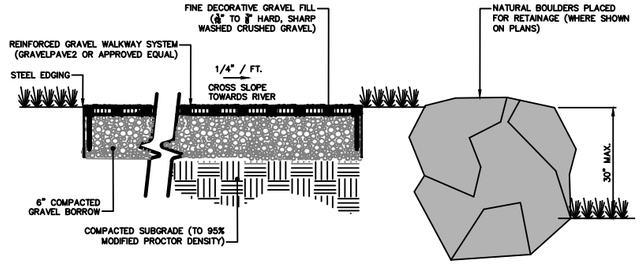
WATER CONTROL & CONSTRUCTION SEQUENCING PLAN NO. 2

LITTLE RIVER DAM REMOVAL AND RESTORATION

HAVERHILL MASSACHUSETTS

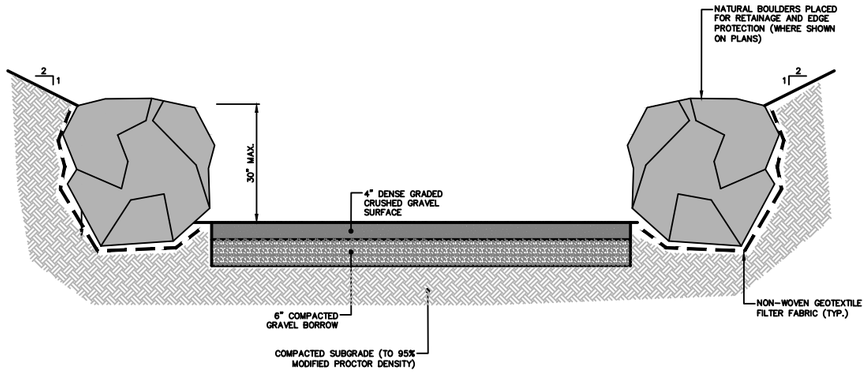
PROJ. No.: 20170390.U30
DATE: JUNE 2022

CW-102



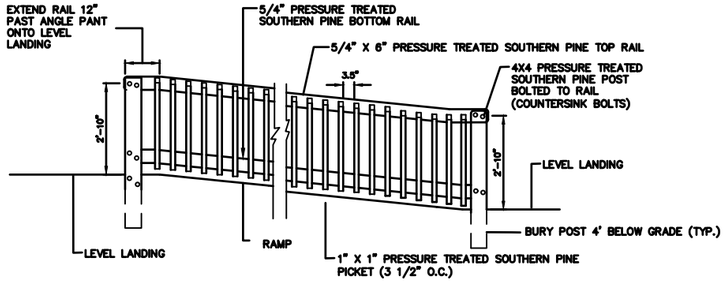
GRAVEL WALKWAY/ACCESS PATH (AT CASHMAN PARK)

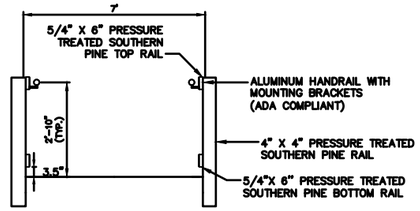
NOT TO SCALE



KAYAK/CANOE ACCESS PATH (AT CASHMAN PARK)

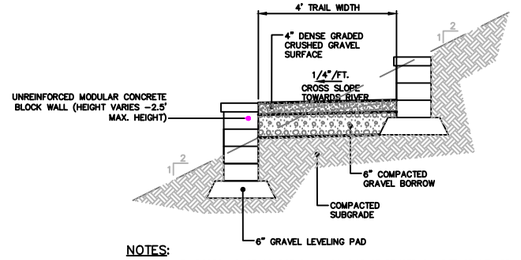
NOT TO SCALE





TIMBER HANDRAIL (AT KAYAK/CANOE ACCESS)

NOT TO SCALE

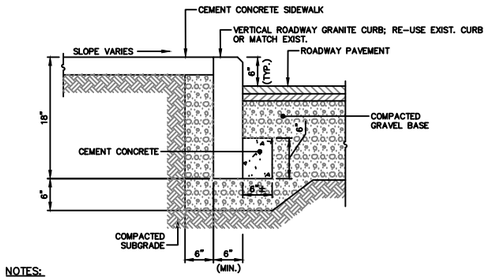


NOTES:

1. GRAVEL BORROW BASE COURSE SHALL CONSIST OF REUSED ON-SITE GRAVEL OR IMPORTED GRAVEL MEETING THE GRADATION REQUIREMENTS OF M.1.03 OF THE MASSDOT STANDARD SPECIFICATIONS.
2. DENSE GRADED CRUSHED GRAVEL SURFACE SHALL CONSIST OF GRAVEL SURFACE MATERIAL MEETING THE REQUIREMENTS OF M2.05.0 OF THE MASSDOT STANDARD SPECIFICATIONS.
3. ALIGNMENT OF TRAIL MAY VARY SLIGHTLY WITHIN LIMIT OF DISTURBANCE (AS FIELD DIRECTED BY ENGINEER) IN ORDER TO MINIMIZE TREE AND VEGETATION REMOVAL.

COMPACTED GRAVEL WALKING TRAIL

NOT TO SCALE

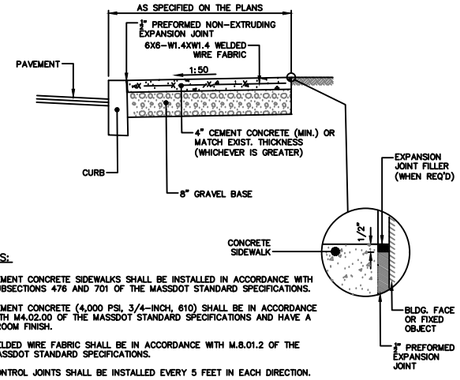


NOTES:

1. CURBING SHALL BE INSTALLED IN ACCORDANCE WITH SUBSECTION 501 OF THE MASSDOT STANDARD SPECIFICATIONS.
2. GRANITE CURB, GRANITE CURB INLETS, AND GRANITE CURB CORNERS SHALL BE IN ACCORDANCE WITH M9.04.1, M9.04.5, AND M9.04.6 OF THE MASSDOT STANDARD SPECIFICATIONS, RESPECTIVELY.
3. CEMENT CONCRETE (3,000 PSI, 3/4-INCH, 520) SHALL BE IN ACCORDANCE WITH M4.02.00 OF THE MASSDOT STANDARD SPECIFICATIONS AND INSTALLED IN ACCORDANCE WITH SUBSECTION 476 OF THE MASSDOT STANDARD SPECIFICATIONS.
4. MORTAR FOR CURBING JOINTS SHALL BE IN ACCORDANCE WITH M4.02.15 OF THE MASSDOT STANDARD SPECIFICATIONS.

VERTICAL ROADWAY GRANITE CURB

NOT TO SCALE

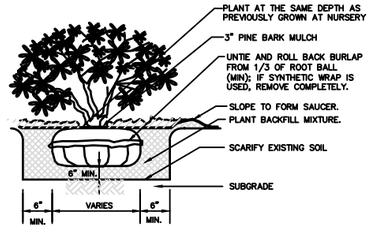


NOTES:

1. CEMENT CONCRETE SIDEWALKS SHALL BE INSTALLED IN ACCORDANCE WITH SUBSECTIONS 476 AND 701 OF THE MASSDOT STANDARD SPECIFICATIONS.
2. CEMENT CONCRETE (4,000 PSI, 3/4-INCH, 610) SHALL BE IN ACCORDANCE WITH M4.02.00 OF THE MASSDOT STANDARD SPECIFICATIONS AND HAVE A BROOM FINISH.
3. WELDED WIRE FABRIC SHALL BE IN ACCORDANCE WITH M.8.01.2 OF THE MASSDOT STANDARD SPECIFICATIONS.
4. CONTROL JOINTS SHALL BE INSTALLED EVERY 5 FEET IN EACH DIRECTION.
5. EXPANSION JOINTS SHALL BE INSTALLED EVERY 20 FEET IN EACH DIRECTION AT FOUNDATIONS AND WALLS IN IN A SQUARE PATTERN AROUND MANHOLE COVERS, HYDRANTS, SIGN POSTS AND UTILITY POLES. THE EXPANSION JOINT SHALL BE THE FULL DEPTH OF THE SIDEWALK AND FILLED WITH AN APPROVED TYPE OF PREMOLDED EXPANSION JOINT FILLER IN ACCORDANCE WITH M.9.14.0 OF THE MASSDOT STANDARD SPECIFICATIONS.

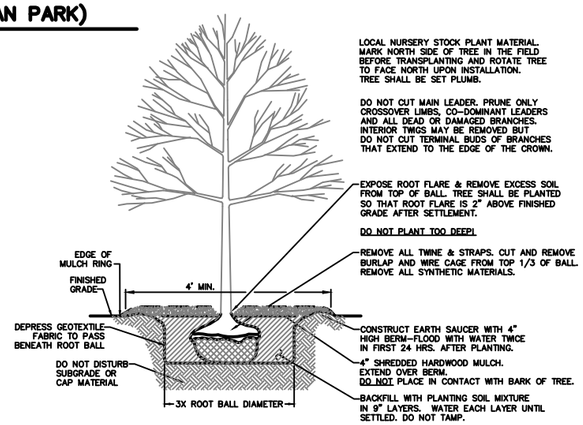
CEMENT CONCRETE SIDEWALK

NOT TO SCALE



SHRUB PLANTING

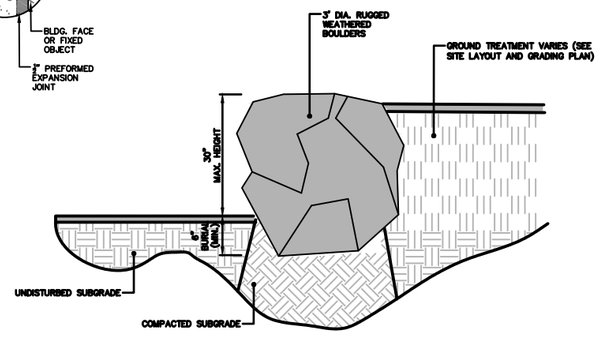
NOT TO SCALE



NOTES:
1. STAKES & GUYS SHALL NOT BE USED.
2. SPRAY WITH ANTIDESICCANT IN ACCORDANCE WITH MFG'S INSTRUCTIONS IF FOLIGAE IS PRESENT.

TREE PLANTING DETAIL

NOT TO SCALE



NATURAL BOULDER PLACEMENT (FOR RETAINAGE)

NOT TO SCALE

No.	DATE	DESCRIPTION	DESIGNER	REVIEWER

SCALE:
HORZ.: AS NOTED
VERT.:
DATUM:
HORZ.: NAD83
VERT.: NAVD88
0
GRAPHIC SCALE

CITY OF HAVERHILL

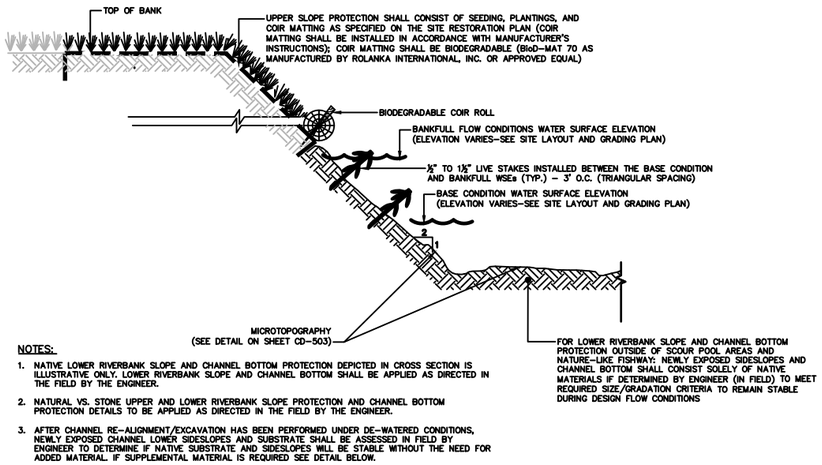
CONSTRUCTION DETAILS

LITTLE RIVER DAM REMOVAL AND RESTORATION

HAVERHILL MASSACHUSETTS

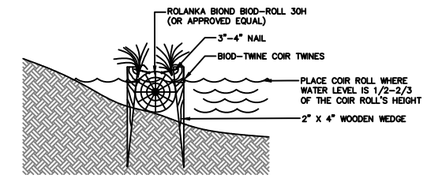
PROJ. No.: 20170390.U30
DATE: JUNE 2022

CD-501

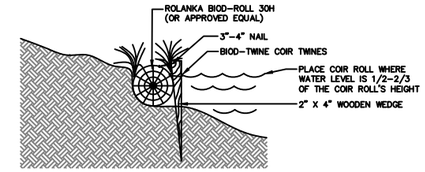


NOTES:

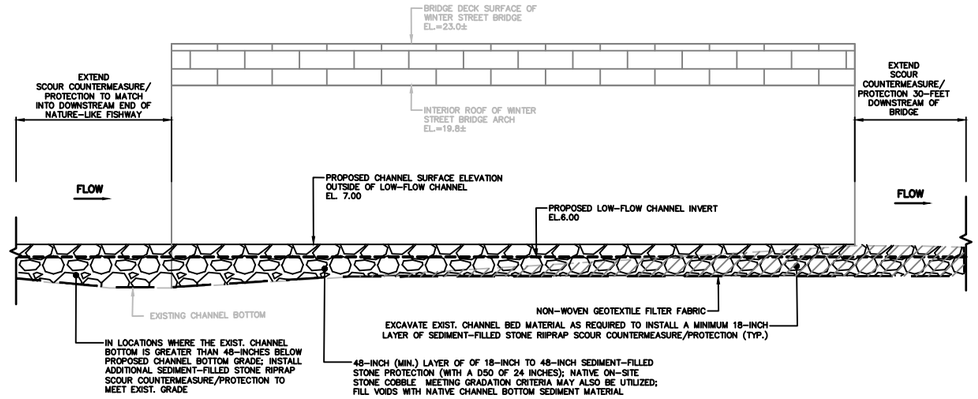
1. NATIVE LOWER RIVERBANK SLOPE AND CHANNEL BOTTOM PROTECTION DEPICTED IN CROSS SECTION IS ILLUSTRATIVE ONLY. LOWER RIVERBANK SLOPE AND CHANNEL BOTTOM SHALL BE APPLIED AS DIRECTED IN THE FIELD BY THE ENGINEER.
2. NATURAL VS. STONE UPPER AND LOWER RIVERBANK SLOPE PROTECTION AND CHANNEL BOTTOM PROTECTION DETAILS TO BE APPLIED AS DIRECTED IN THE FIELD BY THE ENGINEER.
3. AFTER CHANNEL RE-ALIGNMENT/EXCAVATION HAS BEEN PERFORMED UNDER DE-WATERED CONDITIONS, NEWLY EXPOSED CHANNEL LOWER SIDESLOPES AND SUBSTRATE SHALL BE ASSESSED IN FIELD BY ENGINEER TO DETERMINE IF NATIVE SUBSTRATE AND SIDESLOPES WILL BE STABLE WITHOUT THE NEED FOR ADDED MATERIAL. IF SUPPLEMENTAL MATERIAL IS REQUIRED SEE DETAIL BELOW.



COIR ROLL PLACEMENT OPTION 1 – WITHOUT BANK SUPPORT



COIR ROLL PLACEMENT OPTION 2 – WITH BANK SUPPORT

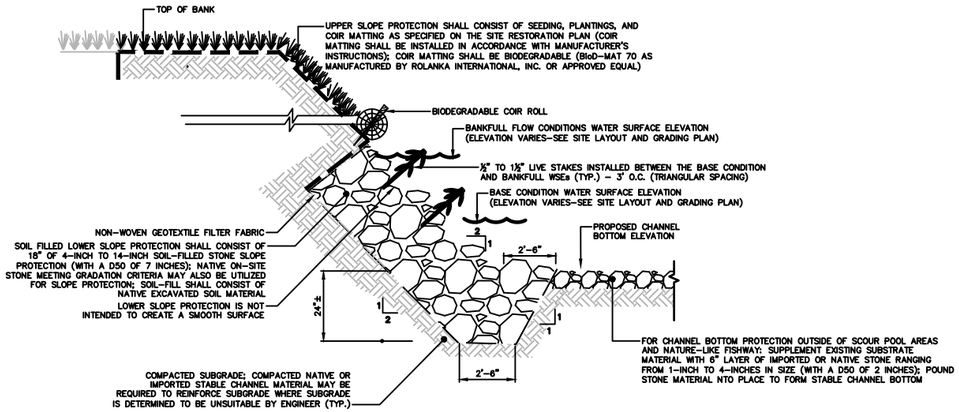


WINTER STREET BRIDGE SCOUR COUNTERMEASURE/PROTECTION

NOT TO SCALE

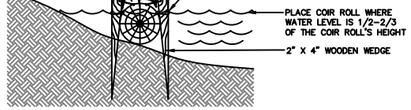
NATURAL UPPER AND LOWER RIVERBANK SLOPE PROTECTION AND CHANNEL BOTTOM PROTECTION (OUTSIDE OF NATURE-LIKE FISHWAY, SCOUR HOLE, AND SCOUR COUNTERMEASURE LOCATIONS)

NOT TO SCALE

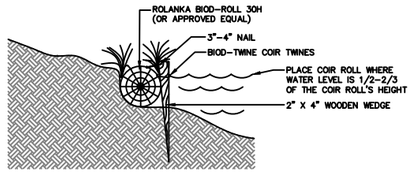


NOTE:

IMPORTED LOWER RIVERBANK SLOPE AND CHANNEL BOTTOM PROTECTION DEPICTED IN CROSS SECTION IS ILLUSTRATIVE ONLY. LOWER RIVERBANK SLOPE AND CHANNEL BOTTOM SHALL BE APPLIED AS DIRECTED IN THE FIELD BY THE ENGINEER.



COIR ROLL PLACEMENT OPTION 1 – WITHOUT BANK SUPPORT



COIR ROLL PLACEMENT OPTION 2 – WITH BANK SUPPORT

STONE UPPER AND LOWER RIVERBANK SLOPE PROTECTION AND CHANNEL BOTTOM PROTECTION (OUTSIDE OF NATURE-LIKE FISHWAY, SCOUR HOLE, AND SCOUR COUNTERMEASURE LOCATIONS)

NOT TO SCALE

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GRAPHIC SCALE

CITY OF HAVERHILL

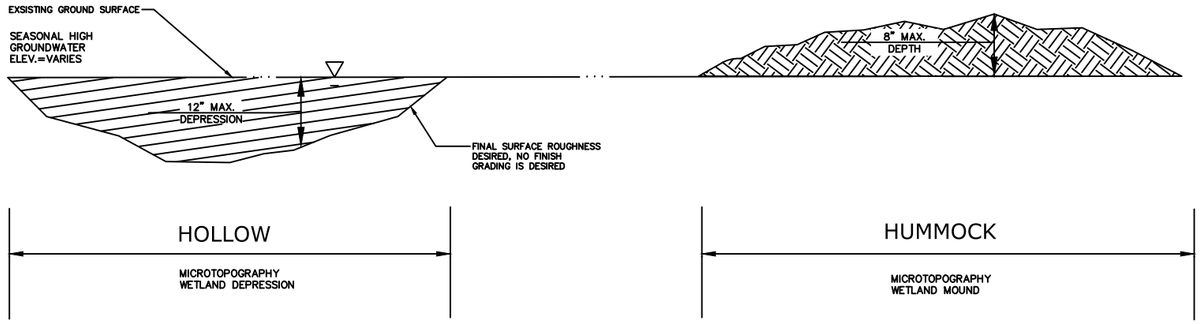
CONSTRUCTION DETAILS

LITTLE RIVER DAM REMOVAL AND RESTORATION

HAVERHILL MASSACHUSETTS

PROJ. No.: 20170390.U30
DATE: JUNE 2022

CD-502



MICROTOPOGRAPHY CROSS SECTION

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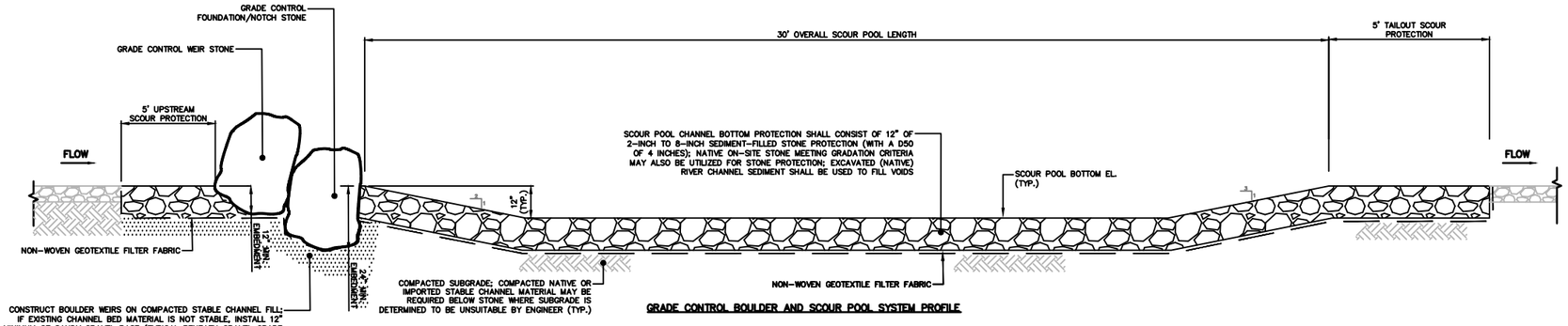


GRADE CONTROL BOULDER AND SCOUR POOL SYSTEM PROFILE

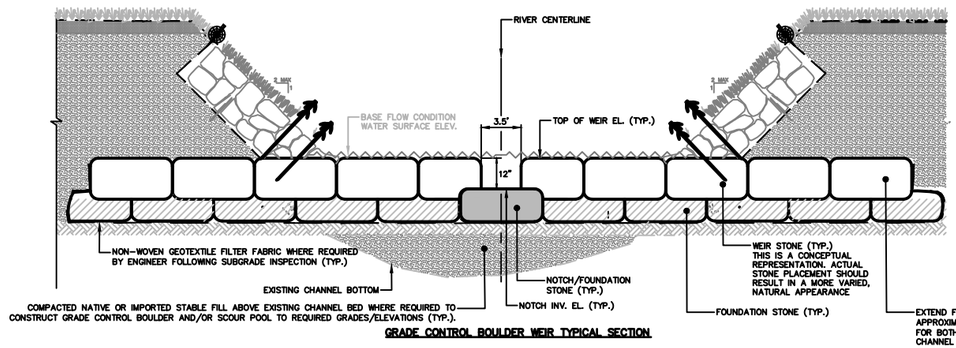
GRADE CONTROL WEIR

STONE TYPE	STONE LENGTH (A)*	STONE WIDTH (B)	STONE HEIGHT (C)
FOUNDATION/NOTCH STONE	3.0'-4.0'	2.0'-3.0'	3.0'-3.5'
WEIR STONE	3.0'-4.0'	2.0'-3.0'	3.0'-3.5'

* 'A' DIMENSION REFERS TO LENGTH OF STONE PERPENDICULAR TO FLOW; 'C' DIMENSION REFERS TO WIDTH OF STONE PARALLEL TO FLOW.

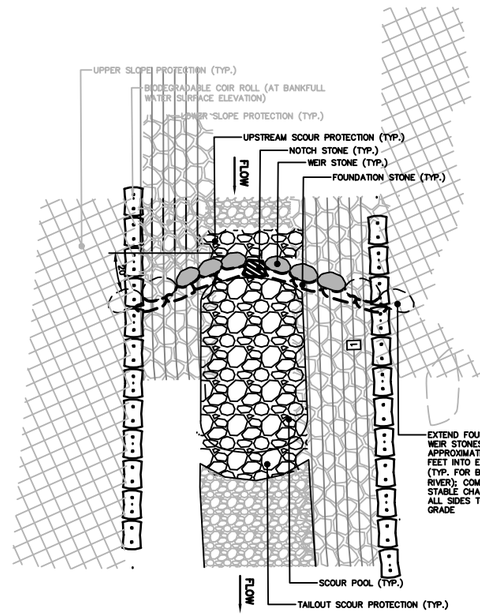
** ADDITIONAL WEIR STONE MAY BE PLACED BEHIND & ABUTTING THE NOTCH STONES AS DIRECTED BY THE ENGINEER TO OBTAIN REQUIRED NOTCH WIDTH.

*** DIMENSIONS SELECTED FOR ANY FOUNDATION/NOTCH AND WEIR STONES SHALL RESULT IN A MINIMUM WEIGHT OF 2,200 LBS ASSUMING THE STONE HAS AN APPROXIMATE UNIT WEIGHT OF 160 LBS/CF.



GRADE CONTROL BOULDER WEIR TYPICAL SECTION

NOTE:
REFER TO THE SITE GRADING AND LAYOUT PLANS FOR TOP OF GRADE CONTROL BOULDER WEIR AND NOTCH INVERT ELEVATION INFORMATION.



TYPICAL PLAN VIEW

TYPICAL GRADE CONTROL BOULDER AND SCOUR POOL SYSTEM

NOT TO SCALE

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MS VIEW: LAYER STATE: PC3: AUTOCAD PDF (GENERAL DOCUMENTATION).PC3 STB/CTB: FO HALF.STB

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GRAPHIC SCALE

CITY OF HAVERHILL

CONSTRUCTION DETAILS

LITTLE RIVER DAM REMOVAL AND RESTORATION

HAVERHILL MASSACHUSETTS

PROJ. No.: 20170390.U30
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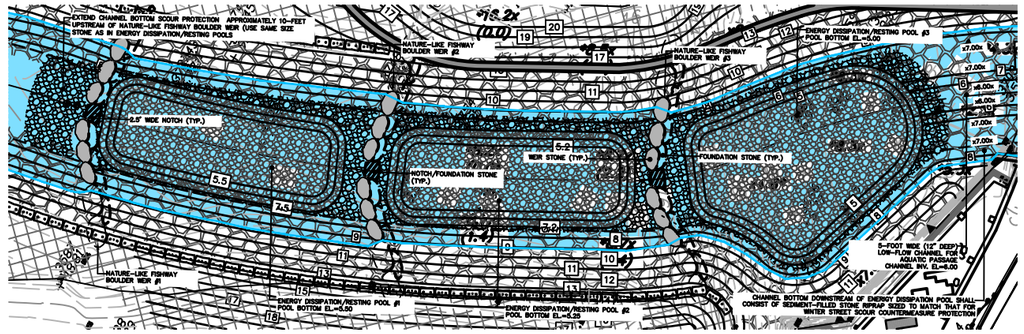
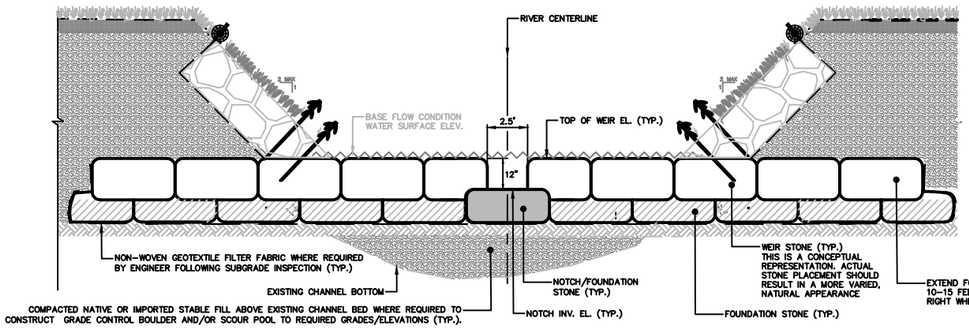
CD-503



NATURE-LIKE FISHWAY LAYOUT

SCALE 1"=30'



NATURE-LIKE FISHWAY BOULDER WEIR TYPICAL SECTION

NOTE:

REFER TO THE SITE GRADING AND LAYOUT PLANS FOR TOP OF NATURE-LIKE FISHWAY BOULDER WEIR AND NOTCH INVERT ELEVATION INFORMATION.

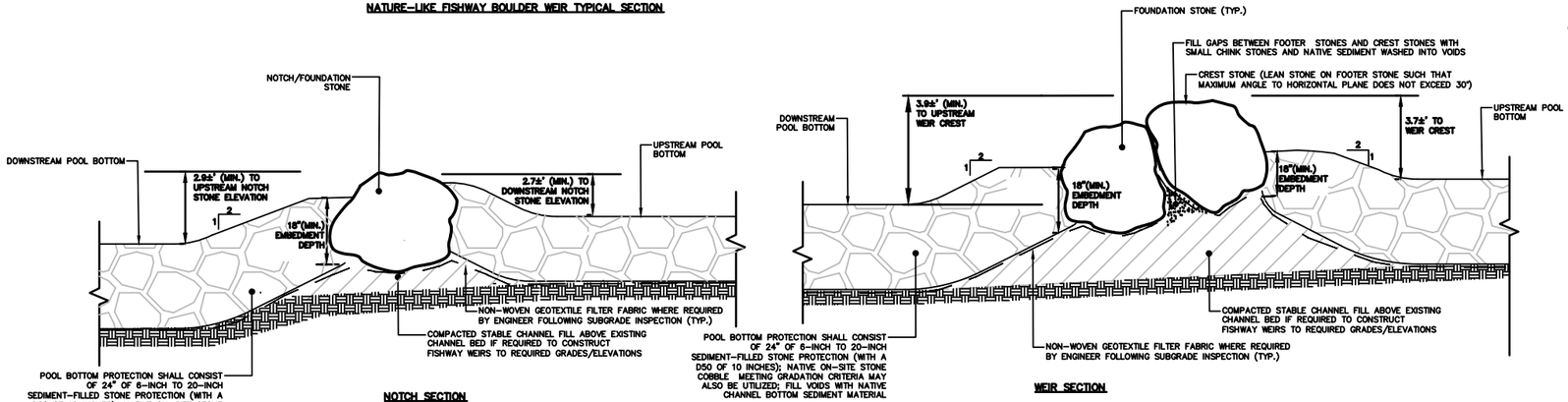
NATURE-LIKE FISHWAY BOULDER WEIR

STONE TYPE	STONE LENGTH (A)*	STONE WIDTH (B)	STONE HEIGHT (C)
FOUNDATION/NOTCH STONE	3.0'-4.0'	2.0'-3.0'	3.0'-3.5'
WEIR STONE	3.0'-4.0'	2.0'-3.0'	3.0'-3.5'

* 'A' DIMENSION REFERS TO LENGTH OF STONE PERPENDICULAR TO FLOW; 'C' DIMENSION REFERS TO WIDTH OF STONE PARALLEL TO FLOW.

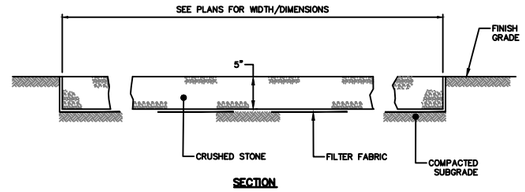
** ADDITIONAL WEIR STONE MAY BE PLACED BEHIND & ABUTTING THE NOTCH STONES AS DIRECTED BY THE ENGINEER TO OBTAIN REQUIRED NOTCH WIDTH.

*** DIMENSIONS SELECTED FOR ANY FOUNDATION/NOTCH AND WEIR STONES SHALL RESULT IN A MINIMUM WEIGHT OF 2,400 LBS ASSUMING THE STONE HAS AN APPROXIMATE UNIT WEIGHT OF 160 LBS/CF.



TYPICAL NATURE-LIKE FISHWAY WEIR AND RESTING POOL PROFILE

NOT TO SCALE

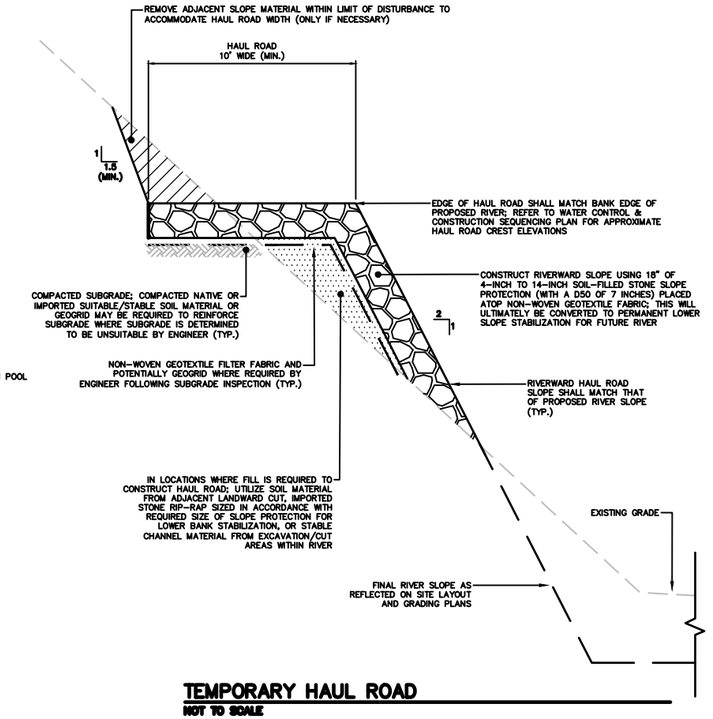


NOTES:

1. MAINTAIN ANTI-TRACKING APRON IN GOOD CONDITION THROUGHOUT CONSTRUCTION PERIOD.
2. ADJACENT ROADWAY SHALL BE SWEPT DAILY TO REMOVE ANY MATERIAL THAT MAY BE TRACKED ONTO PAVEMENT.
3. WIDTH OF APRON SHALL NOT BE LESS THAN WIDTH OF INGRESS OR EGRESS.
4. CRUSHED STONE SHALL CONFORM TO THE REQUIREMENTS OF STANDARD SPECIFICATIONS SECTION M2.01.1 (1 1/2 INCH).
5. FILTER FABRIC SHALL BE NON-WOVEN AND BE LISTED WITHIN MASSDOT'S APPROVED MATERIALS LIST FOR CLASS 1 AND 2 APPLICATIONS.

TEMPORARY STONE CONSTRUCTION ACCESS

NOT TO SCALE



TEMPORARY HAUL ROAD

NOT TO SCALE

No.	DATE	DESCRIPTION	DESIGNER	REVIEWER

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CITY OF HAVERHILL

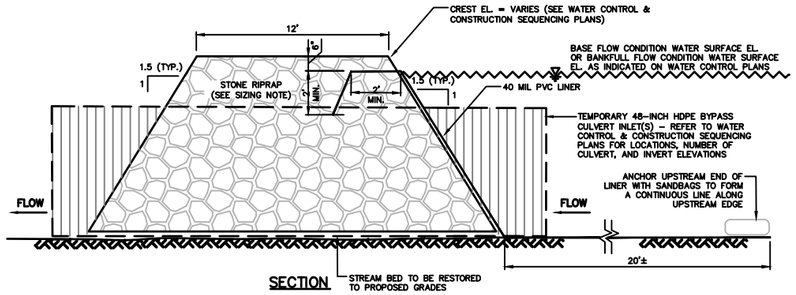
CONSTRUCTION DETAILS

LITTLE RIVER DAM REMOVAL AND RESTORATION

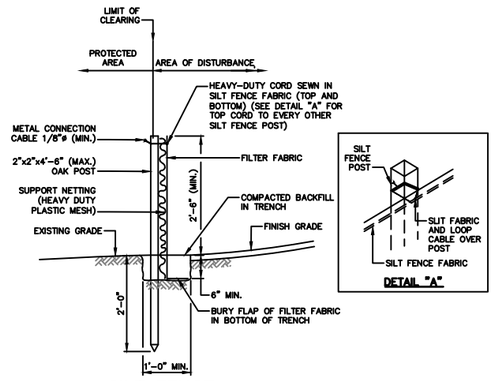
HAVERHILL MASSACHUSETTS

PROJ. No.: 20170390.U30
DATE: JUNE 2022

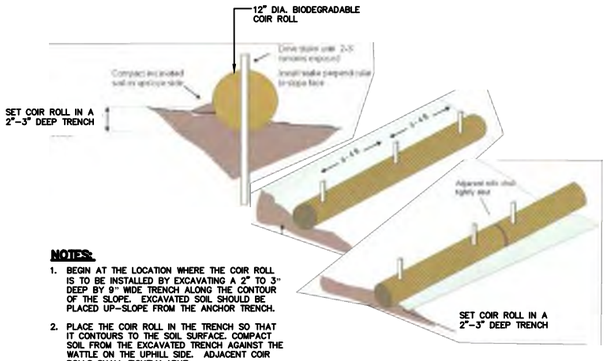
CD-504



TEMPORARY RIVER CROSSING
NOT TO SCALE



SILT FENCE
NOT TO SCALE



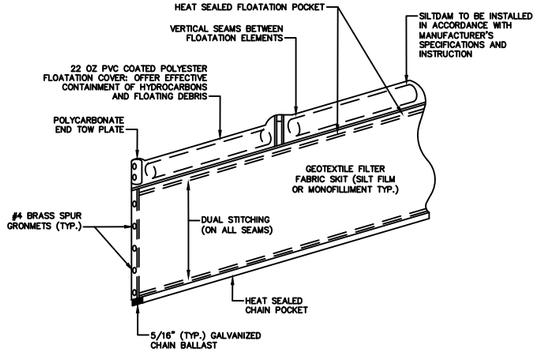
NOTES:

1. BEGIN AT THE LOCATION WHERE THE COIR ROLL IS TO BE INSTALLED BY EXCAVATING A 2" TO 3" DEEP BY 9" WIDE TRENCH ALONG THE CONTOUR OF THE SLOPE. EXCAVATED SOIL SHOULD BE PLACED UP-SLOPE FROM THE ANCHOR TRENCH.
2. PLACE THE COIR ROLL IN THE TRENCH SO THAT IT CONTOURS TO THE SOIL SURFACE. COMPACT SOIL FROM THE EXCAVATED TRENCH AGAINST THE WATTLE ON THE UPHILL SIDE. ADJACENT COIR ROLLS SHALL TIGHTLY ABUT.
3. SECURE THE COIR ROLL WITH 36" LONG (2"x2") STAKES SPACED EVERY 3' TO 4' ON CENTER AND WITH A STAKE ON EACH END. STAKES SHOULD BE DRIVEN THROUGH THE MIDDLE OF THE COIR ROLL LEAVING AT LEAST 2" TO 3" OF STAKE EXTENDING ABOVE THE COIR ROLL. STAKES SHALL BE DRIVEN PERPENDICULAR TO THE SLOPE FACE.

BIODEGRADABLE COIR ROLL (FOR PERIMETER EROSION CONTROL MEASURE)
NOT TO SCALE

1. OVERALL SUMP PIT DIMENSIONS SHALL BE COMPATIBLE WITH ANTICIPATED SEEPAGE RATES AND PUMP SIZE TO BE USED.
2. THE STANDPIPE DIAMETER AND NUMBER OF PERFORATIONS SHALL BE COMPATIBLE WITH THE PUMP SIZE BEING USED.
3. PERFORATIONS IN THE STANDPIPE SHALL BE EITHER CIRCULAR OR SLOTS. PERFORATION SIZE SHALL NOT EXCEED 1/2" IN DIAMETER.
4. **CRUSHED STONE SHALL CONFORM TO THE GRADATION LISTED FOR CRUSHED STONE IN SUBSECTION M2.01.4 OF THE MASSDOT STANDARD SPECIFICATIONS FOR 3/4-INCH CRUSHED STONE. CRUSHED STONE SHALL EXTEND A MINIMUM OF 12" BELOW THE BOTTOM OF THE STANDPIPE.**
5. IF EXCESSIVE MOVEMENT OF FINE SOIL PARTICLES FROM THE SURROUNDING EXISTING SOILS IS ANTICIPATED, A PROPERLY DESIGNED GEOTEXTILE SHALL BE PLACED BETWEEN THE EXISTING SOILS AND THE CRUSHED STONE OR GRAVEL BACKFILL.
6. THE STANDPIPE SHALL EXTEND A MINIMUM OF 12" ABOVE THE SURROUNDING GROUND.
7. **WHEN USED FOR WATER CONTROL DURING THE CONSTRUCTION OF THE LOWER SLOPE AND TOE PROTECTION ASSOCIATED WITH BIOENGINEERED SLOPE STABILIZATION, TREE REVETMENT SYSTEM, AND THE OUTFALL HEADWALL AND ASSOCIATED CHANNEL BOTTOM SCOUR PROTECTION; PUMP DISCHARGE MAY NEED TO BE DIVERTED THROUGH A DEWATERING BAG PRIOR TO BEING DIRECTED INTO THE BROOK IF IT IS DETERMINED BY THE ENGINEER THAT THE DISCHARGE IS TURBID OR CLOUDY.**

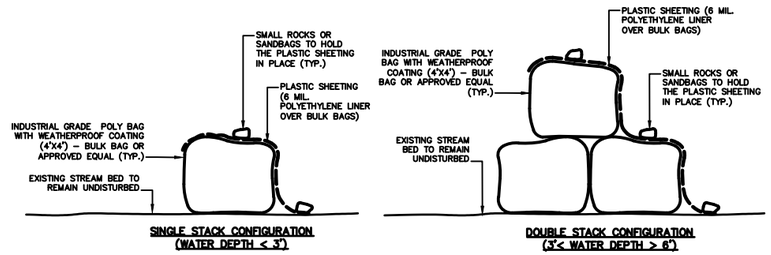
CRUSHED STONE SUMP DETAIL (FOR CONSTRUCTION DEWATERING PUMPS)
NOT TO SCALE



NOTES:

1. CURTAIN SHALL BE A TYPE III HEAVY DUTY CURTAIN THAT IS SUITABLE FOR INSTALLATION WITH FLOWS UP TO 5 FEET PER SECOND (FPS).
2. FLOATATION SIZE (6", 8" OR 12" DIA.) DETERMINED BY SKIRT DEPTH/SITE VARIABLES.
3. OTHER END TYPES AVAILABLE SUCH AS ALUMINUM UNIVERSAL SLIDE OR SLOTTED TUBE.
4. OPTIONAL TOP TENSION CABLE (5/16" TYP.) AVAILABLE FOR INCREASED STRENGTH.

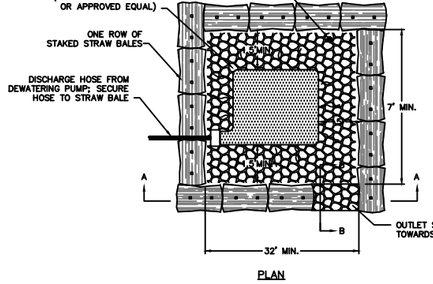
TYPE III FLOATING TURBIDITY CURTAIN
NOT TO SCALE



WATER CONTROL NOTES:

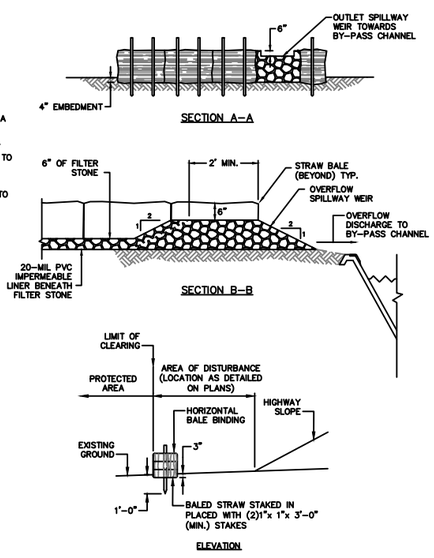
1. TEMPORARY SANDBAGS SHALL CONSIST OF POLYPROPYLENE LARGE SANDBAGS, BULK BAGS OR APPROVED EQUAL, AND SHALL BE FILLED WITH SAND CONFORMING TO SUBSECTION M1.04.0 (TYPE B) OF THE MASSDOT STANDARD SPECIFICATIONS.
2. INSTALL DURING PERIOD OF LOW-FLOW IN BROOK. MONITOR WATER CONTROL SYSTEM DAILY. PROMPTLY CORRECT SEEPAGE, BREAKAGE, OR OTHER EVIDENCE OF MOVEMENT TO ENSURE THAT TEMPORARY COFFERDAM(S) AND WATER BYPASS CONVEYANCES REMAIN STABLE AND FUNCTIONING AS INTENDED.
3. MAINTAIN CRUSHED STONE STUMP AND PUMPS AS NECESSARY TO MAINTAIN DEWATERED CONDITIONS WITHIN COFFERDAMMED AREAS SUFFICIENT FOR COMPLETION OF WORK AND PLACEMENT PROPOSED MATERIALS UNDER SAFE, CONTROLLED CONDITIONS.
4. REMOVE ALL SANDBAGS, ACCUMULATED SEDIMENT, AND OTHER COFFERDAM MATERIALS AFTER IN-RIVER CONSTRUCTION IN RESPECTIVE PHASE IS COMPLETE

TEMPORARY LARGE SANDBAG COFFERDAM (BULK BAGS OR APPROVED EQUAL)
NOT TO SCALE



NOTES:

1. STRAW BALES FOR EROSION CONTROL SHALL CONFORM TO SECTION 767 OF THE STANDARD SPECIFICATIONS INCLUDING MATERIALS AND CONSTRUCTION METHODS.
2. BALES OF STRAW SHALL BE FASTENED WITH WIRE AND HAVE A MINIMUM SIZE OF 1'x1.5'x3'.
3. FILTER STONE SHALL CONSIST OF 1-1/2 INCH STONE CONFORMING TO SUBSECTION M2.01.1 OF THE STANDARD SPECIFICATIONS.
4. FILTER FABRIC SHALL CONFORM TO A TYPE I FABRIC AS INCLUDED WITHIN SECTION M9.50.0 OF THE STANDARD SPECIFICATIONS.



NOTES:

1. THE DEWATERING BAG, DIRTBAG® DB55 OR APPROVED EQUAL, SHALL BE HEAVY DUTY AND CONSIST OF A NONWOVEN BAG SEWN WITH A DOUBLE NEEDLE MATCHING USING A HIGH STRENGTH THREAD.
2. EACH DEWATERING BAG SHALL HAVE A FILL SPOUT LARGE ENOUGH TO ACCOMMODATE A 4-INCH DISCHARGE HOSE. THE BAG SHALL BE PROVIDED WITH STRAPS TO SECURE THE HOSE AND PREVENT PUMPED WATER FROM ESCAPING WITHOUT BEING FILTERED.
3. MAINTAIN DEWATERING BAG(S) AS NECESSARY TO EFFICIENTLY FILTER SEDIMENT OR PASS WATER AT A REASONABLE RATE. USE OF EXCESSIVE FLOW RATES OR OVERFILLING DIRTBAG® WITH SEDIMENT WILL CAUSE RUPTURES OF THE BAGS OR FAILURE OF THE HOSE ATTACHMENT STRAPS.
4. DISPOSE OF DEWATERING BAG AND CONTENTS AT OFF-SITE DISPOSAL FACILITY IN ACCORDANCE WITH THE APPROVED SOIL MANAGEMENT PLAN OR AS DIRECTED BY ENGINEER.
5. INSTALL DEWATERING BAG AND CRUSHED STONE BEDDING WITH A SLOPE SO INCOMING WATER FLOWS DOWNHILL THROUGH THE BAG WITHOUT CREATING MORE EROSION. STRAP THE NECK OF DEWATERING BAG TIGHTLY TO THE DISCHARGE HOSE.

TEMPORARY DEWATERING BASIN WITH FILTER BAG
NOT TO SCALE

File: J:\DWG\P20170390\U30\Civil\Plan\20170390U30_DET01.dwg Layout: 11X17-CD-505 Plotted: 2022-12-08 3:22 PM Saved: 2022-12-08 2:44 PM User: CNauman
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No.	DATE	DESCRIPTION	DESIGNER	REVIEWER

SCALE:
HORZ.: AS NOTED
VERT.:
DATUM:
HORZ.: NAD83
VERT.: NAVD88
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GRAPHIC SCALE

CITY OF HAVERHILL

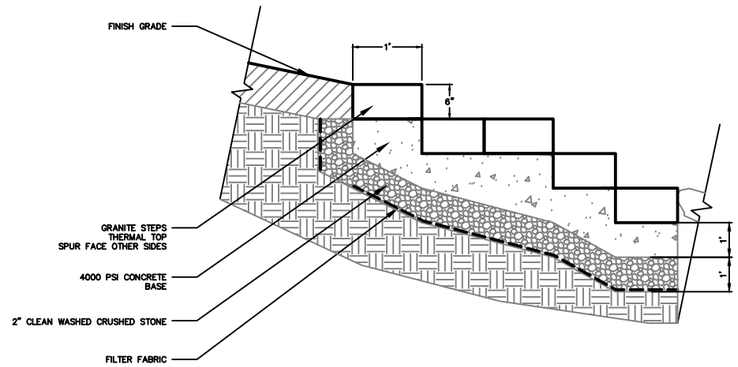
CONSTRUCTION DETAILS

LITTLE RIVER DAM REMOVAL AND RESTORATION

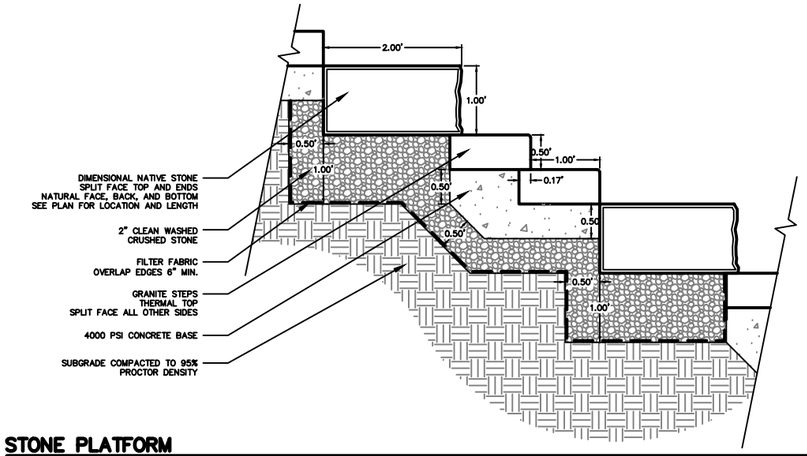
HAVERHILL MASSACHUSETTS

PROJ. No.: 20170390.U30
DATE: JUNE 2022

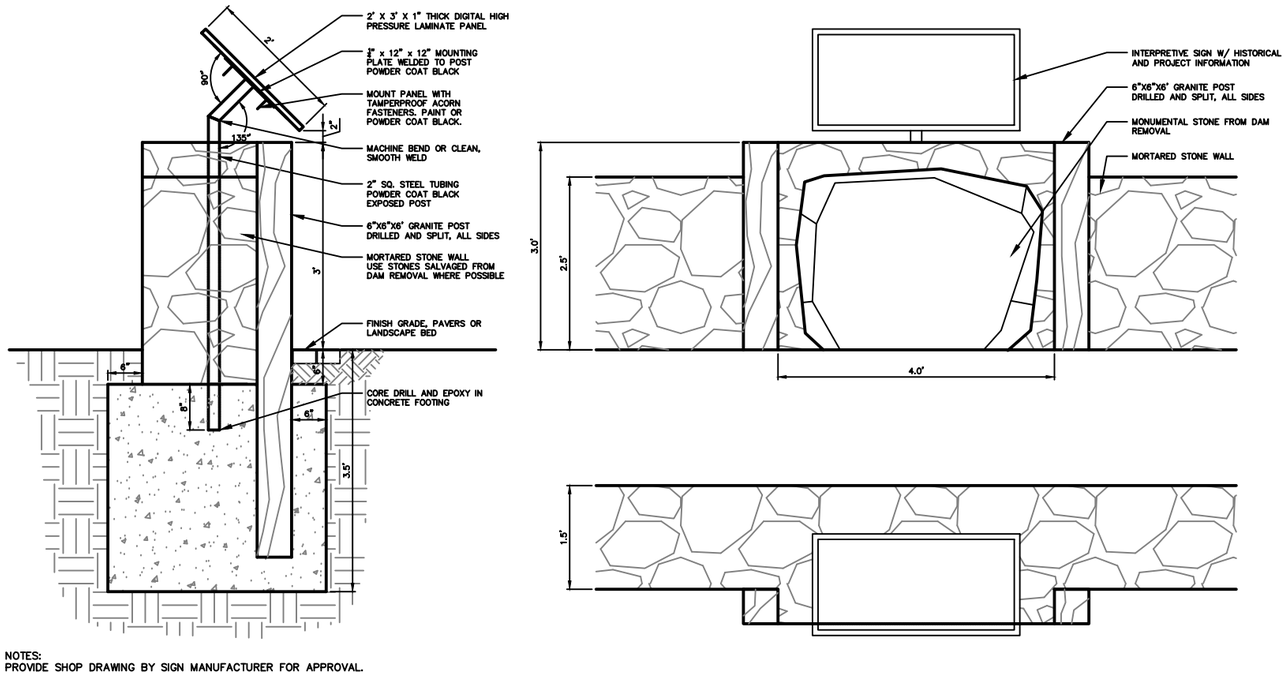
CD-505



GRANITE STEPS
N.T.S.

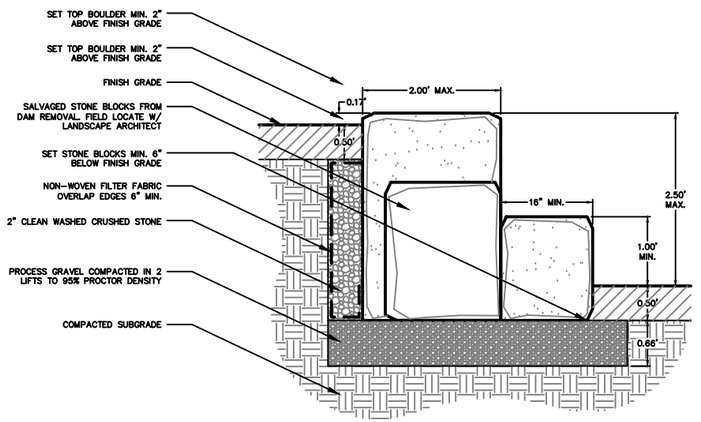


STONE PLATFORM
N.T.S.



NOTES:
PROVIDE SHOP DRAWING BY SIGN MANUFACTURER FOR APPROVAL.

STONE WALL AND INTERPRETIVE SIGN
SCALE: NOT TO SCALE



STACKED SALVAGED STONE BLOCKS
N.T.S.

No.	DATE	DESCRIPTION	DESIGNER	REVIEWER

SCALE:
HORZ.: AS NOTED
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GRAPHIC SCALE

CITY OF HAVERHILL

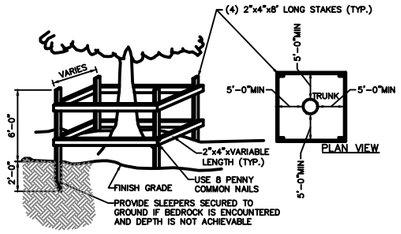
CONSTRUCTION DETAILS

LITTLE RIVER DAM REMOVAL AND RESTORATION

HAVERHILL MASSACHUSETTS

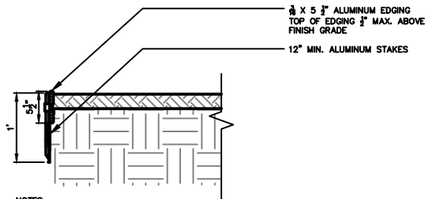
PROJ. No.: 20170390.U30
DATE: JUNE 2022

CD-506



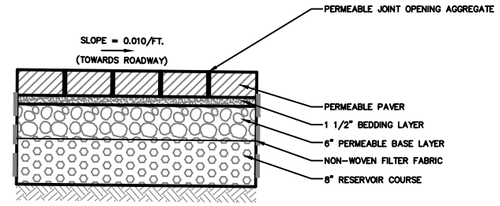
NOTES:
SEE LANDSCAPING PLAN FOR ADDITIONAL TREE PROTECTION NOTES.

TEMPORARY TREE PROTECTION
NOT TO SCALE



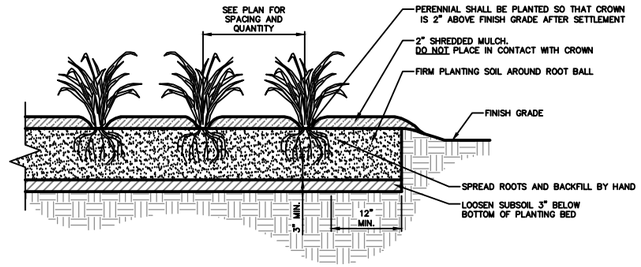
NOTES:
1. 16'-0" SECTIONS TO INCLUDE FIVE (5) 12" STAKES
2. 8'-0" SECTIONS TO INCLUDE THREE (3) 12" STAKES
3. COMPACT GRADES ADJACENT TO EDGING TO MINIMIZE SETTLING
4. CORNERS – CUT BASE OF EDGING HALF WAY AND FORM A CONTINUOUS CORNER.

LANDSCAPE EDGING
SCALE: NOT TO SCALE



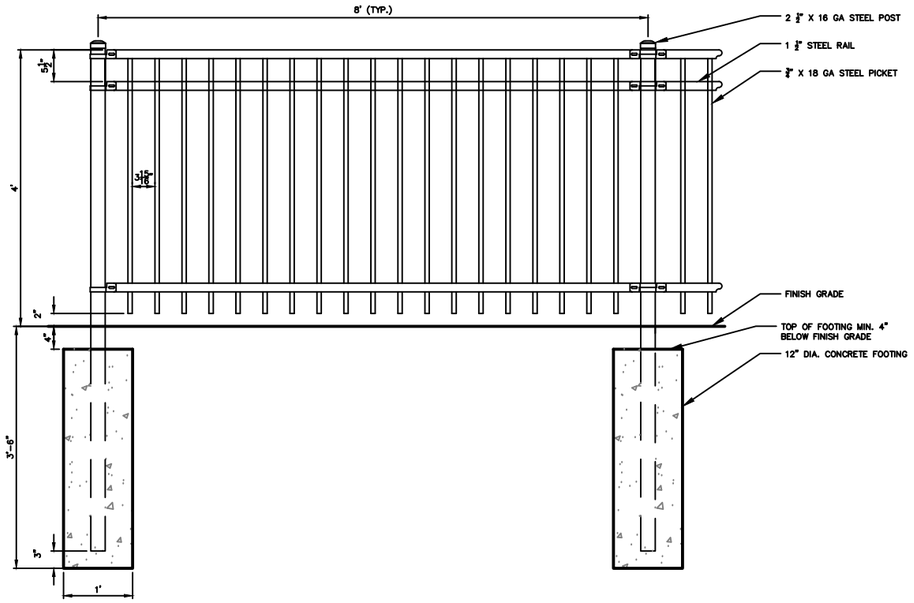
NOTES:
1. THICKNESS OF PERMEABLE CONCRETE PAVERS SHALL VARY BASED ON PRODUCT AND MANUFACTURER SELECTED.
2. THE MINIMUM THICKNESSES OF THE BEDDING LAYER, PERMEABLE BASE LAYER, AND RESERVOIR COURSE LAYER AS SPECIFIED ABOVE REPRESENT MINIMUM THICKNESSES AFTER COMPACTION.
3. PROTECT PERMEABLE PAVERS AND AGGREGATES FROM CONSTRUCTION VEHICLE TRAFFIC, RUNOFF FROM ADJACENT AREAS, AND SEDIMENTATION.

PERMEABLE PAVER SYSTEM
Scale: N.T.S.

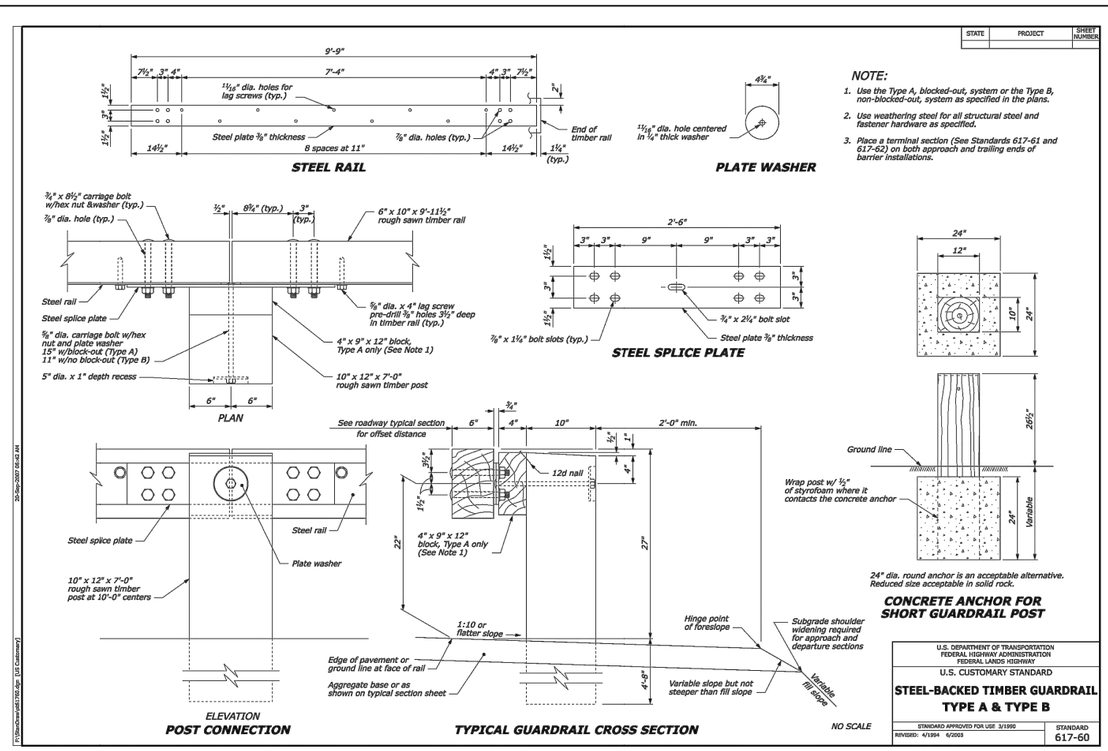


NOTES:
- SPADED PLANTING SOIL MIX SHALL BE PLACED 3" BELOW ROOT BALL AND BE MIXED WITH FERTILIZER. DO NOT COMPACT AFTER PLANTING.
- WATER THOROUGHLY AFTER PLANTING.
- PROVIDE WELL DRAINING SUBSOIL WHEN SOIL IS HEAVY OR COMPACTED.
- FOR CONTAINER GROWN PLANTS, USE FINGERS OR SMALL HAND TOOLS TO PULL THE ROOTS OUT OF THE OUTER LAYER OF POTTING SOIL; THEN CUT OR PULL APART ANY ROOTS CIRCLING THE PERIMETER OF THE CONTAINER.

PERENNIAL PLANT BED
Scale: N.T.S.



DECORATIVE FENCE
SCALE: NOT TO SCALE



STEEL BACKED TIMBER GUARDRAIL
NOT TO SCALE

No.	DATE	DESCRIPTION	DESIGNER	REVIEWER

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HORZ.: AS NOTED
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DATUM:
HORZ.: NAD83
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GRAPHIC SCALE

CITY OF HAVERHILL

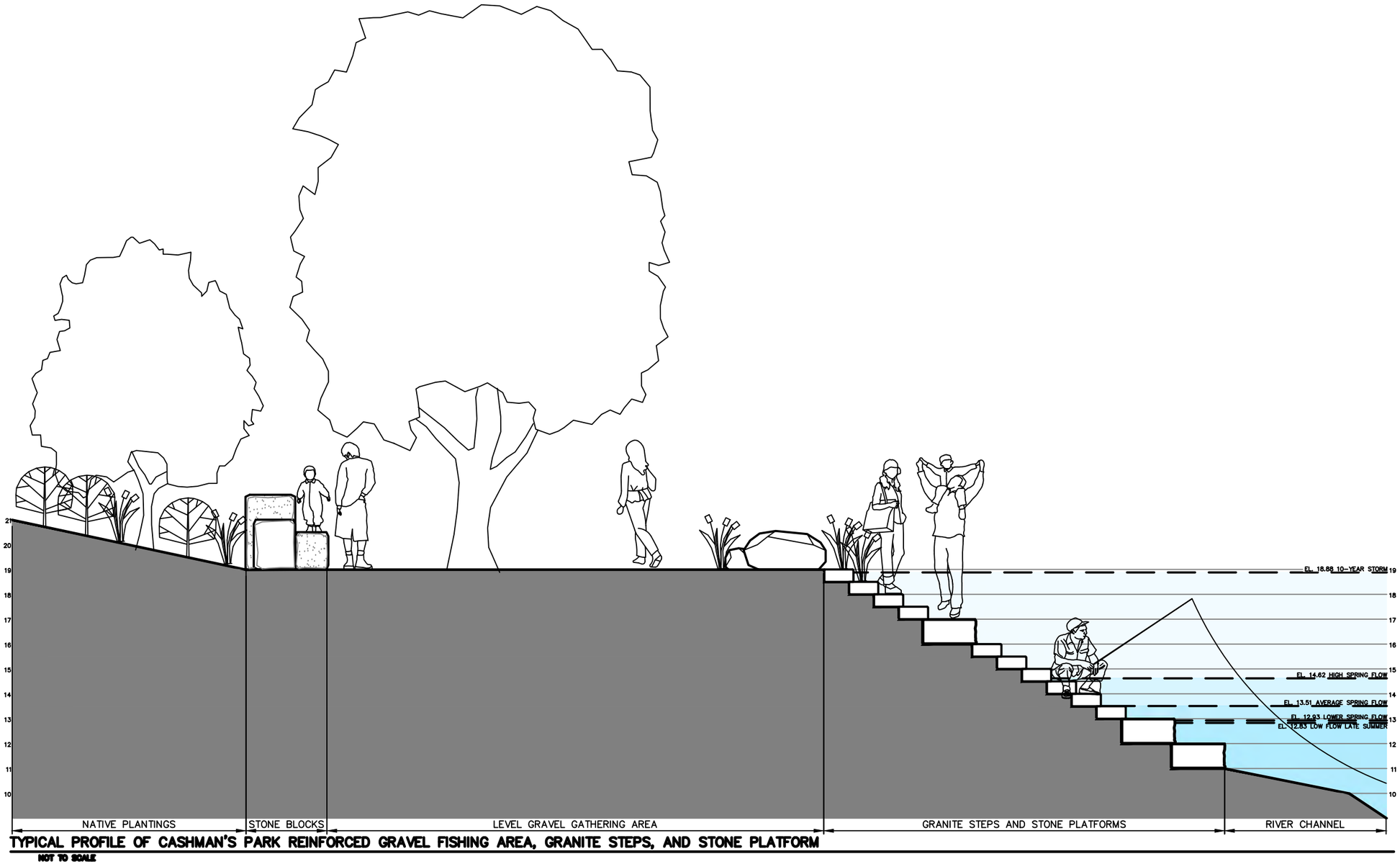
CONSTRUCTION DETAILS

LITTLE RIVER DAM REMOVAL AND RESTORATION

HAVERHILL MASSACHUSETTS

PROJ. No.: 20170390.U30
DATE: JUNE 2022

CD-507



TYPICAL PROFILE OF CASHMAN'S PARK REINFORCED GRAVEL FISHING AREA, GRANITE STEPS, AND STONE PLATFORM

NOT TO SCALE

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No.	DATE	DESCRIPTION	DESIGNER	REVIEWER

SCALE:
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GRAPHIC SCALE

CITY OF HAVERHILL

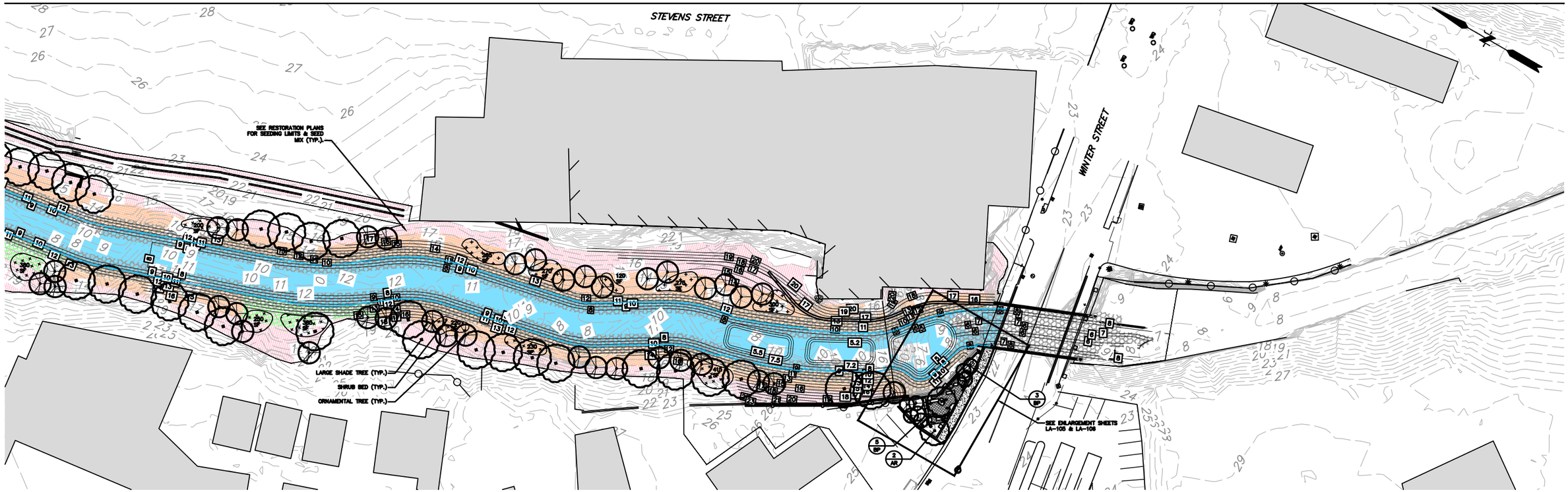
CONSTRUCTION DETAILS

LITTLE RIVER DAM REMOVAL AND RESTORATION

HAVERHILL MASSACHUSETTS

PROJ. No.: 20170390.U30
DATE: JUNE 2022

CD-508



PLANT LIST

KEY	BOTANICAL NAME	COMMON NAME	SIZE
	LARGE SHADE TREES		
AB	ABIES BALSAMEA	BALSAM FIR	6–7' HT.
AR	ACER RUBRUM	RED MAPLE	2"–2 ½" CAL.
AS	ACER SACHARINUM	SILVER MAPLE	2"–2 ½" CAL.
BA	BETULA ALLEGHANIENSIS	YELLOW BIRCH	2"–2 ½" CAL.
LL	LARIX LARCINA	AMERICAN LARCH	6–7' HT.
PO	PLATANUS OCCIDENTALIS	AMERICAN SYCAMORE	2"–2 ½" CAL.
PS	PRUNUS SEROTINA	BLACK CHERRY	2"–2 ½" CAL.
UA	ULMUS AMERICANA	AMERICAN ELM	2"–2 ½" CAL.
	ORNAMENTAL TREES		
AL	AMELANCHIER LAEVIS	ALLEGHENY SERVICEBERRY	6–8' HT.
BP	BETULA POPULIFOLIA	GREY BIRCH	1"–1 ½" CAL.
CA	CORNUS ALTERNIFOLIA	PAGODA DOGWOOD	1"–1 ½" CAL.
CC	CARPINUS CAROLINIANA	AMERICAN HORNBEAM	1"–1 ½" CAL.

	SHRUBS		
AA	ARONIA ARBUTIFOLIA	RED CHOKEBERRY	3 GAL.
AI	ALNUS INCANA	SPECKLED ALDER	3 GAL.
AM	ARONIA MELANOCARPA	BLACK CHOKEBERRY	3 GAL.
CP	CLETHRA ALNIFOLIA	SWEET PEPPERBUSH	3 GAL.
CR	CORNUS RACEMOSA	GRAY DOGWOOD	3 GAL.
HV	HAMAMELIS VIRGINIANA	WITCH HAZEL	3 GAL.
IV	ILEX VERTICILLATA	WINTERBERRY HOLLY	3 GAL.
KA	KALMIA ANGUSTIFOLIA	SHEEP LAUREL	3 GAL.
SL	SPIRAEA LATIFOLIA	MEADOWSWEET	3 GAL.
ST	SPIRAEA TOMENTOSA	STEEPLEBUSH	3 GAL.
VL	VIBURNUM LENTAGO	NANNYBERRY	3 GAL.

LEGEND:

LARGE SHADE TREE
TOTAL QTY: 222

UNLESS OTHERWISE NOTED ON LANDSCAPE PLAN, SELECT AT LEAST 2 OF THE FOLLOWING SPECIES IN EQUAL QUANTITIES
–AMERICAN SYCAMORE (PLATANUS OCCIDENTAILS, FACW)
–AMERICAN ELM (ULMUS AMERICANA, FACW)
–AMERICAN LARCH (LARIX LARCINA, FACW)
–BLACK CHERRY (PRUNUS SEROTINA, FACU)
–SILVER MAPLE (ACER SACCHARINUM, FACW)

UNLESS OTHERWISE NOTED ON LANDSCAPE PLAN, SELECT AT LEAST 2 OF THE FOLLOWING SPECIES IN EQUAL QUANTITIES
–RED MAPLE (ACER RUBRUM, FAC)
–YELLOW BIRCH (BETULA ALLEGHANIENSIS, FAC)
–BALSAM FIR (ABIES BALSAMEA, FAC)

ORNAMENTAL TREE
TOTAL QTY: 258

UNLESS OTHERWISE NOTED ON LANDSCAPE PLAN, SELECT AT LEAST 3 OF THE FOLLOWING SPECIES IN EQUAL QUANTITIES
–GRAY BIRCH (BETULA POPULIFOLIA, FAC)
–AMERICAN HORNBEAM (CARPINUS CAROLINIANA, FAC)
–ALTERNATE LEAF DOGWOOD (CORNUS ALTERNIFOLIA, FACU)
–SHADBUSH (AMELANCHIER LAEVIS, NI)

SHRUBS
TOTAL AREA: 30,000 SF

SELECT AT LEAST 2 OF THE FOLLOWING SPECIES IN EQUAL QUANTITIES, PLANTED AT 6' O.C.
–MEADOWSWEET (SPIRAEA LATIFOLIA, FACW)
–STEEPLEBUSH (SPIRAEA TOMENTOSA, FACW)
–SPECKLED ALDER (ALNUS INCANA, FACW)
–RED CHOKEBERRY (ARONIA ARBUTIFOLIA, FACW)
–WINTERBERRY HOLLY (ILEX VERTICILLATA, FACW)

SELECT AT LEAST 2 OF THE FOLLOWING SPECIES IN EQUAL QUANTITIES, PLANTED AT 6' O.C.
–BLACK CHOKEBERRY (ARONIA MELANOCARPA, FAC)
–SWEET PEPPERBUSH (CLETHRA ALNIFOLIA, FAC)
–GRAY DOGWOOD (CORNUS RACEMOSA, FAC)
–NANNYBERRY (VIBURNUM LENTAGO, FAC)
–SHEEP LAUREL (KALMIA ANGUSTIFOLIA, FAC)
–WITCH HAZEL (HAMAMELIS VIRGINIANA, FACU)

EXISTING TREE TO REMAN

PLANTING NOTES:

1. ALL PLANTING MATERIAL TO BE NURSERY GROWN STOCK SUBJECT TO A.A.N. STANDARDS
2. THE CONTRACTOR SHALL SUPPLY ALL PLANTS IN QUANTITIES SUFFICIENT TO COMPLETE THE WORK SHOWN ON THE DRAWINGS AND LISTED IN THE PLANT LIST. IN THE EVENT OF A DISCREPANCY BETWEEN QUANTITIES SHOWN IN THE PLANT LIST AND THOSE REQUIRED BY THE DRAWINGS, THE LARGER NUMBER SHALL APPLY.
3. PRECISE LOCATION OF ITEMS NOT DIMENSIONED ON THE PLAN ARE TO BE FIELD STAKED BY THE CONTRACTOR AND SHALL BE SUBJECT TO THE REQUIREMENTS SPECIFIED IN THE PREVIOUS NOTE.
4. ALL SHRUB MASSINGS AND TREE PITS SHALL BE MULCHED TO A DEPTH OF 3" WITH SHREDDED PINE BARK MULCH.
5. TREES SHALL NOT BE STAKED UNLESS OTHERWISE NOTED.
6. THE CONTRACTOR IS RESPONSIBLE FOR ANY DAMAGED VEGETATION AND SHALL REPLACE OR REPAIR ANY DAMAGED MATERIAL, AT HIS OWN EXPENSE. THE CONTRACTOR SHALL CONTACT "CALL BEFORE YOU DIG" AT 1–800–922–4455 PRIOR TO CONSTRUCTION.
7. ALL SHRUB AND GROUNDCOVER PLANTING AREAS SHALL HAVE CONTINUOUS BEDS OF TOPSOIL 12" DEEP. ALL SOD AND HYDROSEED AREAS SHALL HAVE A MINIMUM TOPSOIL BED OF 6".
8. THE CONTRACTOR IS RESPONSIBLE FOR LOCATING ALL UTILITIES IN THE FIELD. WHERE PLANT MATERIAL MAY INTERFERE WITH UTILITIES, THE CONTRACTOR SHALL NOTIFY THE LANDSCAPE ARCHITECT TO COORDINATE THEIR INSTALLATION.
9. FOR PLANTING SOIL MIX, SEE SPECIFICATIONS OR PLANTING DETAILS.
10. ALL EXISTING RILL, GULLY OR CHANNEL EROSION SHALL BE FILLED WITH APPROPRIATE BACKFILL MATERIAL, FINE RAKED, SCARIFIED AND STABILIZED WITH APPROPRIATE VEGETATIVE MATERIAL AND / OR APPROPRIATE SEDIMENTATION AND EROSION CONTROL MEASURES.
11. ADJUSTMENTS IN THE LOCATION OF THE PROPOSED PLANT MATERIAL AS A RESULT OF EXISTING VEGETATION TO REMAIN SHALL BE APPROVED BY THE LANDSCAPE ARCHITECT PRIOR TO INSTALLATION.
12. THE CONTRACTOR IS RESPONSIBLE FOR ALL MAINTENANCE REPAIR AND REPLACEMENT OF PLANT MATERIAL, AS REQUIRED, FOR THE DURATION OF THE PROJECT AND SUBSEQUENT WARRANTY PERIOD.
13. PLANTINGS INSTALLED IN THE DRY SUMMER MONTHS AND / OR LAWN SEEDED OUT OF SPRING OR FALL PERIODS, IF ALLOWED BY OWNER, WILL REQUIRE AGGRESSIVE IRRIGATION PROGRAMS AT THE CONTRACTOR'S EXPENSE, UNLESS OTHERWISE DIRECTED BY THE OWNER.
14. UPON COMPLETION OF PLANTING, REMOVE FROM SITE ALL EXCESS SOIL, MULCH, AND MATERIALS AND DEBRIS RESULTING FROM WORK OPERATIONS. CLEAN UP SHOULD BE COMPLETED AT THE END OF EACH WORKING DAY. RESTORE TO ORIGINAL CONDITIONS ALL DAMAGED PAVEMENTS, PLANTING AREAS, STRUCTURES AND LAWN AREAS RESULTING FROM LANDSCAPING OPERATIONS.
15. CONTRACTOR SHALL SURVEY, LOCATE, AND PROTECT ALL TREES WITHIN AREAS SHOWN AS "EXISTING VEGETATION TO REMAIN" WITHIN THE DEVELOPMENT ENVELOPE FOR REVIEW BY L.A. PRIOR TO CLEARING OPERATIONS.
16. CONTRACTOR TO RESEED ALL DISTURBED AREAS.

UTILITY NOTE

THE CONTRACTOR SHALL BE RESPONSIBLE FOR NOTIFYING "DIG SAFE" AT 811 OR 888–344–7233 TO ARRANGE FOR MARKING OUT EXISTING UNDERGROUND UTILITIES AT LEAST TWO WORKING DAYS PRIOR TO EXCAVATION.

THE UNDERGROUND UTILITIES DEPICTED HEREON ARE BASED ON FIELD LOCATION OF VISIBLE FEATURES, MAPS AND PLANS OF RECORD, UTILITY MAPPING OR OTHER SOURCES OF INFORMATION. THE ENGINEER MAKES NO GUARANTEE THAT THE UNDERGROUND UTILITIES SHOWN COMPRISE ALL SUCH UTILITIES IN THE AREA, EITHER IN SERVICE OR ABANDONED. THE ENGINEER FURTHER DOES NOT WARRANT THAT THE UNDERGROUND UTILITIES SHOWN ARE IN THE EXACT LOCATION INDICATED ALTHOUGH THE ENGINEER DOES DECLARE THAT THEY ARE DEPICTED AS ACCURATELY AS POSSIBLE FROM INFORMATION AVAILABLE. THE ENGINEER HAS NOT PHYSICALLY LOCATED THE UNDERGROUND UTILITIES.

No.	DATE	DESCRIPTION	DESIGNER	REVIEWER

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HORZ.: 1" = 70'
VERT.:
DATUM:
HORZ.: NAD83
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GRAPHIC SCALE

CITY OF HAVERHILL

LANDSCAPE AND PLANTING PLAN NO. 1

LITTLE RIVER DAM REMOVAL AND RESTORATION

HAVERHILL MASSACHUSETTS

PROJ. No.: 20170390.U30
DATE: JUNE 2022

LA-101

File: J:\DWG\P20170390\U30\Civil\Plan\20170390U30_LND01.dwg Layout: 11X17-LA-101 Plotted: 2022-12-08 3:24 PM Saved: 2022-12-08 2:50 PM User: CNauman
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MATCH LINE SEE SHEET LA–103

MATCH LINE SEE SHEET LA–101

SEE RESTORATION PLANS FOR SEEDING LIMITS & SEED MIX (TYP.).

LARGE SHADE TREE (TYP.)

ORNAMENTAL TREE (TYP.)

SHRUB BED (TYP.)

MBTA RAILROAD

STEVENS STREET

LITTLE RIVER STREET

APPLE STREET

BENJAMIN STREET

CLIFF STREET

No.	DATE	DESCRIPTION	DESIGNER	REVIEWER

SCALE:
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GRAPHIC SCALE

CITY OF HAVERHILL

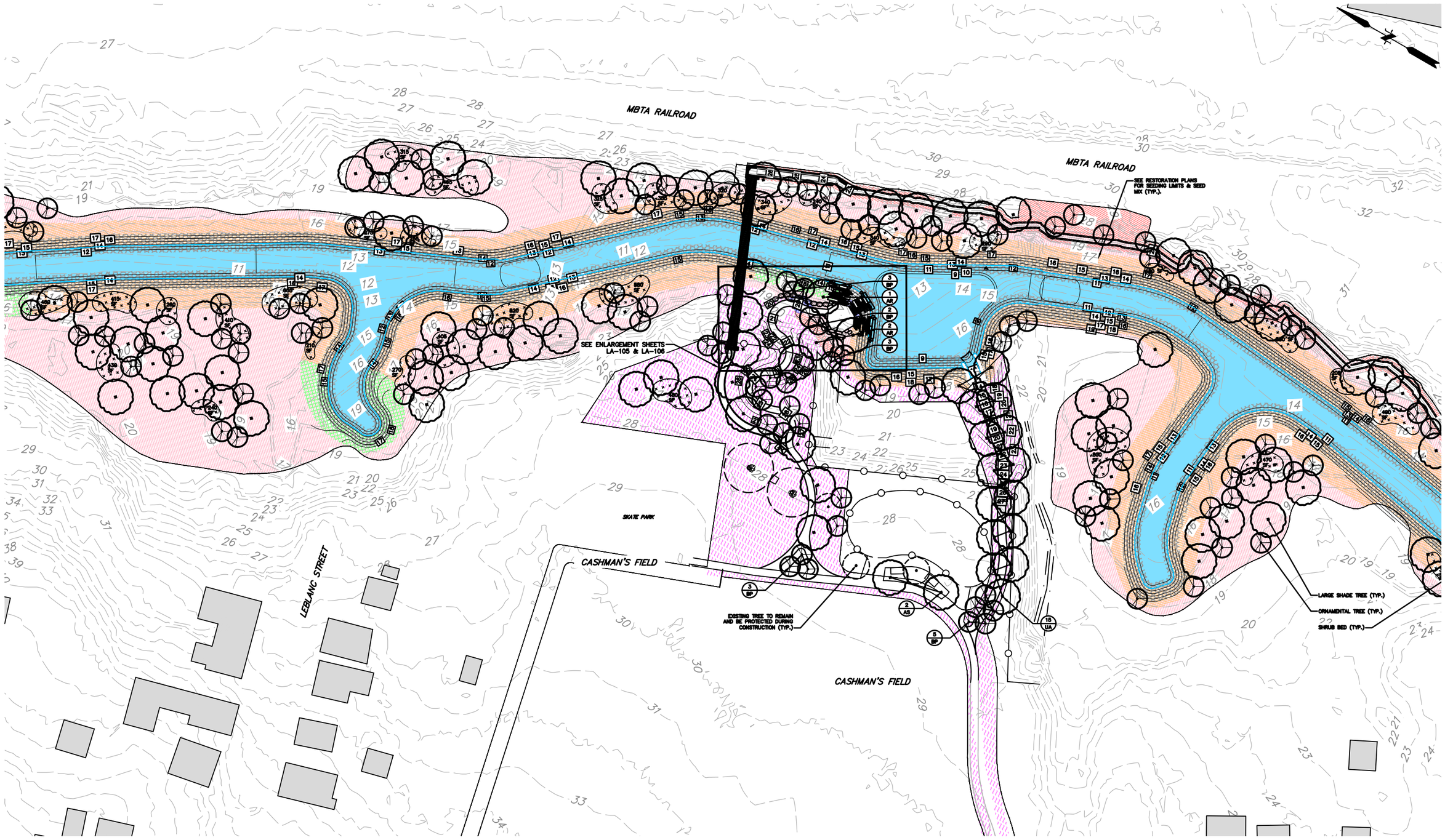
LANDSCAPE AND PLANTING PLAN NO. 2

LITTLE RIVER DAM REMOVAL AND RESTORATION

HAVERHILL MASSACHUSETTS

PROJ. No.: 20170390.U30
DATE: JUNE 2022

LA-102



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GRAPHIC SCALE

CITY OF HAVERHILL

LANDSCAPE AND PLANTING PLAN NO. 3

LITTLE RIVER DAM REMOVAL AND RESTORATION

HAVERHILL MASSACHUSETTS

PROJ. No.: 20170390.U30
DATE: JUNE 2022

LA-103

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MBTA RAILROAD

SEE RESTORATION PLANS FOR SEEDING LIMITS & SEED MIX (TYP.).

ORNAMENTAL TREE (TYP.)

LARGE SHADE TREE (TYP.)

SHRUB PLANTING BED (TYP.)

WHITTIER PLACE

MATCH LINE SEE SHEET LA-103

No.	DATE	DESCRIPTION	DESIGNER	REVIEWER

SCALE:
HORZ.: 1" = 70'
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HORZ.: NAD83
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GRAPHIC SCALE

CITY OF HAVERHILL

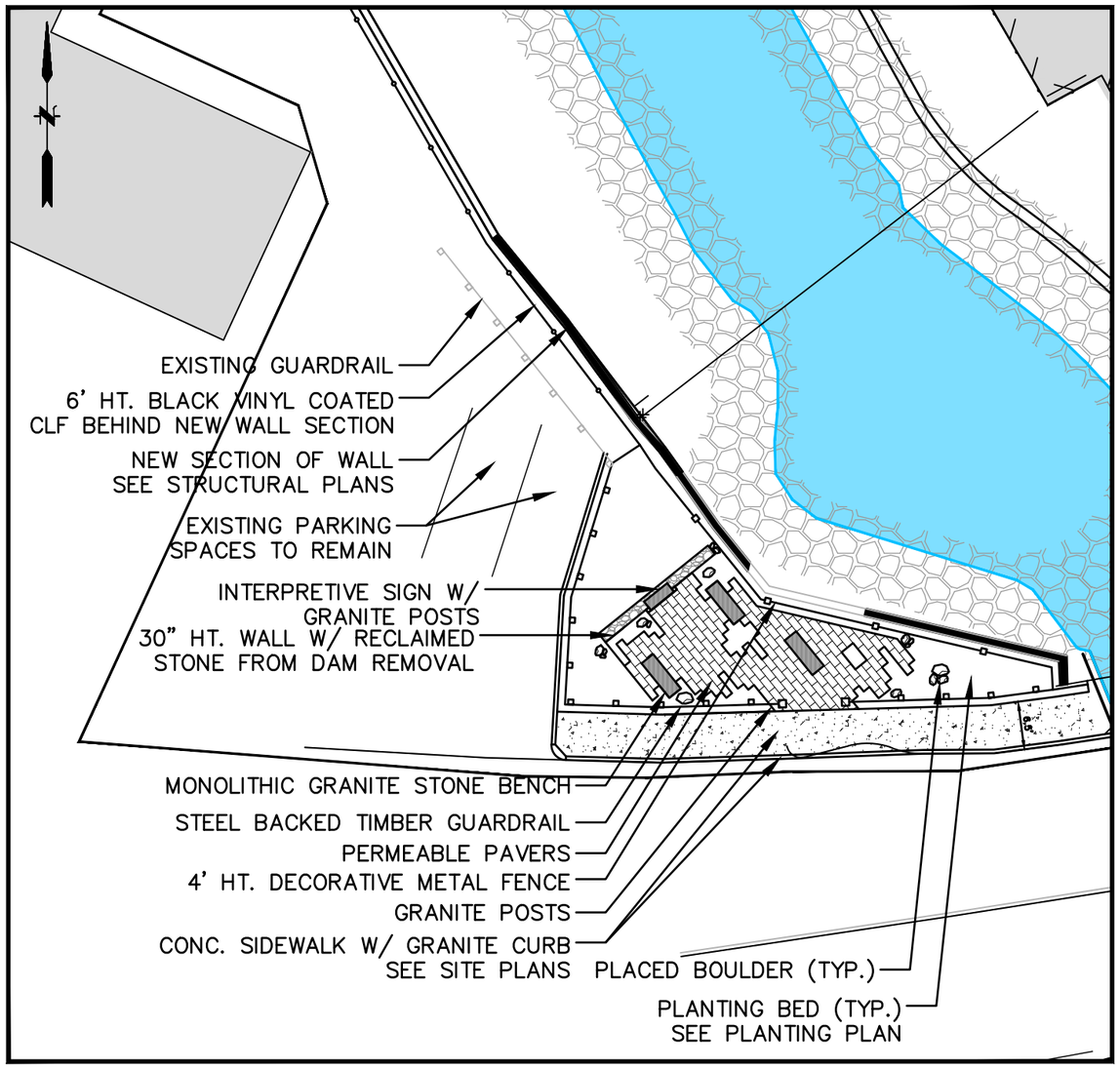
LANDSCAPE AND PLANTING PLAN NO. 4

LITTLE RIVER DAM REMOVAL AND RESTORATION

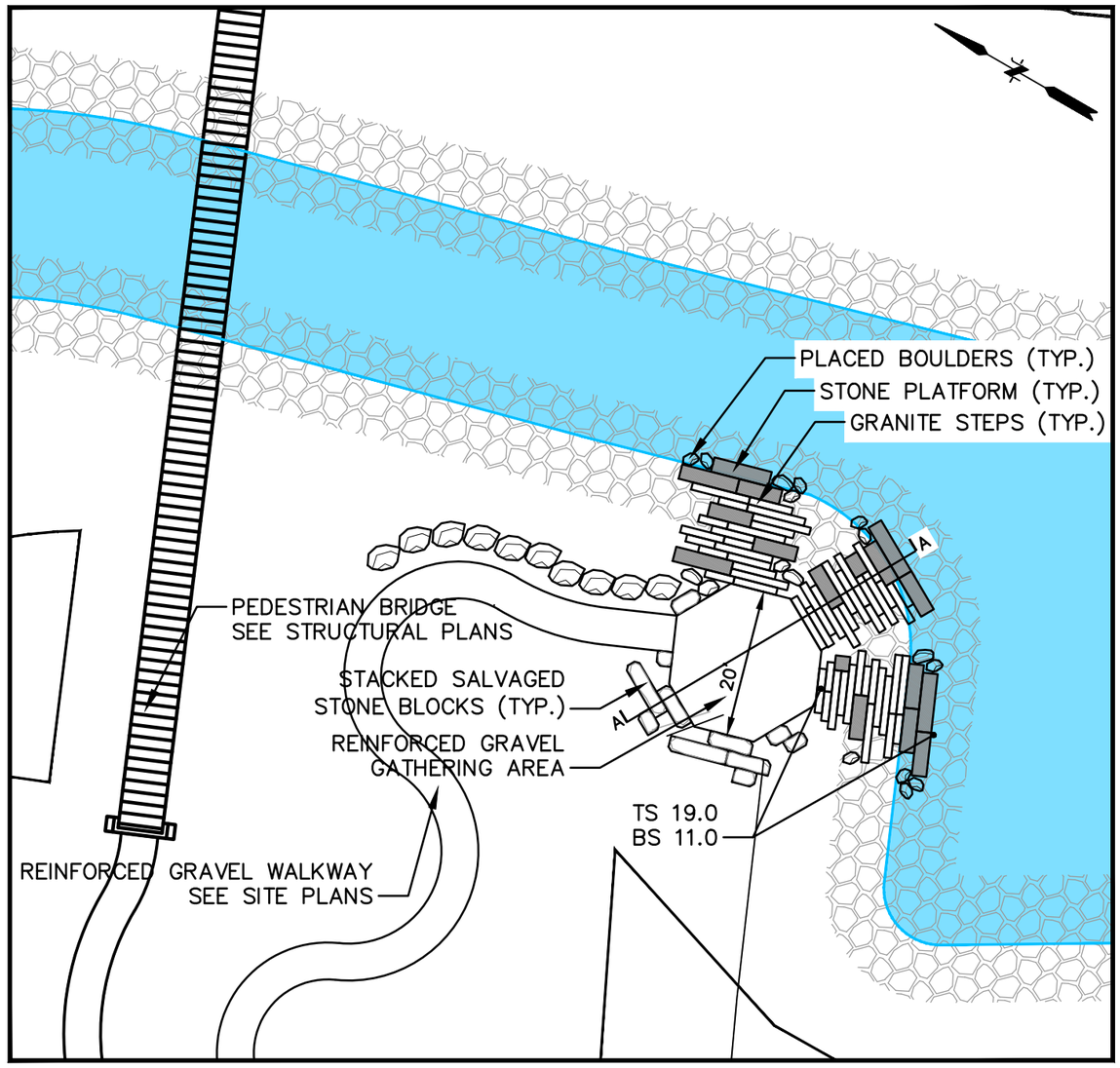
HAVERHILL MASSACHUSETTS

PROJ. No.: 20170390.U30
DATE: JUNE 2022

LA-104



1 OVERLOOK - SITE PLAN ENLARGEMENT
SCALE: 1" = 20'



2 CASHMAN'S PARK - SITE PLAN ENLARGEMENT
SCALE: 1" = 20'

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GRAPHIC SCALE

CITY OF HAVERHILL

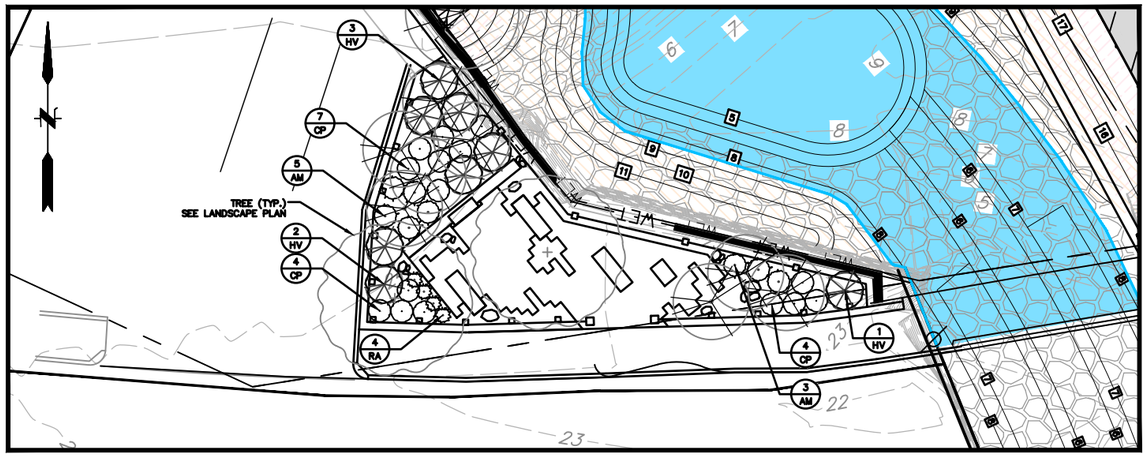
PLANTING PLAN ENLARGEMENTS

LITTLE RIVER DAM REMOVAL AND RESTORATION

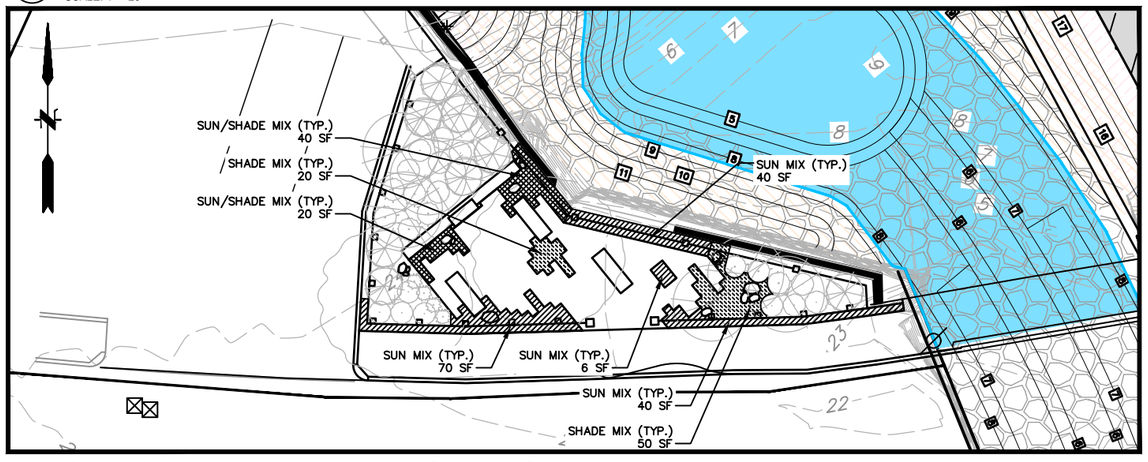
HAVERHILL MASSACHUSETTS

PROJ. No.: 20170390.U30
DATE: JUNE 2022

LA-106



1 OVERLOOK - SHRUB PLANTING ENLARGEMENT
SCALE: 1" = 20'



2 OVERLOOK - PERENNIAL PLANTING ENLARGEMENT
SCALE: 1" = 20'

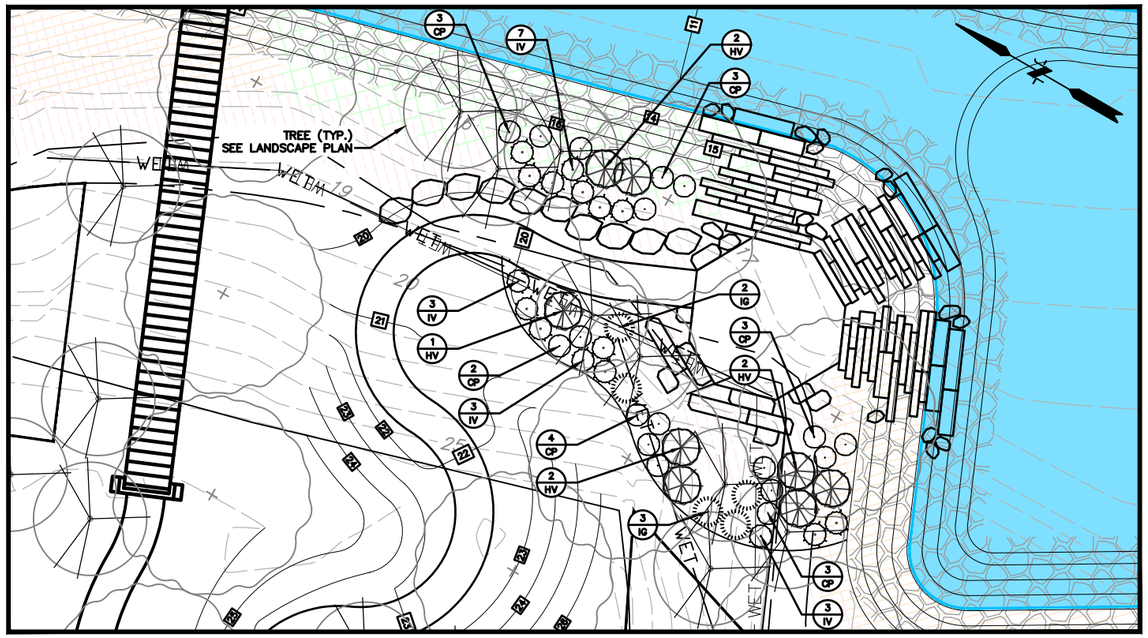
PLANT LIST

KEY	BOTANICAL NAME	COMMON NAME	QTY	SIZE
	SHRUBS			
AM	ARONIA MELANOCARPA	BLACK CHOKEBERRY	8	3 GAL.
CP	CLETHRA ALNIFOLIA	SWEET PEPPERBUSH	33	3 GAL.
HV	HAMAMELIS VIRGINIANA	WITCH HAZEL	16	5-6' HT.
IG	ILEX GLABRA	INKBERRY	5	5 GAL.
IV	ILEX VERTICILLATA 'RED SPRITE'	RED SPRITE WINTERBERRY	16	3 GAL.
RA	RHUS AROMATICA 'GRO LOW'	GRO LOW SUMAC	4	3 GAL.

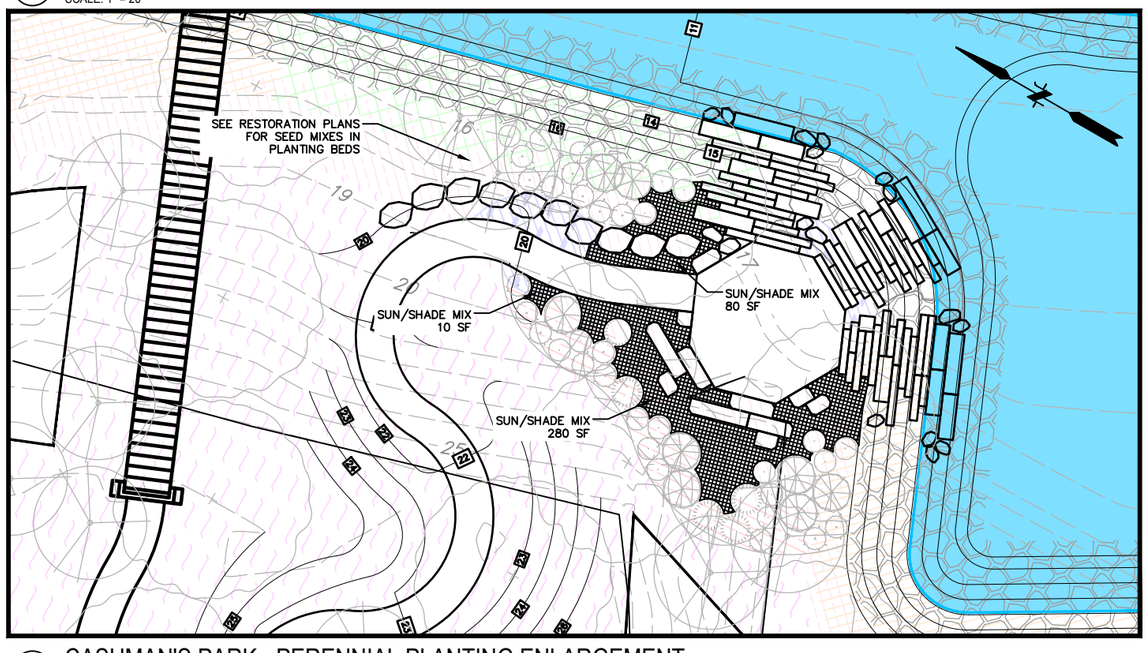
SUN MIX
PLANT THE FOLLOWING SPECIES AT 18" O.C. IN EQUAL QUANTITIES
- –CAREX ROSEA (ROSY SEDGE)
- –PANICUM VIRGATUM (SWITCHGRASS)
- –ASTER NOVAE–ANGLIAE (NEW ENGLAND ASTER)
- –ASCLEPIAS TUBEROSA (BUTTERFLY MILKWEED)

SHADE MIX
PLANT THE FOLLOWING SPECIES AT 18" O.C. IN EQUAL QUANTITIES
- –DENNSTAEDIA PUNCTILOBULA (HAY–SCENTED FERN)
- –THELYPTERIS NOVEBORACENSIS (NEW YARD FARM)
- –AQUILEGIA CANADENSIS (RED COLUMBINE)
- –CAREX ROSEA (ROSY SEDGE)

SUN/SHADE MIX
PLANT THE FOLLOWING SPECIES AT 18" O.C. IN EQUAL QUANTITIES
- –DENNSTAEDIA PUNCTILOBULA (HAY–SCENTED FERN)
- –ASTER NOVAE–ANGLIAE (NEW ENGLAND ASTER)
- –ASCLEPIAS TUBEROSA (BUTTERFLY MILKWEED)
- –CAREX ROSEA (ROSY SEDGE)



3 CASHMAN'S PARK - SHRUB PLANTING ENLARGEMENT
SCALE: 1" = 20'



4 CASHMAN'S PARK - PERENNIAL PLANTING ENLARGEMENT
SCALE: 1" = 20'

No.	DATE	DESCRIPTION	DESIGNER	REVIEWER

SCALE:
HORZ.: 1" = 20'
VERT.:
DATUM:
HORZ.: NAD83
VERT.: NAVD88
0 10 20
GRAPHIC SCALE

CITY OF HAVERHILL

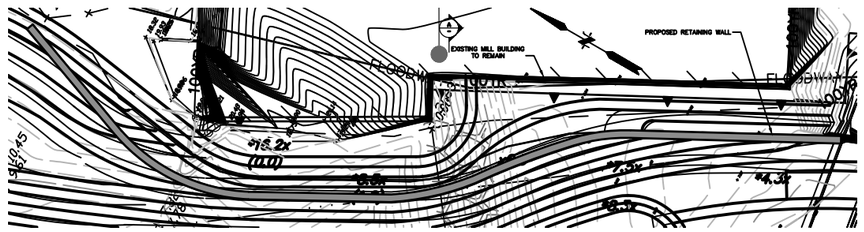
SITE PLAN ENLARGEMENTS

LITTLE RIVER DAM REMOVAL AND RESTORATION

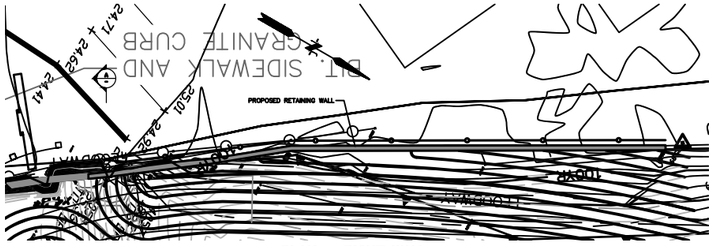
HAVERHILL MASSACHUSETTS

PROJ. No.: 20170390.U30
DATE: JUNE 2022

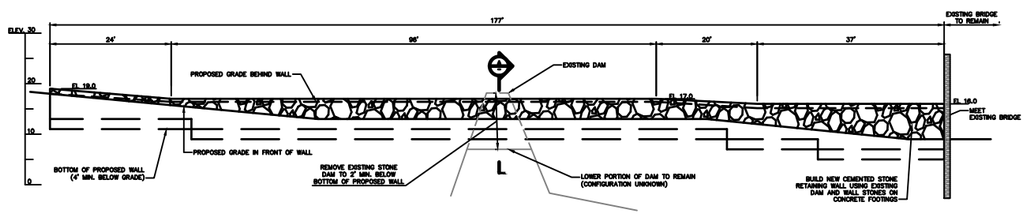
LA-105



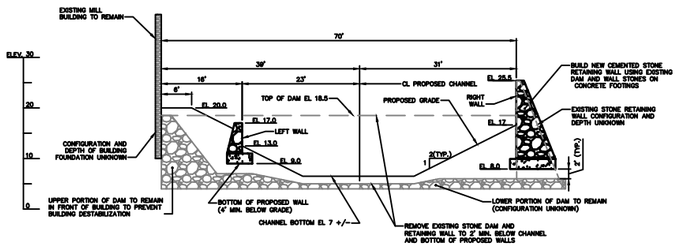
PLAN – LEFT WALL
SCALE: 1"=30'



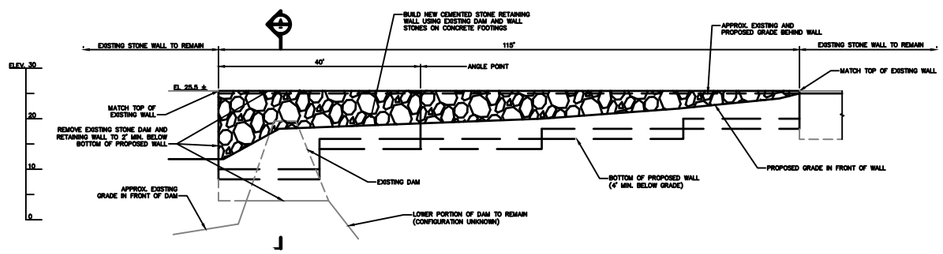
PLAN – RIGHT WALL
SCALE: 1"=30'



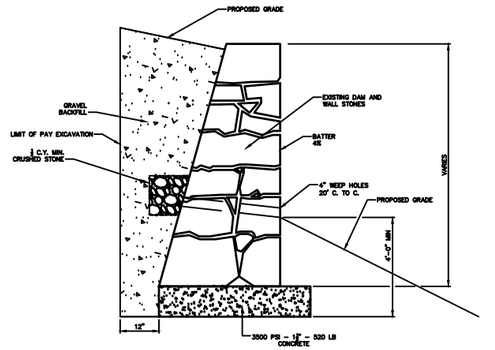
LEFT WALL ELEVATION
SCALE: 1"=30'



SECTION A – LOOKING DOWNSTREAM AT DAM
SCALE: 1"=30'



RIGHT WALL ELEVATION
SCALE: 1"=30'



TYPICAL SECTON – CEMENTED STONE MASONRY WALL
NOT TO SCALE

LAYER STATE:
MS VIEW:

No.	DATE	DESCRIPTION	DESIGNER	REVIEWER

SCALE:
HORZ.: 1" = 30'
VERT.:
DATUM:
HORZ.: NAD83
VERT.: NAVD88
0 15 30
GRAPHIC SCALE

FUSS&O'NEILL
1550 MAIN STREET, SUITE 400
SPRINGFIELD, MA 01103
413.452.0445
www.fando.com

CITY OF HAVERHILL

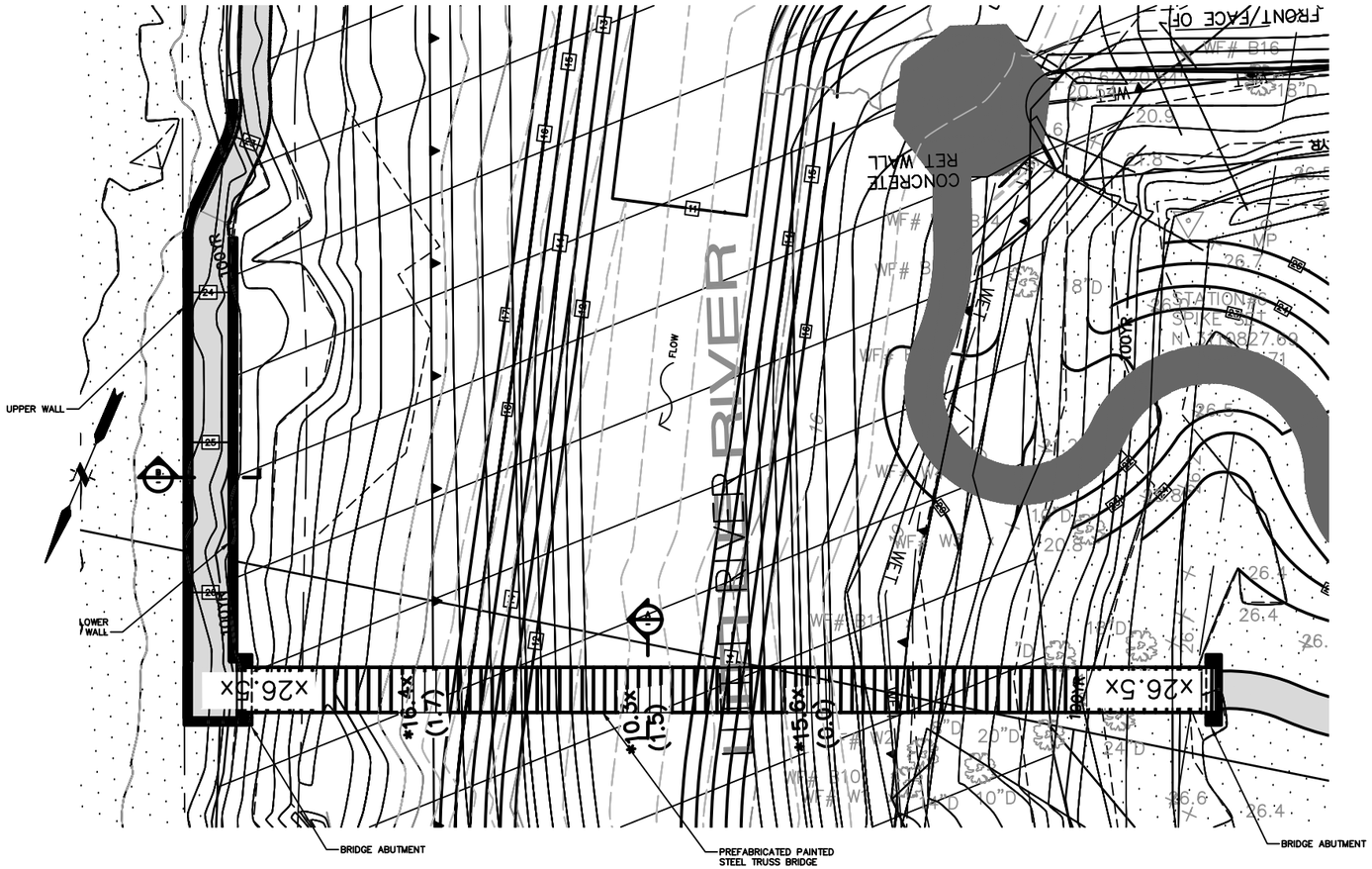
RETAINING WALL DETAILS

LITTLE RIVER DAM REMOVAL AND RESTORATION

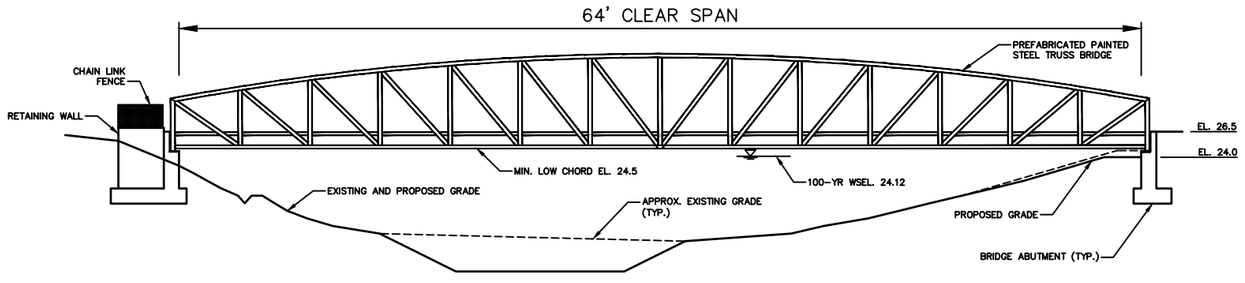
HAVERHILL MASSACHUSETTS

PROJ. No.: 20170390.U30
DATE: JUNE 2022

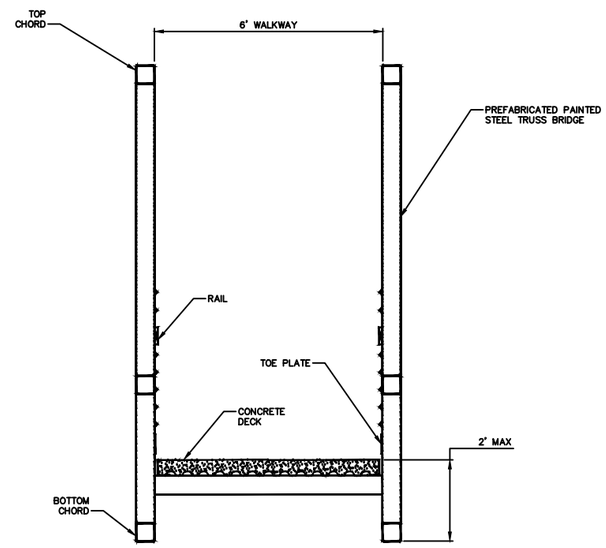
S-101



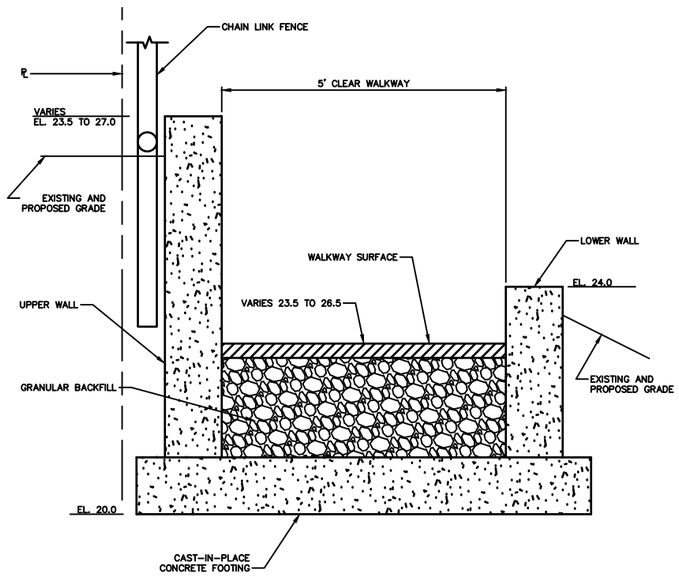
PLAN – PEDESTRIAN BRIDGE
SCALE: 1"=20'



PEDESTRIAN BRIDGE NORTH ELEVATION
SCALE: 1"=20'



SECTION A – BRIDGE SECTION
SCALE: 1"=1'-0"



SECTION B – RETAINING WALL SECTION
SCALE: 3/8"=1'-0"

No.	DATE	DESCRIPTION	DESIGNER	REVIEWER

LAYER STATE:
MS VIEW:

SCALE:
HORZ.:
VERT.:
DATUM:
HORZ.: NAD83
VERT.: NAVD88
0
GRAPHIC SCALE

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PEDESTRIAN BRIDGE DETAILS

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