TOWN OF NEWTON, MA
Department of Parks & Recreation

MARTY SENDER GREENWAY RESTORATION PHASE 2

TABLE OF CONTENTS

SECTION 00 31 32

SUBSURFACE DATA

PART I - GENERAL

1.01 SCOPE:

A. A subsurface exploration program consisting of borings has been performed, with reasonable care. The results of the exploration program, appended hereto and are a part of the Contract Documents, include the following report(s):

- Geotechnical Engineering Report, Marty Sender Greenway Phase 2, Newton, Massachusetts (See Appendix B)

B. The attached geotechnical engineering report in Appendix B is provided for informational purposes only and is not a warranty of subsurface conditions. The Contractor has no right to rely on the interpretations, opinions, conclusions, or recommendations included in the report, only the factual data relative to the specific times, locations, and depths/elevations referenced in the report. Specific project requirements, including any options selected from the geotechnical report, are referenced only in the drawings and specifications.

C. Subsurface information provided in the Contract Documents and the above report is limited by the methods used for obtaining and expressing such data and is subject to various interpretations. The terms used to describe soils, rock, groundwater and such other conditions are subject to local usage and individual interpretation.

D. Borings have been competed substantially at the locations indicated on the drawings and advanced to the depths shown on the logs. Soil information presented in the logs, as to classification, gradation, properties, density and consistency, is based on visual observation of recovered samples. Reported groundwater levels are those measured in the field at the particular location and at the time measurements were made, and do not necessarily represent permanent or variable groundwater elevations. Groundwater elevations may be affected by temperature, rainfall, and other factors that may not have been present at the time the measurements were made. The Contractors should be aware that groundwater level fluctuations may affect methods of construction.

E. Subsurface exploration data are for the general information of the Contractor. The Contractors bidding on the project are obligated to examine the site, review boring logs, all available information and records of explorations, investigations and other pertinent data for the site, and then based upon their own interpretations and investigations decide the character of material to be encountered and excavated, the suitability of the materials to be used for backfilling and such other purposes, the groundwater conditions, difficulties or obstacles likely to be encountered, and other conditions affecting the work. The subsurface data is accurate only at the locations and times the subsurface explorations were made. No

other warranty either expressed or implied by the Owner, Owner's Representative or their agents is made as to the accuracy of the subsurface information and data shown on the drawings or presented in the Contract Documents.

PART 2 – PRODUCTS

Not used.

PART 3 – EXECUTION

Not used.

END OF SECTION

SECTION 00 31 43

PERMITS

PART 1 – GENERAL

1.01 DESCRIPTION:

This Section provides specific information and defines specific requirements of the Contractor regarding the preparation and acquisition of permits required to perform the work of this project.

1.02 RELATED WORK:

A. Section 01 11 00, CONTROL OF WORK AND MATERIALS

B. Section 01 14 19.16, DUST CONTROL

C. Section 01 57 19, ENVIRONMENTAL PROTECTION

D. Section 02 41 13, SELECTIVE SITE DEMOLITION

E. Section 31 00 00, EARTHWORK

F. Section 31 23 19, DEWATERING

1.03 GENERAL REQUIREMENTS:

A. The Owner has obtained or will obtain and pay for the permits listed below, which are required for this project. The Contractor shall assist in obtaining certain permits, as indicated. The Contractor shall obtain and pay for all other permits required, as defined under the Permits subsection of the GENERAL CONDITIONS.

Permits by Owner	Status
Building Permit	*
Conservation Commission Order of Conditions and Certificate of Understanding (Ch. 131, s. 40)	(Attached)
Trench Permit (520 CMR 14.00)(eff. date 3/1/09)	*

*Contractor shall prepare permit application and obtain the permit after contract is awarded, bearing all expenses. Owner will pay for and/or waive the permit application fee, if applicable.

1.04 CONSERVATION COMMISSION ORDER:

Newton's Conservation Commission has, under the authority of Massachusetts General Laws Chapter 131, Section 40, issued an Order of Conditions on the work under this contract. A copy of these Orders are attached in Appendix A.

PART 2 – PRODUCTS - Not Used.

PART 3 – EXECUTION

3.01 PERFORM WORK IN ACCORDANCE WITH REQUIREMENTS:

A. The Contractor shall perform the work in accordance with the Contract Documents, including the attached permits/order of conditions, and any applicable municipal requirements.

B. Prior to commencing any construction activities, the Contractor shall demonstrate to the Owner and the Engineer, through on-site inspection and submitting copies of permits or approvals, that it is in full compliance with the terms and conditions of all permits specified herein. The Contractor shall maintain full compliance with all permits throughout the performance of the work, and upon request, grant access to permitting authorities to inspect the site for the purpose of verifying such compliance.

END OF SECTION

SECTION 01 11 00

CONTROL OF WORK AND MATERIALS

PART 1 – GENERAL

Not Used.

PART 2 – PRODUCTS

Not Used

PART 3 - EXECUTION

3.01 HAULING, HANDLING AND STORAGE OF MATERIALS:

A. The Contractor shall, at its own expense, handle and haul all materials furnished by it and shall remove any of its surplus materials at the completion of the work.

B. The Contractor shall provide suitable and adequate storage for equipment and materials furnished by it that are liable to injury and shall be responsible for any loss of or damage to any equipment or materials by theft, breakage, or otherwise.

C. All excavated materials and equipment to be incorporated in the Work shall be placed so as not to injure any part of the Work or existing facilities and so that free access can be had at all times to all parts of the Work and to all public utility installations in the vicinity of the work. Materials and equipment shall be kept neatly piled and compactly stored in such location as will cause a minimum of inconvenience to public travel and adjoining owners, tenants and occupants.

D. The Contractor shall be responsible for all damages to the work under construction during its progress and until final completion and acceptance even though partial payments have been made under the Contract.

3.02 OPEN EXCAVATIONS:

A. All open excavations shall be adequately safeguarded by providing temporary barricades, caution signs, lights and other means to prevent accidents to persons, and damage to property. The Contractor shall, at its own expense, provide suitable and safe means for completely covering all open excavations and for accommodating travel when work is not in progress.

B. Bridges provided for access to private property during construction shall be removed when no longer required.

C. The length of open trench will be controlled by the particular surrounding conditions but

shall always be confined to the limits prescribed by the Engineer.

D. If the excavation becomes a hazard, or if it excessively restricts traffic at any point, then special construction procedures shall be taken, such as limiting the length of trench and prohibiting stocking excavated material in the street.

E. All street excavations shall be completely closed at the end of each work day. Backfilling or use of steel plates of adequate strength to carry traffic shall be used.

3.03 MAINTENANCE OF TRAFFIC:

A. Unless permission to close the street is received in writing from the proper authority, all excavated materials and equipment shall be placed so that vehicular and pedestrian traffic may be safely maintained at all times.

B. Should the Chief of Police deem it necessary, uniformed officers will be assigned to direct traffic. The Contractor shall make all arrangements in obtaining uniformed officers required.

C. The Contractor shall at its own expense, as directed by the Police Traffic Control/Safety Officer, provide and erect acceptable barricades, barrier fences, traffic signs, and all other traffic devices not specifically covered in a bid item, to protect the work from traffic, pedestrians, and animals. The Contractor shall provide sufficient temporary lighting such as lanterns/flashers (electric battery operated) or other approved illuminated traffic signs and devices to afford adequate protection to the traveling public, at no additional cost to the Owner.

D. The Contractor shall furnish all construction signs that are deemed necessary by and in accordance with Part VI of the Manual on Uniform Traffic Control Devices as published by the U.S. Department of Transportation. In addition, the Contractor may be required to furnish up to 128 square feet of additional special construction warning signs. Size and exact wording of signs shall be determined by the Engineer during construction.

E. The intent of policing is to ensure public safety by direction of traffic. Police officers are not to serve as watchmen to protect the Contractor's equipment and materials.

F. Nothing contained herein shall be construed as relieving the Contractor of any of its responsibilities for protection of persons and property under the terms of the Contract.

3.04 CARE AND PROTECTION OF PROPERTY:

The Contractor shall be responsible for the preservation of all public and private property, and shall use every precaution necessary to prevent damage thereto. If any direct or indirect damage is done to public or private property by or on account of any act, omission, neglect, or misconduct in the execution of the work on the part of the Contractor, such property shall be promptly restored by the Contractor, at its expense, to a condition similar or equal to that existing before the damage was done, to the

satisfaction of the Engineer.

3.05 PROTECTION AND RELOCATION OF EXISTING STRUCTURES AND UTILITIES:

A. All existing buildings, utilities, pipes, poles, wires fences, curbings, property line markers and other structures which the Engineer decides must be preserved in place without being temporarily or permanently relocated, shall be carefully supported and protected from damage by the contractor. Should such property be damaged, it shall be restored by the Contractor, at no additional cost to the Owner.

B. The Contractor shall determine the location of all underground structures and utilities (including existing water services, drain lines, electrical lines, and sewers). Services to buildings shall be maintained, and all costs or charges resulting from damage thereto shall be paid by Contractor.

C. When fences interfere with the Contractor's operations, it shall remove and (unless otherwise specified) promptly restore them in accordance with Section 01 14 19.19 EXISTING FENCES.

D. On paved surfaces the Contractor shall not use or operate tractors, bulldozers, or other power-operated equipment with treads or wheels which are shaped so as to cut or otherwise damage such surfaces.

E. All property damaged by the Contractor's operations shall be restored to a condition at least equal to that in which it was found immediately before work was begun. Suitable materials and methods shall be used for such restoration.

F. Restoration of existing property and structures shall be carried out as promptly as practicable and shall not be left until the end of the construction period.

3.06 MAINTENANCE OF FLOW:

A. The Contractor shall at its own cost, provide for the flow of sewers and drains interrupted during the progress of the work, and shall immediately cart away and dispose of all offensive matter. The entire procedure of maintaining existing flow shall be fully discussed with the Engineer well in advance of the interruption of any flow.

B. All existing drainage facilities including, but not limited to; brooks, streams, canals, channels, ditches, culverts, catch basins and drainage piping shall be adequately safeguarded so as not to impede drainage or to cause siltation of downstream areas in any manner whatsoever. If the Contractor damages or impairs any of the aforesaid drainage facilities, it shall repair the same within the same day.

C. At the conclusion of the work, the Contractor shall remove all silt in drainage structures caused by its operations as described in Section 01 74 13, CLEANING UP.

3.07 REJECTED MATERIALS AND DEFECTIVE WORK:

A. Materials furnished by the Contractor and condemned by the Engineer as unsuitable or not in conformity with the specifications shall forthwith be removed from the work by the Contractor, and shall not be made use of elsewhere in the work.

B. Any errors, defects or omissions in the execution of the work or in the materials furnished by the Contractor, even though they may have been passed or overlooked or have appeared after the completion of the work, discovered at any time before the final payment is made hereunder, shall be forthwith rectified and made good by and at the expense of the Contractor and in a manner satisfactory to the Engineer.

C. The Contractor shall reimburse the Owner for any expense, losses or damages incurred in consequence of any defect, error, omission or act of the Contractor or his employees, as determined by the Engineer, occurring previous to the final payment.

3.08 SANITARY REGULATIONS:

Sanitary conveniences for the use of all persons employed on the work, properly screened from public observation, shall be provided in sufficient numbers in such manner and at such locations as may be approved. The contents shall be removed and disposed of in a satisfactory manner as the occasion requires. The Contractor shall rigorously prohibit the committing of nuisances within, on or about the work. Any employees found violating these provisions shall be discharged and not again employed on the work without the written consent of the Engineer. The sanitary conveniences specified above shall be the obligation and responsibility of the Contractor.

3.09 SAFETY AND HEALTH REGULATIONS:

This project is subject to the Safety and Health regulations of the U.S. Department of Labor set forth in 29 CFR, Part 1926, and to the Massachusetts Department of Labor and Industries, Division of Industrial Safety "Rules and Regulations for the Prevention of Accidents in Construction Operations (454 CMR 10.0 et. seq.)." The Contractor shall be familiar with the requirements of these regulations.

3.10 SITE INVESTIGATION:

The Contractor acknowledges that it has satisfied itself as to the conditions existing at the site of the work, the type of equipment required to perform this work, the quality and quantity of the materials furnished insofar as this information is reasonably ascertainable from an inspection of the site, as well as from information presented by the drawings and specifications made a part of this contract. Any failure of the Contractor to acquaint itself with available information will not relieve it from the responsibility for estimating properly the difficulty or cost of successfully performing the work. The Owner assumes no responsibility for any conclusion or interpretation made by the Contractor on the basis of the information made available by the Owner.

3.11 WEATHER PROTECTION:

In conformance with Sections 44F and 44G of Chapter 149 of the General Laws of Massachusetts, the General Contractor shall install weather protection and shall furnish adequate heat in the area so protected during the months of November through March. Standards for such specifications shall be established by the Director of Building Construction in the Executive Office for Administration and Finance.

3.12 HAZARDOUS WASTE:

Should the Contractor, while performing work under this contract, uncover hazardous materials, as defined in Massachusetts Hazardous Waste Regulations 310 CMR 30.00, he shall immediately notify the Engineer. The Contractor is not, and has no authority to act as, a handler, generator, operator or disposer of hazardous or toxic substances found or identified at the site, and the Owner shall undertake all such functions.

END OF SECTION

SECTION 01 12 16

SCOPE AND SEQUENCE OF WORK

PART 1 – GENERAL

1.01 WORK INCLUDED:

A. The scope of Marty Sender Greenway Phase 2 project includes the installation of pathway, curbing and boardwalk, at Lyons Park, located at 104 W Pine Street, Newton, MA. The specific improvements contained within the Construction Documents are as follows:

a. Site demolition, and preparation including but not limited to gravel path, fencing, and paving.
b. Installation of stone dust surfacing, curbing, boardwalk.
c. Installation of bollards.
d. Planting and plant protection fencing.
e. Loaming and seeding disturbed areas.
f. Other minor site restoration that may be associated with the items above.

1.02 RELATED WORK:

A. SECTION 01 11 00 – CONTROL OF WORK AND MATERIALS

PART 2 - PRODUCTS (NOT APPLICABLE)

PART 3 - EXECUTION

3.01 GENERAL:

A. The Contractor shall be responsible for scheduling its activities and the activities of any subcontractors involved, to meet the completion date, or milestones, established for the contract. Scheduling of the work shall be coordinated with the Owner and Engineer.

B. The Construction Sequence Requirements shall be used by the Contractor to form a complete schedule for the project, which shall be coordinated with the Owner and Engineer. Prior to performing any work at the site, the Contractor shall submit a detailed plan to the Engineer for review. The plan shall describe the proposed sequence, methods, and timing of the work.

END OF SECTION

SECTION 01 14 00

SPECIAL PROVISIONS

PART 1 - GENERAL

Not used

PART 2 - PRODUCTS

Not used

PART 3 - EXECUTION

3.01 WATER FOR CONSTRUCTION PURPOSES:

A. In locations where water is in sufficient supply, the Contractor may be allowed to use water without charge for jetting backfill and other construction purposes. The express approval of the Owner shall be obtained before water is used. Waste of water by the Contractor shall be sufficient cause for withdrawing the privilege of unrestricted use.

B. If no water is available, the Contractor shall supply water at no additional cost to the Owner.

3.02 DIMENSIONS OF EXISTING STRUCTURES:

Where the dimensions and locations of existing structures are of critical importance in the installation or connections of new work, the Contractor shall verify such dimensions and locations in the field before the fabrication of any material or equipment that is dependent on the correctness of such information.

3.03 OCCUPYING PRIVATE PROPERTY:

The Contractor shall not enter upon nor occupy with workers, equipment or materials any property outside of the Owner's easements, except with the written consent of the property owner or property owner's agent.

3.04 EXISTING UTILITY LOCATIONS – CONTRACTOR'S RESPONSIBILITY:

A. The location of existing underground services and utilities shown on the drawings is based on available records. It is not warranted that all existing utilities and services are shown, or that shown locations are correct. The Contractor shall be responsible for having the utility companies locate their respective utilities on the ground prior to excavating.

B. To satisfy the requirements of **Massachusetts law, Chapter 82, Section 40**, the Contractor shall, at least 72 hours, exclusive of Saturdays, Sundays and holidays, prior

to excavation in the proximity of telephone, gas, cable television and electric utilities, notify the utilities concerned by calling "DIG SAFE" at telephone number: 1-888-344-7233.

C. The Contractor shall coordinate all work involving utilities and shall satisfy itself as to the existing conditions of the areas in which it is to perform his work. It shall conduct and arrange its work so as not to impede or interfere with the work of other contractors working in the same or adjacent areas.

3.05 COORDINATION OF WORK:

The General Contractor shall be responsible for coordinating its own work as well as that of any subcontractors. It shall be responsible for notification of the Engineer when each phase of work is expected to begin and the approximate completion date.

3.06 TIME FOR COMPLETION OF CONTRACT:

The time for completion of this contract is stipulated in the Form of/for General Bid. The Bidder shall base his bid on completing the proposed work by the completion date stipulated in the BID FORM.

3.07 MAINTENANCE OF TRENCH SURFACE:

After backfilling and compacting the trenches, the Contractor shall be responsible for keeping the ground surface dry and passable at all times until the surface has been restored to its finished conditions.

3.08 DESIGN OF MATERIALS / FURNISHINGS:

Attention is directed to the fact that the layout of certain materials and site furnishings is based on that of one manufacturer. If other items are submitted for approval, the Contractor shall prepare and submit for approval at its expense, detailed structural or other drawings, equipment lists, maintenance requirements, and any other data required by the Engineer, showing all necessary changes and embodying all special features of the equipment he proposes to furnish. Such changes, if approved, shall be made at the expense of the Contractor

3.09 SERVICES OF MANUFACTURER'S REPRESENTATIVE:

A. The Contractor shall arrange for a qualified service representative, at a time suitable to the Engineer, from the company manufacturing or supplying certain equipment as indicated on the detailed specifications, to perform the duties described herein.

3.10 WETLANDS PROTECTION SIGN:

A sign not less than two square feet in size shall be displayed at the site. The sign shall bear the words "Massachusetts Department of Environmental Protection, Wetland Division, File Number 239-0947."

3.11 PROJECT SIGN:

A. Artwork for a project sign shall be provided by the City at contract award. The sign shall be erected within ten (10) days after the construction contract is awarded. The sign shall be sized 8 feet by 4 feet, white 18oz exterior grade vinyl with finished edges. Metal grommets shall be included in each corner. The sign shall be fabricated, erected, and maintained by the Contractor.

B. The Contractor shall provide adequate support for the sign as determined by the Engineer. All supports, trim, and back of sign shall be painted with at least two coats of exterior paint.

C. The project sign shall be maintained by the Contractor in good condition at all times for the duration of construction. The Contractor shall remove the sign upon completion of construction.

3.13 COMPLIANCE WITH PERMITS:

A. The Contractor shall perform all work in conformance with requirements of the Permits, which appear in Section 00 31 43 – PERMITS.

3.14 CUTTING, FITTING AND PATCHING:

A. The Contractor shall do all cutting, fitting, or patching of its work that may be required to make its several parts come together properly and fit it to receive or be received by work of other Contractors, as shown upon or reasonably implied by the drawings and the specifications for the completed structure, including all existing work.

B. The Contractor shall not endanger any work by cutting, digging, or otherwise and shall not cut or alter the work of any other Contractor, save with the consent of the Engineer.

C. All holes or openings required to be made in new or existing work, particularly at pipe, conduit, or other penetrations not covered by escutcheons or plates shall be neatly patched. All such holes shall be made completely watertight as approved by the Engineer.

D. Size and locations of holes required in steel, concrete, or other structural or finish materials for piping, wiring, ducts, etc., which have not been located and detailed on the

drawings shall be approved by the Engineer prior to layout and cutting thereof. All holes shall be suitably reinforced as required by the Engineer.

E. Workmanship and materials of patching and repair work shall match the adjacent similar work and shall conform to the applicable sections of the specification. Patches and joints with existing work shall provide, as applicable in each case, visual, structural, and waterproofing continuity.

3.15 CONNECTIONS TO EXISTING WATER SYSTEMS:

A. The Owner will, upon **72-hour** notice from the Contractor, assist the Contractor by locating and opening or closing any and all valves required for draining or admitting water to the various sections of the water main as required to perform the proposed work. No damages shall be claimed by the Contractor for delays in dewatering pipelines nor shall any damages be claimed because of water leaking through closed valves after dewatering is completed.

B. Connections to the existing distribution system shall be made with the mains under pressure unless the lines can be temporarily taken out of service as approved by the Owner.

C. The Contractor will be required to make test excavations to ascertain that the proposed position of the connections will be clear of joints, fittings, or other obstructions.

D. If any failure occurs in connection to existing mains, service shall be restored in the shortest possible time, the Contractor working around the clock, if necessary. The Contractor shall cooperate with the Owner in notifying the consumers or supplying emergency water. If required by Owner, the Contractor shall make connections to water mains during night hours, on Sunday or at other times of off-peak demand for water.

3.16 PROTECTION OF AQUIFER:

The Contractor's attention is directed to the fact that the construction area is located within the watershed of the existing water supply. The Contractor shall take extra precautions to ensure that no pollutants enter the groundwater table from the construction area. The Contractor shall not store fuels or other hazardous materials or potential contaminants on the construction site. In the event of a spill, the Contractor shall immediately notify the Engineer.

3.17 CONTRACTOR'S REPRESENTATIVE:

The Contractor shall designate a representative who will be available to respond to emergency calls by the Owner at any time day and night and on weekends and holidays should such a situation arise.

3.18 HOURS OF CONSTRUCTION ACTIVITY:

A. The Contractor shall conduct all construction activity between 7:00 a.m. and 5:00 p.m., Monday through Friday. No construction work shall be allowed on Saturdays, Sundays or Holidays without written authorization from the Owner.

B. The Owner will provide personnel for assistance in locating and operating valves at no cost to the Contractor during the Owner's normal working hours **(Monday through Friday 7:00 a.m. to 3:00 p.m.)**. When this assistance is required by the Contractor outside of the Owner's normal working hours the cost will be incurred by the Contractor at the prevailing overtime rate of pay for the personnel providing the assistance. The Owner will bill the Contractor directly.

3.19 CONSTRUCTION CREWS:

The Contractor shall not increase the number of construction crews assigned to the work without providing one-week advance notice to the Engineer.

3.20 NOISE CONTROL

The contractor shall comply with all City of Newton Noise ordinances (City of Newton Ordinance Sec. 20-13 Art II - NOISE) to the greatest extent possible. Should equipment required for the work exceed the allowable decibel levels, the city (Owner) shall issue a noise waiver.

3.21 MASSACHUSETTS DATA SECURITY REGULATIONS:

The Contractor is required to comply with data security regulations contained in 201 CMR 17.00 that have been established to safeguard personal information of Massachusetts residents contained in paper or electronic records. The Contractor shall not submit to the Engineer or Owner documents in paper or electronic form that contain personal information (person's name combined with one or more of the following – Social Security Number, driver's license number or state-issued identification card number, financial institution account number, or credit or debit card number). Any document submitted to the Engineer that violates this provision shall be returned to the Contractor and the Contractor shall remove personal information from the document prior to resubmitting it to the Engineer. The Contractor shall require each Subcontractor to also comply with the MA data security regulations insofar as they involve submittal of personal information to the Engineer and Owner.

END OF SECTION

SECTION 01 14 19.16

DUST CONTROL

PART 1 - GENERAL

1.01 DESCRIPTION:

This section of the specification covers the control of dust via calcium chloride and water, complete.

PART 2 - PRODUCTS

2.01 CALCIUM CHLORIDE:

A. Calcium chloride shall conform to the requirements of AASHTO-M 144, Type I or Type II and Specification for Calcium Chloride, ASTM D98. The calcium chloride shall be packaged in moisture proof bags or in airtight drums with the manufacturer, name of product, net weight, and percentage of calcium chloride guaranteed by the manufacturer legibly marked on each container.

B. Calcium chloride failing to meet the requirements of the aforementioned specifications or that which has become caked or sticky in shipment, may be rejected by the Engineer.

2.02 WATER:

A. Water shall not be brackish and shall be free from oil, acid, and injurious alkali or vegetable matter.

PART 3 - EXECUTION

3.01 APPLICATION:

A. Calcium chloride shall be applied when ordered by the Engineer and only in areas which will not be adversely affected by the application. See Section 01 57 19, ENVIRONMENTAL PROTECTION.

B. Calcium chloride shall be uniformly applied at the rate of 1-1/2 pounds per square yard or at any other rate as required by the Engineer. Application shall be by means of a mechanical spreader, or other approved methods. The number and frequency of applications shall be determined by the Engineer.

C. Water may be sprinkler applied with equipment including a tank with gauge-equipped pressure pump and a nozzle-equipped spray bar.

D. Water shall be dispersed through the nozzle under a minimum pressure of 20 pounds per square inch, gauge pressure.

END OF SECTION

SECTION 01 31 19.23

CONSTRUCTION MEETINGS

PART 1 - GENERAL

1.01 DESCRIPTION:

A. This Section specifies requirements for project meetings including but not limited to Pre-Construction Conference and Progress Meetings.

B. It shall be the responsibility of the Contractor to coordinate work between all subcontractors, sections, and trades required for the proper completion of the Work.

1.02 PRE-CONSTRUCTION CONFERENCE:

A. After the bids have been opened but prior to the start of the construction there will be a pre-construction conference to discuss the phasing and scheduling of the Project. The specific time and place of the conference shall be arranged by the Engineer after the Contract has been awarded.

B. This pre-construction conference is intended to establish lines of communication between the parties involved, review responsibilities and personnel assignments, establish project schedules, discuss proposed performance methods, and coordinate Work to be performed by subcontractors.

C. Authorized representatives of the Owner, Engineer and their consultants, the Contractor, its Superintendent and Site Foreman, and all others invited by the Contractor, shall attend the pre-construction conference. All participants at the conference shall be familiar with the Project and authorized to conclude matters relating to the Work.

D. Discuss items of significance at the pre-construction conference that could affect progress including at least the following:

1. Tentative construction schedule
2. Critical Work sequencing
3. Designation of responsible personnel
4. Procedures for processing field decisions and Change Orders
5. Procedures for processing Applications for Payment
6. Review of Davis Bacon and other federal requirements

7. Distribution of Contract Documents
8. Submittal of Shop Drawings, Product Data and Samples
9. Preparation of record documents
10. Use of the premises
11. Office, work and storage, and laydown areas
12. Equipment deliveries
13. Construction safety procedures
14. Environmental health and safety procedures
15. First aid
16. Security
17. Housekeeping
18. Working hours
19. Traffic Control
20. Emergency Vehicle Access to and around work site
21. Environmental protection measures for construction site

1.03 PROGRESS MEETINGS:

A. During the course of the Project, the Contractor shall attend weekly progress meetings as scheduled by the Owner. The Owner, based on work progress and activities, may adjust the progress meetings to biweekly or other. The attendance of subcontractors may be required during the progress of the Work. The Contractor's delegate to the meeting shall be prepared and authorized to discuss the following items:

1. Progress of Work/Critical Work Sequencing in relation to Contract Schedule.
2. Proposed Work activities for forthcoming period.
3. Resources committed to Contract.
4. Coordination of Work with others.
5. Status of procurement of equipment and materials.
6. Status of Submittals.
7. Outstanding actions, decisions, or approvals that affect Work activities.
8. Site access and/or security issues
9. Hazards and risks
10. Housekeeping
11. Quality issues
12. Potential Claims
13. Change Orders
14. Costs, budget, and payment requests

B. The Contractor shall revise the construction schedule after each progress meeting where revisions to the schedule have been made or recognized and the revised schedule shall be submitted to the Engineer.

PART 2 - PRODUCTS

Not used.

PART 3 – EXECUTION

Not used.

END OF SECTION

SECTION 01 32 16

CONSTRUCTION SCHEDULING

PART 1- GENERAL

1.01 PROGRAM DESCRIPTION:

A. A Critical Path Method (CPM) construction schedule shall be used to control the work of this Contract and to provide a definitive basis for determining job progress. The Contractor shall prepare the construction schedule. All work shall be done in accordance with the established CPM schedule and the Contractor and his subcontractors shall be responsible for cooperating fully with the Owner's Representative and the Owner in effectively utilizing the CPM schedule.

B. The CPM schedule to be prepared and submitted by the Contractor shall consist of a CPM network (diagram of activities) and a computer-generated schedule (print-out) as specified herein. The format shall be the activity-on-node precedence network.

C. The Contractor shall develop his own outline of the work and prepare his proposed CPM schedule. The computer-based schedule shall be the product of a recognized commercial computer software producer and shall meet all of the requirements defined herein.

1.02 QUALIFICATIONS:

A. The Contractor shall have the capability of preparing and utilizing the specified CPM scheduling technique. A statement of CPM capability shall be submitted by the Contractor in writing to the Owner's Representative within 10 days after the issuance of the Notice to Proceed to verify that either the Contractor's organization has in-house capability qualified to use the technique or that the Contractor employs a consultant who is so qualified. Capability shall be verified by description of the construction projects to which the Contractor or his consultant has successfully applied the CPM scheduling technique and which were controlled throughout the duration of the project by means of systematic use and updating of a computer-based CPM schedule. The submittal shall include the name of the individual on the Contractor's staff who will be responsible for the CPM schedule and for providing the required updating information.

1.03 SUBMITTALS:

A. Submit under provisions of Section 01 33 23.

B. Within 10 days following the issuance of the Notice to Proceed, the Contractor shall submit the CPM Schedule to the Owner's Representative for review and acceptance. The Contractor shall submit to the Owner's Representative a preliminary network defining the planned operations during the first 60 calendar days after the issuance of the Notice to Proceed. The Contractor's general approach for the balance of the project

shall be indicated. Cost of activities expected to be completed or partially completed before submission and approval of the complete network shall be included.

1.04 APPROVED CPM SCHEDULE:

A. Following review by the Owner's Representative, the Contractor shall incorporate the Owner's Representative's comments into the network and submit the revised network and computer-generated schedule. This final submittal shall be delivered to the Owner's Representative within 60 days after the issuance of the Notice to Proceed.

B. CPM schedules, which contain activities showing negative, float or which extend beyond the contract completion date in the computer-generated schedule will not be approved.

C. The approved network shall then be the approved CPM schedule to be used by the Contractor for planning, organizing and directing the work, and reporting progress.

D. Approval of the CPM activity network by the Owner's Representative is advisory only and shall not relieve the Contractor of responsibility for accomplishing the work within the contract completion date. Omissions and errors in the approved CPM schedule shall not excuse performance less than that required by the Contract. Approval by the Owner's Representative in no way makes the Owner's Representative an insurer of the CPM schedule's success or liable for time or cost overruns flowing from its shortcomings. The Owner hereby disclaims any obligation or liability by reason of approval by its agent, the Owner's Representative, of the CPM schedule.

E. The CPM activity network shall be submitted on a sheets sized 24-in by 36-in and may be divided into as many separate sheets as required. An electronic file in PDF format shall be submitted.

PART 2 – PRODUCTS

NOT USED

PART 3 – EXECUTION

3.01 NETWORK REQUIREMENTS:

A. The network shall show the order and inter-dependence of activities and the sequence in which the work is to be accomplished as planned by the Contractor. The basic concept of a network analysis diagram shall be followed to show how the start of a given activity is dependent on the completion of preceding activities and its completion restricts the start of following activities.

B. Detailed network activities shall include: construction activities, the submittal and approval of shop drawings, the procurement of materials and equipment, fabrication of materials and equipment and their delivery, installation and testing, start-up and

training. The Contractor shall break the work into activities with durations no longer than twenty working days each, except as to non-construction activities (such as procurement of materials and delivery of equipment) and any other activities for which the Owner's Representative may approve the showing of longer duration. To the extent feasible, **activities related** to a specific physical area of the work should be grouped on the network for ease of understanding and simplification.

C. Separate activities shall be provided for each significant identifiable function in each trade area in each facility. Activities shall be so identified that there will be no reasonable doubt as to how much work remains on each. Specific activities which shall be included are: all subcontract work, all interface work between subcontractors and between the Contractor and subcontractors, leakage tests of pipelines, electrical connections to each item of equipment, supplier and manufacturer technical assistance, mechanical connections to each item of equipment, all tests, concrete finishing, each item of site work, (including restraints on other activities) and all utilities, fuels and chemicals.

D. Each activity on the network shall have the following indicated on the NODE representing it.

1. A single duration (i.e., the single best estimate of elapsed time considering the scope of the work involved in the activity and the resources planned for accomplishing the activity) expressed in working days.

2. A five character (or less) code indicative of the party responsible for accomplishing the activity.

3. A cost estimate for each activity which, when accumulated with the cost of all activities, equals the total contract cost. Estimated overhead and profit shall be prorated throughout all activities. Materials costs shall be assigned to delivery activities.

4. A brief description of the activity.

E. The selection and number of activities shall be subject to the Owner's Representative's approval. The detailed network need not be time scaled but shall be drafted to show a continuous flow from left to right with no flow from right to left. In addition to the brief description, the Contractor shall submit a separate list of all activities containing a detailed narrative of the scope of each activity, including the trades, subcontractors involved, and number of man-hours estimated.

F. To the extent that the network or any revision thereof shows anything not jointly agreed upon or fails to show anything jointly agreed upon, it shall not be deemed to have been approved by the Owner's Representative. Failure to include on a network any element of work required for the performance of this Contract shall not excuse the Contractor from completing all work required within any applicable completion date, notwithstanding the review of the network by the Owner's Representative.

G. Except where earlier completions are specified, CPM schedules, which show completion of all work prior to the contract completion date, may be approved by the Owner's Representative but in no event shall they be acceptable as a basis for claim for delay against the Owner by the Contractor.

3.02 COMPUTER-GENERATED SCHEDULE REQUIREMENTS:

A. Each computer-generated schedule submittal from the CPM activity network shall include the following tabulations: a list of activities in numerical order, a list of activity precedence's, a schedule sequenced by Early Start Date and a schedule sequenced by Total Float. Each schedule shall include the following minimum items:

1. Activity numbers

2. Estimated duration

3. Activity description

4. Early start date (calendar dated)

5. Early finish date (calendar dated)

6. Latest allowable start date (calendar dated)

7. Latest allowable finish date (calendar dated)

8. Status (whether critical)

9. Estimated cost of the activity

10. Total float and free float

B. In addition, each schedule shall be prefaced with the following summary data:

1. Contract name and number

2. Contractor's Name

3. Contract duration

4. Contract schedule

5. The effective or starting date of the schedule.

C. The workday to calendar date correlation shall be based on an 8-hour day and 40-hour week with adequate allowance for holidays, adverse weather and all other special requirements of the work.

3.03 PROGRESS REPORTING:

A. Progress under the approved CPM schedule shall be evaluated monthly by the Contractor. Not less than seven days prior to each monthly progress meeting, The Contractor shall evaluate the status of each activity on which work has started or is due to start, based on the preceding CPM schedule; to **show actual progress,** to identify those activities started and those completed during the previous period, to show the estimated time required to complete or the percent complete of each activity started but not yet completed and to reflect any changes indicated for the network. Activities shall not be considered complete until they are, in fact, 100 percent complete.

B. At each progress meeting the Contractor shall submit a narrative report based on the CPM schedule evaluation described above, in a format agreed upon by the Contractor and the Owner's Representative. The report shall include a description of the progress during the previous period in terms of completed activities, an explanation of each activity which is showing a delay, a description of problem areas, current and anticipated delaying factors and their estimated impact on performance of other activities and completion dates and an explanation of corrective action taken or proposed. This report, as well as the CPM Status Report, will be discussed at each progress meeting.

3.04 RESPONSIBILITY FOR SCHEDULE COMPLIANCE:

A. Whenever it becomes apparent from the current CPM schedule and narrative report that delays to the critical path have resulted and the contract completion date will not be met, the Contractor shall take some or all of the following actions at no additional cost to the Owner. He shall submit to the Owner's Representative for approval, a written statement of the steps he intends to take to remove or arrest the delay to the critical path in the approved schedule.

3.05 ADJUSTMENT OF CONTRACT SCHEDULE AND COMPLETION TIME:

A. If the Contractor desires to make changes in his method of operating which affect the approved CPM schedule, he shall notify the Owner's Representative in writing stating what changes are proposed and the reason for the change. If the Owner's Representative approves these changes, the Contractor shall revise and submit for approval, without additional cost to the Owner, all of the affected portions of the CPM network. The Contractor shall adjust the CPM schedule only after prior approval of his proposed changes by the Owner's Representative.

B. If the completion of any activity, whether or not critical, falls more than 100 percent behind its approved duration, the Contractor shall submit for approval a schedule adjustment showing each such activity divided into two activities reflecting completed versus uncompleted work.

C. Shop drawings which are not approved on the first submittal or within the schedule time and equipment which do not pass the specified tests shall be immediately rescheduled.

D. The contract time will be adjusted only for causes specified in this Contract. In the event the Contractor requests an extension of any contract completion date, he shall furnish such justification and supporting evidence as the Owner's Representative may deem necessary to determine whether the Contractor is entitled to an extension of time under the provisions of this Contract. The Owner's Representative will, after receipt of such justification and supporting evidence, make findings of fact and will advise the Contractor in writing thereof. If the Owner's Representative finds that the Contractor is entitled to any extension of any contract completion date, the Owner's Representative's determination as to the total number of day's extension shall be based upon the currently approved CPM schedule and on all data relevant to the extension. Such data shall be included in the next updating of the schedule. Actual delays in activities, which, according to the CPM schedule, do not affect any contract completion date shown by the critical path in the network, will not be the basis for a change therein.

E. Each request for change in any contract completion date shall be submitted by the Contractor to the Owner's Representative within 30 days after the beginning of the delay for which a time extension is requested but before the date of final payment under this Contract. No time extension will be granted for requests, which are not submitted within the foregoing time limit.

END OF SECTION

SECTION 01 32 33

CONSTRUCTION PHOTOGRAPHS

PART 1 - GENERAL

1.01 WORK INCLUDED:

A. This section covers construction progress photographs to be furnished by the Contractor on the project.

PART 2 - PRODUCTS

2.01 PHOTOGRAPHS:

A. Digital photographs shall be in .gif, .jpeg, .bmp or .tif format.

B. Prints shall be 8 x 10 full color on single weight, white base, and glossy paper, mounted with binder tabs.

C. Photographs shall be taken using a digital camera before groundbreaking, monthly throughout the Work, and on final acceptance of the project.

D. Before the Contractor commences any work at the Site, and on the first work day of each month thereafter until Substantial Completion of the Work, the Contractor shall, at his/her expense, have digital photographs with disc storage taken by a competent photographer from different viewpoints, as directed by the Owner or Engineer. The Owner and Engineer shall have the right to increase or decrease the number of photographs required at each period, maintaining an overall average number of exposures per period.

PART 3 - EXECUTION

3.01 USB DRIVE DELIVERY:

A. A minimum of twenty-four views shall be delivered to the Engineer on a USB Drive within six days of exposure.

B. USB drives turned over to the Engineer shall be retained by the Engineer for future reference during the project.

C. If the Contractor fails to provide the photographs as required by the Contract Documents, the City shall be entitled to a corresponding cost set-off against the Contractor's next Application for Payment, or may choose to have the photograph taken by another photographer, and correspondingly charge those associated costs to the Contractor.

END OF SECTION

SECTION 01 33 23

SUBMITTALS

PART 1 - GENERAL

1.01 WORK INCLUDED:

A. The Contractor shall provide the Engineer with submittals as required by the contract documents.

1.02 RELATED WORK:

A. Divisions 1 – 32 of these specifications that require submittals.

PART 2 - PRODUCTS

NOT USED

PART 3 - EXECUTION

3.01 GENERAL:

A. As required by the General Conditions, Contractor shall submit a schedule of shop and working drawing submittals.

B. The Contractor shall submit the shop and working drawing submittals either electronically or hard copy.

3.02 ELECTRONIC SUBMITTALS:

A. In accordance with the accepted schedule, the Contractor shall submit promptly to the Engineer by email (dakkakf@wseinc.com) or on Compact Disc (mail to Weston & Sampson Engineers, attention: FD), one electronic copy in Portable Document Format (PDF) of shop or working drawings required as noted in the specifications, of equipment, structural details and materials fabricated especially for this Contract.

B. Each electronic copy of the shop or working drawing shall be accompanied by the Engineer's standard shop drawing transmittal form, included as Exhibit 1 of this section (use only for electronic submittals), on which is a list of the drawings, descriptions and numbers and the names of the Owner, Project, Contractor and building, equipment or structure.

C. The Contractor shall receive a shop drawing memorandum with the Engineer's approval or comments via email.

3.03 SHOP AND WORKING DRAWINGS:

A. Shop and working drawings shall show the principal dimensions, weight, structural and operating features, space required, clearances, type and/or brand of finish of shop coat, grease fittings, etc., depending on the subject of the drawings. When it is customary to do so, when the dimensions are of particular importance, or when so specified, the drawings shall be certified by the manufacturer or fabricator as correct for this Contract.

B. All shop and working drawings shall be submitted to the Engineer by and/or through the Contractor, who shall be responsible for obtaining shop and working drawings from his subcontractors and returning reviewed drawings to them. All shop and working drawings shall be prepared on standard size, 24-inch by 36-inch sheets, except those, which are made by changing existing standard shop or working drawings. All drawings shall be clearly marked with the names of the Owner, Project, Contractor and building, equipment or structure to which the drawing applies, and shall be suitably numbered. Each shipment of drawings shall be accompanied by the Engineer's (if applicable) standard shop drawing transmittal form on which is a list of the drawings, descriptions and numbers and the names mentioned above.

C. Only drawings that have been prepared, checked and corrected by the fabricator should be submitted to the Contractor by his subcontractors and vendors. Prior to submitting drawings to the Engineer, the Contractor shall check thoroughly all such drawings to satisfy himself that the subject matter thereof conforms to the Contract Documents in all respects. Shop drawings shall be reviewed and marked with the date, checker's name and indication of the Contractor's approval, and only then shall be submitted to the Engineer. Shop drawings unsatisfactory to the Contractor shall be returned directly to their source for correction, without submittal to the Engineer. Shop drawings submitted to the Engineer without the Contractor's approval stamp and signature will be rejected. Any deviation from the Contract Documents indicated on the shop drawings must be identified on the drawings and in a separate submittal to the Engineer, as required in this section of the specifications and General Conditions.

D. The Contractor shall be responsible for the prompt submittal and resubmittal, as necessary, of all shop and working drawings so that there will be no delay in the work due to the absence of such drawings.

E. The Engineer will review the shop and working drawings as to their general conformance with the design concept of the project and general compliance with the information given in the Contract Documents. Corrections of comments made on the drawings during the review do not relieve the Contractor from compliance with requirements of the Contract Documents. The Contractor is responsible for: confirming and correlating all quantities and dimensions; selecting fabrication processes and techniques of construction; coordinating his work with that of all other trades; and performing his work in a safe and satisfactory manner. The review of the shop drawings is general and shall not relieve the Contractor of the responsibility for

details of design, dimensions, code compliance, etc., necessary for interfacing with other components, proper fitting and construction of the work required by the Contract and for achieving the specified performance. The Engineer will review submittals two times: once upon original submission and a second time if the Engineer requires a revision or corrections. The Contractor shall reimburse the Owner amounts charged to the Owner by the Engineer for performing any review of a submittal for the third time or greater.

F. With few exceptions, shop drawings will be reviewed and returned to the Contractor within 30 days of submittal.

G. No material or equipment shall be purchased or fabricated especially for this Contract nor shall the Contractor proceed with any portion of the work, the design and details of which are dependent upon the design and details of equipment or other features for which review is required, until the required shop and working drawings have been submitted and reviewed by the Engineer as to their general conformance and compliance with the project and its Contract Documents. All materials and work involved in the construction shall then be as represented by said drawings.

H. Two copies of the shop and working drawings and/or catalog cuts will be returned to the Contractor. The Contractor shall furnish additional copies of such drawings or catalog cuts when he needs more than two copies or when so requested.

3.04 SAMPLES:

A. Samples specified in individual Sections include, but are not necessarily limited to, physical examples of the work such as sections of manufactured or fabricated work, small cuts or containers of materials, complete units of repetitively-used products, color/texture/pattern swatches and range sets, specimens for coordination of visual effect, graphic symbols, and units of work to be used by the Engineer or Owner for independent inspection and testing, as applicable to the work.

B. The number of samples submitted shall be as specified. Submittal and processing of samples shall follow the procedures outlined for shop and working drawings unless the specifications call for a field submittal or mock-up.

C. Acceptance of samples will be acknowledged via a copy of the transmittal noting status. When samples are not acceptable, prompt resubmittal will be required.

3.06 OPERATING AND MAINTENANCE MANUALS AND SPARE PARTS LISTS:

A. Where reference is made in technical specification sections to operating and maintenance manuals and/or spare parts lists, the Contractor shall submit four copies to the Engineer for review in accordance with the instructions furnished under "Shop and Working Drawings." If the submittal is complete and does not require any changes, an acknowledgement (copy of transmittal) will be returned noting status. If the submittal is incomplete or does require changes, corrections, additions, etc., two copies of the submittal will be returned with a copy of transmittal noting status. Four copies of the final operating and maintenance manuals and/or spare parts list shall be delivered to the Engineer prior to or with the equipment when it is delivered to the job site. For systems requiring field adjustment and balancing, such as heating and ventilating, the Contractor shall submit separate test results and adjustment data on completion of the work, to be incorporated into the system manual.

B. The information included in the manual shall be as described in the specification sections, but as a minimum shall contain clear and concise instructions for operating, adjusting, lubricating and maintaining the equipment, an exploded assembly drawing identifying each part by number and a listing of all parts of the equipment, with part numbers and descriptions required for ordering spare parts. Spare parts lists shall include recommended quantity and price.

C. Operating and maintenance manuals shall be in durable loose-leaf binders, on 8½-inch by 11-inch paper, with diagrams and illustrations either on 8½-inch by 11 inch or multiple foldouts. The instructions shall be annotated to indicate only the specific equipment furnished. Reference to other sizes or models of similar requirement shall be deleted or neatly lined out.

END OF SECTION

SECTION 01 45 23

STRUCTURAL TESTS AND INSPECTIONS

PART 1 -GENERAL

1.01 WORK INCLUDED:

A. Provide labor, materials, and equipment necessary to complete the work of this Section, including but not limited to the following:

1. Obtaining, coordinating, and providing notifications to the Owner and Engineer.
2. Provide safe access to the work of this Contract to accommodate the indicated tests and inspections.
3. Implementing corrective action and providing additional tests and/or inspections for work identified as non-conforming by the Independent Testing Agency.

1.02 GENERAL REQUIREMENTS:

A. The Massachusetts State Building Code, Latest Edition, 780 CMR, requires the Structural Engineer of Record (SER) to provide a program of structural tests and inspections for this project.

B. Attachment A, Program of Structural Tests and Inspections, shall not relieve the Contractor or its subcontractors of their responsibilities and obligations for quality control of the Work; their other obligations for supervising the Work; for any design work which is included in their scope of services; for full compliance with the requirements of the Contract Documents; the detection of, or failure to detect, deficiencies or defects, whether detected or undetected, in all parts of the Work, and to otherwise comply with all requirements of the Contract Documents.

C. The Program of Structural Tests and Inspection does not apply to the Contractor's equipment, temporary structures used by the Contractor to construct the project, the Contractor's means, methods, procedures, and job site safety.

1.03 CONTRACTOR RESPONSIBILITIES:

A. The Contractor shall provide free and safe access to the Work for the SER and all other individuals who are observing the Work or performing structural tests or inspections. The Contractor shall provide all ladders, scaffolding, staging, and up-to-date safety equipment, all in good and safe working order, and qualified personnel to handle and erect them, as may be required for safe access.

B. The Contractor shall give reasonable notice to the Owner and the Engineer of when the various parts of the Work will be ready for testing and/or inspection. The Contractor shall notify the Owner and the Engineer a minimum of 48 hours before such tests and/or inspections are to take place.

PART 2 - PRODUCTS

NOT USED.

PART 3 - EXECUTION

NOT USED.

ATTACHMENT A

PROGRAM OF STRUCTURAL TESTS AND INSPECTIONS

The following is a summary of Work subject to Tests and Inspections under the Program.

1. In-situ Bearing Strata for Footings
2. Controlled Structural Fill
3. Cast-In-Place Concrete
4. Masonry
5. Structural Steel

Abbreviation	Agent
SER	Structural Engineer of Record
ITA	Contractor – Independent Testing Agency

In-Situ Bearing Strata for Footings

Item	Agent	Scope
1. Bearing Strata QC Review	ITA	Review Contractor's field quality control procedures.
2. General Excavation	ITA	Inspect strata for conformance to the structural drawings, specifications, and/or geotechnical report.
3. General Excavation	ITA	Ensure that excavation is to proper depth or material.
4. General Excavation	ITA	Ensure that excavation is controlled and contains no unsuitable materials.
5. Bearing surfaces for footings	ITA	Inspect bearing surfaces for conformance to the requirements of the structural drawings, specifications, and/or geotechnical report.

Controlled Structural Fill

Item	Agent	Scope
1. Controlled Structural Fill QC Review	SER	Review Contractor's field quality control procedures
2. Fill Material	ITA	Test material for conformance to specifications or geotechnical report. Perform laboratory compaction tests in accordance with the specifications to determine optimum water content and maximum dry density.
3. Installation of controlled structural fill	ITA	Provide full-time inspection of the installation, in accordance with the specifications.
4. Density of Fill	ITA	Perform field density tests of the in-place fill in accordance with the specifications.

Cast-In-Place Concrete Construction

Item	Agent	Scope
1. Cast-In-Place Concrete Construction QC Review	SER	Review Contractor's field quality control procedures. Review frequency and scope of field testing and inspections.
2. Mix Design	SER	Review Mix Designs
3. Materials	SER	Review material certifications for conformance to Specifications
4. Batching Plant	ITA	Review Plant quality control procedures and batching and mixing methods
5. Reinforcement Installation	ITA	Inspect reinforcing for size, quantity, condition and placement
6. Anchor Rods	ITA	Inspect anchor rods prior to and during placement of concrete.
6. Formwork	ITA	Inspect form sizes for proper sizes of concrete members.
7. Concrete Placement and Sampling fresh Concrete	ITA	Observe concrete placement operations. Verify conformance to specifications including cold-weather and hot-weather placement procedures. Perform slump, density and air content tests at point of discharge.
8. Evaluation of Concrete	ITA	Test and evaluate in accordance with the specifications.
9. Curing and Protection	ITA	Observe procedures for conformance to the specifications.

Masonry Construction

Item	Agent	Scope
1. Masonry Construction QC Review	SER	Review Contractor's field quality control procedures
2. Materials	SER	Review material certifications for conformance to specifications.
3. Evaluation of Masonry Strength	SER	Verify strength in accordance with the specifications.
4. Proportioning, Mixing, and Consistency of Mortar and Grout	ITA	Inspect field mixing procedures for conformance to the specifications.
5. Installation of Masonry	ITA	Inspect placement for conformance to the specifications. Verify cleanout hole locations (high lift grouting). Verify the installation of bond beams and special shapes.
6. Reinforcement Installation	ITA	Inspect reinforcing steel for size, quantity, condition and placement for conformance to approved submittals and Contract Documents.
7. Grouting Operations	ITA	Inspect grouting procedures for conformance with the specifications. Inspect cells prior to grouting. Assure observation holes have been installed prior to high lift grouting.
8. Weather Protection	ITA	Inspect protection for cold and hot weather for conformance with the specifications.
9. Anchorage	ITA	Inspect anchorage of masonry to other construction for conformance to the Contract Documents.

Structural Steel

Item	Agent	Scope
1. Fabricator Certification/Quality Control Procedures	SER	Review Contractor's field quality control procedures. Review frequency and scope of field testing and inspections.
2. Fabricator Certification/Quality Control Procedures	SER	Review each Fabricator's quality control procedures.
3. Fabricator Inspection	SER	Inspect in-plant fabrication, or review Fabricator's approved Independent Inspection Agency's reports.
4. Materials	SER	Review materials certifications for conformance to the specifications.
5. Anchor Rods	SER	Review Contractor's as-built survey.
6. Anchor Rods	ITA	Verify that all anchor rods have been properly torqued and have adequate fit-up.
7. Bolting	ITA	Test and inspect bolted connections in accordance with specifications. Verify bolt size and grade.
8. Welding	ITA	Check welder qualifications. Visually inspect fillet welds and test full penetration field welds in accordance with specifications
9. Shear Connectors	ITA	Inspect for size and placement. Test for proper weld attachment
10. Structural Framing, Details, and Assembly	ITA	Inspect for size, grade of steel, camber, installation and connection details. Check against Contract Documents and approved shop drawings.
11. Open Web Steel Joists	ITA	Inspect for size, placement, bridging, bearing and connection to structure. Visually inspect all welds of a minimum of 5% of the joists randomly selected.
12. Expansion and Adhesive Anchors	SER	Review installation procedures for both mechanical anchors and adhesive anchors. Verify that materials are suitable for job conditions.

13. Metal Decking	ITA	Verify gage, width, and type. Inspect placement, laps, welds, side laps attachment and screws or other mechanical fasteners. Check welder qualifications.
14. Field Correction of Fabricated Items	ITA	Review documentation of approved repairs and verify completion of repairs.

END OF SECTION

SECTION 01 57 19

ENVIRONMENTAL PROTECTION

PART 1 – GENERAL

1.01 DESCRIPTION:

A. The work covered by this section of the specifications consists of furnishing all labor, materials, tools and equipment and performing all work required for the prevention of environmental pollution during and as a result of construction operations under this contract.

B. The requirements set forth in this section of the specifications apply to cross-country areas, river and stream crossings, and construction in and adjacent to wetlands, unless otherwise specifically stated.

C. All work under this Contract shall be in accordance with the Conservation Commissions' Orders of Conditions as well as any conditional requirements applied, all of which are attached to Section 00 31 43, PERMITS.

D. Prior to commencement of work, the Contractor shall meet with the Owner and the Engineer to develop mutual understandings relative to compliance of the environmental protection program.

1.02 RELATED WORK:

A. Section 00 31 43, PERMITS

B. Section 01 14 19.16, DUST CONTROL

C. Section 01 33 23, SUBMITTALS

D. Section 31 00 00, EARTHWORK

E. Section 31 23 19, DEWATERING

1.03 SUBMITTALS:

A. The Contractor shall submit details and literature fully describing environmental protection methods to be employed in carrying out construction activities within 100 feet of wetlands or across areas designated as wetlands.

PART 2 - PRODUCTS

2.01 SILT FENCE:

A. The silt fence shall consist of a 3-foot wide continuous length sediment control fabric, stitched to a mesh backing, and stapled to preweathered oak posts installed as shown on the drawings. The oak posts shall be 1-1/4-inches by 1-1/4-inches (Minimum Dimension) by 48-inches and shall be tapered. The bottom edge of the silt fence shall be buried as shown on the drawings.

B. The silt fence shall be DOT Silt Fence PPDM3611, as manufactured by U.S. Silt & Site Supply/Getsco, Concord, NH, or approved equal.

C. Silt fence properties:

Physical Properties	Test Method	Minimum Value
Grab Strength, lbs.	ASTM-D-4632	124
Grab Elongation, %	ASTM-D-4632	15
Mullen burst, psi	ASTM-D-3786	300
Puncture, lbs.	ASTM-D-4833	65
Trapezoidal Tear, lbs.	ASTM-D-4533	65
UV Resistance2, %3	ASTM-D-4355	80@500 hrs.
AOS, US Sieve No.	ASTM-D-4751	30
Flow Rate, gal/min/sq ft	ASTM-D-4491	10
Permittivity,(1/sec)gal/min/sq ft	ASTM-D-4491	0.05 sec^{-1}

2.02 COMPOST SOCK:

A. Compost sock shall consist of a 100% biodegradable exterior jute or coir netting with 100% wheat straw interior filling as manufactured by GEI Works, Sebastian, Florida (Phone: 772-646-0597; website: www.erosionpollution.com), or approved equal.

2.05 CATCH BASIN PROTECTION:

A. To trap sediment and to prevent sediment from clogging drainage systems, catch basin protection in the form of a siltation sack (Siltsack as manufactured by ACF Environmental, Inc. or approved equal) shall be provided as approved by the Engineer.

PART 3- EXECUTION

3.01 NOTIFICATION AND STOPPAGE OF WORK:

A. The Engineer will notify the Contractor in writing of any non-compliance with the provisions of the Order of Conditions. The Contractor shall, after receipt of such notice, immediately take corrective action. Such notice, when delivered to the

Contractor or his authorized representative at the site of the work, shall be deemed sufficient for the purpose. If the Contractor fails to act promptly, the Owner may order stoppage of all or part of the work through the Engineer until satisfactory corrective action has been taken. No claim for an extension of time or for excess costs or damage incurred by the Contractor as a result of time lost due to any stop work orders shall be made unless it was later determined that the Contractor was in compliance.

3.02 AREA OF CONSTRUCTION ACTIVITY:

A. Insofar as possible, the Contractor shall confine his construction activities to those areas defined by the plans and specifications. All land resources within the project boundaries and outside the limits of permanent work performed under this contract shall be preserved in their present condition or be restored to a condition after completion of construction at least equal to that which existed prior to work under this contract.

3.03 PROTECTION OF WATER RESOURCES:

A. The Contractor shall not pollute streams, lakes or reservoirs with fuels, oils, bitumens, calcium chloride, acids or other harmful materials. It is the Contractor's responsibility to comply with all applicable Federal, State, County and Municipal laws regarding pollution of rivers and streams.

B. Special measures should be taken to insure against spillage of any pollutants into public waters.

3.04 CONSTRUCTION IN AREAS DESIGNATED AS WETLANDS ON THE DRAWINGS:

A. Insofar as possible, the Contractor shall make every effort to minimize disturbance within areas designated as wetlands or within 100-feet of wetland resource areas. Total easement widths shall be limited to the widths shown.

B. The Contractor shall perform his work in such a way that these areas are left in the condition existing prior to construction.

C. The elevations of areas designated as wetlands shall not be unduly disturbed by the Contractor's operations outside of the trench limits. If such disturbance does occur, the Contractor shall take all measures necessary to return these areas to the elevations which existed prior to construction.

D. In areas designated as wetlands, the Contractor shall carefully remove and stockpile the top 24 inches of soil. This topsoil material shall be used as backfill for the trench excavation top layer. The elevation of the trench shall be restored to the preconstruction elevations wherever disturbed by the Contractor's operation.

E. The Contractor shall use a trench box, sheeting or bracing to support the excavation

in areas designated as wetlands.

F. Excavated materials shall not be permanently placed or temporarily stored in areas designated as wetlands. Temporary storage areas for excavated material shall be as required by the Engineer.

G. The use of a temporary gravel roadway to construct the pipeline in the wetlands area is not acceptable. The Contractor will be required to utilize timber or rubber matting to support his equipment in these areas. The timber or rubber matting shall be constructed in such a way that it is capable of supporting all equipment necessary to install the pipeline. The timber or rubber matting shall be constructed of materials and placed in such a way that when removed the material below the matting will not be unduly disturbed, mixed or compacted so as to adversely affect recovery of the existing plant life.

H. Bentonite dams shall be placed in wetlands to prevent drainage. Locations for dams are as indicated on the drawings or as required by the Engineer.

I. During construction, easements within wetlands shall be lined with a continuous straw bale/siltation fence barrier or line of compost sock (aka compost filter tube, silt/filter sock, straw wattles).

3.05 PROTECTING AND MINIMIZING EXPOSED AREAS:

A. The Contractor shall limit the area of land which is exposed and free from vegetation during construction. In areas where the period of exposure will be greater than two (2) months, temporary vegetation, mulching or other protective measures shall be provided as specified.

B. The Contractor shall take account of the conditions of the soil where temporary cover crop will be used to ensure that materials used for temporary vegetation are adaptive to the sediment control. Materials to be used for temporary vegetation shall be approved by the Engineer.

3.06 LOCATION OF STORAGE AREAS:

A. The location of the Contractor's storage areas for equipment and/or materials shall be upon cleared portions of the job site or areas to be cleared as a part of this project and shall require written approval of the Engineer. Plans showing storage facilities for equipment and materials shall be submitted for approval of the Engineer.

B. No excavated materials or materials used in backfill operations shall be deposited within a minimum distance of one hundred (100) feet of any watercourse or any drainage facility. Adequate measures for erosion and sediment control such as the placement of baled straw around the downstream perimeter of stockpiles shall be employed to protect any downstream areas from siltation.

C. There shall be no storage of equipment or materials in areas designated as wetlands.

D. The Engineer may designate a particular area or areas where the Contractor may store materials used in his operations.

E. Storage areas in cross-country locations shall be restored to pre-construction conditions with the planting of native species of trees and shrubs.

3.07 PROTECTION OF LANDSCAPE:

A. The Contractor shall not deface, injure, or destroy trees or shrubs nor remove or cut them without written authority from the Owner. No ropes, cables, or guys shall be fastened to or attached to any existing nearby trees for anchorages unless specifically authorized by the Engineer. Excavating machinery and cranes shall be of suitable type and be operated with care to prevent injury to trees which are not to be removed, particularly overhanging branches and limbs. The Contractor shall, in any event, be responsible for any damage resulting from such use.

B. Branches, limbs, and roots shall not be cut except by permission of the Engineer. All cutting shall be smoothly and neatly done without splitting or crushing. When there is unavoidable injury to branches, limbs and trunks of trees, the injured portions shall be neatly trimmed and covered with an application of grafting wax or tree healing paint as directed.

C. Where, in the opinion of the Engineer, trees may possibly be defaced, bruised, injured, or otherwise damaged by the Contractor's equipment or by his blasting or other operations, the Engineer may require the Contractor to adequately protect such trees by placing boards, planks, poles or fencing around them. Any trees or landscape feature scarred or damaged by the Contractor's equipment or operations shall be restored as nearly as possible to its original condition at the expense of the Contractor. The Engineer will decide what method of restoration shall be used, and whether damaged trees shall be treated and healed or removed and disposed.

D. Cultivated hedges, shrubs, and plants which could be injured by the Contractor's operations shall be protected by suitable means or shall be dug up, balled and temporarily replanted and maintained. After construction operations have been substantially completed, they shall be replanted in their original positions and cared for until growth is re-established. If cultivated hedges, shrubs, and plants are injured to such a degree as to affect their growth or diminish their beauty or usefulness, they shall be replaced by items of a kind and quality at least equal to that existing at the start of the work.

3.08 DISCHARGE OF DEWATERING OPERATIONS:

A. Any water that is pumped and discharged from the trench and/or excavation as part of the Contractor's water handling shall be filtered by an approved method prior to its discharge into a receiving water or drainage system.

B. Under no circumstances shall the Contractor discharge water to the areas designated as wetlands. When constructing in a wetlands area, the Contractor shall discharge water from dewatering operations directly to the nearest drainage system, stream, or waterway after filtering by an approved method.

C. The pumped water shall be filtered through filter fabric and baled hay, a vegetative filter strip or a vegetated channel to trap sediment occurring as a result of the construction operations. The vegetated channel shall be constructed such that the discharge flow rate shall not exceed a velocity of more than 1 foot per second. Accumulated sediment shall be cleared from the channel periodically.

3.00 DUST CONTROL:

A. During the progress of the work, the Contractor shall conduct his operations and maintain the area of his activities, including sweeping and sprinkling of streets as necessary, to minimize creation and dispersion of dust. If the Engineer decides it is necessary to use calcium chloride for more effective dust control, the Contractor shall furnish and spread the material, as directed. Calcium chloride shall be as specified under Section 01 14 19.16, DUST CONTROL.

B. Calcium Chloride shall not be used for dust control within a drainage basin or in the vicinity of any source of potable water.

3.10 SEPARATION AND REPLACEMENT OF TOPSOIL:

A. Topsoil shall be carefully removed from cross-country areas where excavations are to be made, and separately stored to be used again as required. The topsoil shall be stored in an area acceptable to the Engineer and adequate measures shall be employed to prevent erosion of said material.

3.12 ERECTION AND MAINTENANCE OF SILT FENCE:

A. Where indicated on the drawings or where required by the Engineer, the Contractor shall erect and maintain a temporary silt fence. In areas designated as wetlands, the Contractor shall line the limits of the construction easement with a silt fence. The silt fence shall be used specifically to contain sediment from runoff water and to minimize environmental damage caused by construction.

3.13 SURFACE RESTORATION OF CROSS COUNTRY AREAS:

A. Plantings detailed in Section 32 93 00 shall be conducted when construction of the pipeline has been completed within the areas designated. A one-year guarantee of maintenance will be required on these plantings to ensure that they establish in the area.

3.14 CATCH BASIN PROTECTION:

A. Catch basin protection shall be used for every catch basin, shown on the plans or as required by the Engineer, to trap sediment and prevent it from clogging drainage systems and entering wetlands. Siltation sack shall be securely installed under the catch basin grate. Care shall be taken to keep the siltation sack from breaking apart or clogging. All deposited sediment shall be removed periodically and at times prior to predicted precipitation to allow free drainage flow. Prior to working in areas where catch basins are to be protected, each catch basin sump shall be cleaned of all debris and protected. The Contractor shall properly dispose of all debris at no additional cost to the Owner.

B. All catch basin protection shall be removed by the Contractor after construction is complete.

3.15 COMPOST SOCK:

A. The compost socks will be placed in a shallow trench (2-3 inches deep) and staked in the ground using wooden stakes driven at 4-foot intervals. The wooden stakes will be placed at a minimum depth of 24-inches into the ground.

B. The compost socks shall be regularly inspected and before and after every forecasted major weather event. All deposited sediment shall be removed and not allowed to accumulate to the top of the compost socks. Socks damaged during construction shall be repaired or replaced as required by the Engineer at no additional cost to the Owner.

C. The Contractor shall remove all compost socks after construction is completed.

END OF SECTION

SECTION 01 74 13

CLEANING UP

PART 1 - GENERAL

1.01 DESCRIPTION:

The Contractor must employ at all times during the progress of its work adequate cleanup measures and safety precautions to prevent injuries to persons or damage to property. The Contractor shall immediately, upon request by the Engineer provide adequate material, equipment and labor to cleanup and make safe any and all areas deemed necessary by the Engineer.

1.02 RELATED WORK:

A. Section 00 72 00 GENERAL CONDITIONS

B. Section 01 11 00 CONTROL OF WORK AND MATERIALS

C. Section 01 14 00 SPECIAL PROVISIONS

D. Section 01 57 19 ENVIRONMENTAL PROTECTION

PART 2 - PRODUCTS

Not applicable

PART 3 - EXECUTION

3.01 DAILY CLEANUP:

A. The Contractor shall clean up, at least daily, all refuse, rubbish, scrap and surplus material, debris and unneeded construction equipment resulting from the construction operations and sweep the area. The site of the work and the adjacent areas affected thereby shall at all times present a neat, orderly and workmanlike appearance.

B. Upon written notification by the Engineer, the Contractor shall within 24 hours clean up those areas, which in the Engineer's opinion are in violation of this section and the above referenced sections of the specifications.

C. If in the opinion of the Engineer, the referenced areas are not satisfactorily cleaned up, all other work on the project shall stop until the cleanup is satisfactory.

3.02 MATERIAL OR DEBRIS IN DRAINAGE FACILITIES:

A. Where material or debris has washed or flowed into or has been placed in existing watercourses, ditches, gutters, drains, pipes, structures, such material or debris shall be entirely removed and satisfactorily disposed of during progress of the work, and the ditches, channels, drains, pipes, structures, and work shall, upon completion of the work, be left in a clean and neat condition.

3.03 REMOVAL OF TEMPORARY BUILDINGS, STRUCTURES AND EQUIPMENT:

A. On or before completion of the work, the Contractor shall, unless otherwise specifically required or permitted in writing, tear down and remove all temporary buildings and structures it built; shall remove all temporary works, tools and machinery or other construction equipment it furnished; shall remove all rubbish from any grounds which it has occupied; shall remove silt fences and hay bales used for trapping sediment; and shall leave the roads and all parts of the property and adjacent property affected by its operations in a neat and satisfactory condition.

3.04 RESTORATION OF DAMAGED PROPERTY:

A. The Contractor shall restore or replace, when and as required, any property damaged by its work, equipment or employees, to a condition at least equal to that existing immediately prior to the beginning of operations. To this end the Contractor shall do as required all necessary highway or driveway, walk and landscaping work. Materials, equipment, and methods for such restoration shall be as approved by the Engineer.

3.05 FINAL CLEANUP:

A. Before acceptance by the Owner, the Contractor shall perform a final cleanup to bring the construction site to its original or specified condition. This cleanup shall include removing all trash and debris off of the premises. Before acceptance, the Engineer shall approve the condition of the site.

END OF SECTION

SECTION 01 78 00

PROJECT CLOSEOUT

PART 1 - GENERAL

1.01 WORK INCLUDED:

A. This Section covers administrative and procedural requirements for closing out the project, including, but not limited to:

1. Project as-built documents

2. Checkout and Certification

4. Final Cleaning

5. Substantial Completion

6. Closeout Procedures

7. Final Completion

8. Correction/Warranty Period

B. Closeout checklist to be completed by the Engineer.

1.02 RELATED WORK:

A. General Requirements in their entirety.

B. Section 01 74 13, CLEANING UP

C. Section 01 78 39 PROJECT AS-BUILT RECORD DRAWINGS

D. Division 2 through Division 33.

1.03 AS-BUILT DOCUMENTS:

A. Contractor shall maintain on site, separate from the documents used for construction, one set of the documents listed below, and as construction progresses, shall legibly record on these documents all changes made during construction.

1. Contract Drawings.

2. Specifications.

3. Addenda.

4. Change Orders and other Modifications to the Contract.

5. Reviewed shop drawings, product data, and samples.

6. Written interpretations and clarifications.

7. Field Orders.

8. Field test reports properly verified.

B. The completed set of as-built documents shall be submitted to the Engineer with the final Application for Payment.

C. The draft and completed set of as-built documents shall be submitted to the Engineer and Owner.

1.04 CHECKOUT AND CERTIFICATIONS:

A. Prior to checkout and certifications the following tasks shall be completed:

1. Construction shall be complete. For this purpose, completion of construction is defined as follows:

a. The Contractor has completed construction and erection of the work in conformance with the Contract Drawings and Specifications.

b. The Contractor has installed and adjusted operating equipment, systems, or facilities, as applicable, as defined by the manufacturers' erection, installation, operation and maintenance instructions.

2. All shop drawings shall have final approval.

3. All shop tests shall be complete and approved test results submitted to the Engineer.

B. Refer to Section 01 75 13 for requirements regarding equipment checkout and certification.

1.05 FINAL CLEANING:

A. Complete the following cleaning operations before requesting inspection for Certification of Substantial Completion.

1. Clean the site, including landscape development areas of rubbish, litter and other foreign substances. Sweep paved areas broom clean; remove stains, spills and

other foreign deposits. Rake grounds that are neither paved nor planted, to smooth, even textured surfaces.

2. Remove waste and surplus materials, rubbish, fencing equipment, temporary utilities and construction facilities from the site, unless otherwise required by the Engineer.

3. Comply with requirements of Section 01 74 13 CLEANING UP.

1.06 SUBSTANTIAL COMPLETION:

A. Substantial Completion is officially defined in the General and Supplementary Conditions. The date of substantial completion will be certified by the Engineer. This date will not be certified until the following requirements have been satisfied by the Contractor:

1. All Contract requirements are coordinated into a fully operational system. All individual units of equipment and treatment are fully operative and performing at specified efficiencies. Where efficiencies are not specified, performance shall meet acceptable standards for the particular unit.

2. All field tests have been satisfactorily completed and reports forwarded to the Engineer.

3. All final training has been completed by the manufacturers' representatives.

4. All spare parts and lubricants have been satisfactorily delivered to the Owner. Spare parts are for the exclusive use of the Owner when the facility has been turned over. Contractor is responsible for all maintenance and repair materials required until the facility is accepted by the Owner.

1.07 CLOSEOUT PROCEDURES:

A. Submit written certification that Contract Documents have been reviewed, Work has been inspected, and is complete in accordance with Contract Documents and ready for Engineer's and Owner's inspection.

B. Accompany Engineer and Owner on inspection to verify conformance with the Contract Documents. Prepare a punch list of work items that have been determined by inspection to not conform to Contract Documents. Punch list items shall include work items that are missing, incomplete, damaged, incorrect items, or improperly installed or constructed. The Contractor shall correct the punch list deficiencies by re-work, modifications, or replacement, as appropriate, until the items conform to the Contract Documents. The initial punch list shall be produced by the Contractor, with copies to the Engineer and Owner. When the Contractor has reduced the number of deficient items to a reasonable level, the Engineer will develop a definitive punch list for the use of the Contractor.

C. Provide submittals to Engineer that are required by governing or other authorities.

D. Submit final Application for Payment identifying total adjusted Contract Sum, previous payments, and sum remaining due. The Contractor shall submit the following documents with or prior to Final Application for Payment: Set of as-built documents, Contract Completion and Acceptance Certificate, Consent of Surety to Final Payment, Release and Waiver of Liens and Claims (SECTION 01 78 00 – ATT. A), Affidavit of Payment of Debts and Claims, and remaining releases, waivers, warranties/guarantees, and all other data required by the Contract Documents.

1.08 FINAL COMPLETION:

A. Prior to final completion, the following tasks shall be completed:

1. All items in the punch list shall be completed.

2. All Contract closeout documentation shall be submitted to and accepted by the Engineer.

1.09 CORRECTION/WARRANTY PERIOD:

A. During the correction period, the Contractor shall correct all deficiencies in equipment and materials.

B. During the warranty period, the Contractor shall perform all corrective work on warranty deficiencies.

C. Corrective work will be identified by the Engineer or Owner, as appropriate. The Contractor will be notified of the item(s) requiring corrective work.

D. The Contractor shall begin work on all corrective work within ten days of being notified of the deficiency by the Engineer and shall then work continuously until the deficiency is corrected. Upon completion of the corrective work, the Contractor shall submit a letter report to the Engineer describing the deficiency and the corrective action that was taken.

E. The Contractor shall coordinate all corrective work with the Engineer and/or the Owner.

1.10 COMPLETION CHECKLIST:

A. The Project Completion Checklist, which follows, *shall be modified as required for the* and shall be completed as the project nears completion. When the project has been fully completed, Final Payment can be approved.

PROJECT COMPLETION CHECKLIST

Owner _____ Job No.

Project

As part of the project closeout, all items listed below must be checked off as being complete or otherwise accounted for. The person verifying completion of the item shall list the completion date and his/her initials.

Project Closeout Checklist		
	Date Completion Verified	Verified by
AS-BUILT DOCUMENTS HANDED OVER		
1. Contract Drawings		
2. Specifications		
3. Addenda		
4. Change Orders/Contract Modifications		
5. Reviewed Shop Drawings, Product Data and Samples		
6. Written Interpretations/Clarifications		
7. Field Orders		
8. Field Test Reports		

Project Closeout Checklist		
	Date Completion Verified	Verified By
FINAL CLEANING		
1. All Construction Facilities Removed		
2. All Construction Debris Removed		
3. All Areas Swept/Cleared		
SUBSTANTIAL COMPLETION		
1. All Items Coordinated Into a Fully Operational System		
2. All Equipment Units Operational at Specified Efficiencies		
3. All Field Tests Completed and Reports Submitted		
4. All Final Training by Manufacturer's Rep. Completed		
5. All Spare Parts and Lubricants Provided		
CLOSEOUT PROCEDURES		
1. Written Certification Submitted that Work is Ready for Owner & Engineer Inspector		
2. Inspection by Owner, Engineer, Contractor completed		
3. Punch List of Nonconforming Items Prepared		
4. Documents Required by Governing or Other Authorities Submitted (List Them)		
5. Final Application for Payment Received		
6. Contract Completion and Acceptance Certificate Submittal		
7. Consent of Surety to Final Payment Submittal		
8. Release and Waiver of Liens and Claims Submitted		
9. Affidavit of Payment of Debts and Claims Submitted		
10. Warranties/Guarantees Submitted		
11. Other Required Releases and Waivers Submitted (List Them)		
12. Permits Submitted (List Them)		
13. Weekly Payrolls Submitted as Required by Law		

Project Closeout Checklist		
	Date Completion Verified	Verified By
FINAL COMPLETION		
1. All Items in Punch List Completed		
2. All Other Required Documentation Submitted (List It)		
CORRECTION/WARRANTY PERIOD		
1. Correction Period Start Date: _____ End Date: _____		
2. Specific Warranties Provided Item Warranty Duration		

Full name of persons signing their initials on this checklist:

_____

_____

_____

_____

_____

END OF SECTION

SECTION 01 78 39

PROJECT AS-BUILT RECORD DRAWINGS

PART 1 - GENERAL

1.01 WORK INCLUDED:

This Section covers the Contractors As-Built Record drawings for the project. The As-Built Record drawings for the project shall include, but are not limited to:

A. The Contractors construction coordination drawings for all the project disciplines. The Contractors construction coordination drawings for the project disciplines shall be submitted to the Engineer prior to Construction of the said discipline. The Contractors construction coordination drawings for the project disciplines shall include but are not limited to the following:

1. Landscape Architectural
2. Structural

B. Draft Record Documents Review

Upon completion of the project construction the Contractor shall submit a complete copy of 24- by 36-inch Record Drawings to the Owner and the Engineer for review. The Owner and the Engineer shall jointly review the Record Drawings and provide comments to the Contractor. The Contractor shall modify the Record Drawings as necessary based on the comments provided by the Owner and the Engineer.

C. Final Record Documents

Upon incorporation and acceptance of the Draft Record Drawings comments from the Owner and the Engineer, the Contractor shall submit the Final Record Drawings and documentation. The Contactor shall submit two sets of 24- by 36-inch Record Drawings to the Owner and an additional two sets of 24- by 36-inch Record Drawings to the Engineer for their records. The Contractor shall also submit to the Engineer a minimum 20 gigabyte flash drive with the electronic Record Drawing files. The electronic Record Drawing files shall be obtained from the Owner (the Engineer shall provide on behalf of the Owner if the Engineer was the project designer) and developed in AutoCAD 2010/Revit 2017 (or later) and the submittal shall include the Final AutoCAD DWG/Revit RVT file documents, drawing line types, blocks, etc. The actual version of AutoCAD/Revit shall be coordinated with the Engineer.

D. Pre- and Post-Construction Survey

The Contractor shall perform a pre- and post-construction survey of the entire project area. The topographic survey shall be performed by or under the supervision of and certified by a Registered Land Surveyor in the State of Massachusetts. The Contractor shall also submit to the Engineer a minimum 20 gigabyte flash drive with the electronic pre- and post-construction survey files. The Contractor shall send the electronic pre- and post-construction survey files to the Engineer which shall be developed in AutoCAD 2010/ Revit 2017 (or later) and the submittal shall include the Final AutoCAD DWG / Revit RVT file documents, drawing line types, blocks, etc. The actual version of AutoCAD / Revit shall be coordinated with the Engineer. The Contractor shall notify the Owner and Engineer at least 48-hours in advance of each survey.

1.02 RELATED WORK:

A. General Requirements in their entirety.

B. Division 02 through Division 32.

1.03 AS-BUILT DOCUMENTS:

A. Contractor shall maintain on site, separate from the documents used for construction, one complete set of the documents listed below, and as construction progresses, shall legibly record on these documents all changes made during construction.

1. Contract Drawings.
2. Specifications.
3. Addenda.
4. Change Orders and other Modifications to the Contract.
5. Reviewed shop drawings, product data, and samples.
6. Written interpretations and clarifications.
7. Field Orders.
8. Field test reports properly verified.

B. The completed set of documents shall include but are not limited to:

1. Significant deviations of any nature made during construction.

C. The completed set of as-built documents shall be submitted to the Engineer with the final Application for Payment.

PART 2 - MATERIALS

Not Used

PART 3 - EXECUTION

Not Used

END OF SECTION

SECTION 02 41 13

SELECTIVE SITE DEMOLITION

PART 1 - GENERAL

1.01 SCOPE OF WORK:

A. Work under this Section shall consist of the careful removal, storage for reuse, transportation off-site, or demolition, of all structures and site features encountered or noted to be removed or abandoned to a minimum of three feet below finished grade, and the removal and disposal of all materials not called for to be reused or salvaged, in accordance with the contract drawings, these specifications, and Engineer's requirements. Provide all labor, equipment, materials and transportation necessary to complete the work.

B. Items plan referenced to be removed and stored shall be carefully removed and stored on site in a manner and location designated by the Engineer for reinstallation later as shown on the plans or as indicated by the Engineer.

C. Items plan referenced, or as indicated by the Engineer to be removed and disposed of shall be removed from the site and properly and legally disposed of by the Contractor.

D. Items indicated on the contract drawings or in the specifications to be removed and salvaged, or other items required to be removed by the Engineer, shall be transported to a municipal storage facility, located within the **City** confines, and unloaded and stacked as required by the Engineer.

E. Items indicated on the contract drawings or in the specification to be removed and reset shall be carefully removed and reset in the same location as existing according to the specification and details.

F. The following scope describes the general work/demolition requirements of this Section.

1. Cement pavers.
2. Post and cable fence.
3. Strip of loam and other features as indicated on the drawings.
4. Strip and remove gravel base as indicated on the drawings.
5. Other items as indicated on the contract drawings.

1.02 PROTECTION:

A. The Contractor shall assume complete responsibility and liability for the safety and structural integrity of all work and utilities to remain during demolition. The contractor shall take special care to protect existing granite pier and pillars to remain

as indicated on the contract drawings.

B. Provide safeguards including, but not limited to, warning signs, barricades, temporary fences, warning lights and other items required for protection of personnel and the general public during performance of all work.

C. All features related to protection shall be maintained until that work has been completed to the point when such safeguards are no longer required.

1.03 SPECIAL REQUIREMENTS:

A. The Contractor shall salvage items label to be demolished and transport these to the **Owner's City Yard** unless these are called for to be reused or required by the Engineer to be disposed of.

B. Install erosion controls to protect adjacent areas from eroded materials likely to enter wetlands, resource areas, or drainage ways/systems, downstream of areas disturbed by work activities.

C. Where items to be demolished are located within or adjacent to pavements to remain, the Contractor shall make provisions to protect that pavement to remain. Cut concrete pavement back to score line and cut bituminous concrete pavement back far enough so as not to allow disturbance to base course materials. Pavements damaged as a result of Contractor activities shall be replaced to the extent determined by the Engineer at no additional cost to the Owner.

1.04 REFERENCES:

A. Massachusetts Department of Transportation (MassDOT) Standard Specifications for Highways and Bridges – latest edition.

PART 2 - PRODUCTS

2.01 BACKFILL:

A. The Contractor shall provide suitable backfill as specified under Section 31 23 00 of these Specifications, to fill voids left by removal or abandonment of site features, and shall provide all pipe cap ends, mortar, brick and other material needed to cap off or plug pipes of various sizes and kinds.

B. Suitable materials shall be used as base course fill and topsoil to the depth as specified herein. Restore disturbed areas with similar materials blended to match the line and grades of adjacent surfaces.

2.02 TEMPORARY FENCE:

A. The work under these Items shall conform to the relevant provisions of section 644 of the MassDOT Standard Specifications.

B. The work shall include temporary installation of chain link fence around the perimeter of the work limits where shown on the plans, and as required by the Engineer, and as Contractor sees fit to protect work.

C. Temporary fence shall consist of 6 foot high chain link fence anchored into a base that is both stable and movable to allow access and adjustment as needed. Reclaimed existing fence fabric and materials may be used with the approval of the Engineer. The Contractor shall submit a shop drawing to the Engineer for approval prior to installation.

PART 3 - EXECUTION

3.01 SALVAGEABLE MATERIAL:

A. Frames, grates and other salvageable material shall be carefully removed to minimize damage and stored for later reuse, transport, or removal from site.

3.02 ABANDONED STRUCTURES:

A. All inlets and outlets shall be plugged with at least eight (8) inches of brick and mortar masonry. Upper portions of masonry structures shall be removed to a depth of three feet. The bottoms of all structures shall be broken to allow drainage, and the structure shall be filled with suitable backfill material placed in six (6) inch layers and thoroughly compacted at each level.

B. The Engineer shall review work related to abandoned structures before backfilling. Those items not reviewed before backfilling shall be uncovered and backfill procedures observed, at no expense to the Owner.

3.03 ABANDONED PIPES OR CONDUITS:

A. Plug previously abandoned drainpipes encountered with masonry brick at least eight (8) inches in thickness.

B. Abandon discontinued water supplies that are encountered during the execution of this contract in accordance with Owner requirements.

C. Electrical conduits encountered and previously abandoned shall be capped or plugged.

END OF SECTION

SECTION 03 30 00

CAST-IN-PLACE CONCRETE

PART 1 -GENERAL

1.01 GENERAL PROVISIONS:

A. Attention is directed to the CONTRACT AND GENERAL CONDITIONS and all Sections within DIVISION 1 – GENERAL REQUIREMENTS, which are hereby made part of this Section of the Specifications.

1.02 DESCRIPTION OF WORK:

A. Work Included: This Section specifies cast-in-place concrete, including formwork, reinforcement, concrete materials, mixture design, placement procedures, and finishes for the following:

1. Abutments
2. Boardwalk Slab on Grade
3. Retaining Walls
4. Concrete Pad for site furniture per contract drawings
5. Grout

B. Items To Be Installed Only: Not Applicable

C. Items To Be Furnished Only: Not Applicable

D. Related Work: The following items are not included in this Section and will be performed under the designated Sections:

1. Section 01 45 23, STRUCTURAL TESTS AND INSPECTIONS
2. Section 06 20 00, FINISH CARPENTRY
3. Section 31 00 00, EARTHWORK

1.03 SUBMITTALS:

A. Refer to Section 01 33 00, SUBMITTALS for submittal provisions and procedures.

B. Product data for proprietary materials and items, including reinforcement and forming accessories, admixtures, patching compounds, joint systems, curing compounds, and others if requested by the Owner's Representative or SER.

C. Shop drawings for reinforcement detailing, fabricating, bending, and placing concrete reinforcement. Comply with ACI 315 "Manual of Standard Practice for

Detailing Reinforced Concrete Structures". Include bar sizes, lengths, material, grade, bar schedules, stirrup spacing, bent bar diagrams, bar arrangement, splices and laps, mechanical connections, tie spacing, hoop spacing and supports for concrete.

D. Submit shop drawings for all formwork for Architecturally Exposed Concrete (Concrete Exposed to View) showing cone tie patterns.

E. Concrete mix design for each mix specified. Supporting test data shall be submitted if requested.

1. Submit alternate mix designs when the characteristics of materials, project conditions, weather, test results, or other circumstances warrant adjustments.
2. Indicate the amounts of mixing water to be withheld for later addition at the Project site.

F. Proposed method of curing and associated products.

G. Proposed precautions for hot weather and cold weather concreting.

H. Laboratory test reports for concrete materials and mix design test.

I. Material test reports for the following, from a qualified testing agency, indicating compliance with specification requirements:

1. Aggregates. Include service record data indicating absence of deleterious expansion of concrete due to alkali aggregate reactivity.

J. Material certificates for each of the following, signed by the manufacturers:

1. Cementitious material.
2. Admixtures
3. Form materials and form-release agents.
4. Steel reinforcement and accessories.
5. Non-metallic shrinkage resistant grout.
6. Curing compounds.
7. Bonding agents.
8. Adhesives.
9. Semi-rigid joint filler.
10. Joint-filler strips.
11. Repair materials.

K. Qualification Data: For Installer and Manufacturer.

1.04 QUALITY ASSURANCE:

A. Manufacturer Qualifications: A firm experienced in manufacturing ready-mix concrete products that complies with ASTM C 94 requirements for production facilities and equipment.

1. Manufacturer certified according to NRMCA's "Certification of Ready Mixed Concrete Production Facilities."

B. Testing Agency for Mix Design Qualifications: An independent agency, registered in the Commonwealth of Massachusetts as an approved testing agency, qualified according to ASTM C 1077 and ASTM E 329 for testing indicated, as documented according to ASTM E 548.

1. Personnel conducting field tests shall be qualified as ACI Concrete Field Testing Technician, Grade 1, according to ACI CP-01 or an equivalent certification program.
2. Personnel performing laboratory tests shall be ACI certified Concrete Strength Testing Technician and Concrete Laboratory Testing Technician – Grade 1. The Testing Agency Laboratory supervisor shall be an ACI certified Concrete Laboratory Testing Technician – Grade II.

C. Source Limitations: Obtain each type of class of cementitious material of the same brand from the same manufacturer's plant, obtain aggregate from one source, and obtain admixtures through one source from a single manufacturer.

D. ACI Publications:

1. Comply with the following unless modified by requirements in the Contract Documents:
    a. ACI 117, "Standard Specifications for Tolerances for Concrete Construction and Materials."
    b. ACI 211.1, "Recommended Practice for Selecting Proportions for Normal and Heavyweight Concrete."
    c. ACI 214, "Evaluation of Strength Test Results of Concrete."
    d. ACI 301, "Specification for Structural Concrete."
    e. ACI 304, "Guide for Measuring, Mixing, Transporting and Placing Concrete."
    f. ACI 305, "Hot Weather Concreting."
    g. ACI 306, "Cold Weather Concreting."
    h. ACI 308, "Guide to Curing Concrete."
    i. ACI 309, "Guide for Consolidation of Concrete."

j. ACI 311.1, “ACI Manual of Concrete Inspection.”

k. ACI 315, “Details and Detailing of Concrete Reinforcement.”

l. ACI 318, “Building Code Requirements for Structural Concrete and Commentary.”

m. ACI 347, “Guide for Formwork for Concrete.”

2. Where the language in any of the documents referred to herein is in the form of a recommendation or suggestion, such recommendations or suggestions shall be deemed to be mandatory under this Contract.

E. American Society for Testing and Materials (ASTM):

1. ASTM C309 "Liquid Membrane-Forming Compounds for Curing Concrete."
2. ASTM C494 "Standard Specification for Chemical Admixtures for Concrete."
3. ASTM C979 "Standard Specification for Pigments for Integrally Colored Concrete."

F. American Association of State Highway and Transportation Officials (AASHTO):

1. AASHTO M194 "Chemical Admixtures."

G. Pre-installation Conference: Conduct a conference at the Project site to comply with requirements in Division 1 Section “Project Management and Coordination.”

1. Before submitting design mixtures, review concrete design mixture and examine procedures for ensuring quality of concrete materials. Require representatives of each entity directly concerned with cast-in-place concrete to attend including the following:
   a. Contractor’s superintendent.
   b. Independent testing agency responsible for concrete design mixtures.
   c. Ready-mix concrete manufacturer.
   d. Concrete subcontractor.
   e. Structural Engineer.
   f. Independent testing agency responsible for field testing.
   g. Owner’s Authorized Representative.
   h. Engineer.
2. Review inspection and testing and inspecting agency procedures for field quality control, concrete finishes and finishing, cold and hot-weather concreting procedures, curing procedures, construction contraction and isolation joints, and joint filler strips, semi-rigid joint fillers, forms and form removal limitations, anchor rod and anchorage device installation tolerances,

steel reinforcement installation, floor slab and slab flatness and levelness measurement, concrete repair procedures, and concrete protection.

1.05 DELIVERY, STORAGE, AND HANDLING:

A. Steel Reinforcement: Deliver, store, and handle steel reinforcement to prevent bending and damage.

PART 2 -PRODUCTS

2.01 FORM-FACING MATERIALS:

A. Smooth-Formed Finished Concrete: Form-facing panels that will provide continuous, true, and smooth concrete surfaces. Furnish in largest practicable sizes to minimize number of joints.

1. Plywood, metal, or other approved panel materials.
2. Formwork for elements exposed to view, including, but not limited to knee walls, above grade piers, and exposed faces of retaining walls, shall conform to Surface Finish 3.0 per ACI 301.

B. Forms for Cylindrical Columns, Pedestals, and Supports: Metal, glass-fiber-reinforced plastic, paper, or fiber tubes that will produce surfaces with gradual or abrupt irregularities not exceeding specified formwork surface class. Provide units with sufficient wall thickness to resist plastic concrete loads without detrimental deformation.

C. Chamfer Strips: Wood, metal, PVC, or rubber strips, 1-inch by 1-inch, minimum.

D. Rustication Strips: Wood, metal, PVC, or rubber strips, kerfed for ease of form removal.

E. Form-Release Agent: Commercially formulated form-release agent that will not bond with, stain, or adversely affect concrete surfaces and will not impair subsequent treatments of concrete surfaces.

1. Formulate form-release agent with rust inhibitor for steel form-facing materials.

F. Form Ties: Factory-fabricated, removable or snap-off metal or glass-fiber-reinforced plastic form ties designed to resist lateral earth pressure of fresh concrete on forms and to prevent spalling of concrete on removal.

G. Furnish units that will leave no corrodible metal closer than 1-inch to the plane of exposed concrete surface.

H. Furnish ties with integral water-barrier plates to walls indicated to receive dampproofing or waterproofing.

I. Formliners for Cast-In-Place Concrete Retaining Wall, Type 2: Formliner shall be applied as called out in construction drawings. Formliner shall be Pattern 16021 1.5" Wide Plank Random Depth Vac U Form by Fitzgerarld Formliners, 1500 East Chestnut Ave, Santa Ana, CA 92701, Phone: (800) 547 7760, (714) 547 6710, www.formliners.com, or

1. Model #152 Grave Stake as manufactured by Scott System, Inc., 10777 East 45th Avenue, Denver, Colorado 80239, (303) 373 2500, www.scottsystem.com, or

2. Model #313 SALEM as manufactured by Architectural Polymers, Inc., 1220 Little Gap Road, Palmerton, PA 18071, PH: 610-824-3322, FAX: 610-824-3777, www.apformliner.com, or

3. Or approved equal.

2.02 STEEL REINFORCEMENT:

A. Reinforcing Bars: ASTM A 615, Grade 60, deformed.

B. Plain Steel Wire: ASTM A 82, as drawn.

C. Plain-Steel Welded Wire Reinforcement: ASTM A 185, plain, fabricated from as-drawn steel wire into flat sheets.

D. Steel reinforcing shall be galvanized per ASTM A767 Class 1.

2.03 NON-METALLIC SHRINKAGE RESISTANT GROUT:

A. Grout: ASTM C 1107, factory-packaged, nonmetallic aggregate grout, noncorrosive, non-staining, mixed with water to consistency suitable for application and a 30-minute working time. The minimum ultimate compressive strength of the grout shall be 5000 psi at 7 days and 7500 psi at 28 days.

2.04 REINFORCEMENT ACCESSORIES:

A. Joint Dowel Bars: ASTM A 615, Grade 60, plain-steel bars, cut bars true to length with ends square and free of burrs.

B. Bar Supports: Bolster, chairs, spacers, and other devices for spacing, supporting, and fastening reinforcing bars and welded wire reinforcement in place. Manufacture bar supports from steel wire, plastic, or precast concrete according to CRSI's "Manual of Standard Practice", of greater of compressive strength than concrete and as follows:

1. For concrete surfaces exposed to view where legs of wire bar supports contact forms, use CRSI Class 1 plastic-protected steel wire or CRSI Class 2 stainless steel bar supports.
2. For slabs-on-grade, use supports with sand plates or horizontal runners where base material will not support chair legs. Concrete bricks may be used to support reinforcing steel where application allows.

2.05 CONCRETE MATERIALS:

A. Cementitious Material: Use the following cementitious materials, of the same type, brand, and source, throughout the Project:

1. Portland Cement: ASTM C 150, Type I/II. Supplement with the following:

B. Fly Ash: ASTM C 618, Class C or F.

C. Ground Granulated Blast Furnace Slag: ASTM C 989, Grade 100 or 120.

D. Cementitious Materials: Percentage, by weight, of cementitious materials other than Portland cement in concrete as follows:

1. Fly Ash or Ground Granulated Blast Furnace Slag: 25 percent, minimum.
2. Combined Fly Ash and Pozzolan: 35 percent, maximum.
3. Ground Granulated Blast Furnace Slag: 50 percent, maximum.
4. Combined Fly Ash or Pozzolan and Ground Granulated Blast Furnace Slag: 50 percent Portland cement minimum, with fly ash or pozzolan not exceeding 35 percent.

E. Normal-Weight Aggregates: ASTM C 33, Class 3S coarse aggregate or better, graded. Provide aggregates from a single source.

1. Maximum Coarse Aggregate Size: ¾-inch nominal.
2. Fine Aggregate: Free of materials with deleterious reactivity to alkali in cement.

F. Water: ASTM C 94 and potable.

2.06 ADMIXTURES:

A. Air-Entraining Admixture: ASTM C 260.

B. Chemical Admixtures: Provide admixtures certified by manufacturer to be compatible with other admixtures and that will not contribute water-soluble chloride ions exceeding those permitted in hardened concrete. Do not use calcium chloride or admixtures containing calcium chloride.

1. Water-Reducing Admixture: ASTM C 494, Type A.
2. Retarding Admixture: ASTM C 494, Type B.
3. Water-Reducing and Retarding Admixture: ASTM C 494, Type D.
4. High-Range, Water-Reducing Admixture: ASTM C 494, Type F.
5. High-Range, Water-Reducing and Retarding Admixture: ASTM C 494, Type G.
6. Plasticizing and Retarding Admixture: ASTM C 1017, Type II.

C. Set-Accelerating Corrosion-Inhibiting Admixture: Commercially formulated, anodic inhibitor or mixed cathodic and anodic inhibitor,; capable of forming a protective barrier and minimizing chloride reactions with steel reinforcement in concrete and complying with ASTM C 494, Type C.

1. Products:
2. Euclid Chemical Company; Eucon CIA.
3. Grace Construction Products, W.R. Grace & Co.; DCI.
4. BASF Admixtures, Inc.; Rheocrete CNI.
5. Sika Corporation; Sika CNI.

D. Non-Set-Accelerating Corrosion-Inhibiting Admixture: Commercially formulated, non-set-accelerating, anodic inhibitor or mixed cathodic and anodic inhibitor; capable of forming a protective barrier and minimizing chloride reactions with steel reinforcement in concrete.

1. Products:
    a. Grace Construction Products, W.R. Grace & Co.; DCI-S.
    b. Sika Corporation; FerroGard 903
    c. Or approved equal.

2.07 CURING MATERIALS:

A. Absorptive Cover: AASHTO M 182, Class 2, burlap cloth made from jute or kenaf, weighing approximately 9 oz. /sq. yd. when dry.

B. Moisture-Retaining Cover: ASTM C 171, polyethylene film or white burlap-polyethylene sheet.

C. Water: Potable.

D. Clear, Waterborne, Membrane-Forming Curing Compound: ASTM C 309, Type 1, Class B, 18 to 25 percent solids, non-dissipating, certified by curing compound manufacturer to not interfere with bonding of floor coverings.

1. Products:
    a. Conspec Marketing & Manufacturing Co., Inc., a Dayton Superior Company; High Seal.
    b. Dayton Superior Corporation; Safe Cure and Seal (J-19).
    c. Euclid Chemical Company; Diamond Clear VOX.
    d. Lambert Corporation; Glazecote Sealer-20.
    e. L&M Construction Chemicals, Inc.; Dress & Seal WB.
    f. Meadows, W.R., Inc.; Vocomp-20.
    g. Nox-Crete Products Group, Kinsman Corporation; Cure & Seal 200E.
    h. Sonneborn, Div. Of ChemRex; Kure-N-Seal.
    i. Symons Corporation, a Dayton Superior Company; Cure & Seal 18 Percent E.

E. Clear, Waterborne, Membrane-Forming Curing and Sealing Compound: ASTM C 1315, Type 1, Class A.

1. Products:
    a. Conspec Marketing & Manufacturing Co., Inc., a Dayton Superior Company; Sealcure 1315 WB.
    b. Euclid Chemical Company; Super Diamond Clear VOX.
    c. Lambert Corporation; UV Safe Seal.
    d. L&M Construction Chemicals, Inc.; Lumiseal WB Plus.
    e. Meadows, W.R., Inc.; Vocomp-30.
    f. Symons Corporation, a Dayton Superior Company; Cure & Seal 31 Percent E.

2.08 RELATED MATERIALS:

A. Expansion and Isolation Joint Filler Strips: ASTM D 1752, cork or self-expanding cork.

B. Semirigid Joint Filler: Two-component, semirigid, 100 percent solids, epoxy resin with a Type A shore durometer hardness of 80 per ASTM D 2240.

C. Bonding Agent: ASTM C 1059, Type II, non-redispersible, acrylic emulsion or styrene butadiene.

D. Epoxy Bonding Adhesive: ASTM C 881, two-component epoxy resin, capable of humid curing and bonding to damp surfaces, of class suitable for application temperature and of grade to suit requirements, and as follows:

1. Types IV and V, load bearing, for bonding hardened or freshly mixed concrete to hardened concrete.

E. Reglets: Fabricate reglets of not less than 0.0217-inch thick, galvanized steel sheet. Temporarily fill or cover face opening of reglet to prevent intrusion of concrete or debris.

B. Dovetail Anchor Slots: Hot-dip galvanized steel sheet, not less than 0.0336-inch thick, with bent tab anchors. Temporarily fill or cover face opening of slots to prevent intrusion of concrete or debris.

2.09 REPAIR MATERIALS:

A. Repair Underlayment: Cement based, polymer-modified, self-leveling product that can be applied in thicknesses from 1/8-inch and that can be feathered at edges to match adjacent floor elevations.

1. Cement Binder: ASTM C 150, Portland cement or hydraulic or blended hydraulic cement as defined in ASTM C 219.
2. Primer: Product of underlayment manufacturer recommended for substrate, conditions, and application.
3. Aggregate: Well-graded, washed gravel, 1/8-inch to ¼-inch or coarse sand as recommended by the underlayment manufacturer.
4. Compressive Strength: Not less than 4100 psi at 28 days when tested in accordance with ASTM C 109.

B. Repair Overlayment: Cement based, polymer-modified, self-leveling product that can be applied in thicknesses from 1/8-inch and that can be feathered at edges to match adjacent floor elevations.

1. Cement Binder: ASTM C 150, Portland cement or hydraulic or blended hydraulic cement as defined in ASTM C 219.
2. Primer: Product of underlayment manufacturer recommended for substrate, conditions, and application.
3. Aggregate: Well-graded, washed gravel, 1/8-inch to ¼-inch or coarse sand as recommended by the topping manufacturer.
4. Compressive Strength: Not less than 5000 psi at 28 days when tested in accordance with ASTM C 109.

2.10 CONCRETE MIXTURES, GENERAL:

A. Prepare design mixtures for each type and strength of concrete, proportioned on the basis of laboratory trial mixture or field test data, or both, according to ACI 301.

1. Use a qualified independent testing agency for preparing and reporting proposed mixture designs based on trial mixtures.

B. Cementitious Materials: Limit percentage, by weight, of cementitious materials other than Portland cement in concrete as follows:

1. Fly Ash: 25 percent.
2. Combined Fly Ash and Pozzolan: 25 percent.
3. Ground Granulated Blast-Furnace Slag: 50 percent.
4. Combined Fly Ash or Pozzolan and Ground Granulated Blast-Furnace Slag: 50 percent.

C. Limit water-soluble, chloride-ion content in hardened concrete to 0.15 percent by weight of cement.

D. Admixtures: Use admixtures according to manufacturer's written instructions.

1. Use water-reducing, high-range water reducing or plasticizing admixture in concrete, as required, for placement and workability.
2. Use water-reducing and retarding admixture when required by high temperatures, low humidity, or other adverse placement conditions.
3. Use water-reducing admixture in pumped concrete, concrete for heavy-use industrial slabs and parking structure slabs, concrete required to be watertight, and concrete with a water cementitious materials ratio below 0.50.
4. Use retarding admixture in combination with Set accelerating Corrosion Inhibitor. Retarder is not required for non-set accelerating corrosion inhibitor.
5. Use corrosion inhibiting admixture in concrete mixtures where indicated.

2.11 CONCRETE MIXTURES FOR BUILDING ELEMENTS:

A. Footings, Walls and Retaining Walls: Proportion normal-weight concrete mixture as follows:

1. Minimum Compressive Strength: 4500 psi at 28 days.
2. Maximum Water-Cementitious Materials Ratio: 0.40.
3. Slump Limit: 4-inches for concrete with verified slump of 2-inch to 4-inches before adding high-range water-reducing admixture or plasticizing admixture, plus or minus 1-inch.
4. Air Content: 6 percent, plus or minus 1.5 percent at point of delivery for 3/4-inch nominal maximum aggregate size.
5. Corrosion Inhibiting Admixture: Apply to all slabs at a rate of 2 gallons per cubic yard of concrete.

B. Slabs-on-Grade, Exterior Walks: Proportion normal-weight concrete mixture as follows:

1. Minimum Compressive Strength: 5000 psi at 28 days.
2. Maximum Water-Cementitious Materials Ratio: 0.40.
3. Slump Limit: 4-inches for concrete with verified slump of 2-inch to 4-inches before adding high-range water-reducing admixture or plasticizing admixture, plus or minus 1-inch
4. Air Content: 6 percent, plus or minus 1.5 percent at point of delivery for 3/4-inch nominal maximum aggregate size.
5. Corrosion Inhibiting Admixture: Apply to all slabs at a rate of 2 gallons per cubic yard of concrete.

2.12 FABRICATING REINFORCEMENT:

A. Fabricate steel reinforcement according to CRSI's "Manual of Standard Practice".

2.13 CONCRETE MIXING:

A. Ready-Mix Concrete: Measure, batch, mix, and deliver concrete according to ASTM C94, and furnish batch ticket information.

B. When air temperature is between 85 and 90 degrees F, reduce mixing and delivery time from 1-1/2 hours to 75 minutes; when air temperature is above 90 degrees F, reduce mixing and delivery time to 60 minutes.

PART 3 - EXECUTION

3.01 GENERAL:

A. Coordinate the installation of joint materials, and other related materials with placement of forms and reinforcing.

3.02 FORMWORK:

A. Design, erect, shore, brace, and maintain formwork, according to ACI 301, to support vertical, lateral, static, and dynamic loads, and construction loads that might be applied, until structure can support such loads.

B. Construct formwork so concrete members and structures are of size, shape, alignment, elevation, and position indicated, within tolerance limits of ACI 117. For elements exposed to view, conform to Surface Tolerance A.

C. Limit concrete surface irregularities, designated by ACI 347R as abrupt or gradual, as follows:

1. Class A, 1/8-inch for smooth-formed finished surfaces.

D. Construct forms tight enough to prevent loss of concrete mortar.

E. Fabricate forms for easy removal without hammering or prying against concrete surfaces. Provide crush or wrecking plates where stripping may damage concrete surfaces. Provide top forms for inclined surfaces steeper than 1.5 horizontal to 1 vertical.

1. Install keyways, reglets, recesses, and the like for easy removal.
2. Do not use rust-stained steel form-facing material.

F. Set edge forms, bulkheads, and intermediate screed strips for slabs to achieve required elevations and slopes in finished concrete surfaces. Provide and secure units to support screed strips; use strike-off templates or compacting-type screeds.

G. Provide temporary openings for cleanouts and inspections ports where interior area formwork is inaccessible. Close openings with panels tightly fitted to forms and securely braced to prevent loss of concrete mortar. Locate temporary openings in forms at inconspicuous locations.

H. Chamfer exterior corners and edges of permanently exposed concrete.

I. Form openings, chases, offsets, sinkages, keyways, reglets, blocking, screeds, and bulkheads required in the Work. Determine sizes and locations from trades providing such items.

J. Clean forms and adjacent surfaces to receive concrete. Remove chips, wood, sawdust, dirt, and other debris just before placing concrete.

K. Retighten forms and bracing before placing concrete, as required, to prevent mortar leaks and maintain proper alignment.

L. Coat contact surfaces of forms with form-release agent, according to manufacturer's written instructions, before placing reinforcement.

3.03 EMBEDDED ITEMS:

A. Place and secure anchorage devices and other embedded items required for adjoining work that is attached to or supported by cast-in-place concrete. Use setting drawings, templates, diagrams, instructions, and directions furnished with items to be embedded.

1. Install anchor rods, accurately located, to elevations required and complying with tolerances in Section 7.5 of AISC's "Code of Standard Practice for Steel Buildings and Bridges".
2. Install reglets to receive waterproofing and to receive through-wall flashings in outer face of concrete frame at exterior walls, where flashing is shown at lintels, shelf angles, and other conditions.

B. Forms for Slabs: Set edge forms, bulkheads, and intermediate screed strips for slabs to achieve required elevations and contours in finished surfaces. Provide and secure units to support screed strips using strike-off templates or compacting type screeds.

3.04 REMOVING AND REUSING FORMS:

A. General: Formwork for sides of beams, walls, columns, and similar parts of the Work that does not support weight of concrete may be removed after cumulatively curing at not less than 50 degrees F for 24 hours after placing concrete, if concrete is hard enough to not be damaged by form removal operations and curing and protection operations are maintained.

B. Clean and repair surfaces of forms to be reused in the Work. Split, frayed, delaminated, or otherwise damaged form-facing material will not be acceptable for exposed surfaces. Apply new form-release agent.

C. When forms are reused, clean surfaces, remove fins and laitance, and tighten to close joints. Align and secure joints to avoid offsets. Do not use patched forms for exposed concrete surfaces unless approved by the Owner's Representative.

3.05 STEEL REINFORCEMENT:

A. General: Comply with CRSI's "Manual of Standard Practice" for placing reinforcement.

1. Do not cut or puncture vapor retarder. Repair damage and reseal vapor retarder before placing concrete.

B. Clean reinforcement of loose rust and mill scale, earth, ice, and other foreign materials that would reduce bond to concrete.

C. Accurately position, support, and secure reinforcement against displacement. Locate and support reinforcement with bar supports to maintain minimum concrete cover. Do not tack weld crossing reinforcing bars.

D. Set wire ties with ends directed into concrete, not toward exposed concrete surfaces.

E. Install welded wire reinforcement in longest practicable lengths on bar supports spaced to minimize sagging. Lap edges and ends of adjoining sheets at least one

mesh spacing. Offset laps of adjoining sheet widths to prevent continuous laps in either direction. Lace overlaps with wire ties.

3.06 JOINTS:

A. General: Construct joints true to line with faces perpendicular to surface plane of concrete.

B. Construction Joints: Install so strength and appearance of concrete are not impaired, at locations indicated or approved by the Owner's Representative.

1. Place joints perpendicular to main reinforcement. Continue reinforcement across construction joints, unless otherwise indicated. Do not continue reinforcement through sides of strip placements of floors and slabs.
2. Form keyed joints as indicated. Embed keys at least 1-1/2-inches into concrete.
3. Locate joints for beams, slabs, joists, and girders in the middle third of spans. Offset joints in girders a minimum distance of twice the beam width from a beam-girder intersection.
4. Use a bonding agent at locations where fresh concrete is placed against hardened or partially hardened concrete surfaces.
5. Use epoxy-bonding adhesive at locations where fresh concrete is placed against hardened or partially hardened concrete surfaces.

C. Doweled Joints: Install dowel bars and support assemblies at joints where indicated. Lubricate or asphalt coat one-half of dowel length to prevent concrete bonding to one side of joint.

3.07 CONCRETE PLACEMENT:

A. Before placing concrete, verify that installation of formwork, reinforcement, and embedded items is complete and that required inspections have been performed.

B. Do not add water to concrete during delivery, at Project site, or during placement unless approved by Owner's Representative.

C. Before test sampling and placing concrete, water may be added at Project site, subject to limitations of ACI 301.

1. Do not add water to concrete after adding high-range water-reducing admixtures to mixture.

D. Deposit concrete continuously in one layer or in horizontal layers of such thickness that no new concrete will be placed on concrete that has hardened enough to cause

seams or planes of weakness. If a section cannot be placed continuously, provide construction joints as indicated. Deposit concrete to avoid segregation.

1. Deposit concrete in horizontal layers of depth not to exceed formwork design pressures and in a manner to avoid inclined construction joints.
2. Consolidate placed concrete with mechanical vibrating equipment according to ACI 301.
3. Do not use vibrators to transport concrete. Insert and withdraw vibrators vertically at uniformly spaced locations to rapidly penetrate placed layer and at least 6-inches into preceding layer. Do not insert vibrators into lower layers of concrete that have begun to lose plasticity. At each insertion, limit duration of vibration to time necessary to consolidate concrete and complete embedment of reinforcement and other embedded items without causing mixture constituents to segregate.

E. Cold-Weather Placement: Comply with ACI 306.1 and as follows. Protect concrete work from physical damage or reduced strength that could be caused by frost, freezing actions, or low temperatures.

1. When average high and low temperature is expected to fall below 40 degrees F for three successive days, maintain delivered concrete mixture temperature within the temperature range required by ACI 301.
2. Do not use frozen materials or materials containing ice or snow. Do not place concrete on frozen subgrade or on subgrade containing frozen materials.
3. Do not use calcium chloride, salt, or other materials containing antifreeze agents or chemical accelerators unless otherwise specified and approved in mixture designs.

F. Hot-Weather Placement: Comply with ACI 301 and as follows:

1. Maintain concrete temperature below 90 degrees F at time of placement. Chilled mixing water or chopped ice may be used to control temperature, providing water equivalent of ice is calculated to total amount of mixing water. Using liquid nitrogen to cool concrete is Contractor's option.
2. Fog-spray forms, steel reinforcement, and subgrade just before placing of concrete. Keep subgrade uniformly moist without standing water, soft spots, or dry areas.

3.08 FINISHING FORMED SURFACES:

A. Rough-Formed Finish: As-cast concrete texture imparted by form-facing material with tie holes and defects repaired and patched. Remove fins and other projections that exceed specified limits on formed-surface irregularities.

1. Apply to concrete surfaces not exposed to public view.

B. Smooth-Formed Finish: Provide Surface Finish 3.0 per ACI 301 and Surface Tolerance Class A per ACI 117. As-cast concrete texture imparted by form-facing material, arranged in an orderly and symmetrical manner with minimum number of seams. Repair and patch tie holes and defects. Remove fins and other projections that exceed specified limits on formed-surface irregularities.

1. Apply to concrete surfaces exposed to view including but not limited to knee walls, above grade piers, and exposed faces of retaining walls.
2. Mock-up of concrete surface appearance is not required.

C. Related Unformed Surfaces: At tops of walls, horizontal offsets, and similar unformed surfaces adjacent to formed surfaces, strike off smooth finish with texture matching adjacent formed surfaces. Continue final surface treatment of formed surfaces uniformly across adjacent unformed surfaces, unless otherwise indicated.

3.09 MISCELLANEOUS CONCRETE ITEMS:

A. Filling In: Fill in holes and openings left in concrete structures, unless otherwise indicated, after work of other trades is in place. Mix, place, and cure concrete, as specified, to blend with in-place construction. Provide other miscellaneous concrete filling indicated or required to complete the Work.

B. Curbs: Provide monolithic finish to interior curbs by stripping forms while concrete is still green and by steel-troweling surfaces to a hard, dense finish with corners, intersections, and terminations slightly rounded.

C. Equipment Bases and Foundations: Provide machine and equipment bases and foundations as shown on Drawings. Set anchor bolts for machines and equipment at correct elevations, complying with diagrams or templates from manufacturer furnishing machines and equipment.

3.10 CONCRETE PROTECTING AND CURING:

A. General: Protect freshly placed concrete from premature drying and excessive cold or hot temperatures. Comply with ACI 306.1 for cold-weather protection and ACI 301 for hot-weather protection during curing.

B. Unformed Surfaces: Begin curing immediately after finishing concrete. Cure unformed surfaces, including floors and slabs, concrete floor toppings, and other surfaces.

C. Cure concrete according to ACI 308.1, by one or a combination of the following methods:

1. Moisture Curing: Curing all slabs in the project with moisture curing. Keep surfaces continually moist for not less than seven days with the following materials:
    a. Water.
    b. Continuous water-fog spray.
    c. Absorptive cover, water saturated, and kept continuously wet. Cover concrete surfaces and edges with 12-inch lap over adjacent absorptive covers.
2. Moisture-Retaining Cover Curing: Cover concrete surfaces with moisture-retaining cover for curing concrete, placed in the widest practicable width, with sides and ends lapped at least 12-inches, and sealed by waterproof tape or adhesive. Cure for not less than seven days. Immediately repair any holes or tears during curing period using cover material and waterproof tape.
3. Curing Compound: Apply uniformly in continuous operation by power spray or roller according to manufacturer's written instructions. Recoat areas subject to heavy rainfall within three hours after initial applications. Maintain continuity of coating and repair damage during curing period.
    a. After curing period has elapsed, remove curing compound without damaging concrete surfaces by method recommended by curing compound manufacturer unless manufacturer certifies curing compound will not interfere with bonding of floor covering used on Project.

D. Curing Formed Surfaces: Cure formed concrete surfaces, including underside of beams, supported slabs, and other similar surfaces, by moist curing with forms in place for the full curing period or until forms are removed. If forms are removed, continue curing by methods specified above, as applicable.

3.11 JOINT FILLING:

A. Prepare, clean, and install joint filler according to manufacturer's written instructions.

1. Defer joint filling until concrete has aged at least one month. Do not fill joints until construction traffic has permanently ceased.

B. Remove dirt, debris, saw cuttings, curing compounds, and sealers from joints; leave contact faces of joint clean and dry.

3.12 CONCRETE SURFACE REPAIRS:

A. Defective Concrete: repair and patch defective areas when approved by the Owner's Representative. Remove and replace concrete that cannot be repaired and patched to the Owner's Representative's approval.

B. Patching Mortar: Mix dry-pack patching mortar, consisting of one part Portland cement to two and one-half parts fine aggregate passing a No. 16 sieve, using only enough water for handling and placing.

C. Repairing Formed Surfaces: Surface defects include color and texture irregularities, cracks, spalls, air bubbles, honeycombs, rock pockets, fins and other projections on the surface, and stains and other discolorations that cannot be removed by cleaning.

1. Immediately after form removal, cut out honeycombs, rock pockets, and voids more than ½-inch in any dimension in solid concrete, but not less than 1-inch in depth. Make edges of cuts perpendicular to concrete surface. Clean, dampen with water, and brush coat holes and voids with bonding agent. Fill and compact patching mortar before bonding agent has dried. Fill form-tie voids with patching mortar or cone plugs secured in place with bonding agent.
2. Repair defects on surfaces exposed to view by blending white Portland cement and standard Portland cement so that, when dry, patching mortar will match surrounding color. Patch a test area at inconspicuous locations to verify mixture and color match before proceeding with patching. Compact mortar in place and strike off slightly higher than surrounding surface.
3. Repair defects on concealed formed surfaces that affect concrete's durability and structural performance as determined by the Owner's Representative.

D. Repairing Unformed Surfaces: Test unformed surfaces, such as floors and slabs, for finish and verify surface tolerances specified for each surface. Correct low and high areas. Test surfaces sloped to drain for trueness of slope and smoothness; use a sloped template.

1. Repair finished surfaces containing defects. Surface defects include spalls, pop outs, honeycombs, rock pockets, crazing and cracks in excess of 0.01-inch wide or that penetrate to reinforcement or completely through unreinforced sections regardless of width, and other objectionable conditions.
2. After concrete has cured at least 14-days, correct high areas by grinding.
3. Correct localized low areas during or immediately after completing surface finishing operations by cutting out low areas and replacing with patching mortar. Finish repaired areas to blend into adjacent concrete.
4. Correct other low areas scheduled to receive floor coverings with a repair underlayment. Prepare, mix, and apply repair underlayment and primer according to manufacturer's written instructions to produce a smooth, uniform, plane, and level surface. Feather edges to match adjacent floor elevations.
5. Repair defective areas, except random cracks and single holes 1-inch or less in diameter, by cutting out and replacing with fresh concrete. Remove

defective areas with clean, square cuts and expose steel reinforcement with at least ¾-inch clearance all around. Dampen concrete surfaces in contact with patching concrete and apply bonding agent. Mix patching concrete of same materials and mixture as original concrete except without coarse aggregate. Place, compact, and finish to blend with adjacent finished concrete. Cure in same manner as adjacent concrete.

6. Repair random cracks and single holes 1-inch or less in diameter with patching mortar. Groove top of cracks and cut out holes to sound concrete and clean off dust, dirt, and loose particles. Dampen cleaned concrete surfaces and apply bonding agent. Place patching mortar before bonding agent has dried. Compact patching mortar and finish to match adjacent concrete. Keep patched area continuously moist for at least 72-hours.

E. Perform structural repairs of concrete, subject to Owner's Representative's approval, using epoxy adhesive and patching mortar.

F. Repair materials and installation not specified above may be used, subject to the Owner's Representative's approval.

3.13 FIELD QUALITY CONTROL:

A. Testing and Inspecting: Owner will engage a qualified testing and inspecting agency to perform field tests and inspections and prepare test reports.

B. Inspections:

1. Steel reinforcement placement.
2. Steel reinforcement welding.
3. Headed bolts and studs.
4. Verification of use of required design mixture.
5. Concrete placement, including conveying and depositing.
6. Curing procedures and maintenance of curing temperature.

C. Concrete Tests: Testing of composite samples of fresh concrete obtained according to ASTM C 172 shall be performed according to the following requirements:

1. Testing Frequency: Obtain one composite sample of each day's pour of each concrete mixture exceeding 5 cubic yards, but less than 25 cubic yards, plus one set for each additional 50 cubic yards or fraction thereof.
2. Slump: ASTM C 143; one test at point of placement for each composite sample, but not less than one test for each day's pour of each concrete mixture. Perform additional tests when concrete consistency appears to change.

3. Air Content: ASTM C 231, pressure method, for normal-weight concrete; one test for each composite sample, but not less than one test for each day's pour of each concrete mixture.
4. Concrete Temperature: ASTM C 1064; one test hourly when air temperature is 40 degrees F and below and when 80 degrees F and above, and one test for each composite sample.
5. Compression Test Specimens: ASTM C 31.
6. Cast and laboratory cure five standard cylinder specimens for each composite sample.
7. Compressive Strength Tests: ASTM C 39; test one set of two-laboratory-cured specimens at 7 days and one set of two specimens at 28 days. Test remaining specimen at 28 days if previous results are satisfactory or retain this specimen for 56 day testing if results are not satisfactory.
8. Strength of each concrete mixture will be satisfactory if every average of any three consecutive compressive strength tests equals or exceeds specified compressive strength and no compressive strength test value falls below specified compressive strength by more than 500 psi.

D. Test results shall be reported in writing to the Owner's Representative, concrete manufacturer, and Contractor within 48 hours of testing. Reports of compressive strength tests shall contain Project identification name and number, date of concrete placement, name of concrete testing and inspecting agency, location of concrete batch in Work, design compressive strength at 28 days, concrete mixture proportions and materials, compressive breaking strength, and type of break for both 7 and 28 day tests.

1. Nondestructive Testing: Impact hammer, sonoscope, or other nondestructive device may be permitted by Owner's Representative but will not be used as the sole basis for approval or rejection of concrete.
2. Additional Tests: Testing and inspecting agency shall make additional tests of concrete when test results indicate that slump, air entrainment, compressive strengths, or other requirements have not been met, as required by the Owner's Representative. Testing and inspecting agency may conduct tests to determine adequacy of concrete by cored cylinders complying with ASTM C 42 or by other methods as required by the Owner's Representative.
3. Additional testing and inspecting, at Contractor's expense, will be performed to determine compliance of replaced or additional work with specified requirements.
4. Correct deficiencies in the Work that test reports and inspections indicate does not comply with the Contract Documents.

E. Measure floor and slab flatness and levelness according to ASTM E 1155 within 24 hours of finishing.

3.14 GROUTING:

A. Mix grout in accordance with the approved manufacturer's instructions to a consistency which will permit placement. Place grout so as to ensure complete bearing and elimination of air pockets.

END OF SECTION

SECTION 05 50 00

MISCELLANEOUS METALS

PART 1 - GENERAL

1.01 WORK INCLUDED:

A. This section of the specification covers all miscellaneous metal items required for the work, except as specified elsewhere.

B. All miscellaneous metalwork shall be fabricated as detailed or approved and shall be installed complete with all necessary anchors, anchor bolts, eye bolts, guides, bolts and other accessories.

C. In general, site and shop fabricated items are included under this section, and factory fabricated items excluded. This section includes but is not limited to: fasteners, plates and all other site or shop fabricated metal items.

A.02 RELATED WORK:

A. SECTION 03 05 00, FIELD CONCRETE

B. SECTION 03 30 00, CAST-IN-PLACE CONCRETE

1.03 QUALITY ASSURANCE:

A. The drawings show the character and extent of the work required, but do not attempt to show all methods, materials, and details of construction, fastening, etc. Supplementary parts customarily necessary to complete an item, though such parts are not definitely shown or specified, shall be included as part of the item.

B. Details of construction of the various items shall be submitted on the shop drawings. High quality construction with a neat, finished, and workmanlike appearance will be required.

C. The size and spacing of screws, connectors, anchors, and similar items, and the size and dimensions of metal items stated herein shall apply in general; specific sizes and spacing of fasteners and dimensions of metal items listed on the drawings shall take precedence.

D. Items supplied hereunder which are required to be built into the concrete, masonry, etc., shall be delivered to the site at locations as required by the Engineer, and as required by the overall construction schedule.

E. Manufacturers of other products comparable in quality and type to those specified will be acceptable if satisfactory data on past performance and other required information is furnished by the Contractor, and if approved by the Engineer.

G. Contractor shall submit an affidavit to Engineer that materials used are protected from or will not be subject to galvanic action.

1.04 REFERENCES:

A. The following standards from a part of these specifications, and indicate the minimum standards required:

American Institute of Steel Construction (AISC)

AISC	Specification for Structural Steel Buildings

American Society for Testing and Materials (ASTM)

ASTM	A36	Structural Steel
ASTM	A53	Pipe, Steel, Black and Hot-Dipped Zinc-Coated Welded and Seamless
ASTM	A123	Zinc (Hot-Dip-Galvanized) Coatings on Iron and Steel Products
ASTM	A153	Zinc Coating (Hot-Dip) on Iron and Steel Hardware
ASTM	A239	Test for Uniformity of Coating by the Preece Test (Copper Sulfate Dip) on Zinc-Coated (Galvanized) Iron or Steel Articles
ASTM	A307	Carbon Steel Externally and Internally Threaded Standard Fasteners
ASTM	A366	Steel, Carbon, Cold-Rolled Sheet, Commercial Quality
ASTM	A525	Steel Sheet, Zinc-Coated (Galvanized) by the Hot-Dip Process, General Requirements
ASTM	A569	Steel Carbon (0.15 Maximum Percent) Hot-Rolled Sheet and Strip, Commercial Quality
ASTM	B221	Aluminum-Alloy Extruded Bars, Rods, Shapes and Tubes
ASTM	B308	Aluminum-Alloy Standard Structural Shapes, Rolled or Extruded
ASTM	C478	Precast Reinforced Concrete Manhole Sections

American Welding Society (AWS)

AWS D1.1 Structural Welding Code Steel

1.05 SUBMITTALS: IN ACCORDANCE WITH REQUIREMENTS OF GENERAL SPECIFICATIONS, SUBMIT THE FOLLOWING:

A. Before fabricating or assembling any aluminum or stainless steel items, samples indicating full range of finish, color, and texture to be supplied shall be submitted to the Engineer for review.

B. Shop drawings for all metalwork included in this section shall be submitted to the Engineer for review.

C. The shop drawings shall be complete and checked, showing sizes, layout, method of assembly, fastenings, anchorage or connection with other work, finish, and coatings, etc. Shop drawings for aluminum work shall indicate alloys, temper and finish to be used.

PART 2 - PRODUCTS

2.01 MATERIALS:

A. STEEL:

1. Materials, fabrication, and erection of miscellaneous steel sections shall conform to the applicable requirements of the AISC Specification.

2. Steel shapes, plates and bars shall conform to ASTM A36.

3. Steel pipe shall conform to ASTM A53.

4. Stainless steel shall be Type 304 unless otherwise indicated or specified.

B. FASTENERS:

1. Metalwork shall be complete, with all bolts, anchors, plates, washers, clamps, screws, studs and other such devices for proper securing and anchoring. Where positions of anchorages can be predetermined, they shall be shop-installed on the item; otherwise the material or equipment to be fastened shall be expansion bolted, toggle bolted, screwed, or otherwise fastened as shown on the drawings or called for herein.

2. Bolts and nuts for general anchorage and for miscellaneous ferrous metal assemblies and fasteners shall be galvanized, unfinished bolts conforming to ASTM A307 unless otherwise noted on the drawings.

3. Expansion bolts for use in concrete and masonry shall be of one manufacturer and shall be approved. Bolts shall be Kwik Bolt concrete anchors manufactured by Hilti Corp.; Trubolt+ manufactured by Red Head Concrete Anchoring Specialists; Wej-it manufactured by Wej-it Fastening Systems; or an approved equal product.

4. The centerline of expansion shields shall not be closer than 3-inches to the edge of any concrete in which they are placed.

5. Material for fasteners shall match or be galvanically compatible with the materials fastened. Washers, nuts and other accessories shall match the bolts.

6. Where the specific type, material, size and spacing of fasteners has not been called for on the drawings or in specifications, the fasteners proposed by the Contractor shall be reviewed by the Engineer. If, in the opinion of the Engineer, they are not in accordance with good safety practices, the contractor shall revise and resubmit appropriate fasteners.

PART 3 - EXECUTION

3.01 GALVANIZING:

A. Hot-Dip Galvanizing:

1. Provide a coating for iron and steel fabrication applied by the hot-dip process. The galvanizing bath shall contain .05-.09% nickel. Immediately before galvanizing, the steel shall be immersed in a bath of zinc ammonium chloride. The use of the wet kettle process is prohibited. Comply with ASTM A-123 for fabricated products and ASTM A-153 for hardware. Provide thickness of galvanizing specified in referenced standards. Provide coating by Duncan galvanizing or approved equal.

B. Factory-Applied Primer Over Hot-Dip Galvanizing:

1. Provide a factory-applied polyamide epoxy coating primer, 2.0 mils dry film thickness minimum. Apply primer within 12 hours after galvanizing at the galvanizer's plant in a controlled environment meeting applicable environmental regulations or mechanically abrade to create a uniform surface profile of 1.0 – 2.0 mils, and as recommended by coating manufacturer. Provide primer coating by Duncan Galvanizing, Tnemec Co. or approved equal.

C. Factory – Or Field-Applied Architectural Finish Over Primer And Hot-Dip Galvanizing:

1. Provide a factory- or field-applied polyurethane color coating, 2.5 mils dry film thickness minimum. Apply coating at the galvanizer's plant or coating shop, immediately after application of the prime coat, in a controlled environment meeting applicable regulations, and as recommended by the coating manufacturer. Provide finish coating by Duncan Galvanizing, Tnemec Co. or approved equal.

D. The Contractor shall be responsible for determining if any fabricated items are not suitable to be hot-dip galvanized and shall notify the Engineer in writing.

E. Surfaces of metal to be galvanized shall be free from all dirt, grease, rust and moisture. Burrs and sharp projections shall be removed from edges, holes, etc., before galvanizing. Fabricated items shall be galvanized after fabrication.

3.02 WELDING OF STEEL:

Welding of steel shall be done in accordance with the AWS Code. Welds shall be continuous along entire line of contact, except where plug or tack welding is noted. Exposed welds shall be ground smooth.

3.04 FABRICATION AND ERECTION:

A. Metalwork shall be complete, with all necessary bolts, nuts, washers, anchors, plates, fastenings, and other fittings. To the extent possible, holes for attachment of blocking, clip angles, etc. shall be shop punched. Where shop punching is impracticable, holes shall be field drilled. Burned holes will not be permitted.

B. Material shall be straight, accurately fabricated with joints neatly framed, square, and welded.

C. Metalwork to receive hardware shall have all cutouts and attachments accurately made using the hardware itself or templates where necessary.

D. Metalwork shall be accurately set and secured in position, with lines plumb and level and surfaces flush and square, or as otherwise required to conform to the structure as shown on the drawings.

E. Wherever possible, all metalwork shall be built into the cast in place concrete work and shall have sufficient anchors, well- fastened.

3.05 WORK PROTECTION:

A. Aluminum surfaces, which after erection are to be in contact with wood or treated wood, shall be given a heavy brush coat of aluminum-pigmented bituminous paint or two (2) coats of aluminum metal paint.

B. Aluminum surfaces, which after erection are to be in contact with concrete, shall be given a heavy brush coat of alkali-resistant bituminous paint.

C. Aluminum surfaces which after erection are to be in contact with dissimilar metals, other than zinc or stainless steel, shall receive a heavy brush coat of zinc chromate primer, followed by two (2) coats of aluminum metal and masonry paint, or shall receive a heavy brush coat of alkali-resistant bituminous paint.

D. Aluminum surfaces which are to be exposed to the weather, including anodized surfaces, shall receive two sprayed-on shop coats of water-white methacrylate lacquer, capable of withstanding the action of lime mortar for at least one week in an atmosphere of 100 percent humidity at room temperature. Surfaces shall be perfectly clean and dry before lacquering.

E. Prior to the application of any of the above coatings, any and all areas where the paint has been damaged by abrasion or other cause shall be cleaned and repainted as required so that the aluminum will have a complete protective paint film when brought into contact with the material against which it is being protected.

F. Before application of any coating, the surface shall be cleaned of all dirt, heavy deposits of grease or oil, and other foreign substances such as paint, lacquer, tape, moisture, or other material, which might interfere with the adhesion of the coating to be applied. All metals shall be left in a clean condition. Cleaning methods shall employ steam, mild soaps, mild detergents, or solvents such as kerosene, or naphtha. Lacquered surfaces may be cleaned with a mineral solvent or turpentine. Thorough rinsing with clean water and drying with clean, soft cloths shall follow any of the above cleaning methods. No other cleaning method may be used without the specific permission of the Engineer.

G. After suitable cleaning, all metalwork shall be given an approved shop coating of methacrylate lacquer to protect the surface from stain. The protective coating of lacquer on all metalwork worn off due to handling or erection shall be replaced by a new coating of lacquer of the same type.

H. During construction, precautions shall be taken to prevent damage to the metal work from splashing or the accumulation of paint, concrete, mortar, or other similar materials, or from staining adjacent surfaces during cleaning operations. Any staining or damage that does occur shall be immediately and completely removed.

I. Each piece of metal in transit and in storage shall be individually wrapped with a non-scratching material, with the joints securely sealed. Wrapping shall completely cover and protect each item. Storage shall be out of the weather, protected from moisture, and with adequate ventilation.

3.06 PAINTING:

A. Ferrous metals of this section, except for galvanized or stainless steel shall be shop primed in accordance with the following:

1. Submerged service components shall be sandblasted clean in accordance with SSPC-SP-10, Near White, immediately prior to priming.

2. Non-submerged service components shall be sandblasted clean in accordance with SSPC-SP-6, Commercial Grade, immediately prior to priming.

3. Shop primer, except as otherwise noted, shall be one spray applied coat with dry film thickness of 3.5 to 4.5 mils of Tnemec 66 Boston Gray Primer by Tnemec Co.; or Aquapun by PPG, Inc; or approved equal.

4. Portions of ferrous metals to be embedded in concrete or masonry shall be given a heavy brush coat of alkali resistant bituminous paint.

5. Scratches or abrasions in the shop coat and areas at field welds, bolts, nuts and other unpainted areas shall be touched up after erection with the paint specified for the shop coat. Cold galvanized paint shall be used for touch up of galvanized surfaces. Paint shall be one of the following; Sealube Co., ZRC; Galvicon Corp., Galvicon; Stanley Chemical Div., Zinc Shield; Duncan Galvanizing Corp., ZIRP; or an approved equal.

6. Shop and field prime paint systems shall be compatible with finish coat.

END OF SECTION

SECTION 06 10 00

CARPENTRY

PART 1 - GENERAL

1.01 WORK INCLUDED:

A. This Section covers tools, equipment, labor, and materials necessary to perform rough carpentry work complete and miscellaneous carpentry items not specified elsewhere including fasteners and supports.

B. Nails, screws, bolts, anchors, brackets, and other hardware for fastening and securing items provided under this section of the specification shall be furnished under this section.

1.02 RELATED WORK:

A. Section 03 30 00, CAST-IN-PLACE CONCRETE

D. Section 31 50 00, SUPPORT OF EXCAVATION

1.03 SUBMITTALS: IN ACCORDANCE WITH REQUIREMENTS OF SECTION 01 33 23, SUBMITTALS, SUBMIT THE FOLLOWING:

A. Framing lumber product data and certifications from the appropriate grading agency
B. Three sets of certificates of wood treatment upon delivery of treated wood product. Treated wood product shall bear appropriate American Wood Preservers Bureau (AWPB) quality mark.
C. Fastener and connector product data.

D. Color samples:
   a. Three (3) sets of samples of wood shall be submitted to the Engineer for selection of colors.
   b. Color samples of the non-slip deck tread.

E. Field Measurements: Take accurate field measurements before preparation of shop drawings and fabrication. Do not delay job progress. Allow for field cutting and fitting where taking field measurements before fabrication is not possible.

F. Mock-Up:
   a. Decking: Contractor shall provide at least one (1) fully finished representative samples that maybe installed in the finished condition at the Contractor's option. Showing full range of cuts, fasteners, and variations expected. The sample shall be a minimum of twenty-five (25) square feet.
   b. **Non-slip Deck Treads: Contractor shall lay out the treads for review and approval by the Engineer prior to installation.**

1.04 DELIVERY:

Lumber, plywood, and other wood material shall be delivered to the job dry, and shall be protected from injury, dirt, dampness, and extreme changes of temperature and humidity at all times.

PART 2 - PRODUCTS

2.01 MATERIALS:

A. LUMBER:

1. The grades of all materials under this section shall be defined by the rules of the recognized associations of lumber manufacturers producing the material specified, but the maximum defects and blemishes permissible in any specified grades shall not exceed the limitations of the American Lumber Standards.

2. Lumber shall bear the grade and trademark of the association under whose rules it is produced, and a mark of mill identification. Lumber shall be of sound stock, thoroughly seasoned, kiln dried to a moisture content not exceeding 15 percent.

3. Exposed surfaces of wood which are to be painted shall be free from defects or blemishes that will show after the second coat of paint is applied.

4. Framing Lumber for joists, rafters, plates, headers, stair stringers and carriages, and sleepers shall be Southern Pine Select Structural Grade with the following minimum properties:

Size Classification 12” Wide, 2” -4” Thick	Size Classification 5” x 5” or Larger
$E = 1.8 \times 10^6$ PSI Specific Gravity, G = 0.55 Fb = 1600 PSI Fv = 175 PSI Fc, perp. = 565 PSI Ft = 1100 PSI	$E = 1.5 \times 10^6$ PSI Specific Gravity, G = 0.55 Fb = 1500 PSI Fv = 165 PSI Fc, perp. = 375 PSI Ft = 950 PSI

5. Engineered wood products shall be preservative treated conforming to Trus Joist Pressure Treated Plus PSL or approved equal.

6. Materials not specifically listed shall be of an accepted grade dictated by good practice.

B. WOOD DECKING

1. Wood decking shall be pressure treated Southern Pine with a minimum allowable extreme fiber stress of 1350 PSI and minimum modules of elasticity of 1,400,000 PSI.

2. Wood decking shall be No. 1/Dense Select grade lumber.

3. Wood decking to be fastened with stainless steel screws or better. All screws will be recessed a minimum of ½" below deck surface. At time of installation, planks are to be placed tight together with a maximum 1/8-inch gap between planks.

C. WOOD PRESERVATION TREATMENT:

1. Decking, joists, and beams shall be preservative treated to meet AWPA Use Category 4B. Framing below the deck shall be preservative treated to meet AWPA Use Category 5A. Use of pentachlorophenol is not permitted.

2. Before the preservative treatment is applied, the lumber to be treated shall be sawed to exact lengths required, and bored ready for use in the work so far as practicable, in order to reduce to a minimum cutting or boring of lumber after treatment. Only lumber of the same kind and approximately the same size and seasoning shall be treated in any one charge. All surfaces of treated lumber cut after treatment shall receive two heavy brush coats of preservative solution before the lumber is placed in the work. Framing shall not be incised.

D. NON-SLIP DECK TREAD

1. Non-slip deck treads shall be affixed to the top of each decking board. Two tread shall be used per board and centered on each board.

2. Non-slip deck treads shall be manufactured by Handi-Treads, 5600 99th Ave, Unit A4, Kenosha, WI 53144, 877-328-7389, www.handitreads.com. Treads shall be no-rust and manufactured in aluminum. Dimensions shall be 48-inches long by 1.875-inches wide. Final color to be submitted for approval by the Engineer prior to installation. Hardware needed for the tread installation shall match the tread color.

E. HARDWARE

1. Brackets, spikes, bolts, washers, nuts, joist hangers and all related hardware shall be comprised of steel and shall be hot dipped galvanized in accordance with ASTM A123 or A153, unless noted otherwise on the plans.

2. Prefabricated fasteners (i.e. Simpson/USP Hardware) shall include ZMAX (Simpson G185 galvanized finish) finish or approved equivalent.

3. Bolts shall be ASTM A-307. All bolt holes shall be 1/16" larger than bolt. Furnish bolts of the proper length for each connection (use the plan length of bolts given for estimating purposes only). Furnish square or hexagonal bolt heads and nuts where the washers bear on wood and hexagonal bolt heads where the washers bear on metal.

4. Provide washers on each end of bolts, except with high strength bolts where only one washer is required. Provide standard cut washers for ½ inch bolts or smaller that are

bearing on wood or metal. For bolts larger than ½ inch diameter, furnish cast ogee or approved equivalent malleable castings where washers bear on wood. Furnish cast ogee washers with a diameter of four times the bolt and a thickness at least equal to the diameter of the bolt. Furnish malleable washers with a diameter of four times the bolt and a thickness at least half of the diameter of the bolt.

5. All nails shall be stainless steel.

6. All screws shall be 316 stainless steel unless noted otherwise.

7. Deck screws for securing deck boards shall be stainless steel Torx star head deck screws or approved equal, unless otherwise noted on the plans.

PART 3 - EXECUTION

3.01 CONSTRUCTION:

A. Work shall be erected plumb, true and square.

B. Coordinate delivery and erection of prefabricated components. Field applied items shall be installed in accordance with good trade practices. Cutting and carpentry for other trades shall be performed. Cut ends of lumber previously treated with preservative specified shall be brushcoated with the same material.

C. Examine cable work for railing to determine which cables will be anchored or will penetrate. Coordinate with responsible entity to perform corrective work as necessary. Verify post size and cable spacing are in accordance with the manufacturer's recommendations. Take field measurements and compare installation conditions with construction drawings/plans. Notify manufacturer and owner if field measurements vary from the construction drawings/plans.

D. Except as otherwise indicated on the design drawings, fasteners for nailers and for other wood members used as nailers or anchorage material shall be the equivalent of 1/2-inch diameter bolts at 2'-6" o.c. for 2-inch material, and 3/8-inch diameter bolts at 2'-0" o.c. for 1-inch material.

E. Minimum length of nails shall be twice the thickness of wood being fastened and in accordance with the Massachusetts code requirements for wood frame construction.

F. Furring, blocking, nailers, and similar items shall be provided wherever required for the support, proper erection, fastening, or installation of carpentry or other materials, and as shown on the drawings.

G. Wood decking shall be pre-drilled and attached with galvanized self-tapping screws. Every plank must be attached with at least two fasteners at each end. Decking shall be tied down such that there is no uplift or lateral movement (in direction of bridge span). All fasteners to be zinc plated. Planks are to be pre-drilled prior to installation of bolts

and/or screws. Screw patterns shall be straight, consistent, and evenly spaced throughout and marked by chalk line prior to installation. Decking shall be designed such that deflection is limited to L/300 (where L is the distance between supports. Decking shall have a 1/16-inch gap between adjacent planks.

H. All lumber shall be installed such that all stamps, barcodes, logos, brands, lettering/numbering, or other markings are hidden from view.

I. Re-treat drill (bolt) holes with preservative prior to installation.

J. All shavings and wood cuttings of treated lumber shall be captured and removed. No shavings, cuttings, or scrap treated lumber shall enter the watercourse.

K. Non-slip deck treads shall be installed per manufacturer's recommendations.

END OF SECTION

SECTION 12 93 00

SITE FURNISHINGS

PART 1 - GENERAL

1.01 WORK INCLUDED:

A. Furnish and install site furnishings in the locations shown or as described herein, complete with anchorages and associated site work.

1.02 RELATED SECTIONS:

A. Section 03 30 00, CAST-IN-PLACE CONCRETE

B. Section 31 00 00, EARTHWORK

1.03 SUBMITTALS: IN ACCORDANCE WITH SECTION 01 33 23 SUBMITTALS, SUBMIT THE FOLLOWING:

PART 2 - PRODUCTS

2.01 VEHICLE RATED BOLLARD:

Vehicle rated bollard shall be 4-1/2” diameter schedule 40 steel (ASTM A36), a welded flat cap, 72” length, 7” steel rebar, primed with a black powder coated finish per Model #BOS-SURFACE, as manufactured by Dawn Enterprises, 275 Progress Drive, Suite B, Manchester CT 06042, 800-262-3296, website: www.godawn.com, or approved equal.

Bollard shall be surface mount.

PART 3 - EXECUTION

3.01 Site furnishings shall be installed in accordance with manufacturer's installation instructions, and as shown on the plans.

3.02 Any site improvement materials which are constructed of steel and not galvanized, or factory coated with a finish system shall be painted in the field in accordance with Division 9 Specification "Painting and Finishes". Colors by Engineer.

3.03 All site furnishings shall be installed ready for use.

END OF SECTION

SECTION 31 00 00

EARTHWORK

PART 1 - GENERAL

1.01 WORK INCLUDED:

The Contractor shall make excavations of normal depth in earth for trenches and structures, shall backfill and compact such excavations to the extent necessary, shall furnish the necessary material and construct embankments and fills, and shall make miscellaneous earth excavations and do miscellaneous grading.

1.02 RELATED WORK:

A. Section 00 31 43, PERMITS

B. Section 01 11 00, CONTROL OF WORK AND MATERIALS

C. Section 01 57 19, ENVIRONMENTAL PROTECTION

D. Section 31 05 19.13, GEOTEXTILE FABRICS

E. Section 31 23 19, DEWATERING

F. Section 31 50 00, SUPPORT OF EXCAVATION

G. Section 32 91 19, LOAMING AND SEEDING

1.03 REFERENCES:

ASTM International (ASTM)

ASTM	C131	Test Method for Resistance to Degradation of Small Size Coarse Aggregate by Abrasion and Impact in the Los Angeles Machine.
ASTM	C330	Specification for Lightweight Aggregate for Structural Concrete.
ASTM	D1557	Standard Test Methods for Laboratory Compaction Characteristics of Soil Using Modified Effort (56,000 ft-lbf/ft3) (2700 kN-m/m3))
ASTM	D6938	Test Methods for Density of Soil and Soil-aggregate in Place by Nuclear Methods (Shallow Depth).
ASTM	D6913	Standard Test Method Particle Size Analysis of Soils

Massachusetts Department of Transportation (MassDOT) Standard Specifications for Highways and Bridges.

Code of Massachusetts Regulations (CMR) 310.40.0032 Contaminated Media and Contaminated Debris

Code of Massachusetts Regulations (CMR) 520 CMR 14.00 Excavation & Trench Safety Regulation

1.04 SUBMITTALS: IN ACCORDANCE WITH REQUIREMENTS OF GENERAL SPECIFICATIONS, SUBMIT THE FOLLOWING:

A. Material Test Reports: From a qualified independent testing agency indicating and interpreting test results for compliance of the following with requirements indicated:
   1. Classification according to ASTM D 2487 and moisture content according to ASTM D 2216 of each on-site and borrow soil and/or fill material proposed for fill and backfill.
   2. Laboratory compaction curve according to ASTM D 1557 for each onsite and borrow soil and/or fill material proposed for fill and backfill.

1.05 PROTECTION OF EXISTING PROPERTY:

A. The work shall be executed in such manner as to prevent any damage to facilities at the site and adjacent property and existing improvements, such as but not limited to streets, curbs, paving, service utility lines, structures, monuments, benchmarks, and other public or private property. Protect existing improvements from damage caused by settlement, lateral movements, undermining, washout and other hazards created by earthwork operations.

B. In case of any damage or injury caused in the performance of the work, the Contractor shall, at its own expense, make good such damage or injury to the satisfaction of, and without cost to, the Owner. Existing roads, sidewalks, and curbs damaged during the project work shall be repaired or replaced to at least the condition that existed at the start of operations. The Contractor shall replace, at its own cost, existing benchmarks, monuments, and other reference points, which are disturbed or destroyed.

C. Buried drainage structures and pipes which are subject to damage from construction equipment shall be clearly marked to indicate the hazard. Markers shall indicate limits of danger areas, by means which will be clearly visible to operators of trucks and other construction equipment and shall be maintained at all times until completion of project.

1.06 DRAINAGE:

A. The Contractor shall provide, at its own expense, adequate drainage facilities to complete all work items in an acceptable manner. Drainage shall be done in a manner so that runoff

will not adversely affect construction procedures or cause excessive disturbance of underlying natural ground or abutting properties.

1.07 FROST PROTECTION AND SNOW REMOVAL:

A. The Contractor shall, at its own expense, keep earthwork operations clear and free of accumulations of snow as required to carry out the work.

B. The Contractor shall protect the subgrade beneath new structures from frost penetration when freezing temperatures are expected.

1.08 GEOTECHNICAL FIELD AND LABORATORY TESTING:

The Contractor shall retain the services of a geotechnical testing laboratory to conduct the laboratory analyses and field testing of soil materials required by this specification. Coordinate locations and types of field tests to be performed with the Engineer and cooperate in every way with the Engineer and testing laboratory during field testing and with collection of soil samples for laboratory testing.

PART 2 - PRODUCTS

2.01 MATERIALS:

A. GRAVEL BORROW:

Gravel Borrow shall satisfy the requirements listed in MassDOT Specification Section M1.03.0, Type b.

B. CRUSHED STONE:

Crushed stone shall satisfy the requirements listed in MassDOT Specification Section M2.01.4 (3/4-inch crushed stone) unless otherwise required.

C. SAND BORROW:

Sand Borrow shall satisfy the requirements listed in MassDOT Specification Section M1.04.0.

D. PEASTONE:

Peastone shall be smooth, hard, naturally occurring, rounded stone meeting the following gradation requirements:

Passing 5/8 inch square sieve opening	-	100%
Passing No. 8 sieve opening	-	0%

E. PROCESSED GRAVEL:

1. Processed gravel shall satisfy the requirements listed in MassDOT Specification Section M1.03.1.

2. Processed gravel shall consist of inert material that is hard, durable stone and coarse sand, free from loam and clay, surface coatings and deleterious materials. The coarse aggregate shall have a percentage of wear, by the Los Angeles Abrasion Test, of not more than 50.

3. The gradation shall meet the following requirements:

Sieve Designation	Percentage Passing
3-in.	100
1 ½-in.	70-100
¾-in.	50-85
No. 4	30-60
No. 200	0-10

4. The approved source of bank-run gravel material shall be processed by mechanical means. The equipment for producing crushed gravel shall be of adequate size with sufficient adjustments to produce the desired materials. The processed material shall be stockpiled in such a manner to minimize segregation of particle sizes. All processed gravel shall come from approved stockpiles.

PART 3 - EXECUTION

3.01 DISTURBANCE OF EXCAVATED AND FILLED AREAS DURING CONSTRUCTION:

A. Contractor shall take the necessary steps to avoid disturbance of subgrade during excavation and filling operations, including restricting the use of certain types of construction equipment and their movement over sensitive or unstable materials, dewatering and other acceptable control measures.

B. All excavated or filled areas disturbed during construction, all loose or saturated soil, and other areas that will not meet compaction requirements as specified herein shall be removed and replaced with a minimum 12-inch layer of compacted crushed stone wrapped all around in non-woven filter fabric. Costs of removal and replacement shall be borne by the Contractor.

C. The Contractor shall place a minimum of 12-inch layer of crushed stone wrapped in filter fabric over the natural underlying soil to stabilize areas which may become disturbed as a result of rain, surface water runoff or groundwater seepage pressures, all at no additional cost to the Owner. The Contractor also has the option of drying materials in-place and compacting to specified densities.

3.02 EXCAVATION:

A. GENERAL:

1. The Contractor shall perform all work of any nature and description required to accomplish the work as shown on the Drawings and as specified.

2. Excavations, unless otherwise required by the Engineer, shall be carried only to the depths and limits shown on the Drawings. If unauthorized excavation is carried out below required subgrade and/or beyond minimum lateral limits shown on Drawings, it shall be backfilled with gravel borrow and compacted at the Contractor's expense as specified below, except as otherwise indicated. Excavations shall be kept in dry and good conditions at all times, and all voids shall be filled to the satisfaction of the Engineer.

3. In all excavation areas, the Contractor shall strip the surficial topsoil layer and underlying subsoil layer separate from underlying soils.

4. The Contractor shall follow a construction procedure, which permits visual identification of stable natural ground. Where groundwater is encountered, the size of the open excavation shall be limited to that which can be handled by the Contractor's chosen method of dewatering, and which will allow visual observation of the bottom and backfill in the dry.

5. The Contractor shall excavate unsuitable materials to stable natural ground where encountered at proposed excavation subgrade, as required by the Engineer. Unsuitable material includes topsoil, loam, peat, other organic materials, snow, ice, and trash. Unless specified elsewhere or otherwise required by the Engineer, areas where unsuitable materials have been excavated to stable ground shall be backfilled with compacted crushed stone wrapped all around in non-woven filter fabric.

B. FOUNDATION EXCAVATION:

1. Excavations shall not be wider than required to set, brace, and remove forms for concrete, or perform other necessary work.

2. After the excavation has been made, and before forms are set for footings, or other structures, and before reinforcing is placed, all loose or disturbed material shall be removed from the subgrade. The bearing surface shall then be compacted to meet the requirements of this specification.

3. If, in the opinion of the Engineer, the existing material at subgrade elevation is unsuitable for structural support, the Contractor shall excavate and dispose of the unsuitable material to the required width and depth as required by the Engineer. If, in the opinion of the Engineer, filter fabric is required; the Contractor shall place filter fabric, approved by the Engineer, as per manufacturer’s recommendations.

Crushed stone shall then be placed in lifts and compacted to required densities. Backfill shall be placed to the bottom of the proposed excavation.

C. EXCAVATION NEAR EXISTING STRUCTURES:

1. Attention is directed to the fact that there are pipes, manholes, drains, and other utilities in certain locations. An attempt has been made to locate all utilities on the drawings, but the completeness or accuracy of the given information is not guaranteed.

2. As the excavation approaches pipes, conduits, or other underground structures, digging by machinery shall be discontinued and excavation shall be done by means of hand tools, as required. Such manual excavation, when incidental to normal excavation, shall be included in the work to be done under items involving normal excavation.

3. Where determination of the exact location of a pipe or other underground structure is necessary for properly performing the work, the Contractor shall excavate test pits to determine the locations.

3.03 BACKFILL PLACEMENT AND COMPACTION:

A. GENERAL:

1. Prior to backfilling, the Contractor shall compact the exposed subgrade to a firm and unyielding condition with at least 4 passes of fully loaded, ten cubic yard dump truck over the subgrade or other acceptable compaction equipment subject to the approval of the Engineer.

2. After approval of subgrade by the Engineer, the Contractor shall backfill areas to required contours and elevations with specified materials.

3. The Contractor shall place and compact materials to the specified density in continuous horizontal layers, not to exceed nine (9) inches in uncompacted lifts. The degree of compaction shall be based on maximum dry density as determined by ASTM Test D1557, Method C. The minimum degree of compaction for fill placed shall be as follows:

Location	Percent of Maximum Density
Landscape areas	92
Adjacent to structures	95
Below structures	95

4. The Engineer reserves the right to test backfill for conformance to the specifications and the Contractor shall assist as required to obtain the information. Compaction testing will be performed by the Engineer or by an inspection laboratory designated

by the Engineer, engaged and paid for by the Owner. If test results indicate work does not conform to specification requirements, the Contractor shall remove or correct the defective Work by recompacting where appropriate or replacing as necessary and approved by the Engineer, to bring the work into compliance, at no additional cost to the Owner. All backfilled materials under structures shall be field tested for compliance with the requirements of this specification.

5. Where horizontal layers meet a rising slope, the Contractor shall key each layer by benching into the slope.

6. If the material removed from the excavation is suitable for backfill with the exception that it contains stones larger than permitted, the Contractor has the option to remove the oversized stones and use the material for backfill or to provide replacement backfill at no additional cost to the Owner.

7. The Contractor shall remove loam and topsoil, loose vegetation, stumps, large roots, etc., from areas upon which embankments will be built or areas where material will be placed for grading. The subgrade shall be shaped as indicated on the Drawings and shall be prepared by forking, furrowing, or plowing so that the first layer of the fill material placed on the subgrade will be well bonded to the subgrade.

B. BACKFILLING ADJACENT TO STRUCTURES:

1. The Contractor shall not place backfill against or on structures until they have attained sufficient strength to support the loads to which they will be subjected. Excavated material approved by the Engineer may be used in backfilling around structures. Backfill material shall be thoroughly compacted to meet the requirements of this specification.

2. Contractor shall use extra care when compacting adjacent to structures. Backfill and compaction shall proceed along sides of structures so that the difference in top of fill level on any side of the structure shall not exceed two feet (2') at any stage of construction.

3. Where backfill is to be placed on only one side of a structural wall, only hand-operated roller or plate compactors shall be used within a lateral distance of five feet (5') of the wall for walls less than fifteen feet (15') high and within ten feet (10') of the wall for walls more than fifteen feet (15') high.

3.04 DISPOSAL OF SURPLUS MATERIALS:

A. Surplus excavated materials, which are acceptable to the Engineer, shall be used to backfill normal excavations in rock or to replace other materials unacceptable for use as backfill. Upon written approval of the Engineer, surplus excavated materials shall be neatly deposited and graded so as to make or widen fills, flatten side slopes, or fill

depressions; or shall be neatly deposited for other purposes as indicated by the Owner, within its jurisdictional limits; all at no additional cost to the Owner.

B. Surplus excavated material not needed as specified above shall be hauled away and disposed of by the Contractor at no additional cost to the Owner, at appropriate locations, and in accordance with arrangements made by it. Disposal of all rubble shall be in accordance with all applicable local, state and federal regulations.

C. No excavated material shall be removed from the site of the work or disposed of by the Contractor unless approved by the Engineer.

D. The Contractor shall comply with Massachusetts regulations (310 CMR 40.0032) that govern the removal and disposal of surplus excavated materials. Materials, including contaminated soils, having concentrations of oil or hazardous materials less than an otherwise Reportable Concentration and that are not a hazardous waste, may not be disposed of at locations where concentrations of oil and/or hazardous material at the receiving site are significantly lower than the levels of those oil and /or hazardous materials present in the soil being disposed or reused.

END OF SECTION

SECTION 31 05 19.13

GEOTEXTILE FABRICS

PART 1 - GENERAL

1.01 WORK INCLUDED:

This Section covers furnishing of all labor, materials, and equipment necessary to install specified geotextile fabrics in locations shown on the drawings and as required by the Engineer.

1.02 SUBMITTALS: IN ACCORDANCE WITH REQUIREMENTS OF SECTION 01 33 00 SUBMITTALS, SUBMIT THE FOLLOWING:

Shop drawings or working drawings and material specifications shall be submitted to the Engineer for review for each type of geotextile fabric furnished. General installation practices and installation schedule shall be included.

PART 2 - PRODUCTS

2.01 FILTER/DRAINAGE FABRIC:

A. The filter/drainage fabric shall be composed of continuous-filament fibers bonded together to form a sheet. The fabric shall be an average of 20 mils thick and possess the characteristics of Tencate Mirafi 140N.

B. The filter/drainage fabric shall be Tencate Mirafi 140N as manufactured by Tencate Geosynthetics, Pendergrass, GA; Foss-65 by Foss Manufacturing Co., Hampton, NH; US 120NW, as manufactured by US Fabrics, Cincinnati, OH, or approved equal.

PART 3 - EXECUTION

3.01 INSTALLATION:

A. GENERAL:

Installation of geotextile fabrics shall be strictly in accordance with manufacturer's instructions and specific layout plans and details reviewed by the Engineer.

B. FILTER/DRAINAGE FABRIC:

1. The filter/drainage fabric shall be installed in the final graded trench bottom prior to placement of the crushed stone bedding and at other locations shown on the drawings or designated by the Engineer. The drainage fabric in place shall cover the entire trench bottom and trench sides as shown on the drawings. Each width

of drainage fabric shall be overlapped in accordance with manufacturer's recommendations, but not less than 2 feet, to prevent intrusion of soil fines into the bedding.

2. On landfill projects, the filter/drainage fabric shall be installed over the drainage layer prior to loaming and seeding, per manufacturer's installation recommendations.

3.02 FINAL INSPECTION AND ACCEPTANCE:

A. The Contractor shall, at his expense, have a manufacturer's representative inspect the work at completion of the installation. Any work found to be unsatisfactory shall be corrected at the Contractor's expense.

B. The Engineer, at the Contractor's expense, reserves the right to have a manufacturer's representative inspect the installation process at any time during construction.

END OF SECTION

SECTION 31 11 00

CLEARING AND GRUBBING

PART 1 - GENERAL

1.01 WORK INCLUDED:

A. The Contractor shall do all required clearing and grubbing as indicated on the drawings or herein specified in the area required for construction operations on the Owner's land or in the Owner's permanent or temporary easements and shall remove all debris resulting therefrom.

B. Unless otherwise noted, all areas to be cleared shall also be grubbed.

C. The Contractor shall not clear and grub outside of the area required for construction operations.

1.02 RELATED WORK:

Any trees and shrubs specifically designated by the Owner not to be cut, removed, destroyed, or trimmed shall be saved from harm and injury in accordance with Section 01 57 19, ENVIRONMENTAL PROTECTION.

PART 2 - PRODUCTS: NOT APPLICABLE

PART 3 - EXECUTION

3.01 RIGHT TO WOOD AND LOGS:

The Owner shall have the right to cut and remove logs and other wood of value in advance of the Contractor's operations. All remaining logs and other wood to be removed in the course of clearing shall become the property of the Contractor.

3.02 CLEARING:

A. Unless otherwise indicated, the Contractor shall cut or otherwise remove all trees, saplings, brush and vines, windfalls, logs and trees lying on the ground, dead trees and stubs more than 1-foot high above the ground surface (but not their stumps), trees which have been partially uprooted by natural or other causes (including their stumps), and other vegetable matter such as shags, sawdust, bark, refuse, and similar materials.

B. The Contractor shall not remove mature trees (4-inches or greater DBH) in the Owner's temporary easements.

C. Except where clearing is done by uprooting with machinery or where stumps are left longer to facilitate subsequent grubbing operations, trees, stumps, and stubs to be cleared

shall be cut as close to the ground as practicable but not more than 6-inches above the ground surface in the case of small trees, and 12-inches in the case of large trees. Saplings, brush and vines shall be cut close to the ground.

3.03 GRUBBING:

A. Unless otherwise indicated, the Contractor shall completely remove all stumps and roots to a depth of 18-inches, or if the Contractor elects to grind the stumps, they shall be ground to a minimum depth of 6-inches.

B. Any depression remaining from the removal of a stump and not filled in by backfilling shall be filled with gravel borrow and/or loam, whichever is appropriate to the proposed ground surface.

3.04 DISPOSAL:

All material collected in the course of the clearing and grubbing, which is not to remain, shall be disposed of in a satisfactory manner away from the site or as otherwise approved. Such disposal shall be carried on as promptly as possible and shall not be left until the final clean-up period.

END OF SECTION

SECTION 31 13 13

TREE PRUNING, TREE AND STUMP REMOVALS

PART 1 - GENERAL

1.01 WORK INCLUDED:

A. The work of this Section includes the following:

1. Pruning - Class II, including the removal of all limbs necessary to execute the field, playground and fence work required under this contract.

2. Removal of trees and stumps.

B. Refer to the Contract Drawings for general location of trees along the site perimeter. In general, all trees are to remain and be pruned in conformance with this Specification. Tree removals shall be limited to the area denoted on the plans and shall include the removal of individual trees that would impede the construction of proposed facilities.

1.02 QUALIFICATIONS OF CONTRACTOR:

A. This work shall be limited to individuals, partnerships and corporations who are actively engaged in the field of Arboriculture, and who demonstrate competence, experience and financial capability to carry out the terms of this project. The Owner may require proof of these qualifications.

B. All work shall be conducted by qualified and trained personnel under the direct supervision of a Massachusetts Certified Arborist (MCA) in the Contractor's employ.

1.03 PERSONNEL:

A. The Contractor shall submit each employee's name and title prior to the commencement of work. The Contractor shall advise the Owner of any changes in personnel assigned to this Contract.

B. The crew foreman shall have a minimum of five (5) years climbing/pruning experience. At least one (1) crew person shall be an MCA and shall be certified in CPR.

C. Each trimmer shall be experienced and highly qualified with the necessary tree worker skills to successfully complete the work of this Section, including the ability and training to perform aerial rescue. Said skill shall also include worker safety and ability in compliance with current OSHA and ANSI Z-133.1 Standards.

1.04 SPECIAL REQUIREMENTS:

A. Dutch Elm diseased wood shall be disposed of in accordance with provisions of General Laws, Chapter 87, Section 5, and Chapter 132, Sections 8 and 11 as amended; and in accordance with any additional local regulations. All wood shall be removed from the site and be properly disposed of in accordance with state and local regulations.

B. No burning shall be permitted on the project site.

C. Prior to commencing work, the Contractor shall submit a plan to the Owner for legal disposal of removed materials, in conformance with State and Federal regulations.

1.05 STANDARDS AND DEFINITIONS:

A. All pruning work shall be performed in accordance with the following:

1. The ANSI A300 'Standard Practices for Trees, Shrubs, and Other Wood Plant Materials' of the Secretariat: National Arborist Association, Post Office Box 1094, Amherst, New Hampshire 03031.

2. American National Standards Institute (ANSI) Standard Z-133.1.

3. The standards and practices of the International Society of Arborists.

4. The standards and practices of the Massachusetts Arborist Association.

5. The standards and practices of the American Association of Nurserymen.

B. The term 'Owner' shall mean the Owner's designated representative charged with carrying out the requirements of this Project, Owner's Representative, Planner, or Tree Warden as referenced herein, rendering approvals for the Owner.

1.06 EXAMINATION OF SITE AND DOCUMENTS:

A. The Contractor shall be responsible for having a clear understanding of the existing site conditions and shall be responsible for fully carrying out the work of this Section, regardless of actual site conditions encountered.

1.07 ORDER OF WORK:

A. Based on the site conference, the Contractor shall submit a schedule of work for the Owner's review and approval prior to beginning work. Unless otherwise authorized by the Owner, failure of the Contractor to comply with the approved removal

schedule shall be sufficient cause to give notice that the Contractor is in default of the contract.

1.08 PROTECTION OF THE VEGETATION TO BE PRESERVED:

A. The Contractor shall protect all existing trees, shrubs, lawns and other site features designated to remain. The placement of protection devices, such as snow fence enclosures, shall, however, be at the Contractor's discretion.

B. Damage no plant to remain by burning, pumping water, cutting of live roots or branches, or any other means. Neither vehicles nor equipment shall be parked within the dripline of trees to remain, or where ever damage may result to trees to be saved. Construction material shall not be stored beneath trees to be saved.

C. The Contractor shall be liable for any damage to any trees, shrub, lawn or other site features to remain, and shall immediately report to the Owner. Damaged shrubs or lawns shall be restored or replaced to match existing to remain to the satisfaction of the Owner.

D. The Contractor shall compensate the Owner for damages by installing replacement tree(s) of the size and species approved by the Owner and of sufficient quantity such that the sum of the Diameter at Breast Height (DBH) inches for replacement trees equals the total DBH inches of the damaged tree(s). Damaged shrubs shall be replaced with shrubs(s) of the same size, species, and quantity, unless determined otherwise by the Owner.

1.09 USE AND CARE OF THE SITE:

A. The Contractor shall leave the work site at the end of each working period in a condition satisfactory to the Owner.

B. Pavements shall be swept and lawns or other surfaces raked and/or otherwise cleaned of all material related to the work operation. Degree of clean-up required will be described by the Owner and will be based upon the character of the work area.

C. All trimmings or any other form of debris (except diseased materials or trimmings from Elms) shall be collected and chipped. The Contractor shall remove all materials and shall dispose of such materials off site in a legal manner.

D. No vehicles are to be stored on site. The Contractor shall be fully and solely responsible for any damage to equipment or vehicles left at the site of the work. All necessary permits shall be obtained by the Contractor.

PART 2 - PRODUCTS

2.01 EQUIPMENT:

A. Equipment necessary for this Contract shall be properly maintained and in good operating condition to the City's satisfaction. The Contractor shall promptly remove and replace any equipment which the Owner deems to be in unsatisfactory condition or otherwise unsuitable.

B. Cutting tools shall be kept well sharpened to provide clean smooth cuts. Any tools utilized on any tree suspected to have cankers or other fungal, bacterial or viral diseases shall be sterilized or not used on any other specimen.

C. A disc chipper shall be used which will process material up to twelve (12) inches in diameter.

PART 3 - EXECUTION

3.01 PRUNING:

A. Under this Section, the Contractor shall furnish all labor, materials, equipment and transportation required to complete all aspects of the work in accordance with all local, state and federal regulations in force at the same time of this Contract and in accordance with tree pruning as specified herein.

B. The work of this Section consists of all pruning work and related items as specified herein and includes, but is not limited to:

1. Pruning - Class II throughout the designated areas and limb removal required to allow for the proper installation of all fields, play equipment and new fencing.

   Class II pruning is defined as medium pruning and shall consist of the removal of dead, dying, diseased, interfering, objectionable and weak branches on the main trunks as well as those within the leaf area. An occasional branch one (1) inch or less in diameter may remain within the main leaf area where it is not practical to remove it.

3.02 DESCRIPTION OF PRUNING WORK:

A. Pruning and trimming are generally described as the removal and disposal of limbs, branches and stubs which are either dead, potentially detrimental to the health of the tree or dangerous to pedestrians, visually deficient, interfering or otherwise objectionable as determined by the Owner.

B. The limits of all trees to be pruned have been identified on the plans or referenced

elsewhere in this specification section.

C. Vehicle access shall be controlled and approved by the Owner.

D. If the Contractor discovers tree(s) which have not been marked for pruning, but whose condition is such that removal is warranted, whether due to death, disease, decay, or structural weakness, such tree(s) shall not be pruned and the Contractor shall immediately report these findings in writing to the Owner and await the Owner's direction before proceeding with work on the particular tree(s) in question.

E. All pruning shall be performed in a manner that maintains the natural aesthetic characteristics of the species and variety of trees. No topping or dehorning of trees or stubbing back of branches shall be permitted. All cuts shall be made to a lateral branch that is a minimum of one third (1/3) the size of the branch being removed, unless otherwise instructed by the Owner.

F. The use of climbing spurs or spiked shoes shall not be permitted and their use will result in the immediate cancellation of the contract.

G. All cuts shall be made sufficiently close to the parent stem so that wound closure can be readily started under normal conditions. Cuts shall, however, never be made through the branch collar. Slab cuts and rip cuts will result in cancellation of the contract.

H. All limbs over two (2) inches in diameter to be removed shall be precut to prevent splitting. Any branches that by falling would injure existing trees to remain or other objects shall be lowered to the ground by proper ropes.

I. On trees known to be diseased and where there is known to be danger of transmitting the disease on tools, tools shall be disinfected with alcohol or bleach after each cut between trees.

J. Lateral branches as well as occasional branch suckers ("water sprouts") may be retained. Complete removal of secondary laterals and branch suckers resulting in the stripping of major limbs, ("lion tailing") will not be permitted.

K. Tree paint to seal pruning cuts shall not be used.

L. All branches and limbs shall be manually lowered to the ground via rope and pulley. This practice must be consistent with the National Arborist Association Standards for Pruning. All grade-level artifacts and landscaping must be protected from damage.

3.03 REMOVALS:

A. The Contractor shall furnish all labor, materials, equipment and transportation

required to complete all aspects of the removals work in accordance with all local, state, and federal regulations in force at the time of this contract and in accordance with tree and stump removals as specified herein.

3.04 DESCRIPTION OF REMOVAL WORK:

A. Removal is generally described as the removal of groups and individual trees and shrubs which interfere with the growth of more desirable types of trees; the clearing away of lesser growth that may obscure outstanding trees; and thinning out to provide space for healthy growth by the elimination of thinner, weaker trees.

B. The Contractor shall adhere to the specifications and provide suitable facilities for inspecting the work. Failure of the Owner to immediately reject unsatisfactory work or to notify the Contractor of deviations from the specification shall not relieve the Contractor of responsibility to correct or remedy unsatisfactory work.

C. The Contractor shall only work on trees designated by the Owner. No compensation will be made for work performed on any other tree or trees.

D. Trees designated to be removed shall be taken down and all leaves, branches and trunks of trees properly disposed of by chipping and removal from the premises.

E. Fell trees in a manner that allows all site features and those trees to be saved undamaged.

F. Removal of all the parts of each tree shall be completed on the same day that the tree is cut.

G. Stumps shall be ground to eighteen (18) inches below grade by grinding or other means acceptable to the Owner. The void from the stump removal operations shall be filled with ordinary borrow soil to within six (6) inches of finished grade. The top six (6) inches shall be filled with screened loam, moderately tamped to prevent future settling. In grass areas the disturbed area shall be sown with grass seed of a mix appropriate to the location, as required by the Owner.

H. Excavation or grading within the branch spread of trees to be saved shall be performed as required by the Owner. Removal of pavement such as bituminous concrete in these zones shall be by hand tools and/or air spade to ensure root health for trees to remain.

I. All equipment to be used and all work to be performed must be in full compliance with all standards as promulgated by OSHA at the time of bidding, including but not limited to those regulations concerning noise levels, protective devices and operator safety.

J. The Contractor shall be solely responsible for pedestrian and vehicular safety and

control within the work site and shall protect the public and its property from injury or damage that could be caused by the progress of the work. To this end the Contractor shall provide, erect, and maintain protective devices acceptable to the Owner, including but not limited to barricades, lights and warning signs.

K. Any practice employed by the Contractor that is obviously hazardous as determined by the Owner shall be immediately discontinued by the Contractor upon receipt of either written or oral notice from the Owner to discontinue such practice.

END OF SECTION

SECTION 31 23 19

DEWATERING

PART 1 - GENERAL

1.01 WORK INCLUDED:

This section specifies designing, furnishing, installing, maintaining, operating and removing temporary dewatering systems as required to lower and control water levels and hydrostatic pressures during construction; disposing of pumped water; constructing, maintaining, observing and, except where indicated or required to remain in place, removing of equipment and instrumentation for control of the system.

1.02 RELATED WORK:

A. Section 00 31 43, PERMITS

B. Section 01 57 19, ENVIRONMENTAL PROTECTION

C. Section 31 00 00, EARTHWORK

D. Section 31 50 00, SUPPORT OF EXCAVATION

1.03 SYSTEM DESCRIPTION:

A. Dewatering includes lowering the water table and intercepting seepage which would otherwise emerge from the slopes or bottom of the excavation; increasing the stability of excavated slopes; preventing loss of material from beneath the slopes or bottom of the excavation; reducing lateral loads on sheeting and bracing; improving the excavation and hauling characteristics of sandy soil; preventing rupture or heaving of the bottom of any excavation; and disposing of pumped water.

1.04 QUALITY ASSURANCE:

A. The Contractor is responsible for the adequacy of the dewatering systems.

B. The dewatering systems shall be capable of effectively reducing the hydrostatic pressure and lowering the groundwater levels to a minimum of 2 feet below excavation bottom, unless otherwise required by the Engineer, so that all excavation bottoms are firm and dry.

C. The dewatering system shall be capable of maintaining a dry and stable subgrade until the structures, and appurtenances to be built therein have been completed to the extent that they will not be floated or otherwise damaged.

D. The dewatering system and excavation support (see Section 31 50 00, SUPPORT OF EXCAVATION) shall be designed so that lowering of the groundwater level outside the excavation does not adversely affect adjacent structures, utilities or wells.

1.05 SUBMITTALS:

A. In accordance with Section 01 33 23, Contractor shall submit a plan indicating how it intends to control the discharge from any dewatering operations on the project, whether it is discharge of groundwater from excavations or stormwater runoff during the life of the project.

PART 2 - PRODUCTS: NOT APPLICABLE

PART 3 - EXECUTION

3.01 DEWATERING OPERATIONS:

A. All water pumped or drained from the work shall be disposed of in a manner that will not result in undue interference with other work or damage to adjacent properties, pavements and other surfaces, buildings, structures and utilities. Suitable temporary pipes, flumes or channels shall be provided for water that may flow along or across the site of the work. All disposal of pumped water shall conform to the provisions of Section 01 57 19 ENVIRONMENTAL PROTECTION and Section 00 31 43 PERMITS.

B. Dewatering facilities shall be located where they will not interfere with utilities and construction work to be done by others.

C. Dewatering procedures to be used shall be as described below:

1. Crushed stone shall encapsulate the suction end of the pump to aid in minimizing the amount of silt discharged.

2. For dewatering operations with relatively minor flows, pump discharges shall be directed into straw bale sedimentation traps lined with filter fabric. Water is to be filtered through the straw bales and filter fabric prior to being allowed to seep out into its natural watercourse.

3. For dewatering operations with larger flows, pump discharges shall be into a steel dewatering basin. Steel baffle plates shall be used to slow water velocities to increase the contact time and allow adequate settlement of sediment prior to discharge into waterways.

4. Where indicated on the contract drawings or in conditions of excess silt suspended in the discharge water, silt control bags shall be utilized in catch basins.

D. The Contractor shall be responsible for repair of any damage caused by his dewatering operations, at no cost to the Owner.

END OF SECTION

SECTION 31 50 00

SUPPORT OF EXCAVATION

PART 1 - GENERAL

1.01 WORK INCLUDED:

A. This section of the specification covers wood sheeting and bracing for support of excavations. The requirements of this section shall also apply, as appropriate, to other methods of excavation support and underpinning which the Contractor elects to use to complete the work.

B. The Contractor shall furnish and place timber sheeting of the kinds and dimensions required, complying with these specifications, where indicated on the drawings or required by the Engineer.

1.02 RELATED WORK:

A. Section 31 23 19, DEWATERING.

B. Section 31 00 00, EARTHWORK.

1.03 QUALITY ASSURANCE:

A. This project is subject to the Safety and Health regulations of the U.S. Department of Labor set forth in 29 CFR, Part 1926, and to the Massachusetts Department of Safety and Department of Labor, Division of Occupational Safety "Excavation & Trench Safety Regulation (520 CMR 14.00)" and "Rules and Regulations for the Prevention of Accidents in Construction Operations (454 CMR 10.0 et seq.)." Contractors shall be familiar with the requirements of these regulations.

B. The excavation support system shall be of sufficient strength and be provided with adequate bracing to support all loads to which it will be subjected. The excavation support system shall be designed to prevent any movement of earth that would diminish the width of the excavation or damage or endanger adjacent structures.

PART 2 - PRODUCTS

2.01 MATERIALS:

A. Timber sheeting shall be sound spruce, pine, or hemlock, planed on one side and either tongue and grooved or splined. Timber sheeting shall not be less than nominal 2-inches thick.

B. Timber and steel used for bracing shall be of such size and strength as required in the excavation support design. Timber or steel used for bracing shall be new or undamaged used material which does not contain splices, cutouts, patches, or other alterations which would impair its integrity or strength.

PART 3 - EXECUTION

3.01 INSTALLATION:

A. Work shall not be started until all materials and equipment necessary for their construction are either on the site of the work or satisfactorily available for immediate use as required.

B. The sheeting shall be securely and satisfactorily braced to withstand all pressures to which it may be subjected and be sufficiently tight to minimize lowering of the groundwater level outside the excavation, as required in Section 31 23 19, DEWATERING.

C. The sheeting shall be driven by approved means to the design elevation. No sheeting may be left so as to create a possible hazard to safety of the public or a hindrance to traffic of any kind.

D. If boulders or very dense soils are encountered, making it impractical to drive a section to the desired depth, the section shall, as required, be cut off.

E. The sheeting shall be left in place where indicated on the drawings or required by the Engineer in writing. At all other locations, the sheeting may be left in place or salvaged at the option of the Contractor. Steel or wood sheeting permanently left in place shall be cut off at a depth of not less than two feet below finish grade unless otherwise required.

F. All cut-off will become the property of the Contractor and shall be removed by him from the site.

G. Responsibility for the satisfactory construction and maintenance of the excavation support system, complete in place, shall rest with the Contractor. Any work done, including incidental construction, which is not acceptable for the intended purpose shall be either repaired or removed and reconstructed by the Contractor at his expense.

H. The Contractor shall be solely responsible for repairing all damage associated with installation, performance, and removal of the excavation support system.

END OF SECTION

SECTION 32 15 40.13

STABILIZED STONE DUST PAVEMENT

PART 1 - GENERAL

1.01 WORK INCLUDED:

A. The work to be done under this Section shall be the furnishing, placement and compaction of stabilized stone dust surfacing as shown on the drawings and as specified herein. The Contractor shall be responsible for supplying the material, labor, equipment and transportation necessary to do the work.

1.02 RELATED WORK:

A. Section 01 33 23, SUBMITTALS

B. Section 31 23 00, EXCAVATION, BORROW AND BACKFILL

1.03 SAMPLES:

A. Prior to ordering and delivering materials to the site, (1) representative samples of stone dust shall be sent to the Engineer for approval. The material shall be analyzed by a certified testing laboratory and certified by the supplier as a byproduct of a stone quarry operation.

B. The color shall be medium to dark gray when wet and consistent throughout. Samples must match that product which is to be installed.

PART 2 - PRODUCTS

2.01 STONE DUST:

A. Stone dust shall be the product of a stone crusher and shall consist of inert materials that are hard, durable stone, free from surface coatings and deleterious materials.

B. Gradation requirements shall be as follows:

U.S. Sieve No.	Percent Passing by Weight
# 4	100
# 8	96
# 16	68
# 30	43

# 50	29
# 100	17
# 200	11

2.02 STABILIZER:

A. Non-toxic, non-staining water-activated soil stabilizer.

B. "STABILIZER" by Stabilizing Solutions, Inc. Phoenix, AZ 1-800-336-2468 or approved equal.

PART 3 - EXECUTION

3.01 PLACING AND COMPACTING:

A. The stone dust shall be placed over a previously approved and installed compacted base of gravel or concrete slab as detailed and as specified under Section 31 23 00 of these Specifications.

B. The stone dust shall be placed to the line and grades shown on the plans and shall consist of a minimum of the detailed thickness after watering and compacting to ninety-five percent (95%) of the maximum dry density of the material as determined by the Standard AASHTO Test Designation T99 compaction test Method C at optimum moisture content as determined by the Engineer.

C. Compaction shall continue until the surface is even and true to the proposed lines and grades within a tolerance of three-eighths (3/8) inch above or below the required cross sectional elevations and to a maximum irregularity not exceeding three-eighths (3/8) inch under a ten (10) foot line longitudinally. Any specific area of material sub-base which, after being rolled, does not form a satisfactory, solid, stable foundation shall be removed, replaced and recompacted by the Contractor without extra compensation.

3.02 SOIL STABILIZER BLENDING:

A. The soil stabilizer shall be carefully measured and shall be subsequently blended with the stonedust at the manufacturers recommended rate for three (3) inch compacted stabilized stonedust pathways. (If 'STABILIZER' brand stabilizer is used the blending ratio shall be as follows: One (1) pound of 'STABILIZER' powder per one and one-quarter (1 ¼) cubic feet of stonedust OR as otherwise stated; one (1) pound of 'STABILIZER' powder per five (5) square feet of surface area for three (3) inch compacted depth stone dust.)

END OF SECTION

SECTION 32 16 00

CURBING

PART 1 - GENERAL

1.01 WORK INCLUDED:

A. This section covers furnishing and installation of granite curb where required, as shown on the Drawings and herein specified.

B. This section also covers replacement of curbing removed during construction.

1.02 RELATED WORK:

A. Required earthwork is specified under Section 31 00 00 EARTHWORK.

1.03 REFERENCES:

The following standards form a part of these specifications, as referenced:

Massachusetts Department of Transportation (MassDOT) Standard Specifications for Highways and Bridges

1.04 SUBMITTALS: IN ACCORDANCE WITH REQUIREMENTS OF SECTION 01 33 23 SUBMITTALS, SUBMIT THE FOLLOWING:

Shop drawings, showing dimensions of typical curb sections.

PART 2 - PRODUCTS

2.01 GRANITE CURBING:

A. Granite curbing shall be Type VA4 conforming to Subsection M9.04.1 of the latest edition of the MassDOT Standard Specifications for Highways and Bridges.

B. Special shapes and corners shall be supplied as required.

PART 3 - EXECUTION

3.01 GRANITE CURBING:

A. Except as modified herein or on the drawings, installation of curbing shall conform to Section 500 of the MassDOT Standard Specifications for Highways and Bridges.

B. Excavation shall be made to the bottom of the 6-inch gravel base below the curbing, the trench being sufficiently wide to permit thorough tamping. The base shall be compacted to a firm, even surface and shall be approved by the Engineer.

C. The curbing shall be set on edge and settled into place with a heavy wooden hand-rammer, to the line and grade required, straight and true for the full depth. The joints of the stone curbing shall be pointed with mortar for the full depth of the curbing. At approximately 50-foot intervals, a 1/2-inch joint shall not be filled with mortar but left free for expansion. The ends of the stone curbing at driveways and intersections shall be cut at a bevel or rounded as required by the Engineer.

D. The trench for the stone curbing shall be backfilled with approved material; the first layer to be 4 inches in depth, thoroughly rammed; the other layers to be more than 6 inches in depth and thoroughly rammed until the trench is filled.

E. Where indicated on the plans, or as required, drainage openings shall be made through the curbing at the elevations and of the size required.

END OF SECTION

SECTION 32 91 00

SCREENED LOAM BORROW AND TOPSOIL

PART 1 - GENERAL

1.01 SCOPE OF WORK

A. Under this Section, the Contractor shall furnish all labor, materials, equipment (including low ground pressure equipment (LGP)) and transportation required to furnish and place ½" Screened Loam Borrow as shown on the drawings and as specified. Where proposed tree and shrub planting mix and/or sod or seed is noted on the drawings, it shall be composed of Loam Borrow, or Topsoil in compliance with this specification.

B. The Contractor shall be responsible for screening and amending topsoil as required.

C. No heavy duty equipment and vehicular traffic shall be allowed on the prepared areas. While using the blecavator, the contractor shall fine grade soil over the blecavation areas based on the proposed elevations indicated on the site plan.

1.02 SAMPLES/TESTS

A. The Contractor shall furnish a Certified Laboratory Report showing the soils classification and nutrient analysis of representative samples of the proposed Loam to be used, including the extent of lime and fertilizer required. Samples submitted for approval must be representative of the total volume to be furnished, taken in the presence of the Owner's Representative, and delivered to a certified laboratory by the Contractor; all costs for such shall be borne by the Contractor.

B. At least ten (10) days prior to shipment/delivery of materials, the Contractor shall submit to the Owner a one (1) cubic foot representative sample, certifications, certified test results for materials as specified below. The Contractor shall provide a listing of the addresses (locations) identifying the origin of the soil to be delivered. If the origin is from multiple locations, all locations shall be provided at the time of submission of required information specified above. No materials shall be ordered or delivered until the required submittals have been reviewed and approved by the Owner. Delivered materials shall closely match the approved samples. Approval shall not constitute final acceptance. The Owner shall reserve the right to reject, on or after delivery, any material that does not meet these Specifications.

C. If the material does not conform to the above requirements it shall be rejected and additional sources shall be found. Sampling and testing shall be accomplished as specified herein until an approved material is found, all at the Contractor's expense.

D. To assure that materials fulfill specified requirements regarding textural analysis, organic matter content, pH, and fertility testing may be undertaken:
   1. Prior to site delivery; at source;

   2. At time of delivery; on-site; and/or

   3. Immediately following spreading on site. Soil sampling shall also indicate if specified soil was supplied uniformly to the minimum specified depth.

1.03 STANDARDS

A. ASTM - American Society for Testing and Materials.

1.04 NOTIFICATION

A. The Contractor shall notify the Owner in writing at least ten (10) days in advance of the time he intends furnishing Screened Loam Borrow stating the location and amount of such deposit, the name and address of the supplier and also shall furnish such facilities, transportation and assistance as the Owner may require for collecting and forwarding samples.

1.05 QUALITY CONTROL

A. Following installation of irrigation system and prior to installation of sod, contractor shall notify landscape architect or owner and provide the owner with compaction tests along the center line of the field as well as along the side lines to ensure that the root zone mix has not been heavily compacted. Compaction test shall fall within the industry standards for fields and any areas that exceed these standards shall be corrected at the contractor's expense prior to installation of sod.

B. The Contractor or Sub-contractor must have a minimum of five (5) years of experience installing root zone mix based athletic fields of similar size and quality of this project.

C. The Contractor shall avoid excessive compaction of the subgrade prior to installation of the loam. Refer to Specification Section 31 00 00, EARTHWORK.

PART 2 - MATERIALS

2.01 LOAM BORROW

A. In accordance with the specific requirements of this project, existing on-site soil may be re-used as Loam Borrow only if it meets this Specification. Existing topsoil that does not meet this Specification may be re-used only up to the subgrade elevation within the limits of areas to receive new Loam Borrow. The Contractor shall furnish all required Loam Borrow, from off site sources, as

necessary, to complete the project.

B. Screened Loam shall be "fine sandy loam" or "sandy loam" determined by mechanical analysis (ASTM D-422) and based on the "USDA" Classification System". Screened Loam has the following mechanical analysis:

Textural Class	Percentage of Total Weight	Average Percentage
Sand (0.05 – 2.0mm)	50 – 80	70
Silt (0.002 – 0.05mm)	15 – 30	20
Clay (Less than 0.002mm)	5 – 10	10

C. Screened Loam shall be a natural product consisting primarily of natural topsoil, free from subsoil, and obtained from an area that has never been stripped, as noted above, the location of the source of the loam must be submitted to the Owner. Screened Loam shall not contain less than five percent (5%) nor more than seven percent (7%) organic matter as determined by the loss on ignition of oven-dried samples, at 100°C ± 5°C. To adjust organic matter content, the soil may be amended, prior to site delivery, by the addition of composted leaf mold or peat moss. Use of organic amendments is accepted only if random soil sampling indicates a through incorporation of these materials. No mixing or amending of Loam will be permitted on site. The Loam shall not be delivered when in a wet or frozen condition.

D. Screened Loam shall consist of fertile, friable, natural loam capable of sustaining vigorous plant growth. Loam shall be without admixture of subsoil, and refuse, resulting in a homogeneous material free of stones greater than ½" in the longest dimension, be free of lumps, plants, glass, roots, sticks, excessive stone content, debris, and extraneous matter as determined by the Owner. Screened Loam shall be within the pH range of 6.0 to 6.5 except as where noted on plans and details. It shall be uncontaminated by salt water, foreign matter and substances harmful to plant growth. The maximum soluble salt index shall be 100. Screened Loam shall not have levels of aluminum great than 200 parts per million.

E. If limestone is required to amend the screened loam to bring it within a pH range of 6.0 to 6.5 no more than 200 pounds of limestone per 1,000 square feet of loam, incorporated into the soil, or 50 pounds of limestone per 1,000 square feet of loam, surface application, within a single season.

F. The Owner will reject any material delivered to the site that does not meet these Specifications after post-delivery testing. If the delivered screened loam does not meet the specifications stated in this document, the delivered screened loam will be removed by the Contractor at the Contractor's expense and at the time of

rejection.

G. The topsoil shall not be handled or moved when in a wet or frozen condition.

H. Topsoil structure shall not be destroyed through excessive and unnecessary handling or compaction. Inappropriate handling leading to the compaction or deterioration of soil structure will result in rejection of topsoil for use.

I. At no time should equipment or material rest on the soil.

J. Loam Borrow shall be free of plants and their roots, debris and other extraneous matter. It shall be uncontaminated by salt water, foreign matter and substances harmful to plant growth. The electrical conductivity (EC2) of a 1:2 soil-water suspension shall be equal to, or less than, 1.0 millimhos/cm. (test material passing #4 sieve).

PART 3 - EXECUTION

3.01 PLACEMENT

A. The Contractor shall furnish and spread Loam Borrow to the depths shown on the contract drawings, which depth shall be the minimum required depth after settlement. No compaction shall be required beyond that extent necessary to place sod or to plant trees and shrubs to ensure against unevenness or settling below accepted growth lines.

B. All backfill to subgrade, shall be compacted to not less than eighty-five percent (85%) and not more than ninety percent (90%) of the maximum dry density of the material as determined by the Standard AASHTO Test Designation T-180-86, Modified Proctor Test.

C. Low Ground Pressure (LGP) Equipment must be used for final grading of subgrade in order to minimize the compaction on the backfill and subgrade.

3.02 ADDITIVES

A. The Contractor shall apply all necessary fertilizer and lime to the soil in accordance with the manufacturer and laboratory's recommendations and as required by the sodding, seeding and/or planting specifications referenced elsewhere.

END OF SECTION

SECTION 32 92 19

SEEDING

PART 1 - GENERAL

1.01 WORK INCLUDED:

A. This Section includes furnishing all labor, materials, equipment, seed and incidental materials necessary to accomplish all grass seeding and related work, complete in place, maintained, and accepted, in accordance with the Contact Drawings and Specifications. All grassed areas disturbed by the Contractor's operations shall be repaired as herein specified.

B. The Contractor shall bear the responsibility and cost of furnishing and applying water or any other substances, as necessary to ensure the sustainability of grass seeded areas, as part of the work of this contract.

1.02 RELATED WORK:

A. Section 31 05 13.13, LOAM BORROW

B. Section 32 93 00, TREES, SHRUBS, GROUNDCOVERS AND LANDSCAPING

1.03 SUBMITTALS:

In accordance with requirements of Section 01 33 23 SUBMITTALS, the Contractor shall submit the following to the Engineer for review and approval:

A. Information for seed mixes including the following:

1. Name and address of the seed supplier.

2. Source of origin and dates of harvest for each of the various types of seed

3. Certification of seed mix composition and proportion, indicating named seed varieties by percent, percent germination, purity, and percent crop seed, percent inert matter, and percent weed seed content.

4. Estimated number of seeds per pound of each type of seed in the mix

B. Information detailing proposed limestone, fertilizers, insecticides, herbicides, fungicides, mulch materials, hydroseeding materials (as required), and slope protection material (as required) to be applied to seeded areas.

C. Watering, fertilizing and maintenance schedule.

D. Marked up prints indicating the square footage of all proposed seeded areas with quantities of various soil additives and amendments, and quantities of seed for each area prior to beginning work.

PART 2 - PRODUCTS

2.01 MATERIALS:

A. LOAM BORROW:

1. Loam Borrow shall be as specified in Section 31 05 13.13, LOAM BORROW.

B. LIMESTONE:

1. Lime shall be an approved agricultural limestone containing at least 50 percent total oxides (calcium oxide and magnesium oxide). The material will be ground such that 50 percent of the material will pass through a No. 100 mesh sieve and 98 percent will pass a No. 2 mesh sieve. Lime shall be uniform in composition, dry and free-flowing and shall be delivered to the site in the original sealed containers, each bearing the manufacturer's guaranteed analysis.

C. FERTILIZER:

1. Fertilizer shall be a complete, standard commercial fertilizer, homogenous and uniform in composition, dry and free-flowing, and shall be delivered to the site in the manufacturer's original sealed containers, each bearing the manufacturer's guaranteed analysis and marketed in compliance with State and Federal Laws. All fertilizer shall be used in accordance with the manufacturer's recommendations.

2. The analysis for supplemental maintenance fertilizer shall have a ratio of Nitrogen (N) – Phosphorous (P) – Potassium (K) of approximately 4 – 1 – 2 and shall be applied to deliver 1 pound of Nitrogen per 1000 square feet, or as approved by the Engineer. At least 50 percent of nitrogenous elements shall be Urea-form or derived from organic sources and contain no less than 3 percent water soluble Nitrogen.

D. SEED:

1. Seed shall be of an approved perennial variety mixture, the previous year's crop, clean, and high in germinating value. Weed seed content shall be less than 0.5 percent and include no noxious weeds. Seed shall be obtained from a reliable seed company and shall be accompanied by certificates of compliance relative to mixture purity and germinating value. Seed shall be furnished and delivered in new, clean, sealed and properly labeled containers. All seed shall comply with applicable State and Federal laws. Seed that has become wet, moldy or otherwise damaged shall not be accepted.

2. Grass seed for Wet Meadow Planting Areas shall be per New England Wetland Plants, Inc., South Hadley, MA. New England Native Warm Season Grass Mix. Containing the following mix:

Botanical	Common Names
Carex vulpinoidea	Fox Sedge
Carex scoparia	Blunt Broom Sedge
Carex lurida	Lurid Sedge
Carex lupulina	Hop Sedge
Poa palustris	Fowl Bluegrass
Bidens frondosa	Beggar Ticks
Scirpus atrovirens	Green Bulrush
Asclepias incarnata	Swamp Milkweed
Carex crinita	Fringed Sedge
Vernonia noveboracensis	New York Ironweed

3. Grass seed for disturbed areas due to the removal of existing gravel base shall be Semi-Shade Tolerant Seed Mix per New England Wetland Plants, Inc., South Hadley, MA. Semi- Shade Tolerant Seed Mix. Containing the following mix:

Botanical	Common Names
Elymus virginicus	Virginia Wild Rye
Elymus canadensis	Canada Wild Rye
Festuca rubra	Red Fescue
Chamaecrista fasciculata	Partridge Pea
Liatris spicata	Spiked Gayfeather/Marsh Blazing Star
Onoclea sensibilis	Sensitive Fern
Aster prenanthoides	Zigzag Aster
Eupatorium fistulosum	Hollow-Stem Joe Pye Weed
Eupatorium perfoliatum	Boneset
Juncus tenuis	Path Rush

E. TEMPORARY COVER CROP:

1. Temporary cover crop shall conform to the following requirements:

Botanical and Common Names	Proportion by Weight	Germination Rate	Purity Minimum
Annual Ryegrass (Lolium multiflorum)	80% min.	85%	%
Creeping Red Fescue			

(Festuca rubra)	4% min.	85%	95%
Perennial Ryegrass (Lolium perenne)	3% min.	90%	98%
Red Clover (Trifolium pratense)	3% min.	90%	%
Other Crop Grass	0.5% max.		
Noxious Weed Seed	0.5% max.		
Inert Matter	1.0% max.		

F. MULCH:

1. Materials to be used in mulching seeded areas shall be free of weed seed and shall conform to the following requirements:

    a. Straw Mulch shall consist of stalks or stems of grain after threshing.

    b. No hay mulch or salt hay shall be used.

G. HYDROSEED MULCH, TACKIFIERS AND WATER RETENTION AGENTS:

1. Wood fiber mulch for Hydroseed application shall be a manufactured product of natural wood cellulose fibers with a non-toxic green marking dye incorporated to ensure uniform distribution. Mulch shall be packed in sealed original containers, clearly labeled with brand name and manufacturer. It shall have delivered moisture content less than 12 percent.

2. Hydroseed tackifier shall be a powdered starch-based product approved by the Engineer. Hydroseed tackifier shall be applied in conjunction with the hydroseed slurry in accordance with the manufacturer's recommendations.

3. Moisture retention agent shall be a powdered starch-based product, approved by the Engineer, and shall be capable of retaining up to 400 times their weight in water. Moisture retaining agents shall be added to the hydroseed slurry in accordance with the manufacturer's recommendations. Moisture retention agent shall be 'Hydro-Gel', as manufactured by Finn Corporation, Fairfield, OH.

H. SLOPE EROSION PROTECTION:

1. Erosion control blanket shall be 100 percent biodegradable mesh with 100 percent biodegradable straw or straw/coconut fill. Fill shall be held together by biodegradable fastening. Weight shall be 0.50 pounds per square yard. Erosion control blankets shall be applied parallel to direction of water flow. The erosion control blankets shall be by North American Green, Evansville, IN or approved

equal. For slopes 2:1 or greater, erosion control blanket shall be composed of 70 percent straw 30 percent coconut fiber, Model SC150. For slopes less than 2:1, erosion control blanket shall be a high velocity straw matting, Model S150.

2. Six-inch wire staples shall be placed in accordance with the manufacturer's recommendations to anchor the mesh material. Staples shall be biodegradable.

I. WATER:

1. Water shall be furnished by the Contractor, unless otherwise specified, and shall be suitable for irrigation and free from ingredients harmful to plant growth and viability. The delivery and distribution equipment required for the application of water shall be the furnished by the Contractor, at no additional cost to the Owner.

J. INSECTICIDES:

1. No insecticides shall be used on-site without the Contractor notifying and obtaining prior approval of the Engineer.

2. Insecticides shall be EPA registered and approved for use in public open spaces. All insecticides shall be handled by State licensed applicators only, delivered in the original sealed manufacturer’s containers, and used in accordance with the manufacturer’s instructions.

3. Insecticide use shall be limited and selective, only to control specific insect infestations, as identified by the Contractor or the Owner’s Representative, that may result in the disfigurement, decline, or death of plant materials.

4. Grub control insecticide shall be Proturf Insecticide III, as manufactured by A.M. Scotts & Sons, Inc.; Dursban Granules, as manufactured by Old Fox Chemical Corp., or ACMC; or approved equal.

K. HERBICIDES:

1. No herbicides shall be used on-site without the Contractor notifying and obtaining prior approval of the Engineer.

2. All herbicides shall be EPA registered and approved for use in public open spaces. All herbicides shall be handled by State licensed applicators only, delivered in the original sealed manufacturer’s containers, and used in accordance with the manufacturer’s instructions.

3. Herbicide for post-emergent application shall be glyphosate contact, ‘Roundup’, as manufactured by Monsanto, Inc., or approved equal.

4. Herbicide use shall be limited and selective, only to control specific weed infestations that have been identified by the Contractor or the Owner's Representative.

L. FUNGICIDES:

1. No fungicides shall be used on-site without the Contractor notifying and obtaining prior approval of the Engineer.

2. Fungicides shall be EPA registered and approved for use in public open spaces. All fungicides shall be handled by State licensed applicators only, delivered in the original sealed manufacturer's containers, and used in accordance with the manufacturer's instructions.

3. Fungicide use shall be limited and selective, only to control specific fungal pathogenic disease infestations, as identified by the Contractor or the Owner's Representative that may result in the disfigurement, decline, or death of plant materials.

PART 3 - EXECUTION

3.01 GENERAL:

A. All work shall be performed by skilled workers with a minimum of 2 years of seeded lawn construction and establishment experience and under the full-time supervision of a qualified foreman.

B. Seeding operations shall not begin less than 4 days after the application of lime and fertilizer and the seedbed areas are reviewed and approved by the Engineer.

C. Seeding shall be done when soil and weather conditions permit in early spring, until June 15, or from September 10 to October l5, unless otherwise approved. If it becomes necessary for seed to be sown after June 15, provisions shall be made for supplementary water and using a mulch cover over lawn areas.

D. If there is a delay in seeding, during which weeds grow, or soil is washed out, the Contractor shall eliminate the weeds by chemical or physical means, or replace the soil before sowing the seed, without additional compensation. Immediately before seeding is begun, the soil shall be lightly raked.

E. Seed shall be sown at the approved rate, on a non-windy day by machine, or as approved by the Engineer.

F. The surface shall be kept moist by a fine spray until the seed shows uniform germination over the entire area. Wherever poor germination occurs in areas larger than 3 square feet, the Contractor shall reseed, roll, and water as necessary to obtain proper germination.

G. If there is insufficient time in the planting season to complete soil preparations, fertilizing, and seeding, permanent seeding may be left until the following planting season, at the option of the Contractor, or as required by the Engineer. In that event, a temporary cover crop shall be sown. This cover crop shall be cut and watered as necessary until the beginning of the following planting season, at which time it shall be plowed or harrowed into the soil, the area shall be fertilized and the permanent seed crop shall be sown as specified.

H. Protection of all newly loamed and graded areas is required and shall be accomplished by whatever means necessary such as mulch applied with a tackifier, or by other means approved by the Engineer. The Contractor shall be responsible for the prevention of siltation in areas beyond the limit of work and for all means of protection throughout the maintenance period at no additional cost to the Owner.

3.02 SURFACE PREPARATION:

A. If approved by the Engineer, the entire site area to be seeded shall be treated with an approved herbicide, in accordance with the manufacturer's instructions, not less than 7 days before the start of seeding operations.

B. If approved by the Engineer, grub control insecticide shall be spread on the surface of the seedbed, in accordance with the manufacturer's instructions, after the seedbed has been properly graded, not less than 24 hours before the start of seeding operations.

3.03 BROADCAST SEEDING, PLACING MULCH AND SLOPE EROSION PROTECTION:

A. The seed mix shall be broadcast at 6 pounds per 1000 square feet, as recommended by the seed supplier, or as required by the Engineer. Seed shall be divided into 2 equal amounts and uniformly distributed in 2 applications at right angles to each other. Seed shall then be raked lightly into the soil to a depth of l/4-inch.

B. If mulch is not necessary the seed shall be directly firmed into the soil with a roller that will apply pressure between 75 and 100 pounds per linear foot of width.

C. Straw Mulch shall be used based on time of seeding as previously specified over all seeded areas, as designated on the plans, or as otherwise required. If mulch is to be used, it shall be loosely spread to a uniform depth at a rate of 4-1/2 tons per acre to provide ¼-inch of cover, or as otherwise required. The seed and mulch shall then be firmed into the soil with a roller that will apply a pressure between 75 and 100 pounds per foot of width.

D. Straw Mulch may be applied by mechanical apparatus, if in the judgment of the Engineer, the apparatus spreads the mulch uniformly and forms a suitable mat to control slope erosion. The apparatus shall be capable of spreading at least 80 percent of the hay or straw in lengths of 6-inches or more, otherwise it shall be spread by hand without additional compensation.

E. Slope erosion control blankets shall be placed as indicated on the plans or as required by the Engineer.

3.04 HYDROSEEDING:

A. The application of lime, fertilizer, grass seed and mulch may be accomplished in a single operation with the use of approved hydroseeding equipment. The materials shall be mixed with water in the machine and kept in an agitated state in order that the materials may be uniformly suspended in the water. The slurry shall be of such consistency that it can be sprayed from a hydroseed gun or through at least 200 feet of 1½- inch diameter hose. The spraying equipment shall be so designed that when the solution is sprayed over an area, the resulting deposits of lime, fertilizer, grass seed, and mulch shall be equal to the specified quantities.

B. Prior to the start of hydroseeding, the Contractor shall furnish to the Engineer, in writing, the weights of limestone, fertilizer, grass seed, mulch, tackifier (as required) and moisture retention agent (as required) per 100 gallons of water to be used. This statement should also specify the number of square yards of seeding that can be covered with the solution specified above. If the results of hydroseeding operations are unsatisfactory, the Contractor will be required to abandon this method and to apply the lime, fertilizer, grass seed and mulch by other means.

C. Seed shall be incorporated with the mulching material to obtain a minimum hydroseeded sown coverage of 200 pounds of the specified seed mix per acre, as recommended by the seed suppliers, or as required by the Engineer.

D. Wood fiber mulch shall be uniformly spread over certain selected seeded areas at the minimum rate of 1,400 pounds per acre unless otherwise directed. Mulch shall be placed by spraying from an approved spraying machine with pressure sufficient to cover the entire area in a single operation.

E. The Contractor shall immediately cleanup hydroseed oversprays from plant materials, pavements, furnishings, etc., to the satisfaction of the Engineer.

3.05 MAINTENANCE:

A. The Contractor shall maintain and protect the entire seeded area, as necessary to ensure dense healthy growth, until completion of the guarantee period and final acceptance of the project, or for 60 days, whichever is longer. If lawns are planted in late summer or during the fall, maintenance shall continue through the following spring for at least 30 days. Maintenance shall include watering as specified, liming, fertilizing, removal of stones, control of weeds, insect pests and fungal pathogens, and regular mowing. Defective work shall be corrected as soon as possible after it becomes apparent and weather and season permit.

B. The first cutting of lawn areas shall be done when the grass is between 2½ - to 3-inches in height. The lawn shall be cut no shorter than 2-inches in height and shall be regularly mowed as necessary to maintain the above-prescribed conditions. All cuttings shall be removed from the lawn during the maintenance period and disposed of off-site.

C. The Contractor shall be responsible to regularly water seeded areas with the equivalent of 1-inch minimum of rainfall per week, or as necessary to develop and sustain dense, green growth.

D. Six weeks after turf has established, and only during the months of April, May, or September, the Contractor shall apply fertilizer as specified above, at one half the rate recommended by the initial soils laboratory tests, or as required by the Engineer.

E. The Contractor shall be responsible for securing all seeded areas from physical damage as necessary, including warning signs, barriers, temporary fencing, or other means of protection, through the guarantee period until final acceptance. All damaged areas shall be repaired to reestablish healthy vigorous growth of turf to the satisfaction of the Engineer, at no additional cost to the Owner. All temporary barriers shall remain the property of the Contractor and shall be removed by the Contractor upon final acceptance by the Engineer.

F. Pavement shall be kept clean and clear of cuttings and debris at all times during the maintenance period to the satisfaction of the Engineer.

3.06 INSPECTION AND PRELIMINARY ACCEPTANCE:

A. At the beginning of the planting season following that in which the permanent grass crop is sown, seeded areas will be inspected. Any section not showing dense, vigorous growth shall be promptly reseeded by the Contractor at no additional cost to the Owner. The seeded areas shall be watered, weeded, cut and otherwise maintained by the Contractor, as many times as necessary, in accordance with these specifications, until they are accepted.

B. The Contractor shall provide written notice to the Engineer not less than 10 days before the anticipated date of inspection for preliminary acceptance. The Engineer shall recommend preliminary acceptance of the work of this Section only after completion and re-inspection of all necessary repairs, renewals, or replacements.

C. Inspection and acceptance of seeded areas may be requested and granted in part, provided the areas for which acceptance is requested are relatively substantial in size, and with clearly definable boundaries. Acceptance and use of these areas by the Owner shall not waive any other provisions of this Contract.

3.07 GUARANTEE:

A. Seeded areas shall be guaranteed until final acceptance of the project, or, in the case of late summer or fall planting, the guarantee period shall extend through the following spring.

B. When the work is accepted in part, the guarantee period shall extend from each partial acceptance to the terminal date of the last guarantee period. All guarantee periods terminate at one time.

C. Guarantee shall not apply to the replacement of seeded lawns resulting from the removal, loss, or damage due to occupancy of the project in any part; vandalism or acts of neglect on the part of others; physical damage by animals, vehicles, etc.; and Acts of God, including but not limited to, catastrophic fire, hurricanes, riots, war, etc.

D. In the instance of curtailment of water by local water authorities (when supply was to be furnished by the Owner), the Contractor shall furnish all necessary water by water tanker, the cost of which will be approved and paid for by the Owner.

3.08 FINAL INSPECTION AND FINAL ACCEPTANCE:

A. At the end of the guarantee period, the Contractor shall provide written notice to the Engineer not less than 10 days before the anticipated date of final inspection for final acceptance.

B. The Engineer shall recommend final acceptance of the work of this Section only after completion and re-inspection of all necessary repairs, renewals or replacements.

END OF SECTION

SECTION 32 93 00

TREES, SHRUBS, GROUNDCOVERS, AND LANDSCAPING

PART 1 - GENERAL

1.01 WORK INCLUDED:

A. This Section includes furnishing all labor, materials, equipment, plants, and incidental materials necessary to perform all operations related to the planting of all trees, shrubs, herbaceous plants, ground covers, and for all appurtenant work, complete in place, maintained, and accepted, in accordance with the Contract Drawings and Specifications.

B. The Contractor shall bear the responsibility and cost of furnishing and applying water or any other substances, as necessary to ensure the sustainability of plant materials, as part of the work of this contract.

1.02 RELATED WORK:

A. Section 32 91 00, SCREENED LOAM BORROW AND TOPSOIL

C. Section 32 92 19, SEEDING

1.03 SUBMITTALS:

In accordance with requirements of the general specifications, the Contractor shall submit the following:

A. Prior to planting, State nursery inspection certificates for all plant materials shall be submitted to the Engineer for review.

B. A shop drawing of the layout of each temporary herbivore deterrent fencing area, including post locations, shall be submitted to the Engineer for review prior to wet meadow plug installation.

C. Samples and six copies of the manufacturer's product data, as applicable, shall be submitted to the Engineer for review and approval for the following materials:

1. Limestone.

2. Fertilizer.

3. Sphagnum Peat Moss.

4. Humus.

5. Organic Compost.

6. Manure.

7. Mulch.

8. Guying and Staking Apparatus.

9. Crepe Wrapping for tree trunks.

10. Anti-transpirant/Anti-desiccant.

11. Insecticides.

12. Herbicides.

13. Fungicides.

14. Temporary watering bags

15. Temporary plant establishment protection fencing

16. Temporary herbivore deterrent fencing

PART 2 - PRODUCTS

2.01 PLANT MATERIALS:

A. The Contractor shall furnish and plant all plant materials as shown on the plans and in the quantities and sizes listed thereon. No substitutions shall be permitted without the written approval of the Engineer.

B. Plants larger than those specified in the Plant List may be used if approved by the Engineer. However, use of such oversized plants shall not be considered grounds for any increase in the contract price. If the use of larger plants is approved, the required spread of roots or ball of earth shall be increased in proportion to the size of the plant and plant pits shall be increased, as necessary.

C. All plants shall be certified to have passed all required Federal and State inspection laws requiring ensuring freedom from plant diseases and insect infestations. The Contractor shall obtain clearance from applicable governing agencies, as required by law, before planting any plants delivered from outside the state in which they are to be planted.

D. All plants shall be nursery-grown under climatic conditions and environmental stresses

similar to those in the locality of the project. All plants shall originate from nurseries that are no more than one Hardiness Zone higher (as established by the Arnold Arboretum, Jamaica Plain, MA) than where the plant is to be installed. Plants also shall conform to the botanical names and standards of size, culture, and quality for the highest grades and standards as adopted by the American Association of Nurserymen, Inc. in the American Standard for Nursery Stock, ANSI-Z60.1, latest edition. All plants shall be legibly tagged with their proper botanical name.

E. No heeled-in plants or plants from cold storage shall be used. All plants shall be typical of their species or variety and shall have a normal habit of growth. Plants shall be sound, healthy, and vigorous, well branched, and densely foliated when in leaf; shall be free of disease, insects, eggs, or larvae; and shall have healthy, well-developed root systems. All parts of the plant shall be moist and shall show active green cambium when cut.

F. All nursery plants shall be balled and burlapped or container-grown and shall have been acclimatized for at least one growing season. Container-grown stock shall have been grown in a container long enough for the root system to have developed sufficiently to hold its soil together, firm, and whole, after removal from the container. No plants shall be loose in the container. Container-grown plants shall have no girdling roots and shall not be in a root-bound condition. Plants shall remain in their container until planted.

G. Care shall be exercised in digging and preparing field-grown plants for shipment and planting. Balled and burlapped materials shall have solid unbroken balls of earth of sufficient size to encompass all fibrous feeding roots necessary to ensure successful recovery and development of the plants. Balls shall be firmly wrapped in untreated biodegradable burlap and tied securely with wire cages and/or jute twine. Roots or balls of plants shall be adequately protected at all times from sun and drying winds. No plant shall be accepted when the ball of earth surrounding its roots has been badly cracked or broken preparatory to or during planting, or after the burlap, staves, wire cage, rope, or platform in connection with its transplanting have been removed. Soil characteristics (i.e., composition, texture, pH, etc.) of all field-grown plants shall closely match those of the soil where plant materials are to be planted.

H. The height of the trees, measured from the crown of the roots to the top of the top branch, shall not be less than the minimum size designated in the Plant List in the Drawings. The branching height for deciduous trees installed adjacent to or within walks shall be 7 feet minimum, having been pruned to this height at least 1 year prior to transplanting. Except when a clump is designated, the trunk of each tree shall be a single trunk growing from a single, unmutilated crown of roots. No part of the trunk shall be conspicuously crooked as compared with normal trees of the same variety. The trunk shall be free from sunscald, frost cracks, or wounds resulting from abrasions, fire, or other causes. All pruning cuts shall comply with acceptable horticultural practices. No pruning wounds having a diameter of more than 1½-inches shall be present. Any such wounds must show vigorous bark growth on all edges. Evergreen trees shall be branched to within 1 foot of the ground. No tree that has had its leader cut or die shall be accepted.

I. Caliper measurements for tree trunks shall be taken 6-inches above ground for trees up to and including 4-inch caliper size and at 12-inches above ground for larger sizes.

J. Shrubs shall meet the requirements for spread and/or height stated in the Plant List on the Drawings. The measures for height are to be taken from the crown or root flare to the average height of the top of the shrub mass (not the longest branch). The fullness of each shrub shall correspond to the trade classification "No. 1". Single stemmed or thin plants will not be accepted. The side branches must be generous, well-twigged and the plant as a whole must be well-bushed to the ground. The plants must be in a moist, vigorous condition, free from dead wood, bruises or other root or branch injuries.

K. Herbaceous plants and groundcovers shall be of the size, age and/or condition designated in the Plant List on the Drawings.

L. Plants shall be delivered only after preparations for planting have been completed. Plants shall be handled and packed in a horticulturally approved manner and all necessary precautions shall be taken to ensure that plants arrive on-site in a healthy vigorous condition. Trucks used for transporting plants shall be equipped with covers to protect plants from windburn, desiccation, and overheating during transport. Plants that have not been thoroughly watered shall not be accepted at the planting site. Any plants delivered to the site in a dry or wilted condition shall be rejected and replaced at no expense to the Owner. All plant materials shall be protected, watered, and otherwise maintained prior to, during, and upon delivery to the site.

M. Plants shall be subject to inspection and approval by the Engineer at the place of growth, or upon delivery, for conformity to specification requirements as to quality, size, variety, and condition. Inspection and selection of plants before digging shall be at the option of the Engineer. The Contractor, or his representative, shall be present, if requested by the Engineer, for inspection of plants at the Nursery. Such approval shall not impair the right of inspection and rejection upon delivery at the site or during the progress of work, for size and condition of balls and roots, disease, insects and latent defects or injuries. Rejected plants shall be removed immediately from the site. Certificates of inspection of plant materials shall be furnished as may be required by Federal, State, and other authorities to accompany shipments.

2.02 LOAM BORROW:

Loam Borrow shall be as specified in Section 32 91 00, SCREENED LOAM BORROW AND TOPSOIL.

2.03 BIORETENTION SOIL MIX

Bioretention soil mix shall be specified in Section 32 91 16, BIORETENTION SOIL MIX.

2.04 SOIL ADDITIVES AND AMENDMENTS:

A. LIMESTONE:

Lime shall be an approved agricultural limestone containing at least 50 percent total oxides (calcium oxide and magnesium oxide). The material will be ground such that 50 percent of the material will pass through a No. 100 mesh sieve and 98 percent will pass a No. 2 mesh sieve. Lime shall be uniform in composition, dry and free-flowing and shall be delivered to the site in the original sealed containers, each bearing the manufacturer's guaranteed analysis.

B. FERTILIZER:

1. Fertilizer shall be a complete, standard commercial fertilizer, homogeneous and uniform in composition, dry and free-flowing, and shall be delivered to the site in the manufacturer's original sealed containers, each bearing the manufacturer's guaranteed analysis and marketed in compliance with State and Federal Laws. All fertilizer shall be used in accordance with the manufacturer's recommendations.

2. Fertilizer for tree, shrub and groundcover plantings shall contain all major plant nutrients and minor trace elements essential to sustain plant growth and shall have the following analysis:

Nitrogen (N)	Phosphorous (P)	Potassium (K)
10%	10%	10%

3. As approved by the Engineer, a slow-release root contact fertilizer installed at the time of planting, may be used in place of the above, at the discretion of the Contractor.

C. Organic Compost shall be a standard commercial product comprised of fully decomposed, 100 percent plant-derived, natural organic matter. Its composition shall furnish ample water holding capacity and cation exchange capacity for the retention of plant nutrients. Compost shall be free of sticks, stones, weed seeds, roots, mineral or other foreign matter and delivered air dry. It shall be free from excessive soluble salts, heavy metals, phytotoxic compounds, and/or substances harmful to plant growth and viability. Organic compost shall have an acidity range of 4.5 to 7.0 pH.

D. Sphagnum Peat Moss shall be a standard commercial product. Its composition shall furnish ample water holding capacity and cation exchange capacity for the retention of

plant nutrients. Peat moss shall be free of sticks, stones, weeds or weed seeds, roots, mineral or other foreign matter. It shall be free from toxic substances and/or compounds harmful to plant growth and viability. It shall be delivered air dry in standard bales and shall have an acidity range of 3.5 to 5.5 pH.

E. Humus shall be natural humus, reed peat, or sedge peat. Its composition shall furnish ample water holding capacity and cation exchange capacity for the retention of plant nutrients. Humus shall be free of sticks, stones, weeds, roots, mineral or other foreign matter and/or toxic substances harmful to plant growth and viability. It shall be low in wood content, free from hard lumps and excessive amounts of zinc and delivered air dry in a shredded or granular form. The acidity range for humus shall be 5.5 to 7.5 pH, and the organic matter content shall be not less than 85 percent, as determined by loss on ignition. The minimum water holding capacity shall be 200 percent by weight on an oven-dry basis.

F. Manure shall be well-rotted, leached, cow manure not less than 8 months or more than 2 years old. It shall be free of sawdust, shavings, or refuse of any kind and shall not contain more than 25 percent straw. It shall contain no substances harmful to plant growth. The Contractor shall furnish information regarding chemical disinfectants, if any, that may have been used in storage of the manure.

2.05 PLANTING MIXTURE:

Planting mix shall consist of 7 parts loam borrow and 1-part organic compost, humus, sphagnum peat moss, or manure, thoroughly blended.

2.06 WATER:

A. Water shall be furnished by the Contractor, unless otherwise specified, and shall be suitable for irrigation and free from ingredients harmful to plant growth and viability for the duration of **two years** beginning at the time of project completion. The delivery and distribution equipment required for the application of water shall be watering bags as manufactured by located at each tree stake (3 per tree) furnished by the Contractor, at no additional cost to the Owner.

B. Watering bags shall be Treegator original style watering bags as manufactured by Treegator, 15 Mosswood Blvd., Youngsville, NC 27596 (866) 873-3428, www.treegator.com or

C. Approved Equal

2.07 MULCH:

Mulch shall be fibrous pliable shredded soft bark mulch, not exceeding ½-inch in width. It shall be 98 percent organic matter with a pH range between 3.5 and 4.5 and a moisture

content not to exceed 35 percent. It shall be free of weeds, weed seeds, debris, and other materials harmful to plant growth and viability. Organic mulch shall be aged no longer than 2 years.

2.08 MATERIALS FOR STAKING, GUYING, AND WRAPPING:

Tree stakes, drive anchors and guy wire assembies, and tree wraps shall not be used.

2.09 TREE PAINT:

Tree paint shall not be used.

2.10 ANTI-TRANSPIRANT/ANTI-DESICCANT:

Anti-transpirant or anti-desiccant shall be 'Wilt-Pruf', as manufactured by Nursery Specialty Products, Inc., Groton Falls, NY, or approved equal. It shall be delivered in original sealed manufacturer's containers and used in accordance with the manufacturer's instructions.

2.11 INSECTICIDES:

A. No insecticides shall be used on-site without the Contractor notifying and obtaining the prior approval of the Engineer.

B. Insecticides shall be EPA registered and approved for use in public open spaces. All insecticides shall be handled by State licensed applicators only, delivered in the original sealed manufacturer's containers, and used in accordance with the manufacturer's instructions.

C. Insecticide use shall be limited and selective, only to control specific insect infestations, as identified by the Contractor or the Engineer that may result in the disfigurement, decline, or death of plant materials.

2.12 HERBICIDES:

A. No herbicides shall be used on-site without the Contractor notifying and obtaining prior approval of the Engineer.

B. Herbicides shall be EPA registered and approved for use in public open spaces. All herbicides shall be handled by State licensed applicators only, delivered in the original sealed manufacturer's containers, and used in accordance with the manufacturer's instructions.

C. Herbicide for post-emergent application shall be glyphosate contact, 'Roundup', as manufactured by Monsanto, Inc., or approved equal.

D. Herbicide use shall be limited and selective, only to control specific weed infestations that have been identified by the Contractor or the Engineer.

2.13 FUNGICIDES:

A. No fungicides shall be used on-site without the Contractor notifying and obtaining prior approval of the Engineer.

B. Fungicides shall be EPA registered and approved for use in public open spaces. All fungicides shall be handled by State licensed applicators only, delivered in the original sealed manufacturer's containers, and used in accordance with the manufacturer's instructions.

C. Fungicide use shall be limited and selective, only to control specific fungal pathogenic disease infestations, as identified by the Contractor or the Engineer, that may result in the disfigurement, decline, or death of plant materials.

2.14 TEMPORARY PLANT ESTABLISHMENT PROTECTION FENCING

A. Plant establishment areas designated on the Contract Drawings areas shall be protected by a barrier raised immediately after plant installation and shall be maintained for the two (2) year establishment period. Areas to be protected are indicated on the drawings.

B. Temporary plant establishment protection fencing shall be "Snow Fence Wood" as manufactured by Louis E. Page, Inc., PO Box 639, Sterling, Massachusetts, 01564 (866-328-5018, www.louispage.com), or approved equal.

C. Fence shall be 4 feet tall. Slats shall be made of natural (intreated) No. 1 grade aspen measuring 3/8" thick x 1-1/2-inches wide x 48-inches high, held together with five 2-wire strands of galvanized wire. Thickness shall be a minimum of three-eights (3/8") inches thick but shall not exceed nine-sixteenths (9/16") inches thick. Both ends shall be cut square. The slats shall be spaced 2 ¼ inches apart plus or minus ¼-inch.

D. The base metal of the wire shall be of a good commercial quality of steel. The galvanized wire shall not be less than 13 steel wire gauge. The weight of the coating shall not be less 3/10 (0.3) ounce per square foot of uncoated wire surface, determined in accordance with AASCO Designation T65 (Class I). Weight of Coating on Zinc-Coated (Galvanized) Iron on Steel Articles. The zinc coating shall adhere to the wire, without flaking and without being removable by rubbing with bare fingers, when the wire is bent completely around a pin of the same diameter as that of the wire.

E. There shall be not less than 2 three hundred and sixty (360) degree twists of the wire in the weave between the slats. The fabric must be tightly woven so that the wire is forced into the wood slats sufficiently to hold tightly. The strands of wire shall be spaced 10 inches

apart and 4 inches from the ends of the slat. The fence shall be stretched after weaving and before being placed in rolls.

F. Posts shall be 3-inches in diameter, 8-foot long, and made from No. 1 grade northern spruce, untreated. End posts shall be adequately braced

G. 16 gauge wire shall be used to secure the sand fence to posts. Fencing shall be tensioned to the manufacturer's specification.

H. Signs shall be placed every 40 feet on center that read "PLANT ESTABLISHMENT AREA".

I. Signs shall be aluminum with font size no smaller than 10 inches by 16 inches. Submit sample for approval.

2.15 TEMPORARY HERBIVORE DETERRENT FENCING

A. Aquatic planting areas designated on the Contract Drawings areas shall be protected by a temporary herbivore deterrent fencing raised immediately after plant installation and shall be maintained for the two (2) year establishment period. Areas to be protected are indicated on the drawings.

B. The herbivore deterrent fence shall be a 2'-6" high barrier, constructed as detailed in the Contract Documents, and include the following:

a. 5-foot x 2-inch x 2-inch No. 1 untreated spruce, pine, or fir stakes set on a 50 foot grid and embedded into the lake's substrate a minimum of 2 feet, with one interior stake placed at the center of each 50-foot by 50-foot square.

b. Polypropylene safety fencing shall be 36-inches tall with 2-inch x 2.75-inch mesh openings secured to the stakes with U-Nail and embedded 6 inches into the lake's substrate. Safety fencing color shall be black.

c. 1/8-inch braided natural-fiber jute twine. Tensile strength shall be 84 pounds.

d. Biodegradable roll flagging, by Presco, 1201 E. Pecan Street, Sherman, TX 75090 (800-527-3295, www.presco.com) or approved equal. Color options shall be provided to the Owner for selection.

PART 3 - EXECUTION

3.01 INSTALLATION:

A. All plants shall be subject to inspection and approval by the Engineer upon delivery to the site. No materials shall be planted until approval is received.

B. All work shall be performed by skilled workers with a minimum of 2 years planting experience, in accordance with accepted horticultural/nursery practices, under the full-time supervision of a Certified Nurseryman or Arborist.

C. All balled and burlapped plants that cannot be planted immediately upon delivery shall be set on the ground and the root balls shall be well protected with soil, wet moss, or other acceptable material. All foliage shall be protected and covered with perforated shade materials.

D. The planting season for evergreen trees and shrubs shall extend from the time the soil becomes workable in the spring until new growth appears, and from September 15 until November 30 in the fall. Deciduous trees and shrubs shall be planted only when dormant, either prior to bud break and/or before leaves appear in the spring, or subsequent to their leaf drop in the fall. Ground covers shall be planted only after the last frost in the spring through mid-May. Planting season periods may be extended if weather and soil conditions permit only with the written approval of the Engineer. Extended or out-of-season planting requirements shall include application of antitranspirant and extra water as needed. Plant guarantee periods shall remain as stated below. Planting shall not be permitted in frozen ground.

E. All plant locations and outlines for planting beds shall be staked out for review and potential adjustment by the Engineer before any excavation is begun. In the event that rock, underground construction work or obstructions are encountered in any proposed planting pit or bed, the Engineer may select alternate locations. Where locations cannot be changed, the obstruction shall be removed, subject to the Engineer's approval, to a depth of not less than 3 feet below grade and not less than 6-inches below the bottom of the root ball when plant is properly set at the required grade. Removal of boulders or obstructions greater than 1 cubic yard in size shall be subject to approval and will be paid for by the Owner. No ledge will be removed to create planting pits or beds.

F. All planting pits shall be excavated with sloped walls, wider at the top than at the bottom, and scarified to eliminate glazing. Tree pits shall be at least 2 feet greater in diameter than the root ball of earth or root system. Shrub pits shall be at least 1 foot greater than the diameter of the root ball. Planting pits shall not be deeper than the height of the root ball.

G. When excavation occurs in areas of heavily compacted earth, stones, concrete chunks or other foreign matter, pits shall be dug at least 3 times the width of the rootball. Excavated material from plant pits shall be disposed of as required.

H. Container plants shall be removed from their growing container before planting. If roots are densely matted, the outer root mass shall be scored, sliced vertically, with a sharp knife to separate roots. All herbaceous plants and groundcovers shall be evenly spaced to produce a uniform effect and staggered in rows at intervals designated on the contract

drawings.

I. Shrubs and trees shall be set in the center of planting pits, plumb and straight, and at such a level that after settlement the crown of the roots will be 1-inch above the surrounding finished grade. Root ball masses shall not be loosened, broken or damaged. When balled and burlapped plants are set, planting mixture shall be compacted around bases of balls to fill all voids. All tying materials, twine and rope shall be cut and removed. Biodegradable burlap shall be laid back or cut away from the top half of the ball. If a wire basket is present, the upper 2/3 of the basket shall be cut away and removed. Do not remove the entire basket. Roots or bare root plants shall be properly spread out and planting mixture carefully worked in among them. Broken or frayed roots shall be cleanly cut.

J. Backfill plant pits with planting mixture in layers of not more than 9-inches and firmly tamp each layer and water to sufficiently settle the backfilled soil before the next layer is put in place. When the planting pit is 2/3 backfilled, the hole shall be flooded and watered thoroughly so that the water level reaches the top of the planting pit. Allow water to soak in, then complete the backfilling operation. Immediately after planting pit is backfilled, a shallow basin 3-inches deep and slightly larger than the pit shall be formed with a ridge of soil for water retention. Form a common basin for plant materials throughout mass planting beds. After planting, lightly till the soil in planting beds between planting pits and rake smooth to eliminate compaction of soils.

K. All planting hole basins shall be flooded with water twice within the first 24 hours of planting and watered not less than twice per week until final acceptance of the work.

N. Immediately after planting operations are complete, all plant pit basins and plant beds shall be covered with approved mulch to the depths designated on the plans. Mulch shall not contact tree bark, cover tree root flares, or shrub crowns. No mulch shall be applied prior to the first watering.

O. The pruning of trees and shrubs shall only be permitted to remove dead or dying branch limbs and tips, sucker growth, water sprouts, crossing or rubbing branches, broken or damaged branches, diseased or insect infested limbs, and to preserve the natural character of the plant. Plant materials shall be pruned in accordance with American Nurserymen Association Standards and as required by the Engineer. Questionable weak limbs and branch removals that may disfigure the plant shall be left to the discretion of the Engineer. The tree leader shall never be permitted to be cut. Pruning shall be done with clean, sharp tools. All large pruning cuts that are ½-inch in diameter or larger shall be made along the bark branch ridge. Pruning cuts shall not breach or otherwise interfere with the branch collar. All pruning cuts less than ¼-inch diameter shall be made with hand pruners as close to the main stem as possible without damaging the cambium or bud. Tree paint shall not be used to cover pruning cuts.

P. As the work proceeds, the Contractor shall remove all debris from the site, including but

not limited to branches, rock, paper, and rubbish. All areas shall be kept clean, neat and in an orderly condition at all times. Prior to final acceptance, the Contractor shall cleanup the entire area to the satisfaction of the Engineer.

3.02 TEMPORARY FENCING

A. **As the work proceeds and prior to final completion, the Contractor shall install temporary plant establishment protection fencing around all planting areas shown on the plans and herbivore deterrent fence around all aquatic planting areas. Temporary fencing shall stay in place and maintained for the duration of two (2) years and during the water and plant establishment period.**

B. All temporary fencing should be kept plumb and upright throughout the plant establishment period.

C. Maintain fencing in sound condition until project completion. Do not relocate installed fencing without the express approval of the Engineer or Owner.

3.03 MAINTENANCE:

A. Maintenance shall begin immediately after each plant is planted and shall continue until completion of the **two (2) year guarantee period** and final acceptance of the project. Plants shall be watered, pruned, sprayed, fertilized, cultivated, and otherwise maintained and protected for two years. Defective work shall be corrected as soon as possible after it becomes apparent and weather and season permit.

B. Settled plants shall be reset to proper grade and position, planting pits and common basins restored, and dead materials removed and replaced. Planting beds and individual basins shall be neat in appearance, maintained to their original layout lines and kept free of weeds. Mulch shall be replaced as required to maintain proper depths.

C. Contractor shall make arrangements to provide sufficient water to maintain all trees, shrubs, and plant materials until final acceptance. Plants shall be sprayed with anti-transpirant or anti-desiccant if required by seasonal conditions or as required by the Engineer.

D. Planting areas shall be protected against trespass and damage of any kind onceeach plant is planted and shall continue during the guarantee period. This shall include the furnishing and installation of approved temporary fencing per plans. If any plants become damaged, they shall be treated or replaced as required by the Engineer at no additional cost to the Owner.

3.04 INSPECTION AND PRELIMINARY ACCEPTANCE:

A. Contractor shall provide written notice to the Engineer not less than 10 days before the anticipated date of inspection for preliminary acceptance. The Engineer shall recommend preliminary acceptance of the work of this Section only after completion and re-inspection of all necessary repairs, renewals, or replacements.

B. Inspection and acceptance of plantings may be requested and granted in part, provided the areas for which acceptance is requested are relatively substantial in size, and with clearly definable boundaries. Acceptance and use of these areas by the Owner shall not waive any other provisions of this Contract.

3.05 GUARANTEE:

A. All plant materials shall be guaranteed for a plant establishment period of **two years** after preliminary acceptance of the project by the Owner.

B. When the work is accepted in part, the guarantee period shall extend from each partial acceptance to the terminal date of the last guarantee period. All guarantee periods terminate at one time.

C. Plants shall be healthy, free of pests and disease. Plants shall exhibit vigorous growth, shall bear foliage of normal density, size, and color, and shall have no less than seventy-five percent (75%) of their branches alive at the end of the guarantee period. If the leader of any single-leader species is dead, the entire plant shall be considered dead.

D. Any plant required under this Contract that is dead or unsatisfactory, as determined by the Engineer, shall be removed from the site. These shall be replaced as soon as weather permits during the specified planting season, at no additional cost to the Owner, until the plants live through **two years**.

E. All replacements shall be plants of the same kind and size as specified on the Plant List. They shall be furnished and planted as specified above.

F. The guarantee of all replacement plants shall extend for an additional **two-year** period from the date of their acceptance as replacement.

G. Guarantee shall not apply to the replacement of unacceptable plants resulting from the removal, loss, or damage due to occupancy of the project in any part; vandalism or acts of neglect on the part of others; physical damage by animals, vehicles, etc.; and Acts of God, including but not limited to, catastrophic fire, hurricanes, riots, war, etc.

H. In the instance of curtailment of water by local water authorities (when supply was to be furnished by the Owner), the Contractor shall furnish all necessary water by water tanker, the cost of which will be approved and paid for by the Owner.

I. Work included during the plant establishment period shall include a meeting two (2) times a year (one in spring and one in fall). In total, four establishment visits are required. These must be coordinated with the Owner and within the seeding periods, established in specifications herein. The Contractor shall meet with the Owner, or appointed representative, to review the condition of all plants within the contract area. The meeting will establish a list of tasks to be performed. These include:

1. Hand weeding within the designated area to remove any plants not included on the planting plan and schedule (weeds). Contractor must demonstrate the ability to differentiate between weeds and intentional plantings.

2. Cutting back grasses and pruning of shrubs as directed in the planting. maintenance manual or as directed by the Owner.

3. Replacement of any dead plants or shrubs, according to specifications.

3.07 FINAL INSPECTION AND FINAL ACCEPTANCE:

A. At the end of the guarantee period, the Contractor shall provide written notice to the Engineer not less than 10 days before the anticipated date of final inspection for final acceptance.

B. The Owner, Planner, Engineer shall recommend final acceptance of the work of this Section only after completion and re-inspection of all necessary repairs, renewals, or replacements.

END OF SECTION

APPENDIX A
ORDER OF CONDITIONS AND CERTIFICATE OF UNDERSTANDING

Ruthanne Fuller
Mayor

City of Newton, Massachusetts
Department of Planning and Development
1000 Commonwealth Avenue Newton, Massachusetts 02459

Telephone
(617) 796-1120
Telefax
(617) 796-1142
TDD/TTY
(617) 796-1089
www.newtonma.gov

Barney S. Heath
Director

February 10, 2023

Luis Perez Demorizi, Director of Open Space
Newton Parks, Recreation & Culture (PRC)
246 Dudley Road Newton, MA 02459
lpdemorizi@newtonma.gov | 617-796-1500

RE: Order of Conditions and Certificate of Understanding
SITE: Lyons Park (Islington Rd to Kaposia St), Null Commonweath Ave., Newton MA 02460
DEP file: #239-947
Project: Marty Sender Pathway Phase II Improvements

Dear Luis:

Enclosed is the Order of Conditions (the permit) issued under the Wetlands Protection Act, General Laws, Ch. 131, Sec. 40 and Newton Floodplain/Watershed Protection Ordinance, Section 22-22, for the referenced project.

1. Please **read all the conditions starting on Page 10-A.**

2. Please note that there are **requirements that must be met prior to any work starting** on the project.

3. If any changes to the approved plans referenced in this Order of Conditions (see page 10A) are proposed, the **revised plans and a memo enumerating every desired plan change must be uploaded to the NewGov record.** The Conservation Office will review and approve the changes if/as appropriate.

4. **Upon completion of the project, you must submit all appropriate materials for a Certificate of Compliance, including:**
   - An engineered "as-built plan" showing all structure and landscape features.
   - A letter from an engineer stating that the project was completed in substantial compliance with the order and plans.
   - A "landscape as-built plan" signed by the landscaper

If you have any questions, please don't hesitate to contact the office at 617-796-1134.

For the Commission,
Jennifer Steel
Jennifer Steel, Chief Environmental Planner

Enclosed: Order of Conditions; Certificate of Understanding.

CC: *Wetlands Division, DEP - NERO*

Certificate of Understanding re
Conditions and Restrictions in Wetlands and Buffer Zones

I, Luis Perez Demori (printed name) one of the owners of Lyons Park, 0 Commonwealth ave. (printed street address) Newton, MA 02459 in Newton, Massachusetts, and holder of MassDEP wetland permit number 239-947 **do hereby understand and acknowledge that:**

• I understand that the Order of Conditions (OOC) must be **recorded at the Registry of Deeds** and **proof of recording given to the Conservation Office and Building Dept./ISD**	*initials* LP
• I, as property owner, am **responsible for all work on my property** even if it is conducted by private contractors	*initials* LP
• I have **read and understand all the conditions** in the referenced OOC:	*initials* LP
○ The standard and site-specific **requirements <u>PRIOR</u> to the start of work**	*initials* LP
○ the standard and site-specific **requirements <u>DURING</u> work**	*initials* LP
○ The **<u>ONGOING/PERPETUAL</u> conditions for landscaping and maintenance activities** on my property	*initials* LP
• If any changes are proposed to the plans approved in this Order of Conditions (page 10A), I **must submit to the Conservation Office for their review and approval the revised plans and a memo enumerating the proposed changes**	*initials* LP
• I must **request a Certificate of Compliance** once all work is complete	*initials* LP
• **Even after project completion, I have ongoing obligations under this OOC**	*initials* LP

(Signature) Luis Perez Demori *(Printed Name)* 2/13/23 *(Date)*

Please complete this form and return it to:
Newton Conservation Office
1000 Commonwealth Avenue
Newton, Massachusetts 02459

Massachusetts Department of Environmental Protection
Bureau of Resource Protection - Wetlands

WPA Form 5 – Order of Conditions

Massachusetts Wetlands Protection Act M.G.L. c. 131, §40

Provided by MassDEP:
239-947
MassDEP File #

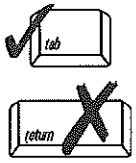
eDEP Transaction #

Newton
City/Town

A. General Information

Please note: this form has been modified with added space to accommodate the Registry of Deeds Requirements

Important: When filling out forms on the computer, use only the tab key to move your cursor - do not use the return key.



1. From: Newton
Conservation Commission

2. This issuance is for (check one): a. ☒ Order of Conditions b. ☐ Amended Order of Conditions

3. To: Applicant:

Luis — a. First Name
Demorizi — b. Last Name
Newton Parks, Rec and Culture — c. Organization
1000 Commonwealth Avenue — d. Mailing Address
Newton — e. City/Town
MA — f. State
02459 — g. Zip Code

4. Property Owner (if different from applicant):

a. First Name
b. Last Name
City of Newton — c. Organization
1000 Commonwealth Avenue — d. Mailing Address
Newton — e. City/Town
MA — f. State
02459 — g. Zip Code

5. Project Location:

Lyons Park (Islington Rd to Kaposia St) — a. Street Address
Newton — b. City/Town
410220001 — c. Assessors Map/Plat Number
d. Parcel/Lot Number
Latitude and Longitude, if known: d m s — d. Latitude
d m s — e. Longitude

Massachusetts Department of Environmental Protection
Bureau of Resource Protection - Wetlands
WPA Form 5 – Order of Conditions
Massachusetts Wetlands Protection Act M.G.L. c. 131, §40

Provided by MassDEP:
239-947
MassDEP File #

eDEP Transaction #

Newton
City/Town

A. General Information (cont.)

6. Property recorded at the Registry of Deeds for (attach additional information if more than one parcel):

Middlesex South
a. County

b. Certificate Number (if registered land)

15084
c. Book

553
d. Page

7. Dates: 1/24/2023 (a. Date Notice of Intent Filed) 2/9/2023 (b. Date Public Hearing Closed) 2/10/2023 (c. Date of Issuance)

8. Final Approved Plans and Other Documents (attach additional plan or document references as needed):

see Findings and Special Conditions pg 10A for a complete list of approved plans
a. Plan Title

b. Prepared By

c. Signed and Stamped by

d. Final Revision Date

e. Scale

f. Additional Plan or Document Title

g. Date

B. Findings

1. Findings pursuant to the Massachusetts Wetlands Protection Act:

Following the review of the above-referenced Notice of Intent and based on the information provided in this application and presented at the public hearing, this Commission finds that the areas in which work is proposed is significant to the following interests of the Wetlands Protection Act (the Act). Check all that apply:

a. ☒ Public Water Supply b. ☐ Land Containing Shellfish c. ☒ Prevention of Pollution

d. ☒ Private Water Supply e. ☒ Fisheries f. ☒ Protection of Wildlife Habitat

g. ☒ Groundwater Supply h. ☒ Storm Damage Prevention i. ☒ Flood Control

2. This Commission hereby finds the project, as proposed, is: (check one of the following boxes)

Approved subject to:

a. ☒ the following conditions which are necessary in accordance with the performance standards set forth in the wetlands regulations. This Commission orders that all work shall be performed in accordance with the Notice of Intent referenced above, the following General Conditions, and any other special conditions attached to this Order. To the extent that the following conditions modify or differ from the plans, specifications, or other proposals submitted with the Notice of Intent, these conditions shall control.

Massachusetts Department of Environmental Protection
Bureau of Resource Protection - Wetlands
WPA Form 5 – Order of Conditions
Massachusetts Wetlands Protection Act M.G.L. c. 131, §40

Provided by MassDEP: 239-947 (MassDEP File #)
eDEP Transaction #
Newton (City/Town)

B. Findings (cont.)

Denied because:

b. ☐ the proposed work cannot be conditioned to meet the performance standards set forth in the wetland regulations. Therefore, work on this project may not go forward unless and until a new Notice of Intent is submitted which provides measures which are adequate to protect the interests of the Act, and a final Order of Conditions is issued. **A description of the performance standards which the proposed work cannot meet is attached to this Order.**

c. ☐ the information submitted by the applicant is not sufficient to describe the site, the work, or the effect of the work on the interests identified in the Wetlands Protection Act. Therefore, work on this project may not go forward unless and until a revised Notice of Intent is submitted which provides sufficient information and includes measures which are adequate to protect the Act's interests, and a final Order of Conditions is issued. **A description of the specific information which is lacking and why it is necessary is attached to this Order as per 310 CMR 10.05(6)(c).**

3. ☒ Buffer Zone Impacts: Shortest distance between limit of project disturbance and the wetland resource area specified in 310 CMR 10.02(1)(a) — a. linear feet

Inland Resource Area Impacts: Check all that apply below. (For Approvals Only)

Resource Area	Proposed Alteration	Permitted Alteration	Proposed Replacement	Permitted Replacement
4. ☐ Bank	a. linear feet	b. linear feet	c. linear feet	d. linear feet
5. ☒ Bordering Vegetated Wetland	a. square feet	b. square feet	c. square feet	d. square feet
6. ☐ Land Under Waterbodies and Waterways	a. square feet	b. square feet	c. square feet	d. square feet
	e. c/y dredged	f. c/y dredged		
7. ☒ Bordering Land Subject to Flooding	3,540 a. square feet	b. square feet	c. square feet	d. square feet
Cubic Feet Flood Storage	260 e. cubic feet	307 f. cubic feet	g. cubic feet	h. cubic feet
8. ☐ Isolated Land Subject to Flooding	a. square feet	b. square feet		
Cubic Feet Flood Storage	c. cubic feet	d. cubic feet	e. cubic feet	f. cubic feet
9. ☒ Riverfront Area	19,465 a. total sq. feet	19,465 b. total sq. feet		
Sq ft within 100 ft	2,725 c. square feet	2,725 d. square feet	e. square feet	f. square feet
Sq ft between 100-200 ft	16,740 g. square feet	16,740 h. square feet	i. square feet	j. square feet

Massachusetts Department of Environmental Protection
Bureau of Resource Protection - Wetlands
WPA Form 5 – Order of Conditions
Massachusetts Wetlands Protection Act M.G.L. c. 131, §40

Provided by MassDEP: 239-947
MassDEP File #

eDEP Transaction #

Newton
City/Town

B. Findings (cont.)

Coastal Resource Area Impacts: Check all that apply below. (For Approvals Only)

	Proposed Alteration	Permitted Alteration	Proposed Replacement	Permitted Replacement
10. ☐ Designated Port Areas	Indicate size under Land Under the Ocean, below			
11. ☐ Land Under the Ocean	a. square feet	b. square feet		
	c. c/y dredged	d. c/y dredged		
12. ☐ Barrier Beaches	Indicate size under Coastal Beaches and/or Coastal Dunes below			
13. ☐ Coastal Beaches	a. square feet	b. square feet	c. nourishment cu yd	d. nourishment cu yd
14. ☐ Coastal Dunes	a. square feet	b. square feet	c. nourishment cu yd	d. nourishment cu yd
15. ☐ Coastal Banks	a. linear feet	b. linear feet		
16. ☐ Rocky Intertidal Shores	a. square feet	b. square feet		
17. ☐ Salt Marshes	a. square feet	b. square feet	c. square feet	d. square feet
18. ☐ Land Under Salt Ponds	a. square feet	b. square feet		
	c. c/y dredged	d. c/y dredged		
19. ☐ Land Containing Shellfish	a. square feet	b. square feet	c. square feet	d. square feet
20. ☐ Fish Runs	Indicate size under Coastal Banks, Inland Bank, Land Under the Ocean, and/or inland Land Under Waterbodies and Waterways, above			
	a. c/y dredged	b. c/y dredged		
21. ☐ Land Subject to Coastal Storm Flowage	a. square feet	b. square feet		
22. ☐ Riverfront Area	a. total sq. feet	b. total sq. feet		
Sq ft within 100 ft	c. square feet	d. square feet	e. square feet	f. square feet
Sq ft between 100-200 ft	g. square feet	h. square feet	i. square feet	j. square feet

Massachusetts Department of Environmental Protection
Bureau of Resource Protection - Wetlands
WPA Form 5 – Order of Conditions
Massachusetts Wetlands Protection Act M.G.L. c. 131, §40

Provided by MassDEP:
239-947
MassDEP File #

eDEP Transaction #
Newton
City/Town

B. Findings (cont.)

* #23. If the project is for the purpose of restoring or enhancing a wetland resource area in addition to the square footage that has been entered in Section B.5.c (BVW) or B.17.c (Salt Marsh) above, please enter the additional amount here.

23. ☐ Restoration/Enhancement *:

a. square feet of BVW | b. square feet of salt marsh

24. ☐ Stream Crossing(s):

a. number of new stream crossings | b. number of replacement stream crossings

C. General Conditions Under Massachusetts Wetlands Protection Act

The following conditions are only applicable to Approved projects.

1. Failure to comply with all conditions stated herein, and with all related statutes and other regulatory measures, shall be deemed cause to revoke or modify this Order.
2. The Order does not grant any property rights or any exclusive privileges; it does not authorize any injury to private property or invasion of private rights.
3. This Order does not relieve the permittee or any other person of the necessity of complying with all other applicable federal, state, or local statutes, ordinances, bylaws, or regulations.
4. The work authorized hereunder shall be completed within three years from the date of this Order unless either of the following apply:
   a. The work is a maintenance dredging project as provided for in the Act; or
   b. The time for completion has been extended to a specified date more than three years, but less than five years, from the date of issuance. If this Order is intended to be valid for more than three years, the extension date and the special circumstances warranting the extended time period are set forth as a special condition in this Order.
   c. If the work is for a Test Project, this Order of Conditions shall be valid for no more than one year.
5. This Order may be extended by the issuing authority for one or more periods of up to three years each upon application to the issuing authority at least 30 days prior to the expiration date of the Order. An Order of Conditions for a Test Project may be extended for one additional year only upon written application by the applicant, subject to the provisions of 310 CMR 10.05(11)(f).
6. If this Order constitutes an Amended Order of Conditions, this Amended Order of Conditions does not extend the issuance date of the original Final Order of Conditions and the Order will expire on 2/10/2026 unless extended in writing by the Department.
7. Any fill used in connection with this project shall be clean fill. Any fill shall contain no trash, refuse, rubbish, or debris, including but not limited to lumber, bricks, plaster, wire, lath, paper, cardboard, pipe, tires, ashes, refrigerators, motor vehicles, or parts of any of the foregoing.

C. General Conditions Under Massachusetts Wetlands Protection Act

8. This Order is not final until all administrative appeal periods from this Order have elapsed, or if such an appeal has been taken, until all proceedings before the Department have been completed.

9. No work shall be undertaken until the Order has become final and then has been recorded in the Registry of Deeds or the Land Court for the district in which the land is located, within the chain of title of the affected property. In the case of recorded land, the Final Order shall also be noted in the Registry's Grantor Index under the name of the owner of the land upon which the proposed work is to be done. In the case of the registered land, the Final Order shall also be noted on the Land Court Certificate of Title of the owner of the land upon which the proposed work is done. The recording information shall be submitted to the Conservation Commission on the form at the end of this Order, which form must be stamped by the Registry of Deeds, prior to the commencement of work.

10. A sign shall be displayed at the site not less then two square feet or more than three square feet in size bearing the words,

    "Massachusetts Department of Environmental Protection" [or, "MassDEP"]

    "File Number 239-947 "

11. Where the Department of Environmental Protection is requested to issue a Superseding Order, the Conservation Commission shall be a party to all agency proceedings and hearings before MassDEP.

12. Upon completion of the work described herein, the applicant shall submit a Request for Certificate of Compliance (WPA Form 8A) to the Conservation Commission.

13. The work shall conform to the plans and special conditions referenced in this order.

14. Any change to the plans identified in Condition #13 above shall require the applicant to inquire of the Conservation Commission in writing whether the change is significant enough to require the filing of a new Notice of Intent.

15. The Agent or members of the Conservation Commission and the Department of Environmental Protection shall have the right to enter and inspect the area subject to this Order at reasonable hours to evaluate compliance with the conditions stated in this Order, and may require the submittal of any data deemed necessary by the Conservation Commission or Department for that evaluation.

16. This Order of Conditions shall apply to any successor in interest or successor in control of the property subject to this Order and to any contractor or other person performing work conditioned by this Order.

Massachusetts Department of Environmental Protection
Bureau of Resource Protection - Wetlands
WPA Form 5 – Order of Conditions
Massachusetts Wetlands Protection Act M.G.L. c. 131, §40

Provided by MassDEP:
239-947
MassDEP File #

eDEP Transaction #

Newton
City/Town

C. General Conditions Under Massachusetts Wetlands Protection Act (cont.)

17. Prior to the start of work, and if the project involves work adjacent to a Bordering Vegetated Wetland, the boundary of the wetland in the vicinity of the proposed work area shall be marked by wooden stakes or flagging. Once in place, the wetland boundary markers shall be maintained until a Certificate of Compliance has been issued by the Conservation Commission.

18. 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. 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 the Conservation Commission, 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 this Order.

19. The work associated with this Order (the "Project")
    (1) ☒ is subject to the Massachusetts Stormwater Standards
    (2) ☐ is NOT subject to the Massachusetts Stormwater Standards

    If the work is subject to the Stormwater Standards, then the project is subject to the following conditions:

    a) All work, including site preparation, land disturbance, construction and redevelopment, shall be implemented in accordance with the construction period pollution prevention and erosion and sedimentation control plan and, if applicable, the Stormwater Pollution Prevention Plan required by the National Pollution Discharge Elimination System Construction General Permit as required by Stormwater Condition 8. Construction period erosion, sedimentation and pollution control measures and best management practices (BMPs) shall remain in place until the site is fully stabilized.

    b) No stormwater runoff may be discharged to the post-construction stormwater BMPs unless and until a Registered Professional Engineer provides a Certification that:

    i. all construction period BMPs have been removed or will be removed by a date certain specified in the Certification. For any construction period BMPs intended to be converted to post construction operation for stormwater attenuation, recharge, and/or treatment, the conversion is allowed by the MassDEP Stormwater Handbook BMP specifications and that the BMP has been properly cleaned or prepared for post construction operation, including removal of all construction period sediment trapped in inlet and outlet control structures;

    ii. as-built final construction BMP plans are included, signed and stamped by a Registered Professional Engineer, certifying the site is fully stabilized;

    iii. any illicit discharges to the stormwater management system have been removed, as per the requirements of Stormwater Standard 10;

C. General Conditions Under Massachusetts Wetlands Protection Act (cont.)

iv. all post-construction stormwater BMPs are installed in accordance with the plans (including all planting plans) approved by the issuing authority, and have been inspected to ensure that they are not damaged and that they are in proper working condition;

v. any vegetation associated with post-construction BMPs is suitably established to withstand erosion.

c) The landowner is responsible for BMP maintenance until the issuing authority is notified that another party has legally assumed responsibility for BMP maintenance. Prior to requesting a Certificate of Compliance, or Partial Certificate of Compliance, the responsible party (defined in General Condition 18(e)) shall execute and submit to the issuing authority an Operation and Maintenance Compliance Statement ("O&M Statement) for the Stormwater BMPs identifying the party responsible for implementing the stormwater BMP Operation and Maintenance Plan ("O&M Plan") and certifying the following:

i.) the O&M Plan is complete and will be implemented upon receipt of the Certificate of Compliance, and

ii.) the future responsible parties shall be notified in writing of their ongoing legal responsibility to operate and maintain the stormwater management BMPs and implement the Stormwater Pollution Prevention Plan.

d) Post-construction pollution prevention and source control shall be implemented in accordance with the long-term pollution prevention plan section of the approved Stormwater Report and, if applicable, the Stormwater Pollution Prevention Plan required by the National Pollution Discharge Elimination System Multi-Sector General Permit.

e) Unless and until another party accepts responsibility, the landowner, or owner of any drainage easement, assumes responsibility for maintaining each BMP. To overcome this presumption, the landowner of the property must submit to the issuing authority a legally binding agreement of record, acceptable to the issuing authority, evidencing that another entity has accepted responsibility for maintaining the BMP, and that the proposed responsible party shall be treated as a permittee for purposes of implementing the requirements of Conditions 18(f) through 18(k) with respect to that BMP. Any failure of the proposed responsible party to implement the requirements of Conditions 18(f) through 18(k) with respect to that BMP shall be a violation of the Order of Conditions or Certificate of Compliance. In the case of stormwater BMPs that are serving more than one lot, the legally binding agreement shall also identify the lots that will be serviced by the stormwater BMPs. A plan and easement deed that grants the responsible party access to perform the required operation and maintenance must be submitted along with the legally binding agreement.

f) The responsible party shall operate and maintain all stormwater BMPs in accordance with the design plans, the O&M Plan, and the requirements of the Massachusetts Stormwater Handbook.

Massachusetts Department of Environmental Protection
Bureau of Resource Protection - Wetlands
WPA Form 5 – Order of Conditions
Massachusetts Wetlands Protection Act M.G.L. c. 131, §40

Provided by MassDEP:
239-947
MassDEP File #

eDEP Transaction #
Newton
City/Town

C. General Conditions Under Massachusetts Wetlands Protection Act (cont.)

g) The responsible party shall:
1. Maintain an operation and maintenance log for the last three (3) consecutive calendar years of inspections, repairs, maintenance and/or replacement of the stormwater management system or any part thereof, and disposal (for disposal the log shall indicate the type of material and the disposal location);
2. Make the maintenance log available to MassDEP and the Conservation Commission ("Commission") upon request; and
3. Allow members and agents of the MassDEP and the Commission to enter and inspect the site to evaluate and ensure that the responsible party is in compliance with the requirements for each BMP established in the O&M Plan approved by the issuing authority.

h) All sediment or other contaminants removed from stormwater BMPs shall be disposed of in accordance with all applicable federal, state, and local laws and regulations.

i) Illicit discharges to the stormwater management system as defined in 310 CMR 10.04 are prohibited.

j) The stormwater management system approved in the Order of Conditions shall not be changed without the prior written approval of the issuing authority.

k) Areas designated as qualifying pervious areas for the purpose of the Low Impact Site Design Credit (as defined in the MassDEP Stormwater Handbook, Volume 3, Chapter 1, Low Impact Development Site Design Credits) shall not be altered without the prior written approval of the issuing authority.

l) Access for maintenance, repair, and/or replacement of BMPs shall not be withheld. Any fencing constructed around stormwater BMPs shall include access gates and shall be at least six inches above grade to allow for wildlife passage.

Special Conditions (if you need more space for additional conditions, please attach a text document):

See attached "Findings and Special Conditions of the Newton Conservation Commission" pages 10-A et seq.

20. For Test Projects subject to 310 CMR 10.05(11), the applicant shall also implement the monitoring plan and the restoration plan submitted with the Notice of Intent. If the conservation commission or Department determines that the Test Project threatens the public health, safety or the environment, the applicant shall implement the removal plan submitted with the Notice of Intent or modify the project as directed by the conservation commission or the Department.

Massachusetts Department of Environmental Protection
Bureau of Resource Protection - Wetlands
WPA Form 5 – Order of Conditions
Massachusetts Wetlands Protection Act M.G.L. c. 131, §40

Provided by MassDEP:
239-947
MassDEP File #

eDEP Transaction #

Newton
City/Town

D. Findings Under Municipal Wetlands Bylaw or Ordinance

1. Is a municipal wetlands bylaw or ordinance applicable? ☒ Yes ☐ No

2. The Newton (Conservation Commission) hereby finds (check one that applies):

   a. ☐ that the proposed work cannot be conditioned to meet the standards set forth in a municipal ordinance or bylaw, specifically:

   City Floodplain Ordinance (1. Municipal Ordinance or Bylaw) — 22-22 (2. Citation)

   Therefore, work on this project may not go forward unless and until a revised Notice of Intent is submitted which provides measures which are adequate to meet these standards, and a final Order of Conditions is issued.

   b. ☐ that the following additional conditions are necessary to comply with a municipal ordinance or bylaw:

   City Floodplain Ordinance (1. Municipal Ordinance or Bylaw) — 22-22 (2. Citation)

3. The Commission orders that all work shall be performed in accordance with the following conditions and with the Notice of Intent referenced above. To the extent that the following conditions modify or differ from the plans, specifications, or other proposals submitted with the Notice of Intent, the conditions shall control.

   The special conditions relating to municipal ordinance or bylaw are as follows (if you need more space for additional conditions, attach a text document):

   If "yes" above is checked, please see attached "Findings and Special Conditions of the Newton Conservation Commission" pages 10-A et seq.

Findings (considered as and given equal status as special conditions)

Site: 0 Comm. Ave. (Lyons & Auburndale Parks), Marty Sender Path (southern portion, boardwalk)

Owner: Newton Park, Recreation & Culture (PRC)
246 Dudley Road Newton, MA 02459. 617-796-1500

Applicant: Luis Perez Demorizi, Director of Open Space
Newton Park, Recreation & Culture (PRC), 246 Dudley Road Newton, MA 02459
lpdemorizi@newtonma.gov

Representative: Farah Dakkak, Project Landscape Architect
Weston and Sampson
DakkakF@wseinc.com | direct: 857.972.9974

Date of Issuance: February 10, 2023

Existing Conditions: Gravel roadway 10-15' wide (used as walking path)

Approved Project Purpose:

- Convert a 1,200-foot long, heavily used, degraded, section of the existing "roadway" to be converted to a share-use pathway (only), accommodate increasingly frequent flooding, and allow universal access by upgrading the existing gravel roadbed to a well-graded stone dust path and elevated boardwalk.
- Connect to the recently completed Phase 1 trail improvements.

Approved Project Summary:

- Improve the grading of and drainage from a short segment of the existing gravel roadway into a stone dust shared-use path
- Install a 500-foot-long by 10-foot wide boardwalk above the flood elevation (260 cf of fill from the piers of the boardwalk)
- Remove portions of the existing roadway "berm" from under the new boardwalk that blocks the flow of stormwater and disconnects wetlands from the floodplain to provide 307 cf of compensatory flood storage
- Convert existing turf grass into an area of native herbaceous plants, shrubs, and trees.

Final Approved Plans

- Marty Sender Greenway (90% Design Documents), dated January 24, 2023, prepared by Weston and Sampson, signed and stamped by Brandon Kunkel, PLA
  - L001: Cover Sheet
  - L100: Existing Conditions Plan
  - L110: Site Demolition and Preparation Plan
  - L120: Material and Planting Plan
  - L130: Layout Plan
  - L140: Grading And Drainage Plan
  - L500: Construction Details
  - S001: Structural General Notes and Details

Plan Revisions

- Any required or desired deviations from the approved plans shall be requested in writing. Relatively minor changes resulting in the same or decreased impacts may be administratively approved. If the project purpose or scope changes substantially, the Commission may require an amended OOC or new Notice of Intent.
- When plans are updated, the applicant must provide all involved City Departments with updated plans.
- The Newton Conservation Commission retains the right to require the submittal of additional information or impose additional conditions deemed necessary to ensure the protection of wetland resource areas.

Jurisdiction

- Buffer Zone: 310 CMR 10.53(1)
- Riverfront Area Redevelopment: 310 CMR 10.58(5)
- Bordering Land Subject to Flooding: 310 CMR 10.57
- Bordering Vegetative Wetlands: 310 CMR 10.55

Reasons for Approval (Impact Analysis)

- Buffer Zone: The areas of Buffer Zone affected by this project are existing gravel roadway. There will be no degradation of vegetated buffer zone, only revegetation of gravel verges and conversion of turf grass to native vegetation.
- Bordering Land Subject to Flooding: 307 cubic feet of existing gravel will be removed from: (1) the roadway where the boardwalk will be installed and (2) the turf grass area adjacent to the existing roadway to accommodate wetland plants and shrubs. In this way, 47 cf of excess flood storage capacity will be provided.
- Riverfront Area: The proposed alterations within RFA are limited to improvements of an existing gravel roadway into a shared use pathway and boardwalk (which will be narrower and better defined than the current roadway) and enhancement of an area traditionally maintained as turf grass.
- Stormwater Management Standards have been met by reducing the extent of impervious gravel roadway to a consistent 10-foot wide stone dust pathway, and replacing a 550-foot long section of the gravel roadway with an elevated, slatted boardwalk.
- Conclusion: The site is currently developed; the proposed project will reduce impervious area, restore altered areas to native vegetation, and create new flood storage capacity. The project will convert a significant area of existing turf grass to a buffer zone enhancement area with native wetland plantings and provide the added benefit of reducing the city's maintenance mowing costs. The project will also increase hydrologic connectivity between the wetlands near Lyons Field and Ware's Cove by the removal of existing path material from under the boardwalk and areas next to the path which currently prevent water from flowing freely.

Limit of Work: The sediment control line shall be the limit of work.

In case of emergencies, problems, or questions, contact: Jennifer Steel: 617-796-1134.

Newton's Standard Conditions Prior to the Start of Work

21. To ensure broad understanding of this Order and good lines of communication, the applicant must:
    a. Review all conditions with all contractors and workers involved in on-site operations prior to the commencement of construction on this project. Any contractors and workers arriving after construction commences must also be apprised of these conditions. The project supervisor overseeing daily operations at the site must read this Order.
    b. Include this document in all contracts, subcontracts, and specifications associated with the proposed work and shall supersede any conflicting contract requirements. The Applicant shall ensure that all contractors, subcontractors and personnel performing the permitted work are aware of the permit's terms and conditions. Thereafter, the contractor will be held jointly liable for any violation of this Order. Nothing in this paragraph shall limit or restrict the liability of the Applicant for violations of this Order.
22. The applicant must schedule and attend a pre-construction site visit with the applicant, construction supervisor and Conservation agent, to review and provide the following.
    a. A signed Certificate of Understanding (attached to the Order of Conditions cover letter).
    b. Contact information for those responsible for compliance with the Order on site. An emergency telephone number must be provided in the event that action is required during non-working hours.
    c. The anticipated timeline.
    d. Proof of Recording the Order (Note: the proof of recording must be submitted to the Conservation Office through the City's online permitting system.)
    e. DEP File number sign (minimum size 2'x2', clearly visible from the street)
    f. Sedimentation/erosion controls (properly installed in the correct locations)
    g. Protection of all trees and shrubs within the limit of work, and as necessary outside the limit of work, with orange snow fence installed at the dripline, plywood sheeting over the roots, and boards tied to the trunk.
23. Notice shall be given to the Conservation Commission at least two business days prior to the start of work.

Newton's Site-Specific Conditions Prior to the Start of Work

24. A dewatering plan designed to limit and control any adverse impact on the wetlands resource area(s) must be presented to the Conservation Commission for review and approval.
25. A concrete washout plan designed to limit and control any adverse on the wetlands resource area(s) must be presented to the Conservation Commission for review and approval.

26. Adequate protection must be installed for the tree(s). This may include the addition of orange snow fencing near the drip line, boards tied to the trunk, and/or mulch and plywood placed over the roots.

Newton's Standard Conditions During Work

27. A copy of the approved plans and Order of Conditions shall be always on-site and available. All contractors must adhere to the approved plan and conditions. Should any damage occur during the project, the applicant or any successor shall be responsible for the full cost of restoration of the wetland to the satisfaction of the Commission.
28. Erosion controls must be inspected and properly maintained during construction until the site is stable. If a breach of the erosion control barriers occurs, the Newton Conservation Commission shall be notified, and measures shall be taken to remediate said breach. City streets shall be kept clean and catch basins in the immediate area shall be protected from eroding soils. An adequate supply of extra erosion control materials shall be stored on-site at all times for repair or replacement. Hay bales are prohibited without permission from the Commission. Erosion control barriers shall remain in place until written authorization for their removal has been received from the Newton Conservation Commission.
29. The Applicant must inform the Commission of any violation of this Order and any other project related spill or accident that may impact wetland resource areas as soon as possible and at least by the end of the business day and must take appropriate action to mitigate impacts from such spill or accident.
30. "Good housekeeping practices" shall be implemented at all times, including:
    a. appropriate limits to stormwater discharges
    b. appropriate stockpile area management
    c. appropriate limits to vehicle refueling, washing, etc.
    d. appropriate litter management
    e. appropriate controls for tire tracking
31. Work shall be immediately halted on the site if an Agent of the Commission or DEP determines that any of the work is not in compliance with this Order of Conditions or Special Conditions.

Newton's Site-Specific Conditions During Work

32. Dewatering basins and discharge, if any, must occur on the established grassy fields. It may not occur within wooded wetland areas.
33. Compensatory flood storage must be provided in its entirety as per the plans. Finished grades must comport with the approved plans (i.e., there must be net removal of ~250 cubic feet of roadway material around the 38' NAVD88 contour from under the boardwalk and removal of ~50 cubic feet of turf grass and soil where the wetland plants are due to be established).
34. Existing trees shall be protected at all times, as per Condition #26 and the details and notes on sheets L-110 and L-500.
35. The edges of the existing gravel roadway that extend beyond the edges of the boardwalk and parts of the pathway shall have some gravel material removed, possibly some loam installed, then be seeded with a shade-tolerant native seed mix.
36. Riverfront Area / Buffer Zone enhancement plantings must:
    a. Be installed in compliance with the approved plans (desired changes must be approved by the Conservation office in advance) BUT:
        i. The "aquatic seed mix planting" shown on the plans shall be "New England Wetmix" or "New England Erosion Control/Restoration Mix for Detention Basins and Moist Sites" or an equivalent.
        ii. Because of the risk of heavy browse, and the wet conditions, the lowbush blueberry shall be substituted with another shrub species from the approved plant schedule.
    b. Be installed under the direction of a qualified wetland consultant to ensure proper installation, proper placement, and appropriate and even filling of the entire mitigation area.
    c. Be installed and maintained in such a manner as to replicate to the maximum extent practical a diverse ecological system, provide habitat for native species, and keep invasive species in check. Mulch applications, if any, shall diminish over time and eventually cease as ground cover species and shrubs spread.
    d. Stabilize all disturbed areas

e. Include 4 native canopy trees and have a survival rate of 100 % of total number of trees (after 2 growing seasons)
f. Include 71 native shrubs and have a survival rate of 80 % of total number of shrubs (after 2 growing seasons)
g. Include the native herbaceous plants shown on the approved plan and have a survival rate of 75 % aerial coverage of such plants (after 2 growing seasons)
h. Be managed to control/minimize invasives species. If herbicides are use, manufacturer's recommended directions must be followed.

37. Restoration planting areas shall be surrounded with sand dune fencing or equivalent until establishment has been achieved to minimize animal browse and foot traffic.
38. If any trees intended to be protected within the project area die within 2 years of the start of construction as a result of the construction or have been demonstrably harmed by construction activities, they shall be replaced at a ratio of 2:1 with native canopy saplings (of roughly 2 caliper inches).

Newton's Standard Conditions After Work has been Completed

39. The applicant must apply for a Certificate of Compliance in accordance with DEP Condition #12, by submitting:
    b. A completed "Request for Certificate of Compliance (WPA Form 8A)."
    b. An as-built plan signed and stamped by a professional engineer and/or land surveyor registered in Massachusetts. This plan must include all structures, hardscape, grading (topography), mature trees, landscape features and plantings.
    c. A written statement from a Professional Landscape Architect registered in Massachusetts certifying that the work has been completed in substantial compliance with this Order of Conditions and the approved plans referenced herein (or approved revisions). If the completed work differs from that in the approved plans and conditions, the report must specify how the project differs.
    d. A letter from a landscaper certifying compliance with the approved planting scheme.

Newton's Site-Specific Perpetual Conditions that Shall Not Expire upon the Issuance of a Certificate of Compliance - none

TEAR-SHEET FOR REQUIRED MITIGATION PLANTING AREA

Location: between boardwalk and Lyons Field

Plan citation: Sheet L-120: Material and Planting Plan, dated January 24, 2023.

NATIVE PLANT LIST

Qty	Common Name	Botanical Name	Plant Size
2	Ironwood	*Carpinus caroliniana*	2"-2.5" cal.
1	River Birch	*Betula nigra*	12-14' height
1	Red Oak	*Quercus rubra*	2"-2.5" cal.
9	Black Chokeberry	*Aronia melanocarpa 'low scape mound*	#3
19	Button Bush	*Cephalanthus occidentalis*	#3
8	Sweet Pepperbush	*Clethra alnifolia 'hummingbird'*	#3
18	Inkberry	*Ilex glabra*	#3
20	Winterberry Holly	*Ilex glabra*	#3
15	Sweetgale	*Myrica gale*	#3
18	Lowbush Blueberry	*Vaccinium angustifolium*	#2
55	Bearded Sedg	*Carex comosa*	
125	Tussock Sedge	*Carex stricta*	

NOTE: Other native plants may be substituted with prior approval from the Conservation office staff.
617-796-1152 / 617-796-1134 / conservation@newtonma.gov

INSTALLATION REQUIREMENTS AND PERFORMANCE STANDARDS

The mitigation planting area must:

- Be watered as needed to achieve establishment.
- Stabilize all exposed soils.
- Be maintained to keep invasive species in check.

SURVIVAL

- Plants must survive 2 growing seasons.
- Seeded area must achieve 75% coverage after 2 growing seasons.

Massachusetts Department of Environmental Protection
Bureau of Resource Protection - Wetlands
WPA Form 5 – Order of Conditions
Massachusetts Wetlands Protection Act M.G.L. c. 131, §40

Provided by MassDEP:
239-947
MassDEP File #

eDEP Transaction #

Newton
City/Town

E. Signatures

This Order is valid for three years, unless otherwise specified as a special condition pursuant to General Conditions #4, from the date of issuance.

2/10/2023
1. Date of Issuance

Please indicate the number of members who will sign this form.
This Order must be signed by a majority of the Conservation Commission.

7
2. Number of Signers

The Order must be mailed by certified mail (return receipt requested) or hand delivered to the applicant. A copy also must be mailed or hand delivered at the same time to the appropriate Department of Environmental Protection Regional Office, if not filing electronically, and the property owner, if different from applicant.

I, Jennifer Steel, Chief Environmental Planner of the City of Newton, am authorized to execute on behalf of the members of the City of Newton Conservation Commission all Determinations of Applicability, Orders of Condition, and Certificates of Compliance pursuant to the Commission's vote dated April 2, 2020, and recorded with the Middlesex South District Registry of Deeds in Book 74537, Page 433.

Jennifer Steel 2/10/2023

Signature	Printed Name
s/ Daniel Green	Daniel Green
s/ Susan Lunin	Susan Lunin
s/ Jeffery Zabel	Jeffery Zabel
s/ Judith Hepburn	Judith Hepburn
s/ Ellen Katz	Ellen Katz
s/ Kathy Cade	Kathy Cade
s/ Leigh Gilligan	Leigh Gilligan

☑ by hand delivery on

Date

☐ by certified mail, return receipt requested, on

Date

Massachusetts Department of Environmental Protection
Bureau of Resource Protection - Wetlands
WPA Form 5 – Order of Conditions
Massachusetts Wetlands Protection Act M.G.L. c. 131, §40

Provided by MassDEP:
239-947
MassDEP File #

eDEP Transaction #
Newton
City/Town

F. Appeals

The applicant, the owner, any person aggrieved by this Order, any owner of land abutting the land subject to this Order, or any ten residents of the city or town in which such land is located, are hereby notified of their right to request the appropriate MassDEP Regional Office to issue a Superseding Order of Conditions. The request must be made by certified mail or hand delivery to the Department, with the appropriate filing fee and a completed Request for Departmental Action Fee Transmittal Form, as provided in 310 CMR 10.03(7) within ten business days from the date of issuance of this Order. A copy of the request shall at the same time be sent by certified mail or hand delivery to the Conservation Commission and to the applicant, if he/she is not the appellant.

Any appellants seeking to appeal the Department's Superseding Order associated with this appeal will be required to demonstrate prior participation in the review of this project. Previous participation in the permit proceeding means the submission of written information to the Conservation Commission prior to the close of the public hearing, requesting a Superseding Order, or providing written information to the Department prior to issuance of a Superseding Order.

The request shall state clearly and concisely the objections to the Order which is being appealed and how the Order does not contribute to the protection of the interests identified in the Massachusetts Wetlands Protection Act (M.G.L. c. 131, § 40), and is inconsistent with the wetlands regulations (310 CMR 10.00). To the extent that the Order is based on a municipal ordinance or bylaw, and not on the Massachusetts Wetlands Protection Act or regulations, the Department has no appellate jurisdiction.

Massachusetts Department of Environmental Protection
Bureau of Resource Protection - Wetlands
WPA Form 5 – Order of Conditions
Massachusetts Wetlands Protection Act M.G.L. c. 131, §40

Provided by MassDEP:
239-947
MassDEP File #

eDEP Transaction #

Newton
City/Town

G. Recording Information

Prior to commencement of work, this Order of Conditions must be recorded in the Registry of Deeds or the Land Court for the district in which the land is located, within the chain of title of the affected property. In the case of recorded land, the Final Order shall also be noted in the Registry's Grantor Index under the name of the owner of the land subject to the Order. In the case of registered land, this Order shall also be noted on the Land Court Certificate of Title of the owner of the land subject to the Order of Conditions. The recording information on this page shall be submitted to the Conservation Commission listed below.

Conservation Commission

Detach on dotted line, have stamped by the Registry of Deeds and submit to the Conservation Commission.

To:

Conservation Commission

Please be advised that the Order of Conditions for the Project at:

Project Location | MassDEP File Number

Has been recorded at the Registry of Deeds of:

County | Book | Page

for: Property Owner

and has been noted in the chain of title of the affected property in:

Book | Page

In accordance with the Order of Conditions issued on:

Date

If recorded land, the instrument number identifying this transaction is:

Instrument Number

If registered land, the document number identifying this transaction is:

Document Number

Signature of Applicant

Massachusetts Department of Environmental Protection
Bureau of Resource Protection - Wetlands

Request for Departmental Action Fee Transmittal Form

Massachusetts Wetlands Protection Act M.G.L. c. 131, §40

DEP File Number:

Provided by DEP

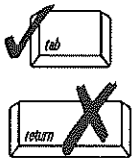
A. Request Information

1. Location of Project

a. Street Address | b. City/Town, Zip

c. Check number | d. Fee amount

Important: When filling out forms on the computer, use only the tab key to move your cursor - do not use the return key.



2. Person or party making request (if appropriate, name the citizen group's representative):

Name

Mailing Address

City/Town | State | Zip Code

Phone Number | Fax Number (if applicable)

3. Applicant (as shown on Determination of Applicability (Form 2), Order of Resource Area Delineation (Form 4B), Order of Conditions (Form 5), Restoration Order of Conditions (Form 5A), or Notice of Non-Significance (Form 6)):

Name

Mailing Address

City/Town | State | Zip Code

Phone Number | Fax Number (if applicable)

4. DEP File Number:

B. Instructions

1. When the Departmental action request is for (check one):

☐ Superseding Order of Conditions – Fee: $120.00 (single family house projects) or $245 (all other projects)

☐ Superseding Determination of Applicability – Fee: $120

☐ Superseding Order of Resource Area Delineation – Fee: $120

Massachusetts Department of Environmental Protection
Bureau of Resource Protection - Wetlands

Request for Departmental Action Fee Transmittal Form

Massachusetts Wetlands Protection Act M.G.L. c. 131, §40

DEP File Number:

Provided by DEP

B. Instructions (cont.)

Send this form and check or money order, payable to the *Commonwealth of Massachusetts,* to:

Department of Environmental Protection
Box 4062
Boston, MA 02211

2. On a separate sheet attached to this form, state clearly and concisely the objections to the Determination or Order which is being appealed. To the extent that the Determination or Order is based on a municipal bylaw, and not on the Massachusetts Wetlands Protection Act or regulations, the Department has no appellate jurisdiction.

3. Send a **copy** of this form and a **copy** of the check or money order with the Request for a Superseding Determination or Order by certified mail or hand delivery to the appropriate DEP Regional Office (see https://www.mass.gov/service-details/massdep-regional-offices-by-community).

4. A copy of the request shall at the same time be sent by certified mail or hand delivery to the Conservation Commission and to the applicant, if he/she is not the appellant.

APPENDIX B
GEOTECHNINCAL ENGINEERING REPORT

55 Walkers Brook Drive, Suite 100 Reading, MA 01867 (HQ)
Tel: 978.532.1900

Marty Sender Greenway Phase 2 Project
Weston & Sampson Project No. ENG22-0315

August 16, 2022

Mr. Luis Perez Demorizi
Director of Parks & Open Space
Newton Parks, Recreation, and Culture
246 Dudley Road
Newton, MA 02459

RE: Geotechnical Engineering Report
Marty Sender Greenway Phase 2
Newton, Massachusetts

INTRODUCTION

Weston & Sampson Engineers, Inc. (Weston & Sampson) is pleased to present our geotechnical engineering report for Phase 2 of the proposed Marty Sender Greenway project in Newton, Massachusetts. The proposed project involves improvements to the Marty Sender walking trail between Auburndale Park and Lyons Park. Phase 2 of the project will be constructed between the southern limits of the Phase 1 portion of the trail and Lyons Park. Our services were completed in general accordance with Task 8 of our May 20, 2022 proposal.

Information on the use of this report is provided in the document titled "Important Information about this Geotechnical Engineering Report" by Geoprofessional Business Association (GBA), Inc., as described in the Limitations section of this report.

EXISTING CONDITIONS AND PROJECT UNDERSTANDING

Lyons Park is contiguous to Auburndale Park, which is bounded by Commonwealth Avenue to the south, Flowed Meadow Conservation Area and the Massachusetts Department of Conservation and Recreation (DCR) Trail bordering Waltham to the North, the Charles River to the West and a residential neighborhood to the East. The section between the Auburndale Park and Lyons Park is wooded as shown on *Figure 1 – Locus Map.*

Phase 2 of the project will include upgrades to the existing trail, new tree plantings, and drainage improvements. Within a portion of the trail, construction of an approximately 400-foot-long elevated boardwalk crossing between existing wetlands is planned. At the time of this report, information regarding boardwalk type and structural loading was not available. Refer to the preliminary design plan provided in *Attachment A* for additional information.

Based on topographic information obtained from Massachusetts Office of Geographic Information (MassGIS), and observations made during our site visit, grades throughout the project area are relatively flat.

SUBSURFACE CONDITIONS

Geologic Setting

Surficial geology information available from MassGIS and the "Surficial Materials Map of the Natick Quandrangle" (Unites States Geological Survey, Stone, J.R. and Stone, B.D., 2018) indicates that the site is located in an area of coarse deposits, composed predominantly of sand and gravel with cobbles and boulders. Depths of surficial soils at the site were not mapped.

According to the 1983 "Bedrock Geologic Map of Massachusetts" by E-an Zen, bedrock at the site consists of Cambridge Argillite, consisting of gray argillite and minor quartzite; rare sandstone and conglomerate. The closest mapped bedrock outcrops are located about 0.7 miles west of the site.

Subsurface Exploration Program

Subsurface conditions were explored on July 16, 2022 by advancing four borings (B-1 through B-4). Each boring encountered shallow refusal (less than 10 ft.) and was offset approximately 5 ft. to reattempt to advance the boring past initial refusal. Offset borings are indicated by an "A" or "B" (e.g., B-1A) and approximate boring locations are shown in *Figure 2 – Site Plan*. Weston & Sampson geotechnical engineering staff observed boring activities, measured boring locations relative to existing site features, and prepared logs for each boring.

The borings were completed by Technical Drilling Services, Inc. of Sterling, MA. Standard penetration tests (SPTs) were conducted in each boring by driving a split spoon sampler with an automatic hammer in general accordance with ASTM D1586. All borings were advanced to auger refusal at depths ranging from approximately 3.5 to 9.2 ft. Additional details are provided on the boring logs and the Guide to Subsurface Exploration Logs included in *Attachment B.*

Encountered Subsurface Conditions

Subsurface conditions encountered in the borings generally consisted of fill underlain by native sands, gravels and weathered argillite to the depths explored. The subsurface conditions encountered in the borings were generally consistent with mapped surficial geology.

Subsurface soil and groundwater conditions described below have been interpreted based on a limited number of explorations that were observed by Weston & Sampson. Variations may occur and should be expected between locations. The strata boundaries shown in our boring logs are based on our interpretations and the actual transitions may be gradual. Refer to the boring logs included in *Attachment B* for detailed descriptions of the soil samples collected. The general Unified Soil Classification System (USCS) designation(s) for each stratum is included in the descriptions below in parentheses. Depths provided below are relative to the existing ground surface at the time of drilling.

Surface Materials – All borings were completed along the edge of the existing walking trail and

encountered sand and/or gravel at the ground surface.

Fill – Medium dense to dense fill was encountered below the surficial materials in all borings. Fill was encountered to depths ranging from approximately 1 to 3 ft. and generally consisted of silty sand with varying amounts of fine to coarse gravel (SM). Trace roots and asphalt debris were encountered within the fill layer. Grinding of the augers was noted several times while drilling through the fill which likely indicates the presence of cobbles and/or boulders.

Native Sand – Loose to medium dense native sand was encountered below the fill in borings B-1, B-3, and B-4 and extended to depths ranging from about 3.5 to 4.5 ft. below existing grades. The native sand generally consisted of silty sand with gravel. B-3 was terminated in this stratum at a depth of 3.5 ft. This stratum was not encountered in B-2. Grinding of the augers was noted several times while drilling through this stratum which likely indicates the presence of cobbles and/or boulders.

Weathered Bedrock – Gray, intensely fractured, Cambridge Argillite was encountered below the native sand in borings B-1, B-3, and B-4 and below the fill in B-2. All borings except B-3 were terminated within this stratum.

Refusal – Auger refusal was encountered in all borings (including offset borings) at depths ranging from about 3.5 ft. to 9.2 ft. Rock coring was not performed. Therefore, refusal could have been on fractured or competent bedrock.

Groundwater – Groundwater levels were estimated at depths ranging from approximately 2 to 4 ft based on field-observed moisture content of the samples. Groundwater levels should be expected to fluctuate with season, variations in precipitation, construction in the area, and other factors. Perched groundwater conditions could exist close to the ground surface, especially during and after extended periods of wet weather.

GEOTECHNICAL RECOMMENDATIONS

General

Based on the subsurface conditions encountered in our borings, conventional shallow foundations are recommended for support of the proposed boardwalk. Other foundation alternatives were also considered for support of the proposed boardwalk, (e.g., Diamond Piers®, helical piers, etc.) as discussed herein. However, due to the dense soil conditions and shallow bedrock, shallow foundations are considered the most appropriate foundation support alternative.

The proposed elevated boardwalk can be supported on shallow foundations bearing in medium dense (or denser) native sand, weathered bedrock or the top of bedrock. The existing fill is not suitable for support of the boardwalk foundations due to risk of differential settlement from potential variations in thickness, consistency, compaction, and variable rates of compression of these materials.

Excavations to construct the foundations will likely encounter medium dense to dense fill, and layers of loose to medium dense sand. Based on shallow refusals and intermittent grinding of the augers, boulder removal and difficult excavation conditions should be anticipated during construction of foundations and utilities.

Shallow Foundations

Based on the subsurface conditions encountered in our explorations, the proposed boardwalk foundations can be supported by shallow spread footings bearing on native undisturbed sand, weathered bedrock or on Structural Fill directly overlying suitable native materials. Foundations should be designed in accordance with the provisions of the current edition of the Massachusetts State Building Code (MSBC). Footings should be embedded at least 4 feet below the nearest proposed adjacent ground surface exposed to freezing. As noted above, auger refusal was encountered as shallow as 3.5 ft. along the proposed alignment of the boardwalk on possible competent bedrock. If competent bedrock is encountered above the planned footing depth, footings may be supported directly on competent bedrock.

Footings founded as recommended herein can be designed using an allowable bearing pressure of 5,000 psf. Resistance to lateral loads can be obtained by a passive equivalent fluid pressure of 250 pcf, ignoring the top 12 inches of embedment, and by a footing base friction coefficient of 0.45.

Shallow foundations constructed as recommended herein are anticipated to undergo total and differential settlements of less than 1-inch and ½-inch, respectively. The majority of foundation settlement is expected to occur during construction.

Diamond Pier® Foundation System

At the request of the City of Newton, Weston & Sampson evaluated the feasibility of supporting the proposed boardwalk on a Diamond Pier® Foundation System. Diamond Piers® are proprietary shallow foundations that can support lightly loaded structures like decks or boardwalks. The foundation system consists of individual precast concrete heads, each with four 1 to 2-inch diameter steel bearing pins. The bearing pins are driven through the precast head at an approximately 40-degree angle into the underlying soil to provide resistance to imposed axial and lateral loads and can be installed using simple hand tools. The Diamond Pier® Foundation System is beneficial in that individual piers can be installed quickly without the need for heavy construction equiptment. The system is also cost-effective when compared to constructing traditional shallow footings.

The size of the precast concrete head and steel bearing pins will vary based on design loads of the structure and the soil conditions underlying the site. Bearing pins typically range from 4 to 13 ft. in length. Based on preliminary conversations with Diamond Pier®, for a boardwalk system similar to what is proposed on this project, minimum pin lengths are expected to be about 5 ft. which would translate to a required embedment of almost 4 ft. below grade when driven at a 40-degree angle through the precast concrete head. The Diamond Pier® Foundation System is only feasible at sites which have penetrable soils to the required embedment depths of the system. Given the shallow refusal conditions, shallow bedrock, and auger grinding observed in our borings, achieving the anticipated minimum required embedment depth at each pier location along the entire boardwalk alignment is considered unlikely and could result in re-design efforts during construction. In addition,

if the bearing pins are not able to be installed to their design embedment, frost heave resulting in differential movement along the boardwalk may occur. Therefore, the use of Diamond Piers® is not considered the most appropriate foundation type for support of the proposed boardwalk.

Seismic Design

Seismic site class is determined in accordance with the International Building Code (IBC) as adapted by the MSBC using a weighted average of SPT blow counts in the upper 100 feet of soil at a site. As our deepest exploration extended to a depth of 9.2 ft. (B-4), our site class evaluation considered mapped surficial geologic conditions in the site vicinity and assumed bedrock below a depth of 9.2 feet. Based on the results of explorations and analyses and depths of proposed structures, we recommend that the subject project be evaluated using parameters associated with Site Class C. The structural engineer shall determine the seismic site parameters (S_1 and S_s) based on the site location and site coefficients (F_a and F_v) based on the seismic site parameters and Site Class.

Liquefaction is the sudden drop in shear strength between soil particles that can occur in saturated, cohesionless soils as a result of ground acceleration during a seismic event. Liquefaction typically results in soil densification and subsequent settlement of overlying features and structures. Conditions most likely to contribute to liquefaction include a soil matrix containing loose, uniform medium to fine sand (poorly graded sand) below the groundwater table. Based on the soil and groundwater conditions encountered in our explorations, the risk of liquefaction induced structurally damaging ground deformations is low.

EARTHWORK AND CONSTRUCTION CONSIDERATIONS

Site Preparation

Site preparation for foundation construction should include removal of fill, debris, and surficial organic and unsuitable (e.g., soft or disturbed) soils with the limits of proposed foundations. Recent explorations were performed adjacent to existing trees and shrubs and encountered approximately 1 to 3 feet of fill. Deeper stripping depths and removal of loose surficial organic soil should be anticipated in areas of landscaping, shrubs, and trees. Root balls from trees and brush may extend several feet and grubbing operations can cause considerable subgrade disturbance. In general, roots greater than one-inch in diameter should be removed as well as areas of concentrated smaller roots. All disturbed material should be removed to undisturbed subgrade.

Excavations resulting from site preparation should be backfilled as recommended herein. Any existing utilities should be removed or properly abandoned using Structural Fill, controlled density fill (CDF), or grouting in such a manner to prevent voids.

Subgrade Preparation and Protection

Based on the subsurface conditions encountered in our explorations and assuming proposed subgrade elevations are within a few feet of existing grades, stripping and subgrade preparation will likely expose fill and native sandy soils with variable amounts of gravel and silt. Undocumented fill, organics, and loose or disturbed soils should be removed from within the zone-of-influence of all foundations. Boulders should be removed to a minimum depth of 1 foot below footing subgrades.

Footing subgrades should be proof compacted to a firm and unyielding condition as determined by a representative of the Geotechnical Engineer. All subgrades should be observed by Weston & Sampson prior to placement of fill, forms and rebar.

Soft and/or disturbed areas will require over-excavation and backfilling with compacted angular crushed stone or compacted structural fill. A geosynthetic separation layer between the excavation subgrade and crushed stone backfill may also be required. We recommend that a geosynthetic used for stabilization consist of a woven geosynthetic with an AOS of #70 to # 100 sieve, and a minimum puncture resistance of at least 120 pounds (such as Mirafi FW700 or equivalent).

Soils containing more than trace amounts of silt are highly susceptible to softening and disturbance by construction activity during wet or freezing weather. A few inches of angular crushed stone can be placed and compacted at the base of footing excavations to protect subgrades from disturbance during construction and wet weather conditions. If foundation construction occurs during freezing conditions, insulating blankets, heaters, or other suitable measures should be employed to prevent foundation subgrades from freezing until the foundations are backfilled sufficiently to prevent frost from reaching the footing subgrades and penetrating beneath foundation elements.

Excavation Considerations

Excavation will be required for site preparation, foundation construction, utility construction, site grading, etc. Groundwater and surface water should be controlled during construction and prevented from eroding slopes and disturbing excavation and subgrade materials. Groundwater was estimated in some of the borings at depths ranging from about 2 to 4 feet below existing grades. Some excavations may encounter groundwater and moderate caving and possible flowing conditions should be expected where seepage is present.

Depending on excavation depth and amount of groundwater seepage, dewatering may be necessary. Flow rates for dewatering are likely to vary depending on location, soil type, and the season during which the excavation occurs. The dewatering systems should be designed by the contractor and be capable of adapting to variable flows and conditions.

Fill

Structural Fill – Well graded sand and gravel with a maximum particle size of 3 inches and less than approximately 10 percent fines (such as MassDOT M1.03.0-type B Gravel Borrow or M2.01.7 Dense-graded Crushed Stone) are recommended for use as Structural Fill beneath proposed structures. Structural Fill should be placed in maximum 10-inch-thick lifts (measured prior to compaction) with each lift compacted to at least 95 percent of maximum dry density as determined by ASTM D1557 (Modified Proctor) for the specific fill material.

Ordinary Fill – Well graded sand and gravel with a maximum particle size of 6 inches and less than approximately 20 percent fines (such as MassDOT M1.01 Ordinary Borrow) is recommended for use as Ordinary Fill outside the zone-of-influence beneath foundations. Ordinary Fill should be placed in maximum 10-inch-thick lifts (measured prior to compaction) with each lift compacted to at least 92 percent of maximum dry density as determined by ASTM D1557 (modified Proctor) for the specific fill material.

Crushed Stone - Crushed stone shall consist of durable crushed rock or durable crushed gravel stone, free from ice and snow, sand, clay, loam, or other deleterious or organic material. The crushed stone shall be uniformly blended and shall conform to the requirements provided in MassDOT Standard Specifications section M2.01.0. Crushed stone should be placed and compacted to a firm and unyielding condition with at least 4 passes of a vibratory compactor.

Reuse of On-Site Soils - Fill and natural soils excavated from the site free of organics, contamination (including metals, VOCs, SVOCs, etc.), and other deleterious materials may be suitable for reuse as Structural or Ordinary Fill provided the grain size distribution meets the requirements provided above. Use of on-site materials as Structural or Ordinary Fill should be evaluated on a case-by-case basis during construction by the Geotechnical Engineer.

The moisture content of fill materials should be within 3 percent of the optimum moisture content. Moisture conditioning, if required, could consist of drying by scarification and frequent mixing in thin lifts during warm, dry conditions. Density testing should be completed on each lift of fill during construction to confirm adequate compaction. In confined areas and where only hand-guided compaction equipment can be used, the lift thickness should be reduced to not more than six inches and the maximum particle size reduced to three inches.

LIMITATIONS

Observation of Construction

Satisfactory earthwork and foundation performance depends to a large degree on the quality of construction. Subsurface conditions observed during construction should be compared with those encountered during the subsurface explorations. Recognition of changed conditions often requires experience; therefore, qualified personnel should visit the site with sufficient frequency to evaluate whether actual subsurface conditions differ from those anticipated. In addition, full-time construction observation of the contractor's activities is a key part of determining that the work is completed in accordance with the construction drawings and specifications.

The recommendations in this report are preliminary as actual subsurface conditions may differ from those interpreted based on our subsurface explorations. In order for our recommendations to be considered final, we must be retained to observe the actual subsurface conditions encountered during construction. Our observations will allow us to interpret the actual conditions present during construction and adapt our recommendations if needed.

Variations of Subsurface Conditions and Use of Report

We have prepared this report for use by the owner, members of the design and construction team for the subject project and site, only. The data and report can be used for estimating purposes, but our report, conclusions, and interpretations should not be construed as a warranty of the subsurface conditions and are not applicable to other sites.

Explorations indicate soil conditions only at specific locations and only to the depths penetrated. They do not necessarily reflect subsurface conditions that may exist outside or between exploration

locations. If subsurface conditions differing from those described are noted during the course of excavation and construction, reevaluation will be necessary and we should be consulted.

Site development plans and design details were considered preliminary at the time this report was prepared. If changes are made in site grades, configuration, design loads, or type of construction for the structure, the conclusions and recommendations may not be applicable. We should be consulted to review final design drawings and specifications to see that our recommendations are suitably followed. If design changes are made, we should be retained to review our conclusions and recommendations and provide a written evaluation or modification. Additional geotechnical engineering analyses and explorations may be necessary.

Within the limitations of scope, schedule, and budget, our services have been executed in accordance with generally accepted practices in this area at the time this report was prepared. No warranty or other conditions, expressed or implied, is given. For additional information on the use of this report, please refer to the document titled "Important Information about This Geotechnical-Engineering Report" included in *Attachment C.*

It has been a pleasure assisting you with this project and we look forward to our continued involvement. Please call if you have any questions.

Sincerely,

WESTON & SAMPSON ENGINEERS, INC.

Daniel Dwyer, PE
Geotechnical Project Manager

Stephen Spink, PE
Geotechnical Team Leader

Attachments:
Figure 1 – Locus Plan
Figure 2 –Site Plan
Attachment A – Preliminary Design Plan
Attachment B – Boring Logs
Attachment C – Important Information about This Geotechnical-Engineering Report

DD:STS

P:\MA\Newton\On-Call LA Services\Marty Sender Greenway at Lyons Park\Geotech\Report\Geotechnical Letter Report _Marty Sender Boardwalk_081622.docx

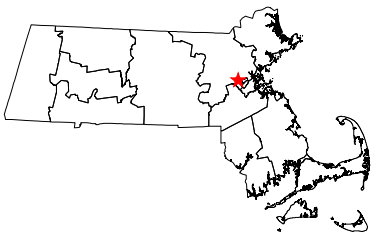
Figures

Weston & Sampson

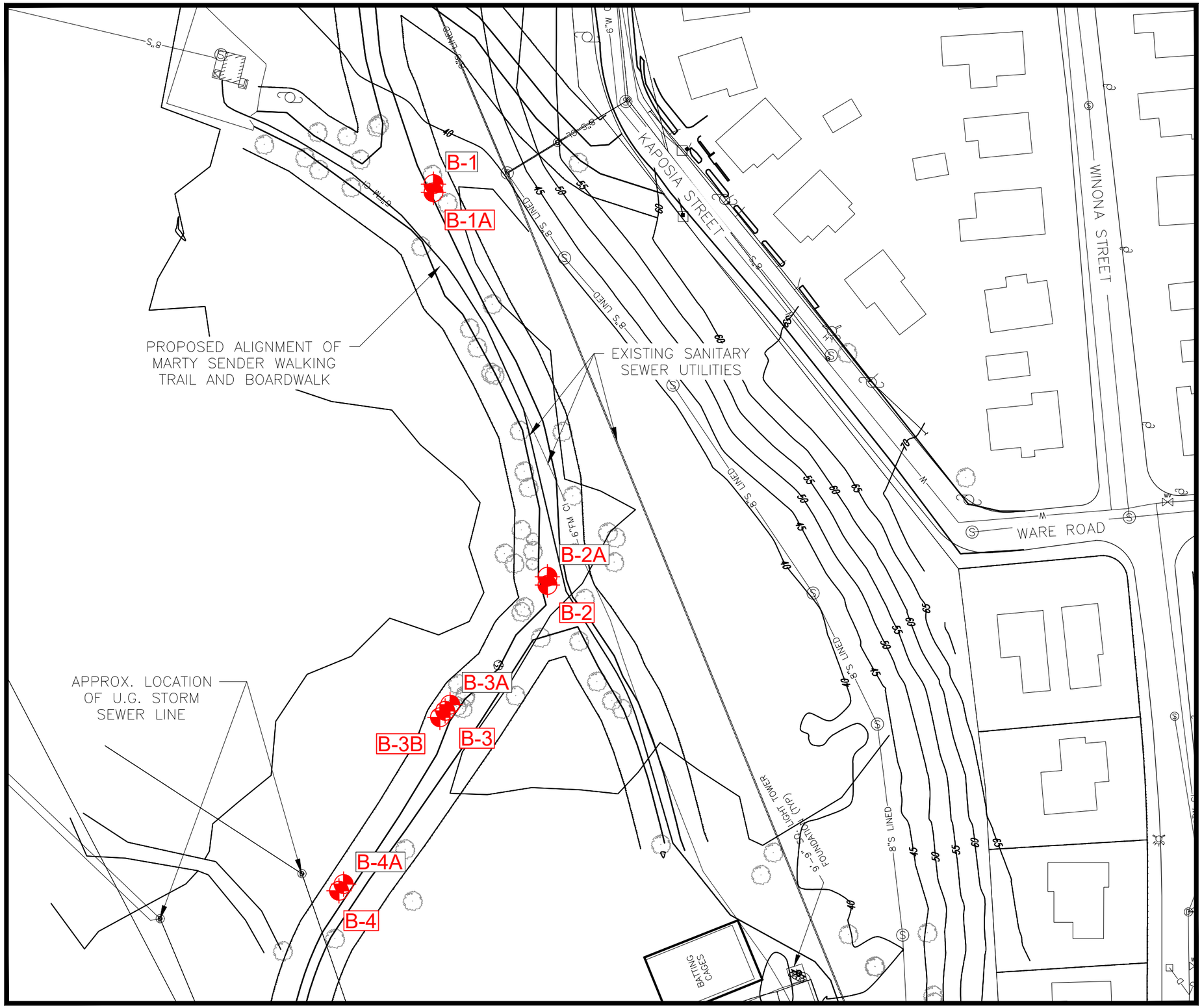
FIGURE 1
LOCUS MAP

104 WEST PINE STREET
CITY OF AUBURNDALE, MA
MIDDLESEX COUNTY

GOOGLE EARTH, LANDSET COPERNICUS



\\wse03.local\WSE\Projects\MA\Newton\On-Call LA Services\Marty Sender Greenway at Lyons Park\Geotech\CAD\Figure 1 _Locus Map_8.2.22.dwg



Weston & Sampson Engineers, Inc.
55 Walkers Brook Drive, Suite 100
Reading, MA 01867
978.532.1900 800.SAMPSON
www.westonandsampson.com

NOTES

1. BORINGS WERE COMPLETED BY TECHNICAL DRILLING SERVICES, INC. OF STERLING, MA ON JULY 16, 2022.
2. ALL BORINGS WERE OBSERVED BY A WESTON & SAMPSON ENGINEER.
3. BORING LOCATIONS SHOWN ARE APPROXIMATE AND BASED ON FIELD MEASUREMENTS RELATIVE TO EXISTING SITE FEATURES.

LEGEND

B-1 — DESIGNATION AND APPROXIMATE LOCATION OF BORING

GRAPHIC SCALE

60 30 0 60 120

SCALE: 1"=60'

ORIENTATION	TITLE
	SITE PLAN
	PROJECT: MARTY SENDER GREENWAY BOARDWALK, 104 WEST PINE STREET, AUBURNDALE, MA 02466

DATE	8/2022
DRWN BY	AJC
CHKD BY	SS
PRJ. NO.	ENG22-0315
REV. NO.	-

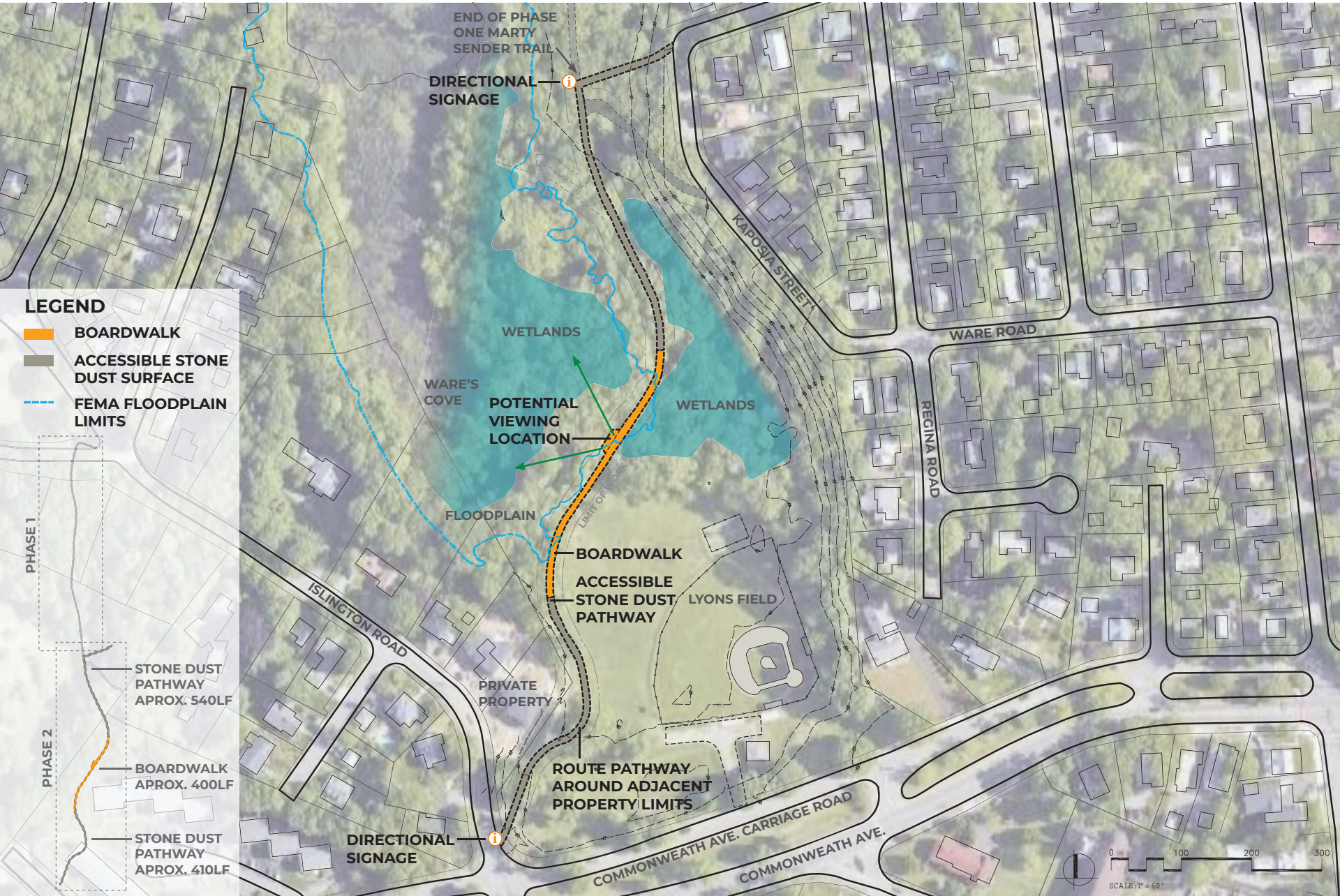
FIGURE 2

\\wse03.local\WSE\Projects\MA\Newton\On-Call LA Services\Marty Sender Greenway at Lyons Park\Geotech\CAD\Marty Sender Greenway_Site Plan_8.16.22.dwg

Attachment A

Preliminary Design Plan

PROPOSED PHASE 2 GREENWAY PLAN



Attachment B

Boring Logs

GUIDE TO SUBSURFACE EXPLORATION LOGS

Weston & Sampson℠

INDEX SHEET 1 GENERAL INFORMATION

GENERAL NOTES AND USE OF LOGS

1.) Explorations were made by ordinary and conventional methods and with care adequate for Weston & Sampson's study and/or design purposes. The exploration logs are part of a specific report prepared by Weston & Sampson for the referenced project and client, and are an integral part of that report. Information and interpretations are subject to the explanations and limitations stated in the report. Weston & Sampson is not responsible for any interpretations, assumptions, projections, or interpolations made by others.

2.) Exploration logs represent general conditions observed at the point of exploration on the date(s) stated. Boundary lines separating soil and rock layers (strata) represent approximate boundaries only and are shown as solid lines where observed and dashed lines where inferred based on drilling action. Actual transitions may be gradual and changes may occur over time.

3.) Soil and rock descriptions are based on visual-manual examination of recovered samples, direct observation in test pits (when permissible), and laboratory testing (when conducted).

4.) Water level observations were made at the times and under the conditions stated. Fluctuations should be be expected to vary with seasons and other factors. Use of fluids during drilling may affect water level observations. The absence of water level observations does not necessarily mean the exploration was dry or that subsurface water will not be encountered during construction.

5.) Standard split spoon samplers may not recover particles with any dimension larger than 1-3/8 inches. Reported gravel conditions or poor sample recovery may not reflect actual in-situ conditions.

6.) Sections of this guide provide a general overview of Weston & Sampson's practices and procedures for *identifying* and *describing* soil and rock. These procedures are predominantly based on ASTM D2488, *Standard Practice for Description and Identification of Soils (Visual-Manual Procedures)*, the International Society of Rock Mechanics (ISRM) standards, and the *Engineering Geology Field Manual* published by the Bureau of Reclamation. Not all aspects of this guide relating to description and identification procedures of soil and rock may be applicable in all circumstances.

SAMPLER GRAPHICS

- Split Spoon (Standard) 2" OD, 1-3/8" ID
- Split Spoon (Oversize) 3" OD, 2-3/8" ID
- Shelby or Piston Tube 3" OD, 2-7/8" ID
- Double-Tube Rock Core Barrel 2" Core Diameter
- Direct Push with Acetate Liner Various Liner Sizes
- A — Auger Sample *(from cuttings or hand auger)*
- G — Grab Sample *(manual, from discrete point)*
- C — Composite Sample *(multiple grab samples)*

WELL GRAPHICS

- Cement concrete seal around casing or riser pipe
- Bentonite seal around casing or riser pipe
- Cement grout seal around casing or riser pipe
- Soil backfill around riser pipe or beneath screen
- Gravel backfill around screen or riser pipe
- Sand backfill around screen or riser pipe (filter sand)
- Solid-wall riser; Sch. 40 PVC, 1" ID unless noted otherwise
- Slotted screen; Sch. 40 PVC, 1" ID with machined slots

CAVING / SEEPAGE TERMS

The following caving and/or seepage terms may appear on a test pit log.

Caving Term	Criteria
Minor	less than 1 cubic ft.
Moderate	1 to 3 cubic ft.
Severe	greater than 3 cubic ft.

Seepage Term	Criteria
Slow	less than 1 gpm
Moderate	1 to 3 gpm
Fast	greater than 3 gpm

KEY TO WATER LEVELS

- Observed in exploration during advancement.
- Measured in exploration at completion, prior to backfilling or well installation.
- Measured in exploration after the stated stabilization period, prior to backfilling, or in well installation if noted.

DEFINITIONS OF COMMON TERMS

Sample Recovery Ratio - The length of material recovered in a drive or push type sampler over the length of sampler penetration, in inches (e.g. 18/24).

Standard Penetration Test (*SPT*) - An in-situ test where a standard split-spoon sampler is driven a distance of 12 or 18 inches (after an initial 6-inch seating interval) using a 140-lb. hammer falling 30 inches for each blow.

SPT Blows - The number of hammer blows required to drive a split-spoon sampler each consecutive 6-inch interval during a *Standard Penetration Test*. If no discernable advancement of a split spoon sampler is made after 50 consecutive hammer blows, 50/X indicates *sampler refusal* and is the number of blows required to drive the sampler X inches.

SPT N-Value (*N*) - The uncorrected blow count representation of a soil's penetration resistance over a 12-inch interval after an initial 6-in. seating interval, reported in blows per foot (bpf). The N-value is correlated to soil engineering properties.

Auger Refusal - No discernable advancement of the auger over a period of 5 minutes with full rig down pressure applied.

Casing Refusal (Driven) - Casing penetration of less than 6 inches after a minimum 50 blows of a drop hammer weighing 300 lbs. or a minimum 100 blows of a drop hammer weighing 140 lbs.

PID Measurement - A measurement (electronic reading) taken in the field using a photoionization detector (PID) to detect the presence of volatile organic compounds in a soil sample. Values are reported as benzene equivalent units in parts per million (ppm) unless noted otherwise.

Rock Quality Designation (RQD) - A qualitative index measure of the degree of jointing and fracture of a rock core taken from a borehole. The RQD is defined as the sum length of solid core pieces 4 inches or longer divided by the run (cored) length, expressed as a percentage. Higher RQD values may indicate fewer joints and fractures in the rock mass.

Fill (Made Ground) - A deposit of soil and/or artificial waste materials that has been placed or altered by human processes.

LABORATORY TESTS AND FIELD MEASUREMENTS

MC	Moisture Content	IC	1D Incremental Consolidation
OC	Organic Content	VS	Laboratory Vane Shear
PL	Plastic Limit	US	Unconfined Compression
LL	Liquid Limit	TC	Triaxial Compression
GC	Gravel Content	PP	Pocket (Hand) Penetrometer
SC	Sand Content	TV	Torvane (Hand Vane)
FC	Fines Content	PID	Photoionization Detector
DS	Direct Shear	FID	Flame Ionization Detector

BORING ADVANCEMENT METHODS

Hollow-Stem Auger Drilling - Utilizes continuous flight auger sections with hollow stems to advance the borehole. Drill rods and a plug are inserted into the auger stem to prevent the entrance of soil cuttings into the augers.

Rotary Wash Drilling - Utilizes downward pressure and rotary action applied to a non-coring bit while washing the cuttings to the surface using a circulating fluid injected down the drill rods. The borehole is supported with either steel casing or the drilling fluid. Where a casing is used, the borehole is advanced sequentially by driving the casing to the desired depth and then cleaning out the casing. The process of driving and cleaning the casing is commonly referred to as the 'drive-and-wash' technique.

Continuous Sampling - Includes a variety of methods and procedures during which the borehole is advanced via continuous recovery of soil samples. *Direct Push* sampling is a common method that uses static downward pressure combined with percussive energy to drive a steel mandrel into the ground at continuous intervals while recovering soil samples in disposable acetate liners.

Rock Coring - Utilizes downward pressure and rotary action applied to a core barrel equipped with a diamond-set or tungsten carbide coring bit. During conventional coring, the entire barrel is retrieved from the hole upon completion of a core run. Wireline coring allows for removal of the inner barrel assembly containing the actual core while the the drill rods and outer barrel remain in the hole. Various types and sizes of core barrels and bits are used.

GUIDE TO SUBSURFACE EXPLORATION LOGS

Weston & Sampson℠

INDEX SHEET 2
SOIL DESCRIPTION

SOIL CONSTITUENTS

Naturally occurring soils consist of one or more of the following matrix constituents defined in terms of particle size.

Constituent		U.S. Sieve Size			Observed Size (in.)		
Gravel	(Coarse)	3/4 in.	-	3 in.	3/4	-	3
Gravel	(Fine)	No. 4	-	3/4 in.	1/5	-	3/4
Sand	(Coarse)	No. 10	-	No. 40	1/16	-	1/5
Sand	(Medium)	No. 40	-	No. 10	1/64	-	1/16
Sand	(Fine)	No. 200	-	No. 40	1/300	-	1/64
Fines	(Silt or Clay)	Smaller than		No. 200	Less than		1/300

SOIL IDENTIFICATION

Soil identification refers to the grouping of soils with similar physical characteristics into a category defined by a **group name** and corresponding **group symbol** based on estimation of the matrix soil constituents to the nearest 5% and simple manual tests. Proportions of cobbles, boulders, and other non-matrix soil materials are not considered during this procedure but are included in the overall soil description if observed or thought to be present. Refer to the following descriptions and tables adapted from ASTM D2488.

Coarse-Grained Soil - Coarse-grained soils contain fewer than 50% fines and are identified based on the following table.

Primary Constituent	Fines Percent	Type of Fines and Gradation		Group Symbol	Group Name [1]
GRAVEL *% gravel > % sand*	≤ 5%	well graded		GW	Well graded gravel
		poorly graded		GP	Poorly graded gravel
	10%	clayey fines	well graded	GW-GC	Well graded gravel with clay
			poorly graded	GP-GC	Poorly graded gravel with clay
		silty fines	well graded	GW-GM	Well graded gravel wth silt
			poorly graded	GP-GM	Poorly graded gravel with silt
	15% to 45%	clay fines		GC	Clayey gravel
		silt fines		GM	Silty gravel
SAND *% sand ≥ % gravel*	≤ 5%	well graded		SW	Well graded sand
		poorly graded		SP	Poorly graded sand
	10%	clayey fines	well graded	SW-SC	Well graded sand with clay
			poorly graded	SP-SC	Poorly graded sand with clay
		silty fines	well graded	SW-SM	Well graded sand with silt
			poorly graded	SP-SM	Poorly graded sand with silt
	15% to 45%	clay fines		SC	Clayey sand
		silt fines		SM	Silty sand

[1] If soil is a gravel and contains 15% or more sand, add "with sand" to the group name. If soil is a sand and contains 15% of more gravel, add "with gravel" to the group name.

Inorganic Fine-Grained Soil - Fine-grained soils contain 50% or more fines and are identified based on the following table.

Plasticity Criteria	Dry Strength	Coarse Fraction S = Sand, G = Gravel		Group Symbol	Group Name [1]
Medium	Medium to high	< 15% S + G		CL	Lean clay
		≥ 30%	% S ≥ % G	CL	Sandy lean clay
		S + G	% S < % G	CL	Gravelly lean clay
Non-plastic	None to low	< 15% S + G		ML	Silt
		≥ 30%	% S ≥ % G	ML	Sandy silt
		S + G	% S < % G	ML	Gravelly silt
High	High to very high	< 15% S + G		CH	Fat clay
		≥ 30%	% S ≥ % G	CH	Sandy fat clay
		S + G	% S < % G	CH	Gravelly fat clay
Low to Medium	Low to medium	< 15% S + G		MH	Elastic silt
		≥ 30%	% S ≥ % G	MH	Sandy elastic silt
		S + G	% S < % G	MH	Gravelly elastic silt

[1] If soil contains 15% to 25% sand or gravel, add "with sand" or "with gravel" to the group name.

Organic Fine-Grained Soil - Fine-grained soils that contain enough organic particles to influence the soil properties are identified as Organic Soil and assigned the group symbol **OL** or **OH**.

Highly Organic Soil (Peat) - Soils composed primarily of plant remains in various stages of decomposition are identified as Peat and given the group symbol **PT**. Peat usually has an organic odor, a dark brown to black color, and a texture ranging from fibrous (original plant structure intact or mostly intact) to amorphous (plant structure decomposed to fine particles).

SOIL DESCRIPTION

Soils are *described* in the following general sequence. Deviations may occur in some instances.

Identification Components

(1) Group Name and Group Symbol

Description Components

(2) Consistency (Fine-Grained) or Apparent Density (Coarse-Grained)
(3) Color (*note, the term "to" may be used to indicate a gradational change*)
(4) Soil Moisture
(5) Matrix Soil Constituents (Gravel, Sand, Fines)
  └► Proportion (*by weight*), particle size, plasticity of fines, angularity, etc.
(6) Non-Matrix Soil Materials and Proportions (*by volume*)
(7) Other Descriptive Information (Unusual Odor, Structure, Texture, etc.)
(8) [Geologic Formation Name or Soil Survey Unit]

SPT N-VALUE CORRELATIONS

Consistency	SPT N-Value	Apparent Density	SPT N-Value
Very soft	0 - 2	Very loose	0 - 5
Soft	2 - 4	Loose	5 - 10
Medium stiff	4 - 8	Medium dense	10 - 30
Stiff	8 - 15	Dense	30 - 50
Very stiff	15 - 30	Very dense	> 50
Hard	> 30		

SOIL MOISTURE

Dry..... Apparent absence of moisture; dry to the touch.
Moist..... Damp but no visible water.
Wet..... Visible free water; saturated.

PROPORTIONS / PERCENTAGES

Proportions of gravel, sand, and fines (excluding cobbles, boulders, and other constituents) are stated in the following terms indicating a range of percentages by weight (to nearest 5%) of the minus 3-in. soil fraction and add up to 100%.

Mostly ..... 50% - 100%
Some ..... 30% - 45%
Little ..... 15% - 25%
Few ..... 5% - 10%
Trace..... Less than 5%

Proportions of cobbles, boulders, and other non-matrix soil materials including artificial debris, roots, plant fibers, etc. are stated in the following terms indicating a range of percentages by volume (to the nearest 5%) of the total soil.

Numerous ..... 40% - 50%
Common ..... 25% - 35%
Occasional ..... 10% - 20%
Trace..... Less than 5%

PLASTICITY (FINES ONLY)

Non-plastic.....Dry specimen ball falls apart easily. Cannot be rolled into thread at any moisture content.
Low.....Dry specimen ball easily crushed with fingers. Can be rolled into 1/8-in. thread with some difficulty.
Medium.....Difficult to crush dry specimen ball with fingers. Easily rolled into 1/8-in. thread.
High.....Cannot crush dry specimen ball with fingers. Easily rolled and re-rolled into 1/8-in. thread.

COBBLES AND BOULDERS

Cobbles - Particles of rock that will pass a 12-in. square opening and be retained on a 3-in. sieve.

Boulders - Particles of rock that will not pass a 12-in. square opening.

Note: Where the percentage (by volume) of cobbles and/or boulders cannot be accurately or reliably estimated, the terms "with cobbles", "with boulders", or "with cobbles and boulders" may be used to indicate observed or inferred presence.

Weston & Sampson

Marty Sender Greenway Boardwalk
104 West Pine Street, Auburndale, MA

BORING ID: B-1

WSE Project: ENG22-0315

CONTRACTOR:	Technical Drilling Services, Inc.	BORING LOCATION:	See Attached Figure	DATE START:	July 16, 2022
FOREMAN:	Brett Balyk	ADVANCE METHOD:	Hollow-Stem Auger Drilling	DATE FINISH:	July 16, 2022
LOGGED BY:	Aaron Chabot, E.I.T.	AUGER DIAMETER:	4-1/4" ID (Stem), 7-5/8" OD (Flights)	GROUND EL:	Not Available
CHECKED BY:	Hector Flores	SUPPORT CASING:	N/A	FINAL DEPTH:	7.3 ft. (Refusal)
EQUIPMENT:	Diedrich D-50, ATV Mounted	CORING METHOD:	N/A	GRID COORDS:	N:2952642.1620 / E:723022.0680
SPT HAMMER:	Automatic (140-lb.)	BACKFILL MATERIAL:	Drill Cuttings	GRID SYSTEM:	N/A

DEPTH BELOW GROUND SURFACE [VERTICAL FT.]	SAMPLE TYPE GRAPHIC	SAMPLE ID NUMBER AND RECOVERY RATIO [IN./IN.]	SPT BLOWS / 6 IN. (OR) CORE RATE / 12 IN. [MIN.]	GEOTECHNICAL TEST DATA	STRATIGRAPHY LOG	STRATUM IDENTIFICATION AND DESCRIPTION	REMARKS, OTHER TESTS, AND INSTALLATIONS
				● N-Value, Raw (bpf) ☒ Organic Content (%) 10 20 30 40 ⊕ Moisture Content (%) ▶ Plastic Limit, PL (%) ◀ Liquid Limit, LL (%) 25 50 75 100		Surface: Bare soil, no vegetation.	Note: Values in brackets preceeding a remark indicate depth below ground surface (in feet) corresponding to the remark.
		S-1 12/24	13 19 25 16	● 44		**Silty sand with gravel (SM)** - Dense; brown; moist; mostly fine to coarse SAND, little non plastic fines, little fine to coarse gravel; Trace asphalt. **[FILL]**	
		S-2 14/24	10 14 15 19	● 29		**Silty sand with gravel (SM)** - Medium dense to dense; light brown; moist; mostly fine to coarse SAND, little fine to coarse gravel, little non plastic fines.	
		S-3 9/9	22 50/3			Argillite; sedimentary; gray; Very intensely fractured. **[Cambridge Argillite]** ▼	[4.0 - 7.3] Intermittent auger grinding. [4.0] Estimated water level at time of drilling based on changes in sample moisture.
5		S-4 4/4	100/4				***Auger refusal at 7.3 ft. (exploration ended).***
10							
15							
20							

Weston & Sampson

Marty Sender Greenway Boardwalk
104 West Pine Street, Auburndale, MA

BORING ID: B-1A

WSE Project: ENG22-0315

CONTRACTOR:	**Technical Drilling Services, Inc.**	BORING LOCATION:	**See Attached Figure**	DATE START:	**July 16, 2022**
FOREMAN:	**Brett Balyk**	ADVANCE METHOD:	**Hollow-Stem Auger Drilling**	DATE FINISH:	**July 16, 2022**
LOGGED BY:	**Aaron Chabot, E.I.T.**	AUGER DIAMETER:	**4-1/4" ID (Stem), 7-5/8" OD (Flights)**	GROUND EL:	**Not Available**
CHECKED BY:	**Hector Flores**	SUPPORT CASING:	**N/A**	FINAL DEPTH:	**5.0 ft. (Refusal)**
EQUIPMENT:	**Diedrich D-50, ATV Mounted**	CORING METHOD:	**N/A**	GRID COORDS:	**N/A**
SPT HAMMER:	**Automatic (140-lb.)**	BACKFILL MATERIAL:	**Drill Cuttings**	GRID SYSTEM:	**N/A**

DEPTH BELOW GROUND SURFACE [VERTICAL FT.]	SAMPLE TYPE GRAPHIC	SAMPLE ID NUMBER AND RECOVERY RATIO [IN./IN.]	SPT BLOWS / 6 IN. (OR) CORE RATE / 12 IN. [MIN.]	GEOTECHNICAL TEST DATA ● N-Value, Raw (bpf) ☒ Organic Content (%) 10 20 30 40 ⊕ Moisture Content (%) ▶ Plastic Limit, PL (%) ◀ Liquid Limit, LL (%) 25 50 75 100	STRATIGRAPHY LOG	STRATUM IDENTIFICATION AND DESCRIPTION	REMARKS, OTHER TESTS, AND INSTALLATIONS
						Surface: Bare soil, no vegetation. Refer to B-1 for soil conditions.	[1.0 - 5.0] Intermittent auger grinding.
5							***Auger refusal at 5.0 ft. (exploration ended).***
10							
15							
20							

Note: Values in brackets preceeding a remark indicate depth below ground surface (in feet) corresponding to the remark.

Weston & Sampson

Marty Sender Greenway Boardwalk
104 West Pine Street, Auburndale, MA

BORING ID: B-2

WSE Project: ENG22-0315

CONTRACTOR:	Technical Drilling Services, Inc.	BORING LOCATION:	See Attached Figure	DATE START:	July 16, 2022
FOREMAN:	Brett Balyk	ADVANCE METHOD:	Hollow-Stem Auger Drilling	DATE FINISH:	July 16, 2022
LOGGED BY:	Aaron Chabot, E.I.T.	AUGER DIAMETER:	4-1/4" ID (Stem), 7-5/8" OD (Flights)	GROUND EL:	Not Available
CHECKED BY:	Hector Flores	SUPPORT CASING:	N/A	FINAL DEPTH:	4.0 ft. (Refusal)
EQUIPMENT:	Diedrich D-50, ATV Mounted	CORING METHOD:	N/A	GRID COORDS:	N:2952398.6960 / E:723102.0860
SPT HAMMER:	Automatic (140-lb.)	BACKFILL MATERIAL:	Drill Cuttings	GRID SYSTEM:	N/A

DEPTH BELOW GROUND SURFACE [VERTICAL FT.]	SAMPLE TYPE GRAPHIC	SAMPLE ID NUMBER AND RECOVERY RATIO [IN./IN.]	SPT BLOWS / 6 IN. (OR) CORE RATE / 12 IN. [MIN.]	GEOTECHNICAL TEST DATA	STRATIGRAPHY LOG	STRATUM IDENTIFICATION AND DESCRIPTION	REMARKS, OTHER TESTS, AND INSTALLATIONS
				● N-Value, Raw (bpf) ☒ Organic Content (%) 10 20 30 40 ⊕ Moisture Content (%) ▶ Plastic Limit, PL (%) ◀ Liquid Limit, LL (%) 25 50 75 100		Surface: Bare soil, no vegetation.	Note: Values in brackets preceeding a remark indicate depth below ground surface (in feet) corresponding to the remark.
		S-1 12/24	14 17 26 23	43		**Silty sand with gravel (SM)** - Dense; brown; moist; mostly fine to coarse SAND, little non plastic fines, little fine to coarse gravel; Trace asphalt. **[FILL]**	[1.0 - 4.0] Intermittent auger grinding.
		S-2 9/24	13 21 15 26	36		**Silty sand with gravel (SM)** - Dense; brown; moist; mostly fine to coarse SAND, little fine to coarse gravel, little non plastic fines; Trace asphalt. **[FILL]**	[3.0] Estimated water level at time of drilling based on changes in sample moisture.
						Argillite; sedimentary; gray; Very intensely fractured. **[Cambridge Argillite]**	***Auger refusal at 4.0 ft. (exploration ended).***
5							
10							
15							
20							

Weston & Sampson

Marty Sender Greenway Boardwalk
104 West Pine Street, Auburndale, MA

BORING ID: B-2A

WSE Project: ENG22-0315

CONTRACTOR:	**Technical Drilling Services, Inc.**	BORING LOCATION:	**See Attached Figure**	DATE START:	**July 16, 2022**
FOREMAN:	**Brett Balyk**	ADVANCE METHOD:	**Hollow-Stem Auger Drilling**	DATE FINISH:	**July 16, 2022**
LOGGED BY:	**Aaron Chabot, E.I.T.**	AUGER DIAMETER:	**4-1/4" ID (Stem), 7-5/8" OD (Flights)**	GROUND EL:	**Not Available**
CHECKED BY:	**Hector Flores**	SUPPORT CASING:	**N/A**	FINAL DEPTH:	**4.0 ft. (Refusal)**
EQUIPMENT:	**Diedrich D-50, ATV Mounted**	CORING METHOD:	**N/A**	GRID COORDS:	**N/A**
SPT HAMMER:	**Automatic (140-lb.)**	BACKFILL MATERIAL:	**Drill Cuttings**	GRID SYSTEM:	**N/A**

DEPTH BELOW GROUND SURFACE [VERTICAL FT.]	SAMPLE TYPE GRAPHIC	SAMPLE ID NUMBER AND RECOVERY RATIO [IN./IN.]	SPT BLOWS / 6 IN. (OR) CORE RATE / 12 IN. [MIN.]	GEOTECHNICAL TEST DATA ● N-Value, Raw (bpf) ☒ Organic Content (%) 10 20 30 40 ⊕ Moisture Content (%) ▶ Plastic Limit, PL (%) ◀ Liquid Limit, LL (%) 25 50 75 100	STRATIGRAPHY LOG	STRATUM IDENTIFICATION AND DESCRIPTION	REMARKS, OTHER TESTS, AND INSTALLATIONS
						Surface: Bare soil, no vegetation. Refer to B-2 for soil conditions.	[1.0 - 4.0] Intermittent auger grinding.
5							***Auger refusal at 4.0 ft. (exploration ended).***
10							
15							
20							

Note: Values in brackets preceeding a remark indicate depth below ground surface (in feet) corresponding to the remark.

Weston & Sampson

Marty Sender Greenway Boardwalk
104 West Pine Street, Auburndale, MA

BORING ID: B-3

WSE Project: ENG22-0315

CONTRACTOR:	Technical Drilling Services, Inc.	BORING LOCATION:	See Attached Figure	DATE START:	July 16, 2022
FOREMAN:	Brett Balyk	ADVANCE METHOD:	Hollow-Stem Auger Drilling	DATE FINISH:	July 16, 2022
LOGGED BY:	Aaron Chabot, E.I.T.	AUGER DIAMETER:	4-1/4" ID (Stem), 7-5/8" OD (Flights)	GROUND EL:	Not Available
CHECKED BY:	Hector Flores	SUPPORT CASING:	N/A	FINAL DEPTH:	3.5 ft. (Refusal)
EQUIPMENT:	Diedrich D-50, ATV Mounted	CORING METHOD:	N/A	GRID COORDS:	N:2952321.8010 / E:723039.9700
SPT HAMMER:	Automatic (140-lb.)	BACKFILL MATERIAL:	Drill Cuttings	GRID SYSTEM:	N/A

DEPTH BELOW GROUND SURFACE [VERTICAL FT.]	SAMPLE TYPE GRAPHIC	SAMPLE ID NUMBER AND RECOVERY RATIO [IN./IN.]	SPT BLOWS / 6 IN. (OR) CORE RATE / 12 IN. [MIN.]	GEOTECHNICAL TEST DATA	STRATIGRAPHY LOG	STRATUM IDENTIFICATION AND DESCRIPTION	REMARKS, OTHER TESTS, AND INSTALLATIONS
				● N-Value, Raw (bpf) ☒ Organic Content (%) 10 20 30 40 ⊕ Moisture Content (%) ▶ Plastic Limit, PL (%) ◀ Liquid Limit, LL (%) 25 50 75 100		Surface: Bare soil, no vegetation.	Note: Values in brackets preceeding a remark indicate depth below ground surface (in feet) corresponding to the remark.
		S-1 9/24 S-2 6/13	7 12 12 25 13 50 50/1	● 24		**Silty sand (SM)** - Medium dense; brown to light brown; moist; mostly fine to coarse SAND, little non plastic fines, few fine gravel; Trace asphalt and roots. **[FILL]** **Silty sand with gravel (SM)** - Medium dense to very dense; brown; moist; mostly fine to coarse SAND, little fine to coarse gravel, little non plastic fines; Trace roots. **[FILL]** **Silty sand with gravel (SM)** - Very dense; brown to gray; wet; mostly fine to coarse SAND, little fine gravel, little low plasticity fines.	[2.0 - 3.5] Intermittent auger grinding. [2.0] Estimated water level at time of drilling based on changes in sample moisture. ***Auger refusal at 3.5 ft. (exploration ended).***
5							
10							
15							
20							

Refer to the attached index sheets for important information about this log including general notes, legends, and guidance on description methods and procedures.

Weston & Sampson

Marty Sender Greenway Boardwalk
104 West Pine Street, Auburndale, MA

BORING ID: B-3A

WSE Project: ENG22-0315

CONTRACTOR:	**Technical Drilling Services, Inc.**	BORING LOCATION:	**See Attached Figure**	DATE START:	**July 16, 2022**
FOREMAN:	**Brett Balyk**	ADVANCE METHOD:	**Hollow-Stem Auger Drilling**	DATE FINISH:	**July 16, 2022**
LOGGED BY:	**Aaron Chabot, E.I.T.**	AUGER DIAMETER:	**4-1/4" ID (Stem), 7-5/8" OD (Flights)**	GROUND EL:	**Not Available**
CHECKED BY:	**Hector Flores**	SUPPORT CASING:	**N/A**	FINAL DEPTH:	**3.5 ft. (Refusal)**
EQUIPMENT:	**Diedrich D-50, ATV Mounted**	CORING METHOD:	**N/A**	GRID COORDS:	**N/A**
SPT HAMMER:	**Automatic (140-lb.)**	BACKFILL MATERIAL:	**Drill Cuttings**	GRID SYSTEM:	**N/A**

DEPTH BELOW GROUND SURFACE [VERTICAL FT.]	SAMPLE TYPE GRAPHIC	SAMPLE ID NUMBER AND RECOVERY RATIO [IN./IN.]	SPT BLOWS / 6 IN. (OR) CORE RATE / 12 IN. [MIN.]	GEOTECHNICAL TEST DATA ● N-Value, Raw (bpf) ☒ Organic Content (%) 10 20 30 40 ⊕ Moisture Content (%) ▶ Plastic Limit, PL (%) ◀ Liquid Limit, LL (%) 25 50 75 100	STRATIGRAPHY LOG	STRATUM IDENTIFICATION AND DESCRIPTION	REMARKS, OTHER TESTS, AND INSTALLATIONS
						Surface: Bare soil, no vegetation. Refer to B-3 for soil conditions.	Note: Values in brackets preceeding a remark indicate depth below ground surface (in feet) corresponding to the remark. [2.0 - 3.5] Intermittent auger grinding.
5							***Auger refusal at 3.5 ft. (exploration ended).***
10							
15							
20							

Refer to the attached index sheets for important information about this log including general notes, legends, and guidance on description methods and procedures.

Weston & Sampson

WSE Project: ENG22-0315

Marty Sender Greenway Boardwalk
104 West Pine Street, Auburndale, MA

BORING ID: B-3B

CONTRACTOR:	**Technical Drilling Services, Inc.**	BORING LOCATION:	**See Attached Figure**	DATE START:	**July 16, 2022**
FOREMAN:	**Brett Balyk**	ADVANCE METHOD:	**Hollow-Stem Auger Drilling**	DATE FINISH:	**July 16, 2022**
LOGGED BY:	**Aaron Chabot, E.I.T.**	AUGER DIAMETER:	**4-1/4" ID (Stem), 7-5/8" OD (Flights)**	GROUND EL:	**Not Available**
CHECKED BY:	**Hector Flores**	SUPPORT CASING:	**N/A**	FINAL DEPTH:	**5.2 ft. (Refusal)**
EQUIPMENT:	**Diedrich D-50, ATV Mounted**	CORING METHOD:	**N/A**	GRID COORDS:	**N/A**
SPT HAMMER:	**Automatic (140-lb.)**	BACKFILL MATERIAL:	**Drill Cuttings**	GRID SYSTEM:	**N/A**

DEPTH BELOW GROUND SURFACE [VERTICAL FT.]	SAMPLE TYPE GRAPHIC	SAMPLE ID NUMBER AND RECOVERY RATIO [IN./IN.]	SPT BLOWS / 6 IN. (OR) CORE RATE / 12 IN. [MIN.]	GEOTECHNICAL TEST DATA	STRATIGRAPHY LOG	STRATUM IDENTIFICATION AND DESCRIPTION	REMARKS, OTHER TESTS, AND INSTALLATIONS
				● N-Value, Raw (bpf) ☒ Organic Content (%) 10 20 30 40 ⊕ Moisture Content (%) ▶ Plastic Limit, PL (%) ◀ Liquid Limit, LL (%) 25 50 75 100		Surface: Bare soil, no vegetation. Refer to B-3 for soil conditions.	Note: Values in brackets preceeding a remark indicate depth below ground surface (in feet) corresponding to the remark. [2.0 - 5.0] Intermittent auger grinding.
5	◪	S-1 3/3	50/3			Argillite; sedimentary; gray; Very intensely fractured. **[Cambridge Argillite]**	***Auger refusal at 5.2 ft. (exploration ended).***
10							
15							
20							

Weston & Sampson

Marty Sender Greenway Boardwalk
104 West Pine Street, Auburndale, MA

BORING ID: B-4

WSE Project: ENG22-0315

CONTRACTOR:	Technical Drilling Services, Inc.	BORING LOCATION:	See Attached Figure	DATE START:	July 16, 2022
FOREMAN:	Brett Balyk	ADVANCE METHOD:	Hollow-Stem Auger Drilling	DATE FINISH:	July 16, 2022
LOGGED BY:	Aaron Chabot, E.I.T.	AUGER DIAMETER:	4-1/4" ID (Stem), 7-5/8" OD (Flights)	GROUND EL:	Not Available
CHECKED BY:	Hector Flores	SUPPORT CASING:	N/A	FINAL DEPTH:	9.2 ft. (Refusal)
EQUIPMENT:	Diedrich D-50, ATV Mounted	CORING METHOD:	N/A	GRID COORDS:	N:2952211.9950 / E:722975.6220
SPT HAMMER:	Automatic (140-lb.)	BACKFILL MATERIAL:	Drill Cuttings	GRID SYSTEM:	N/A

DEPTH BELOW GROUND SURFACE [VERTICAL FT.]	SAMPLE TYPE GRAPHIC	SAMPLE ID NUMBER AND RECOVERY RATIO [IN./IN.]	SPT BLOWS / 6 IN. (OR) CORE RATE / 12 IN. [MIN.]	GEOTECHNICAL TEST DATA	STRATIGRAPHY LOG	STRATUM IDENTIFICATION AND DESCRIPTION	REMARKS, OTHER TESTS, AND INSTALLATIONS
		S-1 13/24	11 16 16 15	● N-Value, Raw (bpf) ☒ Organic Content (%) 10 20 30 40 ⊕ Moisture Content (%) ▶ Plastic Limit, PL (%) ◀ Liquid Limit, LL (%) 25 50 75 100 32		Surface: Gravel area.	Note: Values in brackets preceeding a remark indicate depth below ground surface (in feet) corresponding to the remark.
		S-2 5/24	5 4 4 5	8		**Well graded sand with silt (SW-SM)** - Dense; brown; moist; mostly fine to coarse SAND, few fine gravel, few non plastic fines. **[FILL]**	
						Silty sand with gravel (SM) - Loose to dense; brown; moist; mostly fine to coarse SAND, little fine to coarse gravel, little non plastic fines.	
5		S-3 15/24	12 27 54 44	>> 81		**Silty gravel with sand (GM)** - Very dense; brown; wet; some fine to coarse GRAVEL, some medium to coarse sand, little non plastic fines.	[4.0] Estimated water level at time of drilling based on changes in sample moisture.
						Argillite; sedimentary; gray; Very intensely fractured. **[Cambridge Argillite]**	[5.0 - 9.0] Intermittent auger grinding.
		S-4 3/3	50/3				***Auger refusal at 9.2 ft. (exploration ended).***
10							
15							
20							

Refer to the attached index sheets for important information about this log including general notes, legends, and guidance on description methods and procedures.

Weston & Sampson

Marty Sender Greenway Boardwalk
104 West Pine Street, Auburndale, MA

BORING ID: B-4A

WSE Project: ENG22-0315

CONTRACTOR:	**Technical Drilling Services, Inc.**	BORING LOCATION:	**See Attached Figure**	DATE START:	**July 16, 2022**
FOREMAN:	**Brett Balyk**	ADVANCE METHOD:	**Hollow-Stem Auger Drilling**	DATE FINISH:	**July 16, 2022**
LOGGED BY:	**Aaron Chabot, E.I.T.**	AUGER DIAMETER:	**4-1/4" ID (Stem), 7-5/8" OD (Flights)**	GROUND EL:	**Not Available**
CHECKED BY:	**Hector Flores**	SUPPORT CASING:	**N/A**	FINAL DEPTH:	**8.5 ft. (Refusal)**
EQUIPMENT:	**Diedrich D-50, ATV Mounted**	CORING METHOD:	**N/A**	GRID COORDS:	**N/A**
SPT HAMMER:	**Automatic (140-lb.)**	BACKFILL MATERIAL:	**Drill Cuttings**	GRID SYSTEM:	**N/A**

DEPTH BELOW GROUND SURFACE [VERTICAL FT.]	SAMPLE TYPE GRAPHIC	SAMPLE ID NUMBER AND RECOVERY RATIO [IN./IN.]	SPT BLOWS / 6 IN. (OR) CORE RATE / 12 IN. [MIN.]	GEOTECHNICAL TEST DATA ● N-Value, Raw (bpf) ☒ Organic Content (%) 10 20 30 40 ⊕ Moisture Content (%) ▶ Plastic Limit, PL (%) ◀ Liquid Limit, LL (%) 25 50 75 100	STRATIGRAPHY LOG	STRATUM IDENTIFICATION AND DESCRIPTION	REMARKS, OTHER TESTS, AND INSTALLATIONS
						Surface: Gravel area. Refer to B-4 for soil conditions.	Note: Values in brackets preceeding a remark indicate depth below ground surface (in feet) corresponding to the remark. [4.0 - 8.5] Intermittent auger grinding.
5							
10							***Auger refusal at 8.5 ft. (exploration ended).***
15							
20							

Refer to the attached index sheets for important information about this log including general notes, legends, and guidance on description methods and procedures.

Attachment C

Important Information about This Geotechnical-Engineering Report

Important Information about This

Geotechnical-Engineering Report

Subsurface problems are a principal cause of construction delays, cost overruns, claims, and disputes.

While you cannot eliminate all such risks, you can manage them. The following information is provided to help.

The Geoprofessional Business Association (GBA) has prepared this advisory to help you – assumedly a client representative – interpret and apply this geotechnical-engineering report as effectively as possible. In that way, you can benefit from a lowered exposure to problems associated with subsurface conditions at project sites and development of them that, for decades, have been a principal cause of construction delays, cost overruns, claims, and disputes. If you have questions or want more information about any of the issues discussed herein, contact your GBA-member geotechnical engineer. Active engagement in GBA exposes geotechnical engineers to a wide array of risk-confrontation techniques that can be of genuine benefit for everyone involved with a construction project.

Understand the Geotechnical-Engineering Services Provided for this Report

Geotechnical-engineering services typically include the planning, collection, interpretation, and analysis of exploratory data from widely spaced borings and/or test pits. Field data are combined with results from laboratory tests of soil and rock samples obtained from field exploration (if applicable), observations made during site reconnaissance, and historical information to form one or more models of the expected subsurface conditions beneath the site. Local geology and alterations of the site surface and subsurface by previous and proposed construction are also important considerations. Geotechnical engineers apply their engineering training, experience, and judgment to adapt the requirements of the prospective project to the subsurface model(s). Estimates are made of the subsurface conditions that will likely be exposed during construction as well as the expected performance of foundations and other structures being planned and/or affected by construction activities.

The culmination of these geotechnical-engineering services is typically a geotechnical-engineering report providing the data obtained, a discussion of the subsurface model(s), the engineering and geologic engineering assessments and analyses made, and the recommendations developed to satisfy the given requirements of the project. These reports may be titled investigations, explorations, studies, assessments, or evaluations. Regardless of the title used, the geotechnical-engineering report is an engineering interpretation of the subsurface conditions within the context of the project and does not represent a close examination, systematic inquiry, or thorough investigation of all site and subsurface conditions.

Geotechnical-Engineering Services are Performed for Specific Purposes, Persons, and Projects, and At Specific Times

Geotechnical engineers structure their services to meet the specific needs, goals, and risk management preferences of their clients. A geotechnical-engineering study conducted for a given civil engineer will not likely meet the needs of a civil-works constructor or even a different civil engineer. Because each geotechnical-engineering study is unique, each geotechnical-engineering report is unique, prepared *solely* for the client.

Likewise, geotechnical-engineering services are performed for a specific project and purpose. For example, it is unlikely that a geotechnical-engineering study for a refrigerated warehouse will be the same as one prepared for a parking garage; and a few borings drilled during a preliminary study to evaluate site feasibility will not be adequate to develop geotechnical design recommendations for the project.

Do not rely on this report if your geotechnical engineer prepared it:

- for a different client;
- for a different project or purpose;
- for a different site (that may or may not include all or a portion of the original site); or
- before important events occurred at the site or adjacent to it; e.g., man-made events like construction or environmental remediation, or natural events like floods, droughts, earthquakes, or groundwater fluctuations.

Note, too, the reliability of a geotechnical-engineering report can be affected by the passage of time, because of factors like changed subsurface conditions; new or modified codes, standards, or regulations; or new techniques or tools. *If you are the least bit uncertain* about the continued reliability of this report, contact your geotechnical engineer before applying the recommendations in it. A minor amount of additional testing or analysis after the passage of time – if any is required at all – could prevent major problems.

Read this Report in Full

Costly problems have occurred because those relying on a geotechnical-engineering report did not read the report in its entirety. Do not rely on an executive summary. Do not read selective elements only. *Read and refer to the report in full.*

You Need to Inform Your Geotechnical Engineer About Change

Your geotechnical engineer considered unique, project-specific factors when developing the scope of study behind this report and developing the confirmation-dependent recommendations the report conveys. Typical changes that could erode the reliability of this report include those that affect:

- the site's size or shape;
- the elevation, configuration, location, orientation, function or weight of the proposed structure and the desired performance criteria;
- the composition of the design team; or
- project ownership.

As a general rule, *always* inform your geotechnical engineer of project or site changes – even minor ones – and request an assessment of their impact. *The geotechnical engineer who prepared this report cannot accept*

responsibility or liability for problems that arise because the geotechnical engineer was not informed about developments the engineer otherwise would have considered.

Most of the "Findings" Related in This Report Are Professional Opinions

Before construction begins, geotechnical engineers explore a site's subsurface using various sampling and testing procedures. *Geotechnical engineers can observe actual subsurface conditions only at those specific locations where sampling and testing is performed.* The data derived from that sampling and testing were reviewed by your geotechnical engineer, who then applied professional judgement to form opinions about subsurface conditions throughout the site. Actual sitewide-subsurface conditions may differ – maybe significantly – from those indicated in this report. Confront that risk by retaining your geotechnical engineer to serve on the design team through project completion to obtain informed guidance quickly, whenever needed.

This Report's Recommendations Are Confirmation-Dependent

The recommendations included in this report – including any options or alternatives – are confirmation-dependent. In other words, they are not final, because the geotechnical engineer who developed them relied heavily on judgement and opinion to do so. Your geotechnical engineer can finalize the recommendations *only after observing actual subsurface conditions* exposed during construction. If through observation your geotechnical engineer confirms that the conditions assumed to exist actually do exist, the recommendations can be relied upon, assuming no other changes have occurred. *The geotechnical engineer who prepared this report cannot assume responsibility or liability for confirmation-dependent recommendations if you fail to retain that engineer to perform construction observation.*

This Report Could Be Misinterpreted

Other design professionals' misinterpretation of geotechnical-engineering reports has resulted in costly problems. Confront that risk by having your geotechnical engineer serve as a continuing member of the design team, to:

- confer with other design-team members;
- help develop specifications;
- review pertinent elements of other design professionals' plans and specifications; and
- be available whenever geotechnical-engineering guidance is needed.

You should also confront the risk of constructors misinterpreting this report. Do so by retaining your geotechnical engineer to participate in prebid and preconstruction conferences and to perform construction-phase observations.

Give Constructors a Complete Report and Guidance

Some owners and design professionals mistakenly believe they can shift unanticipated-subsurface-conditions liability to constructors by limiting the information they provide for bid preparation. To help prevent the costly, contentious problems this practice has caused, include the complete geotechnical-engineering report, along with any attachments or appendices, with your contract documents, *but be certain to note conspicuously that you've included the material for information purposes only.* To avoid misunderstanding, you may also want to note that "informational purposes" means constructors have no right to rely on the interpretations, opinions, conclusions, or recommendations in the report. Be certain that constructors know they may learn about specific project requirements, including options selected from the report, *only* from the design drawings and specifications. Remind constructors that they may perform their own studies if they want to, and *be sure to allow enough time* to permit them to do so. Only then might you be in a position to give constructors the information available to you, while requiring them to at least share some of the financial responsibilities stemming from unanticipated conditions. Conducting prebid and preconstruction conferences can also be valuable in this respect.

Read Responsibility Provisions Closely

Some client representatives, design professionals, and constructors do not realize that geotechnical engineering is far less exact than other engineering disciplines. This happens in part because soil and rock on project sites are typically heterogeneous and not manufactured materials with well-defined engineering properties like steel and concrete. That lack of understanding has nurtured unrealistic expectations that have resulted in disappointments, delays, cost overruns, claims, and disputes. To confront that risk, geotechnical engineers commonly include explanatory provisions in their reports. Sometimes labeled "limitations," many of these provisions indicate where geotechnical engineers' responsibilities begin and end, to help others recognize their own responsibilities and risks. *Read these provisions closely.* Ask questions. Your geotechnical engineer should respond fully and frankly.

Geoenvironmental Concerns Are Not Covered

The personnel, equipment, and techniques used to perform an environmental study – e.g., a "phase-one" or "phase-two" environmental site assessment – differ significantly from those used to perform a geotechnical-engineering study. For that reason, a geotechnical-engineering report does not usually provide environmental findings, conclusions, or recommendations; e.g., about the likelihood of encountering underground storage tanks or regulated contaminants. *Unanticipated subsurface environmental problems have led to project failures.* If you have not obtained your own environmental information about the project site, ask your geotechnical consultant for a recommendation on how to find environmental risk-management guidance.

Obtain Professional Assistance to Deal with Moisture Infiltration and Mold

While your geotechnical engineer may have addressed groundwater, water infiltration, or similar issues in this report, the engineer's services were not designed, conducted, or intended to prevent migration of moisture – including water vapor – from the soil through building slabs and walls and into the building interior, where it can cause mold growth and material-performance deficiencies. Accordingly, ***proper implementation of the geotechnical engineer's recommendations will not of itself be sufficient to prevent moisture infiltration. Confront the risk of moisture infiltration*** by including building-envelope or mold specialists on the design team. ***Geotechnical engineers are not building-envelope or mold specialists.***

GEOPROFESSIONAL BUSINESS ASSOCIATION

Telephone: 301/565-2733
e-mail: info@geoprofessional.org www.geoprofessional.org