Hoot, Toot, & Whistle Trail Improvements

Request for Proposals for Construction Services

Town of Wilmington, Vermont

Date Issued: Thursday June 20,2024

Site Visit: Tuesday July 9th, 2024 at 4pm at the Mountain Mills Boat Launch area (end of Fairview Ave)

Date Due: Thursday July 18th, 2024 at 4pm in-person Town of Wilmington 2nd Floor 2 East Main Street Wilmington, VT 05363 or via email: jdefrancesco@wilmingtonvt.us

The Town of Wilmington is requesting proposals for construction services to the multi-use Hoot, Toot, & Whistle Trail; redevelop the trail for broader accessibility and sustainability by reconstructing the existing 2-mile trail to make it safer and more enjoyable for bikes, strollers, and pedestrians. The main goals of the project are to improve trail surfaces, parking, and accessibility.

For more information contact: Gretchen Havreluk ghavreluk@wilmingtonvt.us (802)464-8591 ext 117

RESPONSE FORMAT

Responses to this RFP shall consist of:

1. **Hoot, Toot, & Whistle Trail Improvement Project Bid Forms that includes:**
   a. **Base Bid Trail Segments 3,4,6**
   b. **Add Alternate #1: Segment 1**
   c. **Add Alternate #2: Segment 5**
   d. **Add Alternate #3: Segment 7**
   e. **Completion of Bidder Information as applicable in Section 00 41 13**
2. **Qualifications: Examples of similar project experience including constructing boardwalks, bridges, and steps specified in the design plans.**
3. **Proposed Timeline**
4. **References from similar projects noting name of project, company name, contact person, and phone number.**

All work must be performed in accordance with the Standard Guidelines for outdoor recreation assets included here:

Trail Design and Construction

USFS Trail Construction and Maintenance Notebook - https://fpr.vermont.gov/sites/fpr/files/doc_library/USFS-Trail-Construction-and-Maintenance-Notebook_0.pdf

USFS Trail Fundamentals and Trail Management Objectives - https://fpr.vermont.gov/sites/fpr/files/doc_library/USGS-Trail-Fundamentals-and-Trail-Management-Objectives.pdf

Vermont Town Forest Trail Design Guide - https://fpr.vermont.gov/sites/fpr/files/doc_library/FPR-VT-Town-Forest-trail-design-guide.pdf

Accessible Recreation

USFS Accessibility Guidebook - https://fpr.vermont.gov/sites/fpr/files/doc_library/USFS-Accessibility-Guide-Book.pdf

Rail Trails and Multi-Use Paths

VTrans Pedestrian and Bicycle Facility Design Manual - https://fpr.vermont.gov/sites/fpr/files/doc_library/VTrains-Pedestrian-and-Bicycle-Facility-Design-Manual.pdf

Trails Near Wetlands

USFS Wetland Trail Design and Construction - https://fpr.vermont.gov/sites/fpr/files/doc_library/USFS-Wetland-trail-design-and-construction.pdf

VT DEC Wetlands Program Recreation Trail Building and Wetlands - https://fpr.vermont.gov/sites/fpr/files/doc_library/VTDEC-VT-Wetlands-Program-Guidance-for-Recreational-Trails.pdf

AWARD OF CONTRACT

The Wilmington Trails Committee will make a recommendation to the Wilmington Town Select Board to award a contract to the lowest reasonable qualified bidder. The Wilmington Select Board will award the contract at warned public meeting. The Town of Wilmington reserves the right to reject any and all proposals received as a result of this solicitation, to negotiate with any qualified source, or cancel this RFP in part or in its entirety, if it is in the best interest of the Town. This Request for Proposals in no way obligates the Town of Wilmington to award a contract.

Proposals and/or modifications received after the date and time due will not be accepted or reviewed

All proposals, upon submission, become the property of the Town of Wilmington. The cost of preparing, submitting and presenting is the sole expense of the contractor.

CONTRACTING

The Consultant, prior to being awarded a contract, shall apply for registration with the Vermont Secretary of State's Office to do business in the State of Vermont, if not already so registered. The registration form may be obtained from the Vermont Secretary of State, 128 State Street Montpelier, VT 05633-1101, PH: 802-828-2363, Toll-free: 800-439-8683; Vermont Relay Service – 711; web site: https://www.vtsosonline.com/online

The contract will not be executed until the Consultant is registered with the Secretary of State's Office. The successful Consultant will be expected to execute sub-agreements for each sub-consultant named in the proposal upon award of this contract.

The Consultant’s attention is directed to the VTrans’ Disadvantaged Business Enterprise (DBE) Policy Requirements. These requirements outline the State’s and the consultant’s responsibility with regard to the utilization of DBEs for the work covered in the RFP. It is expected that all consultants will make good faith efforts to solicit DBE sub-consultants.

If the award of the contract aggrieves any firms, they may appeal in writing to the Town of Wilmington Select Board, P.O. Box 217, Wilmington, VT 05363. The appeal must be post-marked within seven (7) calendar days following the date of written notice to award the contract. Any decision of the Town Select Board is final.

Prior to beginning any work, the Consultant shall obtain Insurance Coverage in accordance with the Specifications for Contractor Services located in the Municipal Assistance Bureau Guidebook Appendix. The certificate of insurance coverage shall be documented on forms acceptable to the Town.

SECTION 00 41 13

BID FORM

TOWN OF WILMINGTON

WINDHAM COUNTY **VERMONT**

HOOT, TOOT & WHISTLE TRAIL IMPROVEMENT PROJECT – BASE BID

Bidder agrees to perform all of the work described in the specifications and shown on the plans consisting of installation of all items in the Contract Documents including but not limited to clearing, demolishing and preparing the site for construction, regrading of sections of trail, installation of aggregate fill, clearing, grubbing & leveling of areas for new trail, construction of timber boardwalks, bridges & steps, and associated site improvements as indicated on the plans for Trail Segments 3, 4, & 6.

ITEM NO.	DESCRIPTION	QTY.	UNITS	UNIT PRICE	TOTAL ITEM PRICE
1	DEMOLITION/ SITE PREPARATION/ EROSION & SEDIMENT CONTROL MEASURES	1	L.S		
2	TRAIL REMEDIATION – TRAIL LEVELING	340	L.F.		
3	TRAIL REMEDIATION – AGGREGATE FILL	1646	S.F.		
4	TRAIL CONSTRUCTION - BOARDWALKS	535	L.F.		
5	TRAIL CONSTRUCTION – BRIDGE, 25’ SPAN	1	EA		
6	TRAIL CONSTRUCTION – BRIDGE, 35’ SPAN	1	EA		
7	TRAIL CONSTRUCTION – TIMBER STEPS	120	L.F.		
8	TRAIL CONSTRUCTION – NEW TRAIL (CLEARING & GRUBBING, GRADING, EARTHWORK)	155	L.F.		

TOTAL AMOUNT OF BASE BID (ITEM 1 TO 8)

_____Dollars

and _____ Cents **Lump Sum ($_____)**

(Amounts are to be shown in both words and figures. In case of discrepancy, the amount shown in words will govern.)

HOOT, TOOT & WHISTLE TRAIL IMPROVEMENT PROJECT
ADD. ALTERNATE #1: SEGMENT 1

Bidder agrees to perform all of the work described in the specifications and shown on the plans consisting of installation of all items in the Contract Documents including but not limited to clearing, demolishing and preparing the site for construction, pruning & removal of exposed roots within the trail corridor, regrading of sections of trail, installation of aggregate fill, installation of drainage culverts & associated piping, installation of timber / log retainers, and construction of timber boardwalks & bridges.

ITEM NO.	DESCRIPTION	QTY.	UNITS	UNIT PRICE	TOTAL ITEM PRICE
1	DEMOLITION/ SITE PREPARATION/ EROSION & SEDIMENT CONTROL MEASURES	1	L.S		
2	TRAIL REMEDIATION – ROOT REMOVAL & PRUNING	625	L.F.		
3	TRAIL REMEDIATION – TRAIL LEVELING	355	L.F.		
4	TRAIL REMEDIATION – AGGREGATE FILL	7,490	S.F.		
5	TRAIL CONSTRUCTION - BOARDWALKS	220	L.F.		
6	TRAIL CONSTRUCTION – BRIDGE, 30’ SPAN	1	EA		
7	TRAIL CONSTRUCTION – TIMBER RETAINERS	4	EA		
8	TRAIL CONSTRUCTION – DRAINAGE CULVERT	3	EA		

TOTAL AMOUNT OF ADD. ALTERNATE #1 (ITEM 1 TO 8)

_____ Dollars

and _____ Cents Lump Sum ($_____)

(Amounts are to be shown in both words and figures. In case of discrepancy, the amount shown in words will govern.)

HOOT, TOOT & WHISTLE TRAIL IMPROVEMENT PROJECT
ADD. ALTERNATE #2: SEGMENT 5

Bidder agrees to perform all of the work described in the specifications and shown on the plans consisting of installation of all items in the Contract Documents including but not limited to clearing, demolishing and preparing the site for construction, regrading of sections of trail and construction of timber boardwalks & bridges.

ITEM NO.	DESCRIPTION	QTY.	UNITS	UNIT PRICE	TOTAL ITEM PRICE
1	DEMOLITION/ SITE PREPARATION/ EROSION & SEDIMENT CONTROL MEASURES	1	L.S		
2	TRAIL REMEDIATION – TRAIL LEVELING	275	L.F.		
3	TRAIL REMEDIATION – AGGREGATE FILL	200	S.F.		
4	TRAIL CONSTRUCTION - BOARDWALKS	65	L.F.		

TOTAL AMOUNT OF ADD. ALTERNATE #2 (ITEM 1 TO 4)

_____Dollars

and _____ Cents Lump Sum ($_____)

(Amounts are to be shown in both words and figures. In case of discrepancy, the amount shown in words will govern.)

HOOT, TOOT & WHISTLE TRAIL IMPROVEMENT PROJECT
ADD. ALTERNATE #3: SEGMENT 7

Bidder agrees to perform all of the work described in the specifications and shown on the plans consisting of installation of all items in the Contract Documents including but not limited to clearing, demolishing and preparing the site for construction and construction of a new stone dust path.

ITEM NO.	DESCRIPTION	QTY.	UNITS	UNIT PRICE	TOTAL ITEM PRICE
1	DEMOLITION/ SITE PREPARATION/ EROSION & SEDIMENT CONTROL MEASURES	1	L.S		
2	TRAIL REMEDIATION – STONE DUST PATH	505	L.F.		

TOTAL AMOUNT OF ADD. ALTERNATE #3 (ITEM 1 TO 2)

_____Dollars

and _____ Cents Lump Sum ($_____)

(Amounts are to be shown in both words and figures. In case of discrepancy, the amount shown in words will govern.)

1. The following documents are attached to and made a condition of this Bid:

   (a) Required Bid Security in the form of _____
   (b) Required Bidder's Qualifications of Bidders statement with supporting data.
   (c) Required Certification by Bidder regarding Employment Opportunity.

2. Communications concerning this Bid shall be addressed to:

   The address of Bidder is indicated below.

3. The terms used in this Bid which are defined in the General Conditions of the Construction Contract included as part of the Contract Documents have the meanings assigned to them in the General Conditions.

SUBMITTED on _____, 2024.

If Bidder is:

AN INDIVIDUAL

By _____
(Individual's Name)

doing business as _____

Business address: _____

Phone Number: _____

_____
Signature

A PARTNERSHIP

By _____
(Firm Name)

_____
(General Partner)

Business address: _____

Phone Number: _____

_____
Signature

A CORPORATION

By _____
(Corporation Name) (SEAL)

_____
(State of Incorporation)

By _____

(Name of Person Authorized to Sign) Signature

_____ (Corporate Seal)
(Title)

Attest _____
(Secretary)

Business address: _____

Phone Number: _____

A JOINT VENTURE

By _____
(Name)

_____
(Address)

By _____
(Name) Signature

_____
(Address)

By _____
(Name) Signature

_____
(Address)

(Each joint venturer must sign. The manner of signing for each individual, partnership and corporation that is a party to the joint venture should be in the manner indicated above).

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). The Contractor shall be responsible for having the utility companies locate their respective utilities at and in the vicinity of the site prior to excavating. To satisfy the requirements of Vermont law, Title 30, Chapter 86, and Public Service Board Rule 3.800, the Contractor shall, at least 48 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 1-888-344-7233.

. 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 Vermont's Occupational Safety and Health Administration Standards and Vermont Labor Statutes. 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:

The Contractor shall install weather protection and shall furnish adequate heat in the area so protected during the months of November through March, as required to protect the site and/or materials.

3.12 ELECTRIC SERVICE:

A. The Contractor shall make all necessary applications and arrangements and pay for all fees and charges for electrical energy for power and light necessary for the proper completion of this contract during its entire progress. The Contractor shall provide and pay for all temporary wiring, switches, connections, and meters.

B. There shall be sufficient electric lighting so that all work may be done in a workmanlike manner where there is not sufficient daylight.

END OF SECTION

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SECTION 01 12 16

SCOPE AND SEQUENCE OF WORK

PART 1 – GENERAL

1.01 WORK INCLUDED

A. The scope of work shall include all demolition and installation of work as specified in the contract drawings.

1.02 EXISTING CONDITIONS

A. By submitting a bid, the Contractor affirms having carefully examined the site and all conditions affecting the Work. No claim for additional costs will be allowed because of lack of full knowledge of existing conditions.

1.03 SEQUENCE OF WORK

A. The Contractor shall furnish all labor, materials, equipment, and incidentals, required to complete the work as shown in the Contract Drawings and specified herein for the Work Area. The work includes, but is not limited to the following:

1. Apply for, pay for and obtain all necessary permits required, by local, State, and Federal agencies having jurisdiction over work for successful completion of this Contract.

2. Supply all submittals required by Section 01 33 23 – SUBMITTALS and those required to proceed with the completion of this scope.

3. Erosion and sediment control shall be installed, as required, as described on the Contract Drawings and specified herein. This shall include straw wattles/siltation traps around catch basins and straw wattles/silt fencing as described on the Contract Drawings and specified herein and any additional measures that may be required or as determined by Engineer. Install decontamination pad, as required, to prevent mud and dirt from public roadways

4. Provide all temporary utilities and obtain applicable permits that are anticipated for use during the completion of the project, including electricity, and temporary water service, as required.

5. Complete demolition and removal of all ancillary structures and debris within the Limits of Work of the Work Area.

6. Pick up all debris resulting from demolition and other Contract related activities.

7. Lawful disposal of, or recycling of, all demolition debris including, but not limited to: rubble, masonry, wood, plastic, concrete, electrical, metal, roofing materials, and other miscellaneous demolition debris from the site, including miscellaneous debris piles, empty home heating oil tanks and empty drums. Recycling and reuse are strongly encouraged.

8. Cleanup of site, including removal of temporary fencing and erosion and sediment controls.

PART 2 - PRODUCTS

Not Used.

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 established for the Contract. Scheduling of the work shall be coordinated with the Owner and Engineer.

B. Prior to performing any work at the Site, the Contractor shall submit a detailed scheduling plan to the Engineer for review. The plan shall describe the proposed sequence, methods, and timing of the work.

C. The schedule shall consist of a Gantt Chart showing the sequence of work described herein including permitting submittal preparation, Site mobilization, Site work, project closeout, demobilization, and chart contract completion.

END OF SECTION

SECTION 01 14 00

SPECIAL PROVISIONS

PART 1 – GENERAL

1.01 SUMMERY

A. Selection of Materials

B. Water for Demolition Purposes.

C. Occupying Private Property.

D. Existing Utility Locations and Dimensions.

E. Coordination of Work.

F. Time for Completion of Contract.

G. Signs.

H. Compliance with Permits.

I. Contractor's Representative.

J. Hours of Construction Activity.

1.02 SELECTION OF MATERIALS:

A. All hauled-in material shall be certified free of contaminations, free of invasive species, and in compliance with all requirements or restrictions as part of Great River Hydro (GRH), or the current the property owner, and the Town of Wilmington agreements.

1.03 WATER FOR DEMOLITION PURPOSES:

B. The Contractor shall make arrangements with the Owner to use available water supplies for demolition purposes. The Contractor shall furnish a reduced pressure zone type backflow preventer to protect the water supply and a meter to measure the water usage. There will be no charge for the water.

C. 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. Hydrants shall only be operated under supervision of the Owners

personnel.

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

1.04 OCCUPYING PRIVATE PROPERTY:

A. The Contractor shall not enter upon nor occupy with workers, equipment or materials any property outside of the Limits of Work shown within the Drawings, except with the prior written consent of the property owner or property owner's agent.

1.05 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. 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 811 or 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 its work. The Contractor shall coordinate a meeting with the Town of Wilmington to verify locations of existing utilities on the site

D. Where the dimensions and locations of existing structures and pipes are of importance for any part of the Work, the contractor shall verify such dimensions and locations in the field before the fabrication of any material or equipment that is dependent on correctness of such information.

1.06 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.

1.07 TIME FOR COMPLETION OF CONTRACT:

The time for completion of this contract is stipulated in the FORM FOR GENERAL BID.

1.08 SIGNS:

A. The Contractor shall install and maintain construction signs for the duration of the Project at the request of the owner. Signs to be installed and maintained by the Contractor include, but are not limited to: project signs, "Construction Area" signs (minimum of two (2) 24" x 36" signs) and "No Trespassing/Keep Out" signs (minimum of four (4) 24" x 36" signs). The Contractor shall fabricate and install signs as specified herein. Locations and wording shall be coordinated with the Owner after the contract is awarded.

B. The Contractor shall submit sign templates for review by the Owner and Engineer prior to fabricating the signs. The signs shall be erected before site work begins. The signs shall be fabricated, erected, and maintained by the Contractor.

C. The Contractor shall provide adequate support for the signs as determined by the Engineer.

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

1.09 COMPLIANCE WITH PERMITS:

The Contractor shall perform all work in conformance with requirements of the applicable permits.

1.10 CONTRACTOR'S REPRESENTATIVE:

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

1.11 HOURS OF CONSTRUCTION ACTIVITY:

The Contractor shall conduct all construction activity during daylight hours 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.

PART 2 – PRODUCTS

Not Used.

PART 3 – EXECUTION

Not Used

END OF SECTION

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SECTION 01 14 19.16

DUST CONTROL

PART 1 - GENERAL

1.01 DESCRIPTION:

A. This Section specifies requirements for controlling dust generated during work of this Contract. Work activities requiring special attention to dust control include building demolition, stockpiling, loading and removal of material from the site, and earthwork. Dust generated during the course of the Work must be controlled and kept on-site. The Contractor shall undertake additional precautions to ensure dust is controlled at the site when demolishing the building due to its close proximity to a brook and a neighboring commercial building.

B. The Contractor is responsible for control of dust at all times during work of this Contract, 24 hours per day, 7 days per week, including non-working hours, weekends, and holidays.

C. 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. The Engineer may perform air/dust monitoring for confirmation purposes. If dust exceeds action levels described in this Section, or determined to be a nuisance by the Engineer, the Contractor shall be responsible for implementing additional engineering controls (e.g. additional dust suppression agents, wind screens), as required by the Engineer, and described in this Section at no additional cost to the Owner.

D. The Contractor is responsible for daily clean-up of public roadways, sidewalks, adjacent driveways/parking lots, and walkways affected by work of this Contract. A wet spray power vacuum street sweeper shall be used on pavement, as required. Dry power sweeping is prohibited.

E. The Contractor shall provide temporary water trucks and connections to any roadside fire hydrant and provide all lines necessary for distribution of water.

1.02 RELATED WORK:

A. Section 01 14 00 – SPECIAL PROVISIONS

B. Section 01 57 19 – ENVIRONMENTAL PROTECTION

B. Section 31 23 00 – EARTHWORK

1.03 REGULATORY REQUIREMENTS:

A. The Contractor shall perform all work specified under this Section in compliance with the applicable local, state, and federal requirements.

B. Work of this Contract shall be conducted in a manner that will not result in excessive particulate matter emissions, nuisance dust conditions, PM_{10} (particulate matter with an aerodynamic diameter less than or equal to 10 microns) emissions, or PM_{10} concentrations exceeding of 150 $\mu g/m^3$ on 24-hour average basis.

1.04 SUBMITTALS:

A. Contractor shall submit to the Engineer product literature and Material Safety Data Sheets for any dust suppression wetting agents and stabilizers that the Contractor proposes to use.

1.05 QUALITY CONTROL:

A. The Engineer may conduct air monitoring with a Mini RAM monitor, or equivalent, to ensure dust is being controlled at the site. During the course of the Work, the Contractor shall be responsible for implementing engineering controls (e.g., wetting, calcium chloride) to minimize or eliminate fugitive dust emissions. If dust exceeds action levels described in Paragraph 1.03 of this section, or determined to be a nuisance by the Engineer, the Contractor shall be responsible for implementing additional engineering controls (e.g. additional dust suppression agents, wind screens), as required by the Engineer. If additional wet suppression (water) and/or wind screens, barriers, or covers are required per the Engineer based on air/dust monitoring results, they shall be at no additional cost to the Owner.

PART 2 - PRODUCTS

2.01 DUST SUPPRESSION AGENTS:

A. Dust suppression wetting agents shall be water soluble, non-toxic, non-reactive, non-volatile, and non-foaming.

2.02 BARRIERS, SCREENS, AND COVERS:

A. Wind screens shall be a durable fabric mesh of 50 percent porosity, attached to demolition site fence.

B. Wind barriers shall be solid wood fences, solid durable fabric attached to temporary site fence, or other solid barriers intended to block the passage of wind.

C. Covers for stockpiles shall be plastic tarps. Contaminated soil covers shall be 20-mil polyethylene sheeting or 10-mil nylon reinforced polyethylene sheeting. The stockpile shall be placed on 40-mil polyethylene sheeting.

2.03 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 CONSTRUCTION SITE DUST CONTROL – GENERAL:

A. Wet suppression shall be used to provide temporary control of dust. Several applications per day may be necessary to control dust depending upon meteorological conditions and work activity. The Contractor shall apply wet suppression on a routine basis as necessary or required by the Engineer, to control dust. At a minimum, wet suppression shall be applied to demolition debris, excavated material, aggregate piles, and exposed soils and dirt.

1. Wet suppression consists of the application of water or a wetting agent in solution with water. Ensure wetting agent is not used on plantable soils.

2. Wet suppression equipment shall consist of sprinkler pipelines, tanks, tank trucks, or other devices capable of providing regulated flow, uniform spray, and positive shut-off.

3. Water may be sprinkler applied with equipment including a tank with gauge-equipped pressure pump and a nozzle-equipped spray bar. Water shall be dispersed through the nozzle under a minimum pressure of 20 pounds per square inch, gauge pressure.

4. The Contractor shall provide the necessary means to retain on-site all water runoff generated by dust control and dispose of such water in accordance with the requirements of the appropriate regulatory agencies. The Contractor shall be responsible for providing water, a means of disposal, necessary permits, and all appurtenances required to control dust. Coordinate with the requirements of Section 01 57 19 – ENVIRONMENTAL PROTECTION.

B. The use of petroleum products for dust suppression is prohibited in this Contract.

C. Provide additional wind screens and wind barriers, if required, in locations where they would be effective in minimizing wind erosion and spread of dust. Locations

shall be submitted as part of the Contractor's Dust Control Plan. The Contractor shall keep wind screens and barriers in good repair for the life of the Contract.

D. The Contractor is responsible for daily clean-up of paved areas affected by the work of this Contract. A wet spray power vacuum street sweeper shall be used on paved areas. Dry power sweeping is prohibited

3.02 PUBLIC ROADWAY DUST CONTROL:

A. Vehicles leaving the demolition site shall have no mud and dirt on the vehicle body or wheels. Any foreign matter on the vehicle body or wheels shall be physically removed prior to vehicle's entering of a public roadway. Contractor shall not permit any truck to leave the site with exterior mud or dirt that has the potential to be deposited on public roadways.

B. Haul truck cargo areas shall be securely and completely covered during material transport on public roadways. Vehicle mud and dirt carryout, material spills, and soil wash-out onto public roadways and walkways and other paved areas shall be cleaned up immediately.

C. The Contractor is responsible for daily clean-up of public roadways and walkways affected by work of this Contract. A wet spray power vacuum street sweeper shall be used on paved roadway. Dry power sweeping is prohibited.

3.03 CONTROL OF EARTHWORK DUST:

A. During batch drop operations (i.e., earthwork with front-end loader, clamshell bucket, or backhoe) the free drop height of excavated or aggregate material shall be reduced as much as practical to minimize the generation of dust.

B. To prevent spills during transport, freeboard space shall be maintained between the material load and the top of the truck cargo bed rail.

3.04 CONTROL OF STOCKPILE DUST:

A. The Contractor shall use the following methods to control dust and wind erosion of active and inactive stockpiles:

1. Wet suppression without wetting agent during active stockpile load-in, load-out, and maintenance activities.

2. Soil stabilizers applied to the surface of inactive stockpiles.

3. Polyethylene tarps on stockpiles shall be placed both below and on top of stockpiles, and secured with sandbags or an equivalent method to prevent the cover from being dislodged by the wind. The Contractor shall repair

or replace covers whenever damaged or dislodged, at no additional cost to the Owner.

4. The tarps shall be bermed 12-inches high at all edges to prevent any infiltration of storm water or exfiltration of leachate.

B. The methods to be used shall be submitted to the Engineer as part of the Dust Control Plan.

3.05 DEMOLITION DUST CONTROL MEASURES:

A. The Contractor shall use water sprinkling, temporary enclosures, and other suitable methods to limit dust and dirt rising and scattering in the air to the lowest practical level. Sufficient water shall be supplied for the building, demolition-related debris, and site compacting to meet Federal, State, and local air-quality regulations and to minimize dust during demolition and debris handling.

B. Closed chutes shall be used for the handling of debris. Dropping or throwing of debris is prohibited.

C. Debris shall not be stockpiled. Debris shall be removed promptly from the site.

D. During transport of debris, the truck cargo area shall be securely covered.

END OF SECTION

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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.

C. Meetings may be setup virtually with approval by the Owner. The Contractor shall coordinate with the Owner and Engineer to setup virtual meetings if necessary.

1.02 PRE-CONSTRUCTION CONFERENCE:

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

1.03 PROGRESS MEETINGS:

A. During the course of the Project, the Contractor shall attend bi-weekly progress meetings as scheduled by the Owner and/or Owner's Project Manager. 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 and Owner.

PART 2 - PRODUCTS

Not used.

PART 3 – EXECUTION

Not used.

END OF SECTION

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SECTION 01 32 16

CONSTRUCTION SCHEDULING

PART 1- GENERAL

1.01 DESCRIPTION

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

B. A construction schedule shall be used to control the work of this Contract and to provide a definitive basis for determining job progress. The construction schedule and updates shall be prepared by the Contractor and coordinated with the Engineer and Owner. All work shall be done in accordance with the established schedule and the Contractor and his subcontractors shall be responsible for cooperating fully with the Engineer and Owner in effectively utilizing the schedule.

C. The Contractor shall submit a schedule for approval by the Engineer prior to initiation of work. The schedule shall consist of a Gantt Chart showing the sequence of work described in Section 01 12 16 – SCOPE AND SEQUENCE OF WORK. The schedule shall include, but not limited to, the following: permitting, submittal preparation, site mobilization, site work (see Section 01 12 16 – SCOPE AND SEQUENCE OF WORK), project closeout, and demobilization.

1.02 SUBMITTALS

A. Prior to performing any work at the Site, the Contractor shall submit a detailed schedule to the Engineer and Owner for review.

B. The schedule shall be updated by the Contractor on a biweekly basis and submitted to the Engineer and Owner for review.

1.03 RESPONSIBILITY FOR SCHEDULE COMPLIANCE

A. Whenever it becomes apparent from the current schedule that delays have resulted and the Contract completion date will not be met, or when so requested by the Engineer, the Contractor shall take some or all of the following actions at no additional cost to the Owner. He shall submit to the Engineer for approval, a written statement of the steps he intend to take to remove or arrest the delay to the critical path in the approved schedule.

1. Increase construction manpower in such quantities and crafts as will substantially eliminate the backlog of Work.

2. Increase the number of working hours per shift, shifts per day, working days per week, the amount of construction equipment, or any combination of the foregoing, sufficiently to substantially eliminate the backlog of work.

3. Reschedule activities to achieve maximum practical concurrency of accomplishment of activities and comply with the revised schedule.

C. If when so requested by the Engineer, the Contractor should fail to submit a written statement of the steps he intends to take or should fail to take such steps as approved by the Engineer, the Engineer may request the Contractor to increase the level of effort in man-power (trades), equipment and work schedule (overtime, weekend and holiday work, etc.) to be employed by the Contractor in order to remove or arrest the delay to the critical path in the approved schedule and the Contractor shall promptly provide such level of effort at no additional cost to the Owner.

PART 2 - PRODUCTS

Not used.

PART 3 – EXECUTION

Not used.

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 – 31 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 (BiggsD@wseinc.com) 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 HARD COPY SUBMITTALS:

A. If requested, in accordance with the accepted schedule, the Contractor shall submit promptly to the Engineer, by mail (to Weston & Sampson Engineers, attention: CSD), six (6) copies each of shop or working drawings required as noted in the specifications, of equipment, structural details and materials fabricated especially for this Contract.

B. 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 of the Owner, Project, Contractor and building, equipment or structure.

3.04 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.

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 14 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.

3.05 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.

END OF SECTION

EXHIBIT 1 TO SECTION 01 33 23 SUBMITTALS

SHOP DRAWING TRANSMITTAL FORM

Shop Drawing Transmittal

Weston & Sampson

Instruction for Preparing Transmittal

No action will be taken on any item unless accompanied by this form.
TRANSMITTAL NOS. to be consecutive (1, 2, 3, etc.).
Each resubmittal of same item shall use same number with suffix letter (A, B, etc.).
SPEC. SECT. NO: Only one spec. section no. to each transmittal.
DESCRIPTION: Complete identification of document or group of documents.
SOURCE: Originator of document(s) being submitted.

DRAWING NO: Identification of document(s).
CONTRACT DRAWING REFERENCE: Contract drawing number(s) showing details of document(s).
SPECIAL INSTRUCTIONS: Special cases and emergencies, changes in distribution and special handling requests, etc. should be entered here.
SIGNATURE OF CONTRACTOR: Signature of individual who reviews and approves material prior to submittal to engineer.

THIS SECTION TO BE COMPLETED BY CONTRACTOR

TRANSM. NO.	SPEC. SECT. NO.	DATE	CONTRACTORS JOB NO.	W&S JOB NO.

PROJECT NAME & CONTRACT NO.	LOCATION

TO	FROM
Weston & Sampson Engineers, Inc, 1 Winners Circle, Suite 130 Albany, New York 12205	

						BY W&S	
ITEM NO.	DESCRIPTION	SOURCE	DRAWING NO. CATALOG NO. BROUCHURE, ETC	NO. OF COPIES	CONTRACT DRAWING REF.	ACTION CODE	REVIEWED BY
1							
2							
3							
4							

THIS CERTIFIES THAT ALL ITEMS SUBMITTED HEREWITH HAVE BEEN CHECKED BY THE CONTRACTOR, ARE IN CONFORMANCE WITH THE REQUIREMENTS OF THE CONTRACT DOCUMENTS, EXCEPT AS NOTED, AND ARE APPROVED BY THE CONTRACTOR FOR THIS PROJECT.	SIGNATURE & TITLE	

THIS SECTION TO BE COMPLETED BY W&S

ACTION CODE:
1. NO EXCEPTIONS TAKEN
2. MAKE CORRECTIONS NOTED
3. AMEND AND RESUBMIT
4. REJECTED- SEE REMARKS
5. ACKNOWLEDGEMENT
6. SUBMITTAL NOT REQUIRED, RETURNED WITHOUT REVIEW

a. INSTALLATION SHALL PROCEED ONLY WHEN ACTION CODE IS 1 OR 2
b. ACTION CODED 3 SHALL BE RESUBMITTED WITHIN TIME LIMIT SET IN CONTRACT
c. REVIEW DOES NOT RELIEVE CONTRACTOR FROM RESPONSIBILITY OF COMPLIANCE WITH ALL REQUIREMENTS OF THE CONTRACT DOCUMENTS

Weston & Sampson

SECTION 01 37 00

SCHEDULE OF VALUES

PART 1 - GENERAL

1.01 SUMMARY:

A. Section Includes:

1. Provide Schedule of Values covering each bid item.

B. Related Sections:

1. Section 01 33 23 – SUBMITTALS.

1.02 SUBMITTALS:

A. Submit the following in accordance with Section 01 33 23 - SUBMITTALS:

1. Schedule of Values.

a. Submit draft Schedule of Values within 5 days of NTP.

b. Revise and resubmit Schedule of Values until acceptable to the Engineer.

2. Itemize separate line item cost for work comprising each lump sum bid item:

a. Ensure that the sum of the items listed in the Schedule of Values for each lump sum item equals the price bid for the respective lump sum item.

b. Items such as bond premium and temporary construction facilities may be listed separately in the Schedule of Values, provided amounts can be substantiated.

3. Break down installed costs into:

a. Delivered cost of product.

b. Total installed cost with overhead and profit.

1) Do not list overhead and profit as separate items.

4. Work requiring verification of proper disposal

a. A separate line item shall be included for any items requiring documentation of proper legal disposal.

b. At least 10% of that items value shall be withheld pending submission of required documentation.

5. Schedule of Values shall include an item for Close-out documentation & Reports.

6. Include 5% retainage for each item to be held until the Final Payment Application.

7. An unbalanced Schedule of Values providing for overpayment on items of work performed first will not be accepted.

1.03 SEQUENCING AND SCHEDULING:

A. Before submitting any application for payment, obtain the Engineer's approval of the Schedule of Values.

PART 2 – PRODUCTS

Not Used

PART 3 – EXECUTION

Not Used

END OF SECTION

SECTION 01 52 13

TEMPORARY FACILITIES

PART 1 - GENERAL

1.01 SECTION INCLUDES

Temporary Utilities including; electricity, lighting for construction purposes, water service and sanitary facilities.

1.02 TEMPORARY ELECTRICITY

Provide and pay for power service required from utility source as needed for construction operation. The Contractor may elect to utilize generators as long as their use does not cause excess noise (see Paragraph 1.03 below) or odorous fugitive emissions as to disturb neighbors. The temporary electrical service/panel, as required, shall be installed at a location approved by the Engineer and Owner. See additional electrical service requirements in Special Conditions, Section 01 11 00 – CONTROL OF WORK AND MATERIALS, and the Contract Drawings.

1.03 NOISE LEVEL REQUIREMENTS:

The Contractor shall make special provisions to prevent excessive noise during demolition and construction. See Section 01 57 19 – ENVIRONMENTAL PROTECTION for noise control requirements.

1.04 TEMPORARY WATER SERVICE

The Contractor shall provide, maintain and pay for suitable quality water service required for construction operations and dust control as specified herein and the Contract Drawings. The Contractor shall provide water for demolition purposes as specified in Section 01 14 00 – SPECIAL PROVISIONS and the Contract Drawings. The Contractor shall be responsible to coordinate, permit and supply water at the Site and pay for all permits, meters and water used on the Site.

1.06 TEMPORARY SANITARY FACILITIES

The Contractor shall provide and maintain required sanitary facilities as specified in Section 01 11 00 – CONTROL OF WORK AND MATERIALS, provide facilities at time of Project mobilization and remove facilities at the end of Work.

PART 2 - PRODUCTS

Not used.

PART 3 – EXECUTION

Not used.

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 requirements of the Vermont Agency of Natural Resources, USACOE and any conditional requirements applied.

D. Prior to commencement of work, the Contractor shall meet with representatives of the Owner's Representative to develop mutual understandings relative to compliance of the environmental protection program.

1.02 RELATED WORK:

A. Section 01 14 19.16 – DUST CONTROL

B. Section 01 33 23 – SUBMITTALS

C. Section 31 11 00 – CLEARING AND GRUBBING

D. Section 31 23 00 – EARTHWORK

1.03 SUBMITTALS:

A. A. The Contractor shall submit for approval 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 22-foot wide, continuous length support netting, and stapled to preweathered oak posts installed as shown on the drawings. The oak posts shall be 1½-inches by 1½-inches (Minimum Dimension) by 48 inches and shall be tapered. The support netting shall be industrial strength polypropylene. The bottom edge of the sediment control fabric shall be buried as shown on the drawings. The sediment control fabric shall conform to the following properties:

Property	Value	Test Method
1. Grab Strength (lbs.)	124	ASTM D-4632
2. Elongation (%)	15%	ASTM D-4632
3. Puncture Strength (lbs.)	65	ASTM D-4833
4. Burst Strength (psi)	300	ASTM D-3786
5. Trapezoid Tear (lbs.)	60	ASTM D-4533
6. Equivalent Opening Size (U.S. Sieve)	No. 30	ASTM D-4571
7. Permittivity (sec^{-1})	0.10	ASTM D-4491
8. Water Flow Rate (gal/min/sf.)	10	ASTM D-4491
9. UV Resistance (%)	70	ASTM D-4355

B. The silt fence shall be Mirafi Envirofence manufactured by Mirafi, Inc. or approved equal.

2.02 STRAW BALES:

A. Straw bales shall consist of certified seed free stems of agricultural grain and cereal crops and shall be free of grasses and legumes. Standard bales shall be 14-inches high, 18-inches wide and 36- to 40-inches long tied with polypropylene twine and weigh within 5 percent of 7 lbs. per cubic ft.

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 Contract Documents. 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 brooks, 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 or demolition debris into the adjacent canal or any other public waters.

C. Should catch basins be encountered within the contract limits, they shall be protected as specified in Section 01 11 00 – CONTROL OF WORK AND MATERIALS with a nonwoven geotextile filter fabric trap, or straw wattles as described in this Section, and as approved by the Engineer.

D. The Contractor is responsible for maintaining flow into each catch basin to prevent ponding/flooding. The Contractor shall clean filter fabric by removing accumulated material, as needed. Removed material shall be disposed of per applicable local, State, and Federal requirements at no extra cost to the Owner.

E. 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 characteristic of Mirafi 140 N.

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 that are to remain.

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

C. The elevations of areas designated as wetlands to remain shall not be unduly disturbed by the Contractor's operations. 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 Owner's Representative.

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 insure 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 adjacent to any watercourse or any drainage facility. Adequate measures for erosion and sediment control such as the placement of baled hay or 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, remove or cut existing trees or shrubs not scheduled to be removed 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 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 of under the provisions of Section 31 11 00 – CLEARING AND GRUBBING.

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 CLEARING AND GRUBBING:

A. The Contractor shall clear and grub areas as necessary to demolish the building, unless otherwise noted on the Contract Drawings and as specified in Section 31 11 00 – CLEARING AND GRUBBING.

3.09 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. Refer to Section 31 23 19 – DEWATERING for additional requirements.

B. Under no circumstances shall the Contractor discharge water to the areas designated as wetlands or to he adjacent stream.

C. The pumped water shall be filtered through filter fabric and straw wattles, 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. Refer to Section 31 23 19 – DEWATERING for additional requirements.

3.10 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.

3.11 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 Owner's Representative and adequate measures shall be employed to prevent erosion of said material.

3.12 STRAW WATTLES:

A. To trap sediment and to prevent sediment from clogging drainage systems, straw wattles may be used. Care shall be taken to keep the wattles from breaking apart. The wattles should be securely staked to prevent overturning, flotation, or displacement. All deposited sediment shall be removed periodically. Wattles shall not be placed within a waterway during construction of the pipeline crossing.

3.13 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.

3.14 CATCH BASIN PROTECTION:

A. Catch basin protection shall be used for every catch basin, shown on the drawings or as required by the Engineer, to trap sediment and prevent it from clogging drainage systems and entering wetlands. Siltation fabric shall be securely installed under the catch basin grate. Care shall be taken to keep the siltation fabric 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.

3.15 NOISE CONTROL:

A. The Contractor shall make special provisions to prevent excessive noise during demolition and construction. No heavy demolition and construction equipment or large engine vehicle shall be allowed to operate on the site between the hours of 7 PM and 7 AM, unless special permission is granted by the Owner. Temporary noise barriers shall be erected by the Contractor at the direction of the Owner if the noise level at the perimeter of the site is determined as excessive.

B. When available, make the maximum use of "low-noise-emission products" as certified by EPA. No blasting or use of explosives is permitted.

C. Protect employees against noise exposure in accordance with the requirements of the Occupational Safety and Health Act of 1972.

D. Compliance with the requirements of this Section will not offer any relief from responsibility for compliance with local ordinances, regulations, and other Sections.

E. Compliance with the requirements of this Section will require the use of machines with effective mufflers or enclosures and selection of quieter alternative procedures.

F. Unless otherwise indicated, all noise level limits are measured 50 feet from the equipment producing said noise.

G. Noise Level Restrictions in All Areas: In no case expose the public to demolition and construction noise levels exceeding 85 dBA (slow) or to impulsive noise levels with a peak sound pressure level exceeding 125 dBA (fast). If work is specifically approved by Engineer during nighttime, restrict noise levels to not more than 50 dBA (slow).

Intermittent Noise: Prevent noises from non-stationary mobile equipment operated by a driver or from any source of nonscheduled intermittent, non-repetitive, short-term noises not lasting more than a few hours from exceeding 75 dBA daytime and 60 dBA nighttime.

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 his 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 used.

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 directed or permitted in writing, tear down and remove all temporary buildings and structures built by him; shall remove all temporary works, tools and machinery or other construction equipment furnished by him; shall remove all rubbish from any grounds, which he has occupied; shall remove silt fences and straw wattles used for trapping sediment; shall remove temporary fencing/gates; and shall leave the roads and all parts of the property and adjacent property affected by his operations in a neat and satisfactory condition.

3.04 RESTORATION OF DAMAGED PROPERTY:

A. The Contractor shall restore or replace, when and as directed, any property damaged by his 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

3. Final Cleaning

4. Substantial Completion

5. Closeout Procedures

6. Final Completion

B. Closeout checklist to be completed by the Engineer.

C. The time for completion of this contract is stipulated in the FORM FOR GENERAL BID.

1.02 RELATED WORK:

A. General Requirements in their entirety.

B. Section 01 74 13 - CLEANING UP

1.03 AS-BUILT DOCUMENTS:

A. The 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. As-built documents shall include permanent bridge locations, GPS coordinates, including depths below grade, for all utility locations. Utilities to be shown with GPS coordinates on the As-Built Documents include, but not limited to, the locations of all new culvert start and end points.

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 activities in conformance with the Contract Drawings and Specifications.

2. All shop drawings shall have final approval.

3. All sampling test results, if required, submitted to the Engineer.

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. This date will not be certified until the following requirements have been satisfied by the

Contractor:

1. All Contract requirements are complete.

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

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 for each Project Milestone.

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 the Owner's Project Manager. 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, Affidavit of Payment of Debts and Claims, and remaining releases, waivers, warranties/guarantees, and all other data required by the Contract Documents.

1.08 CLOSEOUT SUBMITTALS

A. The closeout submittals for each Project Milestone include but are not necessarily limited to:

1. Evidence of payment and release of liens.

2. Waste shipment manifests, Bills of Lading (if required), weight slips, and shipping records.

3. Records of quantities/weights of materials shipped off-site, including all contaminated materials to disposal facilities, construction and demolition debris to recycling/disposal facilities, and all recycled/reused materials.

4. All other records or documents as necessary (i.e.injury reports, etc.)

5. Construction photographs

6. As-built drawings, including survey/GPS information on locations of utility terminations as described in Paragraph 1.03.B of this Section.

1.09 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.

1.10 COMPLETION CHECKLIST:

A. When the project has been fully completed, Final Payment can be approved.

PART 2 - PRODUCTS

Not used.

PART 3 – EXECUTION

Not used.

END OF SECTION

EXHIBIT 1 TO SECTION 01 78 00 PROJECT CLOSEOUT

PROJECT COMPLETION CHECKLIST

PROJECT COMPLETION CHECKLIST

Project _____

Job No. _____

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		
EQUIPMENT CHECKOUT AND CERTIFICATIONS		
1. Work Complete per Drawings/Specifications		
2. Equipment Decommissioned and Removed		
3. All Shop Drawings have Final Approval		
4. All Shop Tests Complete and Results Submitted		

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 Complete		
CLOSEOUT PROCEDURES		
1. Written Certification Submitted that Work is Ready for Authority & Engineer Inspector		
2. Inspection by Authority , 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. Contact 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		
FINAL COMPLETION		
1. All Items in Punch List Completed		
2. All Other Required Documentation Submitted (List It)		
CORRECTION/WARRANTY PERIOD		

Project Closeout Checklist		
	Date Completion Verified	Verified By
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 31 01 01

SITE RESTORATION

PART 1 – GENERAL

1.01 QUALITY ASSURANCE

A. Provide prepackaged seed readily available to the public with quality and purity equal to product of O.M. Scotts and Son, Marysville, OH 43041. On-the-job or made-to-order mixes will not be accepted.

B. Refer to Specification 32 91 19 LOAMING AND SEEDING for more information.

1.02 DELIVERY STORAGE AND HANDLING

A. Deliver fertilizer in manufacturer's standard size bags or cartons showing weight, analysis, and the name of the manufacturer. Store as approved by Engineer.

B. Store all seed at the site in a cool dry place as approved by the Owner's Representative. Replace any seed damaged during storage.

1.03 SCHEDULING

A. Time For Seeding: Optimum period to sow permanent grass seed is generally between April 1st and May 15th or between August 15th and October 1st. Schedule application for when weather conditions permit or as required.

1. Provide temporary seed and mulch when final grading is complete while waiting for optimal seeding period.

2. Provide temporary seed and mulch for temporary cover on disturbed ground not to be worked on for more than 7 days.

3. Provide temporary seed and mulch on disturbed earth prior to temporary shutdown of construction.

PART 2 – PRODUCTS

2.01 TOPSOIL

A. Provide topsoil conforming to the following:

1. Original loam topsoil, well drained homogeneous texture and of uniform grade, without the admixture of subsoil material and entirely free of dense material, hardpan, sod, or any other objectionable foreign material.

2. Containing not less than 4 percent nor more than 20 percent organic matter in that portion of a sample passing a 1/4 inch sieve when determined by the wet combustion method on a sample dried at 105 degrees C.

3. Containing a Ph value within the range of 4.5 to 7 on that portion of the sample that passes a 1/4 inch sieve.

4. Containing the following gradations:

SIEVE DESIGNATION	PERCENT PASSING
1 inch	100
1/4 inch	97 - 100
No. 200	20 - 65 (of the 1/4 inch sieve)

2.02 FERTILIZER

A. Fertilizer: Mixed commercial fertilizers shall contain total nitrogen, available phosphoric acid and soluble potash in the ratio of 10-6-4 (50% N/UF). 50% of total nitrogen shall be derived from ureaform furnishing a minimum of 3.5% water insoluble nitrogen (3.5% WIN). The balance of the nitrogen shall be present as methylene urea, water-soluble urea, nitrate and ammoniacal compounds.

2.03 SEED

A. Furnish fresh, clean, new-crop seed mixed in the proportions specified for species and variety, and conforming to Federal and State Standards.

B. Acceptable material in a seed mixture other than pure live seed consists of nonviable seed, chaff, hulls, live seed of crop plants and inert matter. The percentage of weed seed shall not exceed 0.1 percent by weight.

C. All seed will be rejected if the label indicates any noxious weed seeds.

D. Provide seed mixture per Specification 32 91 19 LOAMING AND SEEDING.

2.04 MULCH

A. Hydroseed Application: Do all slurry preparation at the job site:

1. Water, mulch, fertilizer, binder and other ingredients shall be added to the tank simultaneously so that the finished load is a homogenous mix of the specified ingredients.

2. Seed shall be added last and shall be discharged within 2 hours. Loads held over 2 hours will be recharged with ½ the seed rate before application.

3. Once fully loaded, the complete slurry shall be agitated for 3-5 minutes to allow for uniform mixing.

B. HydroSeeding Application: One Step Hydroseed

Lbs/Ac	Material
2,000 lbs	100% Cellulose or Wood Fiber
80 lbs	Fertilizer (3.04 Fertilizer 10-6-4)
16 lbs	Seed as per section (2.02 Seed)

PART 3 – EXECUTION

3.01 GRADING

A. Rough Grading: Trim and grade lawn areas within the Contract Limit to a level of 4 inches below the finish grades indicated, except in the area of the engineered barrier, and unless otherwise specified herein or where greater depths are indicated. Provide smooth uniform transition to adjacent areas.

B. Finish Grading: Finish surfaces free from irregular surface changes, and as follows:

1. Grassed Areas: Finish areas to receive topsoil to within 1 inch above or below the required subgrade surface elevations.

3.02 SPREADING TOPSOIL

A. Perform topsoil spreading operations only during dry weather.

B. To insure a proper bond with the topsoil, harrow or otherwise loosen the subgrade to a depth of 3 inches before spreading topsoil.

C. Spread topsoil directly upon prepared subgrade to a minimum depth measuring 4 inches after natural settlement in areas to be seeded. Smooth out unsightly variations, bumps, ridges, and depressions that will hold water. Remove stones, litter, or other objectionable material. Finished surfaces shall conform to the contour lines and elevations indicated on the drawings or fixed by the Owner's Representative.

3.03 PREPARATION FOR SEEDING

A. Seed Bed: Scarify soil to a depth of 2 inches in compacted areas. Smooth out unsightly variations, bumps, ridges, and depressions that will hold water. Remove stones, litter, or other objectionable material.

3.04 FERTILIZING

A. Apply 10-6-4 fertilizer evenly at the rate of 40 pounds per 1000 sq ft.

3.05 SEEDING

A. Assume all risks when seed is sowed before approval of seed analysis.

B. Do not seed when the wind velocity exceeds 5 miles per hour.

C. Application Rate: 8 pounds per 1000 sq ft.

D. Dry Application: Sow seed evenly by hand or seed spreader on dry or moderately dry soil.

E. Wet Application: Refer to Hydroseeding Application.

3.06 MULCHING

A. Dry Application: Within 3 days after seeding, cover the seeded areas with a uniform blanket of straw mulch at the rate of 50 pounds per 1000 sq ft of seeded area.

B. Wet Application: All hydroseed applications are to be applied in a sweeping motion to form a uniform application and form a mat at the specified rates.

1. Unused Loads: If mixture remains in tank for more than 8 hours it shall be removed from the job site at contractor’s expense.

2. Reseeding: After “Final Acceptance”, reseeding will be done at the request of the owner and shall be considered extra.

3.07 LAWN ESTABLISHMENT

A. Maintain the grass at heights between 2-1/2 inches and 3-1/2 inches and include a minimum of 2 mowings.

B. Water and protect all seeded areas until final acceptance of the lawn.

3.08 FINAL ACCEPTANCE

A. Final acceptance of seeded areas will be granted when a uniform stand of acceptable grass is obtained, with a minimum of 95 percent coverage. Portions of the seeded areas may be accepted at various times at the discretion of the Owner's Representative.

B. Unacceptable seeded areas, dry application: Reseed as specified and fertilized at one-half the specified rate.

C. Once accepted, the Owner will assume all maintenance responsibilities.

END OF SECTION

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SECTION 31 05 13.13

LOAM BORROW

PART 1 - GENERAL

1.01 WORK INCLUDED:

A. This Section covers all labor, materials, and equipment necessary to furnish and place Loam Borrow and all related work as indicated on the drawings and as herein specified.

B. Existing on-site topsoil that has been stockpiled may be re-used provided it meets these specifications. The Contractor shall be solely responsible to determine if adequate quantities of on-site topsoil exist that may potentially be reused.

1.02 RELATED WORK:

A. Section 31 23 00 – EARTHWORK

1.03 QUALITY ASSURANCE:

A. For each particular source of loam, the Contractor shall send representative samples totaling approximately 10 pounds of Loam Borrow to an approved State-certified testing laboratory.

B. Loam shall be subject to tests for Soluble Salts (1:2 soil-water ratio), Nitrogen (including nitrate and ammonium Nitrogen), Phosphorous, Potassium, Sulfate, Calcium, Magnesium, Aluminum, and Ferric Iron concentrations.

C. Loam shall also tested for heavy metals concentration, which shall include Boron, Cadmium, Zinc, Chromium, Copper, Lead, Manganese, and Nickel.

D. Mechanical gradation (textural analysis) as per USDA Soil Classification System and determine Organic matter content and the pH (1:1 soil-water ratio).

E. All tests shall be at the Contractor's expense. Laboratory test results shall state whether the Loam Borrow is acceptable as a planting medium, whether it needs to be amended, or if it fails to meet accepted requirements. Test results shall also include soil amendment and fertilizing recommendations and shall be forwarded to the Engineer at least 1month before any loaming is to be undertaken.

F. Samples and tests shall continue to be made at the Contractor’s expense until Loam Borrow to be provided is found to be acceptable to the Engineer.

1.04 SUBMITTALS:

In accordance with requirements of general specifications, the Contractor shall submit the following:

A. One digital copy of information detailing the soil amendments including limestone, fertilizers, organic material amendments, and the name and address of the supplier and origin of Loam Borrow shall be submitted to the Engineer for approval.

B. One digital copy of soils test results shall be submitted to the Engineer for review.

PART 2 - PRODUCTS

2.01 MATERIALS:

A. LOAM BORROW:

1. Loam Borrow shall consist of, fertile, friable natural topsoil, typical of productive soils in the vicinity, obtained from naturally well-drained areas that have never been stripped. Loam Borrow shall be reasonably free of stumps, roots, heavy or stiff clay, stones larger than 1-inch in diameter, lumps, coarse sand, noxious weeds, sticks, brush or other litter.

2. Loam Borrow shall be classified as a sandy loam by the USDA textural classification system as determined by sieve and pipette or hydrometer analysis. Loam Borrow shall have the following mechanical analysis:

Textural Class	Percent of Total Weight	Avg. Percentage
Sand (0.05 – 2.0mm range)	45 – 75	60
Silt (0.002 – 0.05mm range)	15 – 35	25
Clay (less than 0.002mm)	5 – 20	15

3. Loam Borrow shall contain not less than 4 percent or more than 7 percent organic matter as determined by the loss of weight by ignition of oven-dried samples. Test samples shall be oven-dried to a constant weight at a temperature of 230 degrees F.

4. Loam Borrow shall not be excessively acid or alkaline, and shall not contain any phytotoxic materials or unacceptable concentration levels of any substance harmful to plant growth as determined by the soils testing laboratory. Loam Borrow shall have a pH value range between 5.0 and 6.5. Maximum soluble salt index shall be 100. The electrical conductivity (EC2) of a 1:2 soil-water suspension shall be less than or equal to 1.0 millimhos/cm. Aluminum concentration levels shall be less than 200ppm.

5. Loam Borrow shall not be worked, excavated, or delivered in a frozen or muddy condition. Soil structure shall not be destroyed through excessive and unnecessary handling or compaction.

6. Existing on-site topsoil may be re-used as Loam Borrow provided it meets these specifications.

7. All amendments to Loam Borrow shall be approved by the Engineer and shall be made in accordance with recommendations from the soils testing laboratory for use of Loam Borrow as a plant-growing medium and these specifications.

B. 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.

C. 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. For Fertilizers containing Nitrogen, at least 50 percent of the nitrogenous elements shall be Urea-form or derived from organic sources and contain no less than 3 percent water-soluble Nitrogen.

3. Superphosphate shall be composed of finely ground phosphate rock as commonly used for agricultural purposes, containing not less than 18 percent available phosphoric acid.

D. ORGANIC MATERIAL AMENDMENTS:

1. 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.

2. 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.

3. 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.

4. 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.

PART 3 - EXECUTION

3.01 After approval of rough grading, the sub-base shall be raked to a depth of 3 inches to remove stones, rock or other foreign materials 3-inches or larger in dimension. The Engineer shall inspect the work for approval, prior to placing of Loam Borrow.

3.02 Loam Borrow shall be placed and spread to the required depths over the locations approved by the Engineer.

3.03 Lime shall be uniformly applied in accordance with the soil testing laboratory recommendations, or as required by the Engineer, at a maximum rate of 100 pounds per 1000 square feet per application, in necessary quantities to achieve the pH range requirements for Loam Borrow.

3.04 Fertilizer shall be uniformly applied in accordance with the soil testing laboratory recommendations, or as required by the Engineer. At slopes exceeding 25 percent gradient, fertilizer shall be applied manually in a manner approved by the Engineer. Fertilizer shall not be applied between June 15 and August 31.

3.05 Loam Borrow shall be worked by tilling or power raking to a minimum depth of 3-inches, thoroughly incorporating the lime and fertilizer into the soil. The Loam Borrow shall then be raked until the surface is finely pulverized and smooth and compacted with rollers, weighing between 75 and 100 pounds per linear foot of tread, to an even surface conforming to the prescribed lines, grades and depths indicated on the plans.

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 used.

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 unless written approval is granted by the Owner.

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 22 13

ROUGH GRADING

PART 1 – GENERAL

1.01 RELATED DOCUMENTS: Drawings and general provisions of Contract, including General and Supplementary Conditions and Division 1 Specification Sections, apply to this Section.

1.02 WORK INCLUDED

A. Cutting, filling, and compacting to establish subgrade for:

1. Trails.

2. Lawns and landscape areas.

B. Compaction of embankments.

C. Disposal of unsuitable material.

D. Disposal of excess material.

1.03 RELATED SECTIONS

A. SECTION 31 05 13.13 LOAM BORROW

B. SECTION 31 23 00 EARTHWORK

C. SECTION 31 23 16 TRENCHING, BACKFILLING AND COMPACTION

D. SECTION 32 91 19 LOAMING AND SEEDING

1.04 QUALITY ASSURANCE

A. Requirements of Regulatory Agencies.

1. Comply with requirements of:

a. OSHA.

b. U.S. Army Corps of Engineers

c. Other agencies with jurisdiction.

2. Obtain all permits required for the completion of the project.

B. Testing Laboratory Requirements:

1. Obtain a testing laboratory to perform soil testing and inspection for quality control during rough grading operations.

2. Before commencing work, obtain approval from Owner and Landscape Architect/Engineer of:

a. Testing laboratory.

b. Testing schedule.

C. Reference Standards:

1. VTRANS.

2. ASTM.

D. Allowable Tolerances:

1. Subgrades for areas other than roadways and miscellaneous surfaces should be:

a. Graded parallel to finished grade.

b. Within one inch of required grade.

c. Without depressions which hold water.

1.05 SUBMITTALS

A. Test Requirements:

1. Testing laboratory.

2. Testing schedule.

3. Gradation test reports: For all materials specified in this section.

4. Optimum moisture and maximum density:

a. Structural Fill.

b. Native, on-site general fill.

5. Field density test reports.

B. Manufacturer's Data:

1. Geotextile.

2. Compaction equipment.

3. All Products.

1.06 PROJECT CONDITIONS

A. Notify:

1. UFPO at 1-800-962-7962 not less than 72 hours prior to starting rough grading for location of underground utilities such as gas, telephone, electric lines, etc.

2. Other private and public utilities in the work area.

3. Landscape Architect/ Engineer and Construction Manager.

a. At least 24 hours prior to commencing rough grading.

b. When rough grading has established final subgrade elevations.

c. When unsuitable material is encountered at required subgrades.

d. When unauthorized excavations have taken place.

e. When rock is encountered.

f. When suitable subgrades become unsuitable due to lack of dewatering.

g. When uncharted, unidentified, incorrectly charted or incorrectly located underground utilities are encountered.

B. Existing Conditions:

1. Data regarding subsurface conditions are not intended as representations or warranties of accuracy or continuity between soil borings and test pits. It is expressly understood that the Owner or Landscape Architect/ Engineer will

not be responsible for interpretations or conclusions drawn therefrom by Contractor. Data are made available for convenience of Contractor.

2. Additional test borings and other exploratory operations may be made by Contractor at no cost to Owner.

3. Do not interrupt existing utilities servicing facilities occupied and used by Owner and others except when permitted in writing, and then only after acceptable temporary utility services have been provided, or permission to interrupt service is granted by utility authority. Provide minimum of 48 hour notice to utility company, and receive written notice to proceed before interrupting any utility.

C. Environmental Conditions:

1. Do not commence rough grading if ground is frozen, muddy or covered with snow.

2. Do not commence or continue rough grading when precipitation is falling.

3. Protect established subgrades against freezing when atmospheric temperature is less than 35° F.

4. Do not place embankment on frozen subgrade.

1.07 SEQUENCING AND SCHEDULING

A. Do not commence rough grading until:

1. Site preparation is complete within the Contract Limit Line.

2. Site preparation is complete within substantial portions of the Project as approved by the Landscape Architect/ Engineer.

3. Adequate grade stakes have been established to guide work as required by the Landscape Architect/ Engineer.

4. All protective measures are in place.

PART 2 – PRODUCTS

2.01 MATERIALS

A. Select Fill: Conform to VTRANS Standard Specifications, Item 203.30, sound, durable sand, gravel, stone or blends of these materials, free from organic material, other deleterious frozen sections.

B. Select Granular Subgrade: Conforming to VTRANS Standard Specification, Item 301.25.

1. Materials should be free from organic materials, other deleterious material and frozen sections.

C. Native Material: Subsoils found at the site may be used as fill that will not support structures, roadways, field or miscellaneous surfaces, as approved by Engineer.

1. Saturated native materials should be stockpiled in windrows to dry.

2. Use native materials in embankments only after optimum moisture content has been reached.

3. Material should be free from organic materials, other deleterious materials and frozen sections.

D. Geotextile: Woven, polypropylene reinforcement fabric.

1. Amoco 2006 or,

2. Mirafi 500 X or,

3. Approved equivalent.

4. Or as indicated on the plans.

PART 3 – EXECUTION

3.01 PREPARATION

A. Protect structures, utilities, sidewalks, pavements, and other facilities on and adjacent to Owner's property from damage caused by settlement, lateral movement, undermining, washout and other hazards created by rough grading operations.

B. Protect survey markers on and adjacent to Owner's property including but not limited to iron pipes and rods, concrete and stone monuments, hubs, stakes, etc.

C. The following are prohibited within the drip line of all vegetation to remain:

1. Stockpiling construction materials, including soil.

2. Vehicular traffic.

3. Parking of any vehicle or equipment.

4. Discharging solid or liquid waste.

5. Servicing vehicles, machinery or equipment.

6. Placing shanties, sheds and other temporary enclosures.

D. Demolish and completely remove from site existing underground utilities indicated to be removed. Coordinate with utility companies for shut-off of services if lines are active. Comply with regulations and requirements of utility authority. (Provide temporary means of conveyance for all disturbed utilities as required until such a time the new systems are operational).

E. Bench existing slopes where embankments are to be placed on slopes steeper than 1 (vertical) on 5 (horizontal).

1. Bottom of bench: Sloped at approximately 2 percent, draining downhill, without depressions.

2. Sideslope of bench: At a stable angle of repose suitable to sustain itself until placement of embankment material.

3. Place embankment material as soon as each bench is complete.

3.02 INSPECTION

A. Examine the site to verify:

1. All protective measures are in place.

2. Field stake-out has been completed.

3.03 SPECIAL PRECAUTIONS

A. The use of explosives is not permitted. Do not bring explosives onto the site or use in the work of this Contract.

B. Should uncharted, or incorrectly charted, piping or other utilities be encountered during excavation, consult utility owner immediately for directions. Cooperate with Owner and utility companies in keeping respective services and facilities in operation. Repair damaged utilities to satisfaction of utility owner. Report findings to Landscape Architect and/or Engineer.

C. Perform excavation within drip line of trees to remain by hand and protect the root system from damage or dry out.

D. Protect newly graded areas from traffic and erosion and keep them free of trash and debris until completion of the work of this Contract.

E. Slope sides of excavations to comply with local codes and ordinances having jurisdiction. Shore and brace in accordance with applicable laws and codes where sloping is not possible because of space restrictions or stability of material excavated.

F. Maintain sides and slopes of excavations in safe condition until completion of backfilling.

G. The Contractor is responsible for all means of erosion control during all phases of construction, at his expense. Any damage due to erosion conditions shall be repaired by the Contractor at no cost to the Owner and to the satisfaction of the Landscape Architect/ Engineer.

3.04 HANDLING MATERIALS

A. The moisture content of a material may be such that its use will require extensive manipulation. It is the Contractor's responsibility to determine the economics of using, or disposing of and replacing such materials. Material determined by the Contractor to be uneconomic for use may be disposed of as specified and replaced with other material at no additional cost to the Owner.

B. Stockpile satisfactory excavated materials until required for backfill or fill. Place, grade and shape stockpiles for proper drainage and drying. Protect from contamination.

C. Locate and retain soil materials away from edge of excavations. Do not store within drip line of trees indicated to remain.

D. Where subgrade or lifts of soil material must be moisture conditioned before compaction, uniformly apply water to surface or subgrade, or lifts of soil material, to prevent free water appearing on surface during or subsequent to compaction operations.

E. Remove and replace, or scarify and air dry, soil material that is too wet to permit compaction to specified density.

F. All excavated unsuitable and excess materials are the Contractor's responsibility for disposal at an off-site location in a legal manner.

3.05 ROUGH GRADING

A. Establish required subgrades by cutting, filling and compacting.

1. Subgrades should conform to cross sections, elevations and grades of finished grades with allowances for depth of finish improvements. Subgrades shall comply with allowable tolerances. Failure to do so shall

be at the contractor's risk and cost.

3.06 GRADING BELOW REQUIRED SUBGRADES

A. Fill all unauthorized excavation in subgrade areas with compacted select granular subgrade material without altering required subgrade elevations.

1. Concrete fill may be used to bring subgrades to required elevations only when approved in writing by the Landscape Architect/ Engineer.

2. Notify Landscape Architect/Engineer of unauthorized excavation before commencing remedial work.

B. Unauthorized excavation in lawn and landscape areas may be filled with the material otherwise specified for placement on subgrade at no additional cost to the Owner.

C. If unsuitable bearing materials are encountered at required subgrade elevations, notify the Owner and Landscape Architect/ Engineer and proceed with the following operations at no additional cost to the owner.

1. Carry excavations deeper until suitable bearing material is encountered or as required.

2. Remove unsuitable material and dispose of in a lawful manner.

3. Place geofabric on undercut subgrade.

4. Place select granular subgrade material and compact in lifts to required subgrade elevations.

D. If established subgrades on suitable material become unsuitable because of saturation due to Contractor's failure to provide de-watering, or other construction operations, proceed with the operations specified in the preceding paragraph at no additional cost to the Owner.

3.07 ROCK

A. Where footings, foundations or other work requiring soil support rest entirely on rock, remove all loose soil and rock at required subgrade elevations.

B. Where footings, foundations or other work requiring soil support rest partially on rock and partially on soil, notify the Landscape Architect/ Engineer immediately, before backfilling or placing other work.

3.08 DEWATERING

A. Prevent surface water and subsurface or ground water from flowing into excavations and from flooding project site and surrounding area.

B. Do not allow water to accumulate in excavations. Remove water to prevent softening of foundation bottoms, undercutting footings and soil changes detrimental to stability of subgrades and foundations. Provide and maintain pumps, well points, sumps, suction and discharge lines, and other dewatering system components necessary to convey water away from excavations at no additional cost to the Owner.

C. Establish and maintain temporary drainage ditches and other diversions outside grading limits to convey rain water and water removed from excavations to collecting or run-off areas. Do not use trench excavations as temporary drainage ditches.

D. The Contractor is responsible for providing all the necessary means of dewatering for the duration of the project. Areas damaged due to improper dewatering methods shall be repaired at no cost to the Owner to the satisfaction of the Landscape Architect/ Engineer.

3.09 FILLING AND COMPACTING

A. Place geofabric on subgrade according to manufacturer's instructions so it lays flat without creases, folds, or other irregularities. Minimum overlap at joints: 18 inches.

B. Place embankment materials in lifts not exceeding 12 inches in loose depth.

1. Stumps, logs and other decomposable materials are not to be used in any part of embankments.

C. Compact each lift of embankment material as specified in VTRANS Standard Specifications

1. In all areas other than those supporting lawns and landscape areas: to at least 95% of Modified Proctor Maximum Dry Density.

2. In all lawn and landscape areas: to a minimum of 85% and maximum of 90% of Modified Proctor Maximum Density.

3. In detention basin fill areas: to a minimum of 80% and maximum of 85% for the basin bottom and at least 95% of Modified Proctor Maximum Density for weir or berm (earth containment) areas.

3.10 PROOF ROLLING

A. Immediately prior to final trimming of the subgrade and placement of subbase materials for roadways and miscellaneous surfaces, all areas of the subgrade should be proof rolled.

1. On embankments conforming to VTRANS Standard Specifications.

2. In cut sections conforming to VTRANS Standard Specifications.

B. If proof rolling reveals unsatisfactory bearing conditions:

1. In cut sections: proceed according to paragraph 3.6 C of this specification as directed.

2. On embankments: proceed according to paragraph 3.6 D of this specification as required, at no additional cost to the Owner.

3.11 REMEDIAL ACTION

A. If field density reports or inspection by the Owner or Landscape Architect/ Engineer reveal that subgrades or embankments have been constructed below specified density, provide additional compaction and testing at no additional cost to the Owner until specified densities are achieved.

B. Repair and re-establish grades in settled, eroded and rutted areas to specified tolerance.

C. Where completed, compacted areas are disturbed by subsequent construction operations or adverse weather, scarify surface, re-shape, and compact to required density prior to further construction.

D. Where settling is measurable or observable during general project warranty period, remove surface (pavement, lawn or other finish), add originally specified material, substituting select granular subgrade material for native material, compact, and replace surface treatment. Restore appearance, quality, and condition of surface or finish to match adjacent work, and eliminate evidence of restoration to greatest extent possible.

E. Subgrade areas which do not comply with the allowable tolerances set forth in these specifications shall be reestablished to such tolerances and approved by the Landscape Architect/ Engineer for substantial compliance.

END OF SECTION

SECTION 31 23 00

EARTHWORK

PART 1 – GENERAL

1.01 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 1 Specification Section, apply to this Section.

1.02 SUMMARY

A. Work Included:

1. Excavation, backfill, grading, and compaction relating to all phases of construction.

2. Importing and exporting material fill as required to meet final grades.

B. Related Sections include the following:

1. SECTION 31 05 15.13 LOAM BORROW

2. SECTION 31 11 00 CLEARING AND GRUBBING

3. SECTION 31 22 13 ROUGH GRADING

4. SECTION 31 23 16 TRENCHING BACKFILLING & COMPACTION

5. SECTION 32 91 19 LOAMING AND SEEDING

6. SECTION 32 93 00 PLANTS

1.03 UNIT PRICES

A. Rock Measurement: Volume of rock actually removed, measured in original position, but not to exceed the following:

1. 6 inches beneath pipe in trenches, and the greater of 24 inches wider than pipe or 42 inches wide.

B. Unit prices for rock excavation include replacement with approved materials.

C. Unit prices for unsatisfactory soils include excavation of soils and replacement with approved materials.

1.04 DEFINITIONS

A. Backfill: Soil materials used to fill an excavation.

1. Initial Backfill: Backfill placed beside and over pipe in a trench, including haunches to support sides of pipe.

2. Final Backfill: Backfill placed over initial backfill to fill a trench.

B. Base Course: Layer placed between the subbase course and finished surface.

C. Bedding Course: Layer placed over the excavated subgrade in a trench before laying pipe.

D. Borrow: Satisfactory soil imported from off-site for use as fill or backfill.

E. Drainage Course: Layer supporting slab-on-grade used to minimize capillary flow of pore water.

F. Excavation: Removal of material encountered above subgrade elevations.

1. Additional Excavation: Excavation below subgrade elevations as required by the Engineer. Additional excavation and replacement material will be paid for according to Contract provisions for changes in the Work.

2. Bulk Excavation: Excavations more than 10 feet in width and pits more than 30 feet in either length or width.

3. Unauthorized Excavation: Excavation below subgrade elevations or beyond indicated dimensions without a request by the Engineer. Unauthorized excavation, as well as remedial work required by the Engineer, shall be without additional compensation.

G. Fill: Soil materials used to raise existing grades.

H. Rock: Rock material in beds, ledges, unstratified masses, and conglomerate deposits and boulders of rock material exceeding 1 cu. yd. for bulk excavation or 3/4 cu. yd. for footing, trench, and pit excavation that cannot be removed by rock excavating equipment equivalent to the following in size and performance ratings, without systematic drilling, ram hammering, or blasting, when permitted:

1. Excavation of Footings, Trenches, Pits and Bulk Excavations: Late-model, track-mounted hydraulic excavator; equipped with a 42 inch-wide,

short-tip-radius rock bucket; rated at not less than 120-hp flywheel power with bucket-curling force of not less than 25,000 lbf and stick-crowd force of not less than 18,700 lbf; measured according to SAEJ-1179.

2. If the material can be removed by ripping, plowing or excavating equipment from any direction, the material shall not be classified as rock.

I. Structures: Buildings, footings, foundations, retaining walls, slabs, tanks, curbs, mechanical and electrical appurtenances, or other man-made stationary features constructed above or below the ground surface.

J. Subbase Course: Layer placed between the subgrade and base course.

K. Subgrade: Surface or elevation remaining after completing excavation, or top surface of a fill or backfill immediately below subbase, drainage fill, or topsoil materials.

L. Utilities on-site underground pipes, conduits, ducts, and cables, as well as underground services within buildings.

M. Unsatisfactory soil: Soil which in the opinion of the Engineer is incapable after compaction of properly supporting the utility pipe or structure. The ability of soils listed in paragraph 2.1 C to provide proper support will be based upon field conditions.

1.05 SUBMITTALS

A. Product Data: For the following:

1. Drainage fabric.

2. Separation fabric.

3. All Products.

B. Samples: For the following:

1. Soil gradation results for each proposed soil material.

2. 12-by-12-inch sample of drainage fabric.

3. 12-by-12-inch sample of separation fabric.

C. Material Test Reports: From a qualified testing agency indicating and interpreting test results for compliance of the following with requirements indicated:

1. Classification according to ASTMD 2487 of each on-site or borrow soil material proposed for fill and backfill.

2. Laboratory compaction curve according to ASTMD 698 for each on-site or borrow soil material proposed for fill and backfill.

3. Laboratory compaction curve according to ASTMD 1557 for each on-site or borrow soil material proposed for fill and backfill.

1.06 QUALITY ASSURANCE

A. Pre-excavation Conference: Conduct conference at Project site.

B. Comply with latest requirements of:

1. OSHA.

2. VTrans.

3. Vermont Department of Environmental Conservation.

4. Other agencies with jurisdiction.

1.07 PROJECT CONDITIONS

A. Existing Utilities: Do not interrupt utilities serving facilities occupied by Owner or others unless permitted in writing by Engineer and then only after arranging to provide temporary utility services according to requirements indicated:

1. Notify Engineer not less than two days in advance of proposed utility interruptions.

2. Do not proceed with utility interruptions without Engineer written permission.

3. Contact utility-locator service for area where Project is located before excavating.

B. Demolish and completely remove from site existing underground utilities indicated to be removed. Coordinate with utility companies to shut off services if lines are active.

PART 2 – PRODUCTS

2.01 SOIL MATERIALS

A. General: Provide borrow soil materials when sufficient satisfactory soil materials are not available from excavations. (Geotechnical Report referenced material).

B. Satisfactory Soils: ASTM D 2487 in classification groups GW, GP, GM, SW, SP, and SM, or a combination of these group symbols; free of rock or gravel larger than 3 inches in any dimension, debris, waste, frozen materials, vegetation, and other deleterious matter.

C. Unsatisfactory Soils: ASTM D 2487 soil classification groups GC, SC, ML, MH, CL, CH, OL, OH, and PT, or a combination of these group symbols.

1. Unsatisfactory soils also include satisfactory soils not maintained within 2 percent of optimum moisture content at time of compaction.

D. Backfill and Fill: Satisfactory soil materials in accordance with Geotechnical Report

E. Backfill and Fill Material for Utility Trenches & Bridge Backwalls: Naturally or artificially graded mixture of natural or crushed gravel, crushed stone, and natural or crushed sand; meeting gradation of VTRANS Standard Specifications Item 203.30

F. Subbase Material: Shall consist solely of approved blast furnace slag or of stone which is the product of crushing ledge rock; meeting gradation of VTRANS Standard Specifications Item 301.25 depth as indicated on plans.

I. Drainage Fill: Naturally or artificially graded mixture of natural or crushed gravel, crushed stone, and natural or crushed sand; meeting gradation VTRANS Standard Specifications Item 301.25 (where applicable.)

J. Impervious Fill: Clayey gravel and sand mixture capable of compacting to a dense state. (Shall be approved by Engineer).

I. Stone Dust: 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.

1. 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 ACCESSORIES

A. Filter Fabric: (Separation Fabric) Manufacturer's standard nonwoven geotextile fabric of polypropylene, nylon or polyester fibers, or a combination, with the following properties: Amoco 4545 or equivalent:

1. Grab Tensile: 90 lbs., ASTM D 4632.

2. Grab Elongation: 50%, ASTM D 4632.

3. Mullen Burst: 225 psi, ASTM D 3786.

4. Puncture: 65 lbs., ASTM D 4833.

5. Trapezoidal Tear: 45 lbs., ASTM D 4533.

6. U.V. Resistance (Strength Retained): 70%, ASTM D 4355.

7. Equivalent Opening Size: 70 min. U.S. Sieve Number, ASTM D 4751.

8. Permittivity: 2.5 $sec.^{-1}$, ASTM D 4491.

9. Flow Rate: 175 $gal/min/ft^2$, ASTM D 4491.

B. Soil Reinforcement/Erosion Control Matting: Shall be a three-dimensional geomatrix of heavy nylon monofilaments fused at their intersections, with 95% of the geomatrix being open space, meeting the following properties unless otherwise indicated.

Property	Value
Carbon Black content by weight	2%
Nominal Weight ($02/yd^2$)	12.0
Minimum Weight ($02/yd^2$)	11.1
Thickness (inches)	0.75
Minimum Filament Diameter (inches)	0.016
Tensile Strength (lbs/ft length)	250
Tensile Strength (lbs/ft length)	120
Tensile Elongation - Length (%)	75
Tensile Elongation - Width (%)	75

C. Pavement Fabric for walks, track events and artificial turf field: As indicated on plans.

PART 3 – EXECUTION

3.01 PREPARATION

A. Protect structures, utilities, sidewalks, pavements, and other facilities from damage caused by settlement, lateral movement, undermining, washout, and other hazards created by earthwork operations.

B. Protect subgrades and foundation soils against freezing temperatures or frost. Provide protective insulating materials as necessary.

C. Provide erosion-control measures to prevent erosion or displacement of soils and discharge of soil-bearing water runoff or airborne dust to adjacent properties and walkways, as ordered by Engineer as required and/or as required by the Engineer during all phases of construction.

3.02 DEWATERING

A. Prevent surface water and ground water from entering excavations, from ponding on prepared subgrades, and from flooding Project site and surrounding area.

B. Protect subgrades from softening, undermining, washout, and damage by rain or water accumulation.

1. Reroute surface water runoff away from excavated areas. Do not allow water to accumulate in excavations. Do not use excavated trenches as temporary drainage ditches.

2. Install a dewatering system to keep subgrades dry and convey ground water away from excavations. Maintain until dewatering is no longer required. Damage to existing and/or new components of the site due to excess water shall be repaired at no cost to the Owner and to the satisfaction of the Engineer.

3.03 EXPLOSIVES

A. Explosives: Do not use explosives.

3.04 EXCAVATION, GENERAL

A. Classified Excavation: Excavation to subgrade elevations classified as earth and rock. Rock excavation will be paid for by adjusting the Contract Sum according to unit prices included in the Contract Documents.

1. Earth excavation includes excavating pavements and obstructions visible on surface; underground structures, utilities, and other items indicated to be removed; together with soil, boulders, and other materials not classified as rock or unauthorized excavation.

2. Rock excavation includes removal and disposal of rock.

a. Do not excavate rock until it has been classified and cross-sectioned by Engineer.

3.05 EXCAVATION FOR STRUCTURES

A. Excavate to indicated elevations and dimensions within a tolerance of plus or minus 1 inch. Extend excavations a sufficient distance from structures for placing and removing concrete form work, for installing services and other construction, and for inspections.

3.06 EXCAVATION FOR WALKS AND PAVEMENTS (where applicable)

A. Excavate surfaces under walks and pavements to indicated cross sections, elevations, and grades. Refer to Section 31 22 13 ROUGH GRADING for subgrade tolerances.

3.07 EXCAVATION FOR UTILITY TRENCHES

A. Excavate trenches to indicated gradients, lines, depths, and elevations.

1. Beyond building perimeter, excavate trenches to allow installation of pipe to the depths required by the Contract Documents. Refer to Section 31 23 16 ROUGH GRADING.

B. Excavate trenches to uniform widths to provide a working clearance on each side of pipe or conduit. Excavate trench walls vertically from trench bottom to 12 inches higher than top of pipe or conduit, unless otherwise indicated.

1. Clearance: 12 inches on each side of pipe or conduit, unless otherwise indicated.

C. Trench Bottoms: Excavate and shape trench bottoms to provide uniform bearing and support of pipes and conduit. Shape subgrade to provide continuous support for bells, joints, and barrels of pipes and for joints, fittings, and bodies of conduits. Remove projecting stones and sharp objects along trench subgrade. Refer to

Section 31 23 16 TRENCHING, BACKFILLING, AND COMPACTING, and Contract details.

3.08 APPROVAL OF SUBGRADE

A. Notify Engineer and Construction Manager when excavations have reached required subgrade.

B. If the Engineer determines that unsatisfactory soil is present, continue excavation and replace with compacted backfill or fill material as directed.

1. Additional excavation and replacement material will be paid for under time and material as approved by the Engineer.

C. Proof roll subgrade with a 10-ton vibratory roller to identify soft pockets and areas of excess yielding. Soft pockets should be excavated and backfilled with Controlled Fill material. Do not proof roll wet or saturated subgrades. Proof roll to be witnessed by the Engineer.

D. Reconstruct subgrades damaged by freezing temperatures, frost, rain, accumulated water, or construction activities, as required by the Engineer at no cost to the Owner.

E. Subgrade compaction shall be as stated in Section 31 22 13 ROUGH GRADING. Methods are the responsibility of the contractor.

F. The General Site Contractor is completely responsible for establishing the grades indicated within the tolerance indicated for the establishment of the subgrade. The subgrade shall be sloped mirroring the final grades of the turf field at those respective elevations allowing for the proper construction of the subbase system. The General Site Contractor shall provide an as-built survey once the subgrade has been established to ensure it meets the required grades. The survey shall include spot grades at 20 feet on center in all directions. The Contractor shall make all necessary grade adjustments/corrections until such time that the subgrade has been approved.

G. Subgrade shall be established using laser grades equipment only.

3.09 UNAUTHORIZED EXCAVATION

A. Fill unauthorized excavations under other construction or utility pipe as required by the Engineer at no cost to the Owner.

3.10 STORAGE OF SOIL MATERIALS

A. Stockpile borrow materials and satisfactorily excavated soil materials. Stockpile soil materials without intermixing. Place, grade, and shape stockpiles to drain surface water. Cover to prevent windblown dust.

1. Stockpile soil materials away from edge of excavations. Do not store within drip line of remaining trees.

2. Stockpile at location approved by the Owner.

3.11 BACKFILL

A. Place and compact backfill in excavations promptly, but not before completing the following:

1. Construction below finish grade including, where applicable, damproofing, waterproofing, and perimeter insulation.

2. Surveying locations of underground utilities for record documents.

3. Inspecting and testing underground utilities.

4. Removing concrete formwork.

5. Removing trash and debris.

6. Removing temporary shoring and bracing, and sheeting.

7. Installing permanent or temporary horizontal bracing on horizontally supported walls.

3.12 UTILITY TRENCH BACKFILL

A. Place and compact bedding course on trench bottoms and where required by the contract documents. Shape bedding course to provide continuous support for bells, joints, and barrels of pipes and for joints, fittings, and bodies of conduits.

B. Backfill trenches excavated under footings and within 18 inches of bottom of footings; fill with concrete to elevation of bottom of footings.

C. Provide 4-inch-thick, concrete-base slab support for piping or conduit less than 30 inches below surface of roadways. After installing and testing, completely encase piping or conduit in minimum of 4 inches of concrete before backfilling or placing roadway subbase.

D. Place and compact initial backfill of subbase material, free of particles larger than 1-inch, to a height of 12 inches over the utility pipe or conduit.

1. Carefully compact material under pipe haunches and bring backfill evenly up on both sides along the full length of utility piping or conduit to avoid damage or displacement of utility system.

E. Coordinate backfilling with utilities testing.

F. Fill voids with approved backfill materials while shoring and bracing, and as sheeting is removed.

G. Place and compact final backfill of satisfactory soil materials to final subgrade.

H. Install warning tape directly above utilities, 12 inches below finished grade, except 6 inches below subgrade under pavements and slabs.

3.13 FILL

A. Preparation: Remove vegetation, topsoil, debris, unsatisfactory soil materials, obstructions, and deleterious materials from ground surface before placing fills.

B. Plow, scarify, bench, or break up sloped surfaces steeper than 1 vertical to 4 horizontal so fill material will bond with existing material.

C. Place and compact fill material in layers to required elevations as follows:

1. Under steps and ramps, use Structural Fill.

2. Adjacent to pavement areas: Structural Fill.

3. Under Trail Surfacing: As indicated on Plans.

3.14 MOISTURE CONTROL

A. Uniformly moisten or aerate subgrade and each subsequent fill or backfill layer before compaction to within 2 percent of optimum moisture content.

1. Do not place backfill or fill material on surfaces that are muddy, frozen, or contain frost or ice.

2. Remove and replace, or scarify and air-dry, otherwise satisfactory soil material that exceeds optimum moisture content by 2 percent and is too wet to compact to specified dry unit weight.

3.15 COMPACTION OF BACKFILLS AND FILLS

A. Place backfill and fill materials in layers not more than 12 inches in loose depth for material compacted by heavy compaction equipment, and not more than 4 inches in loose depth for material compacted by hand-operated tempers.

B. Place backfill and fill materials evenly on all sides of structures to required elevations, and uniformly along the full length of each structure.

C. Compact soil to not less than the following percentages of maximum dry unit weight according to ASTM D-1557.

1. Under structures, building slabs, steps, and pavements, scarify and recompact top 12 inches of existing subgrade and each layer of backfill or fill material at 95 percent.

2. Under walkways, scarify and recompact top 6 inches below subgrade and compact each layer of backfill or fill material at 95 percent.

3. Under lawn or unpaved areas, scarify and recompact top 6 inches below subgrade and compact each layer of backfill or fill material at a minimum of 85% and maximum of 90%.

3.16 GRADING

A. General: Uniformly grade areas to a smooth surface, free from irregular surface changes. Comply with compaction requirements and grade to cross sections, lines, and elevations indicated.

1. Provide a smooth transition between adjacent existing grades and new grades.

2. Cut out soft spots, fill low spots, and trim high spots to comply with required surface tolerances.

3.17 SUBSURFACE DRAINAGE (where applicable)

A. Drainage Piping: As indicated on Plans.

B. Subsurface Drain: Place a layer of drainage fabric around perimeter of drainage trench as indicated. Place a 6-inch course of filter material on drainage fabric to support drainage pipe. Encase drainage pipe in a minimum of 12 inches of filter material and wrap in drainage fabric, overlapping sides and ends at least 6 inches. (Perimeter drain shall be as indicated on Plans.)

1. Compact each course of filter material to 95 percent of maximum dry unit weight according to ASTMD 698.

C. Drainage Backfill: Place and compact filter material over subsurface drain, to width indicated, to within 12 inches of final subgrade. Overlay drainage backfill with one layer of drainage fabric, overlapping sides and ends at least 6 inches.

1. Compact each course of filter material to 95 percent of maximum dry density according to ASTM 698.

2. Place and compact impervious fill material over drainage backfill to final subgrade.

3.18 DRAINAGE COURSE

A. Under slabs-on-grade, place drainage course on prepared subgrade and as follows:

1. Compact drainage course to required cross sections and thickness to not less than 95 percent of maximum dry unit weight according to ASTM D-1557.

2. When compacted thickness of drainage course is 6 inches or less, place materials in a single layer.

3. When compacted thickness of drainage course exceeds 6 inches, place materials in equal layers, with no layer more than 6 inches thick or less than 3 inches thick when compacted.

3.19 FIELD QUALITY CONTROL

A. Testing Agency: Contractor will engage a qualified independent geotechnical engineering testing agency to perform field quality-control testing.

B. Allow testing agency to inspect and test subgrades and each fill or backfill layer. Proceed with subsequent earthwork only after test results for previously completed work comply with requirements.

C. Footing Subgrade: At footing subgrades, at least one test of each soil stratum will be performed to verify design bearing capacities. Subsequent verifications and approval of other footing subgrades may be based on a visual comparison of subgrade with tested subgrade when approved by the Engineer.

D. Testing agency will test compaction of soils in place according to ASTM D 1556, ASTM D 2167, ASTM D 2922, and ASTM D 2937, as applicable. Tests will be performed at locations and frequencies indicated in Specification Section 313200-Soil Testing Services.

E. When testing agency reports that subgrades, fills, or backfills have not achieved degree of compaction specified, scarify and moisten or aerate, or remove and

replace soil depth required; recompact and retest until specified compaction is obtained.

3.20 PROTECTION

A. Protecting Graded Areas: Protect newly graded areas from traffic, freezing, and erosion. Keep free of trash and debris.

B. Repair and re-establish grades to specified tolerances where completed or partially completed surfaces become eroded, rutted, settled, or where they lose compaction due to subsequent construction operations or weather conditions.

1. Scarify or remove and replace soil material to depth as required by the Engineer; reshape and recompact.

C. Where settling occurs before Project correction period elapses, remove finished surfacing, backfill with additional soil material compact, and reconstruct surfacing.

1. Restore appearance, quality, and condition of finished surfacing to match adjacent work, and eliminate evidence of restoration to the greatest extent possible.

3.21 DISPOSAL OF SURPLUS AND WASTE MATERIALS

A. Disposal: Remove surplus satisfactory soil and waste material, including unsatisfactory soil, trash, and debris, and legally dispose of it off Owner's property.

END OF SECTION

SECTION 31 23 16

TRENCHING, BACKFILLING AND COMPACTION

PART 1 – GENERAL

1.01 RELATED DOCUMENTS: Drawings and general provisions of Contract, including General and Supplementary Conditions and Division 1 Specification Sections, apply to this Section.

1.02 WORK INCLUDED

A. Unclassified earth excavation for construction of pipe, conduit, manholes, catch basins, appurtenances, and structures outside of building lines.

B. Disposal of excavated materials, salvage of material for backfill, and removal of excess or material not suitable for re-use.

C. Maintenance of excavations including sheeting, dewatering, bridging and fencing outside of building lines.

D. Construction of bedding, pipe zone and trench backfill, outside of building lines.

E. Protection of utilities, outside of building lines.

F. Protection of trenches and open excavations, outside of building lines.

1.03 RELATED SECTIONS

A. SECTION 31 22 13 ROUGH GRADING

B. SECTION 31 23 00 EARTHWORK

1.04 QUALITY ASSURANCE

A. Requirements of Regulatory Agencies:

1. Comply with Subpart P, "Excavations, Trenching and Shoring" of United States Department of Labor OSHA Regulations for Construction.

2. Comply with rules, regulations, and laws concerning construction activity in roads of the applicable jurisdiction.

3. Comply with all other applicable regulations.

B. Reference Standards: VTRANS Standards.

C. Allowable Tolerances:

1. Alignment of Excavation: To permit construction of pipe, structures, and appurtenances to the tolerances specified under pertinent drawings and specifications.

a. Trench bottom vertical alignment: Excavate to the required elevations below proposed pipes and other structures for proper vertical alignment. Do not over excavate below dimensions indicated for the proposed utilities.

b. Trench sides horizontal alignment: Do not excavate less than dimension shown on Contract Drawings. Note and comply with any limit of payment dimensions shown on plans or as specified.

2. Bedding: Construct bedding with specified material as indicated.

1.05 SUBMITTALS

A. Reports: Before using material for special trench backfill, pipe zone backfill, or bedding, submit samples from each typical source to an approved soils testing laboratory and submit reports for approval as follows:

1. Submit copies of the gradation analysis of gravel from each source used for trench backfill, bedding, or subbase.

2. Submit copies of the gradation analysis of crushed stone from each source.

3. Submit copies of the gradation analysis and compaction requirements for each typical class of select backfill used for trench backfill as shown on the plans:

a. Report from soils testing laboratory should state any special manipulation or compaction requirements required to achieve specified density or supportive value for each class of type of select backfill.

b. Re-testing of backfill compacted in place may be required at any time or place as required by the Engineer.

B. Shop Drawings: Prior to start of work, submit shop drawings and details, for all materials to be incorporated into the work.

C. Samples: Prior to the start of backfill grading, submit the number and size of samples requested by the Owner and Engineer for acceptance.

D. Product Data: Submit products data for all materials, including but not limited to:

1. Plastic Warning Tape (each type).

2. Geotextiles.

3. Controlled low-strength material, including design mixture.

4. Geofoam.

E. All submittals must receive approval prior to being incorporated into work. Failure to do so shall be at the Contractor's risk and expense.

1.06 DELIVERY, STORAGE AND HANDLING

A. Store and stockpile material suitable for backfilling away from interference with traffic, and nearby residents. Use all stockpiled material as soon as practical. Do not allow material to become contaminated. Do not allow material to erode or wash into trench, onto road or adjacent property.

B. Load and haul away excavated material not suitable for other uses at the site. Use haul routes approved by the municipality having jurisdiction.

1.07 PROJECT CONDITIONS:

A. Notify: Dig Safely, 1-800-962-7962, not less than 72 hours prior to starting excavation for location of gas, telephone and electric lines.

B. Notify other private and public utilities in the work area.

C. Notify Owner and Engineer at least 24 hours prior to commencing trenching and backfilling.

1.08 PROTECTION OF PERSONS AND PROPERTY

A. It shall be noted and stressed that this contractor’s installations will be made during a period when the existing building(s) are in use. Contractor shall schedule and conduct their operations so as to cause the least amount of inconvenience to the Owner. Contractor shall provide all possible safe-guards to protect students and others at the site.

B. Barricade open excavations occurring as part of this work. Furnish night lighting as required.

C. Contractor shall furnish, erect and maintain barriers where feasible or directed to

separate construction activities from other operations on site. Gates may be provided where required. Contractor shall limit operations and activities to fenced areas where applicable.

D. Protect structures, utilities, pavements and other facilities from damage caused by settlement, lateral movement, undermining, washout and other hazards caused by earthwork operations.

E. Perform any shoring and bracing required to safely do the work required. Maintain sides and slopes of elevations in a safe manner. Provide necessary sheet piling and/or shoring needed for protection of workman, materials, buildings, other properties, and the public.

F. Locate excavations support and protection systems clear of permanent construction so that forming and finishing of concrete surfaces is not impeded.

G. Monitor excavations support and protection systems daily during excavation progress and for as long as excavation remains open. Promptly correct bulges, breakage, or other evidence of movement to ensure that excavation support and protection systems remain stable.

H. Promptly repair damages to adjacent facilities caused by installing excavation support and protection systems.

I. Remove excavation support and protection systems when construction has progressed sufficiently to support excavation and bear soil and hydrostatic pressures. Remove in stages to avoid disturbing underlying soils or damaging structures, pavements, facilities, and utilities.

J. Contractor is responsible for all sheet piling and shoring required, any sheet piping provided is to be installed under supervision and approval of a Registered Professional Engineer in the State of Vermont.

1.09 EXISTING UTILITIES

A. Locate existing underground utilities in areas of work. If utilities are to remain in place, provide adequate means of support and protection during earthwork operations.

B. Do not interrupt utilities serving facilities occupied by Owner or others unless permitted in writing by Engineer, and then only after arranging to provide temporary utility services according to requirements indicated.

1. Notify Engineer not less than (2) days in advance of proposed utility interruptions.

2. Do not proceed with utility interruptions without Engineer's written permission.

3. Contact utility-locator service for area where Project is located before excavating.

C. Should uncharted, or incorrectly charted, piping or other utilities be encountered during excavation, consult utility owner and Engineer immediately for directions. Cooperate with Owner and utility companies in keeping respective services and facilities in operation. Repair damaged utilities to the satisfaction of the utility owner.

1.10 WATER CONTROL

A. Contractor shall furnish, install, test, operate, monitor, and maintain dewatering system of sufficient scope, size, and capacity to control ground-water flow into excavations if required and permit construction to proceed on dry, stable subgrades.

1. Maintain dewatering operations to ensure erosion control, stability of excavations and constructed slopes, that excavation does not flood, and that damage to subgrades and permanent structures is prevented.

2. Prevent surface water from entering excavations by grading, dikes, or other means.

3. Accomplish dewatering without damaging existing buildings adjacent to excavation.

4. Remove dewatering system if no longer needed.

B. It is the responsibility of the Contractor to examine all available information prior to bidding to determine existing water table elevation. Dewatering must be covered in Base Bid, no extra compensation for dewatering will be allowed.

C. Comply with water disposal requirements of authorities having jurisdiction.

D. Installation: Install dewatering system utilizing wells, well points, or similar methods complete with pump equipment, standby power and pumps, filter material gradation, valves, appurtenances, water disposal, and surface-water controls.

E. Before excavating below ground-water level, place system into operation to lower water below excavation depth. Operate system continuously until construction is complete and fill materials have been placed, or until dewatering is no longer required.

F. Do not permit open-sump pumping that leads to loss of fines, soil piping, subgrade softening, and slope instability.

G. Dispose of water removed by dewatering in a manner that avoids endangering public health, property, and portions of work under construction or completed.

1.11 REMOVALS

A. Perform the work of demolition at the existing sites as indicated on the drawings and/or as required by the new construction. All materials removed shall be examined by the Owner. Those materials designated by the Owner as "scrap" shall become the property of the Contractor and removed from the site; Materials to be retained by the Owner shall be delivered to the Owner at location as directed.

B. All excess soil removed from excavations, existing concrete sidewalks, etc. not to be reused as backfill, shall be trucked from the site and disposed of by the Contractor.

1.12 MAINTENANCE & REPAIR OF EXISTING FACILITIES

A. Before work is started, the contractor shall inspect the existing work which will be affected by his operations. For the contractor this will include, but is not limited to, driveway, roads, lawn area, walks, shrubbery, etc.

B. Contractor shall report in writing any observed defects to the Owner in order to avoid his being held responsible for damage which may not be his fault.

PART 2 – PRODUCTS

2.01 MATERIALS

A. Sand: An imported or native natural run-of-bank sand graded from fine to coarse particles, free of lumps and frozen material. It shall not contain slag, cinders, ashes, rubbish, vegetation, or other foreign material (shall not contain any stones larger than 1/2" diameter). (Native material must be approved by Engineer).

B. General Fill: Native onsite soils capable of meeting compaction requirements, and in accordance with the Geotechnical Report. (Material shall be approved by Engineer).

C. Processed Gravel: Gravel meeting VTRANS Standard Specifications Item 301.25.

D. Temporary Fencing (where required by site conditions):

1. Materials may be new or used.

2. Wire Fabric: 0.083 inch diameter (No. 14 B.W.D.) with maximum size openings of 2 inches wide, 4 inches high.

3. Minimum height: Five feet.

4. Posts: Metal. T or U Type, minimum length eight feet, driven into ground at least two feet.

5. Signs: Size 16 inches by 24 inches with 5 inch black letters on orange background, message:

"DANGER-KEEP OUT".

2.02 SUITABLE BACKFILL MATERIAL

A. Excavated or borrow material shall be predominantly granular, non-expansive and free from roots, rocks or lumps over 3" and deleterious matter.

1. Gravel: Run of bank gravel, reasonable free of loam, silt and clay.

2. Stone: Select, graded crushed stone, free from organic, frozen or deleterious matter.

2.03 GRASS RESTORATION

A. Refer to Section 32 91 19 LOAMING AND SEEDING.

2.04 SOIL MATERIALS

A. Provide borrow soil materials when sufficient satisfactory soil materials are not available from excavations.

B. Sand: ASTM C 33; fine aggregate, natural, or manufactures sand.

2.05 GEOTEXTILES

A. Refer to Section 33 46 26: GEOTEXTILE FABRICS.

2.06 ACCESSORIES

A. Detectable Warning Tape: Acid- and alkali-resistant polyethylene film warning tape manufactured for marking and identifying underground utilities, a minimum of 6 inches wide and 4 mils. thick, continuously inscribed with a description of the utility, with metallic core encased in a protective jacket for corrosion protection, detectable by metal detector when tape is buried up to 30 inches deep; colored as follows:

1. Red: Electric.

2. Yellow: Gas, Oil, Steam, and Dangerous Materials.

3. Orange: Telephone and other Communications.

4. Blue: Water Systems.

5. Green: Sewer Systems.

PART 3 – EXECUTION

3.01 INSPECTION

A. Prior to all work, carefully inspect the site and verify that construction may properly commence.

1. Before excavation, verify:

a. Work layout, horizontal and vertical, and conformance of layout with Contract Drawings.

b. Limits of construction.

c. Utility locations including, but not limited to: aerial, pole lines, buried, underground, transmission, local service, and individual connections.

2. After excavation, verify that pipe, structures and appurtenances to be placed in trenches may be installed in accordance with pertinent drawings and specifications.

3. Before backfilling, notify the Owner and Engineer at least 24 hours in advance and verify:

a. Pipe, structures and appurtenances have been installed in accordance with pertinent drawings and specifications, and joints are secure.

b. Utilities are adequately continued, supported and maintained without damage.

B. In the event of discrepancy or unsatisfactory condition, immediately notify the Owner and Engineer.

3.02 PREPARATION

A. Utility Protection and Changes: Where public and/or private utilities are encountered:

1. Maintain, support, and save from damage all public utilities.

2. Allow reasonable time and space for owner of private utilities to cooperate in maintaining their facilities.

3.03 PERFORMANCE

A. Excavation: Perform all trenching for construction of pipe, appurtenances, structures, bedding, and backfill. Remove surface materials and drainage facilities:

1. Disposal of excavated material:

a. Store material suitable for backfill. Protect from contamination.

b. All surplus earth, rock and other unsuitable or unsatisfactory material shall be disposed of off project site by Contractor.

2. Perform excavation in such manner and to such widths as will give ample room for installing the pipe, appurtenances and structures, and for sheeting, bracing, pumping and draining. Dewater the excavation and maintain the dewatered condition as required to perform the construction and install compacted backfill.

3. Do not disturb bottom of excavation at structures requiring a cast-in-place concrete base. In case material is disturbed or saturated, carefully excavate to undisturbed level and fill with concrete at no additional cost to Owner.

4. Unauthorized Excavation: Unauthorized excavations carried outside lines and grades shown on Contract Drawings shall be filled by Contractor at no additional cost to Owner as follows:

a. Below concrete cradle, concrete encasement or concrete foundation, fill unauthorized excavations with 3000 psi concrete.

b. Below specified bedding, fill unauthorized excavations with compacted bedding material.

5. Maintenance of Trench:

a. Keep sides of excavation from slides, cave-ins. Use any method including but not limited to: temporary sheeting, shoring, bracing, and cribbing.

b. Keep excavations free from water. Use any method including but not limited to gravity flow, pumping, sumps. Maintain excavation in a dry condition until backfill has been placed and compacted a minimum of 18 inches above top of pipe. In all cases, maintain dry trench at backfill level.

6. Schedule:

a. Advance excavation operations ahead of pipe laying to allow for field conditions.

b. Limit excavations ahead of pipe laying a maximum of 200 feet, unless more is approved by the Engineer in writing.

B. Backfill - General:

1. Backfill excavations as shown on the Contract Drawings. Materials shall be placed and compacted from the top of the pipe zone backfill to the surface of the ground or the bottom of any special surface treatment, such as pavement subbase or topsoil.

a. Do not backfill against masonry walls or other structures until they have attained sufficient strength to safely resist the thrust of fill materials.

b. Do not backfill with frozen materials.

c. If settlement or washout occurs before Final Inspection, furnish, place and compact additional material to resurface the low places as required by the Owner.

d. Maintain dust control at all times.

3. Heavy equipment shall not be allowed to pass over the pipe until a fill of at least two (2) foot depth has been placed over the top of the pipe. In any case, movement of construction equipment and all other vehicles and loads over and adjacent to any pipe shall be done at the Contractor's risk. When

determined by the Owner, any pipe that is damaged or disturbed through any cause, shall be replaced as required by the Owner, at the expense of the Contractor and at no cost to the Owner.

3. Methods of Compaction:

   a. Hand Compaction: Tamping by hand with flat hand tampers.

   b. Mechanical Compaction: Compaction by means of vibratory or other mechanical tampers.

4. Compact Backfill to 95% Modified Proctor Density Compaction:

   a. Backfill material shall be placed in horizontal layers not exceeding six (6) inches thick and be thoroughly compacted by mechanical compaction.

C. Utility Protection:

1. Contractor shall hold the Owner harmless against:

   a. Injury to electric, telephone lines, gas, water lines, and other underground and overhead utilities.

D. Temporary Wire Fence:

1. Where trenches and open excavation are left unattended during non-working hours or days, furnish and maintain temporary fences.

2. A temporary wire fence will be required except where temporary sheeting is extended a minimum of three feet above ground surface, and no void exists between sheeting and side of excavation.

3. Provisions for this fencing are in addition to provisions the Contractor would normally make to safeguard his work operations and in no way diminish his obligations in this respect.

4. Construction Details:

   a. Construct temporary fence to completely surround all excavations.

   b. Mount "DANGER-KEEP OUT" signs at intervals not exceeding 50 feet along fence line.

   c. Provide posts or adequate supports for fencing at intervals not in excess of 10 feet. Stretch and fasten wire fabric at top, middle and

bottom of each support.

3.04 FIELD QUALITY CONTROL

A. Quality Control Testing During Construction: Testing laboratory must inspect and approve subgrades and fill layers before further construction work is performed thereon.

B. If testing laboratory subgrade and/or fill reports are below specified density, provide additional compaction at no expense to Owner.

3.05 GRADING

A. Uniformly grade areas within limits of this work, including adjacent transition areas. Compact with uniform levels or slopes between finished elevations and adjacent existing grades.

B. Grade areas to achieve drainage away from structures and to prevent ponding.

C. Soft spots are to be re-excavated and backfilled with suitable material.

3.06 MAINTENANCE

A. Protect newly graded areas from traffic and erosion and keep free of trash and debris.

B. Where compacted areas are disturbed by subsequent construction operations or adverse weather, scarify surface, re-shape and re-compact to required density.

3.07 DISPOSAL OF EXCESS AND WASTE MATERIALS

A. If specifically directed by Owners Representative, transport acceptable excess excavated material to designated soil storage areas on the Owner's Property.

END OF SECTION

SECTION 31 25 00

SEDIMENT AND EROSION CONTROL

PART 1 – GENERAL

1.01 SUMMARY

A. Applicable provisions of the Contract Documents govern work under this section.

1.02 SUBMITTALS

A. In accordance with Shop Drawings, Product Data, and Samples Specification Section, designate erosion control and maintenance activities on submitted Project Schedule.

B. Submit pre-construction photographs and short narrative of erosion control implementation plan as specified herein.

C. Project Schedule: Contractor shall provide construction schedule indicating schedule of work with key milestones for each phase of construction.

D. Qualified Inspector Certifications: Contractor shall provide Certifications of all Qualified Inspectors performing monitoring of Erosion & Sediment Control measures.

1.03 WORK INCLUDED

A. Provide all labor, equipment and materials necessary to install and maintain erosion control blankets, silt fence, hay bale dikes, sediment traps, inlet protection, and to implement erosion control measures as shown on the plans, as specified, as required by regulatory permits, as required by the Owner's Representative if measures are not indicated on the plans, and as job conditions dictate.

1.04 QUALITY ASSURANCE

A. All Erosion/Sediment Control activities and water quality objectives performed by the contractor shall be in compliance with the following standards of practice:

1. VTANR's "Low Risk Site Handbook for Erosion Prevention and Sediment Control", latest edition.

2. USDA Soil Conservation Service "Guidelines for Urban Erosion and Sediment Control, latest revision.

3. Other applicable federal, state and local regulations.

B. Local Guidelines for Erosion and Sediment Control.

1. VTRANS & VTANR Specifications.

C. Contractor is responsible for all monitoring, reporting, and repair of erosion control measures as required by the Contract Documents throughout the duration of construction. Contractor shall provide a qualified inspector performing all Erosion & Sediment Control inspections.

D. Directives of Owner, Owner's Representative, and/or regulatory personnel of authority having jurisdiction requiring further control measures as warranted.

PART 2 – PRODUCTS

2.01 MULCHES

A. Mulches shall be suitable material acceptable to the Owner's Representative and reasonably clean and free of noxious weeds and deleterious materials. The following materials are acceptable:

		Application Rates		
Mulch Material	Quality Standards	Per 1000 SF	Per Acre	Depth
Wood Chips or Shavings	Green or air-dried. Free of objectionable coarse material	500-900 lbs.	10-20 tons	2 - 7"
Straw	Air-dried; free of undesirable seeds & coarse materials	90-100 lbs. 2-3 bales	2 tons 100-120 bales	90%
Excelsior Wood Fiber Mats	Interlocking web of excelsior fibers with Photodegradable plastic netting	48" x 100" 2 sided plastic, 48"x 180"1 sided plastic	----------	----------

2.02 GRASS

A. Grass shall be quick growing species suitable to the area and as a temporary cover which will not compete with the grasses sown later for permanent cover.

B. Seed Mixtures

1. Temporary Seeding

Type	Lbs./Acre	Lbs./1000 SF
Ryegrass (Annual or Perennial)	80	1.9
Certified "Aroostook" Winter Rye	100	2.5

Use winter rye if seeding in October/November.

2.03 SOIL AMENDMENTS

A. Fertilizer and soil conditioners shall be a standard commercial grade acceptable to the Owner's Representative.

1. Lime: pH of 6.

2. Fertilizer: Meeting VTRANS specifications or as approved. 1-2-1 N.P.P. ratio.

2.04 JUTE MESH

A. Jute mesh and appurtenances shall comply with VTRANS Standard Drawings, latest revision.

2.05 SILT FENCE

A. Field Assembled Units

1. Fabric shall meet the following minimum criteria:

Minimum Acceptable

Property	Value	Test Method
Grab Tensile Strength (lbs.)	90	ASTM D1682
Elongation at Failure (%)	50	ASTM D1682
Mullen Burst Strength (psi)	190	ASTM D3786
Puncture Strength (lbs.) (Modified)	40	ASTM D751
Slurry Flow Rate (gal/min/sf)	0.3	
Equivalent Opening Size	40-80	US Std Sieve CW-02215
Ultra-Violet Radiation Stability (%)	90	ASTM G-26

2. Posts

a. Wood: Oak or similar quality hardwood, 3.0 square inches cross-sectional area minimum.

b. Steel: Standard T or U section weighing 1.00 pound per linear feet minimum.

3. Mesh

a. 14-1/2 gauge minimum with 6 inch maximum mesh opening, plastic safety fence, orange or black, or as approved.

B. Prefabricated Units

1. Pre-assembled units meeting the material requirements of 2.5 A may be used in lieu of field assembled units.

2.06 CHEMICAL BINDER

A. Non-toxic conforming to VTRANS and VTANR Specifications.

2.07 RIP-RAP

A. Per VTRANS and VTANR Specifications.

2.08 FILTER STONE

A. Sound durable stone per VTRANS and VTANR, size(s) per plans.

2.09 TURF REINFORCEMENT MATTING

A. VMAX Model SC250 UV-stable polypropylene permanent matting as manufactured by RollMax Rolled Erosion Control or approved equivalent.

1. 70% Straw Fiber / 30% Coconut Fiber.

2. Thread: Polypropylene UV Stable.

3. Thickness: 0.62 in.

4. Resiliency: 95.2%.

5. Density: 0.891 g/cm^3.

6. UV Stability: 100%.

7. Light Penetration: 4.1%.

8. Porosity: 99%.

9. Tensile Strength: 709 lbs/ft.

10. Elongation: MD=23.9% / TD=36.9%.

PART 3 – EXECUTION

3.01 GENERAL

A. The contractor is responsible for completing all monitoring, and reporting as required throughout the duration of construction as required, and provide reports to the Owner's Representative for acceptance.

B. Contractor shall implement erosion control measures as indicated in the Contract Documents, shown on the plans, as job conditions dictate, and to comply with the local municipality. Intent is to minimize erosion and pollutants at the source, capture sediment at regular intervals and prevent sediment intrusion into storm sewer pipes, structures, and waterways. Work includes, but is not limited to, hay bales, mulching, temporary silt fences, filter fabric, expeditious grading, stormwater diversion, prompt turf establishment, sediment dikes, and maintenance of same. The contractor is responsible for controlling all runoff from the site during the period of construction. If erosion control measures are not shown on the Plans, he will be instructed by the Owner's Representative on where to implement them at no cost to the Owner.

C. The Contractor shall initiate stabilization measures as soon as practicable in portions of the site where construction activities have temporarily or permanently ceased, but in no case more than 14 days after the construction activity in that portion of the site has temporarily or permanently ceased. If disturbed soil surfaces are to be left exposed for a period of greater than 14 days, stabilize the soil with temporary seeding and/or mulch to limit erosion. Where the initiation of stabilization measures by the 14th day after construction activity temporarily or permanently ceased is precluded by snow cover or frozen ground conditions, stabilization measures shall be initiated as soon as practicable. The onset of seasonally adverse weather shall not be used as an excuse for not implementing the necessary erosion controls. The Contractor shall use foresight in his activities to only disturb areas that he can stabilize before adverse weather conditions prevail. The Contractor is encouraged to schedule his work such that final land surface restoration closely follows initial disturbance to the maximum extent possible in order to limit bare soil exposure and dependence on the temporary systems discussed above.

D. Sediment shall be removed from sediment traps or sediment ponds whenever their capacity has been reduced by fifty (50) percent from the design capacity and/or as required to ensure intent. Prior to fine grading and restoration, the Contractor shall remove and dispose of accumulated sediments and silts as required.

3.02 AUTHORITY OF WORK

A. The Owner's Representative has the authority to limit the surface area of erodible earth material exposed by clearing and grubbing, the surface area of erodible earth material exposed by excavation, borrow and fill operations and to require the Contractor to provide immediate permanent or temporary pollution control measures to prevent contamination of adjacent streams or other watercourses/ waterbodies.

3.03 POLLUTION CONTROL

A. Provide methods, means and facilities required to prevent contamination of soil, water or atmosphere by the discharge of noxious substances from construction operations. Promptly repair equipment leaks. Provide equipment and personnel to perform emergency measures required to contain any spillages, and to remove contaminated soils or liquids.

B. Notify Owner, Owner's Representative and regulatory authority having jurisdiction if contaminated soil, groundwater or other form of pollution is encountered. Excavate and dispose of any contaminated earth immediately in accordance with Federal, State and local regulations off-site, and replace with suitable compacted fill.

C. Pollutants such as fuels, lubricants, bitumen's, raw sewage and other harmful materials shall not be discharged into or near rivers, streams, and impoundments or into natural or man-made channels leading thereto. Wash water or waste from concrete mixing operations or trucks shall not be allowed to enter live streams.

3.04 DEWATERING AND WASHWATERS

A. Water from aggregate washing, equipment washing, dewatering or other operations containing sediment, shall be treated by filtration, settling basin or other means sufficient to reduce the turbidity, so as not to cause a substantial visible contrast to natural conditions.

3.05 DIVERSION BERMS/SWALES

A. Slopes of significantly barren slopes exceeding 15 percent require special treatment such as water diversion berms/swales, straw bale sediment barriers, sodding,

approved mulch tacking agent over straw mulch applied over seeded areas, or a combination thereof.

3.06 SILT FENCE INSTALLATION

A. A silt fence may be used subject to the following conditions:

1. Maximum allowable slope lengths contributing runoff to a silt fence are:

Slope Steepness	Maximum Slope Length (Ft)
2:1	50
3:1	75
4:1	100
5:1	150
Flatter than 5:1	150 or as shown on the plans

2. Maximum drainage area for overland flow to a silt fence shall not exceed ½ acre per 100 feet of fence.

3. Erosion would occur in the form of sheet erosion.

4. There is no concentration of water flowing to the barrier.

B. Woven wire fence to be fastened securely to fence posts with wire ties or staples.

C. Filter cloth to be fastened securely to woven wire fence with ties spaced every 24 inches at top and mid-section.

D. Embed silt fence material a minimum of 6 inches below finished grade.

E. When two sections of filter cloth adjoin each other, they shall be overlapped by six inches and folded.

F. Maintenance shall be performed as needed and material removed when “bulges” develop in the silt fence, or when 6 inches of sediment has accumulated against it, whichever occurs first. All sediment barriers shall be repaired or replaced when they no longer function as a barrier.

3.07 CONSTRUCTION OPERATIONS

A. When borrow material is obtained from other than commercially operated sources, erosion of the borrow site shall be so controlled, both during and after completion of the work so that erosion will be minimized and sediment will not enter streams or other bodies of water. Waste or disposal areas and construction roads shall be located and constructed in a manner that will minimize sediment-entering streams.

Install sediment containment devices around stockpiles and waste areas. Stabilize the surface of temporary haul roads to minimize sediment creation.

B. Install stabilized construction entrances at all ingress/ egress points to local and state roads as required and as detailed on the plans.

3.08 CONSTRUCTION PHOTOGRAPHS

A. The Contractor shall take good quality photographs of streams, ditches, channels, ponds or other water bodies immediately adjacent to project work area that will receive runoff from construction activity. Document existing conditions such as existing sediment deposition, water turbidity, eroded streambed/ streambanks and condition of vegetation.

3.09 CONSTRUCTION SCHEDULE

A. Prior to beginning construction, the Contractor shall submit a detailed project schedule which outlines his program for controlling erosion, limiting conveyance of silt and sediment, pollution prevention, maintenance of devices/ controls, and restoration of graded surfaces for the duration of the project and the one-year warranty period, for review and acceptance.

B. The Owner's Representative may limit the area of clearing and grubbing, excavation, trenching and embankment operations in progress, commensurate with the Contractor's capability, responsiveness, and progress in keeping the finish grading, mulching, seeding and other such permanent control measures current in accordance with the accepted schedule. Should season limitations make such coordination unrealistic, temporary erosion control measures shall be taken immediately to the extent feasible.

3.10 FINAL STABILIZATION

A. Final stabilization is defined as all soil disturbing activities at the site have been completed, and that a uniform perennial vegetative cover with a density of at least 80% has been established or equivalent stabilization measures (such as the use of mulches or geotextiles) have been employed on all unpaved areas and areas not covered by permanent structures.

3.11 REMOVAL OF TEMPORARY EROSION AND SEDIMENT CONTROL MEASURES

A. Remove erosion control devices when final stabilization has occurred for the respective areas of the site and are no longer needed.

3.12 CONTRACTOR'S RESPONSIBILITY

A. Contractors are responsible for the performance of their subcontractors and to ensure they properly comply with the Erosion Control Measures, where applicable.

B. The actual scheduling and implementation of Erosion Control Measures and Maintenance of required water quality is the responsibility of the Contractor(s). The erosion and sediment control plan and devices shown are considered to comprise the majority of efforts needed, but not necessarily all that will be required. Weather, site and unforeseen conditions can dictate that greater efforts will be necessary.

END OF SECTION

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SECTION 32 44 00

BRIDGES, BOARDWALKS AND STEPS

PART 1 - GENERAL

1.01 WORK INCLUDED:

A. Bridges:

1. Installation and materials per U.S. Department of Agriculture Forest Service (USDAFS) drawings and specifications for a 25-ft, 30-ft, and 35-ft bridges per the contact drawings.
2. Refer to plans for location.
3. Built on site by contractor.

B. Boardwalks:

1. Installation and materials per USDAFS drawings and specifications.
2. Refer to plans for location.
3. Built on site by contractor.

C. Steps:

1. Installation and materials per USDAFS drawings and specifications.
2. Refer to plans for location.
3. Built on site by contractor.

1.02 RELATED WORK:

A. Section 01 33 23 - SUBMITTALS

B. APPENDIX A – STANDARD SPECIFICATIONS FOR CONSTRUCTION OF TRAILS AND BRIDGES ON FOREST SERVICE PROJECTS

1.03 REFERENCES:

A. U.S. Department of Agriculture Forest Service (USDAFS)

B. Reference Standards: Comply with applicable requirements of the following standards and those others referenced in this Section. Where these standards conflict with other specified requirements, the most restrictive requirements shall govern.

1.04 ADMINISTRATIVE REQUIREMENTS:

A. Coordination

1. General: Coordinate the work of this Section for installing bridges, boardwalks, and steps and arrange for delivery, receipt and installation of materials to prevent delay of the Work.

B. Refer to the USDAFS attachments for drawings and specifications for:

1. Multiple Log String Trail Bridge
2. Standard Boardwalk
3. Overlapping Timber Step

C. All design required under this Section shall be performed by a Professional Structural Engineer registered in the State of Vermont.

D. Design and provide special framing for the support of architectural features.

E. Field Measurements: Verify that field measurements are as indicated in the contract drawings.

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

A. Manufacturer's product data sheets, specifications, performance data, physical properties and installation instructions for each item furnished hereunder. Include data on profiles, component dimensions, fasteners, and sealants.

B. Delegated Design Submittals

1. Furnish complete design analysis for the bridges, boardwalks, and steps. The engineer shall be registered in the State of Vermont and shall state in writing that the structural framing and components are in compliance with the criteria set forth in the specifications, special provisions, and as indicated on the Drawings and that the foundation design will support the bridges, boardwalks, and steps and other loads imposed by use of the building.
2. Provide manufacturer load tables indicating the selected material, and configuration meets the design requirements.

C. Shop Drawings

1. Shop drawings shall be submitted as a complete package for the boardwalk, bridge, or step construction. Partial submissions or submissions without a professional engineer’s stamp and signature will be rejected.
2. Elevations, plans and details: 1/8-inch scale elevations and plans, and large-scale design details showing framing and complete installation details.
    a. Indicate assembly dimensions, locations of structural members, connections, attachments, openings, cambers (if required), and both live and dead design loads.

b. System details, anchorages and method of anchorage, method or installation. Show layouts of support framing, details of edge conditions, joints, corners, supports, anchorages, trim, flashings, closures, and special details.

3. Anchor-Bolt Plans: Indicate anchor bolt locations, settings, sizes and material, column base plate dimensions, sizes, etc. and column base reactions at foundation connections.

4. Structural-Framing Drawings: Show complete fabrication of primary and secondary framing.

5. All shop drawings shall be stamped and signed by a professional structural engineer registered in the State of Vermont.

D. Qualification Submittals

1. Contractor's written certification stating that the contractor is qualified, licensed, authorized and approved to construct features in accordance with the specifications.

E. Closeout Submittals: Submit the following under provisions of Section 01 78 00 PROJECT CLOSEOUT.

F. Bonds and Warranty Documentation

1. Manufacturer's warranties and guarantees as specified elsewhere herein this Section.

G. Record Documentation: Submit accurately record actual locations of concealed utilities.

1.06 QUALITY ASSURANCE:

A. Qualifications

1. Contractor: The contractor shall have experience with construction of similar timber bridges, boardwalks and steps to those indicated in the contract drawings.

1.07 DELIVERY, STORAGE AND HANDLING:

A. Delivery and Acceptance Requirements

1. Do not build, fabricate or deliver items to the site, until all specified submittals have been submitted to, and approved by the Owner's Representative.

B. Storage and Handling Requirements

1. Store, handle and protect materials from damage due to moisture, corrosion and damage from construction operations and other causes.

C. Remove any damaged or contaminated materials from job site immediately, including materials in broken packages, packages containing water marks, or show

other evidence of damage, unless the Owner's Representative specifically authorizes correction thereof and usage on project.

PART 2 - PRODUCTS

2.01 DESIGN AND DESIGN CRITERIA:

A. Members to withstand progressive snow and live loading, and design loads stand specifications for construction of trails and bridges or for similar projects.

PART 3 - EXECUTION

3.01 EXAMINATION:

A. Verification of Conditions: Inspect all surfaces and verify that they are in proper condition to receive the work of this Section.

B. Beginning of installation means acceptance of existing substrate and project conditions.

3.06 TOLERANCES:

A. Framing Members, maximum variation from plumb or level: ¼-inch (6 mm) from level; 1/8-inch (3 mm) from plumb.

3.07 CLEANING:

A. Upon completion of the work of this Section in any given area, remove tools, equipment and all rubbish and debris from the work area; leave area in broom-clean condition.

B. Clean work under provisions of Section 01 74 13 CLEANING UP.

END OF SECTION

SECTION 32 91 19

LOAMING AND SEEDING

PART 1 - GENERAL

1.01 WORK INCLUDED:

This section covers all labor, materials, and equipment necessary to do all loaming, seeding and related work as indicated on the drawings and as herein specified. All lawns disturbed by the Contractor's operations shall be repaired as herein specified.

1.02 RELATED WORK:

A. Section 32 93 00 PLANTS

1.03 QUALITY ASSURANCE:

A. For a particular source of loam, the Engineer may require the Contractor to send approximately 10 pounds of loam to an approved testing laboratory and have the following tests conducted:

1. Organic concentration.

2. pH.

3. Nitrogen concentration.

4. Phosphorous concentration.

5. Potash concentration

B. These tests shall be at the Contractor's expense. Test results, with soil conditioning and fertilizing recommendations, shall be forwarded to the Engineer.

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

A. Six sets of information detailing the seed mixes, fertilizers, mulch material, slope protection material (if required) and origin of loam shall be submitted to the Engineer for review.

B. Three sets of test results shall be submitted to the Engineer for review.

PART 2 - PRODUCTS

2.01 MATERIALS:

A. LOAM:

1. Loam shall be a natural, fertile, friable soil, typical of productive soils in the vicinity, obtained from naturally well-drained areas, neither excessively acid nor alkaline, and containing no substances harmful to grass growth. Loam shall not be delivered to the site in frozen or muddy condition and shall be reasonably free of stumps, roots, heavy or stiff clay, stones larger than 1-inch in diameter, lumps, coarse sand, noxious weeds, sticks, brush or other litter.

2. The loam shall contain not less than 4 percent or more than 20 percent organic matter as determined by the loss of weight by ignition of oven-dried samples. Test samples shall be oven-dried to a constant weight at a temperature of 230 degrees F.

B. LIME: Lime shall be standard commercial ground limestone containing at least 50 percent total oxides (calcium oxide and magnesium oxide), and 50 percent of the material must pass through a No. 100 mesh sieve with 98 percent passing a No. 2 mesh sieve.

C. FERTILIZER: Fertilizer shall be commercial fertilizer, 10-10-10 fertilizer mixture containing at least 40 percent of organic nitrogen. It shall be delivered to the site in the original sealed containers, each showing the manufacturer's guaranteed analysis. Fertilizer shall be stored so that when used it will be dry and free flowing. No fertilizer shall be used which has not been marketed in accordance with State and Federal Laws, relating to fertilizers.

D. MULCH:

1. Materials to be used in mulching shall conform to the following requirements:

2. Straw Mulch - Straw Mulch shall consist of stalks or stems of grain after threshing.

3. Wood Fiber Mulch - Wood Fiber Mulch shall consist of wood fiber produced from clean, whole uncooked wood, formed into resilient bundles having a high degree of internal friction and shall be dry when delivered to the project.

E. SEED:

1. Seed shall be of an approved mixture, the previous year's crop, clean, high in germinating value, a perennial variety, and low in weed seed. Seed shall be obtained from a reliable seed company and shall be accompanied by certificates relative to mixture purity and germinating value.

2. Grass seed for cross-country areas, slopes and other areas not normally mowed shall conform to the following requirements:

	Proportion by Weight	Germination Minimum	Purity Minimum
Creeping Red Fescue	50%	85%	95%
Kentucky 31	30%	85%	95%
Domestic Rye	10%	90%	98%
Red Top	5%	85%	92%
Ladino Clover	5%	85%	96%

F. TEMPORARY COVER CROP:

1. Temporary cover crop shall conform to the following requirements:

	% Weight	Germination Minimum
Winter Rye	80 min.	85%
Red Fescue (creeping)	4 min.	80%
Perennial Rye Grass	3 min.	90%
Red Clover	3 min.	90%
Other Crop Grass	0.5 max.	
Noxious Weed Seed	0.5 max.	
Inert Matter	1.0 max.	

G. SLOPE EROSION PROTECTION:

1. Erosion control blanket shall be 100% degradable plastic mesh with 100% degradable straw or straw/coconut fill. Fill shall be held together by degradable fastening. Weight shall be 0.50 lb. /sq. yd. 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, Model SC150 shall be used. For slopes less than 2:1, Model S150 shall be used.

2. Six inch wire staples shall be placed according to manufacturer's recommendations to anchor the mesh material. Staples shall be designed to decompose.

PART 3 - EXECUTION

3.01 SURFACE PREPARATION:

A. After approval of rough grading, loam shall be placed on areas affected by the Contractor's operations. Loam shall be at least 6-inches compacted thickness.

B. Lime shall be applied to bring the pH to 6.5 or, without a soil test, at the rate of 2-3 tons of lime per acre.

C. Fertilizer shall be applied according to the soil test, or without a soil test, at the rate of 1000 pounds per acre.

D. Loam shall be worked a minimum of 3-inches deep, thoroughly incorporating the lime and fertilizer into the soil. The loam shall then be raked until the surface is finely pulverized and smooth and compacted with rollers, weighing not over 100 pounds per linear foot of tread, to an even surface conforming to the prescribed lines and grades. Minimum depth shall be 6-inches after completion.

3.02 SEEDING:

A. Seeding shall be done when weather conditions are approved as suitable, in the periods between April l and May 30 or August l5 to October l, unless otherwise approved.

B. If there is a delay in seeding, during which weeds grow or soil is washed out, the Contractor shall remove the weeds or replace the soil before sowing the seed, without additional compensation. Immediately before seeding is begun, the soil shall be lightly raked.

C. Seed shall be sown at the approved rate, on a calm day by machine.

D. One half the seed shall be sown in one direction and the other half at right angles. Seed shall be raked lightly into the soil to a depth of l/4-inch and rolled with a roller weighing not more than l00 pounds per linear foot of tread.

E. The surface shall be kept moist by a fine spray until the grass shows uniform germination over the entire area. Wherever poor germination occurs in areas larger than 3 sq. ft., the Contractor shall reseed, roll, and water as necessary to obtain proper germination.

F. The Contractor shall water, weed, cut and otherwise maintain and protect seeded areas as necessary to produce a dense, healthy growth of perennial lawn grass.

G. If there is insufficient time in the planting season to complete the 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.

3.03 PLACING MULCH:

A. Straw Mulch shall be loosely spread to a uniform depth over all areas designated on the

plans, at the rate of 4-1/2 tons per acre, or as otherwise required.

B. 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.

C. Wood Fiber Mulch shall be uniformly spread over certain selected seeded areas at the minimum rate of 1,400 pounds per acre unless otherwise required. It shall be placed by spraying from an approved spraying machine having pressure sufficient to cover the entire area in one operation.

3.04 SEEDING AND MULCHING BY SPRAY MACHINE:

A. The application of lime, fertilizer, grass seed and mulch may be accomplished in one operation by the use of an approved spraying machine. 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 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. A certified statement shall be furnished, prior to start of work, to the Engineer by the Contractor as to the number of pounds of limestone, fertilizer, grass seed and mulch per 100 gallons of water.

C. 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 the spray operation are unsatisfactory, the Contractor will be required to abandon this method and to apply the lime, fertilizer, grass seed and mulch by other methods.

3.05 INSPECTION AND ACCEPTANCE:

At the beginning of the planting season following that in which the permanent grass crop is sown, the seeded areas will be inspected. Any section not showing dense, vigorous growth at that time shall be promptly reseeded by the Contractor at his own expense. The seeded areas shall be watered, weeded, cut and otherwise maintained by the Contractor until the end of that planting season, when they will be accepted if the sections show dense, vigorous growth.

END OF SECTION

SECTION 33 11 13.28

HIGH DENSITY POLYETHYLENE PIPE

PART 1 - GENERAL

1.01 WORK INCLUDED:

A. This Section covers furnishing, handling, laying, joining and installation of HDPE piping, fittings and appurtenances.

B. The Contractor shall furnish and install the various pipelines and appurtenant work as indicated on the Contract Drawings and as specified herein, or as reasonably required to produce a complete, proper, and functional installation in accordance with the intent of these Contract Documents.

1.02 RELATED WORK:

A. Section 31 23 00, EARTHWORK

B. Section 31 23 16, Trenching, Backfilling, and Compaction

1.03 REFERENCES:

A. The latest edition of the following standards form a part of this specification as referenced:

ASTM International (ASTM)

ASTM	D1248	Specifications for Polyethylene Plastics Molding and Extrusion Materials.
ASTM	D2837	Method for Obtaining Hydrostatic Design Basis for Thermoplastic Pipe Materials.
ASTM	D3350	Standard Specification for Polyethylene Plastics Pipe and Fittings Materials
ASTM	F714	Specification for Polyethylene (PE) Plastic Pipe (SDR-PR) Based on Outside Diameter.

Plastic Pipe Institute (PPI)

PPI	TR-3	Policies and Procedures for Developing Hydrostatic Design Stresses for Thermoplastic Pipe Materials.

1.04 QUALITY ASSURANCE:

A. All pipe and fittings shall be inspected and tested at the factory as required by the standard specifications to which the material is manufactured. The Contractor shall furnish in duplicate to the Engineer sworn certificates providing evidence of such tests.

B. The Owner reserves the right to have any or all pipe, fittings, and special castings inspected and/or tested by an independent service at either the manufacturer's plant or elsewhere. Such inspection and/or tests shall be at the Owner's expense.

C. Deflections in horizontal alignment will not be permitted at joints without written consent of the Engineer. If approved, deflections shall not exceed one-half the manufacturer's recommendation.

D. When requested by the Engineer, the Contractor shall ensure that a qualified representative of the manufacturer shall be present at the jobsite for the first day of pipe laying, to assure that proper procedures are followed.

E. The Engineer shall be notified in advance when the location of an existing pipeline conflicts with the proposed location of the Work.

F. All piping shall be of the type and size shown on the drawings and described in this section of the Specifications.

1.05 DELIVERY, STORAGE, AND HANDLING:

A. Pipe shall be packaged to withstand shipment without damage and handled carefully on the jobsite.

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

A. Manufacturer’s literature on the materials of this Section.

B. Manufacturer’s certification that the product was manufactured, tested, and supplied in accordance with this specification.

C. Shop drawings shall be submitted for the HDPE pressure pipe, type of joints, fittings, and couplings, in accordance with the specifications.

PART 2 - PRODUCTS

2.01 SMOOTH INTERIOR CORRUGATED POLYETHYLENE STORM SEWER PIPE:

A. This specification applies to high density polyethylene (HDPE) corrugated pipe with an integrally formed smooth interior. Pipe products must be VTRANS approved and be included on their list of approved manufacturers. Eight and 10-inch diameter pipes shall conform to the strength requirements of AASHTO M252 with the addition that the pipe have a smooth interior liner. Twelve to thirty-six-inch diameter pipe shall conform to AASHTO M294 Type S. Pipe shall be perforated in specific locations where indicated on the plans.

B. Pipe shall be Type HI-Q as manufactured by Hancor, Inc., Type N-12 as manufactured by Advanced Drainage Systems, Inc., or approved equivalent.

C. The pipe and fittings shall be free of foreign inclusions and visible defects. The ends of the pipe shall be cut squarely and cleanly so as not to adversely affect joining.

D. The nominal size for the pipe and fittings is based on the nominal inside diameter of the pipe. Corrugated fittings may be either molded or fabricated by the manufacturer.

E. Fittings produced by manufacturers other than the supplier of the pipe shall not be permitted without the approval of the Engineer.

F. Joints shall be made with manufacturer's integral-bell system, split couplings or sleeve type couplers, corrugated to match the pipe corrugations, and shall engage a minimum of 6 corrugations for 12" and 24" diameter and 4 corrugations for 30" and 36" diameter pipe. The coupler shall be fabricated by the pipe manufacturer to ensure compatibility.

PART 3 - EXECUTION

3.01 INSPECTION BEFORE INSTALLATION:

A. Each length of pipe and each fitting shall be carefully inspected prior to being lowered into the trench. All materials not meeting the requirements of these specifications, or otherwise found defective or unsatisfactory by the Engineer, shall be rejected and immediately marked and removed from the jobsite by the Contractor.

B. Bedding, sub-bedding, and other trench conditions shall be carefully inspected prior to laying pipe. All conditions shall be made available to the Engineer for inspection.

3.02 PIPE INSTALLATION:

A. Except as modified herein, installation of HDPE pipe installation shall be in accordance with ASTM D2321 and manufacturer standards.

B. The pipe shall not be driven down to grade by striking it with a shovel handle, timber, rammer, or other unyielding object. When each pipe has been properly bedded, enough of the backfill material shall be placed and compacted between the pipe and the sides of the trench to hold the pipe in correct alignment.

C. All pipe and fittings shall be installed according to the manufacturer's instructions. Pipe interiors, fitting interiors, and joint surfaces shall be thoroughly cleaned prior to installation. Pipes and fittings shall be maintained clean. For HDPE pipe, a clean cotton cloth shall be employed for cleaning; polyester-type materials shall not be used as they may melt during fusion procedures.

D. Branches and fittings shall be laid by the Contractor as indicated on the drawings, and/or as required by the Engineer. Open ends of pipe and branches shall be closed with PVC caps secured in place with premolded gasket joints or as required by the Engineer.

E. Care shall be taken to prevent earth, water, and other materials from entering the pipe, and when pipe laying operations are suspended, the Contractor shall maintain a suitable stopper in the end of the pipe and also at openings for manholes.

F. If any defective pipe is discovered after being placed, removal and replacement with sound pipe will be required at no additional cost to the Owner.

3.03 HDPE PIPE JOINING:

A. HDPE pipe should be joined by butt-fusion methods, having a completely uniform and monolithic pipe interior according to the fusion joining procedures as instructed by the manufacturer.

B. Each individual performing fusion joining shall have had at least one year of experience in the use of the fusion procedure.

C. Inspection of joints shall be performed by a person qualified by training or experience to evaluate the acceptability of HDPE joints made under the applicable joining procedures.

D. The pipe sections shall be joined at ground level to a length recommended by the manufacturer, such that when pulling the pipe into position alongside the trench, maximum allowable stress is not exceeded. Use appropriate materials and equipment, as recommended by the HDPE pipe manufacturer, when pulling butt-fused pipe sections alongside the trench, to prevent pipe damage.

END OF SECTION

SECTION 33 46 26

GEOTEXTILE FABRICS

PART 1 – GENERAL

1.01 RELATED WORK

A. SECTION 31 22 13 ROUGH GRADING

B. SECTION 31 23 00 EARTHWORK

C. SECTION 31 25 00 SEDIMENT AND EROSION CONTROL

1.02 SUBMITTALS

A. Product Data: Manufacturer's catalog sheets, specifications, and installation instructions for each item specified.

B. Samples: 12 inch x 12 inch sample of prefabricated drainage panel.

PART 2 – PRODUCTS

2.01 MATERIALS

A. Prefabricated Drainage Panel; Any of the Following:

1. MIRADRAIN 6000 by Nicolon/Mirafi Group.

2. J-Drain 300 Composite Drainage System by JDR Enterprises, Inc.

3. Hydraway 300 by Monsanto.

4. Or approved equivalent.

B. Geotextile Woven Polypropylene Reinforcement Fabric:

1. Amoco 2006 by Amoco Fabrics and Fibers Co.

2. Mirafi 500x by Nicolon/Mirafi Group.

3. Or approved equivalent.

C. Geotextile Filter Fabric:

1. Amoco 4545 by Amoco Fabrics and Fibers Co.

2. Or approved equivalent.

PART 3 – EXECUTION

3.01 PROTECTION

A. Protect prefabricated drainage panel from sunlight during transportation and storage.

3.02 INSTALLATION

A. Install the Work of this Section in accordance with the manufacturer's printed instructions.

END OF SECTION

APPENDIX A

STANDARD SPECIFICATIONS FOR CONSTRUCTION OF TRAILS AND TRAIL BRIDGES ON FOREST SERVICE PROJECTS

U.S. Customary Units

National Technology and Development Program

10/30/2014

Supersedes the 1996 Standard Specification for Construction and Maintenance of Trails

Section 911 - Trail and Prism

Description

911.00.01 This work consists of constructing trails, restoration of existing trails or obliteration of abandoned trails. The earthwork and associated trail tread and prism work may be covered by one or more of the following subsections:

911.10. Excavation and Embankment
911.70. Retainers

911.10 - Excavation and Embankment

Description

911.10.01 This work consists of the excavation and placement of excavated material, regardless of its nature, from within the trailway or from other sources, except for material included under other pay items SHOWN IN THE SCHEDULE OF ITEMS.

Includes excavation, embankment, and backfill construction required to shape and finish the trailbed, ditches, backslopes, fill slopes, drainage dips, trail passing sections, and turnouts. Also includes excavation and embankment work required to construct culverts, trail bridges, shallow stream fords and gully crossings, talus and rubble rock sections, and climbing turns.

Materials

911.10.02 Materials. Use materials meeting the requirements of the following sections:

Rock, Grid Pavement Units, and Aggregate	991
Geosynthetics	994
Material for Timber Structures	995

Construction

911.10.03 Use and Disposal of Excavated Material. Conserve and use all suitable material for specified work. Conserve excess excavated rock suitable for specified project work and use in place of materials from designated sources.

Remove all duff and debris from within trailway limits and uniformly spread outside the clearing limits, not more than 4 inches in depth (unless otherwise SHOWN ON THE PLANS). Do not obstruct drainage or create piles, berms, or windrows of debris.

Place excess and unsuitable excavation beyond the downslope edge of the trailbed Do not obstruct drainage and spread to a depth not exceeding 4 inches. This includes any material removed in the grubbing operation and deposited in the same area.

Place rocks over 4 inches in greatest dimension not used in construction beyond the hinge point on the downslope side. Place rocks so that the tops are at least 6 inches lower than the trailbed surface. Ensure that no blockage of drainage or creation of a windrow effect occurs.

911.10.04 Trailway Excavation and Embankment. Minor deviations of ± 12 inches in vertical alignment and 36 inches in horizontal alignment with smooth transitions of at least 30 feet on each side of the deviation are acceptable unless otherwise SHOWN ON THE PLANS.

Construct embankments with suitable compacted material. Compact all disturbed soil within the trailbed area.

Remove any rock within or above the backslopes that is unstable. Use or dispose of rock in accordance with Subsection 912.03.

Leave the finished slope in a uniform and roughened condition.

Make necessary adjustments of horizontal or vertical alignment, within the tolerances specified in this subsection, to produce the designed trailway section and balance earthwork. Such adjustments shall not be considered as changes.

911.10.05 Trailbed Finish. Fill holes with suitable material, compact, and cut high points to provide a uniform trailbed finish.

911.10.07 Ditches. Construct ditches to be free of loose rocks, roots, sticks, and other obstructions.

911.10.08 Geosynthetics. Where SHOWN ON THE PLANS, place geosynthetics flat and parallel to centerline of the trail before placing embankment. Overlap geosynthetics a minimum of 24 inches. Install anchors or fasteners as recommended by the geosynthetic manufacturer.

911.70 - Retainers

Description

911.70.01 This work consists of furnishing and installing log, sawn timber and rock retainers, including excavation and backfill, wood stakes and/or metal anchors and selecting and hauling of retainer materials.

Materials

911.70.02 Materials. Use materials meeting the requirements of the following sections:

Rock, Grid Pavement Units, and Aggregate	991
Material for Timber Structures	995

Construction

911.70.03 General. Place log, sawn timber, or rock retainers in continuous rows. Bed retainers along their entire length and so they are stable. When

retainers are constructed of logs or sawn timber use lengths greater than or equal to 10 feet.

Section 912 - Clearing Limits

Description

912.00.01 This work consists of clearing, grubbing, trimming, removing, and treating trees, logs, limbs, branches, brush, plants, and other vegetation along with removal of rocks, undermined roots and hazard trees within the clearing limits. Clearing and removal of trees, vegetation and rocks may be covered by one or more of the following subsections:

912.30. Logging Out
912.60. Rock and Root Removal

912.30 - Logging Out

Description

912.30.01 This work consists of removing brush, logs, and down trees from the clearing limits.

Construction

912.30.02 Clearing Out. Cut and remove all logs that extend across or into the clearing limits. The portions of cut logs that remain on the upper side of the trail shall be either firmly anchored to prevent sliding or rolling onto the trailway or moved across the trail to the lower side and scattered outside the clearing limits.
Fell all trees over 4 inches in diameter that are leaning into the clearing limits and that are within 10 feet above the trailbed. Stump height of leaning trees that are cut outside the clearing limits shall not exceed 12 inches as measured on the uphill side of the stump. Disposal and payment for the leaning trees described above will be the same as for down logs and trees. Remove roots and stumps from trees within the trailway that have been uprooted.

Rerouting the trail around windfalls, uprooted trees, and other obstacles will not be permitted. Ramp or reroute sections of the trail tread that have been damaged by uprooted stumps as necessary to provide safe passage on the trail. Payment for such work will be incidental to the specified work item, and no extra payment will be made.

Remove sticks or wood chunks exceeding 2 inches in diameter and 12 inches in length that have fallen onto the trailbed.

Scatter the down trees on the lower side of the trailway outside the clearing limits. Do not place such materials in stream channels, drainage ways,

ditches, culvert catch basins or other locations where they would prevent the free flow of water away from the trailbed.

912.60 - Rock and Root Removal

Description

912.60.01 This work consists of removal and disposal of rocks and roots from the tread.

Construction

912.60.02 Rock Removal. Remove surface rocks that are larger than 2 inches at their greatest dimension, and rocks that project more than 2 inches above the surface of the trail tread, when removal can be accomplished by hand or when rocks can be pried out with a pick mattock, shovel, pry bar, or similar tool. Where the trailbed consists predominantly of rock with little or no soil present, remove loose rock in excess of 3 inches.

Shatter any protruding rocks in trail tread that are too large to be pried out with a pick and bar by using either a rock sledge or explosives. Remove the protrusion down to the level of the tread surface. Fill any resulting depressions with suitable material and compact by tamping. If rock removed is not needed for other items of maintenance work, scatter the rock by side-casting to the lower side of the trailway and beyond the clearing limits and distribute rock to ensure that no blockage of drainage or creation of windrow occurs. Do not dispose any waste material in water courses.

912.60.03 Root Removal. Remove exposed tree roots on or in the trail tread that are greater than 1 inch in diameter. Cut embedded roots that project more than 2 inches above the trail tread flush with the trail tread. Scatter removed roots on the lower side of the trailway beyond the clearing limits and outside of water courses.

Fill holes caused by rock and root removal with suitable material and compact to form a smooth trail tread.

Maintain trail tread to the width as SHOWN ON THE PLANS or DESIGNATED ON THE GROUND.

Section 936 – Trail Stairways

Description

936.00.01 This work consists of construction and maintenance of stairways, including excavation and placing embankment and constructing rock, log and treated timber riser, crib-ladder, stairways and railing systems. Construction and

maintenance of stairways may be covered by one or more of the following subsections:

936.20. Overlapping Steps

Materials

936.00.02 Requirements. Use materials meeting the requirements of the following sections:

Rock, Grid Pavement Units, and Aggregate	991
Geosynthetics Materials	994
Material for Timber Structures	995

Construction

936.00.03 General. Construct stairways of the type and at locations SHOWN ON THE PLANS or DESIGNATED ON THE GROUND.

936.00.04 Excavation and Embankment. Excavate and place embankment in accordance with Section 911. Backfill with suitable compacted material after stairs are constructed.

936.20. – Overlapping Steps

Description

936.20.01 This work consists of construction of overlapping steps, including excavation and placing embankment and constructing rock steps.

Construction

936.20.02 Install overlapping steps as required under construction section 936.00. and/or as SHOWN ON THE PLANS.

936.20.03 Overlapping Rock Stairways. Construct steps starting with the bottom rock. Form the entire tread and riser with single rocks and provide two or more contact points for stability.

Section 938—Boardwalks

Description

938.00.01 This work consists of construction and maintenance of boardwalks, including excavation, embankment, backfill, curbs and railing systems. Construction and maintenance of boardwalks may be covered by one or more of the following subsections:

938.10. Standard Boardwalk

Materials

938.00.02 Materials. Conform to the following Sections and Subsections:

Material for Timber Structures	995

Construction

938.00.03 General. Construct boardwalks of the type and at locations SHOWN ON THE PLANS or DESIGNATED ON THE GROUND.

938.00.04 Excavation and Embankment. Perform excavation and embankment in accordance with the requirements of Section 911 and as SHOWN ON THE PLANS.

938.00.05 Mud Sills. Bury mud sills to a depth that provides a uniform walking surface as SHOWN ON THE PLANS.

938.00.06 Piers. Construct piers as SHOWN ON THE PLANS.

938.00.06 Approach Fills. Construct the approach fills with compacted suitable material.

938.10.—Standard Boardwalk

Description

938.10.01 This work consists of construction of standard boardwalks, including excavation, embankment, backfill, curbs and/or railing system.

Construction

938.10.02 Construct standard boardwalks as required under construction section 938.00 and/or as SHOWN ON THE PLANS.

938.10.03 Sawn Timber Stringers. Use sawn timbers that are continuous over 2 or more spans. Fasten each stringer to each mud sill with fasteners as SHOWN ON THE PLANS that penetrate a minimum of 4 inches into the mud sill unless otherwise SHOWN ON THE PLANS. Pre-drill holes for fasteners to prevent splitting and drive spikes flush.

938.10.04 Finished Walkway. Construct abutting ends of sections of boardwalk flush with each other. Do not slope the surface of the completed walkway to either side. Construct the boardwalk with a grade that does not exceed 5 percent and where no change in grade exceeds 5 percent unless otherwise SHOWN ON THE PLANS or DESIGNATED ON THE GROUND. Construct the finished walking surface of the boardwalk flush with the trail grade at each end of the structure.

938.10.05 Decking. Lay sawn deck planks on the stringer to provide bearing for the full width of the plank. Fasten decking evenly at right angles to each stringer. Trim protruding ends of the decking to give a straight-line appearance to the edges of the structure or as SHOWN ON THE PLANS.

938.10.06 Curbs and Railing Systems. Construct curbs and railing systems with sawn timber as SHOWN ON THE PLANS. Use lengths greater than or equal to 10 feet and splice with a 6 inch half-lap joint at a spacer location. Finish curbs and railing systems smooth and free from splinters and sharp projections.

Section 961- Native Log Stringer Trail Bridge

Description

961.00.01 This work consists of constructing native log stringer bridges, including mud sills, bulkheads, rail systems, curbs, decking, excavation, backfill, and approach fills as SHOWN ON THE PLANS. Construction of native log stringer trail bridges may be covered by one or more of the following subsections:

961.20. Multiple Log Stringer Trail Bridge

Materials

961.00.02 Materials. Conform to the following Sections and Subsections:

Rock, Grid Pavement Units, and Aggregate	991
Material for Timber Structures	995

The location of trees for native timber materials will be SHOWN ON THE PLANS and DESIGNATED ON THE GROUND.

Construction

961.00.03 General. Construct native log stringer trail bridges at locations SHOWN ON THE PLANS or DESIGNATED ON THE GROUND.

Pre-drill holes for fasteners when necessary to prevent splitting and drive spikes flush. Use washers with lag screws and bolts.

961.00.04 Excavation and Embankment. Perform excavation and embankment in accordance with Section 911.

961.00.05 Hardware. Furnish and install hardware as SHOWN ON THE PLANS.

961.00.06 Mud Sills. Construct mud sills at each end of the span in the location staked on the ground. Construct mud sills to be level, bedded evenly, and buried to the depth necessary for the bottom of the log stringers to clear the ground surface by a minimum of 6 inches.

Hew sill logs to provide a bearing surface for the log stringers and to provide the log stringers with a level top surface. Do not hew sill logs more than one-third their diameter. Do not level the top surfaces of the log stringers by shimming or notching their ends.

961.00.07 Stringers. Fasten log stringer to each mud sill with a drift pin that penetrates a minimum of 8 inches into the mud sill.

When plank decking is used, hew the top surfaces of log stringers up to 2 inches deep, as necessary, to provide bearing surfaces for deck planks.

961.00.08 Decking. Spike decking evenly at right angles to each stringer, unless otherwise SHOWN ON THE PLANS.

Lay split log decking alternately flat side down first, then round side down, ending with a flat side down. When the round side is down, provide a bearing surface that is between 1½ inches and 2 inches wide.

Lay split and sawn deck planks on the stringer to provide bearing for the full width of the plank.

Trim protruding ends of the decking to give a straight-line appearance to the edges of the structure, except for decking that extends out to provide handrail support.

961.00.09 Curbs. Construct curbs with logs or sawn timber as SHOWN ON THE PLANS. Use lengths greater than or equal to 10 feet and splice with a 24 inch half-lap joint at a curb block location. Match diameters of logs at lap joints and trim excess to provide a smooth transition between logs.

Finish curbs smooth and free from splinters and sharp projections.

961.00.10 Rail Systems. Construct rail systems with logs or sawn timber as SHOWN ON THE PLANS and use lengths greater than or equal to 10 feet.

When rail systems are constructed of logs, splice them with a 6 inch half-lap joint at a post location. Notch surfaces of posts and rails 5/8 inch at connections. Match diameters of rails at lap joints and trim excess to provide a smooth transition between rails. Use timber bolts for fastening rails to posts as SHOWN ON THE PLANS.

When rail systems are constructed of sawn timber, splice them with a diagonal butt joint at a post location. Use S4S sawn timber, for all rails, posts, and top caps. Fasten each rail and top rail to each post with wood screws as SHOWN ON THE PLANS. Finish handrails and posts smooth and free from splinters and sharp projections.

961.00.11 Approach Fills. Construct the approach fills with compacted suitable material.

961.20 – Multiple Log Stringer Trail Bridge

Description

961.20.01 This work consists of construction of a multiple log stringer bridge, including excavation, embankment, backfill, curbs and/or railing system.

Construction

961.20.02 Construct multiple log stringer bridge as required under construction section 961.00 and as SHOWN ON THE PLANS.

Section 965 – Trail Bridge Substructures

Description

965.00.01 This work consists of furnishing, fabricating, constructing trail bridge substructures, including all required geosynthetics, gabion baskets, concrete, lumber, hardware, excavation, and backfill as SHOWN ON THE PLANS. Construction of trail bridge substructure may be covered by one or more of the following subsections:

965.10. Timber Sill on Geocell Pad

Materials

965.00.02 Materials. Conform to the following Sections:

Rock, Grid Pavement Units, and Aggregate	991
Geosynthetic Materials	994
Material for Timber Structures	995

Furnish the following compliance certificates to the CO upon delivery of the materials to the jobsite:

(a) Verification of compliance with grading rules and species of timber and lumber. Provide certification by an agency accepted as competent by the American Lumber Standards Committee (ALSC).

(b) Lot certification of each charge for preservative, penetration in inches, and retention in pounds per cubic foot (assay method) by a qualified independent inspection and testing agency. In addition, have the producer of the treated products provide written certification that Best Management Practices (BMP's) in accordance with "Best Management Practices for Treated Wood in Western Aquatic Environments," published by the Western Wood Preservers Institute (WWPI) and Canadian Institute of Treated Wood, were followed, including a description and appropriate documentation of the applicable BMP's used.

(c) Such other certifications as SHOWN ON THE PLANS or called for in the SPECIAL PROJECT SPECIFICATIONS.

Provide shop drawings in accordance with section 903 for all timber bridge substructures 30 days in advance of fabrication when SHOWN ON THE PLANS or in the SPECIAL PROJECT SPECIFICATIONS. Show all dimensions and fabrication details for all cut, framed, or bored timbers.

Construction

965.00.03 General. Construct trail bridge substructure at locations SHOWN ON THE PLANS or DESIGNATED ON THE GROUND.

Furnish structural lumber and timber of the required stress grade as SHOWN ON THE PLANS.

Clear stacks of weeds, rubbish, or other objectionable material from the ground under and in the vicinity of all stored material. Place the bottom layer of material at least 8 inches above the ground level. Provide sufficient support to prevent sagging.

Open-stack untreated material to shed water. Stack material in layers on spacers (stickers) that extend across the full width of the stack to allow for free air circulation. Align all stickers vertically and space them at regular intervals.

Close-stack treated material to shed water.

Protect material from the weather. If covered, used sheet material such as water-resistant paper or opaque polyethylene film. Do not cover with impervious membranes, such as polyethylene film, during dry weather. Slit individual wrappings full length or puncture on the lower side to permit drainage of water.

Use slings or other devices to protect corners of heavy construction timbers and banded packages of heavy construction timber

965.00.04 Excavation and Embankment. Perform excavation and embankment in accordance with Section 911.

965.00.05 Hardware. Furnish and install hardware as SHOWN ON THE PLANS.

965.00.06 Workmanship. Cut and form all lumber and construction timbers so all joints will have even bearing over the entire contact surface. Do not use shims in making joints. Construct all joints to be closed. Drive nails and spikes to set the heads flush with the wood surface. Use the same end, face, and edge of the timber member for all layout dimensions. Bore all holes from mating faces.

965.10 – Timber Sill on Geocell Pad

Description

965.10.01 This work consists of construction of a timber sill on geocell pad including excavation, embankment, backfill, curbs and/or railing system.

Construction

965.10.02 Construct a timber sill on geocell pad as required under construction section 965.00 and as SHOWN ON THE PLANS.

Section 991 - Rock, Grid Pavement Units, Aggregate and Asphalt

991.01 Rock. Use sound, durable rock free of rifts, seams, laminations, and minerals that could deteriorate as a result of weathering. Dress rock to remove thin or weak portions before use.

Furnish rock of the size, shape, weight, and face area necessary to produce the general characteristics and appearance SHOWN ON THE PLANS.

991.02 Gabion and Revet Mattress Rock. Ensure that rock conforms to the requirements of Section 991.01 and the following specifications.

(a) Coarse durability index, AASHTO T 210 52 min.

(b) Unit weight of a filled basket 100 pounds per cubic foot min.

(c) Gradation:

(1) Baskets 12 inches or greater in the vertical dimension:

Maximum dimension of rock .....…. 8 inch

Minimum dimension of rock ..... 4 inch

(d) (2) Baskets less than 12 inches in the vertical dimension:

Maximum dimension of rock ..... 6 inch

Minimum dimension of rock ..... 3 inch

991.03 Grid Pavement Units. Use concrete grid pavement units with a minimum compressive strength of 4495 lbs/in^2 that meet the National Concrete Masonry Association (NCMA) Designation: A-15-82: Specifications for Grid Pavers.

991.04 Pit-Run Aggregate. Use pit-run aggregates consisting of native materials that can be placed on the trail without crushing or screening. No gradation, other than a maximum size, will be required. Provide pit-run aggregate with a maximum size as SHOWN IN THE SCHEDULE OF ITEMS.

991.05 Screened Aggregate. Use screened material consisting of gravel, talus, rock, sand, shale, or other suitable material that is reasonably hard, durable, and free of organic material, mica, clay lumps, or other deleterious material. Use screened aggregate meeting the gradation requirements shown in table 961-1 and of the grading SHOWN IN THE SCHEDULE OF ITEMS.

991.06 Crushed Aggregate for Base or Surface Course. Use crushed aggregate meeting the requirements of tables 991-1 and 991-2 and SHOWN IN THE SCHEDULE OF ITEMS.

At least 50 percent, by weight, of the aggregate retained on the No.4 sieve is to have one fractured face. Naturally fractured faces may be included in the 50-percent requirement.

The CO may approve other gradations if they are similar to those specified Grade aggregate from coarse to fine within the gradation band.

Table 991-1-Crushed and screened aggregate grading requirements for base or surface courses.

	Percent Passing (AASHTO T 11 and T 27)			
Sieve	Grading A	Grading B	Grading C	Grading D
1"				
¾"	100	100		
½"	50-90	70-100		
3/8"			100	100
No.4	30-65	45-75	60-85	70-90
No.8	25-55	30-60	35-70	45-70
No.30		15-40		20-40
No.200	6-12	6-20	5-20	5-20

Table 991-2.-Crushed Aggregate Quality Requirements

Description	AASHTO Test Method	Requirement
Percent Wear	T 96	40 Max.
Durability Index, Coarse and Fine	T 211	35 Min.
Liquid Limit	T 89	35 Max.
Plasticity Index	T 91	2-11

991.07 – Asphalt. Asphalt material for trail construction shall conform to requirements of the U.S. Department of Transportation, Federal Highway Administration, Standard Specifications for Construction or Roads and Bridges on Federal Highway Projects, most current edition, Section 702 – Asphalt Material.

991.08 – Cement. Cement material for trail construction shall conform to requirements of the U.S. Department of Transportation, Federal Highway Administration, Standard Specifications for Construction or Roads and Bridges on Federal Highway Projects, most current edition, Section 701 – Cement.

Section 994 - Geosynthetics

994.01 Geotextiles

(a) Use geotextiles, alone or in combination with other geosynthetics that meet the following Class B requirements for subsurface drainage as specified in AASHTO M288.

(1) Grab Strength at 50 percent elongation
ASTM D4632-91 .....…….. 355 N min.
(2) Seam Strength,
ASTM D 4632 .....……... 310 N min.
(3) Puncture Strength,
ASTM D4833-88 .....…….. 110 N min.
(4) Mullen Burst,
ASTM D 3786-87 ..... 900 kPa min.
(5) Trap Tear Strength,
ASTM D4533-91 .....…….. 110 N min.

(b) Use geotextile meeting the following critical physical properties, unless otherwise SHOWN ON THE PLANS.

(1) Material Structure .....…….. Nonwoven (all purposes) or Slit Film (for reinforcement or separation)
(2) Polymer Composition .....……. Polypropylene
(3) Apparent Opening,
ASTM D 4751-87 .....……. .30 mm max.
(4) Permittivity, ASTM
D4491-92 .....…….. 4060 liters/minute/m^2 min.
(5) Ultraviolet Degradation .....…….. 70 at150 hours

994.02 Geonet. Use geonet meeting the following critical physical proper-ties unless otherwise SHOWN ON THE PLANS.

(a) Polymer Composition of Core
(Net or Mesh).....…….. Medium PE or HDPE
(b) Permeability……..... 0.001cm/second min.
(c) Geotextile .....……..……..…. Must meet all Section 994.01 requirements
(d) Compressive Strength
of Core, ASTM D1621.....……. 500 kPa min.
(e) Transmissivity with Gradient
at 0.1, Pressure at 10 kPa.....……..... 0.0009 m^2/second min.

994.03 Geogrids. Use geogrids made from polypropylene or coated polyester that meets the following critical physical properties.

(a) Polymer Type .....…… HDPE, Polypropylene, or Polyester with Acrylic or PVC coating
(b) Mass per Unit Area, ASTM D5261-92... 175 g/m^2 min.
(c) Maximum Aperture Size
(1) Direction (MD) ....…… 100 mm
(2) Cross-Direction (XD) .....…… 75 mm
(d) Wide-Width Strip Tensile Strength

at 5 percent Strain, ASTM D4595-86

(1) Machine Direction (MD) ....……	8 kN/m min.
(2) Cross-Direction (XD) .....……	6 kN/m max.

994.04 Geocells. Use geocells meeting the following physical properties.

(a) Composition .....…….	PE or HDPE
(b) Geocell Weight expanded: .....…..	1.70 kg/m^2 min.
(c) Minimum Cell Seam Peel Strength, U.S. Army Corps of Engineers Technical Report G:-86-19, Appendix A .....……	800 N min.
(d) Expanded Dimensional Properties…...	AS SHOWN ON PLANS

994.05 Sheet Drains. Use sheet drains meeting the following critical physical properties.

(a) Core Polymer Composition ....……	Polystyrene, HDPE, or polypropylene attached
(b) Geotextile .....……	Nonwoven on one side if core solid; on both sides if core perforated. Must meet all Section 994.01 requirements
(c) Core Thickness, ASTM D5199 …….	10 mm min.
(d) Core Compressive Strength at Yield, ASTM D1621 .....……	650 kPa max.

994.06 Fasteners. Use anchors or fasteners of the design recommended by the manufacturer, and install per manufacturer's specifications.

994.07 Certification. Furnish a certificate or affidavit signed by an official from the company manufacturing the geosynthetic, verifying that the geosynthetic meets specifications.

994.08 Delivery, Storage, and Handling. During shipment and storage, wrap all geosynthetics to protect them from sunlight. When storing geosynthetics, protect them from mud, soil, dust, and debris. If materials are not installed immediately after delivery to site, do not store them in direct sunlight.

Section 995 - Material for Timber Structures

995.01 Untreated Structural Timber and Lumber. Conform to AASHTO M 168. Furnish an inspection certification from an agency accredited by the American Lumber Standards Committee for the species and grade. Mark all pieces with the inspection service, grade designation, species, and inspector identity.

Season and dry all structural timber and lumber before fabrication. Do not use material that is twisted, curved, or otherwise distorted.

Do not use boxed-heart pieces of Douglas fir or redwood in outside stringers, floor beams, caps, posts, sills, or rail posts. Boxed-heart pieces are defined as timber so sawed that at any point in the length of a sawed piece the pith lies entirely inside the four faces.

Select native log stringers from designated sites on Government-administered land. Select the species and sizes of materials as SHOWN ON THE PLANS. Select native log stringers that are straight, sound, and free of defects. Obtain CO approval of logs and trees before felling or moving them to the site. Fell trees to prevent damage to standing timber and to minimize breakage of trees to be used. Buck logs from felled trees in such a way to minimize waste and to obtain the required length and diameter.

Peel logs, square the ends, and trim the knots and limbs flush unless otherwise SHOWN ON THE PLANS. Scatter the debris from the processing of timber away from the trail and so it will not block the trail or plug water courses.

Field treat the following untreated timber surfaces in accordance with AWPA standard M4.

(a) All ends and tops, and all contact surfaces of posts, sills, and caps.

(b) All ends, joints, and contact surfaces of bracing and truss members.

(c) All surfaces of timber bumpers and the back faces of bulkheads.

(d) All other timber that will be in contact with earth.

(e) All ends of log stringers.

995.02 Holes for Bolts, Dowels, Rods & Lag Screws. Bore all holes before preservative treating the wood.

Bore holes for round drift bolts and dowels 1/16 inch smaller in diameter than that of the bolt or dowel to be used. Ensure that the diameter of holes for square drift bolts or dowels is equal to the side dimension of the bolt or dowel.

Bore holes for machine bolts 1/16 inch larger than the diameter, except when galvanized bolts are specified. In this case, drill all holes 1/8 inch greater than the bolt size.

Bore holes for lag screws 1/16 inch larger for the shank portion of the lag screw and drill the remainder of the hole approximately 75 percent of the shank diameter to a depth of 1 inch less than the length of the screw.

995.03 Hardware. Use nails of standard form (ASTM F 1667), wood screws (ANSI/ASME B 18.6.1), hex headed bolts and nuts (ASTM A307), lag screws (ASTM A307 and ANSI/ASME B18.2.1), carriage bolts (ASTM A307), and drift pins and dowels (ASTM A307) as SHOWN ON THE PLANS.

Fabricate washers from gray iron or malleable iron castings unless structural washers are specified. Use malleable iron washers with a diameter approximately four times the bolt diameter under all bolt heads or nuts in contact with wood, unless otherwise SHOWN ON THE PLANS.

Galvanize all hardware according to AASHTO M 232 or cadmium plate all hardware according to ASTM B 766 class 12, type III, unless otherwise SHOWN ON THE PLANS, except for the glued laminated deck panel dowels. Ensure that all fasteners, including nails, spikes, bolts, washers, and timber connectors, other than malleable iron, are galvanized.

Final tighten all nuts to provide proper bearing and snug tight condition. Snug tight is defined as sufficient tightness to bring faces of members into firm contact with each other. Cut off excess bolt lengths of more than 1 inch. After final tightening, check or burr all bolts effectively with a pointing tool to prevent loosening of the nuts.

995.04 Treated Structural Timber and Lumber. Furnish wood according to Subsection 995.01. Incise all wood and make all dimensional cuts and holes in the wood before pressure treatment. Use wood preservative treatment methods meeting the requirements of AASHTO M 133 as SHOWN ON THE PLANS. Treat dimensional lumber, sawn timber and glued laminated timber members according to AWPA Standards as SHOWN ON THE PLANS.

All treated stringers, decking, running planks, and handrails shall be treated after fabrication in accordance with AWPA U1, *Use Category System,* using Pentachlorophenol or Copper Naphthenate (CuN) in Light Oil, (Type C Solvent) for Use Category UC3B.

All treated substructures (sills, backing planks, cribs, timber walls, etc.) shall be treated after fabrication in accordance with AWPA U1 *Use Category System,* using Pentachlorophenol or Copper Naphthenate (CuN) in Heavy Oil (Type A Solvent) for Use Category UC4B.

Treat timber members shall comply with the requirements of the current edition of WWPI's *Best Management Practices for the Use of Treated Wood in Aquatic Environments.*

Except for pine, incise before treatment all surfaces greater than 2 inches in width and all Douglas fir and western larch surfaces. Field treat all cuts, abrasions, drilled

holes, and recesses that occur after initial preservative treatment in accordance with the requirements specified in AWPA standard M4, *Standard for the Care of Pressure-Treated Wood Products*. Plug all unused holes with preservative-treated plugs. Perform all field-applied preservation treatment with necessary precautions so as to prevent soil and/or water contamination.

All treated timber members must have an approved American Lumber Standards Committee quality mark, individually or sealed pallets, assuring that treatment conforms to the appropriate AWPA standards.

Submit a certified copy of the lot certification, by a qualified independent inspection and testing agency, to the CO for each charge of preservative, stating penetration in inches and retention in pounds per cubic foot (assay method). In addition, provide a written certification from the producer of the treated products that "Best Management Practices for Treated Wood in Western Aquatic Environments," published by the Western Wood Preservers Institute and Canadian Institute of Treated Wood, were utilized. Include a description and appropriate documentation of the Best Management Practices used.

Handle treated timber according to the Consumer Information Sheet published by AWPA. Do not cut, frame, or bore treated timber after treatment unless approved by the CO. Handle treated timbers carefully and do not drop, damage outer fibers, or penetrate the surface with tools. Do not use cant dogs, hooks or pike poles. In coastal waters, do not cut or bore timber below the highwater mark.

995.05 Structural Glued Laminated Timber. Furnish structural glued laminated timber according to American National Standard, "Standard Specifications for Structural Glued Laminated Timber of Softwood Species" (ANSI 117). Fabricate according to the combination and grade as indicated in the contract. Fabricate structural glued laminated members according to American National Standard, "Standard for Wood Products - Structural Glued Laminated Timber" (ANSI A190.1).

Manufacture members as industrial appearance grade for wet use conditions, using a phenol-resorcinol resin type of adhesive throughout. Use only single- or multiple-piece laminations with bonded edge joints.