CONTRACT DOCUMENTS AND SPECIFICATIONS FOR

LAKE WENTWORTH GRANT PROJECT – PHASE 4

CAMP BIRCHMONT SCMs

September 2021

Prepared for:

Town of Wolfeboro
Planning & Development Department
84 South Main Street
Wolfeboro, NH 03894

In coordination with:

New Hampshire Department of Environmental Services
Wentworth Watershed Association
Camp Pierce Birchmont

Prepared by:

Comprehensive Environmental Inc.
21 Depot Street
Merrimack, NH 03054

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INFORMATION TO BIDDERS

GENERAL CONTRACTOR BID INFORMATION

Sealed proposals for construction of the Lake Wentworth Grant Project – Phase 4 - 2021 will be received via email by the Town of Wolfeboro, 84 South Main Street, Wolfeboro, NH 03894 attn. Kathryn Carpentier at financedirector@wolfeboronh.us on behalf of Wentworth Watershed Association and the Town of Wolfeboro until 2:00 PM prevailing time on September 16, 2021 at which place and time said Bids will be publicly opened and read aloud. The Owner reserves the right to reject any or all bids, to waive any informalities in the bidding and to accept the bid considered to be in the Town's best interests.

The project consists of the installation of stormwater improvements at Camp Birchmont adjacent to Lake Wentworth in Wolfeboro, NH. Work includes installation of stormwater improvements, underground piping, retaining walls, and landscaping.

A Non-Mandatory Pre-Bid Meeting will be held at 11:00 AM, on Thursday, September 2, 2021 starting at the Camp Birchmont site located at 693 Governor John Wentworth Hwy, Wolfeboro, NH 03894. Contact Nick Shaw at nshaw@ceiengineers.com or 603-424-8444 ext. 304 to RSVP and coordinate the meeting location on site.

Drawings and Contract Documents may be observed or obtained from Comprehensive Environmental, Inc. via email to nshaw@ceiengineers.com. Bid questions should be directed in writing to Mr. Nick Shaw at nshaw@ceiengineers.com. Responses to bid questions will be posted as an addendum back to bidders via email and/or to the Town of Wolfeboro Bid webpage.

No Bidder may withdraw a Bid within 60 days after the actual date of opening thereof.

The right is reserved to waive any informalities in or reject any or all bids and to accept General Contractors that are deemed most favorable to the interest of the Town of Wolfeboro.

Town of Wolfeboro, NH
84 South Main Street
Wolfeboro, NH 03894

BIDS will be received by Town of Wolfeboro Planning and Development Department (herein called the "OWNER"), at 84 South Main Street, Wolfeboro, NH 03894 until 2:00 PM September 16, 2019 and then at said office publicly opened and read aloud.

Each BID must be submitted via email to Kathryn Carpentier at financedirector@wolfeboronh.us or in a sealed envelope, addressed to:

Kathryn Carpentier at 84 South Main Street, Wolfeboro, NH 03894

Each sealed envelope containing a BID must be plainly marked on the outside as BID for Lake Wentworth Grant Project – Phase 4 - 2021 and the envelope should bear on the outside the BIDDER's name, address, and license number if applicable and the name of the project for which the BID is submitted. If forwarded by mail, the sealed envelope containing the BID must be enclosed in another envelope addressed to the OWNER at

84 South Main Street, Wolfeboro, NH 03894

All BIDS must be made on the required BID form. All blank spaces for BID prices must be filled in, in ink or typewritten, and the BID form must be fully completed and executed when submitted. Only one copy of the BID form is required.

The OWNER may waive any informalities or minor defects or reject any and all BIDS. Any BID may be withdrawn prior to the above scheduled time for the opening of BIDS or authorized postponement thereof. Any BID received after the time and date specified shall not be considered. No BIDDER may withdraw a BID within 60 days after the actual date of the opening thereof. Should there be reasons why the contract cannot be awarded within the specified period, the time may be extended by mutual agreement between the OWNER and the BIDDER.

BIDDERS must satisfy themselves of the accuracy of the estimated quantities in the BID SCHEDULE by examination of the site and a review of the drawings and specifications including ADDENDA. After BIDS have been submitted, the BIDDER shall not assert that there was a misunderstanding concerning the quantities of WORK or of the nature of the WORK to be done.

The OWNER shall provide to BIDDERS prior to BIDDING, all information which is pertinent to, and delineates and describes, the land owned and rights-of-way acquired or to be acquired.

BIDDERS shall be aware of the following:

a) Additional contract requirements may be necessary for work at Camp Birchmont as required by the property owner under the Independent Contract Service Agreement Provided in Appendix A.
b) Work shall be completed in accordance with Environmental Permits provided in Appendices B & C.

The CONTRACT DOCUMENTS contain the provisions required for the construction of the PROJECT. Information obtained from an officer, agent, or employee of the OWNER or any other person shall not affect the risks or obligations assumed by the CONTRACTOR or relieve him from fulfilling any of the conditions of the contract.

The OWNER within ten (10) days of receipt of acceptable AGREEMENT signed by the party to whom the AGREEMENT was awarded shall sign the AGREEMENT and return to such party an executed duplicate of the AGREEMENT. Should the OWNER not execute the AGREEMENT within such period, the BIDDER may by WRITTEN NOTICE withdraw his signed AGREEMENT. Such notice of withdrawal shall be effective upon receipt of the notice by the OWNER.

The NOTICE TO PROCEED shall be issued within five (5) days of the execution of the Agreement by the OWNER. Should there be reasons why the NOTICE TO PROCEED cannot be issued within such period, the time may be extended by mutual agreement between the OWNER and CONTRACTOR. If the NOTICE TO PROCEED has not been issued within the five (5) day period or within the period mutually agreed upon, the CONTRACTOR may terminate the AGREEMENT without further liability on the part of either party.

The OWNER may make such investigations as it deems necessary to determine the ability of the BIDDER to perform the WORK, and the BIDDER shall furnish to the OWNER all such information and data for this purpose as the OWNER may request. The OWNER reserves the right to reject any BID if the evidence submitted by, or investigation of, such BIDDER fails to satisfy the OWNER that such BIDDER is properly qualified to carry out the obligations of the AGREEMENT and to complete the WORK contemplated therein.

A conditional or qualified BID will <u>not</u> be accepted.

Award will be made to the lowest responsive, responsible and qualified BIDDER based on the total BASE BID Items only; <u>Or</u>, the total BASE BID Items plus the combination of the total BID ADD-ON Items subject to budgetary limitations and at the discretion of the OWNER, provided however, that the owner reserves its right to reject any and all bids.

All applicable laws, ordinances, and the rules and regulations of all authorities having jurisdiction over construction of the PROJECT shall apply to the contract throughout.

Each BIDDER is responsible for inspecting the site and for reading and being thoroughly familiar with the CONTRACT DOCUMENTS. The failure or omission of any BIDDER to complete any of the foregoing shall in no way relieve any BIDDER from any obligation in respect to his BID.

Further, the BIDDER agrees to abide by the requirements under Executive Order No. 11246.

The low BIDDER shall supply the names and addresses of major material SUPPLIERS and SUBCONTRACTORS when requested to do so by the OWNER.

MANUFACTURERS EXPERIENCE

Wherever it may be written that an equipment manufacturer must have a specified period of experience with his product, equipment which does not meet the specified experience period can be considered if the equipment supplier or manufacturer is willing to provide a bond or cash deposit for the duration of the specified time period which will guarantee replacement of that equipment in the event of failure.

SAFETY AND HEALTH REGULATIONS

This project is subject to all of the Safety and Health Regulations (CFR 29 Part 1926 and all subsequent amendments) as promulgated by the U.S. Department of Labor on June 24, 1974. Contractors are urged to become familiar with the requirements of these regulations.

NON-DISCRIMINATION IN EMPLOYMENT

Contracts for work under this proposal will obligate the contractors and sub-contractors not to discriminate in employment practices.

INSPECTION OF WORK

Work performed on this project shall be subject to inspection by representatives of the Town of Wolfeboro.

Representatives of the Town of Wolfeboro shall be given Right of Access to all portions of the proposed work, including but not limited to actual work site, storage yards, offsite manufacturing and fabricating location and job records.

COPIES OF THE CONTRACT

There shall be at least five (5) executed copies of the Contract to be distributed as follows:

a) Two (2) copies to the Owner
b) Two (2) copies to the Engineer
c) One (1) copy to the Contractor

NON-RESIDENT CONTRACTORS

The successful bidder, if a corporation, limited liability company or other entity established under laws other than the State of New Hampshire, shall file, at the time of the execution of the contract,

with the Owner, notice of the name of its resident attorney, appointed as required by the laws of the State of New Hampshire.

The successful bidder, if not a resident of New Hampshire, and not a corporation, limited liability company, or other legal entity, shall file, at the time of execution of the contract, with the Owner a written appointment of a resident of the state of New Hampshire, having an office or place of business therein, to be his true and lawful attorney upon whom all lawful processes in any actions or proceedings against him may be served; and in such writing, which shall set forth said attorney's place of residence, shall agree that any lawful process against him which is served on said attorney shall be of the same legal force and validity as if served on him and that the authority shall continue in force so long as any liability remains outstanding against him in New Hampshire. The power of attorney shall be filed in the office of the Secretary of State if required, and copies certified by the Secretary shall be sufficient evidence thereof. Such appointment shall continue in force until revoked by an instrument in writing, designating in a like manner some other person upon whom such processes may be served, which instrument shall be filed in the manner provided herein for the original appointment.

A Non-resident Contractor shall be deemed to be:

a) A person who is not a resident of the State of New Hampshire.
b) Any partnership that has no member thereof resident of the State of New Hampshire.
c) Any corporation established under laws other than those of the State of New Hampshire.

BIDDERS QUALIFICATIONS

No award will be made to any Bidder who cannot meet all of the following requirements:

A. He/She shall not have defaulted nor turned the work over to the bonding company on any contract within three years prior to the bid date.

B. He/She shall maintain a permanent place of business.

C. He/She shall have adequate personnel and equipment to perform the work expeditiously.

D. He/She shall have suitable financial status to meet obligations incidental to the work.

E. He/She shall have appropriate technical experience satisfactory to the Engineer and the Division in the class of work involved.

F. He/She shall be registered with the Secretary of State to do business in New Hampshire.

G. He/She shall have performed to the satisfaction of the Engineer and the Division on previous contracts of a similar nature.

H. He/She shall not have failed to complete previous contracts on time, including approved time extensions.

PRE-BID CONFERENCE

A **non-mandatory pre-bid conference** will be held on **Thursday, September 2, 2021** at **11:00 AM** at the Camp Birchmont site located at at 693 Governor John Wentworth Hwy, Wolfeboro, NH 03894.

WITHDRAWAL OF BIDS

Prior to Bid Opening, bids may be withdrawn upon written or telegraphic request of the Bidder provided confirmation of any telegraphic withdrawal over the signature of the Bidder is placed in the mail and postmarked prior to the time set for Bid Opening. Bid documents and security of any Bidder withdrawing his bid in accordance with the foregoing conditions will be returned.

Contract Agreement

This agreement is executed as of the _____ day of _____, 2021 by and between the Town of Wolfeboro, NH, located at 84 South Main Street, Wolfeboro, NH 03894, acting by and through its Town Manager (hereinafter called the "Owner") and_____ located at_____ (hereinafter called the "Contractor").

Witnesseth, that the parties to these presents, each in consideration of the undertakings, promises, and agreements on the part of the other herein contained, have undertaken, promised, and agreed to hereby undertake, promise, and agree, the Contractor for him/herself and his/her heirs, executors, administrator, successors and assigns, as follows:

The Contract Documents - The Contractor's quote for construction of **Lake Wentworth Grant Project – Phase 4 – 2021** as accepted by the Owner, the agreement, the drawings and all addenda and amendments to any of the foregoing collectively constitute the contract documents, and are sometimes herein referred to as the "contract".

Obligations and liability of Contractor - The Contractor shall do all the work and perform and furnish all the labor, services, materials, equipment, plant machinery, apparatus, appliances, tools, supplies, and all other things (except as otherwise expressly provided herein) necessary and as herein specified for the proper performance and completion of the work in the manner and within the time hereinafter specified, in strict accordance with the drawings, specifications, and other contract documents, in conformity with the directions and to the satisfaction of the Owner or designee, and at the prices herein agreed upon therefore.

All parts of the work and all figures, equipment, apparatus and other items indicated on the drawings and not mentioned in the specifications, or vice versa, and all work and material usual and necessary to make it complete and satisfactory and ready for use and operation, whether or not they are indicated on the drawings or mentioned in the specifications, shall be furnished and executed the same as if they were called for both by the drawings and by the Specifications.

The Contractor shall coordinate his/her operations with those of any other Contractors who may be employed on other work of the Owner, shall avoid interference therewith and shall cooperate in the arrangements for storage of materials and equipment.

The Contractor shall conduct his/her work so as to interfere as little as possible with private business and public travel. Wherever and whenever necessary or required, he/she shall maintain fences, furnish watchmen, maintain lights, and take such other precautions as may be necessary to protect life and property and/or as specified under "special conditions".

The Contractor shall indemnify, defend and save harmless the Owner and their officers, agents, servants and employees, from and against any and all claims, demands, costs and expenses, including attorney's fees, on account of bodily injury, sickness, disease or death sustained by any person or persons or injury or damage to or destruction of any property, directly or indirectly arising out of, relating to or in connection with the work, whether or not due or claimed to be due in whole or in part to the active, passive or concurrent negligence or fault of the Contractor, his/her officers, agents, servants or employees, any of his/her sub-contractors, the Owner, or any of their respective officers,

agents, servants or employees and/ or any other person or persons, and whether or not such claims, demands, suits or proceedings are just, unjust, groundless, false or fraudulent; and the Contractor shall and does hereby assume and agrees to pay for the defense of all such claims, demands, suits and proceedings, provided, however, that the Contractor shall not be required to indemnify the Owner, his/her officers, agents, servants, or employees, against any such damages occasioned solely by defects in maps, plans, drawings, designs or specifications prepared, acquired or used by the Owner and/or solely by the negligence or fault of the Owner.

The Contractor shall have complete responsibility for the work and the protection thereof, and for preventing injuries to persons and damage to the work and property and utilities on or about the work, Until final completion and final acceptance thereof. He shall in no way be relieved of his responsibility by any right of the Owner to give permission or directions given, or by failure of the Owner to give such permission or directions. The Contractor shall bear all costs, expenses, losses and damage on account of the quantity or character of the work or the nature of the land except subsurface conditions on which the work is done being different from that indicated or shown in the Contract Documents or from what was estimated or expected, or on account of the weather, elements, or other causes.

Should concealed conditions be encountered in the performance of the work below the surface of the ground or should concealed or unknown conditions in an existing structure be at variance with the conditions indicated by the contract documents, or should unknown physical conditions below the surface of the ground or should concealed or unknown conditions in an existing structure of an unusual nature, differing materially from those ordinarily encountered and generally recognized as inherent in work of the character provided for in this contract, be encountered, the Contract Sum shall be equitably adjusted by change order upon claim by either party made within twenty days after the first observance of the conditions.

The Contractor shall conduct his/her operations so as not to damage existing structures or work installed either by him/her or by other Contractors. In case of any such damage resulting from his/her operations, he/she shall repair and make good as new the damaged portions at his/her own expense with the consent of the damaged party. In the event that consent is not given, the Contractor shall be liable for the damage caused.

The Contractor shall be as fully responsible to the Owner for the acts and omissions of his/her sub-contractor, their officers, agents, servants and employees as he/she is for his own acts and omissions and those of his/her own officers, agents, servants and employees.

The Contractor should be aware that a portion of this work will be completed on private property and the Property Owner may have additional contract requirements beyond those set by the Town of Wolfeboro. For work on the Camp Birchmont Property, the Contractor shall be aware of the "Independent Contractor Service Agreement" and all requirements that is attached to this Contract.

Should the Contractor sustain any loss, damage or delay through any act or omission of any other Contractor or any sub-contractor of any such other Contractor, the Contractor shall have no claim against the Owner therefore, other than for an extension of time, but shall have recourse solely to such other Contractor or sub-contractor.

If any Contractor or any sub-contractor of any such other Contractor shall suffer or claim to have suffered loss, damage or delay by reason of the acts or omissions of the Contractor or of any of his/her sub-contractors, the Contractor agrees to assume the defense against any such claim and to reimburse such other Contractor or sub-contractor for such loss or damage. The Contractor agrees to and does hereby indemnify, defend and save harmless the Owner from and against any and all claims by such other Contractors or sub-contractors alleging such loss, damage or delay and from and against any and all claims, demands, suits, proceedings, Liabilities, Judgements, awards, losses, damages, costs and expenses, including attorney's fees, arising out of, relating to, or resulting from such claims.

The Contractor shall promptly pay all federal, state and local taxes which may be assessed against him/her in connection with the work or his/her operations under the agreement and/or the other Contract documents, including, but not limited to, taxes attributable to the purchase of material and equipment, to the performance of services, and the employment of persons in the prosecution of the work.

The Owner or designee, shall make all necessary explanations as to the meaning and intention of the specifications, shall give all orders and directions contemplated herein or thereby and in every case in which a difficult or unforeseen condition shall arise in the performance of the work required by this contract.

No Saturday or Sunday work will be permitted, except in case of emergency and then only with the written consent of the Town Manager and to such extent as he/she may judge to be necessary. The Contractor shall rigorously prohibit the committing of nuisances about the work or upon adjacent private property.

Supervision of work - The Contractor shall be solely responsible for supervision of the work, shall give the work the constant attention necessary to ensure the expeditious and orderly progress thereof, and shall cooperate with the Owner or designee in every way possible.

At all times, the Contractor shall have as his/her agent on the work, a competent superintendent capable of reading and thoroughly understanding the drawings and specifications with full authority to execute the directions of the Owner or designee without delay and to supply promptly such labor, services, materials, equipment, plant, apparatus, appliances, tools, supplies and other items as may be required. If, in the opinion of the director the superintendent proves incompetent, the Contractor shall replace him/her with another person approved by the Director of the Owner or designee. Such approval, however, shall in no way relieve or diminish the Contractor's responsibility for supervision of the work.

Provisions required by law deemed inserted - Each and every provision of law and clause required by law to be inserted in the Contract shall be deemed to be inserted herein, and the Contract shall be read and enforced as though they were included herein. If through mistake or otherwise any such provision is not inserted, or is not correctly inserted, then upon the application of either party, the Contract shall forthwith be physically amended to make such insertion.

Not to sublet or assign - The Contractor shall constantly give his/her personal attention to the prosecution of the work, shall keep the same under his/her personal control, shall not assign the Contract or sublet the work or any part thereof without the previous written consent of the Owner, and shall not assign any of the monies payable under the contract, or his/her claim thereto, unless by and with the written consent of the Owner and any guarantor. Any assignment or subletting in violation hereof shall be void and unenforceable.

Time for completion - The rate of progress shall be such that the Work shall be performed and completed within **60 days** from notice to proceed except as otherwise expressly provided herein.

It is agreed that the rate of progress herein required has been purposely made low enough to allow for the ordinary and foreseeable delays incident to construction work of this character. No extension of time will be given nor ordinary and foreseeable delays, inclement weather, or accidents, and the occurrence of such will not relieve the Contractor from the necessity of maintaining this rate of progress and completing the work within the stipulated time limit.

If delays are caused by acts of god, acts of government, unavoidable strikes, extra work, or other causes or contingencies clearly beyond the control or responsibility of the Contractor, the Contractor may be entitled to additional time to perform and complete the work, provided that the Contractor shall, within ten (10) days from the beginning of such delay, notify the Owner in writing, of the cause and the required number of additional days needed.

Particulars of the delay - Upon receipt of such notification, the Owner shall review and evaluate the cause and extent of the delay. If, under the terms of the **Agreement,** the delay is properly excusable, the Owner will, in writing, appropriately extend the time for completion of the work (this paragraph will be interpreted to include delays in receipt of equipment as properly excusable, provided that the Contractor placed his/her order and submitted shop drawings for such equipment promptly after execution of the contract, that he/she has shown due diligence in following the progress of the order, and that the time required for delivery is in accordance with conditions generally prevailing in the industry.) The Contractor agrees that he/she shall not have or assert any claim for nor shall he/she be entitled to any additional compensation or damages on account of such delays.

Insurance - Before starting and until final completion and acceptance of the work and expiration of the guarantee period the Contractor shall procure and maintain insurance of the types specified in paragraphs (A) to (G), inclusive, below, and to the limits for this insurance as specified below whether such operations be by himself/ herself or by any sub-contractor or by anyone directly or indirectly employed by any of them, or by anyone for whose acts any of them may be liable. All insurance shall be obtained from companies satisfactory to the Owner.

The following types of insurance shall be provided:

(A) Workman's compensation and Employers liability insurance as specified by State and Federal Law;

(B) Bodily injury insurance for operations and completed operations and Contractor's protective bodily injury insurance;

(C) Property damage insurance for operations and completed operations and Contractor's protective property damage insurance, each including coverage for injury to or destruction of wires or pipes and similar property and appurtenant apparatus and the collapse or structural injury to any building or structure except those on which work under the Contract is being done. Blasting and explosion coverage shall be obtained if there is a need for blasting and shall not be performed until such insurance has been secured;

(D) Bodily injury insurance covering the operation of all motor vehicles owned by the Contractor;

(E) Property damage insurance covering the operation of all motor vehicles owned by the Contractor;

(F) Insurance to cover bodily injuries and property damage resulting from the use of motor vehicles not owned by the Contractor, while such vehicles are being operated in connection with the prosecution of the work;

(G) Contractual liability insurance covering the liability assumed by the Contractor under the fifth paragraph of that subsection titled "Obligations and liability of Contractor" (indemnification) of this certificates from the Contractor's insurance carriers stating the coverages provided. Limits of liability and expiration.

Renewal certificates must be furnished by the Contractor prior to expiration dates of any of the initial insurance.

The **Owner** shall be notified in writing of cancellation or restrictive amendment at least thirty (30) days prior to the effective date.

No insurance required or furnished, hereunder, shall in any way relieve the Contractor of, or diminish any of, his/her responsibilities, obligations and liabilities under the contract.

Public liability	-	$1,000.000. Each occurrence/$2,000,000. General annual aggregate combined single limit (bodily injury and property damage) and $100,000 damage to rented property / $10,000 medical payments limit
Automobile liability	-	$1,000,000./$1,000,000. Bodily injury
	-	$500,000. Property damage liability
Workers' compensation	-	Statutory - $1,000.000. Each occurrence/$1,000,000 Each Employee
Employers liability	-	$1,000,000.

Insurance coverage similar to that required of the Contractor shall be provided by or on behalf of all sub-contractors to cover their operations performed under the agreement. The Contractor shall be held responsible for any modifications in these insurance requirements as they apply to sub-contractors. The Contractor should be aware of any additional insurance requirements set by the Property Owner of Camp Birchmont as provided in the attached "Independent Contractor Service Agreement".

Compliance with laws - The Contractor shall keep him/herself fully informed of all existing and current federal, state, and local laws, ordinances, rules and regulations affecting those engaged or employed on the work, the materials and equipment used in the work or the conduct of the work, and of all orders, decrees and other requirements of bodies or tribunals having any jurisdiction or authority over the same. The Contractor will comply with all provisions of executive orders no. 11246 and 11375.

If any discrepancy or inconsistency is discovered in the drawings, specifications or other Contract Drawings in relation to any such law, ordinance, rule, regulation, order, decree or other requirement, the Contractor shall forthwith report the same to the Owner in writing. The Contractor shall at all times observe and comply with, and cause all his/her agents, servants, employees and sub-contractors to observe and comply with all such laws, ordinances, rules, regulations, orders, decrees and other requirements, and he shall protect, indemnify and save harmless the Owner, its officers, agents, servants and employees, from and against any and all costs and expenses, including attorney's fees, arising from or based upon any violation or claimed violation of any such law, ordinance, rule, regulation, order, decree or other requirement, whether committed by the Contractor or any of his/her agents, servants, employees or subcontract.

This project is funded in part through a Watershed Assistance Grant from the NH Department of Environmental Services using funds provided by the US EPA under Section 319 Clean Water Act. The contractor certifies compliance with all applicable State of New Hampshire rules including the Uniform Administrative Requirements as specified in the Codified Federal Regulation Title 40, Part 30, and those in Title 2 part 215 (formerly OMB Circular A-110).

Interference with and protection of streets - The Contractor shall not close or obstruct any portion of a street, road, or private way without obtaining permits therefore from the proper authorities. If any street, road or private way shall be rendered unsafe by the Contractor's operations, he/she shall make such repairs or provide such temporary ways or guards as shall be acceptable to the Owner and to the proper authorities.

Streets, roads, private ways, and walks not closed shall be maintained passable and safe by the Contractor, who shall assume and have full responsibility for the adequacy and safety of provisions made therefore.

The Contractor shall, at least 24 hours in advance, notify the police and fire departments in writing, with a copy to the Owner, if the closure of a street or road is necessary. He shall cooperate with the police department in the establishment of alternate routes and shall provide adequate detour signs, plainly marked and well lighted, in order to minimize confusion.

Permits - The Contractor shall, at his/her own expense, take out and maintain all necessary permits from the state, county, Town of Wolfeboro, the New Hampshire Department of Transportation or other public authorities; shall give all notices required by law; and shall post all bonds and pay all fees and charges incident to the due and lawful prosecution of the work.

Delay by Owner - The Owner may delay the beginning of the work or any part thereof if the necessary lands or rights-of-way for such work small not have been obtained. The Contractor shall have no claim for additional compensation or damages on account of such delay, but shall be entitled only to an extension of time as hereinbefore provided.

Liquidated damages - In case the Contractor fails to complete the work satisfactorily on or before the date of completion fixed herein or as duly extended as hereinbefore provided, the Contractor agrees that the Owner shall deduct from the payments due the Contractor, the sum of **$50.00** for each calendar day of delay, which sum is agreed upon, not as a penalty, but as fixed and liquidated damages for each day of such delay. If the payments due the Contractor are less than the amount of such liquidated damages, said damages shall be deducted from any other monies due or to become due the Contractor and, in case such damages shall exceed the amount of all money due or to become due the Contractor, the Contractor or his/her surety shall pay the balance to the Owner.

Intoxicating liquors - The Contractor shall not sell and shall neither permit nor suffer the introduction or use of intoxicating liquors upon or about the work.

Examination of work - The Owner or designee shall be furnished by the Contractor with every reasonable facility for examining and inspecting the work and for ascertaining that the work is being performed in accordance with the requirements and intent of the contract, even to the extent of requiring the uncovering or taking down portions of finished work by the Contractor.

Defective work - Until acceptance and during the applicable guarantee period thereafter, the Contractor shall promptly, without charge, repair, correct or replace work, equipment, materials, apparatus or parts thereof which are defective, damaged or unsuitable or which in any way fail to comply with or be in strict accordance with the provisions and requirements of the contract or applicable guarantee and shall pay to the Owner all resulting costs, expenses, losses or damage suffered by the Owner.

Extra work - The Contractor small perform any extra work (work in connection with the Contract but not provided for herein) when and as ordered in writing by Owner at unit prices stipulated in the Contract for such work or, if none are so stipulated, either (a) at the price agreed upon before such work is commenced and named in the written order for such work, or (b) if the Owner, so elects, for the reasonable cost of such work, as determined by the Contractor and approved by the Owner, plus a percentage of such cost, as set forth below. No extra work shall be paid for unless specifically ordered as such in writing by the Owner.

The cost of extra work done under (b) above shall include the reasonable cost to the Contractor of materials used and equipment installed, common and skilled labor, and foremen, and the fair rental of all machinery and equipment used on the extra work for the period of such use. At the request of the Owner, the Contractor shall furnish itemized statements of the cost of the extra work ordered as

above and give the Owner access to all records, accounts, bills, vouchers, and correspondence relating thereto.

The fair rental for all machinery and equipment shall be based upon the most recent edition of "Compilation of Rental Rates for Construction Equipment", published by the Associated Equipment Distributors, or a similar publication approved by the Owner.

The Contractor shall not include in the cost of extra work any cost or rental of small tools, building, or any portion of the time of the Contractor, his superintendent, or his office and engineering staff to the cost of extra work done by the Contractor's own forces under (b) above (determined as stated above), the Contractor shall add 15 percent to cover his overhead, use of capital, the premium of the Bonds as assessed upon the amount of this extra work, and profit.

Abandonment of work or other default - If the work shall be abandoned or any part thereof shall be sublet without previous written consent of the Owner, or the contract or any monies payable hereunder shall be assigned otherwise than as herein specified, or if at any time the Owner shall be of the opinion and shall certify in writing, that the conditions herein specified as to rate of progress are not being complied with, or that the work or any part thereof is being unnecessarily or unreasonably delayed, or that the Contractor has violated or is in default under any of the provisions of the contract, or if the Contractor becomes bankrupt or insolvent or goes or is put into liquidation or dissolution, either voluntarily or involuntarily, or petitions for an arrangement or reorganization under the bankruptcy act, or makes a general assignment for the benefit of creditors or otherwise acknowledges insolvency, the happening of any of which shall be and constitute a default under the contract, the Owner may notify the Contractor in writing, with a copy of such notice mailed to the surety, to discontinue all work or any part thereof; thereupon the Contractor shall discontinue such work or such part thereof as the Owner may designate; and the Owner may, upon giving such notice, by contract or otherwise as it may determine, complete the work or such part thereof and charge the entire cost and expense of so completing the work or such part thereof to the Contractor. In addition to the said entire cost and expense of completing the work, the Owner shall be entitled to reimbursement from the Contractor and the Contractor agrees to pay to the Owner any losses, damages, costs and expenses, including attorney's fees, sustained or incurred by the Owner for reason of any of the foregoing causes. For the purposes of such completion the Owner may for itself or for any Contractors employed by the Owner take possession of and use or cause to be used for any and all materials equipment, plant, machinery, appliances, tools, supplies and such other items of every description that may be found or located at the site of the work.

All costs, expenses, losses, damages, attorney's fees and any and all other charges incurred by the Owner under this subsection shall be charged against the Contractor and deducted and/or paid by the Owner out of any monies due or payable or to become due or payable under the contract to the Contractor; in computing the amounts chargeable to the Contractor, the Owner shall not be held to a basis of the lowest prices for which the completion of the work or any part thereof might have been accompli shed, but all sums actually paid or obligated therefore to effect it prompt completion shall be charged to and against the account of the Contractor. In case the costs, expenses, losses, damages, attorneys' fees and other charges together with all payments heretofore made to or for the account of the Contractor are less than the sum which would have been payable under the contract if the work had been properly performed and completed by the Contractor, the Contractor shall be entitled to

receive the difference, up to the amount of monies which were due and payable to the Contractor at the time of the abandonment of the work or other default and, in case such costs, expenses, losses, damages, attorneys' fees and other charges, together with all payments theretofore made to or for the account of the Contractor, shall exceed the said sum, the Contractor shall pay the amount of the excess to the Owner.

Progress estimates - Once a month, except as hereinafter provided, the Owner or designee shall make an estimate in writing of the total amount and value of the work done to the first of the month by the Contractor. The Owner shall retain five **(5%)** percent of estimated value, as part security for fulfillment of the contract by the Contractor and shall deduct from the balance all previous payments made to the Contractor, all sums chargeable against the Contractor and all sums to be retained under the provisions of the contract. The Owner shall pay monthly to the Contractor the balance not deducted and/or retained as aforesaid, except that payment may be withheld at any time if, in the judgement of the Owner, the work is not proceeding in accordance with the contract. If the Owner deems it expedient to do so, it may cause estimates and payments to be made more frequently than one in each month.

No progress estimate or payment need be made when, in the judgement of Owner or designee, the total value of the work done since the last estimate amounts to less than the amount set forth.

Estimates of lump-sum items shall be based on a schedule dividing each such item into its appropriate component parts together with a quantity and a unit price for each part so that the sum of the products of prices and quantities will equal the contract price for the item. This schedule shall be submitted by the Contractor and must have the approval of the Owner before the first estimate becomes due.

If the Owner or designee determines that the progress of the work will be benefitted by the delivery to the site of certain materials and equipment when available, in advance of actual requirement therefore and if such materials and equipment are delivered and properly stored and protected, the cost to the Contractor or sub-contractor as established by invoices or other suitable vouchers satisfactory to the Owner or designee, less the retained percentages as above provided, may be included in the progress estimates; provided always that there be duly executed and delivered by the Contractor to the Town Manager of the Owner or designee at the same time a bill of sale in form satisfactory to Owner, transferring and assigning to the Owner full Ownership and title to such materials or equipment.

Payment - As soon as practicable the Owner shall make a final payment which includes retainage of monies from all previous payments made to the Contractor of work done.

The Owner shall pay to the Contractor the entire amount earned and due hereunder after deducting therefrom all previous payments, all charges against the Contractor as provided for hereunder, and all amounts to be retained under the provisions of the contract. Except as in this subsection otherwise provided, such payment shall be made not later than thirty (30) days after but in no event before, the expiration of the time within which claims for labor performed or materials or equipment furnished must be filed under the applicable lien law, or, if such time is not specified by law, the expiration of thirty (30) days after the completion of the Owner final estimate.

All quantities shown on progress estimates and all prior payments shall be subject to correction in the final estimate and payment.

Liens - If at any time any notices of lien are filed for labor performed or materials or equipment manufactured, furnished, or delivered to or for the work, the Contractor shall , at its own cost and expense, promptly discharge, remove or otherwise dispose of the same, and until such discharge, removal or disposition, the Owner shall have the right to retain from any monies payable hereunder an amount which in its sole judgement, it deems necessary to satisfy such liens and pay the costs and expenses, including attorney's fees, of defending any actions brought to enforce the same, or incurred in connection therewith or by reason thereof.

Claims - If, at any time, there be any evidence of any claim for which the Contractor is, or may be, liable or responsible hereunder, the Contractor shall promptly settle or otherwise dispose of the same, and until such claims are settled or disposed of, the Owner may retain from any monies which would otherwise be payable hereunder so much thereof, as, in its sole judgement, it may deem necessary to settle or otherwise dispose of such claims and to pay the costs and expenses, including attorneys' fees, of defending any actions brought to enforce such claims, or incurred in connection therewith or by reason thereof.

Guarantee - The Contractor guarantees that the work and services to be performed under the contract, and all workmanship, materials and equipment performed, furnished, used or installed in the construction of the same, shall be free from defects and flaws, and shall be performed and furnished in strict accordance with the drawings, specifications and other contract documents, that the strength of all parts of all manufactured equipment shall be adequate and as specified and that the performance test requirements of the contract shall be fulfilled.

The Contractor shall execute his/her own written guarantee to the Owner warranting all work done under this contract, to be done in a good and workmen like manner and to be perfect for a guarantee period of one (1) year from the date of final completion of the work contemplated in this contract and acceptance of the work as stated in the final estimate. Any imperfections as a whole or in part, by reason of defective materials or workmanship shall be made good to the satisfaction of the Owner at the Contractor' s expense.

Retain money for repairs - The Owner may retain out of the moneys otherwise payable to the Contractor two percent (2%) of the amount, for a 365 day period and may expend the same plus any interest which has accrued, in the manner hereinafter provided, in making such repairs, corrections or replacements in the work as the Owner, in its sole judgement, may deem necessary.

Repair, correction or replacement - If at any time, within the said period of guarantee, any part of the work, in the opinion of the Owner, requires replacing, correcting, or repairing, or damage to other property of the Owner is caused by any defect in the work, the Owner may notify the Contractor in person and/or by writing to make the required repairs, corrections, or replacements. If the Contractor neglects to commence making such repairs, corrections or replacements to the satisfaction of the Owner within five (5) days from the date of giving or receipt of such notice, or having commenced, fails to prosecute such work with diligence, the Owner may employ other persons to make the same. The Owner shall pay the cost and expense of the same out of the amounts retained for that purpose. Upon the expiration of the said period of guarantee, provided that the work at the time is in good order, the Contractor will be entitled to receive the whole or such part of the sum last aforesaid, if

any, as may remain after the cost and expense of making said repairs, corrections and replacements, in the manner aforesaid, have been paid therefrom. Owner has the ability to terminate the contract with Contractor with a minimum 3 weeks prior notification.

Right of Owner to Terminate Contract – In the event that any of the provisions of this contract are violated by the Contractor, or by any of his Subcontractors, the Owner may serve written notice upon the Contractor and the surety of its intention to terminate the contract, and unless within 10 days after the serving of such notice upon the Contractor, such violation or delay shall cease and satisfactory arrangement of correction be made, the contract shall, upon the expiration of said 10 days cease and terminate. In the event of any such termination, the Owner shall immediately serve notice thereof upon the surety and the Contractor and the surety shall have the right to take over and perform the contract; provided, however, that if the surety does not commence performance thereof within 10 days from the date of mailing to such surety of notice of termination, the Owner may take over the work and prosecute the same to completion by contract or by force account for the account and at the expense of the Contractor and the Contractor and his surety shall be liable to the Owner for any excess cost occasioned to the Owner.

Where the contract has been terminated by the Owner, said termination shall not affect or terminate any of the rights of the Owner as against the Contractor or his surety then existing or which may thereafter accrue because of such default. Any retention or payment of monies by the Owner due the Contractor under the terms of the contract, shall not release the Contractor or his surety from liability for his default.

After ten (10) days from the delivery of a Written Notice to the Contractor and the Engineer, the Owner may, without cause and without prejudice to any other remedy, elect to abandon the Project and terminate the Contract. In such case the Contractor shall be paid for all Work executed and any expense sustained plus reasonable profit.

Legal address of Contractor - The Contractor's business address and his/her office at or near the site of the work are both hereby designated as places to which communications shall be delivered. The depositing of any letter, notice, or other communication in a postpaid wrapper directed to the Contractor's business address in a post office box regularly maintained by the post office department or the delivery at either designated address of any letter, notice or other communication by mail or otherwise shall be deemed sufficient service thereof upon the Contractor, and the date of such service shall be the date of receipt. The first named address may be changed at any time by an instrument in writing, executed and acknowledged by the Contractor and delivered to the Owner. Service of any notice, letter, or other communication upon the Contractor personally shall likewise be deemed sufficient service.

Cleaning up - The Contractor at all times shall keep the site of the work free from rubbish and debris caused by his/her operations under the contract. When the work has been completed, the Contractor shall remove from the site of the work all of his/her plant, machinery, tools, construction equipment, temporary work, and surplus materials so as to leave the work and the site clean and ready for use.

In witness whereof, the parties to the foregoing contract hereunto set their hands and seals as of the date first written above.

Owner:
Town of Wolfeboro
By its Town Manager

Contractor:

_____
(type or print name of Contractor)

_____
(signature, title)

_____
(signature, title)

seal:

(if Contractor is a corporation,
affix seal here)

Attest

_____

Address for giving notices

_____

Attest

_____

Address for giving notices

_____

Contractor's Guarantee

Whereas _____

Of _____

Herein called "the Contractor" has completed construction on the following project:

Owner _____

Address of Owner _____

Title of project: _____

Location: _____

Date of completion: _____

Date guarantee expires: _____

Whereas, at the inception of such work the Contractor agreed to guarantee the construction against faulty materials or workmanship for a limited period and subject to the conditions set forth:

Now, therefore, the Contractor hereby guaranteed, subject to the conditions herein set forth, that during a period of (1) year from the date of completion of said construction, it will, at its own cost and expense, following receipt of written notice, make or cause to be made such repairs to said construction resulting solely from faulty construction or defects in materials or workmanship applied by or through the Contractor as may be necessary to maintain the construction in defect-free condition.

This guarantee is made subject to the following conditions:

1.) Specifically excluded from this guarantee is any and all damage caused by the following: acts of god; defects or failure of materials not installed by the Contractor; faulty construction other than that installed by or for the Contractor; or fire. If the construction is damaged by reason of any of the foregoing, this guarantee shall thereupon become null and void for the balance of the guarantee period unless such damage is repaired by the Contractor at the expense of the party requesting such repairs.

2.) This guarantee shall not be or become effective unless and until the Contractor has been paid in full for all his work.

3.) The undersigned agrees to bear the expense of examination and repair of any construction defects due to improper application as specified above, and the Owner is to bear expense if resulting from other cause or causes. In such latter event, the Owner agrees to make payment of

appropriate charge within thirty (30) days after billing, failing which, this guarantee shall be null and void.

4.) This guarantee runs in favor of Owner only and is not transferable.

In witness whereof, this instrument has been duly executed this
_____ DAY OF _____, 20___

_____
NAME OF GENERAL CONTRACTOR

_____
AUTHORIZED NAME AND TITLE

_____
SIGNATURE

CONTRACTOR QUOTE ON
THE FOLLOWING 3 PAGES

BID FORM

Town of Wolfeboro

Lake Wentworth Grant Project - Phase 4

2021

CAMP BIRCHMONT - BASE BID ITEMS

BASE BID ITEMS SCHEDULE

NO.	DESCRIPTION	EST. QUANTITY	UNIT BID PRICE (WORDS)		(FIGURES)		EXTENDED AMOUNT
1	Mobilization & Demob	1 L.S.		Dollars		per L.S.	
2	Erosion Controls	500 LF		Dollars		per LF	
3	Excavation, Grading & Disposal - all areas	82 CY		Dollars		per CY	
4	Excavation Dewatering	1 LS		Dollars		per LS	
5	Sawcut Pavement	70 LF		Dollars		per LF	
6	Rubber Razors	4 EA		Dollars		per EA	
7	Bit Berm Speed Humps	30 LF		Dollars		per LF	
8	Riprap for Plunge Pools	6 TON		Dollars		per TON	
9	Concrete for Perched Beach Retaining Wall and Stairs	90 CY		Dollars		per CY	
10	Versa-Lok Blocks (Stepped Infiltration Area Retaining Wall	300 EA		Dollars		per EA	
11	Impermeable Membrane (Stepped Infiltration Area)	70 SY		Dollars		per SY	
12	Filter Fabric (Stepped Infiltration Area)	70 SY		Dollars		per SY	
13	Crushed Stone (Stepped Infiltration Area)	21 TON		Dollars		per TON	
14	Pea Stone (Stepped Infiltration Area)	6 TON		Cents		per TON	
15	Sand (Stepped Infiltration Area)	12 CY		Dollars		per CY	

Page 1 (Figures) Total: $

BID FORM

Town of Wolfeboro

Lake Wentworth Grant Project - Phase 4

2021

CAMP BIRCHMONT - BASE BID ITEMS

BASE BID ITEMS SCHEDULE NO.	DESCRIPTION	EST. QUANTITY	UNIT BID PRICE (WORDS)		(FIGURES)		EXTENDED AMOUNT
16	Removal and Disposal of Existing Catch Basin	1 EA		Dollars		per EA	
17	Deep Sump Catch Basin with Drop Inlet	1 EA		Dollars		per EA	
18	Loam, Seed, and Fine Grading - 6" Layer on All Disturbed Areas	20 CY		Dollars		per CY	

Page 2 (Figures) Total: $

BID FORM

Town of Wolfeboro

Lake Wentworth Grant Project - Phase 4

2021

CAMP BIRCHMONT - BASE BID ITEMS

BASE BID ITEMS SUMMARY

NO.	DESCRIPTION	EST. QUANTITY	UNIT BID PRICE (WORDS)	UNIT BID PRICE (FIGURES)	EXTENDED AMOUNT

Figures Summary

Page 1 (Figures) Total: _____

Page 2 (Figures) Total: _____

Total Base Bid Price (Figures): _____

Total Base Bid Price (in words):

_____

ATTACH

INSURANCE CERTIFICATES

Technical Specifications

SECTION 01010

SUMMARY OF WORK

PART 1 - GENERAL

1.01 PURPOSE

This project includes the installation of stormwater better management practices and drainage improvements at Camp Birchmont in Wolfeboro, NH. All work locations are in the Town of Wolfeboro, NH as shown in Drawings C-1 to C-3 and D-1 to D-3.

PART 2 - PRODUCTS

Not Used

PART 3 – EXECUTION

A. The Scope of work under this contract shall be the excavation and disposal of excess soil, regrading of soil, construction of porous pavement/paver subgrade, installation of retaining walls, infiltration area, deep sump catch basin, plunge pools, swale, bit berm speed humps, rubber razors, stabilization and vegetation of exposed surfaces, as described herein and as outlined in this Scope of Work and as shown on the attached drawings C-1 to C-3 and D-1 to D-3.

B. The Scope of work includes but is not limited to the following:

Camp Birchmont

1. Perform site investigations to confirm locations and elevations of local drainage piping and underground utilities.
2. Store materials on-site.
3. Install erosion controls and work associated with maintenance of these controls during Construction.
4. Coordinate any required utility adjustments to complete the work as shown on the Drawings.
5. Provide work associated with clearing and grubbing the site in preparation for construction.
6. Earthwork/excavation to prepare for the installation of subgrade materials.
7. Stockpile excess excavated material and loam for re-use or storage. Store excess material on-site. (Excess material not re-used on-site shall be transported off-site by the Contractor).
8. Install footings and retaining wall systems as shown on Construction Drawings.
9. Install subgrade materials as shown on Construction Drawings for the stepped infiltration area, swale and plunge pools.
10. Install proposed rubber razors, bit berm speed humps, and deep sump catch basin.

11. Grade areas to proposed grades as specified on the Construction Drawings.
12. Install vegetated support materials on all exposed grass surfaces and adjacent impacted areas.
13. Reconstruct pavement where previously disturbed.

C. The Contractor is responsible for identifying and locating all underground and above ground utilities and service lines prior to any below or above ground site alterations. The Contractor is responsible for notifying concerned utilities, at least 72 hours prior to excavation in the proximity of telephone, gas and electric utilities, by calling Dig Safe at 1-888-344-7233 and all other utilities by calling the appropriate agency.

D. Contractor shall notify the Town of Wolfeboro Department of Public Works 72 hours prior to any work on streets with water mains and/or sewer for mark-out of the existing system.

E. The Contractor is responsible for performing test pits, sampling subbase materials and supplying Engineer with test reports for gradation of subbase materials prior to Construction. Test pits and subbase sampling shall be done at locations and to elevations as shown on the Construction Drawings.

F. The Contractor is responsible for all Earthwork including clearing and grubbing, excavation, rough grading, and backfilling as shown on the Drawings and specified herein. Earthwork activities shall only occur within right of ways maintained by the Town of Wolfeboro and property owned by the Town of Wolfeboro.

G. The Contractor is responsible for furnishing and installing all subgrade materials for the full depth reclaimed pavement areas; amendment materials for reclaimed materials; rain garden infiltration stone; bedding and backfill for all drainage piping and structures; and all other earthwork activities associated with these installations.

H. The Contractor shall be responsible for furnishing and installing all erosion control fabrics and plantings; furnishing and installing loam and seed for stabilization slopes and vegetated swales and rain gardens; furnishing and installing riprap stone for armored swales; furnishing precast structures; furnishing drainage piping and fittings; and restoration of all other existing adjacent landscaping features impacted by Construction.

I. The Contractor is responsible for installation of precast structures and drainage piping. Connection of all drainage structures and piping shall be done in accordance with the manufacturer's specifications, and the specifications and Drawings contained herein.

J. The Contractor is responsible for the off-site disposal of all material generated during clearing and grubbing activities, excavations and other construction activities. All materials shall be disposed of at an approved site.

K. Any ledge encountered during excavation that will interfere with the placement of specified devices or obtaining finished grades as specified on the Drawings will be

brought to the attention of the Engineer. Any rock excavation will be performed in accordance with Section 02200 EARTHWORK.

L. The Contractor shall provide and maintain erosion control measures as shown on the Drawings and as specified herein at all locations prior to and during all construction activities.

M. The Contractor is responsible for dewatering the project areas during construction activities and shall furnish all necessary equipment including pumps, piping, and sedimentation controls to conduct dewatering activities.

N. The Contractor is responsible for returning the construction area and surrounding area to its pre-construction condition as directed by the Engineer.

O. The Contractor shall provide as-built drawings of each construction site.

P. The Contractor is to perform the work of this contract in accordance with applicable State and Federal laws and regulations. In the event the Owner is required to pay any fines, administrative penalties or damages to anyone, including governmental agencies, due to the Contractor's failure to perform in accordance with this contract and/or regulations, the Contractor will indemnify and hold harmless the Owner and reimburse Owner for all such payments plus reasonable legal fees and expenses incurred.

END OF SECTION

SECTION 01020

CONTROL OF WORK AND MATERIALS

PART 1 - GENERAL

1.01 LOCATION OF WORK

The work in this contract is located in the Town of Wolfeboro, New Hampshire around Lake Wentworth.

1.02 WORK TO BE DONE

The work of this contract includes, but is not limited to the following for Camp Birchmont:

1. Installation of retaining walls, footings and staircases as specified in the construction drawings.
2. Installation of an infiltration area.
3. Installation of a deep sump catch basin.
4. Installation of rubber razors along paved areas.
5. Installation of bit berm speed humps along the paved walkway.
6. Installation of plunge pool and swale stormwater control measures.
7. Installation and maintenance of erosion controls at all sites before and during construction.
8. Dewatering of all construction areas.
9. Installation of vegetation and stabilization measures in disturbed areas.
10. All incidentals for the completion of work in accordance with Drawings C-1 to C-3, and D-1, to D-3 by Comprehensive Environmental Inc. and as further described herein.

1.03 HAULING, HANDLING AND STORAGE OF MATERIALS

The Contractor shall, at his own expense, handle and haul all materials furnished by him or generated by the removal of existing materials. The Contractor shall provide suitable and adequate storage for equipment and materials furnished by him 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. 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.

1.04 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 his own expense, provide suitable and safe means for completely covering all open excavations and for accommodating travel when work is not in progress. 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.

B. Where prescribed by the Engineer, excavations shall be completely closed at the end of each workday. Backfilling or use of steel plates of adequate strength to carry traffic shall be used.

C. If the excavation becomes a hazard, or if it excessively restricts traffic at any point, then special construction procedures shall be taken, such as prohibiting stockpiling excavated material in the roadway.

1.05 REJECTED MATERIALS AND DEFECTIVE WORK

A. Materials furnished by the Contractor and rejected 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.

1.06 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 committance 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.

1.07 SAFETY AND HEALTH REGULATIONS

This project is subject to the Safety and Health regulations of the U.S. Department of Labor set forth in 29 CFR, Part 1926, and to the New Hampshire Department of Labor and Industries, Division of Industrial Safety "Rules and Regulations for the Prevention of Accidents in Construction Operations (Industrial Bulletin No. 12)." Contractors shall be familiar with the requirements of these regulations.

1.08 MAINTENANCE OF DRAINAGE FACILITIES

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 through circumstances beyond his control, any of the aforesaid drainage facilities, he shall repair the same within the same day.

1.09 SITE INVESTIGATION

The Contractor acknowledges that he has satisfied himself 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 himself with available information will not relieve him 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.

1.10 CUTTING, FITTING AND PATCHING

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

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

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

D. Workmanship and materials of patching and repair work shall match the adjacent similar work, and shall conform to the applicable sections of the specification.

Patches and joints with existing work shall provide, as applicable in each case, visual, structural, and waterproofing continuity.

1.11 ELECTRICAL SERVICES

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.

1.12 ACCEPTANCE OF THE WORK

Until the final acceptance of the Work, it shall be under the care and charge of the Contractor and every precaution shall be taken necessary against injury or damage to the Work by the action of the elements or any other causes. The Contractor shall rebuild, repair, restore and make good, at their own expense, all injuries or damages to any portion of the Work before its completion and acceptance.

1.14 REGULATORY COMPLIANCE

A. The Contractor shall give all notices and comply with all laws, ordinances, rules, and regulations bearing on the Work as drawn and specified. If the contractor performs any Work contrary to such laws, ordinances, rules and regulations, the Contractor shall bear all cost arising therefrom.

B. The Contractor shall secure and pay for all necessary permits for this Work.

1.15 PERMANENT FEATURES PROTECTION

A. The Contractor shall maintain and protect existing pipes, poles, wires, fences, curbing, property-line markers, and other structures which, in the opinion of the Engineer, must be preserved in place without being temporarily or permanently relocated. In case of damage, the Contractor shall notify the Engineer so that the proper steps may be taken to repair any and all damage done. When the Engineer does not wish to make the repairs itself, all damage shall be repaired by the Contractor; or, if not promptly done by him, the Engineer may have the repairs made at the expense of the Contractor.

B. During execution of any and all items of the Work, extreme care shall be exercised by the Contractor to preclude any interferences/disturbances of existing structures, roadways, above-grade and below-grade utilities, or other features not associated with the Work. These interferences/disturbances shall include but not be limited to damage, movement, or collapse of the structures, roadways, and utilities. The Contractor shall assume the liability for any and all said damage, movement, settlement or collapse and promptly repair same at no cost to the Owner.

1.16 WORK SCHEDULE

A. Work may be performed at the site on Mondays through Fridays between 7:00 am and 5:00 pm unless otherwise directed by the Owner/Engineer. Construction equipment shall be operated in accordance with local ordinances.

B. Work may be permitted on weekends and legal holidays if the Contractor obtains written approval from the Engineer. The request shall be made 72 hours in advance of the work.

PART 2 - PRODUCTS

Not Used

PART 3 - EXECUTION

Not Used

END OF SECTION

SECTION 01026

SCHEDULE OF VALUES

PART 1 - GENERAL

1.01 DESCRIPTION

Work Included: Provide a detailed breakdown of the agreed Contract Sum showing values allocated to each of the various parts of the Work, as specified herein and in other provisions of the Contract Documents. For unit price bids, the Schedule of Values shall match the bid unit items in quantity and cost unless otherwise directed by the Owner.

1.02 RELATED WORK

Documents affecting work of this Section include, but are not necessarily limited to, General Specifications, Special Conditions, and these specifications.

1.03 GENERAL

For accounting purposes for the Engineer's convenience and as an aid in determining progress payments and price additions or deductions for Contract modifications, the Contractor shall furnish to the Engineer a schedule of values which shall be approved.

1. The schedule of values shall apportion the total amount of the Contract price(s) for each separate item among the main features or costs that form the completed Work.

2. The price breakdown shall be in sufficient detail to permit an analysis of all material, labor, equipment, subcontract and overhead costs, as well as profit, and shall cover all work involved for the properly completed item and feature listed.

3. Any amount claimed for subcontracts shall be supported by a similar schedule of values with the total amount shown by this price under the Contract price stated in the bid form.

1.04 SUBMITTALS

Prior to first application for payment, submit a proposed Schedule of Values to the Engineer

1. Meet with the Engineer and determine additional data, if any, required to be submitted.

2. Secure the Engineer's approval of the Schedule of Values prior to submitting first application for payment.

END OF SECTION

SECTION 01027

APPLICATION FOR PAYMENT

PART 1 - GENERAL

1.01 DESCRIPTION

Work Included: Comply with procedures described in this Section when applying for progress payment and final payment under this Contract.

1.02 RELATED WORK

A. Documents affecting work of this Section include, but are not necessarily limited to, General Conditions, Supplementary Conditions, and these specifications.

B. Progress payments are described in the General Conditions.

C. Final payment is described in the General Conditions.

1.03 SUBMITTALS

A. Informal Submittal: Unless otherwise directed by the Engineer:

1. Make an informal submittal of Request for Payment by filling in, with erasable pencil, pertinent portions of AIA Document G702, “Application and Certificate for Payment’, plus continuation sheet or sheets.

2. Make this preliminary submittal to the Engineer at the end of each month.

3. Revise the informal submittal of Request for Payment as agreed, between both parties, initialing all copies.

B. Formal Submittal: Unless otherwise directed by the Engineer.

1. Make formal submittal of Request for Payment by filling in the agreed data, by typewriter or neat lettering in ink, on AIA Document G702, “application and Certificate for Payment”, plus continuation sheet or sheets.

2. Sign and notarize the Application and Certificate for Payment.

3. Submit the original of the Application and Certificate for Payment, plus six (6) identical copies of the continuation sheet or sheets, to the Engineer.

4. The Engineer shall compare the formal submittal with the approved informal submittal and when approved, shall sign the Application and Certificate of Payment, will make required copies and will distribute:

a. Two copies to Contractor
b. Two copies to Owner
c. Two copies to Engineer's file

5. Application and Certificate for Payment shall be submitted to the Town of Wolfeboro by the 25th of each month for payment on the 15th of the following month.

PART 2 – PRODUCTS

Not Used

PART 3 – EXECUTION

Not Used

END OF SECTION

SECTION 01030

SPECIAL PROVISIONS

PART 1 - GENERAL

1.01 WATER FOR CONSTRUCTION PURPOSES

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

B. Water shall be provided by approved distribution system, hydrant or approved surface supply. Under no circumstances shall water be pumped directly from a reservoir.

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

1.02 DIMENSIONS OF EXISTING STRUCTURES

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

1.03 EXISTING UTILITY LOCATIONS – CONTRACTOR'S RESPONSIBILITY

The Contractor is responsible for identifying and locating all underground and above ground utilities and service lines prior to any below or above ground site alterations. The Contractor is responsible for notifying concerned utilities, at least 72 hours prior to excavation in the proximity of telephone, gas and electric utilities, by calling Dig Safe at 1-888-344-7233.

1.04 OCCUPYING PRIVATE PROPERTY

The Contractor shall not enter upon nor occupy with men, equipment or materials any property outside of the public highways or Town property / easements, except after the consent of the owners or their agents.

For temporary construction access and staging, the Contractor shall enter through the Town right of way. The Contractor shall set up temporary staging areas for construction purposes within the work areas.

1.05 SIGNS

A. Any required signs, including DES file numbers, if necessary, shall be installed as directed by the Engineer. Signs shall be erected within ten (10) days after the construction contract is awarded. Signs shall be fabricated, erected, and maintained by the Contractor.

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

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

D. Contractor shall provide detour signs at the nearest intersection to divert traffic along other roads. It may be necessary to use multiple signs for each detour.

1.06 COORDINATION

A. Coordination of Work

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

B. Coordination with Utilities

1. The Contractor shall, at least 72 hours prior to excavation in the proximity of telephone, gas and electric utilities, notify the utilities concerned by calling Dig Safe at 1-888-344-7233.

2. The Contractor shall notify the Town of Wolfeboro – Public Works at least 72 hours prior to excavation in streets with water mains and/or sewer for mark-out of the existing system.

3. The Contractor shall coordinate all work involving utilities and shall satisfy himself as to the existing conditions of the areas in which he is to perform his work. He shall conduct and arrange his work so as not to impede or interfere with the work of other Contractors working in the same or adjacent areas. The Contractor shall also be responsible for coordinating any and all work performed by his Subcontractors.

1.07 TIME FOR COMPLETION OF CONTRACT

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

1.08 MAINTENANCE OF EXCAVATED SURFACES

After backfilling and compacting excavations, the Contractor shall be responsible for keeping the ground surface clean and passable at all times until the surface has been restored to original conditions.

1.09 PROTECTION OF AQUIFER & WATER COURSES

A. The Contractor shall take extra precautions to ensure that no pollutants enter surface waters or the groundwater table within the construction area. The Contractor shall not store hazardous fuels or other potential contaminants on the construction site and shall take immediate action if any spills occur. This shall include removal of any contaminated soil and replacement with clean fill. In the event of a spill, the Engineer shall be notified immediately.

B. Refueling of construction equipment and washing of equipment shall not be performed on the site without permission from the Engineer.

PART 2 - PRODUCTS

Not Used

PART 3 - EXECUTION

Not Used

END OF SECTION

SECTION 01092

ABBREVIATIONS

PART 1 - GENERAL

1.01 DESCRIPTION

A. Listing of Abbreviations: The listing of abbreviations in this Specification Section represent the Standard Organization named.

B. Related Work

1. Documents affecting work of this section include, but are not necessarily limited to, General Specifications, Special Conditions, and these Specifications.
2. All related Specification Sections shall be used in conjunction with this Section.

1.02 QUALITY ASSURANCE

A. For products or workmanship specified by association, trade, or Federal Standards, comply with requirements of the Standard, except when more stringent requirements are specified or are required by applicable codes.

B. Conform to reference standard by date of issue current on date for receiving bids.

1.03 LISTING OF STANDARD ORGANIZATIONS AND THEIR ABBREVIATIONS

AA	Aluminum Association
AAN	American Association of Nurserymen
AASHTO	American Association of State Highway and Transportation Officials
ACI	American Concrete Institute
ACPA	American Concrete Pipe Institute
ADC	Air Diffusion Council
AGA	American Gas Association
AGCA	Associated General Contractors of America
AHDGA	American Hot Dip Galvanizers Association
AI	Asphalt Institute
AIA	American Institute of Architects
AISC	American Institute of Steel Constructors
AISI	American Iron and Steel Institute
ANSI	American National Standards Institute
APA	American Plywood Association
API	American Petroleum Institute
ASCE	American Society of Civil Engineers
ASHRAE	American Society of Heating, Refrigerating, and Air Conditioning Engineers
ASME	American Society of Mechanical Engineers
ASTM	American Society of Testing and Materials
AWPA	American Wood Preservers Association
AWS	American Welding Society

AWWA	American Water Works Association
BIA	Brick Institute of America
CRSI	Concrete Reinforcing Steel Institute
CSA	Canadian Standards Association
NHDES	New Hampshire Department of Environmental Services
DHI	Door and Hardware Institute
DIPRA	Ductile Iron Pipe Research Association
EJCDC	Engineers Joint Contract Documents Committee
EPA	Environmental Protection Agency
FM	Factory Mutual
Fed. Spec.	Federal Specification
HI	Hydraulic Institute
IEEE	Institute of Electrical and Electronics Engineers
ISA	Instrument Society of America
ISO	International Standards Organization
MIA	Masonry Institute of America
MIL.	Military Specification
SBC	State Building Code
MSS	Manufacturers Standardization Society of the Valve and Fitting Industry
NAAMM	National Association of Architectural Metal Manufacturers
NCMA	National Concrete Masonry Association
NEC	National Electrical Code
NEMA	National Electrical Manufacturers Association
NFPA	National Fire Protection Association
NRCA	National Roofing Contractors Association
NSPC	National Standard Plumbing Code
OSHA	Occupational Safety and Health Administration
PCA	Portland Cement Association
PCI	Prestressed Concrete Institute
PPI	Plastic Pipe Institute
PS	Product Standards of the National Bureau of Standards
SDI	Steel Door Institute
SIGMA	Sealed Insulating Glass Manufacturers Association
SMACNA	Sheet Metal and Air Conditioning Contractors National Association
SPI	Society of the Plastics Industry
SSPC	Steel Structures Painting Council
TCA	Tile Council of America
TPI	Truss Plate Institute
UL	Underwriters Laboratories

END OF SECTION

SECTION 01150

MEASUREMENT AND PAYMENT

PART 1 - GENERAL

1.01 PAYMENT

A. All Work shall be completed in compliance with the Contract Documents and shall be in accordance with the prices bid.

B. Unless otherwise noted, all excavation, removal of excavated material, and furnishing and placement of fill materials shall be included under any item requiring excavation. Unless otherwise noted, each item shall be furnished and installed in accordance with the technical section whether a specific application payment item exists or not.

C. As to all measurement and payment items described herein, the Contractor is responsible for verifying the types and quality of equipment, fixtures, steel, hardware, pipe, excavate, and any other items required to complete the work under this contract.

1.02 LUMP SUM ITEMS

A. Lump sum payment shall be full compensation for: providing all submissions required prior to the start of work; insurance, permits, licenses, and approvals required for the performance of the work; contract close out procedures including the submission of required documentation, including any transport/disposal fees and taxes; and all other tasks and costs incidental to the project unless otherwise specified.

B. Payment shall also fully compensate the Contractor for any other work that is not specified or shown, but that is necessary to complete the Work.

C. Payment for Work performed shall be in accordance with the breakdown of the lump sum price shown in the Bid Schedule.

D. Should any equipment or material be eliminated under a lump sum item then a Change Order shall be issued.

1.03 UNIT PRICE ITEMS

A. Payments for Work performed shall be in accordance with the unit prices bid on the Bid Form and shall be full compensation for all labor, materials, equipment, taxes and fees, testing, onsite handling and transport of materials covered under the unit price bid item.

B. Both the unit price categories and quantities contained in the Bid Form represent estimates. The Owner maintains the option of including: none, a portion, all or exceeding the estimated quantities listed under this contract. Should the Owner elect not to include any of the unit price categories and/or quantities as a part of this

contract, the Contractor is not entitled to any compensations for loss of revenue or profit. Work shall be performed in accordance with the specifications.

C. Should any unit price items contained in the proposal form be found unnecessary for the proper completion of work contracted, the Owner may eliminate such unit price items from the Contract, and such action shall in no way invalidate the Agreement, and no allowance will be made for items so eliminated in making final payment to the Contractor.

1.04 DESCRIPTION

A. The following subsections describe the measurement of one payment for the work to be done under the items listed in the Bid Proposal.

B. Each price stated in the Bid Proposal constitutes full compensation as herein specified for each item of work completed in accordance with the specifications.

C. The Contractor shall be responsible for any damage incurred due to this work on abutting or adjacent properties, private or public.

D. Bid and Bid Alternate Items will be accepted and applied in any or no combination at the sole discretion of the Town of Wolfeboro. No compensation shall be due to the CONTRACTOR for non-acceptance of any Bid or Bid Alternate Items.

PART 2 - MATERIALS

Not Used

PART 3 – BID ITEMS

3.01 ITEM 1 – Mobilization and Demobilization

A. Payment for the Mobilization and Demobilization Measures shall be made at the lump sum price bid in the Bid Form for Item 1.

B. Measurement and payment shall be full compensation for furnishing all necessary tools and equipment required to install the stormwater improvements complete as shown on the drawings and as specified herein at Camp Birchmont. The work shall include but not be limited to: construction administration costs for project startup and closeout; project costs to coordinate with property owners; property costs to coordinate or comply with applicable local and state permitting; project costs for proper survey layout, establishment of proposed grades and elevations and ongoing grade control by qualified professionals; site mobilization and demobilization of all required tools and equipment during and at the completion of work at both project sites; and all other tasks and costs incidental thereto unless otherwise specified.

3.02 ITEM 2 – Erosion Controls

A. Payment for the installation of erosion controls shall be made at the per linear foot price bid per square yard in the Bid Form for Item 2.

B. Measurement and payment shall be full compensation for providing all necessary material, labor, tools and equipment required to install erosion controls as shown on the drawings and as specified herein. The work shall include but not be limited to: installing linear sedimentation and erosion controls; repair of area adjacent to construction; returning site conditions to pre-construction conditions; and all other tasks and costs incidental thereto unless otherwise specified.

3.03 ITEM 3 – Excavation, Grading & Disposal

A. Payment for Excavation and Grading for Stormwater SCMs shall be made at the per cubic yard price bid in the Bid Form for Item 3.

B. Measurement and payment shall be full compensation for providing all necessary material, labor, tools, hardware, equipment and incidentals required to excavate all materials encountered for the construction of stormwater SCMs as shown on the drawings, as directed by the Engineer, and as specified herein. The work under this item shall include but not be limited to: site mobilization of all required labor, material and equipment; excavation of excavate material to approximate lines and grades from the site as defined in the project plans; loading, handling, management and stockpiling of excavate material on-site; proper disposal of excess material; proper slope and site management for safe excavation and material handling; preparation and grading of virgin material for stormwater SCM subgrade materials; supply of compaction equipment; supply of water for compaction efforts; preparation, shaping and grading of stepped infiltration area; preparation, shaping and grading of perched beach; preparation, shaping and grading of precast concrete step subgrades; preparation, shaping and grading of retaining wall subgrades; preparation, shaping and grading of bit berm speed humps subgrades; preparation, shaping and grading of swales; preparation, shaping and grading of plunge pools; site grading and preparation of final grades in proposed excavation areas and all other exposed surfaces; proper off-site transport and legal disposal of surplus materials; proper coordination of parking and traffic control during installation; repair of area adjacent to construction; returning temporary disturbances and adjacent site conditions to pre-construction conditions; and all other tasks and costs incidental thereto unless otherwise specified.

3.04 ITEM 4 – Excavation Dewatering

A. Payment for the dewatering of open excavations shall be made at the per lump sum price bid in the Bid Form for Item 4.

B. Measurement and payment shall be full compensation for providing all necessary material, labor, tools and equipment required to construct the subgrade materials for the dewatering of open excavations as shown on the drawings and as specified herein. The work shall include but not be limited to: site mobilization of all required labor, material and equipment; installation of dewatering measures; dust control; clean-up; and all other tasks and costs incidental thereto unless otherwise specified.

3.05 ITEM 5 – Sawcut Pavement

A. Payment for the saw cutting of existing pavement shall be made at the per linear foot price bid in the Bid Form for Items 5.

A. Measurement and payment shall be full compensation for providing all necessary material, labor, tools, hardware, equipment and incidentals required to saw cut existing pavement at depths shown on the drawings and as specified herein. Payment shall include removal and disposal of all surplus materials, saw-cutting, excavation, dust control and all else incidental to completing the work.

3.06 ITEM 6 – Rubber Razors

A. Payment for Rubber Razors shall be made at the per each price bid in the Bid Form for Items 6.

B. Measurement and payment shall be full compensation for providing all necessary material, labor, tools and equipment required to install rubber razors as shown on the drawings and as specified herein. The work shall include but not be limited to: site mobilization of all required labor, material and equipment; delivery and installation of pressure treated timber; delivery and installation of rubber razor blades; delivery and installation of gravel; purchase, delivery and installation of armor stone; purchase, delivery and installation galvanized nails or decking screws; repair of area adjacent to construction; returning site conditions to pre-construction conditions; and all other tasks and costs incidental thereto unless otherwise specified.

3.07 ITEM 7 – Bit Berm Speed Humps

A. Payment for Bit Berm Speed Humps shall be made at the unit price per linear foot price bid in the Bid Form for Item 7.

B. Measurement and payment shall be full compensation for providing all necessary material, labor, tools and equipment required to install bit berm speed humps as shown on the drawings and as specified herein. The work shall include but not be limited to: site mobilization of all required labor, material and equipment; purchase, delivery, and installation of hot mix asphalt speed humps; repair of area adjacent to construction; returning site conditions to pre-construction conditions; and all other tasks and costs incidental thereto unless otherwise specified.

3.08 ITEM 8 – Riprap for Plunge Pools

A. Payment for the installation of riprap stone shall be made at the per ton price bid in the Bid Form for Item 8.

B. Measurement and payment shall be full compensation for providing all necessary material, labor, tools and equipment required to install riprap stone within the plunge

pools as shown on the drawings and as specified herein. The work shall include but not be limited to: site mobilization of all required labor, material and equipment; purchase, delivery, placement, grading and compaction of the riprap stone; coordination of parking and traffic control during installation; dust control; clean-up; and all other tasks and costs incidental thereto unless otherwise specified.

3.09 ITEM 9 – Concrete for Perched Beach Retaining and Stairs

A. Payment for the installation of a concrete retaining wall with stairs shall be made at the unit price bid per cubic yard in the Bid Form for Items 9.

B. Measurement and payment shall be full compensation for providing all necessary material, labor, tools and equipment required to install a concrete retaining wall with stairs as shown on the drawings and as specified herein. The work shall include but not be limited to: purchase, delivery and installation of formwork; purchase, delivery, and installation of rebar; purchase, delivery, and installation of concrete; repair of area adjacent to construction; returning site conditions to pre-construction conditions; and all other tasks and costs incidental thereto unless otherwise specified.

3.10 ITEM 10 – Versa-Lok Blocks (Stepped Infiltration Area Retaining Wall)

A. Payment to construct a concrete block retaining wall system using Versa-Lok Blocks shall be made at the per each price bid in the Bid Form for Item 10.

B. Measurement and payment shall be full compensation for providing all necessary material, labor, tools and equipment required to install the concrete block retaining wall system as shown on the drawings and as specified herein. The work shall include but not be limited to: site mobilization of all required labor, material and equipment; site grading; preparation of compacted subgrade; purchase, delivery and installation of subgrade crushed stone layers; purchase delivery and installation of filter fabrics; purchase; purchase, delivery and installation of concrete blocks and associated materials; purchase, delivery and installation of backfill material; returning site conditions to pre-construction conditions and all other tasks and costs incidental thereto unless otherwise specified.

3.11 ITEM 11 – Impermeable Membrane (Stepped Infiltration Area)

A. Payment for the installation of impermeable membrane shall be made at the per square yard price bid in the Bid Form for Item 11.

A. Measurement and payment shall be full compensation for providing all necessary material, labor, tools and equipment required to furnish and install impermeable membrane as shown on the drawings and as specified herein. The work shall include but not be limited to: site mobilization of all required labor, material and equipment; site grading and preparation of compacted subgrade; delivery and installation of impermeable membrane as shown on drawings; repair of area adjacent to construction; returning site conditions to pre-construction conditions; and all other tasks and costs incidental thereto unless otherwise specified.

3.12 ITEM 12 – Filter Fabric (Stepped Infiltration Area)

C. Payment for the installation of filter fabric shall be made at the per square yard price bid in the Bid Form for Item 12.

B. Measurement and payment shall be full compensation for providing all necessary material, labor, tools and equipment required to furnish and install impermeable membrane as shown on the drawings and as specified herein. The work shall include but not be limited to: site mobilization of all required labor, material and equipment; site grading and preparation of compacted subgrade; delivery and installation of filter fabric as shown on drawings; repair of area adjacent to construction; returning site conditions to pre-construction conditions; and all other tasks and costs incidental thereto unless otherwise specified.

3.13 ITEM 13 – Crushed Stone (Stepped Infiltration Area)

A. Payment for crushed stone shall be made at the per ton price bid in the Bid Form for Item 13.

C. Measurement and payment shall be full compensation for providing all necessary material, labor, tools and equipment required to furnish and install a layer of crushed stone as shown on the drawings and as specified herein. The work shall include but not be limited to: site mobilization of all required labor, material and equipment; site grading and preparation of compacted subgrade; delivery and installation of crushed stone as shown on drawings; repair of area adjacent to construction; returning site conditions to pre-construction conditions; and all other tasks and costs incidental thereto unless otherwise specified.

3.14 ITEM 14 – Pea Stone (Stepped Infiltration Area)

A. Payment for pea stone shall be made at the per ton price bid in the Bid Form for Item 14.

D. Measurement and payment shall be full compensation for providing all necessary material, labor, tools and equipment required to furnish and install a layer of pea stone as shown on the drawings and as specified herein. The work shall include but not be limited to: site mobilization of all required labor, material and equipment; site grading and preparation of compacted subgrade; delivery and installation of pea stone as shown on drawings; repair of area adjacent to construction; returning site conditions to pre-construction conditions; and all other tasks and costs incidental thereto unless otherwise specified.

3.15 ITEM 15 – Sand (Stepped Infiltration Area)

A. Payment for sand shall be made at the per cubic yard price bid in the Bid Form for Item 14.

E. Measurement and payment shall be full compensation for providing all necessary material, labor, tools and equipment required to furnish and install a layer of sand as shown on the drawings and as specified herein. The work shall include but not be

limited to: site mobilization of all required labor, material and equipment; site grading and preparation of compacted subgrade; delivery and installation of sand as shown on drawings; repair of area adjacent to construction; returning site conditions to pre-construction conditions; and all other tasks and costs incidental thereto unless otherwise specified.

3.16 ITEM 16 – Removal and Disposal of Existing Catch Basin

A. Payment for the removal and disposal of an existing catch basin shall be made at the per each price bid in the Bid Form for Item 46.

B. Measurement and payment shall be full compensation for providing all necessary material, labor, tools and equipment required to remove and dispose existing catch basin as shown on the drawings and as specified herein. The work shall include but not be limited to: site mobilization of all required labor, material and equipment; removal of catch basin; proper disposal of catch basin; coordination of parking and traffic controls; dust control; clean-up; and all other tasks and costs incidental thereto unless otherwise specified.

3.17 ITEM 17 – Deep Sump Catch Basin with Drop Inlet

A. Payment to install a Deep Sump Precast Concrete Catch Basin with a Drop Inlet shall be made at the unit price bid per each in the Bid Form for Item 17.

B. Measurement and payment shall be full compensation for providing all necessary material, labor, tools and equipment required to install a deep sump precast catch basin as shown on the drawings and as specified herein. The work shall include but not be limited to: site mobilization of all required labor, material and equipment; purchase, delivery, installation of precast concrete catch basin with drop inlet; purchase, delivery, installation and compaction of crushed stone subgrade materials; purchase, delivery and installation of support materials including any required field concrete or mortar needed for leveling or sealing; purchase, delivery, installation and compaction of backfill materials; repair of area adjacent to construction; returning site conditions to pre-construction conditions; and all other tasks and costs incidental thereto unless otherwise specified.

3.18 ITEM 18 – Loam, Seed, and Fine Grading

F. Payment for the furnishing and installation of loam, seed and fine grading shall be made at the per cubic yard price bid per linear foot in the Bid Form for Item 18.

G. Measurement and payment shall be full compensation for providing all necessary material, labor, tools and equipment required to loam, seed and fine grade all disturbed areas as shown on the drawings and as specified herein. The work shall include but not be limited to: loaming, seeding and fine grading to repair areas adjacent to construction; returning site conditions to pre-construction conditions; and all other tasks and costs incidental thereto unless otherwise specified.

3.19 EARTH EXCAVATION AND BACKFILL IN TRENCHES

A. Any excavating and backfilling required shall not be measured separately for payment but shall be considered incidental to the project and corresponding bid items as described above.

B. Any fill material required to complete the work shown in the contract shall not be separately measured for payment but shall be considered incidental to the project and corresponding bid items as described above.

3.20 SURFACE RESTORATION

A. The work for surface restoration shall include loaming and seeding and all incidentals thereto for all disturbed areas. The work on adjacent areas to construction shall not be separately measured for payment, but shall be considered incidental to the project and corresponding bid items as described above.

B. Any existing fences which are required to be removed and reset shall not be separately measured for payment, but shall be considered incidental to the project.

C. Any replacement of paved surfaces or concrete sidewalk not described in bid items above that are disturbed during excavation shall not be separately measured for payment, but shall be considered incidental to the project.

3.21 EROSION AND SEDIMENT CONTROLS:

Excluding the initial compost filter sock installation specified in Items 15 and 35, all erosion and sediment controls required to protect the project area and areas outside the limits of work shown on the drawings from construction activities shall be considered incidental to the project. This work shall not be separately measured for payment.

3.22 DEWATERING AND DRAINAGE

Standard dewatering and handling groundwater drainage in accordance with the specifications including all labor, tools and equipment as required shall not be measured separately for payment but shall be considered incidental to the project unless specified elsewhere or as required by the Engineer/Owner when special dewatering procedures may be required.

3.23 DIVERSION OF STORMWATER RUNOFF

Diversion of stormwater runoff to prevent damage to construction in progress during rain events in accordance with the specifications including all labor, tools and equipment as required shall not be measured separately for payment but shall be considered incidental to the project.

3.24 POLICING AND TRAFFIC CONTROLS

Providing police details and control of traffic in accordance with the specifications including all labor, tools and equipment as required shall not be measured separately for payment but shall be considered incidental to the project unless specified elsewhere or directed by the Owner/Engineer.

END OF SECTION

SECTION 01330

PROJECT SUBMITTALS

PART 1 - GENERAL

1.01 SUMMARY:

A. For the purpose of this project the ENGINEER or CONSULTANT shall be Comprehensive Environmental, Inc., 21 Depot Street, Merrimack, NH 03054.

B. This Section includes administrative and procedural requirements for submittal of Shop Drawings, Product Data, Preconstruction Documentation, Samples, the Submittal Schedule, and other miscellaneous administrative and quality control submittals.

C. Submittal Schedule: The Submittal Schedule shall document the Contractor's planning for the timely execution of the Work, in accordance with the Construction Contract and submittal requirements set forth in this Section.

D. Preconstruction Documentation includes but is not limited to videos, photos, or any other documentation in here.

E. Shop Drawings include, but are not limited to, the following: (Note: standard information prepared without specific reference to the Project is not Shop Drawings).

1. Fabrication drawings
2. Installation drawings
3. Setting diagrams
4. Shopwork manufacturing instructions
5. Templates and patterns
6. Schedules

F. Product Data include, but are not limited to, the following:

1. Manufacturer's product data
2. Manufacturer's installation instructions
3. Standard color charts
4. Catalogue cuts
5. Roughing-in diagrams and templates
6. Standard wiring diagrams
7. Printed performance curves
8. Operational range diagrams
9. Mill reports
10. Standard product operating and maintenance manuals

G. Samples include, but are not limited to, the following:

1. Partial sections of manufactured or fabricated components

2. Small cuts or containers of materials
3. Complete units of repetitively used materials
4. Swatches showing color, texture, and pattern
5. Color range sets
6. Components used for independent inspection and testing

H. Quality control submittals include, but are not limited to, the following:

1. Design data
2. Certifications
3. Manufacturer's instructions
4. Manufacturer's field reports

I. Administrative submittals: Refer to other Division 1 Sections and other Contract Documents for requirements for administrative submittals. Such submittals include, but are not limited to, the following:

1. Permits
2. Applications for Payment
3. Performance and payment bonds
4. Insurance certificates
5. Listing of subcontractors

1.02 DEFINITIONS:

A. Field samples are full-size physical examples erected on-site to illustrate finishes, coatings, or finish materials. Field samples are used to establish the standard by which the Work will be judged.

B. Mock-ups are full-size assemblies for review of construction, coordination, testing, or operation; they are not Samples.

1.03 SUBMITTAL SCHEDULE:

A. Prepare a complete schedule of submittals. Submit the schedule at the Pre-Construction meeting for Engineer's and Consultant's review.

1. Coordinate Submittal Schedule with the list of subcontractors, Schedule of Values, and the list of material suppliers, as the well as the Contractor's Construction Schedule.
2. Incorporate submittal schedule in Contractor's Construction Schedule.

B. Prepare the schedule in chronological order. Provide the following information:

1. Schedule date for the first submittal
2. Related Section number
3. Submittal category (Shop Drawings, Product Data, etc.)
4. Name of the subcontractor

5. Description of the part of the Work covered
6. Scheduled date for resubmittal
7. Scheduled date for the Consultant's final release or approval

C. Distribution: Following the Consultant's response to the initial submittal schedule, print and distribute copies to the Consultant, Engineer, subcontractors, and other parties required to comply with submittal dates indicated. When revisions are made, distribute to the same parties. Delete parties from distribution when they have completed their assigned part of the Work and are no longer involved in construction activities.

D. Schedule Updating: Revise the schedule after each meeting or other activity where revisions have been recognized or made. Issue the updated schedule prior to the next regular project meeting.

1.04 SUBMITTAL PROCEDURES:

A. Coordination: Coordinate preparation and processing of submittals with performance of construction activities. Transmit each submittal to the Consultant sufficiently in advance of schedule performance of related construction activities to avoid delay.

1. Coordinate each submittal with other submittals and related activities that require sequential activity including:

a) Testing
b) Purchasing
c) Fabrication
d) Delivery
e) Other submittals and related activities that require sequential activity

2. Coordinate transmittal of different types of submittals for the same element of the Work and different elements of related parts of the Work to avoid delay in processing because of the Consultant's need to review submittals concurrently for coordination.

a) The Consultant reserves the right to withhold action on a submittal requiring coordination with other submittals until related submittals are received.

3. Processing: To avoid the need to delay installation as a result of the time required to process submittals, allow sufficient time for Contractor's review prior to submittal to the Consultant, and for Consultant's review of submittal, including time for re-submittals.

a) Allow ten (10) working days for the Consultant's or Engineer's initial review of each submittal, plus five (5) working days if a Sub-Consultant/Engineer's review is required. Allow additional time if the Consultant must delay processing to permit coordination with subsequent

submittals. The Consultant will advise the Contractor when a submittal being processed must be delayed for coordination.

b) Where necessary to provide an intermediate submittal, process the intermediate submittal in the same manner as the initial submittal.

c) Allow five (5) additional working days for reprocessing each submittal.

d) No extension of contract time will be authorized because of the Contractor's failure to transmit submittals to the Consultant sufficiently in advance of the Work to permit processing.

B. Submittal Preparation: Place a permanent label or title block on each submittal for identification:

1. Indicate name of the firm or entity that prepared each submittal on the label or title block.
2. Provide a space approximately 4 by 5 inches (100 x 125 mm) on the label or beside the title block to record the Contractor's review and approval markings and the action taken by the Consultant.
3. Include the following information on the label for processing and recording action taken:

a) Project name
b) Date
c) Name and address of the Consultant
d) Name and address of the Contractor
e) Name and address of the subcontractor
f) Name and address of the supplier
g) Name of the manufacturer
h) Number and title of appropriate Specification Section
i) Drawing number and detail references, as appropriate
j) Similar definitive information as necessary

C. Submittal Transmittal: Package each submittal appropriately for transmittal and handling. Transmit each submittal from the Contractor to the Consultant and to other destinations by use of a transmittal form. The Consultant will return submittals received from sources other than the Contractor.

1. Record relevant information and requests for data on the transmittal form. On the form, or an attached separate sheet, record deviations from the requirements of the Contract Documents, including minor variations and limitations.
2. Include the Contractor's certification stating that information submitted complies with requirements of the Contract Documents.

D. Placement of Orders for Materials & Components: Do not place orders for materials or components before receipt of reviewed and accepted submittal for same from Consultant.

1.05 SHOP DRAWINGS:

A. Submit newly prepared information, drawn accurately to scale. Do not reproduce Contract Documents or copy standard printed information as the basis of Shop Drawings.

1. Include the following information on Shop Drawings:

a) Identification of products and materials included
b) Compliance with specified standards
c) Notation of coordination requirements
d) Notation of dimensions established by field measurement taken by the Contractor
e) Correlation of Shop Drawings to Contract Documents by reference to sheet number, details, schedule or room number.

2. Specifically note and bring to the Consultant's attention any deviations from the Contract Documents on the Shop Drawings.
3. Do not allow Shop Drawing copies that do not contain an appropriate final stamp or other marking indicating the action taken by the Consultant to be used in construction. The Contractor shall replace improvements installed by the Contractor prior to obtaining approval by the submittal process, if Engineer so requests, at no additional cost to the Engineer.
4. Sheet Size: Except for templates, patterns, and similar full-size Drawings, submit Shop Drawings on sheets at least 8-1/2 by 11 inches (215 by 280 mm) but no larger than 30 by 42 inches (750 by 1050 mm).
5. Initial Submittal: Submit up to 5 black-line prints or bond copies for the Consultant's review. The Consultant will return one marked up copy after review. If the Contractor desires more than one copy back, submit additional copies at initial submittal.
6. Final Submittal: Submit up to 5 black-line prints or bond copies for the Consultant's review. If approved, one copy will be returned to the contractor. If the Contractor desires more than one copy back, submit additional copies at final submittal.

1.06 PRODUCT DATA:

A. Collect Product Data into a single submittal for each element of construction or system. Mark each copy to show which choices and options are applicable to the project.

1. Where Product Data includes information on several similar products, some of which are not required for use on the Project, mark copies clearly to indicate which products are applicable.
2. Where Product Data must be specially prepared for required products, materials, or systems because standard printed data are not suitable for use, submit as Shop Drawings, not Product Data.
3. Include the following information in Product Data:

a) Manufacturer's printed recommendations

b) Compliance with recognized trade association standards
c) Compliance with recognized testing agency standards
d) Application of testing agency labels and seals
e) Notation of dimensions verified by field measurement
f) Notation of coordination requirements

4. Do not submit Product Data until compliance with requirements of the Contract Documents has been confirmed. Include a signed certificate of compliance with each Product Data submittal.

B. Submittals: Submit up to 5 copies of each required Product Data submittal. One copy will be returned to the Contractor. If the Contractor desires more than one copy back, submit additional copies. Unless the Consultant or Engineer observes noncompliance with provisions of the Contract Documents, the submittal may serve as the final submittal.

C. Distribution: Furnish copies of final Product Data submittal to the manufacturers, subcontractors, suppliers, fabricators, installers, governing authorities and others as required for performance of the construction activities. Show distribution on transmittal forms.

1. Do not proceed with installation of materials, products, and systems until a copy of reviewed and accepted Product Data applicable to the installation is in the Installer's possession.
2. Do not permit use of unmarked copies of Product Data in connection with construction.

1.07 SAMPLES:

A. Submit full-size, fully fabricated Samples, cured and finished in the manner specified, and physically identical with the material or product proposed for use.

1. Mount, display, or package Samples in the manner specified to facilitate review of qualities indicated. Prepare Samples to match the Consultant's sample where so indicated. Include the following information:

a) Generic description of the Sample
b) Size limitations
c) Sample source
d) Product name or name of manufacturer
e) Compliance with recognized standards
f) Compliance with governing regulations
g) Availability
h) Delivery time

2. Submit Samples for review of kind, color, pattern, and texture for a final check of these characteristics with other elements and for a comparison of these

characteristics between the final submittal and the actual component as delivered and installed.

a) Where variation in color, pattern, texture, or other characteristic is inherent in the material or product represented by a Sample, submit at least 3 multiple units that show approximate limits of the variations.
b) Refer to other Specification Sections for requirements for Samples that illustrate workmanship, fabrication techniques, details of assembly, connections, operation, and similar construction characteristics.
c) Samples not incorporated into the Work, or otherwise designated as the Engineer's property, are the property of the Contractor and shall be removed from the site prior to Substantial Completion.

B. Preliminary Submittals: Where Samples are specified for selection of color, pattern, texture, or similar characteristics from a manufacturer's range of standard choices, submit a single, full set of available choices for the material or product.

1. Preliminary submittals will be reviewed and returned with the Consultant's marking indicating selection and other action taken.

C. Submittals: Except for Samples intended to illustrate assembly details, workmanship, fabrication techniques, connections, operation, and other characteristics, submit 3 sets of Samples. The Consultant will return one set to the Contractor marked with the action taken, retain one set, and transmit one set to the Engineer.

1. Maintain sets of Samples, as returned by the Consultant, at the project site, available for quality-control comparisons throughout the course of construction activity.
2. Unless the Consultant or Engineer observes noncompliance with the provisions of the Contract Documents, the submittal may serve as the final submittal.
3. Sample sets may be used to obtain final acceptance of the construction associated with each set.

D. Distribution of Samples: Distribute additional sets of Samples to the subcontractors, suppliers, fabricators, manufacturers, installers, governing authorities, and others as required for performance of the Work. Show distribution on transmittal forms.

E. Field Samples specified in individual Specification Sections are special types of Samples. Comply with Sample submittal requirements to the fullest extent possible. Process transmittal forms to provide a record of activity.

1.08 QUALITY ASSURANCE SUBMITTALS:

A. Submit quality-control submittals, including design data, certifications, manufacturer's instructions, manufacturer's field reports, and other quality-control submittals as required under other Sections of the Specifications.

B. Certifications: Where other Sections of the Specifications require certification that a product, material, or installation complies with specified requirements, submit a notarized certification from the manufacturer certifying compliance with the specified requirements.

1. Signature: Certification shall be signed by an officer of the manufacturer or other individual authorized to sign documents on behalf of the company.

C. Inspection and Test Reports: Requirements for submittal of inspection and test reports from independent testing agencies are specified in Division 1 Section "Quality Control."

1.09 CONSULTANT'S ACTION:

A. Except for submittals for the record or for information, where action and return of submittals is required, the Consultant or their respective sub-consultant will review each submittal, mark to indicate the action taken, and return to the Contractor within ten (10) working days of receipt of the submittal.

1. Compliance with specified characteristics is the Contractor's responsibility and not considered part of the Consultant's review and indication of action taken.
2. If the submittal involves either changes to the drawings and/or project manual or contains information not reviewed and approved as part of the project drawings and/or project manual by the Engineer, the Engineer shall also review and approve the submittal. An additional five (5) working days shall be required for the Engineer's review.

B. Action Stamp: The Consultant will stamp each submittal with a uniform action stamp. The Consultant will mark the stamp appropriately to indicate the action taken, as follows:

1. Final Unrestricted Release: Where submittals are marked "No Exceptions Taken," or similar language having the same intent, the Work covered by the submittal may proceed, provided it complies with the requirements of the Contract Documents. Final acceptance will depend on that compliance.
2. Final-but-Restricted Release: Where submittals are marked "Make Corrections Noted," or similar language having the same intent, the Work covered by the submittal may proceed provided it complies with both the Consultant's notations and corrections on the submittal and requirements of the Contract Documents. Final acceptance will depend on that compliance.
3. Returned for Resubmittal: When submittal is marked "Revise and Resubmit," or similar language having the same intent, do not proceed with the Work covered by the submittal, including purchasing, fabrication, delivery, or other activity. Revise or prepare a new submittal according to the Consultant's notations. Resubmit without delay. Repeat if necessary to obtain an action mark that will allow the Work to proceed.

a) Do not permit submittals marked "Revise and Resubmit" or "Rejected," or similar language having the same intent, to be used at the project site or elsewhere where construction is in progress.

4. Other Actions: Where a submittal is primarily for informational or record purposes or for special processing or other activity, the submittal will be returned, marked “Action not Required,” or “Not Reviewed,” or similar language having the same intent.

PART 2 - PRODUCTS:

Not Used

PART 3 - EXECUTION:

Not Used

END OF SECTION

SECTION 01356

STORMWATER POLLUTION PREVENTION MEASURES

PART 1 GENERAL

1.01 DESCRIPTION

This specification covers the requirements for temporary construction measures most used in complying the Best Management Practices of the storm water pollution prevention plan as required by federal, state, or local laws and regulations.

1.02 REFERENCES

ASTM D4439	Standard Terminology for Geosynthetics
ASTM D4491	Water Permeability of Geotextiles by Permittivity
ASTM D4533	Trapezoid Tearing Strength of Geotextiles
ASTM D4632	Grab Breaking Load and Elongation of Textiles
ASTM D4751	Determining Apparent Opening Size of a Geotextile
ASTM D4873	Identification, Storage, and Handling of Geosynthetic Rolls

1.03 GENERAL

A. The Contractor shall implement the storm water pollution prevention measures specified in this section in a manner which will meet the requirements of Section 01567 Environmental Protection, and the requirements of federal, state, and local laws.

1.04 EROSION AND SEDIMENT CONTROLS

A. Discharge of trench, pit or pipe installation dewatering water shall be to a temporary sedimentation collection/filtration structure, adequately protected drainage structure or other method/device as approved by the Engineer. Existing drainage structures shall be protected from water containing any sediment(s) by methods approved by the Engineer.

B. The stabilization practices to be implemented shall include sod stabilization, protection of trees, and preservation of mature vegetation. On his daily report, the Contractor shall record the dates when major grading activities occur, when construction activities temporarily or permanently cease on a portion of the site; and when stabilization practices are initiated.

C. Stabilization practices shall be initiated prior to construction and maintained until permanent protection is established.

D. Any disturbed area subject to erosion control measures shall be in accordance with Specification Section 02276 EROSION CONTROL.

E. Structural practices shall be implemented to divert flows from exposed soils, temporarily store flows, or otherwise limit runoff and the discharge of pollutants from exposed areas of the site. Structural practices shall be implemented prior to any land disturbance to minimize erosion and sediment runoff. Structural practices shall include the following device.

F. The Contractor shall provide Filtrexx SiltSoxx™ as a temporary structural practice to minimize erosion and sediment runoff. Filtrexx SiltSoxx™ shall be properly placed to effectively retain sediment prior to any land disturbance. Filtrexx SiltSoxx™ shall be removed/replaced as needed for work to progress in the drainage area. Areas where Filtrexx SiltSoxx™ are to be used are shown on the drawings. Final removal of Filtrexx SiltSoxx™ barriers shall be upon approval by the Engineer. Rows of Filtrexx SiltSoxx™ shall be provided as follows:

1. Along the downhill perimeter edge of all areas disturbed.
2. Along the top of the slope or top bank of drainage ditches, channels, swales, etc. that traverse disturbed areas.
3. Along the toe of all cut slopes and fill slopes of the construction areas.
4. Perpendicular to the flow in the bottom of existing drainage ditches, channels, swales, etc. that traverses disturbed areas or carry runoff from disturbed areas.
5. Perpendicular to the flow in the bottom of new drainage ditches, channels, and swales. Rows shall be spaced a maximum of 4 feet apart.
6. At the entrance to the culverts that receive runoff from disturbed areas.

PART 2 – PRODUCTS

2.01 PERMEABLE COMPOST FILTER SOCK (FILTREXX SILTSOXX™)

Permeable compost filter socks shall be as specified in Specification Section 02276 EROSION CONTROL.

2.02 SILT FENCES

Silt fences shall be as specified in Specification Section 02276 EROSION CONTROL.

2.03 STRAW BALES

Straw bales shall be as specified in Specification Section 02276 EROSION CONTROL.

PART 3 – EXECUTION

3.01 INSTALLATION OF PERMEABLE COMPOST FILTER SOCK

Installation of permeable compost filter socks shall be as specified in Specification Section 02276 EROSION CONTROL.

3.02 INSTALLATION OF SILT FENCES

Installation of silt fences shall be as specified in Specification Section 02276 EROSION CONTROL.

3.03 INSTALLATION OF HAY BALES

Installation of haybales shall be as specified in Specification Section 02276 EROSION CONTROL.

3.04 MAINTENANCE

A. The Contractor shall maintain the temporary and permanent vegetation, erosion and sediment control measures, and other protective measures in good and effective operating condition by performing routine inspections to determine condition and effectiveness, by restoration of destroyed vegetative cover, and by repair of erosion and sediment control measures and other protective measures.

B. Silt fences shall be inspected as specified herein. Any required repairs shall be made promptly. Close attention shall be paid to the repair of damaged silt fence resulting from end runs and undercutting. Should the fabric on a silt fence decompose or become ineffective, and the barrier is still necessary, the fabric shall be replaced promptly. Sediment deposits shall be removed when deposits reach one-third the height of the barrier. When a silt fence is no longer required, it shall be removed. The immediate area occupied by the fence and any sediment deposits shall be shaped to an acceptable grade.

C. Straw bale barriers shall be inspected as specified herein. Close attention shall be paid to the repair of damaged bales, end runs and undercutting beneath bales. Necessary repairs to barriers or replacement of bales shall be accomplished promptly. Sediment deposits shall be removed when deposits reach one-half of the height of the barrier. Bale rows used to retain sediment shall be turned uphill at each end of each row. When a hay bale barrier is no longer required, it shall be removed. The immediate are occupied by the bales and any sediment deposits shall be shaped to an acceptable grade.

3.05 INSPECTIONS

A. The Contractor shall inspect disturbed areas of the construction site, areas used for storage of materials that are exposed to precipitation that have not been finally stabilized, stabilization practices, structural practices, other controls, and area where vehicles exit the site at least once every seven calendar days and within 24 hours of the end of any storm that produces 0.5 inches or more rainfall at the site. Where sites have been finally stabilized, such inspection shall be conducted at least once every month.

B. Disturbed areas and areas used for material storage that are exposed to precipitation shall be inspected for evidence of, or the potential for, pollutants entering the drainage system. Erosion and sediment control measures identified in the Storm Water Pollution Prevention Plan shall be observed to ensure that they are operating correctly. Discharge locations or points shall be inspected to ascertain whether erosion control measures are effective in preventing significant impacts to receiving waters. Locations where vehicles exit the site shall be inspected for evidence of offsite sediment tracking.

C. For each inspection conducted, the Contractor shall prepare a report summarizing the scope of the inspection, name(s) and qualifications of personnel making the inspection, the date(s) of the inspection, major observations relating to the implementation of the Storm Water Pollution Prevention Plan, maintenance performed, and actions taken. The report shall be furnished to the Engineer within 24 hours of the inspection as a part of the Contractor's daily report. A copy of the inspection report shall be maintained on the job site.

END OF SECTION

SECTION 01505
MOBILIZATION / STAGING / DEMOBILIZATION

PART 1 - GENERAL

1.01 DESCRIPTION

A. Work Includes: The transportation and storage of all equipment, labor and materials to and from the construction site necessary to the Work and the Contractors field office.

B. RELATED WORK

Documents affecting work of this Section include, but are not necessarily limited to, General Conditions, Supplementary Conditions, and these Specifications.

PART 2 - MATERIALS

NOT USED

PART 3 - EXECUTION

3.01 STORAGE AREA

It shall be the Contractor's sole responsibility to procure and maintain a suitable storage area for tools, materials and equipment necessary to perform the work.

1. The storage area obtained by the Contractor shall not obstruct or interfere with pedestrian or vehicular movement, and shall not occupy any space within the public right-of-way, except with specific permission from the Owner.

2. Access to the site and staging of equipment and materials should be completed only on the impacted property that is owned by Camp Pierce Birchmont.

3. The storage / staging areas shall be kept neat at all times.

4. The storage / staging areas shall be surrounded by erosion controls as shown on the Contract Drawings.

5. The Owner shall not be a party to negotiations related to acquisition of areas for storage or cleanup of the same.

3.02 EQUIPMENT

Contractor shall transport all equipment to the site, assemble the equipment, disassemble equipment and remove as needed to proceed with the work. During construction, all equipment and materials shall be maintained as needed during the work.

END OF SECTION

SECTION 01545

PROTECTION OF PROPERTY

PART 1 - GENERAL

1.01 DESCRIPTION

Work Included: The Contractor shall provide all necessary protection of existing property to prevent any damage to property adjacent to the construction.

1.02 RELATED WORK

Documents affecting work of this Section include, but are not necessarily limited to, General Specifications, Special Conditions, and these Specifications.

PART 2 - MATERIALS

Not Used

PART 3 - EXECUTION

3.01 PROTECTION OF PROPERTY

The Contractor shall, at his own expense, preserve and protect from injury all property either public or private along and adjacent to the line of work, and be responsible for and repair any and all damage and injury thereto, arising out of or in consequence of any act or omission of the Contractor.

1. All existing pipes, culverts, poles, wires, fences, mailboxes, stone walls, curbs, bounds, etc., shall be temporarily removed, supported in place or otherwise protected from injury, and shall be restored to at least as good condition as that in which they were found immediately prior to the start of work.

2. Lawns, shrubs, bushes, planting beds and decorative trees disturbed or damaged shall be restored to a condition equal to that found prior to the start of construction, either by temporary transplant or replacement in kind, except as otherwise indicated on the Drawings.

3. Property which has been damaged and replaced shall be equal in quality and workmanship to the damaged property and shall be subject to the approval of the property owner.

4. Branches which interfere with construction may be removed, only upon approval of the Owner.

    a. Limbs and branches shall be trimmed off neatly and cleanly, close to the trunk of the tree or to its main branch.

END OF SECTION

SECTION 01562

DUST CONTROL

PART 1 - GENERAL

1.01 DESCRIPTION

This section of the specifications covers the control of dust complete.

PART 2 - PRODUCTS

2.01 CALCIUM CHLORIDE

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

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

PART 3 - EXECUTION

3.01 CONTROL

A. Contractor shall utilize all dust control measures necessary to keep dust emissions at the site within safe acceptable levels. Such dust control measures may include street sweeping with water, the use of dust suppressants (calcium chloride), wetting, traffic reduction, covers on earth moving equipment, etc. Should the Engineer determine that dust emissions from the Contractor's work are excessive, the Contractor shall stop work, without penalty to the Owner, until additional dust control measures are employed and dust levels are reduced to an acceptable level.

B. All other acceptable methods of dust control shall be implemented before resorting to chemical applications for dust control.

C. The Contractor shall be responsible for any accumulated dust control water and/or wash water which shall be collected and filtered through a 5 micron filter prior to discharge in accordance with the regulations.

3.02 CALCIUM CHLORIDE

A. Calcium chloride shall be applied when ordered by the Engineer.

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

END OF SECTION

SECTION 01567

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, stream crossings and areas adjacent to wetlands and ponds, unless otherwise specifically stated.

C. The Contractor shall minimize environmental pollution and damage that may occur as the result of construction operations. The environmental resources within the project boundaries and those affected outside the limits of permanent work shall be protected during the entire duration of this contract.

D. The Contractor shall comply with all applicable environmental Federal, state, and local laws and regulations. The Contractor shall be responsible for any delays resulting from failure to comply with environmental laws and regulations.

E. The Contractor shall ensure compliance with this section by subcontractors.

1.02 DEFINITIONS

A. Environmental Pollution and Damage: Environmental pollution and damage is the presence of chemical, physical, or biological elements or agents which adversely affect human health or welfare; unfavorably alter ecological balances of importance to human life; affect other species of importance to humankind; or degrade the environment aesthetically, culturally and/or historically.

B. Environmental protection is the prevention/control of pollution and habitat disruption that may occur to the environment during construction. The control of environmental pollution and damage requires consideration of land, water, and air; biological and cultural resources; and includes management of visual aesthetics; noise; solid, chemical, gaseous, and liquid waste; radiant energy and radioactive material as well as other pollutants.

C. Contractor generated hazardous waste means materials that, if abandoned or disposed of, may meet the definition of a hazardous waste. These waste streams would typically consist of material brought on site by the Contractor to execute work, but are not fully consumed during the course of construction.

D. Wetlands means those areas that are inundated or saturated by surface or groundwater at a frequency and duration sufficient to support, and that under normal circumstances do support, a prevalence of vegetation typically adapted for life in saturated soil conditions. Wetlands generally include swamps, marshes, and bogs. Official determination of whether or not an area is classified as a wetland must be done in accordance with applicable regulations.

E. Resource areas exist within the limits of the proposed work; Waterbody definition limits and Protected Shoreland Areas are delineated on the plans.

1.03 NOTIFICATION

A. The Engineer will notify the Contractor in writing of any non-compliance with the foregoing provisions. 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 Engineer may order stoppage of all or part of the work until satisfactorily 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 orders shall be made unless it was later determined that the Contractor was in compliance.

1.04 AREAS 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.

B. Prior to commencing construction activities, the Contractor shall mark the areas that need not be disturbed under this contract. Isolated areas within the general work area which are not to be disturbed shall be marked or fenced. Monuments and markers shall be protected before construction operations commence. Where construction operations are to be conducted during darkness, any markers shall be visible in the dark. The Contractor's personnel shall be knowledgeable of the purpose for marking and/or protecting particular objects.

1.05 GENERAL REQUIREMENTS

A. Discharge of dewatering water shall be to a temporary sedimentation collection/filtration structure, adequately protected drainage structure or other method/device as approved by the Engineer. Existing drainage structures shall be protected from water containing any sediment(s) by methods approved by the Engineer.

B. The Contractor shall minimize environmental pollution and damage that may occur as the result of construction operations. The environmental resources within the project boundaries and those affected outside the limits of permanent work shall be protected during the entire duration of this contract.

C. The Contractor shall comply with all applicable environmental federal, state, and local laws and regulations. The Contractor shall be responsible for any delays resulting from failure to comply with environmental laws and regulations.

1.06 ENVIRONMENTAL ASSESSMENT OF CONTRACT DEVIATIONS

A. Any deviations, requested by the Contractor, from the drawings, plans, and specifications which may have an environmental impact will be subject to approval by the Engineer and may require an extensive review, processing, and approval time. The Engineer reserves the right to disapprove alternate methods, even if they are more cost effective, if the Engineer determines that the proposed alternate method will have an adverse environmental impact.

PART 2 – PRODUCTS

A. Erosion control barriers for slope protection and for use as sedimentation traps in borrow areas and as barriers in drainage swales shall conform to the details shown on the Contract Drawings.

B. Filter fabric shall be made of 15 mil reinforced polypropylene (3.5 ounce per square yard). It shall have a water flow rate of 20 gallons per minute per square foot. The apparent opening size shall be 36-50 (U.S. Standard Sieve). Fabric shall be stable against ultraviolet radiation. Fabric width shall be 3 feet with netting and tension cord on 1-1/2 inch by 1-1/2 inch by 48-inch posts. Filter fabric shall be "Envirofence" Style No. 10550 as manufactured by Mirafi Inc. Charlotte N.C. or approved equal.

C. Woven netting or "jute mesh" shall be "Ludlow Soil Saver", as manufactured by the Ludlow Corp., or similar product as manufactured by Advanced Netting Co., or "Jute-Net" as manufactured by Bemis, Inc.

D. Geotextile material for sedimentation basins shall consist of a woven or non-woven fabric made from polypropylene. The fabric shall be non-rotting, acid- and alkali-resistant and inert to organic chemicals commonly encountered in soils.

E. Temporary/short term erosion control mats shall be S150 (North American Green) or equal and temporary/long term erosion control mats shall be C125 (North American Green) or equal.

PART 3 - EXECUTION

3.01 PROTECTION OF WATER RESOURCES

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

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

C. Stream crossings shall allow movement of materials or equipment without violating water pollution control standards of the Federal, state and local governments.

D. The Contractor shall not enter, disturb, destroy or allow discharge of contaminants into any wetlands.

3.02 LAND RESOURCES

A. The Contractor shall confine all activities to areas defined by the drawings and specifications. Prior to the beginning of any construction, the Contractor shall identify any land resources to be preserved within the work area.

B. The Contractor shall not deface, injure, or destroy trees or shrubs nor remove or cut them without special authority. No ropes, cables, or guys shall be fastened to or attached to any existing nearby trees for anchorages unless specifically authorized by the Engineer. The Contractor shall in any event be responsible for any damage resulting from such use.

C. Where, in the opinion of the Engineer, trees may possibly be defaced, bruised, injured, or otherwise damaged by the Contractor's equipment or by his blasting or other operations, the Engineer may direct 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.

3.03 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, and shall require written approval of the Engineer. Plans showing storage facilities for equipment and materials shall be submitted for approval of the Engineer.

B. No excavated materials or materials used in backfill operations shall be deposited within a minimum distance of twenty-five (25) feet of any watercourse or any drainage facility. Adequate measures for erosion and sediment control such as silt fence in combination with straw wattles or coir logs or Filter Mitts, or other alternative as may be approved by the Commission or its agent shall be employed around the downstream perimeter of stockpiles to protect any downstream areas from siltation.

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

3.04 SITE CLEARING

The Contractor shall clear and grub only the area required for construction operations in the Owner's temporary or permanent easements.

3.05 DISCHARGE OF DEWATERING OPERATIONS

A. Construction operations for dewatering shall be controlled at all times to maintain compliance with existing state water quality standards and designated uses of the surface water body.

B. Any water that is pumped and discharged from a 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.

C. The pumped water shall be filtered through filter bags or equal, as described below.

D. Water generated from the flushing of lines after cleaning water mains, or disinfection and hydrostatic testing, shall be disposed of in accordance with all Federal, state, and local laws and regulations. Specifically, all water and residue resulting from the cleaning process shall be disposed of in an approved manner, using a sedimentation basin as shown on the contract drawings or equal, to prevent cleaning wastes from being deposited in drains, sewers, or water resource areas. Immediately following the cleaning process, the street and other affected areas shall be swept or otherwise cleaned as necessary to present a condition equal to or better than that which existed prior to work under this contract, as determined by the Owner.

3.06 AIR RESOURCES

A. During the progress of the work, the Contractor shall conduct his operations and maintain the area of his activities by sprinkling water so as to minimize the creation and dispersion of dust. If the Engineer decides that 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 01562, DUST CONTROL.

B. Equipment operation, activities, or processes performed by the Contractor shall be in accordance with all Federal and state air emission and performance laws and standards.

C. Dust particles; aerosols and gaseous by products from construction activities shall be controlled at all times, including weekends, holidays and hours when work is not in progress.

D. The Contractor shall maintain excavations, stockpiles, and other work areas within or outside the project boundaries free from particulates that would cause the Federal, state, or local air pollution standards to be exceeded or that would cause a hazard or nuisance. The Contractor shall have sufficient equipment available to accomplish these tasks. Particulate control shall be performed as the work proceeds and whenever a particulate nuisance or hazard occurs.

E. Odors from construction activities shall be controlled at all times. The odors shall not cause a health hazard and shall be in compliance with State regulations and/or local ordinances.

3.07 EROSION AND SEDIMENT CONTROL

A. The Contractor shall be responsible for providing erosion and sediment control measures in accordance with Federal, state, and local laws and regulations. The erosion and sediment controls selected and maintained by the Contractor shall be such that the water quality standards are not violated as a result of the Contractor's construction activities.

B. The area of bare soil exposed at any one time shall be kept to a minimum.

C. The Contractor shall install temporary and permanent erosion control best management practices (BMPs) as indicated on the Drawings and as specified herein. BMPs may include, but not be limited to vegetation cover, stream bank stabilization, slope stabilization, silt fences, sediment traps, inlet and outfall protection, and diversion channels. The erosion/sedimentation/work limit control line shall consist of silt fence in combination with hay bales, or other alternative as may be approved by the local Conservation Commission or its agent.

D. Any temporary BMPs shall be removed after the area has been stabilized.

E. To trap sediment and to prevent sediment from clogging drainage systems, silt sacks as well as Filter Mitts, or other alternative as may be approved by the local Conservation Commission or its agent shall be used where directed by the Engineer. All deposited sediment shall be removed periodically.

3.08 SPECIAL CONDITIONS

A. All work shall be completed in accordance with the State of New Hampshire Chapter RSA 483-B Shoreland Water Quality Protection Act and RSA 482-A Wetlands Protection Act.

B. All fuels, lubricants and hydraulic fluids shall be stored outside the Shoreland Waterfront Buffer Zone. All refueling and maintenance involving transfer of oils or hydraulic fluids shall be performed outside the Shoreland Waterfront Buffer Zone.

C. All paved surfaces shall be swept clean by the end of each work day.

D. If dewatering of segments of trench is necessary during construction, then water pumped from the trench shall be discharged to a dewatering filter bag. Dewatering filter bags shall be placed on a level, stable surface, consisting of pavement, grass or aggregate. Dewatering filter bags shall not be placed within a wetland or in open water. Discharge water shall not cause erosion. Discharge water shall be free of sediment or other pollutants. Dewatering filter bags shall be maintained or replaced when full to capacity. The pump discharge hose shall be installed into the dewatering filter bag spout and secured with a strap. One discharge hose shall be installed per bag. Filter bags shall be

capable of collecting and filtering sediment from pumped water. In no case and under no circumstance shall any water or other material of any kind be discharged directly into wetlands or waterbodies.

E. No fill, excavate, construction debris or equipment shall be allowed to enter the wetlands or resource areas; any such material entering the wetlands shall be removed immediately.

F. Any waste asphalt from the project shall be removed to a proper disposal or recycling facility. Onsite stockpiling of waste asphalt shall not be allowed.

3.09 POST CONSTRUCTION CLEAN UP

A. The Contractor shall clean up all areas used for construction in accordance with the SECTION 01710 – CLEANING UP. The disturbed areas shall be graded, filled and the entire area seeded unless otherwise indicated.

END OF SECTION

SECTION 01570

TRAFFIC REGULATION

PART 1 - GENERAL

1.01 DESCRIPTION

The work under this Section shall consist of maintaining and protecting traffic in the project area to the satisfaction of the applicable Local Regulatory Agencies, and the Owner.

A. Unless otherwise specified within the Contract Documents, the Contractor must maintain pedestrian and vehicular traffic and permit access to businesses, factories, residences, and intersecting streets.

PART 2 - MATERIALS

2.01 TRAFFIC SIGNS

The Contractor shall furnish light and maintain traffic signs as may be directed, or may be necessary for the safe regulation, or convenience of traffic.

A. Said signs shall be as shown or noted on the Contract Drawings or elsewhere herein, or if not specified, they shall be adequate for the regulation, safety and convenience of traffic and in conformance with the applicable requirements of the State/Federal Manual on Uniform Traffic Control Devices.

2.02 BARRICADES

Suitably lighted barriers or barricades shall be furnished by the Contractor and put up and maintained at all times during the night or daytime, around all open ditches, trenches, excavation, or other work potentially dangerous to traffic.

A. Such barricades shall be as shown on the Contract Drawings, or if not shown, shall be constructed of 2 inch by 8 inch rough lumber, securely supported, braced and at least 3 feet high above the ground.

B. Barricades shall be placed on all sides and throughout the entire length and breadth of all open ditches, trenches, excavations, or other work which must be barred to the general public.

C. Barricades shall be properly painted to the satisfaction of the Local Regulatory Agency in order to retain a high degree of visibility to vehicular and pedestrian traffic.

2.03 FLASHERS

The Contractor shall furnish and securely fasten flashing units to signs, barricades, and other objects in such numbers and for such lengths of time as are required for the maintenance and protection of traffic.

A. The flashers shall be in operation during all hours between sunset and sunrise, and during periods of low visibility.

B. Suitably lighted barricades shall be defined as barricades lit by flashers in accordance with this Section or other lighting methods approved by the Local Regulatory Agency in lieu thereof.

C. Flashers shall be placed along the entire length of the barricades at an interval no greater than 8 feet, center to center. Flashers shall be power operated, lens directed, enclosed light units which shall provide intermittent light from 70 to 120 flashers per minute, with the period of light emittance occurring not less than 25 percent of each on-off cycle, regardless of temperature.

D. The emitted light shall be yellow in color and the area of light on at least one face of the unit shall be not less than 12 square inches. The discernible light shall be bright enough to be conspicuously visible during the hours of darkness at a minimum distance of 800 feet from the unit under normal atmospheric conditions.

E. For units which beam light in one or more directions, the foregoing specifications shall apply 10 degrees or more to the side and 5 degrees or more above and below the photometric axis.

2.04 TEMPORARY BRIDGING

The Contractor shall include in his bid, bridging for trenches at all street and driveway crossings in such manner as the Local Regulatory Agency may direct for the accommodation and safety of the traveling public, to provide facilities for access to private driveways for vehicular use, and to prevent blocking of intersecting traffic.

A. He shall erect suitable barriers around the excavation to prevent accidents to the public and shall place and maintain, during the night, sufficient lights on or near the work.

B. A space of 20 feet must be left so that free access may be had at all times to fire hydrants and proper precautions shall be taken so that the entrances to fire hydrants and fire stations shall not be blocked or obstructed.

2.05 DETOURS

Temporary detours shall be constructed on the site as proposed by the Contractor and approved by the Applicable State and/or Local Authorities required by the Contract Drawings or specified elsewhere herein.

A. Detours shall not have grades in excess of 10% anywhere along their lanes unless otherwise shown on the Contract Drawings. Detours shall be smooth riding.

B. Suitable barricades shall be installed continuously along both sides of a detour where:

1. The adjacent side slope is steeper than 1 on 6 inches.
2. The Contractor's operations or equipment may operate within 20 feet of the detour.
3. Other unsafe conditions requiring them for the protection of traffic along the line of detour.

2.06 TRAFFIC CONES AND DRUMS

A. As approved by local jurisdictions.

2.07 MISCELLANEOUS

A. The Contractor may be required to employ traffic persons and take other such reasonable means or precautions as the Local Regulatory Agency may direct, or as may be needed to prevent damage or injury to persons, vehicles, or other property, and to minimize the inconveniences and danger to the public by his construction operations.

PART 3 - EXECUTION

3.01 CONTROL OF TRAFFIC

A. It shall be the sole responsibility of the Owner, DPW, and Contractor to keep the Local Regulatory Agencies (including but not limited to the Police and Fire Departments) pre-warned at least 72 hours in advance of changes in traffic patterns due to reduction of pavement widths or closing of streets. Encumbrance Permits will be needed for any street closures.

B. The Contractor shall supply, install, maintain, adjust, move, relocate, and store all signs, suitably lighted barricades, traffic cones, and traffic delineators, as necessary to carry out the traffic routing plan and maintain vehicular and pedestrian traffic.

1. All of this work shall meet with the requirements of the Local Regulatory Agencies.

2. The Contractor shall maintain, relocate and operate barricades and flashers throughout the life of this Contract.

C. Should the Contractor or his employees neglect to set out and maintain barricades or lights, as required in these Specifications, the Owner immediately, and without notice, may furnish, install and maintain barricades or lights.

1. The cost thereof shall be borne by the Contractor and may be deducted from any amount due or to become due to the Contractor under this Contract.

3.02 ACCESS TO PROPERTY AND UTILITIES

A. The Contractor shall arrange his operations to provide access to properties along the street including temporary bridges to driveways, and provide access to fire hydrants, manholes, gate boxes, or other utilities.

1. Whenever any trench obstructs traffic in or to any public street, private driveway, or property entrance, the Contractor shall take such steps as required to maintain necessary traffic and access including temporary bridging if required.

2. The Contractor shall confine his occupancy of public or traveled ways to the smallest space compatible with the efficient and safe performance of the work contemplated by the Contract.

3. If the Contractor's operations or occupancy of any public street or highway, or the uneven surfaces over any trenches being maintained by the Contractor shall interfere with the removal or sanding of snow or ice by the public authorities or adjoining land owners, in an ordinary manner with regular highway equipment, the Contractor shall be required to perform such services for the public authorities or adjoining owners without charge.

4. If the Contractor fails to do so, he shall reimburse the said authorities or adjoining owners or the Owner for any additional cost to them for doing such work occasioned by conditions arising from the Contractor's operations, occupancy, or trench surfaces, together with any damage to the equipment of said parties by those conditions or claims of any parties for damage or injury or less by reason of failure to remove snow or ice or to sand icy spots under these conditions.

5. The Contractor shall observe and obey all local and state laws, ordinances, regulations and permits in relation to the obstruction of streets and highways, keeping passageways open and protecting traffic where there may be danger from blasting or other construction activities.

B. The Contractor shall be held responsible for any damages that the Engineer, Owner, Governmental units, or their heirs or assigns may have to pay as a consequence of the Contractor's failure to protect the public from injury, and the same may be deducted from any payments that are due or may become due to the Contractor under this Contract.

3.03 CONSTRUCTION PARKING CONTROL

A. Control vehicular parking to prevent interference with public traffic and parking, access by emergency vehicles, and Owner’s operations.

B. Monitor parking of construction personnel’s vehicles [in the existing facilities]. Maintain vehicular access to and through parking areas.

C. Prevent parking on or adjacent to access roads or in non-designated areas.

3.04 POLICE DETAILS

A. Police details are not anticipated for work being performed within the Camp Birchmont project site. If details are deemed necessary to complete work, the Contractor shall submit requests and make arrangements with the Town of Wolfeboro Police Department to assign officers to direct traffic within the location of the work under the contract. Payment for this will be made by the Town of Wolfeboro based on invoices and no payment will be made under any Bid Items under this contract. See SECTION 01572 UNIFORMED POLICE OFFICERS herein.

3.05 TRAFFIC SIGNS

A. At approaches to site and on site, install at crossroads, detours, parking areas, and elsewhere as needed to direct construction and affected public traffic.

END OF SECTION

SECTION 01610

PRODUCT HANDLING

PART 1 - GENERAL

1.01 DESCRIPTION

Work included: Protect products scheduled for use in the Work by means including, but not necessarily limited to, those described in this Section.

1.02 QUALITY ASSURANCE

Include within the Contractor's quality assurance program such procedures as are required to assure full protection of work and materials.

1.03 MANUFACTURER'S RECOMMENDATIONS

Comply with Manufacturers' recommendations on product handling, storage and protection.

1.04 PACKAGING

A. Deliver products to the job site in their manufacturer's original container, with labels intact and legible.

1. Maintain packaged materials with seals unbroken and labels intact until time of use.

2. Promptly remove damaged material and unsuitable items from the job site, and promptly replace with material meeting the specified requirements, at no additional cost to the Owner.

B. The Engineer may reject as non-complying such material and products that do not bear identification satisfactory to the Engineer as to manufacturer, grade, quality and other pertinent information.

1.05 PROTECTION

A. Mechanical equipment subject to damage by the atmosphere if stored outdoors, shall be stored in a building with a controlled environment. The building may be a temporary structure on the site or a building off the site.

B. Any material subject to UV degradation including but not limited to PVC pipe, plastic liners, plastic trash racks and other PVC products, shall be covered to protect it from UV degradation.

1.06 REPAIRS AND REPLACEMENTS

A. In event of damage, promptly make replacements and repairs to the approval of the Engineer at no additional cost to the Owner.

B. Additional time required to secure replacements and to make repairs will not be considered by the Engineer to justify an extension in the Contract Time of Completion.

END OF SECTION

SECTION 01710

CLEANING UP

PART 1 - GENERAL

1.01 DESCRIPTION

A. The Contractor should be familiar with Section 01010 SUMMARY OF WORK, Section 01030 SPECIAL PROVISIONS, Section 01567 ENVIRONMENTAL PROTECTION, and Section 01720 CLOSEOUT, as they pertain to this section.

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

1.02 DAILY CLEAN UP

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. 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, the Engineer reserves the right to stop all other work on the project until the cleanup is satisfactory.

D. Street sweeping shall be done using water to keep dust levels at an acceptable level.

1.03 MATERIAL OR DEBRIS IN DRAINAGE FACILITIES

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.

1.05 RESTORATION OF DAMAGED PROPERTY

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 repair or replace all damaged property as necessary for highway or driveway, side walk and landscaping work. Materials, equipment, and methods for such restoration shall be as approved by the Engineer.

1.06 FINAL CLEAN UP

A. Before acceptance by the Owner, the Contractor shall perform a final clean-up of the site to its original or specified condition. This clean up shall include removing all trash and debris off the site. Before acceptance, the condition of the site shall be approved by the Engineer.

B. All catch basins shall be cleared within the work area.

C. All roads and paved surfaces shall be swept.

1.07 Following final cleanup and stabilization of the site, the Contractor should adequately clean all catch basins of debris and accumulated sediment and remove any temporary catch basin protection measures that were employed during construction.

PART 2 - PRODUCTS

Not Used

PART 3 - EXECUTION

Not Used

END OF SECTION

SECTION 01720

CLOSEOUT

PART 1 - GENERAL

1.01 DESCRIPTION

A. The Contractor should be familiar with General Specifications and Special Conditions, Section 01010 SUMMARY OF WORK, Section 01030 SPECIAL PROVISIONS and Section 01710 CLEANING UP, as they pertain to this section.

B. This section provides information and procedures for terminating the agreement between the Contractor and the Town of Franklin at the completion of the Project.

1.02 PROJECT RECORD DOCUMENTS

A. The Contractor shall maintain on-site one complete set of record documents. These record documents shall indicate actual revisions to the Work. The Contractor shall ensure entries are complete and accurate, enabling future reference by the Town of Franklin. The set of record documents shall include: attachments; reviewed product data and samples; specifications; addenda; change orders and other modifications to the Contract; and material disposal records.

B. Information shall be recorded concurrent with construction progress. Failure to maintain current record attachments will be cause to delay payment.

1.03 CLOSEOUT PROCEDURES

A. Submittals shall be provided to Engineer that are required by governing or other authorities, including copies of any permit reporting documentation or disposal waste slips.

B. For items of Work delayed beyond date of Substantial Completion, the Contractor shall provide updated submittal within 10 days after acceptance, listing date of acceptance as start of warranty period.

C. The Contractor shall supervise and direct the work, using his best skill and attention. The Contractor shall be solely responsible for all construction means, methods, techniques and procedures and for coordinating all portions of the work under the Contract.

D. The Contractor shall carefully check his own work and that of subcontractors as the work is being performed. Unsatisfactory work shall be corrected immediately.

E. During the finishing stages of the project, the Contractor shall make frequent inspections with the subcontractors and the Engineer so as to progressively check for and correct faulty work.

F. When the Contractor determines that he is substantially complete, that he has less than one percent of his contract remaining to be completed, he shall prepare for submission to

the Engineer a list of items to be completed or corrected. The failure to include any items on such list does not alter the responsibility of the Contractor to complete all work in accordance with the Contract Documents.

G. Upon receipt of the Contractor's list of items to be completed or corrected, the Engineer will promptly make a thorough inspection and prepare a "punch list", setting forth in accurate detail any items on the Contractor's list and additional items that are not acceptable.

H. When the "punch list" has been prepared, the Engineer will arrange a meeting with the Contractor and subcontractors to identify and explain all "punch list" items and answer questions on the work which must be done before final acceptance.

I. If the Contractor gives notice that a subcontractor has completed his "punch list" items, the Engineer will inspect that portion of the work and, if the items are found to be satisfactorily completed, advise the Contractor accordingly.

J. The Contractor shall correct all punch-list items or shall cause the correction of the punch list items within a time frame to be established when the punch list is made. The time frame for the completion of the punch list shall not exceed the completion date of the contract.

1.04 GUARANTEES AND WARRANTIES

A. The Contractor shall guarantee the materials and workmanship under this contract to be free of defects for a period of one year from the date of acceptance agreeing to replace or repair any defective materials or work during such period, without additional cost to the Owner.

B. The Contractor shall obtain from all subcontractors a written guarantee that all materials and workmanship under this contract will be free of defects for a period of one year from the date of acceptance agreeing to replace or repair any defective materials or work during such period, without additional cost to the owner.

C. The Contractor shall submit all warranty certificates signed by the manufacturers and suppliers with a written certification that nothing in the installation will render the warranty null and void.

1.05 SUBMITTALS

At completion of punch list items the Contractor shall submit the following completed documents to the owner:

A. B-8.1 CERTIFICATE OF FINAL COMPLETION
B. B-9.1 CONTRACTOR'S AFFIDAVIT
C. B-10.1 CONTRACTOR'S FINAL RELEASE AND WAIVER OF LIEN

PART 2 - PRODUCTS

Not Used

PART 3 - EXECUTION

Not Used

END OF SECTION

SECTION 02010
DEMOLITION AND MODIFICATIONS

PART 1 GENERAL

1.01 SCOPE OF WORK

A. Furnish all labor, materials, equipment and incidentals required to modify or demolish existing structures and pipelines as shown on the Drawings and as specified herein.

B. This section includes complete or partial modifications or removal and disposal of existing structures, sections of structures, buried piping (to be abandoned or removed), and miscellaneous appurtenances encountered during construction operations.

C. Demolition may include:

1. Removal of existing stone and concrete headwalls and drainage structures for installation of drainage structures and piping.

2. Removal of existing portions of structures that require modifications, rebuilding or coring.

2. Removal and/or plugging of existing drainage piping, as shown on the Drawings.

3. Off-site disposal of excess and unacceptable materials.

4. Distribution of salvageable material as specified below.

D. Modifications may include:

1. Completing new water tight pipe connections to existing concrete or block built structures through modifications, rebuilding or coring of existing structures.

2. Re-building of existing precast concrete or block built structures to provide proposed pipe connections, to complete pipe removal / abandonment, or to meet new proposed inverts, elevations, grades or changes in structure type.

3. Completing any proposed water tight pipe connections to existing piping.

E. Blasting and the use of explosives will not be permitted for any demolition work.

1.02 RELATED WORK

A. Excavation and fill operations are included in Section 02200.

1.03 CONDITION OF STRUCTURES

A. The Owner and Engineer assume no responsibility for the actual condition of the structures to be demolished or modified.

B. Conditions existing at the time of inspection for bidding purposes will be maintained by the Owner insofar as practicable. However, variations within a structure may occur prior to the start of demolition work.

1.04 DISPOSAL OF MATERIAL

A. Where directed by the Engineer, salvageable material and equipment listed hereinafter shall become the property of the Owner. The Contractor shall dismantle all such items to a size that can be readily handled, and deliver them to a designated storage area.

B. Any materials and items of equipment shall become the property of the Owner and stored where directed on the site as directed by the Owner. The Contractor shall dismantle all such items to a size that can be readily handled, and deliver them to a designated storage area within the property limits.

C. All other material and items of equipment shall become the Contractor's property and must be removed from the site. Disposal of non-hazardous materials will be the responsibility of the Contractor.

D. Disposal of concrete, concrete block and excess bricks shall be the Contractors responsibility and shall be disposed of as specified below in Part 3.02, Execution.

E. The storage or sale of removed items on the site will not be allowed.

F. Excavated weathered rock and any surplus material from the site shall become the property of the Owner and shall be disposed of on site at a location as directed by the Owner (TBD).

1.05 PROTECTION

A. Conduct operations to minimize damage by falling debris or other causes to adjacent buildings, structures, roadways, and other facilities, including persons. Provide interior and exterior shoring, bracing, or support to prevent movement or settlement or collapse of structures to be demolished and adjacent facilities to remain.

1.06 DAMAGE

A. Promptly repair damage caused to adjacent facilities by demolition operations as directed by the Engineer at no cost to the Owner. Repairs shall be made to a condition at least equal to that which existed prior to construction.

1.07 UTILITIES

A. Maintain existing utilities as directed by the Engineer to remain in service and protect against damage during demolition operations.

B. Do not interrupt existing utilities serving occupied or used facilities, except when authorized by the Engineer. Provide temporary services during interruptions to existing utilities as acceptable to the Engineer.

C. The Contractor shall cooperate with the Owner to shut off utilities serving structures of the existing facilities as required by demolition operations.

D. The Contractor shall be solely responsible for making all necessary arrangements and for performing any necessary work involved in connection with the discontinuance or interruption of all public and private utilities or services under the jurisdiction of the utility companies.

E. All utilities being abandoned shall be disconnected and terminated at the service mains in conformance with the requirement of the utility companies or the municipality owning or controlling them.

1.08 DUST AND NOISE CONTROL

A. The Contractor shall take all measures necessary to minimize the amount of dust and noise resulting from demolition activity.

1.09 HAZARDOUS WASTE

A. In the event that the Contractor discovers hazardous waste during demolition or construction, the Contractor shall stop work in the affected area and notify the Owner.

B. Disposal of hazardous waste will not be allowed at the Town Landfill.

PART 2 PRODUCTS

2.01 MATERIALS

A. All materials or items of equipment required for the performance of the work of this Section shall be suitable of the intended purpose and shall be equal, where applicable, to similar items and materials specified in other Sections of Divisions 2 through 16.

PART 3 EXECUTION

3.01 MODIFICATION OF EXISTING STRUCTURES, PIPING AND APPURTENANCES

A. During existing structure modifications all existing systems should be maintained and/or provisions provided to adequately handle receiving waters.

B. Modifications to existing structures or piping should be done in a manner that provides clean, straight stable work edges so that any proposed connections or proposed work joints can be water tight and completed in a structurally sound manner.

C. Precast concrete coring or drilling shall be done in a safe manner and in accordance with OSHA regulations. Any additional excavation, trenching, shoring or bracing needed to safely core drill or modify the structure shall be considered incidental to the modification pay items and no additional compensation shall be provided.

D. If modifications require rebuild, the completed work shall be in conformance with applicable similar items and materials specified in other Sections of Divisions 2 through 16.

E. During modifications, the contractor shall take special precautions to prevent contamination of any downstream receiving waterbodies, water sources, water supplies or facilities as a result of construction activities. Any measures required for the protection of downstream facilities shall be considered incidental to the modification pay items and no additional compensation shall be provided.

F. Subject to the constraints of maintaining the existing facilities in operation and prior to demolition, existing piping and appurtenances shall be maintained as shown on the Drawings.

G. All structures, piping and appurtenances shall be cleansed, flushed and drained. Equipment to be retained by the Owner as specified in Paragraph 1.05 shall be dismantled sufficiently to permit thorough cleaning and draining. All valves shall be left open unless otherwise specified herein or on the Drawings. All discontinued piping shall be capped and sleeves and openings remaining after removal of the existing equipment, piping and appurtenances shall be plugged and sealed as shown on the Drawings and as directed by the Engineer.

3.02 DEMOLITION

A. Demolition shall be performed to the limits shown on the Drawings or, if no limits are shown, to a depth of at least 2-ft below final grade, or 2 feet below any new foundation or pipe.

B. Wet down work during demolition operations to prevent dust from arising. Provide maximum practicable protection from inclement weather for materials, equipment and personnel located in partially dismantled structures.

C. All demolition debris shall become the property of the Contractor and shall be removed from the site and disposed of by the Contractor. Demolition debris shall not be used for fill or backfill.

D. Blasting or the use of explosives will not be allowed for demolition work.

3.03 BURIED PIPING

A. Remove all buried piping encountered during excavation unless otherwise shown on the Drawings or directed by the Engineer. Pipes indicated to be abandoned but not removed shall have open ends plugged with concrete. The Engineer will determine the location of where pipes shall be plugged.

END OF SECTION

SECTION 02051

TREE & PLANT PROTECTION

PART 1 - GENERAL

1.01 Summary:

This section includes administrative and procedural requirements for the protection of existing trees, shrubs, and plant material not designated for removal. Such trees, shrubs, and plant materials shall be left in place and protected from damage or injury by the Contractor during construction, using full and adequate methods of protection as described herein or as directed by the Engineer.

1.02 Related Sections:

A. Section 01567- Environmental Protection

B. Section 02110 - Site Clearing

C. Section 02200 - Earthwork

D. Section 02575 - Restoration of Excavated Surfaces

E. Section 02940 – Trees, Shrubs and Container Plants

PART 2 - PRODUCTS

2.01 Rigid Tree Protection Fencing:

A. Rigid tree protection fencing shall be comprised of the following:

1. Chain link fencing materials including posts, rails, braces and mesh, 6’ in height.
2. Posts and rails shall be a minimum of 1-1/2” OD steel pipe.
3. Mesh shall be 2”x 2” x 11ga. minimum woven chain link fabric.
4. Post bases shall be minimum 16”x 8” x 8” high concrete piers with sleeves for posts, or approved equal.
5. Plywood shall be a minimum of ¼”, or approved equal.

PART 3 – EXECUTION

3.01 Protection of Existing Trees:

A. The contractor shall use extra care to prevent any damage to existing trees and tree roots during construction.

B. Prior to any construction, the Engineer will mark all trees that are to be "saved" with orange tape and will be labeled as so. any tree labeled as "save" or marked with orange tape in the field that is larger than 8 inches in diameter shall not be removed during construction without authorization from the Engineer.

C. If the Contractor cannot perform construction without removing the tree in question, the Contractor shall immediately contact the Engineer to discuss other options, construction techniques or actions. If all other options have been explored and it is determined by both the Contractor and Engineer that the tree must be removed in order to complete construction per the Engineers requirements, the Contractor will be responsible for replacing the tree with a mature tree of the same species in close proximity to the removed tree once construction is complete.

D. Prior to the installation of any replacement trees the Contractor shall contact the Engineer to perform a visual inspection and shall not complete installation without obtaining final approval of the specimen and its proposed location by the Engineer.

E. The Contractor shall be responsible for repairing and/or replacing any existing trees under 8 inches in diameter that are damaged during work if deemed necessary by the Engineer.

3.02 Protection within the Drip-Line:

A. Where existing trees are within the area of work, or where existing trees outside the area of work have drip-lines extending into the area of work, the Contractor shall employ all methods to minimize adverse impact to these existing trees including limbs and roots. The Contractor shall notify the Engineer of any construction work within the drip-line of trees at least one (1) Working Day before the scheduled activity. These methods may include but not be limited to:

1. Temporary chain link construction fencing.
2. Temporary tie-up of low limbs.
3. Application of a 4- to 6-inch thick layer of mulch (or wood chips salvaged from clearing and grubbing operations) within the drip-line of trees.
4. Timber or steel planking for protection of surface roots from Equipment.
5. Tree root pruning or other tree root treatment as directed by the Engineer and/or Urban Forester.

B. No storage of equipment or materials shall be allowed within the drip-line of trees not designated for removal. Steel planking, or timber planking made of 4-inch thick material, each plank covering a minimum of 8 square feet, shall be used to support backhoe and other Equipment stabilizers when set within the drip-line of a tree or sodded planting strip.

C. Where sidewalk, curb, and pavement removal and placement operations occur that impact tree roots 2-inches or greater in diameter, the Engineer will determine how these tree roots are to be handled.

3.03 Above-grade Work:

A. Tree removal or tree trimming within 10 feet of any overhead utility lines require the Contractor shall make the notifications to the Owner.

B. When the Contractor anticipates construction operations that will unavoidably affect tree limbs, the Contractor shall notify the Engineer at least five (5) Working Days in advance of commencing such operations.

1. Before trimming any trees, the Contractor shall notify the Engineer of the proposed method and the amount of trimming required.

2. Trimming shall be done by a professional tree service company whose past and current performance is in accordance with National Arborist Association tree-pruning standards.

3.04 Trenching and Tunneling within the Drip-Line:

A. Trenching and tunneling within the drip-line of existing trees not designated for removal shall be in accordance with Section 01576 Environmental Protection.

B. Excavation or tunneling of any kind within the "critical root zone," as defined by the Engineer, will not be allowed unless the Contractor requests permission to do so at least two (2) Working Days in advance and receives approval of the Engineer.

C. Treatment of Roots: Excavation around roots 2-inches in diameter and greater requires handwork.

1. Individual tree roots 2-inches or greater in diameter shall not be cut, but rather protected when within the drip-line of the tree.
2. Tree roots smaller than 2-inches in diameter shall be cleanly cut flush with the edge of the trench or tunnel.
3. Ripping or tearing of tree roots will not be allowed.

Protection of Existing Sensitive Shrub, Grasses and Groundcover Plant Species:

A. The Contractor shall take care to prevent damage to any sensitive species been identified by the New Hampshire Natural Heritage Bureau (NH NHB) at the site. The following permit stipulations shall be followed:

1. The NH NHB and the Project Engineer will complete a site visit prior to construction to flag the locations of any identified threatened plant species adjacent to proposed work, and make recommendations relative to rare plant protection and promotion, as appropriate;

2. Prior to construction, the Project Engineer will meet the Contractor on-site to discuss protection measures which could include:

a) Special soil handling procedures shall be completed to remove the top 6-inches of soil substrate and potential plant species in specified areas and stack on-site without screening to ensure that plants and seeds remain with the soil substrate. Stockpiles shall be temporarily covered for re-use upon protect completion. Upon completion of work and installation of proposed plantings, the soil substrate shall be spread over bank areas to meet proposed finished grades and adjacent vegetative support materials in designated areas selected by NH NHB.

b) Install protective orange snow fence completely around any flagged locations by NH NHB to ensure that workers and equipment stay out of flagged areas. The contractor shall complete this work prior to any construction operations and as part of erosion control placement and to maintain the protective fencing during all work activities and throughout the contract duration. The protective snow fence will be removed upon completion of work;

3. If any of the proposed work shown on the Drawings will potentially impact these species and locations, the Engineer and Contractor will make any necessary adjustments to avoid these areas and work around the protective fencing.

4. Payment for these procedures shall be made under Special Soil Excavation, Handling, Storage & Re-Spread and / or Erosion Controls and Existing Vegetation Protection.

3.06 Repair, Replacement and Payment for Damage:

A. Trees or other plant material not ordered or designated to be removed but that are destroyed or irreparably damaged by Contractor operations as determined by the Engineer, shall be repaired or replaced by the Contractor in accordance with the Engineer's recommendations (at least 2 replacement trees for every 1 tree removed).

1. Replacements shall be of the same species and as nearly as possible of the same size as the trees to be replaced (minimum of 2" caliper).
2. The Contractor shall allow one (1) Working Day advance notice for inspection of nursery stock replacements by the Engineer.

B. Payment: In addition to the Contractor's restoration approved by the Engineer, the Contractor will be assessed damages for the difference in the dollar value of the damaged tree, shrub, or other plant material, and the dollar value of the replacement.

1. The dollar value will be determined by the Engineer from the "Guide for Establishing Values of Trees and Other Plants," prepared by the Council of Tree and Landscape Appraisers, current edition. Damages assessed will be deducted from moneys due or that may become due to the Contractor.

C. Planting of replacement stock shall be done in accordance with the requirements of the Contract Documents during the first fall or spring planting period, whichever comes first.

END OF SECTION

SECTION 02110

SITE CLEARING

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 work of this section.

1.02 DESCRIPTION OF WORK

A. The extent of site clearing is shown on drawings and is to be contained within the Limit of Work and only as necessary to complete construction. The Contactor shall take all necessary precautions to maintain as much vegetation as possible and reduce limits of clearing to the best of his ability.

B. Site clearing includes, but is not limited to the protection of existing trees, removal of trees and other vegetation, topsoil stripping, clearing and grubbing.

C. No site clearing shall take place without prior approval from the Engineer. The limits of clearing and grubbing are as indicated on the Drawings.

1.03 JOB CONDITIONS

A. Conduct site clearing operations to ensure minimum interference with roads, streets, walks, and other adjacent occupied or used facilities. Do not close or obstruct streets, walks or other occupied or used facilities without permission from authorities having jurisdiction.

B. Protect existing trees and other vegetation outside of clearing and grubbing limits against unnecessary cutting, breaking or skinning of roots, skinning and bruising of bark, smothering of trees by stockpiling construction materials or excavated materials within drip line, excess foot or vehicular traffic, or parking of vehicles within drip line. Provide temporary guards to protect trees and vegetation to be left standing.

C. Provide protection for roots over 1-1/2” diameter cut during construction operations. Coat cut faces with an emulsified asphalt, or other acceptable coating, formulated for use on damaged plant tissues. Temporarily cover exposed roots with wet burlap to prevent roots from drying out; cover with earth as soon as possible.

D. Carefully remove any items indicated to be salvaged, and store on Owner's premises where indicated or directed by the Engineer.

PART 2 - PRODUCTS

Not Used

PART 3 - EXECUTION

A. Remove trees, shrubs, grass and other vegetation, or obstructions interfering with installation of new construction to extent shown on Drawings. Remove such items elsewhere on site or premises as specifically indicated. Removal includes digging out stumps and roots.

B. Carefully and cleanly cut roots and branches of trees indicated to be left standing, where such roots and branches obstruct new construction.

C. Any large trees that are removed within the clearing limits shall be cut as close to the ground as possible, trimmed and neatly stacked for ultimate removal from the site.

D. Remaining vegetation under 4-inch diameter and debris trimmed from large trees shall be properly disposed of from the site.

E. Where trees are indicated to be left standing, stop topsoil stripping a sufficient distance to prevent damage to main root system.

F. Completely remove stumps, roots, and other debris protruding through ground surface.

G. Properly dispose of stumps, roots, and other woody debris removed during the grubbing process.

H. Remove heavy growths of grass from areas before stripping.

I. Topsoil is defined as friable clay loam surface soil found in a depth of not less than 4". Satisfactory topsoil is reasonably free of subsoil, clay lumps, stones, and other objects over 2" in diameter, and without weeds, roots, and other objectionable material.

J. Strip topsoil to whatever depths encountered in a manner to prevent intermingling with underlying subsoil or other objectionable material.

K. Stockpile topsoil in storage piles in areas where directed by the Engineer. Construct storage piles to freely drain surface water. Cover storage piles if required to prevent wind-blown dust.

L. Fill depressions caused by clearing and grubbing operations with satisfactory soil material, unless further excavation or earthwork is indicated.

M. Place fill material in horizontal layers not exceeding 6" loose depth, and thoroughly compact to a density equal to adjacent original ground or as directed by the Engineer.

END OF SECTION

SECTION 02140

DEWATERING AND DRAINAGE

PART 1 – GENERAL

1.01 WORK INCLUDED:

A. The Contractor shall design, furnish, install, operate, monitor, maintain and remove a temporary dewatering system as necessary to lower and control water levels below subgrades of excavations to permit construction in the dry.

B. The Contractor shall provide, maintain and remove temporary surface water control measures adequate to drain and remove surface water entering excavations.

C. The Contractor shall collect and properly dispose of all discharge water from the dewatering and drainage systems as directed by the Owner/Engineer.

1.02 DESIGN AND PERFORMANCE RESPONSIBILITY:

A. The Contractor shall be responsible for the proper design and execution of method for controlling surface water and groundwater.

B. The Contractor shall be responsible for damage to properties, buildings or structures, sewers and other utility installations, pavements, and work that may result from the dewatering or surface water control operations.

C. Design review and field monitoring activities by the Owner or of the Engineer shall not relieve the Contractor of his responsibilities for the work.

1.03 SUBMITTALS:

Furnish to the Engineer as required detailed plans of the proposed dewatering method, as specified in Subsection 3.03.

PART 2 – PRODUCTS

2.01 MATERIALS:

A. Pipe for observation wells shall consist of minimum 1-inch I.D. Schedule 80 PVC pipe and machine slotted PVC well points, maximum slot size 0.02 in.

B. Pipe for trash pump wells and trench dewatering shall be polyvinyl chloride pipe with an integrally formed smooth interior and meet requirements specified in Section 02625 PVC DRAINAGE PIPE AND FITTINGS. Any PVC Pipe with nominal size 12-inch though 36-inch diameter shall be used with an adequate inner diameter to provide room for the dewatering pump. Perforations shall be cleanly cut so as not to restrict the inflow/outflow of water and uniformly spaced along the length and circumference of the pipe. Dimensions of the perforations shall be as stated in AASHTO M252.

C. Piping used for temporary surface water controls shall be high density polyethylene corrugated pipe with an integrally formed smooth interior and meet requirements specified in Section 02625 PVC DRAINAGE PIPE AND FITTINGS with nominal size 4-inch though 36-inch diameter shall be used with an adequate inner diameter to provide capacity to match or exceed existing upgradient stormwater conveyance methods.

D. Crushed stone used for dewatering wells shall be ¾ -inch crushed stone and shall conform and meet the requirements specified in Section 02200 EARTHWORK.

E. Erosion control tablets for reduction of soil erosion in channel, sedimentation tank or excavation dewatering prior to discharge shall be the following or approved equal:

- FI-3500/FI-3501 by JRM Chemical Inc., Cleveland Ohio

F. Portable temporary coffer dam systems shall be as provided by:

1. East Coast AquaDams
   400 B South Aurora Street
   PO Box 1203
   Easton, Maryland 21601

2. Portadam, Inc.
   3082 South Black Horse Pike
   Williamstown, NJ 08094

3. Aqua Barriers
   Hydro-Solutions, Inc.
   5119 Ashley Court
   Houston, TX 77041

G. Erosion control measures used for reduction of sediment in discharge of water from excavation dewatering prior to discharge shall meet the requirements specified in Section 02276 TEMPORARY EROSION CONTROL.

H. Sedimentation / filtration bags used for reduction of sediment in discharge of water from excavation dewatering prior to discharge shall be made from a nonwoven, needle-punched, polypropylene geotextile and shall be the following or approved equal:

- US Filter Bags, by US Fabrics Inc., Cincinnati, Ohio

PART 3 – EXECUTION

3.01 GENERAL:

The Contractor shall control surface water and groundwater such that excavation to final grade is made in-the-dry, the bearing soils are maintained undisturbed and softening and/or instability or disturbance due to the presence or seepage of water does not occur. All construction and

backfilling shall proceed in-the-dry and the flotation of completed portions of work shall be prohibited.

3.02 SURFACE WATER CONTROL:

A. The Contractor shall construct surface water control measures, including cofferdams, dikes, ditches, sumps and other methods to prevent, as necessary, flow of surface water into excavations.

B. Cofferdams shall be designed taking into account the full range of tide and maintaining a dry excavation.

C. Design of the portable temporary dam or coffer dam system shall be by qualified manufacturers or designers who have completed design and installation of similar systems.

D. The Contractor shall construct temporary surface water control piping measures to prevent, as necessary, flow of surface water into excavations and bypass stormwater flows associated with existing drainage systems that are upgradient of the construction site drainage.

E. Design of temporary surface water control piping shall be designed by the Contractor to adequately handle surface water flows and bypass stormwater flows associated with existing drainage systems that are upgradient of the construction site drainage to prevent any upstream flooding or downstream erosion. The Contractor shall submit to the Engineer for approval a stormwater handling plan prior to construction.

3.03 EXCAVATION DEWATERING:

A. At all times during construction, the Contractor shall provide and maintain proper equipment and facilities to promptly remove and properly dispose of all water entering excavations. Excavations shall be kept dry, so as to obtain a satisfactory undisturbed subgrade foundation condition until the fill, structures or pipes to be built thereon have been completed to such extent that they will not be floated or otherwise damaged by allowing water levels to return to natural elevations.

B. Pipe and their masonry shall neither be laid in water nor submerged within 24 hours after being placed. Water shall not flow over new masonry within four days after placement.

C. In no event shall water rise to cause unbalanced pressure on structures until the concrete or mortar has set at least 24 hours. The Contractor shall prevent flotation of the pipe by promptly placing backfill.

D. Dewatering shall at all times be conducted in such a manner as to preserve the natural undisturbed capacity of the subgrade soils at proposed bottom of excavation. If the subgrade of the trench bottom or excavation becomes disturbed due to inadequate drainage, the Contractor shall excavate below normal grade as directed by the Engineer and refill with screened gravel at no additional cost to the Owner.

E. The Contractor shall evaluate the impact of the anticipated subsurface soil/water conditions on the proposed method of excavation and removal of water.

F. Where groundwater level is above the proposed bottom of excavation level, it is expected that some type of pumped dewatering system will be required for predrainage of the soils prior to final excavation, and for maintaining the lowered groundwater level until construction has been completed to such an extent that the structure, pipeline or fill will not be floated or otherwise damaged. It is further expected that the type of system, spacing of dewatering units and other details of the work will have to be varied depending on soil/water conditions to be encountered along the route. The Contractor will be required at all times to dewater and excavate in a manner which does not cause loss of ground or disturbance to the pipe bearing soil or soil which supports overlying or adjacent structures.

G. If the Contractor's method of dewatering does not dewater the excavation as specified, the Contractor shall install groundwater observation wells as directed by the Engineer and shall not place any pipe or structure until the readings obtained from the observation wells indicated that the groundwater has been lowered a minimum of six (6) inches below the bottom of the final excavation within the trench limits.

H. Dewatering units used in the work shall be surrounded by suitable filter sand and no fines shall be removed by pumping. Pumping from the dewatering system shall be continuous until pipe or structure is adequately backfilled. Stand-by pumps shall be provided.

I. Water entering the excavation from precipitation or surface runoff shall be collected in shallow ditches around the perimeter of the excavation, drained to a sump and pumped from the excavation to maintain a bottom free from standing water.

J. Drainage shall be disposed of in an approved area as specified by the Owner/Engineer. Sanitary sewers shall not be used to dispose of drainage.

K. Proper erosion control and sedimentation/filtration measures shall be used for all discharges of pumping and dewatering of excavations prior to ultimate discharge into adjacent drainage or watercourses.

END OF SECTION

SECTION 02200

EARTHWORK

PART 1 - GENERAL

1.01 RELATED DOCUMENTS

Drawings and general provisions of the Contract, including Division 1 Specifications - General Requirements apply to the work in this section.

1.02 DESCRIPTION OF WORK

A. Extent of earthwork is indicated on Drawings and includes the preparation of subgrade for treatment devices; the base fill course for support of the basins; and backfilling of excavations.

B. "Excavation" consists of removal of material encountered to subgrade elevations indicated, and subsequent relocation or disposal of materials removed.

1.03 QUALITY ASSURANCE

A. Codes and Standards:

1. Perform excavation work in compliance with applicable requirements of governing authorities having jurisdiction.

2. The following standard forms a part of these specifications and indicates the minimum standards required:

American Society for Testing and Materials (ASTM)

ASTM D422	Method for Particle Size Analysis of Soils
ASTM D1557	Tests for moisture-density relations of soils and soil-aggregate mixtures using 10 pound rammer and 18-inch drop.
ASTM D4253	Test Methods for Maximum Index Density of Soils Using a Vibratory Table
ASTM D4254	Test Methods for Minimum Index Density of Soils and Calculation of Relative Density

The State of New Hampshire

Department of Transportation's Standard Specifications for Road and Bridge Construction.

B. Owner will engage soil testing and inspection service for quality control testing during earthwork operations.

1.04 JOB CONDITIONS

A. Existing Utilities:

1. Locate existing underground utilities in areas of work. Utility companies shall be contacted a minimum of 72 hours prior to excavation and/or site work. If utilities are to remain in place, provide adequate means of support and protection during earthwork operations.

2. 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.

3. Do not interrupt existing utilities serving facilities occupied and used by owner or others, during occupied hours, except when permitted in writing by Engineer and then only after acceptable temporary utility services have been provided.

4. Provide minimum of 48-hour notice to Engineer, and receive written notice to proceed before interrupting any utility.

5. Do not bring explosives onto site or use in work without prior written permission from authorities having jurisdiction. Contractor is solely responsible for handling, storage, and use of explosive materials when their use is permitted.

B. Protection of Persons and Property:

1. Barricade open excavations occurring as part of this work and post with warning lights.

2. Operate warning lights as recommended by authorities having jurisdiction.

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

4. Perform excavation within drip-line of large trees to protect the root system from damage or dryout to the greatest extent possible. Maintain moist condition for root system and cover exposed roots with burlap.

PART 2 - PRODUCTS

2.01 SOIL MATERIALS

A. Satisfactory soil materials are defined as those complying with ASTM D2487 soil classification groups GW, GP, GM, SM, SW, and SP.

B. Unsatisfactory soil materials are defined as those complying with ASTM D2487 soil classification groups GC, SC, ML, MH, CL, CH, OL, OH, and PT.

C. Sand:

Sand shall consist of bank run sand conforming to the following requirements determined by ASTM D422:

Sieve Opening	Percent Passing Weight
1-inch	100
1/2-inch	50-100
No.20	20-95
No.50	10-60
No.200	0-8

D. Crushed Stone:

1. Crushed Stone shall not contain vegetation, masses of roots, loam and other organic matter, clay and other fine or harmful substances.

2. 3/8- INCH PEA STONE:

Materials shall consist of natural, rounded, sound, durable sand and gravel, essentially free of organic matter, plastic fines (clay), debris and shall conform to and meet the requirements specified in this section with the gradation requirements listed below:

Sieve Opening	Percent Passing By Weight
½ -inch	100
⅜-inch	85-100
No. 4	20-50
No. 8	0-15
No. 16	0-5

3. ¾-inch to 1½-inch CRUSHED STONE:

Materials shall conform to NHDOT Section 703 – Aggregates Table 1E and meet the requirements specified in this section with the gradation requirements listed below:

Sieve Opening	Percent Passing By Weight
50 mm (2 -inch)	100
37.5mm (1½ -inch)	90-100
19.0 mm (¾ -inch)	0-15
9.5mm (⅜ -inch)	0-5

4. 2-inch CRUSHED STONE:

Crushed Stone shall meet the requirements specified in this section with the gradation requirements listed below. Stone shall be washed and free of debris.

Sieve Opening	Percent Passing By Weight
2 ½ -inch	100
2 -inch	90-100
1 ½ -inch	35-70
1 -inch	0-15
½ -inch	0-5

A. Processed Gravel:

Processed Gravel shall consist of sound, durable sand and gravel, essentially free of organic matter, plastic fines (clay) and debris, and shall meet the gradation requirements below:

Sieve Opening	Percent Passing Weight
3-inch	100
1/2-inch	50-85
No. 4	40-75
No. 40	10-45
No. 200	0-8

B. Gravel Borrow:

Gravel Borrow shall consist of sound, durable sand and gravel, essentially free of organic matter, plastic fines (clay) and debris, and shall meet the gradation requirements below:

Percent

Sieve Opening	Passing Weight
3-inch	100
1/2-inch	50-85
No. 4	40-75
No. 40	10-45
No. 200	0-8

C. Base Fill and Drainage Fill: Shall consist of washed, evenly graded mixture of crushed stone, or crushed or uncrushed gravel, with 100% passing a 1-1/2" sieve and not more than 5% passing a No. 4 sieve.

D. Stone Dust: Material shall consist of crushed limestone. All materials furnished shall be well graded and free from unsuitable materials. All processing shall be completed at the source and shall meet the gradation requirements below:

Sieve Opening	Percent Passing Weight
1/4-inch	100
No. 10	55-75
No. 40	20-40
No. 200	7-15

E. Rounded River Rock: Four-inch to Six-inch (4"-6") rounded river rock shall conform to the specifications listed below. Stone shall be hard, durable, round in shape, resistant to weathering and free from overburden, spoil, shale, and organic material and shall conform to the following gradation requirements:

Sieve Opening	Percent Passing By Weight
8 -inch	100
4 -inch	75-100
2.5 –inch	0-5

F. Cobbles & Boulders: Large Cobbles and Boulders shall be hard, durable, irregular in shape, resistant to weathering and shall meet the size requirements specified and meet the approval of the Engineer. No stone shall have a minimum thickness less than one-third of its length or width. Stone shall be free from overburden, spoil, shale, and organic material. Cobbles and Boulders shall meet the following requirements:

1. Contractor shall furnish large cobbles and boulders similar in appearance, color, type, and approximate size as shown on Drawings or specified in the Contract Documents.

2. No evidence of drilling, scrapes, large flakes, or cracks shall be visible after the boulder is set in place.

3. The Contractor shall coordinate with the Engineer prior to setting boulders to ensure desired face and orientation is achieved. Boulders shall be placed on site as directed by the Engineer.

4. The Contractor shall form a pocket for boulder installation, ensuring that the boulder is even and true to line, buried one-third to one-half (1/3 to 1/2) of the boulder depth, and in accordance with the Standard Detail.

5. Boulders will be measured as units of the specified size complete in place.

G. Backfill Materials:

1. Backfill Materials shall be satisfactory soil materials and meet the approval of the Engineer. Materials shall be of such a nature that they will form a stable dense fill. Materials shall not contain vegetation, masses of roots, individual roots more than 12 inches long or more than 1/2-inch in diameter, trash, clays, frozen materials, or plastic fines. Organic matter shall not exceed 2%. Non-plastic fines shall not exceed 20% (silts).

2. Backfill materials are subdivided according to the maximum allowable size of stone or blacktop pieces as follows:

Type	Largest Stone Diameter (inches)
1. Select Backfill	3
2. Class B Backfill	6
3. Class C Backfill	12

H. Loam materials and topsoil mixtures shall be as specified in Specification Section 02910 VEGETATIVE SUPPORT MATERIAL.

I. Riprap: Riprap stone for Pipe Ends, Swales, Embankments and Emergency Spillways shall be as specified in Specification Section 02271 RIPRAP.

PART 3 - EXECUTION

3.01 EXCAVATION

A. Excavation includes excavation to subgrade elevations indicated, regardless of character of materials and obstructions encountered.

B. Classification:

The following classifications of excavation will be made when rock excavation is encountered in work:

Earth excavation includes excavation of pavements and other obstructions visible on ground surface; underground structures, utilities and other items indicated to be demolished and removed; together with earth and other materials encountered that are not classified as rock or unauthorized excavation.

1. Rock excavation in trenches and pits includes removal and disposal of materials and obstructions encountered which cannot be excavated with a 1.0 cubic yard (heaped) capacity, 42" wide bucket on track-mounted power excavator equivalent to Caterpillar Model 215, rated at not less than 90 HP flywheel power and 30,000 lb. drawbar pull. Trenches in excess of 10'-0" in width, and pits in excess of 30'-0" in either length or width, are classified as open excavation.

2. Rock excavation in open excavations includes removal and disposal of materials and obstructions encountered which cannot be dislodged and excavated with modern track-mounted, heavy-duty, excavating equipment without drilling, blasting, or ripping. Rock excavation equipment is defined as Caterpillar Model No. 973 or No. 977K, or equivalent track-mounted loader, rated at not less than 170 HP flywheel power and developing 40,000 lb. break-out force (measured in accordance with SAE J732C).

3. Typical of materials classified as rock are boulders 1/2 cu. yd. or more in volume, solid rock, rock in ledges, and rock-hard cementitious aggregate deposits.

4. Intermittent drilling, blasting, or ripping performed to increase production and not necessary to permit excavation of material encountered will be classified as earth excavation.

5. Do not perform rock excavation work until material to be excavated has been cross-sectioned and classified by Engineer. Such excavation will be paid on basis of contract conditions relative to changes in work.

C. Rock Payment Lines:

Rock payment lines are limited to the following:

1. Under stormwater structures, 6" below bottom of device.

D. Unauthorized Excavation:

1. Unauthorized excavation consists of removal of materials beyond indicated subgrade elevations or dimensions without specific direction of Engineer. Unauthorized excavation, as well as remedial work directed by Engineer, shall be at Contractor's expense.

2. Backfill and compact unauthorized excavations as specified for authorized excavations of same classification, unless otherwise directed by Engineer.

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

E. Shoring and Bracing:

1. Provide materials for shoring and bracing, such as sheet piling, uprights, stringers and cross-braces, in good serviceable condition, where required.

2. Establish requirements for trench shoring and bracing to comply with local codes and authorities having jurisdiction.

3. Maintain shoring and bracing in excavations regardless of time period excavations will be open. Carry down shoring and bracing as excavation progresses.

F. Dewatering:

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

2. Do not allow water to accumulate in excavations. Remove water to prevent softening of treatment device bottoms, and soil changes detrimental to stability of subgrades treatment devices. Provide and maintain pumps, sumps, suction and discharge lines, and other dewatering system components necessary to convey water away from excavations.

3. Establish and maintain temporary drainage ditches and other diversions outside excavation 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.

G. Material Storage:

1. Stockpile satisfactory excavated materials where directed, until required for backfill or fill. Place, grade and shape stockpiles for proper drainage.

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

3. Dispose of excess soil material and waste materials as herein specified.

H. Excavation for Structures:

Conform to elevations and dimensions shown within a tolerance of plus or minus 0.10', and extending a sufficient distance from stormwater treatment device structures to permit placing of devices, connections, other construction, and for inspection.

I. Excavation for Pavements: Cut surface under pavements to comply with cross-sections, elevations, and grades as shown on Drawings.

J. Excavation for Trenches:

1. Dig trenches to the uniform width required for particular item to be installed, sufficiently wide to provide ample working room. Provide 6" to 9" clearance on both sides of pipe or conduit.

2. Trenches in pavement shall have the traveled way surface cut in a straight line by a concrete saw or equivalent method, to the full depth of pavement. Excavation shall only be between these lines. Cutting operations shall not be done by backhoe, gradall, or other ripping equipment.

3. Excavate trenches to depth indicated or required.

4. Where pipe is to be laid in crushed stone bedding or concrete cradle, the trench may be excavated by machinery to, or to just below the designated depth, provided that the material remaining at the bottom of the trench remains undisturbed.

5. If pipe is to be laid in embankments or other recently filled areas, the fill material shall first be placed to a height of at least 1 foot above the top of the pipe before excavation. Material under the pipe location shall be compacted to 95 percent maximum density according to ASTM D1557, Method C.

6. Where rock is encountered, carry excavation 6" below required elevation and backfill with a 6" layer of crushed stone or gravel prior to installation of pipe.

K. Earth Excavation and Backfill Below Normal Grade:

1. If, in the opinion of the Engineer existing material below trench grade is unsuitable for properly placing bedding material and laying pipe, the Contractor will excavate, remove, and dispose of the unsuitable material to the required width and depth and replace it with gravel borrow as directed by the Engineer.

2. Do not backfill trenches until tests and inspections have been made and backfilling is authorized by Engineer. Use care in backfilling to avoid damage or displacement of pipe systems.

3. For piping or conduit less than 2'-6" below surface of roadways, provide 4" thick concrete base slab support. After installation and testing of piping or conduit, provide minimum 4" thick encasement (sides and top) of concrete prior to backfilling or placement of roadway subbase.

L. Cold Weather Protection: Protect excavation bottoms against freezing when atmospheric temperature is less than 35 degrees F (one degree C).

3.02 COMPACTION

A. Control soil compaction during construction providing minimum percentage of density specified for each area classification indicated below.

B. Percentage of Maximum Density Requirements: Compact soil to not less than the following percentages of maximum density for soils which exhibit a well-defined moisture density relationship (cohesive soils) determined in accordance with ASTM D 1557; and not less than the following percentages of relative density, determined in accordance with ASTM D 2049, for soils which will not exhibit a well-defined moisture-density relationship (cohesionless soils).

1. Structures, Building Slabs and Steps, Pavements: Compact top 12" of subgrade and each layer of backfill or fill material at 95% maximum density for cohesive material or 75% relative density for cohesionless material.

2. Lawn or Unpaved Areas: Compact top 6" of subgrade and each layer of backfill or fill material at 92% maximum density for cohesive soils and 72% relative density for cohesionless soils.

3. Walkways: Compact top 6" of subgrade and each layer of backfill or fill material at 95% maximum density for cohesive material or 75% relative density for cohesionless material.

C. The requirements for compaction of backfill shall conform to the following guidelines based on ASTM D1557, Method C:

Location	Percent Maximum Density
Below pipe centerline	95
Above pipe centerline	92
Below pavement (upper 3 ft)	95
Embankments	92
Below pipe in embankments	95

D. Moisture Control:

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

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

3. Soil material that has been removed because it is too wet to permit compaction may be stockpiled or spread and allowed to dry. Assist drying by discing, harrowing, or pulverizing until moisture content is reduced to a satisfactory value.

E. Crushed Stone:

Material shall be placed to insure that no excessive voids occur which could lead to uneven structural settlement.

3.03 BACKFILL AND FILL

A. Place acceptable soil material in layers to required subgrade elevations, for each area classification listed below.

1. In excavations, use Class C backfill material.

2. Under grassed areas, use Class B backfill material.

3. Under walks and pavements, use gravel borrow or Select Backfill, or combination of both.

4. Under leaching manholes and baffle tanks, use 6 inches of 2” inch stone over Select Backfill.

5. Under piping and conduit, use crushed stone where crushed stone is indicated under piping or conduit; shape to fit bottom 90 degree of cylinder.

B. Backfill excavations as promptly as work permits, but not until completion of the following.

1. Acceptance of construction below finish grade including, where applicable, dampproofing, waterproofing, and perimeter insulation.

2. Inspection, testing, approval and recording locations of underground utilities.

3. Removal of shoring and bracing, and backfilling of voids with satisfactory materials.

4. Removal of trash and debris.

5. Permanent or temporary horizontal bracing is in place on horizontally supported walls.

C. Ground Surface Preparation:

1. Remove vegetation, debris, unsatisfactory soil materials, obstructions, and deleterious materials from ground surface prior to placement of fills. Plow, strip, or break-up sloped surfaces steeper than 1 vertical to 4 horizontal so that fill material will bond with existing surface.

2. When existing ground surface has a density less than that specified under "Compaction" for particular area classification, break up ground surface, pulverize, moisture-condition to optimum moisture content, and compact to required depth and percentage of maximum density.

D. Placement and Compaction: Place backfill and fill materials in layers not more than 9” in loose depth for material compacted by heavy compaction equipment, and not more than 4”-6” in loose depth for material compacted by hand-operated tampers.

E. Backfilling:

1. In general, and unless other material is indicated on the Drawings or specified or classified as unsuitable material by the Engineer, material removed in-the course of making the construction excavation shall be suitable material for backfilling trenches.

2. If the material removed from the excavation is suitable for backfill with the exception that it contains stone or pavement sections having a maximum allowable size larger than that specified, the Contractor has the option to remove the oversized materials from the backfill or provide replacement backfill without additional compensation.

3. Before compaction, moisten or aerate each layer as necessary to provide optimum moisture content. Compact each layer to required percentage of maximum dry density or relative dry density for each area classification. Do not place backfill or fill material on surfaces that are muddy, frozen, or contain frost or ice.

4. Place backfill and fill materials evenly adjacent to structures, piping or conduit to required elevations. Take care to prevent wedging action of backfill against structures or displacement of piping or conduit by carrying material uniformly around structure, piping or conduit to approximately same elevation in each lift.

F. Backfilling Pipe Trenches:

1. As soon as practicable after pipes have been laid, backfilling shall be started.

2. Select backfill shall be placed with care up to a level of 6 inches above the top of pipe. This area of backfill is considered the zone around pipe and shall be thoroughly compacted before the remainder of the trench is backfilled. Compaction of the zone around pipe shall be done by use of power-driven tampers weighing at least 20 pounds. Care shall be taken that material close to the bank, as well as in all other portions of the trench, is thoroughly compacted to densities required.

3. Class B backfill shall be placed from the top of the select backfill to grade. Compaction of backfill in the remainder of the trench shall be done in layers not exceeding 12 inches in depth, and by use of power-driven tampers weighing at least 20 pounds. In lieu of mechanical compaction equipment, water jetting may be used only when approved by the Engineer.

4. The Contractor shall maintain the trench surface as work progresses. If settlement takes place, he shall immediately deposit additional material to restore the level of the ground.

3.04 GRADING

A. Uniformly grade areas within limits of grading under this section, including adjacent transition areas. Smooth finished surface within specified tolerances, compact with uniform levels or slopes between points where elevations are indicated, or between such points and existing grades.

B. Grading Outside Building Lines: Grade areas adjacent to building lines to drain away from structures and to prevent ponding. Finish surfaces free from irregular surface changes, and as follows:

1. Lawn or Unpaved Areas: Finish areas to receive topsoil to within not more than 0.10’ above or below required subgrade elevations.

2. Walks: Shape surface of areas under walks to line, grade and cross-section, with finish surface not more than 0.10’ above or below required subgrade elevation.

3. Pavements: Shape surface of areas under pavement to line, grade and cross-section, with finish surface not more than 1/2” above or below required subgrade elevation.

C. Grading Surface of Fill Under Treatment Device Structures: Grade smooth and even, free of voids, compacted as specified, and to required elevation. Provide final grades within a tolerance of 1/2” when tested with a 10’ straightedge.

D. Compaction: After grading, compact subgrade surfaces to the depth and indicated percentage of maximum or relative density for each area classification.

3.05 PAVEMENT SUBBASE COURSE

A. Subbase course consists of placing gravel borrow material, in layers of specified thickness, over subgrade surface to support a pavement base course.

B. Grade Control: During construction, maintain lines and grades including crown and cross-slope of subbase course.

C. Place shoulders along edges of subbase course to prevent lateral movement. Construct shoulders of acceptable soil materials, placed in such quantity to compact to thickness of each subbase course layer. Compact and roll at least a 12" width of shoulder simultaneously with compacting and rolling of each layer of subbase course.

D. Placing: Place subbase course material on prepared subgrade in layers of uniform thickness, conforming to indicated cross-section and thickness. Maintain optimum moisture content for compacting subbase material during placement operations. The course shall be spaced in layers not more than a 4-inch thick subbase.

3.06 FIELD QUALITY CONTROL

Quality Control Testing During Construction: Allow testing service to inspect and approve subgrades and fill layers before further construction work is performed.

3.07 MAINTENANCE

A. Protection of Graded Areas:

1. Protect newly graded areas from traffic and erosion. Keep free of trash and debris.

2. Repair and re-establish grades - in settled, eroded, and rutted areas to specified tolerances.

B. Reconditioning Compacted Areas: 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.

C. Settling: Where settling is measurable or observable at excavated areas during general project warranty period, remove surface (pavement, lawn or other finish), add backfill 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.

3.08 DISPOSAL OF EXCESS AND WASTE MATERIALS

A. Excavated material shall be transported off the Owner's property.

END OF SECTION

SECTION 02220

TRENCHING, BACKFILLING AND COMPACTION

PART 1 - GENERAL

1.01 SCOPE OF WORK

A. Furnish all labor, materials, equipment and incidentals necessary to perform all trenching for pipelines and appurtenances, including drainage, filling, backfilling, disposal of surplus material and restoration of trench surfaces and easements.

B. Excavation shall extend to the width and depth shown on the Drawings or as specified, and shall provide suitable room for installing pipe, structures and appurtenances.

C. The Contractor shall furnish and place all sheeting, bracing, and supports and shall remove from the excavation all materials which the Engineer may deem unsuitable for backfilling. The bottom of the excavation shall be firm, dry, and in all respects, acceptable. If conditions warrant, the Contractor may be ordered to deposit gravel for pipe bedding, or gravel refill for excavation below grade, directly on the bottom of the trench immediately after excavation has reached the proper depth and before the bottom of the trench has become softened or disturbed by any cause whatever. The length of open trench shall be related closely to the rate of pipe laying. All excavation shall be made in open trenches.

D. All excavation, trenching, and related sheeting, bracing, etc. shall comply with the requirements of OSHA excavation safety standards (29 CFR Part 1926.650 Subpart P) and State requirements. Where conflict between OSHA and State regulations exists, the more stringent requirements shall apply.

E. Wherever the requirement for 92 percent compaction is referred to herein it shall mean “at least 92 percent of maximum density as determined by ASTM compaction tests, Designation D1557, Method D”.

F. Prior to the start of work the Contractor is required to submit his proposed method of backfilling and compaction to the Engineer for review.

PART 2 - PRODUCTS

Not Used

PART 3 - EXECUTION

3.01 TRENCH EXCAVATION

A. Trench excavation shall include material of every description and of whatever substance encountered, except rock and boulders. Pavement shall be cut with a saw, wheel or pneumatic chisel along straight lines before excavating.

B. The Contractor shall strip and stockpile topsoil from grassed areas crossed by trenches. At the Contractor's option, topsoil may be otherwise disposed of and replaced, when required, with approved topsoil of equal quality.

C. While excavating and backfilling is in progress, traffic shall be maintained, and all utilities and other property protected as provided in the General Conditions and General Requirements.

D. Trenches shall be excavated to the depth indicated on the Drawings, and in widths sufficient for laying the pipe, bracing, and for pumping and drainage facilities. The bottom of the excavations shall be firm and dry and in all respects acceptable to the Engineer. Trench width shall be practical minimum.

E. Excavation and dewatering shall be accomplished by methods which preserve the undisturbed state of subgrade soils. The trench may be excavated by machinery to, or just below the designated subgrade, provided that material remaining in the bottom of the trench is no more than slightly disturbed. Subgrade soils which become soft, loose, "quick", or otherwise unsatisfactory as a result of inadequate excavation, dewatering or other construction methods shall be removed and replaced by screened gravel fill as required by the Engineer at the Contractor's expense.

F. Clay and organic silt soils are particularly susceptible to disturbance due to construction operations. When excavation is to end in such soils, the Contractor shall use a smooth-edge bucket to excavate the last one foot of depth.

G. Where pipe is to be laid in screened gravel bedding, the trench may be excavated by machinery to the normal depth of the pipe provided that the material remaining in the bottom of the trench is no more than slightly disturbed.

H. Where pipe is to be laid directly on the trench bottom, final excavation at the bottom of the trench shall be performed manually, providing a flat-bottom true to grade upon undisturbed material. Bell holes shall be made as required.

3.02 DISPOSAL OF MATERIALS

A. Excavated material shall be stacked without excessive surcharge on the trench bank or obstructing free access to hydrants and gate valves. Inconvenience to

traffic and abutters shall be avoided as much as possible. Excavated material shall be segregated for use in backfilling as specified below.

B. It is expressly understood that no excavated material shall be removed from the site of the work or disposed of by the Contractor except as directed by the Engineer. When removal of surplus materials has been approved by the Engineer, the contractor shall dispose of such surplus material in approved areas designated by the Contractor and at no cost to the owner.

C. Should conditions make it impracticable or unsafe to stack material adjacent to the trench, the material shall be hauled and stored at a location provided by the Contractor. When required, it shall be re-handled and used in backfilling the trench.

3.03 TEST PITS

A. The Contractor may be required to excavate test pits for the purpose of locating underground utilities or structures as an aid in establishing the precise location of new work.

B. Test pits shall be backfilled as soon as the desired information has been obtained. The backfilled surface shall be maintained in a satisfactory condition for travel until resurfaced as specified.

3.04 EXCAVATION BELOW GRADE AND REFILL

A. Whatever the nature of unstable material encountered or the groundwater conditions, trench drainage shall be complete and effective.

B. If the Contractor excavates below grade through error or for his own convenience, or through failure to properly dewater the trench, or disturbs the subgrade before dewatering is sufficiently complete, he may be directed by the Engineer to excavate below grade as set forth in the following paragraph, in which case the work of excavating below grade and furnishing and placing the refill shall be performed at his own expense.

C. If the material at the level of trench bottom consists of fine sand, sand and silt or soft earth which may work into the screened gravel notwithstanding effective drainage, the subgrade material shall be removed to the extent directed and the excavation refilled with a 6-in layer of coarse sand, or a mixture graded from coarse sand to the fine peastone, as approved by the Engineer, to form a filter layer preserving the voids in the gravel bed of the pipe. The composition and gradation of gravel shall be approved by the Engineer prior to placement. Screened gravel shall then be placed in 6-inch layers thoroughly compacted up to the normal grade of the pipe. If directed by the Engineer, bank-run gravel shall be

used for refill of excavation below grade.

D. Geotextile filter fabric may be substituted for filter layer if approved by the Engineer. Filter fabric shall be Mirafi 140N, Supac equivalent, or equal.

3.05 BACKFILLING - PIPELINES

A. As soon as practicable after the pipe has been laid and jointed, backfilling shall begin and thereafter be prosecuted expeditiously. Bedding gravel, as specified for the type of pipe installed, shall be placed up to 1 ft over the pipe.

B. An impervious dam or bulkhead cutoff of clay or other impervious material shall be constructed in the trench as directed, to interrupt the unnatural flow of groundwater after construction is completed. The dam shall be effectively keyed into the trench bottom and sidewalls. Provide at least one clay or other impervious material dam in the pipe bedding between each manhole where directed or every 300 feet, whichever is less.

C. Where the pipes are laid cross country, the remainder of the trench shall be filled with common fill material in layers not to exceed 3 ft and mounded 6-in. above the existing grade or as directed. Where a loam or gravel surface exists prior to cross country excavations, it shall be removed, conserved, and replaced to the full original depth as part of the work under the pipe items. In some areas it may be necessary to remove excess material during the clean-up process, so that the ground may be restored to its original level and condition.

D. To prevent longitudinal movement of the pipe, dumping backfill material into the trench and then spreading will not be permitted until selected material or screened gravel has been placed and compacted to a level 1 ft over the pipe.

E. Backfill shall be brought up evenly on all sides. Each layer of backfill material shall be thoroughly compacted by rolling, tamping, or vibrating with mechanical compacting equipment or hand tamping, to 92 percent compaction. If rolling is employed, it shall be by use of a suitable roller or tractor, being careful to compact the fill throughout the full width of the trench.

F. Water jetting or puddling may be used unless the refill contains too great a proportion of clay or loam to permit satisfactory drying. Water jetting shall consist of using a suitable length of pipe at least 1¼-in. in diameter fitted with quick acting valve and sufficient hose to connect to hydrant or pump having adequate pressure and capacity. The full depth of backfill shall be thoroughly inundated by thrusting the pipe into the fill at frequent intervals with the valve open until all slumping ceases. Where backfill is compacted by puddling, it shall be done by depositing in water. Water for jetting or puddling may be obtained from Owner’s hydrants wherever possible. Water may be furnished by the Owner

from these hydrants if reasonable care is exercised in its use and when approved by the Water Division.

G. If water restrictions are in force, the Contractor shall obtain his own water elsewhere, or compact the backfill by other approved methods at no additional cost to this Contract.

H. Where other methods are not practicable, compaction shall be by use of hand or pneumatic ramming with tools weighing at least 20 lbs. The material being spread and compacted in layers not over 6-in. thick. If necessary, sprinkling shall be employed in conjunction with rolling and ramming.

I. Backfill around structures shall be selected common fill material, and may be compacted by puddling where approved by the Engineer. All backfill shall be compacted, especially under and over pipes connected to the structures.

J. Subject to the approval of the Engineer, fragments of ledge and boulders smaller than 6-inches may be used in trench backfill providing that the quantity, in the opinion of the Engineer, is not excessive. Rock fragments shall not be placed until the pipe has at least 2 ft of earth cover. Small stones and rocks shall be place in thin layers alternating with earth to insure that all voids are completely filled. Fill shall not be dropped into the trench in a manner to endanger the pipe.

K. Bituminous paving shall not be placed in backfilling unless specifically permitted, in which case it shall be broken up as directed. Frozen material shall not be used under any circumstances.

L. All road surfaces shall be broomed and hose-cleaned immediately after backfilling. Dust control measures shall be employed at all times.

3.06 BACKFILLING - COMMON FILL

A. Common Fill may be used as fill against exterior walls of structures, as embankment fill or in other areas as designated by the Engineer. Material conforming to the requirements of common fill shall be placed in layers having a maximum thickness of 12-in measured before compaction.

B. Common Fill shall be compacted to at least 92 percent of maximum density as determined by ASTM Compaction Tests, Designation D1557, Method D.

C. Materials placed in fill areas shall be deposited to the lines and grades shown on the Drawings making due allowance for settlement of the material and for the placing of loam thereon.

D. The surfaces of filled areas shall be graded to smooth true lines, strictly

conforming to grades indicated on the grading plan, and no soft spots or uncompacted areas will be allowed in the work.

E. No compacting shall be done when the material is too wet either from rain or from excess application of water. At such times, work shall be suspended until the previously placed and new materials have dried sufficiently to permit proper compaction.

3.07 BACKFILLING - STRUCTURAL FILL

A. Structural Fill shall be placed in layers having a maximum thickness of 8-in. in open areas and 6-in. in confined areas including points where conduit and piping join structures, measured before compaction. Each layer of fill shall be compacted to at least 95 percent of maximum dry density determined by the ASTM Compaction Test, Designation D1557, Method D by methods approved by the Engineer.

B. Structural Fill shall not be placed on a frozen surface or one covered by snow or ice, nor shall snow, ice or frozen earth be incorporated in the compacted fill.

C. Compaction of structural fill in open areas shall consist of a heavy vibratory roller, or any method approved by the Engineer. Compaction of structural fill in confined areas shall be accomplished by hand operated vibratory equipment or mechanical tampers approved by the Engineer. As a minimum, compaction of structural fill shall consist of four coverages of the approved equipment.

D. Working mat is required below all structures, as indicated on the Drawings, it shall consist of structural fill (12" min.).

3.08 RESTORING TRENCH SURFACE

A. Where trench occurs adjacent to paved streets, in shoulders, sidewalks, or in cross-country areas, the Contractor shall thoroughly consolidate the backfill and shall maintain the surface as the work progresses. If settlement takes place, he shall immediately deposit additional fill to restore the level of the ground.

B. In and adjacent to streets, the top 12-in layer (20-in in State Highways) of trench backfill shall consist of compacted processed gravel. Should the Contractor wish to use material excavated from the trench as gravel subbase for pavement replacement, the Contractor shall at his own expense have samples of the material tested by an independent testing laboratory at intervals not to exceed 500 feet, in order to establish its compliance with the specifications. Only material which has been tested by the Contractor and approved by the Engineer shall be allowed to be incorporated into the work.

C. The surface of any driveway or any other area which is disturbed by the trench excavation and which is not a part of the paved road shall be restored by the Contractor to a condition at least equal to that existing before work began.

D. In sections where the pipeline passes through grassed areas, the Contractor shall, at his own expense, remove and replace the sod, or shall loam and seed the surface to the satisfaction of the Engineer.

3.09 STRUCTURE EXCAVATION

A. Excavation shall be made to the grades shown on the Drawings and to such widths as will give suitable room for construction of the structures, for bracing and supporting, pumping and draining. The bottom of the excavations shall be rendered firm and dry and in all respects acceptable to the Engineer.

B. Excavation and dewatering shall be accomplished by methods which preserve the undisturbed state of subgrade soils. Exposed subgrades shall be proof-rolled with at least two coverages of the specified equipment. (Refer to Paragraph 3.09D). The Engineer shall waive this requirement if, in his opinion, the subgrade will be rendered unsuitable by such compaction. Subgrade soils which become soft, loose, “quick”, or otherwise unsatisfactory for support of structures as a result of inadequate excavation, dewatering, proof-rolling, or other construction methods shall be removed and replaced by structural fill as required by the Engineer at the Contractor’s expense.

C. Dewatering shall be such as to prevent boiling or detrimental underseepage at the base of the excavation as specified herein before.

D. Excavation equipment shall be satisfactory for carrying out the work in accordance with the Specifications. In no case shall the earth be ploughed, scraped, or dug with machinery so near to the finished subgrade as to result in excavation of, or disturbance of material below grade, the last of the excavated material being removed with pick and shovel just before placing of concrete or working mat thereon.

E. When excavation for foundations has reached prescribed depths, the Engineer shall be notified and he will inspect conditions. If materials and conditions are not satisfactory to the Engineer, the Engineer will issue instructions as to the procedures, and if additional costs are involved, adjustments of the contract will be made on the basis of unit prices agreed upon by the Owner and the Contractor in accordance with the provisions of the contract documents.

F. During final excavation to subgrade level, take whatever precautions are required to prevent disturbance and remolding. Material which has become softened and mixed with water shall be removed. Hand excavation of the final 3 to 6-in will be

required as necessary to obtain a satisfactory undisturbed bottom. The Engineer will be the sole judge as to whether the work has been accomplished satisfactorily.

END OF SECTION

SECTION 02240

GEOTEXTILE FABRICS (FILTER FABRIC)

PART 1 - GENERAL

1.01 DESCRIPTION:

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

1.02 SUBMITTALS:

A. Six (6) sets of shop drawings or working drawings and material specifications shall be submitted to the Engineer for review for each type of geotextile fabric furnished. A material sample as well as general installation practices and an installation schedule shall be included. Submittals shall be submitted in accordance with the general specifications.

PART 2 – PRODUCTS

2.01 GEOTEXTILE FABRIC:

A. The Geotextile supplied shall be a non-woven, AASHTO M 288 Class 2 having the following minimum average roll values (MARV) in the weakest principle direction:

B. Geotextile fabric shall have the following minimum roll values:

Physical Requirements	Test Method	Minimum Requirements
Weight	ASTM D3776	5.7 oz./sy
Grab Tensile Strength	ASTM D4632	150 lbs
Grab Tensile Elongation	ASTM D4632	50%
Puncture	ASTM D4833	80 lbs
Mullen Burst	ASTM D3786	275 lbs
Coefficient of Permeability	ASTM D4491	0.2 cm/sec
Apparent Opening Size	ASTM D4751	No. 70-100 Sieve

PART 3 – EXECUTION

3.01 INSTALLATION

A. GENERAL:

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

B. GEOTEXTILE FABRIC:

1. Geotextile fabric shall be installed at locations as shown on the drawings or as directed by the Engineer.

2. The fabric in place shall cover the entire riprap/rockfill area and cover the circumference of the excavations for the beds or structures.

3. Each width of fabric shall be overlapped by the subsequent width a minimum of two feet.

4. The Contractor shall follow the manufacturer's installation recommendations to ensure proper completion of the fabric installation.

3.02 FINAL INSPECTION AND ACCEPTANCE:

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

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

END OF SECTION

SECTION 02265

DRAINAGE SWALES

PART 1 - GENERAL

1.01 WORK INCLUDED

This section of the specification covers the construction of drainage swales as shown on the Drawings.

1.02 QUALITY ASSURANCE

A. Use adequate numbers of skilled workmen who are trained and experienced in the necessary crafts and who are completely familiar with the specified requirements and methods required for proper completion of the work under this Section.

B. Use equipment of adequate size, capacity, and quantity to accomplish the work of this Section in a timely manner.

C. Comply with the directions of the Engineer and the requirements of governmental agencies having jurisdiction.

PART 2 - PRODUCTS

2.01 DRAINAGE SWALES

A. Drainage swales shall be planted with Moist Mix, Wetmix, and plantings as shown on the drawings.

B. Seed mixes shall conform to Section 02910 Vegetation and information provided on the drawings.

C. Temporary surface erosion protection for drainage swales shall conform to Section 02241.

2.03 GABION CHECKDAMS & SCOUR PROTECTION

A. Gabions used in the construction of the gabion checkdam shall be galvanized welded wire mesh gabions. Gabions shall be sized as shown on the Drawings.

B. Gabions shall conform to Section 02370 Gabion Baskets.

C. The material to fill the gabion material shall be 6” to 8” diameter rip rap and conform to Section 02271 Rip Rap.

D. Material used for scour protection shall be 4” diameter rip rap and conform to Section 02271 Rip Rap

PART 3 - EXECUTION

3.01 DRAINAGE SWALES

A. Surface erosion protection shall be used in all drainage swales to minimize soil erosion and planting washouts. The material shall be placed over the prepared seeded surface in drainage swales and other locations as directed by the Engineer. Plantings shall be installed after the material has been firmly secured in place.

B. The surface erosion protection shall be installed per manufacturer's recommendations or as directed by the Engineer.

C. Vegetation shall be installed in accordance with Section 02910 Vegetation and as directed on the drawings.

3.02 GABION CHECKDAMS

Gabions shall be installed in accordance with manufacturer's specifications and as shown on the Drawings.

3.03 FINAL INSPECTION AND ACCEPTANCE

~~A. The Contractor shall, at his expense, have a manufacturer's representative inspect the work at completion of installation of the drainage mesh.~~

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

~~C.~~B. Any work found to be unsatisfactory by the manufacturer's representative shall be corrected at the Contractor's expense.

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END OF SECTION

SECTION 02266

STEPPED INFILTRATION AREA

PART 1 - GENERAL

1.01 WORK INCLUDED

This section of the specification covers the construction of infiltration trenches as shown on the Drawings.

1.02 QUALITY ASSURANCE

A. Use adequate numbers of skilled workmen who are trained and experienced in the necessary crafts and who are completely familiar with the specified requirements and methods required for proper completion of the work under this Section.

B. Use equipment of adequate size, capacity, and quantity to accomplish the work of this Section in a timely manner.

C. Comply with the directions of the Engineer and the requirements of governmental agencies having jurisdiction.

PART 2 - PRODUCTS

2.01 INFILTRATION AREA

A. Infiltration area shall be comprised of the subgrade materials as shown on the Drawings.

PART 3 - EXECUTION

3.01 INFILTRATION AREA

A. Surface erosion protection shall be used in all infiltration areas to minimize soil erosion and planting washouts. The material shall be placed over the prepared seeded surface in infiltration trenches and other locations as directed by the Engineer. Plantings shall be installed after the material has been firmly secured in place.

B. The surface erosion protection shall be installed per manufacturer’s recommendations or as directed by the Engineer.

3.02 FINAL INSPECTION AND ACCEPTANCE

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

B. Any work found to be unsatisfactory by the manufacturer's representative shall be corrected at the Contractor's expense.

END OF SECTION

SECTION 02271

RIPRAP

PART 1 - GENERAL

This section of the specification covers riprap complete. Grading and compaction of earth slopes and all other slope preparation are included under other sections of the specification.

PART 2 - PRODUCTS

2.01 RIP RAP

A. Riprap protection shall consist of a protective covering of angular shaped, hard, durable, weather resistant stones, to provide a flow surface and to protect subsequent areas of embankment from erosion.

B. No stone shall have a minimum thickness less than one-third of its length or width. Stone shall be free from overburden, spoil, shale, and organic material. Rounded stone, boulders, sandstone and similar soft stone or relatively thin slabs will not be acceptable.

C. Four-inch (4") riprap for pipe ends, swale ends, and gabion checkdams shall conform to the specifications listed below. Stone shall be free from overburden, spoil, shale, and organic material and shall conform to the following gradation requirements:

Sieve Opening	Percent Passing By Weight
8 -inch	100
4 -inch	75-100
2.5 –inch	0-5

D. Six-inch (6") riprap for pipe ends, swale ends, and gabion checkdams shall conform to the specifications listed below. Stone shall be free from overburden, spoil, shale, and organic material and shall conform to the following gradation requirements:

Sieve Opening	Percent Passing By Weight
8 -inch	95-100
4 -inch	0-25
2.5 –inch	0-5

E. Eight-inch (8") riprap for pipe ends, swale ends, and gabion baskets shall conform to the specifications listed below. Stone shall be free from overburden, spoil, shale, and organic material and shall conform to the following gradation requirements:

Sieve Opening	Percent Passing By Weight
10 – inch	95-100
6 – inch	0-25
4 – inch	0-10

F. Twelve-inch (12") riprap for pipe ends, swale ends, and gabion baskets shall conform to the specifications listed below. Stone shall be free from overburden, spoil, shale, and organic material and shall conform to the following gradation requirements:

Sieve Opening	Percent Passing By Weight
15 – inch	95-100
10 – inch	0-10

G. Eighteen-inch (18") riprap for pipe ends, swale ends, and gabion baskets shall conform to the specifications listed below. Stone shall be free from overburden, spoil, shale, and organic material and shall conform to the following gradation requirements:

Sieve Opening	Percent Passing By Weight
21 – inch	95-100
15 – inch	0-10

2.02 PLACED RIP RAP

Placed rip rap shall consist of granite or other similar durable stone. The exposed surface of the stones shall range from roughly square to rectangular in shape, with split or quarry face finish and uniform in color. The stones shall conform to the following sizes:

Length	12 to 28 inches
Width	10 to 14 inches
Thickness	3 to 6 inches

PART 3 - EXECUTION

3.01 RIP RAP

A. Stone for riprap shall be placed on the prepared slope or area in a manner which will produce a reasonably well-graded mass of stone with the minimum practicable percentage of voids and a minimum void of 12 inches.

B. Riprap protection shall be placed on its full course thickness at one operation and in such a manner as to avoid displacing the underlying material. Placing of riprap protection in layers or by dumping into chutes or by similar methods likely to cause segregation will not be permitted.

C. All material going into riprap protection shall be so placed and distributed so that there will be no large accumulation of either the larger or smaller size of stone.

3.02 PLACED RIP RAP

A. Placed Rip Rap shall be installed in one layer where shown on the drawings. Stones shall be laid flat with the length dimension generally perpendicular to the flow path.

B. Joints between stones shall not exceed 1 ½" where crushed stone is placed below the placed rip rap.

END OF SECTION

SECTION 02276

TEMPORARY EROSION CONTROLS

PART 1 – GENERAL

1.01 WORK INCLUDED

This work shall consist of furnishing, installing, maintaining and dispersing (if needed) water permeable compost filter sock (Filtrexx SiltSoxx™ or approved equal) catch basin protection (Siltsack™ or approved equal) to contain soil erosion and sediment by filtering soil particles from water moving off site into adjacent waterways or storm water drainage systems during construction, ground disturbances and until the site has stabilized.

1.02 SUBMITTALS

Submit to the Engineer product data and samples for permeable compost filter sock.

1.03 QUALITY ASSURANCE

A. Use adequate numbers of skilled workmen who are trained and experienced in the necessary crafts and who are completely familiar with the specified requirements and methods required for proper completion of the work under this Section.

B. Use equipment of adequate size, capacity, and quantity to accomplish the work of this Section in a timely manner.

C. Comply with the directions of the Engineer and the requirements of governmental agencies having jurisdiction.

PART 2 - PRODUCTS

2.01 COMPOSTED PRODUCTS (FILTREXX FILTERMEDIA™)

Composted product: Compost used for permeable filter sock shall be weed free and derived from a well-decomposed source of organic matter. The compost shall be produced using an aerobic composting process meeting CFR 503 regulations, including time and temperature data indicating effective weed seed, pathogen and insect larvae kill. The compost shall be free of any refuse, contaminants or other materials toxic to plant growth. Non-composted products will not be accepted. Test methods for the items below should follow USCC TMECC guidelines for laboratory procedures:

A. PH – 5.0-8.0 in accordance with TMECC 04.11-A, “Electrometric pH Determinations for Compost”

B. Particle size – 99% passing a 2” sieve and a minimum of 60% greater than the 3/8” sieve, in accordance with TMECC 02.02-B, “Sample Sieving for Aggregate Size Classification”.

C. Moisture content of less than 60% in accordance with standardized test methods for moisture determination.

D. Material shall be relatively free (<1% by dry weight) of inert or foreign man made materials.

E. A sample shall be submitted to the engineer for approval prior to being used and must comply with all local, state and federal regulations.

F. Compost product shall be a manufacturer approved media, as determined by testing procedures outlined by the manufacturer. A copy of an approved report shall be kept on file.

2.01 CATCH BASIN PROTECTION (SILTSACK™)

A. Catch basin protection shall be Siltsack Type B model or approved equal. It shall be constructed or adjusted to properly fit within the catch basin grate and shall meet the following requirements.

1. Siltsack shall be manufactured from a specially designed woven polypropylene geotextile and sewn by a double needle machine, using a high strength nylon thread.

2. Siltsack will be manufactured to fit the opening of the catch basin or drop inlet. Siltsack will have the following features: two dump straps attached at the bottom to facilitate the emptying of Siltsack.

3. Siltsack shall have lifting loops as an integral part of the system to be used to lift Siltsack from the basin,

4. Siltsack shall have a restraint cord approximately halfway up the sack to keep the sides away from the catch basin walls, this yellow cord is also a visual means of indicating when the sack should be emptied.

5. Siltsack material shall meet the following material requirements:

Property	**Test Method**	**Units**	**Test Results**
Grab Tensile	ASTM D-4632	lbs.	167.5x300
Grab Elongation	ASTM D-4632	%	10x15
Puncture Strength	ASTM D-4533	lbs.	900
Trapezoid Tear	ASTM D-4533	lbs.	65x90
UV Resistance (@500 hrs)	ASTM D-4355	%	96
AOS	ASTM D-4751	US Sieve	30
Flow Rate	ASTM D-4491	gal/min/ft2	66
Permittivity	ASTM D-4491	sec^{-1}	0.862

PART 3 - EXECUTION

3.01 PERMEABLE COMPOST FILTER SOCK

A. Permeable Compost Filter Sock will be placed at locations indicated on plans as directed by the engineer. Socks should be installed parallel to the base of the slope or other affected area, perpendicular to sheet flow. In extreme conditions (i.e., 2:1 slopes), or when sheet flow flows to the area from a parcel above the work zone, a second sock shall be constructed at the top of the slope in order to dissipate flows.

B. If the Sock is to be left as a permanent filter or part of the natural landscape, it may be seeded at time of installation for establishment of permanent vegetation. The Engineer shall specify seed requirements.

C. Socks may be used in direct flow situations within runoff channels not exceeding 3 feet in depth. Normally, 18" or 24" socks should be used. Be sure to follow staking details as identified by the manufacturer or approved installer.

3.02 CATCH BASIN PROTECTION (SILTSACK™)

A. To install Siltsack in the catch basin, remove the grate and place the sack in the opening. Hold approximately six inches of the sack outside the frame. This is the area of the lifting straps. Replace the grate to hold the sack in place.

B. When the restraint cord is no longer visible, Siltsack is full and should be emptied.

C. To remove Siltsack, take two pieces of 1" diameter rebar and place through the lifting loops on each side of the sack to facilitate the lifting of Siltsack.

D. To empty Siltsack, place unit where the contents will be collected. Place the rebar through the lift straps (connected to the bottom of the sack) and lift. This will lift Siltsack from the bottom and empty the contents. Clean out, rinse and properly dispose of contents. Return Siltsack to its original shape and place back in the basin.

E. Siltsack is reusable. Once the construction cycle is complete, remove Siltsack from the basin and clean. Siltsack should be stored out of sunlight until next use.

3.03 MAINTENANCE

A. The Contractor shall maintain the erosion controls in a functional condition at all times and it shall be routinely inspected.

B. Catch basin protection shall be provided and maintained within all existing drainage structures located on the site with exposed earth or construction activities taking place upgradient until the exposed area has fully stabilized.

C. Catch basin protection shall be provided and maintained within all proposed drainage structures upon completion of the drainage structure until the site has fully stabilized.

D. Where the sock or catch basin protection requires repair, it will be routinely repaired.

E. The contractor shall remove sediment collected at the base of the sock when it reaches 1/2 of the exposed height of the sock, or as directed by the Engineer. Alternatively, rather than create a soil disturbing activity, the engineer may call for additional sock to be added at areas of high sedimentation, placed immediately on top of the existing sediment laden sock.

F. The contractor shall remove sediment collected by the Siltsack once the restraint cord is covered with sediment, or when it reaches within 3 inches of the bottom of the catch basin frame, or as directed by the Engineer. Siltsack should be emptied, cleaned and placed back into the basin.

3.04 PERFORMANCE

A. Contractor is responsible for establishing a working erosion control system and may, with approval of the Engineer, work outside the minimum construction requirements as needed.

B. Where the sock or Siltsack deteriorates or fails, it will be repaired or replaced with a more effective alternative.

C. The Contractor shall remove all temporary erosion controls (compost filter socks and catch basin protection and properly dispose of all captured sediment following full stabilization of the site or as directed by the Engineer/Owner.

3.05 FINAL INSPECTION AND ACCEPTANCE

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

B. Any work found to be unsatisfactory by the manufacturer's representative shall be corrected at the Contractor's expense.

END OF SECTION

SECTION 02513

ASPHALT PAVING

PART 1 - GENERAL

1.01 RELATED DOCUMENTS

Drawings and general provisions of Contract, including all Division 1 and Division 2 Specification Requirements apply to the work in this section.

1.02 DESCRIPTION OF WORK

A. Extent of asphalt concrete paving work is shown on drawings.

B. Prepared subbase is specified in earthwork sections.

C. If required, Cape Cod style berm to be placed monolithically with top wearing course.

1.03 SUBMITTALS

Provide copies of materials certificates signed by material producer and Contractor, certifying that each material item complies with, or exceeds, specified requirements.

1.04 JOB CONDITIONS

A. Weather Limitations:

1. Apply prime and tack coats when ambient temperature is above 50 degrees F (10 degrees C), and when temperature has not been below 35 degrees F (1 degree C) for 12 hours immediately prior to application. Do not apply when base is wet or contains an excess of moisture.

2. Construct asphalt concrete surface course when atmospheric temperature is above 40 degrees F (4 degrees C) and when base is dry. Base course may be placed when air temperature is above 30 degrees F (-1 degree C) and rising.

3. HMA shall only be placed on dry, unfrozen surfaces and only when the temperature requirements contained in Table 450.5 below are met.

Table 450.5 - Temperature Limitations for HMA Placement

HMA Pavement Course	Lift Thickness Inches (mm)	**Minimum Air Temperature** °F (°C)	**Minimum Surface Temperature** °F (°C)
Friction Course	1 (25)	55 (13)	60 (16)

Surface Course	< 1¾ (45)	50 (10)	55 (13)
Surface Course	≥ 1¾ (45)	40 (4)*	45 (7)
Intermediate Course	All	40 (4)*	45 (7)
Base Course	All	40 (4)*	45 (7)
Leveling Course	As Specified	50 (10)	55 (13)

*When the air temperature falls below 50° F (10° C), extra precautions shall be taken in drying the aggregates, controlling the temperatures of the materials, placing and compacting the mixtures.

B. Grade Control: Establish and maintain required lines and elevations.

PART 2 - PRODUCTS

2.01 MATERIALS

A. General: Use locally available materials and gradations which exhibit a satisfactory record of previous installations.

B. The following standards form a part of these specifications and indicate the minimum standards required:

New Hampshire Department of Transportation Standard Specifications for Highway and Bridges

Section 304 Aggregate Base Course
Section 401 Class Plant Mix Pavements -General
Section 403 Hot Bituminous Pavement
Section 404 Recycled Bituminous Pavement

2.02 ASPHALT- AGGREGATE MIXTURE

A. Pavement shall consist of binder course and top course or surface treatment pavements as specified herein. The bituminous paving mixture, equipment, methods of mixing and placing, and the precautions to be observed as to weather, condition of base, etc., shall be in accordance with NHDOT Section 401. The bituminous concrete pavements shall consist of Type B (binder course) Type F (top course).

B. The binder course mixture shall be within the composition limits of binder course as shown in NHDOT 702, and shall be 2-1/2 inches thick.

C. The top course or surface treatment pavement shall be within the composition limits as shown in NHDOT 702, and shall be placed as shown on the drawings or as specified.

D. The top course pavement shall be 1-1/2 inches thick in local streets.

2.03 BITUMINOUS CONCRETE CURBING

Bituminous concrete curbing shall conform to Section 609 including material specification as defined in Table 2 of the New Hampshire Department of Transportation Standard Specifications for Highways and Bridges, 2002.

PART 3 - EXECUTION

3.01 SURFACE PREPARATION

A. Proof roll prepared subbase surface to check for unstable areas and areas requiring additional compaction.

B. Notify Contractor of unsatisfactory conditions. Do not begin paving work until deficient subbase areas have been corrected and are ready to receive paving.

C. Herbicide Treatment: Apply chemical weed control agent in strict compliance with manufacturer's recommended dosages and application instructions. Apply to compacted, dry subbase prior to application of prime coat.

D. Prime Coat: Apply at rate of 0.20 to 0.50 gal. per sq. yd., over compacted subgrade. Apply material to penetrate and seal, but not flood surface. Cure and dry as long as necessary to attain penetration and evaporation of volatiles and per manufacturer's instructions.

E. Tack Coat: Apply to contact surfaces of previously constructed asphalt or portland cement concrete and surfaces abutting or projecting into asphalt concrete pavement. Distribute at rate of 0.05 to 0.15 gal. per sq. yd. of surface. Allow to dry until at proper condition to receive paving. Apply per manufacturer's instructions.

3.02 PLACING MIX

A. General: Place asphalt concrete mixture on prepared surface, spread and strike-off. Spread mixture at minimum temperature of 225 degrees F (107 degrees C).

B. Place inaccessible and small areas by hand. Place each course to required grade, cross-section, and compacted thickness.

C. Joints: Make joints between old and new pavements, or between successive days' work, to ensure continuous bond between adjoining work. Construct joints to have same texture, density and smoothness as other sections of asphalt concrete course. Clean contact surfaces and apply tack coat.

D. Surface treatment pavement over trenches shall be feathered to meet existing paved surfaces.

3.03 ROLLING

A. General: Begin rolling when mixture will bear roller weight without excessive displacement.

B. Compact mixture with hot hand tampers or vibrating plate compactors in areas inaccessible to rollers.

C. Breakdown Rolling: Accomplish breakdown or initial rolling immediately following rolling of joints and outside edge. Check surface after breakdown rolling, and repair displaced areas by loosening and filling, if required, with hot material.

D. Second Rolling: Follow breakdown rolling as soon as possible, while mixture is hot. Continue second rolling until mixture has been thoroughly compacted.

E. Finish Rolling: Perform finish rolling while mixture is still warm enough for removal of roller marks. Continue rolling until roller marks are eliminated and course has attained maximum density.

F. Patching: Remove and replace paving areas mixed with foreign materials and defective areas. Cut-out such areas and fill with fresh, hot asphalt concrete. Compact by rolling to maximum surface density and smoothness.

G. Protection: After final rolling, do not permit vehicular traffic on pavement until it has cooled and hardened.

H. Erect barricades to protect paving from traffic until mixture has cooled enough not to become marked.

3.04 BITUMINOUS CONCRETE CURBING

A. Bituminous concrete curbing shall conform to Section 609 including material specification as defined in Table 2 of the New Hampshire Department of Transportation Standard Specifications for Highways and Bridges, 2002.

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

3.05 FIELD QUALITY CONTROL

A. General: Test in-place asphalt concrete courses for compliance with requirements for thickness and surface smoothness. Repair or remove and replace unacceptable paving as directed by Engineer.

B. Thickness: In-place compacted thickness will not be acceptable if exceeding following allowable variation from required thickness:

1. Base Course: 1/2”, plus or minus.

2. Surface Course: 1/4”, plus or minus.

C. Surface Smoothness: Test finished surface of each asphalt concrete course for smoothness, using 10’ straightedge applied parallel with, and at right angles to centerline of paved area. Surfaces will not be acceptable if exceeding the following tolerances for smoothness.

1. Base Course Surface: 1/4”.

3. Wearing Course Surface: 3/16".

D. Check surface areas at intervals as directed by Engineer.

END OF SECTION

SECTION 02523

BITUMINOUS CONCRETE SPEED HUMPS

PART 1 - GENERAL

1.01 DESCRIPTION OF WORK

This item of work shall consist of furnishing and setting bituminous concrete speed hump on a bituminous concrete base, in accordance with these specifications and in close conformity with the lines and grades shown on the plans or established by the Engineer.

1.02 RELATED DOCUMENTS

Required earthwork is specified under Section 02200 - Earthwork.

1.03 SUBMITTALS

Six (6) sets of shop drawings for the materials of this section, dimensioning typical speed hump sections shall be submitted to the Engineer for review.

PART 2 - PRODUCTS

Bituminous concrete speed humps shall conform to section 609 of the New Hampshire Department of Transportation Standard Specifications for Road and Bridge Construction, 2016.

PART 3 - EXECUTION

A. Bituminous concrete speed humps, unless modified herein, installation shall conform to Section 609 of the NHDOT Standard Specifications for Road and Bridge Construction, 2016.

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

END OF SECTION

SECTION 02575

RESTORATION OF ADJACENT IMPACTED SURFACES

PART 1 – GENERAL

1.1 WORK INCLUDED:

A. Furnish all labor, material, equipment and incidentals required to replace all pavement removed or otherwise disturbed by the Contractor's operations.

B. New pavement shall consist of permanent pavement placed around drainage structures as directed by the Engineer and as specified herein.

C. Streets, driveways, parking areas or sidewalk pavements damaged or disturbed outside of work limits by the Contractor's operations shall be repaired, replaced or restored in accordance with the requirements specified herein and as directed for the respective type of pavement replacement and in a manner satisfactory to the Engineer.

1.2 REFERENCES:

A. Except as otherwise specified herein, the current Standard Specifications for Road and Bridge Construction, including all addenda, issued by the NHDOT and any specific requirements by the Town of Wolfeboro Public Works, shall apply to materials and workmanship required for the work of this Section. The quality of materials and workmanship of pavement restorations by the Contractor shall be at least equal to that required by the referenced specifications.

PART 2 – PRODUCTS

2.1 MATERIALS:

A. Calcium chloride shall conform to AASHTO M144, Type I or Type II.

B. Loam shall be a rich topsoil, free of stones larger than 2-in and free from roots of a size which may not readily be raked out of the finished surfaces. Fertilizer shall be an approved brand of 5-10-5 fertilizer. Grass seed shall be of highest quality made up in proportion of 1 lb of white clover to 5 lbs of red top and 5 lbs or Kentucky Blue Grass, unless otherwise directed by the Engineer.

C. Permanent pavement shall consist of Binder Course and Top Course, conforming to the referenced specification, Section 400 of the NHDOT Standards, bituminous concrete or as directed by the Owner/Engineer.

PART 3 – EXECUTION

3.1 GENERAL:

A. Materials for pavement shall be mixed, delivered, placed and compacted in accordance with the referenced specification, Section 400 of the NHDOT Standards and as specified herein.

B. Whenever the subbase becomes dry enough to cause dust problems, spread calcium chloride uniformly over the gravel surface in sufficient quantity to eliminate the dust.

3.2 INSTALLATION:

A. Where the impacts occur adjacent to paved streets, in shoulders, sidewalks, or in cross-country areas, the Contractor shall thoroughly consolidate the backfill and shall maintain the surface as the work progresses. If settlement takes place, deposit additional fill immediately to restore the level of the ground. Adjacent to paved streets and highways the top 12-in layer of backfill shall consist of compacted bank-run gravel or processed gravel.

B. The surface of all adjacent driveways and other areas which are disturbed by excavation and which are not a part of the paved way, shall be restored by the Contractor to a condition at least equal to that existing before work began.

C. In sections where the impacts occur in adjacent grassed areas, the Contractor shall at his own expense remove and replace the soil, or shall loam and seed the surface to the satisfaction of the Engineer. The depth of loam replaced shall be at least equal to that removed by the Contractor in his operations, but in no event shall it be placed less than 6-in in depth.

D. Prepare surfaces on which loam is to be placed by raking to true grade. Place loam, rake, and dress to true and uniform grades and roll lightly. Apply fertilizer at the rate of twenty (20) pounds per 100 sq yds and sow grass seed at a uniform application of four (4) pounds per 100 sq yds. Rake seed lightly into topsoil and roll with hand roller. Keep seeded areas moist until grass growth is well started. Reseed areas which fail to germinate, and restore and reseed washed areas, if any.

E. Permanent pavement at drainage structures outside the limits of work shall be constructed as follows:

1. Shape and compact subbase to 95 percent of maximum dry density as determined by ASTM D1557.

2. Before placing permanent pavement, saw cut edges of existing pavement 12-in back from the edge of excavation to a smooth line. Edges shall be trimmed straight and square. Broom and tack coat all edges with emulsified or cutback asphalt.

3. Place Binder Course and compact to thicknesses shown on plans by steel-wheeled roller.

4. Broom and tack coat edges of existing pavement and Binder Course with emulsified or cutback asphalt.

5. Place Top Course and compact to finish smooth, dense and flush with surface of existing pavement.

END OF SECTION

SECTION 02601

CATCH BASINS, MANHOLES, AND DRAINAGE STRUCTURES

PART I - GENERAL

1.01 WORK INCLUDED

This section covers all precast catch basins, manholes, and/or drainage structures complete, including, but not limited to, bases, walls, mortar, inverts, frames and covers.

1.02 RELATED WORK

Section 02200 – EARTHWORK

Section 02275 – OUTLET PIPE HOOD

Section 02612 – REINFORCED CONCRETE PIPE

Section 02625 – PVC GRAVITY PIPE AND FITTINGS

1.03 SYSTEM DESCRIPTION

A. Precast sections shall conform in shape, size, dimensions, materials, and other respects to the details indicated on the drawings or as ordered by the Engineer.

B. Catch basins shall have a four-foot deep sump unless otherwise specified.

C. Riser and cone sections shall be precast concrete.

1.04 REFERENCES

The following standards form a part of this specification as referenced:

American Society for Testing and Materials (ASTM)

ASTM A48 Gray Iron Castings

ASTM C32 Sewer and Manhole Brick

ASTM C144 Aggregate for Masonry Mortar

ASTM C207 Hydrated Lime for Masonry Purposes

ASTM C478 Precast Reinforced Concrete Manhole Sections

1.05 SUBMITTALS

A. In accordance with requirements of general specifications, six (6) sets of manufacturer literature of the materials of this section shall be submitted to the Engineer.

B. Certification that structures meet applicable loading requirements (minimum H-20 loading unless otherwise specified).

PART 2 - PRODUCTS

2.01 CONCRETE PRECAST CATCH BASIN/ MANHOLE/ DRAINAGE STRUCTURE

A. Precast concrete catch basin, manhole, and/or drainage structure shall be installed where shown on the Plans.

B. Inlet and discharge connection shall be made according to the details.

C. Each catch basin, manhole, and/or drainage structure shall be equipped with heavy-duty cast iron gratings/ covers unless specified otherwise.

D. Grating shall bear evenly on the catch basin edges.

E. Manhole covers shall be 26” diameter with minimum H20 loading.

PART 3 - EXECUTION

3.01 PRECAST SECTIONS

A. Precast bases shall be supported on a compacted level foundation of crushed stone, as specified in Section 02200 - Earthwork, at least 6 inches thick.

B. Precast concrete sections shall be set vertical and with sections in true alignment.

C. All holes used for handling the sections shall be thoroughly plugged with mortar. Mortar shall be one part cement to 1-1/2 parts sand, mixed slightly damp to the touch (just short of "balling”), hammered into the holes until it is dense and an excess of paste appears on the surface, and then finished smooth and flush with the adjoining surfaces.

3.02 CASTINGS

A. Frames and covers shall be of good quality, strong, tough, even grained cast iron, smooth, free from scale, lumps, blisters, sand holes and defects of any kind which render them unfit for the service for which they are intended. Manhole covers and frame seats shall be machined to a true surface. Castings shall be thoroughly cleaned and subject to hammer inspection. Cast iron shall conform to ASTM A48, Class 30.

B. Frames and covers shall be LeBaron Foundry, Neenah Foundry, or approved equal. Model numbers to be specified by Owner. Covers shall be 26" diameter with min. H-20 loading.

C. Cast iron frames, grates and covers shall be specified. The frames and covers shall be set by the Contractor to conform accurately to the grade of the finished pavement, existing ground surface, or as indicated on the drawings. Frames shall be adjusted to meet the street surface.

D. Frames shall be set concentric with the top of the concrete section and in a full bed of mortar so that the space between the top of the concrete section or brick headers and the bottom flange of the frame shall be completely filled and made watertight. A thick ring of mortar extending to the outer edge of the concrete shall be placed all around the bottom flange. The mortar shall be smoothly finished to be flush with the top of the flange and have a slight slope to shed water away from the frame.

E. Covers and/or grates shall be left in place in the frames, for safety reasons, except while work is being performed.

3.03 ACCESSORIES

A. Accessories shall be installed in accordance with manufacturer's instructions.

B. Hoods shall be SNOUT or approved equal as specified in Section 02275 Outlet Pipe Hood.

3.04 PRECAST CATCH BASIN/ MANHOLE/ DRAINAGE STRUCTURE

Installation shall be as per the manufacturer directions as approved by the Engineer.

3.05 CLEANING

All new manholes shall be thoroughly cleaned of all silt, debris and foreign matter of any kind, before final inspection.

END OF SECTION

SECTION 02602

PRECAST CONCRETE STRUCTURES

PART I - GENERAL

1.01 WORK INCLUDED

A. This section covers all precast concrete structures including the precast concrete stair treads as shown on the Drawings and specified herein.

B. The Contractor shall furnish all labor, materials, tools and equipment and shall do all work to satisfactorily install all precast concrete structures including the precast concrete stair treads shown on the Drawings and specified herein. The work shall include excavation and removal of unwanted backfill, dewatering, flow diversion, construction of structure footings and bedding, installation of the precast structures, backfill, compaction, sheeting as required, clean-up and all necessary labor to complete the installation.

1.02 RELATED WORK

A. Section 01567 – ENVIRONMENTAL PROTECTION

B. Section 02200 – EARTHWORK

C. Section 02625 – PVC DRAINAGE PIPE AND FITTINGS

D. Section 03302 – FIELD CONCRETE

E. Section 02700 – INTERLOCKING CONCRETE BLOCK RETAINING WALL

1.03 SYSTEM DESCRIPTION

Precast sections shall conform in shape, size, dimensions, materials, and other respects to the details indicated on the Drawings or as ordered by the Engineer.

1.04 REFERENCES

The following standards form a part of this specification:

American Concrete Institute (ACI)

ACI 315	Details and Detailing of Concrete Reinforcement
ACI 318	Building Code Requirements for Reinforced Concrete

American Society for Testing and Materials (ASTM)

ASTM C33	Concrete Aggregates
ASTM C40	Test for Organic Impurities in Fine Aggregates for Concrete
ASTM C143	Test for Slump of Portland Cement Concrete
ASTM C150	Portland Cement
ASTM C260	Air Entraining Admixtures for Concrete
ASTM A615	Deformed and Plain Billet-Steel Bars for Concrete Reinforcement
ASTM C27	The Mother of All (Precast) Standards
ASTM C144	Aggregate for Masonry Mortar

1.05 SUBMITTALS

In accordance with requirements of general conditions, six (6) sets of manufacturer literature of the materials of this section shall be submitted to the Engineer prior to commencing work.

A. Submit to the Engineer, shop drawings showing details of construction, reinforcing steel, joints, inserts, fasteners and any special fittings. Submittals shall be provided for the following:

1. Precast concrete stair structure placement and installation plan.

2. Method of repair for minor damage to precast concrete sections.

3. Temporary water diversion and dewatering plan for installation.

B. Certification that structures meet applicable loading requirements (minimum H-20-44 loading unless otherwise specified).

1.06 QUALITY ASSURANCE

A. All material shall be new and unused.

B. Materials' quality, manufacturing process and finished sections are subject to inspection and approval by Engineer or other Owner representative. Inspection may be made at place of manufacture, at work site following delivery, or both.

C. Materials will be examined for compliance with ASTM Specifications, these Specifications and approved manufacturer's drawings. Additional inspection criteria shall include: appearance, dimension(s), blisters, cracks and soundness.

D. Materials shall be rejected for failure to meet any Specification requirement. Rejection may occur at place on manufacture, at work site, or following installation. Mark for identification rejected materials and remove from work site immediately. Rejected materials shall be replaced at no cost to Owner.

E. Repair minor damage to precast concrete sections by approved method, if repair is authorized by Engineer.

PART 2 - PRODUCTS

2.01 GENERAL REQUIREMENTS

Precast sections shall be designed to withstand earth loads due to soil cover on top of the sections plus live loads due to vehicular traffic (H20-44 loading). Design and construction of each section shall meet the requirements of ACI 318 and the AASHTO Load Factor.

2.02 PRECAST CONCRETE STRUCTURES

A. The precast reinforced concrete structures shall be manufactured by Concrete Systems Inc., Michie Precast, Phoenix Precast, Shea Concrete or approved equal. The inside dimensions shall be as indicated on the Drawings. The manufacturer shall notify the Engineer at least five working days prior to concrete placement during the manufacturing process. The Engineer may inspect the reinforcing steel placement and/or require the manufacturer to provide photographs of each section showing the location of all reinforcing steel prior to concrete placement. Should it be determined that the placement of steel is not as detailed on the approved shop drawings, the section in question shall be rejected and a replacement section shall be manufactured at the Contractor's expense. Failure to properly notify the Engineer prior to placing concrete shall require the precast sections to be rejected and replacement sections to be manufactured at the Contractor's expense.

B. Structural design calculations and Drawings shall be prepared and stamped by a Professional Engineer registered in the State of New Hampshire.

C. All precast concrete shall have a minimum compressive strength of 4,000 psi at 28 days. Water shall be kept to a minimum to obtain concrete which is as dense and watertight as possible. The maximum water content shall be 6 gallons per 94 lb sack and the minimum cement factor shall be 6.0 (94 lb) sacks per cubic yard. The above ratios shall be revised for sacks of cement which weight other than 94 pounds per sack.

D. Design Criteria

1. All precast concrete members shall conform to the Building Code Requirements for Reinforced Concrete ACI 318.

2. When the design yield strength “fy” for tension reinforcement exceeds 40,000 psi, the “z” values referred in ACI 318 shall not exceed 95 ksi. The flexural stress in reinforcement under service loads “fs” shall be calculated and shall not be greater than 50 percent of the specified yield strength “fy”.

3. The precast concrete structure’s elements shall be designed to support their own weight, the weight of soil above at 120 pcf and shall be capable of withstanding a live load equal to an AASHTO HS-20 highway loading applied to the top slab in addition to 1000 lb at each eyebolt.

4. The structural design shall take into account discontinuities in the structure produced by openings, joints and inserts set in the structure.

5. The structures shall be designed to prevent floatation without the benefit of skin friction when the ground water level is at finished ground surface. Floatation forces shall be resisted by the dead load of the structure and soil structure and soil frictional forces shall not be considered as being effective in resisting floatation forces.

6. Openings and lifting inserts shall be completely framed as required to carry the full design loads to support the structures. All precast units shall be fully reinforced on both faces where thickness permits, and the minimum reinforcing shall be No. 5 at 12-in E.W.E.F. Additional reinforcing shall be provided around all openings and lifting inserts

7. The lifting inserts shall not be located within 6-in of the edge of structures or any penetrations.

E. The structure shall be built by the manufacturer in individual uniform sections or units.

F. Lifting hooks shall be provided.

G. As required, any openings or penetrations shall be formed with solid forms and located as shown on the Drawings.

2.03 PRECAST CONCRETE STAIR TREADS

A. All precast concrete units or sections shall comply with the dimensions shown on the drawings.

B. Type II cement shall be used except as otherwise approved.

C. Minimum compressive strength of concrete shall be 4,000 psi at 28 days.

D. Each precast piece shall be supplied with four lifting fixtures for handling of each unit according to manufacturer’s recommendations.

E. The inside surfaces shall be smooth so as not to restrict flow through the completed installation.

F. The date of manufacture and the name or trademark of the manufacturer shall be clearly marked on the inside of each section.

G. Reinforcing steel for structures shall be epoxy coated.

H. Steel reinforcement shall be Grade 60 and conform to ASTM A615 for rebar and ASTM 185 for welded wire fabric.

I. Minimum concrete cover over reinforcing steel shall be 1 ½ - inches for precast sections.

J. Design for backfill of precast sections shall have soil with a unit weight of 120 pcf, a minimum lateral pressure coefficient of 0.25 and a maximum lateral pressure coefficient of 0.50.

K. Backfill for the precast sections shall be Select Backfill as specified in Section 02200 – EARTHWORK.

L. If deemed necessary, the contractor shall install any structure leveling pads or footings using field concrete materials in accordance with Section 03300 CAST-IN-PLACE CONCRETE and 03302 FIELD CONCRETE of these Specifications with approval by the Engineer.

M. If required, leveling pads of crushed stone shall be ¾-inch Crushed Stone as specified in Section 02200 – EARTHWORK.

N. The Contractor shall provide the Engineer with shop drawings and installation details prior to construction, if the headwalls and footings are to be cast-in-place.

2.04 JOINTING PRECAST STRUCTURES

A. Tongue and groove joints of structure sections shall be sealed with either a round rubber “O”- ring gasket or a preformed flexible joint sealant. The “O”-ring shall conform to ASTM C443. The preformed flexible joint sealant shall be Kent Seal No.2 as manufactured by Hamilton-Kent; Ram-Nek as manufactured by K.T. Snyder Company; or equal.

2.05 BRICK AND MASONRY

A. Bricks to be used for leveling of precast units shall be sound, hard, uniformly burned, regular and uniform in shape and size. Underburned or salmon bricks shall not be

acceptable. Only whole brick shall be used. Bricks for raising manhole frames to finished grade shall conform to ASTM C62.

B. Mortar to be used for leveling of precast units shall be composed of one part portland cement, two parts sand, and hydrated lime not to exceed 10 lbs to each bag of cement. Portland cement shall be ASTM C150, Type II; hydrated lime shall conform to ASTM C207.

C. Sand shall be washed, cleaned, screened, well graded with all particles passing a No. 4 sieve and conform to ASTM C33.

2.06 DAMPPROOFING

A. Any dampproofing shall be completed on the bottom of stair tread so it does not show as noted on drawings and shall be Hydrocide 648 by Sonneborn Building Products, Dehydratine 4 by A.C. Horn Inc., RIW Marine Liquid by Toch Brothers, or equal.

PART 3 - EXECUTION

3.01 GENERAL REQUIREMENTS

A. All precautions for water courses outlined in Section 01567 ENVIRONMENTAL PROTECTION must be strictly adhered to.

B. Temporary water diversions and dewatering methods adhering to Section 01567 ENVIRONMENTAL PROTECTION may be necessary, as required by the Engineer.

C. Silt control and sand bagging methods may be necessary, as required by the Engineer.

3.02 PRECAST SECTION GENERAL INSTALLATION

A. The structures shall be constructed to the dimensions shown on the Drawings and as specified in the Specifications. The structures shall be protected against flooding and flotation during their installation.

B. Precast concrete stair treads located within waterways or near high groundwater shall be supported on a compacted level foundation of crushed stone, as specified in Section 02200 – Earthwork and as shown on the drawings, at least 12 inches thick.

C. The structures shall be set so as to be vertical with a 1/4-in maximum tolerance in their height allowed. Any outside joints shall be filled with non-shrink mortar and finished flush with the adjoining surfaces as noted on Drawings. Joints shall be allowed to set for 24-hours before backfilling. Backfilling shall be done in a careful

manner, bringing the fill up evenly on all sides. The Contractor shall install the precast sections in a manner that will result in a watertight joint.

D. Where holes must be cut in the precast sections to accommodate penetrations, cutting shall be done prior to setting manhole sections in place to prevent any subsequent jarring which may loosen the mortar joints.

3.03 PRECAST CONCRETE STAIR TREADS

A. Installation shall be as per the manufacturer directions as approved by the Engineer.

B. Precast concrete stair treads shall be supported on a compacted level foundation of crushed stone, as specified in Section 02200 – EARTHWORK and as shown on the drawings, at least 12 inches thick.

C. The precast concrete stair treads shall be installed to the lines and grades indicated on the drawings or given by the Engineer. The stair tread sections shall be installed and assembled and shall form a closed joint with adjoining sections. The bottom stair tread shall be installed first and subsequent sections brought continuously to the required grade.

D. Precast concrete sections shall be set vertical and with sections in true alignment.

E. All holes left in place for handling the sections shall be plugged with grout. The grout shall be one part cement to two parts sand, mixed slightly with water. The grout shall be placed into the holes until it is dense and an excess of past appears on the surface, and then finished smooth and flush with the adjoining surfaces.

F. The concrete stair treads shall be backfilled with Select Backfill material to the finished grades, as specified in Section 02200 – Earthwork and as shown on the drawings. The backfill will be placed in 12 inch lifts and compacted to 95% of maximum density for soils which exhibit a well-defined moisture density relationship (cohesive soils) determined in accordance with ASTM D 1557.

G. If deemed necessary, the contractor shall install stair treads using field concrete methods in accordance with Section 03300 CAST-IN-PLACE CONCRETE and 03302 FIELD CONCRETE of these Specifications with approval by the Engineer.

H. The Contractor shall provide the Engineer with shop drawings and installation details prior to construction, if the stair treads are to be cast-in-place.

3.07 ACCESSORIES

A. Accessories shall be installed in accordance with manufacturer's instructions.

3.08 DAMPPROOFING

A. The bottom outer surfaces of precast stair treads shall be given two coats of bituminous dampproofing at the rate of 30-60 sq ft per gallon as directed by the Engineer and in accordance with the manufacturer's instructions.

3.09 CLEANING

A. The new structures shall be thoroughly cleaned of all silt, debris and foreign matter of any kind, prior to final inspection.

END OF SECTION

SECTION 02620

HIGH DENSITY POLYETHYLENE DRAINAGE PIPE

PART 1 - GENERAL

1.01 WORK INCLUDED:

A. This Section includes furnishing all material, labor and equipment and installing high density polyethylene drainage pipe and fittings as shown on the drawings and as specified herein.

1.02 REFERENCES:

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

American Society for Testing and Materials (ASTM)

ASTM D1557	Standard Test Methods for Moisture-Density Relations of Soils and Soil – Aggregate Mixtures Using 10-lb. Rammer and 18-inch Drop.
ASTM D2321	Standard Practice for Underground Installation of Thermoplastic Pipe for Sewers and Other Gravity Flow Applications.
ASTM F405	Standard Specifications for Corrugated Polyethylene Pipe and Fittings.
ASTM F667	Standard Specifications for Large Diameter Corrugated Polyethylene Pipe and Fittings.

American Association of State Highway and Transportation Officials (AASHTO)

AASHTO M252	Corrugated Polyethylene Drainage Tubing.
AASHTO M294	Corrugated Polyethylene Pipe, 12 to 36 inch diameter.

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

A. Six sets of manufacturer's literature on the materials of this Section shall be submitted to the Engineer for review.

B. Manufacturer's certification that the product was manufactured, tested, and supplied in accordance with this specification shall be furnished to the Engineer on request.

1.04 DELIVERY, STORAGE AND HANDLING:

A. Pipe shall be packaged to withstand shipment without damage and handled carefully on arrival at the job site. Pipe shall be stored so that it is not exposed to sunlight.

PART 2 – PRODUCTS

2.01 GENERAL:

A. This Section applies to high density polyethylene corrugated pipe with an integrally formed smooth interior. It is applicable to nominal sizes 4 though 36 inch diameter.

B. The nominal size for the pipe and fittings is based on the nominal inside diameter of the pipe.

C. The pipe and fittings shall be free of foreign inclusions and visible defects. Fittings may be either molded or fabricated. Fittings supplied by manufacturers other than the supplier of the pipe shall not be permitted without the approval of the Engineer. The ends of the pipe shall be cut squarely and cleanly so as not to adversely affect joining.

D. When perforated pipe is specified, the perforations shall be cleanly cut so as not to restrict the inflow/outflow of water and uniformly spaced along the length and circumference of the pipe. Dimensions of the perforations shall be as stated in AASHTO M252.

E. Joints shall be made with split couplings, corrugated to engage the pipe corrugations, and shall engage a minimum of 4 corrugations, 2 on each side of the pipe joint. Where required by the Engineer, a neoprene gasket shall be utilized with the coupling to provide a soil-tight joint.

F. Pipe sizes 4 through 10 inch shall conform to AASHTO M252. Pipe sizes 12 through 36 inch shall conform to AASHTO M294.

G. Pipe sizes 4 through 6 inch shall conform to ASTM F405. Pipe sizes 8 through 15 inch shall conform to ASTM F667.

PART 3 – EXECUTION

A. The pipe shall be installed as shown on the drawings and in accordance with the requirements of ASTM D2321.

B. Installation of pipe shall be per the manufacturer's recommendations as approved by the Engineer.

C. If pipe is not scheduled for immediate installation, the Contractor shall protect the pipe from sunlight ultra violet rays.

D. Material for pipe bedding specified under Section 02200 EARTHWORK.

E. Backfill shall be as shown on plans and specified in Section 02200.

F. Backfill material shall be compacted to 95 percent of maximum density according to ASTM D1557.

END OF SECTION

SECTION 02625

POLYVINYL CHLORIDE DRAIN PIPE AND FITTINGS (SOLID AND PERFORATED)

PART 1 - GENERAL

1.01 WORK INCLUDED

This section covers the furnishing and installation of Polyvinyl Chloride (PVC) pipe and fittings (solid and perforated) for purposes of stormwater drainage, as indicated on the drawings or as specified herein.

1.02 RELATED WORK

A. Section 02200 EARTHWORK

B. Section 02601 CATCH BASINS, MANHOLES, AND DRAINAGE STRUCTURES

1.03 STANDARDS

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

ASTM D1785	Polyvinyl Chloride (PVC) Plastic Pipe, Schedules 40, 80 and 120
ASTM D2321	American Society for Testing Materials Recommended Practice for Underground Installation of Flexible Thermosplastic Sewer Pipe
ASTM D3034	Specification for Type PSM Polyvinyl Chloride (PVC) Sewer Pipe and Fittings
ASTM D3212	Specification for Joints for Drain and Sewer Plastic Pipes Using Flexible Elastomeric Seals
ASTM F679	Specification for Polyvinyl Chloride (PVC) Large Diameter Plastic Gravity Sewer Pipe and Fittings (1811- 2711)

1.04 SUBMITTALS

Six sets of manufacturer's literature of the materials of this section shall be submitted to the Engineer for review and approval.

PART 2 - PRODUCTS

A. PVC non-pressure pipe shall conform to ASTM D3034, or ASTM D1785/D2665 for pipe 4-inch through 15-inch diameter. Pipe used for stormwater drainage can be Schedule 40 or higher grade. An SDR of 26 is recommended unless otherwise noted, and shall meet the specific requirements and exceptions to the aforementioned specifications which follow.

B. PVC non-pressure pipe shall be furnished in standard lengths.

C. Perforated PVC pipe shall conform to hole pattern requirements set forth in ASTM F758 / AASHTO M278.

D. One pipe bell consisting of an integral wall section with a solid cross section rubber ring, factory assembled, shall be furnished with each standard, random and short length of pipe. Integral rubber rings shall be provided to the requirements of ASTM D3212.

E. The rubber ring shall be retained within the bell of the pipe by a precision formed groove or recess designed to resist fishmouthing or creeping during assembly of joints. Gasket material should conform to the requirement of ASTMF477.

F. Spigot pipe ends shall be supplied with bevels from the manufacturer to ensure proper insertion. Each spigot end shall have an "assembly stripe" imprinted thereon to which the bell end of the mated pipe will extend upon proper jointing of the two pipes. Pipe ends shall be such to permit checking of the rings with a feeler gauge to insure their proper location within the coupling grooves.

G. PVC fittings shall be provided with bell and/or spigot configurations with rubber gasketed joints compatible with that of the pipe. Fittings for Schedule 40 PVC pipe shall conform to ASTM D2466-15.

H. All pipe delivered to the job site shall be accompanied by independent testing laboratory reports certifying that the pipe and fittings conform to the above-mentioned specifications. In addition, the pipe shall be subject to thorough inspection and tests, the right being reserved for the Engineer to apply such of the tests specified as he may from time to time deem necessary.

PART 3 - EXECUTION

3.01 LAYING AND JOINTING PIPE

A. Except as modified herein, installation of the PVC pipe shall be in accordance with ASTM D2321.

B. Each pipe length shall be inspected before being laid to verify that it is not cracked. Pipe shall be laid to conform to the lines and grades indicated on the drawings or given by the Engineer. Each pipe shall be so laid as to form a close joint with the next adjoining pipe and bring the inverts continuously to the required grade.

C. The pipe shall be supported by compacted crushed stone. Crushed stone shall be as specified under Section 02200 - Earthwork.

D. The pipe shall not be driven down to grade by striking it with a shovel handle, timbers 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.

E. Before a joint is made, the pipe shall be checked to assure that a close joint with the next adjoining pipe has been maintained and that inverts are matched and conform to the required line and grade.

F. For pipe placed on crushed stone, immediately after the joint is made, the jointing area shall be filled with suitable materials so placed and compacted that the ends of either pipe will not settle under backfill load.

G. No pipe or fitting shall be permanently supported on saddles, blocking, or stones.

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

I. All pipe joints shall be made as nearly watertight as practicable. There shall be no visible leakage at the joints and there shall be no sand, silt, clay, or soil of any description entering the pipeline at the joints. Where there is evidence of water or soil entering the pipeline, connecting pipes, or structures, the defects shall be repaired to the satisfaction of the Engineer.

END OF SECTION

SECTION 02665

FLEXIBLE MEMBRANE EPDM LINER

PART 1 - GENERAL

1.01 DESCRIPTION:

This Section includes but is not limited to furnishing and installing an Ethylene Propylene Diene Monomer (EPDM) rubber lining material.

1.02 RELATED WORK:

A. Section 02200, EARTHWORK

1.03 QUALITY ASSURANCE:

A. Flexible membrane liner shall be purchased from a qualified manufacturer who has manufactured at least ten million square feet of liner.

B. All work relating to the installation of the flexible membrane liner shall be performed under the direct supervision of a person(s) who is knowledgeable and experienced in the methods of flexible membrane liner installation and has installed a minimum of two million square feet of liner. The liner installation supervisor shall perform his or her work in accordance with and under the direction of the Contractor.

1.04 REFERENCES:

A. The following standards form a part of this specification, as referenced:

American Society for Testing and Materials (ASTM),
(as modified by Standard No.54 National Sanitation Foundation, 1993)

ASTM D1505	Test Method for Density of Plastics by the Density-Gradient Technique
ASTM D4216	Test Method for Black Carbon Content
ASTM D5397	Test Method for Environmental Stress Cracking
ASTM D746	Test Method for Brittleness Temperature of Plastics and Elastomers by Impact
ASTM D1004	Test Method for Initial Tear Resistance of Plastic Film and Sheeting
ASTM D1204	Test Method for Linear Dimensional Changes of Nonrigid Thermoplastic Sheeting or Film at Elevated Temperatures

ASTM D413	Test Methods for Rubber Property – Adhesion to Flexible Substrates
ASTM D751	Test Method for Coated Fabrics
ASTM D792	Test Method for Specific Gravity (Relative Density) and Density of Plastic by Displacement
ASTM D882	Test Methods for Tensile Properties of Thin Plastic Sheeting
ASTM D1203	Test Methods for Volatile Loss from Plastics Using Activated Carbon Methods
ASTM D1238	Test Method for Flow Rates of Thermoplastics by Extrusion Plastometer
ASTM D1603	Test Method for Carbon Black in Olefin Plastics
ASTM D1693	Test Method for Environmental Stress-Cracking of Ethylene Plastics
ASTM D1790	Test Method for Brittleness Temperature of Plastic Film by Impact
ASTM D2136	Methods of Testing Coated Fabrics – Low-Temperature Bend Test
ASTM D3083	Specification for Flexible Ply (Vinyl Chloride) Plastic Sheeting for Pond, Canal, and Reservoir Lining
ASTM D4437	Test Method for Tensile Property of Plastics
ASTM D5321	Standard Test Method for Determining the Coefficient of Soil and Geosynthetic Factor by the Direct Shear Method

1.05 SUBMITTALS:

A. Six (6) sets of detailed shop or working drawings and catalog data, material specifications, structural details and a proposed layout of the Ethylene Propylene Diene Monomer (EPDM) membrane system shall be submitted to the Engineer for review.

B. Installation details shall include the method of field seaming, anchoring the liner to concrete structures, typical anchor trench, sealing around protrusions.

C. General installation practices and a description of installation and field seaming procedures and schedule shall be included.

D. Samples of Ethylene Propylene Diene Monomer (EPDM) membrane material.

PART 2 – PRODUCTS

2.01 GENERAL:

A. These specifications call attention to certain features but do not purport to cover all details entering into the design of the liner.

B. All components shall be of the best quality, proven design and construction and entirely suitable in every respect for the required service.

2.02 FLEXIBLE MEMBRANE LINER:

A. The material used for the impervious flexible liner shall be a minimum of 45 mil Ethylene Propylene Diene Monomer (EPDM) membrane which has been satisfactorily demonstrated by prior use to be suitable and durable for the specified purpose. Textured 45 mil reinforced Ethylene Propylene Diene Monomer (EPDM) shall be installed as shown on the Construction Drawings.

B. The liner shall be uniform in color, thickness, size and surface texture for the designated slopes. The finished liner shall be flexible on both sides and a durable, watertight product, free of cuts, abrasions, pinholes, blisters, contaminants and other imperfections. The liner shall be resistant to fungal or bacterial attack.

C. The liner shall have a nominal thickness as specified. The liner shall be manufactured to be suitable for use in the specified exposed or buried conditions.

D. The textured 45 mil reinforced EPDM membrane shall have a uniform surface texture with a friction angle not less than 36 degrees, based on poorly graded, rounded Ottawa sand for a 3:1 slope.

E. The EPDM liner shall be formulated from virgin compounding materials and shall meet the property values specified below. The liner material shall be manufactured from a composition of high-quality ingredients specifically compounded for use as a impervious flexible membrane. Reprocessed materials will not be acceptable other than clean rework materials of the same virgin ingredients generated from the manufacturer’s own production.

F. A sample of the liner shall be tested by an independent laboratory at no expense to the Owner, to verify conformance with the specifications. Certified copies of the test results shall be supplied to the Owner.

G. The liner shall meet the following minimum specifications, tested using the ASTM standard methods.

H. Requirements for non-reinforced EPDM liner:

Test Parameter*	Test Method	Minimum Specification - - nominal thickness - - 45 mil	60 mil
Specific gravity	ASTM D 792	1.1	1.1
Tensile properties	ASTM D 882		
break stress, lb/in (Type IV at 20 in/min)		50	50
break elongation, %		400	400
Tear resistance, lb	ASTM D 1004	9	11
Puncture resistance, lb	ASTM D 4833	35	60
Low temp brittleness, °F	ASTM D 1790	<-45	<-45
Seam properties	ASTM D413/D4437		
shear strength, lb/in** (NSF modified 20 in/min strain rate)		35	35
peel strength, lb/in***		14	14

* All values, unless specified otherwise, are minimum average roll values as reported for the test method.
** At 200 percent strain.
*** Cohesive bond mode.

I. Requirements for reinforced EPDM liner:

Test Test Parameter*	Test Method	Minimum Specification - - nominal thickness - - 45 mil
Specific gravity	ASTM D 792	1.1
Tensile properties	ASTM D 751 Method A	125
Tear resistance, lb	ASTM D 5884 Method B	130
Puncture resistance, lb	FTMS 101C Method 2031	45
Ply adhesion, lb/in	ASTM D 413 Machine method	7
Low temp brittleness, °F	ASTM D 1790	<-45
Seam properties		
shear strength, lb/in**	ASTM D 751	35
peel strength, lb/in***	ASTM D 413	14

* All values, unless specified otherwise, are minimum average roll values as reported for the test method.
** At 200 percent strain.
*** Cohesive bond mode.

2.03 GASKETS, METAL BATTENS, CLAMPS, BOLTS, ADHESIVE, AND SEALANTS

A. Gasket material shall be neoprene, closed-cell medium, 0.25 inch thick, with adhesive on one side, or other gasket material as approved by the liner manufacturer.

B. Metal battens shall be 0.25-inch-thick by 2-inch-wide stainless steel.

C. Clamps shall be 0.5-inch-wide stainless steel. Bolts shall be stainless steel.

D. Adhesive shall be approved by the manufacturer and shall consist of material with a life expectancy similar to the liner material.

E. Sealant shall be as recommended by the manufacturer.

F. Penetration boots shall be made of the same material as the liner.

2.03 LAYOUT OF LINER MATERIAL:

A. The liner shall be laid out such that wrinkles, punctures, cuts, tears, or any other imperfections are avoided. The Contractor shall approve all site grading and preparations to assure no underlying materials will puncture the liner during or after installation.

B. Each panel of the Ethylene Propylene Diene Monomer (EPDM) membrane shall be laid out and installed in accordance with the approved shop drawings prepared by the Contractor. The layout shall be designed to keep field joining and seams of the Ethylene Propylene Diene Monomer (EPDM) membrane to a minimum, consistent with proper methods of Ethylene Propylene Diene Monomer (EPDM) membrane installation.

2.04 GUARANTEE:

A. The Contractor shall guarantee the Ethylene Propylene Diene Monomer (EPDM) membrane against defects in installation and workmanship for two years commencing with the date of final acceptance. The guarantee shall include the services of qualified service technicians and all materials required for the repairs at no expense to the Owner.

PART 3 – EXECUTION

3.01 MANUFACTURER'S REPRESENTATIVE

A. The Contractor shall, at his expense, provide a technical representative of the liner fabricator at the job site to insure compliance with manufacturer's directions. The technical representative shall be present when the liner is installed. He shall instruct and

observe the work, reporting unsatisfactory conditions or recommendations for improvement in production to the Contractor, with a duplicate copy of any such reports to the Engineer.

3.02 INSTALLATION:

A. GENERAL:

1. The liner shall be closely fitted and sealed around penetrations, using boots made of liner material and a stainless steel band.

2. The liner shall be laid out by the Contractor in a manner to avoid wrinkles, puncture, cuts, tears, or any other imperfections. All labor and equipment needed for the application of the liner shall be arranged by the Contractor. The Contractor (and manufacturer or his representative) shall approve all site grading and preparations to assure no underlying materials will puncture the liner during or after its application.

3. The EPDM membrane material shall be cleaned of all debris and materials which may negatively affect the performance of the system.

4. Each section of the EPDM membrane shall be laid out and installed in accordance with the approved shop drawings prepared by the Contractor. The layout shall be designed to keep field joining of the EPDM membrane to a minimum and consistent with proper methods of EPDM membrane installation.

5. Sufficient slack shall be provided to allow for geomembrane shrinkage and contraction during placement. Methods for quantifying the additional material shall be subject to the approval of the Engineer.

6. During installation and exposure of geomembrane liner:

   a. Pedestrian and equipment activity over the liner shall be kept to a minimum and restricted to that which is necessary for liner construction.

   b. Construction workers shall take precautions not to damage the liner surface, including use of smooth-soled footwear and not dragging tools across the liner surface. No smoking shall be permitted on the geomembrane liner.

   c. Construction staff shall be informed of the restricted access to areas of liner placement barriers and signs shall be posted as necessary to provide restricted access.

d. No tracked equipment or other equipment which poses a risk of puncturing, tearing or otherwise damaging the liner will be permitted for use in placement of material directly over the exposed liner.

e. No vehicles shall be permitted on the membrane prior to the placement of adequate soil cover.

7. All traffic over final cover areas shall be restricted to stabilized roadways designated for such use.

3.03 EARTHEN COVER MATERIAL:

A. Immediately following installation of the flexible membrane liner and acceptance by the Engineer, the liner shall be covered with an 6-inch minimum layer of reclaimed subbase material per Specification Section 02514, RECLAIM and contract drawings. The material shall contain no sharp stones or any material that might puncture the liner. The reclaimed material layer shall be spread on the liner using low ground pressure (LGP) vehicles with a maximum effective ground pressure of 5.0 psi. The reclaimed material layer shall be placed on the liner using rubber tired vehicles. The Contractor will be responsible for any damage to the liner during covering operations and shall submit the method of installation proposed to the Engineer.

3.04 MATERIAL HANDLING AND SITE CLEAN-UP:

A. Contractor shall stockpile and store EPDM liner material at the site to prevent its damage. Following installation of the liner, all scrap material shall be removed from the work area and properly disposed of. Excess material shall be returned to the Owner and stored in an area of the site designated by the Owner.

END OF SECTION

SECTION 02700

INTERLOCKING CONCRETE BLOCK RETAINING WALL SYSTEMS

PART 1 - GENERAL

1.01 DESCRIPTION OF WORK

Work shall consist of furnishing design in accordance with Manufacturer's Recommendations, materials, labor, equipment and supervision to install an Interlocking Concrete Block Retaining Wall (ICBRW) system in accordance with plans and specifications and in reasonably close conformity with the lines, grades and dimensions shown on plans.

1.02 REFERENCE STANDARDS

The following standard forms a part of these specifications and indicates the minimum standards required:

American Society for Testing and Materials (ASTM)

A. Interlocking Concrete Block Retaining Wall Units

1. ASTM C 140 - Sampling and Testing Concrete Masonry Units

2. ASTM C 1372 – Standard Specification for Dry-Cast Segmental Retaining Wall Units

B. Geosynthetic Reinforcement

1. ASTM D 4595 – Standard Test Method for Tensile Properties of Geotextiles by the Wide-Width Strip Method

2. ASTM D 5262 – Standard Test Method for Evaluating the Unconfined Tension Creep and Creep Rupture Behavior of Geosynthetics

3. ASTM D 5321 – Standard Test Method For Determining the Coefficient of Soil and Geosynthetic or Geosynthetic and Geosynthetic by Direct Shear Method

4. ASTM D 5818 - Standard Practice for Exposure and Retrieval of Samples to Evaluate Installation Damage of Geosynthetics

5. ASTM D 6706 – Standard Test Method for Measuring Geosynthetic Pullout Resistance in Soil

C. Soils

1. ASTM D 698 – Standard Test Method for Laboratory Compaction Characteristics of Soil Using Standard Effort

2. ASTM D 2487 – Standard Practice for Classification of Soils for Engineering Purposes

3. ASTM D 422 – Standard Test Method for Particle-Size Analysis of Soils

4. ASTM D 4318 – Standard Test Method for Liquid Limit, Plastic Limit and Plasticity Index of Soils

5. ASTM G 51 – Standard Test Method for Measuring pH of Soil for Use in Corrosion Testing

D. Drainage Pipe

1. ASTM F 758– Standard Specification for Smooth-Wall Polyvinyl Chloride (PVC) Plastic Underdrain Systems for Highway, Airport or Similar Drainage

2. ASTM F 405 – Standard Specification for Corrugated Polyethylene (PE) Pipe and Fittings

E. Engineering Design

1. "NCMA Design Manual for Segmental Retaining Walls," Third Edition

F. Where specifications and reference documents conflict, the final determination of applicable document shall be made in accordance with the manufacturer's recommendations.

1.03 SUBMITTALS

A. Materials Submittals: The Contractor shall submit manufacturers' certifications two weeks prior to start of work stating that the ICBRW units and geosynthetic reinforcement meet the requirements of Section 2 of this specification.

B. Design Submittal: The Contractor shall submit two sets of detailed design calculations and final retaining wall plans, in accordance with the manufacturer's recommendations, for approval at least two weeks prior to the beginning of wall construction.

1.04 DELIVERY, STORAGE AND HANDLING

A. Contractor shall check materials upon delivery to ensure that the specified type and grade of materials have been received and proper color and texture of ICBRW units have been received.

B. Contractor shall store and handle materials in accordance with manufacturer's recommendations and in a manner to prevent deterioration or damage due to moisture, temperature changes, contaminants, corrosion, breaking, chipping or other causes.

C. Contractor shall prevent excessive mud, wet concrete, epoxies and similar materials that may affix themselves from coming in contact with materials.

D. Contractor shall protect materials from damage; no damaged material shall be incorporated into the Interlocking Concrete Block wall.

E. Geosynthetic shall be protected from UV exposure and the protective covering on geosynthetic shall remain until immediately before installation and shall be stored at temperatures above -10 degrees F.

PART 2 - MATERIALS

2.01 INTERLOCKING CONCRETE BLOCK RETAINING WALL UNITS

A. ICBRW units shall be machine formed, Portland cement concrete blocks specifically designed for retaining wall applications with a minimum net average 28 days compressive strength of 3000 psi.

B. Finish of ICBRW units shall be split-face.

C. ICBRW unit faces shall be of straight geometry.

D. ICBRW unit height shall be 6 inches.

E. ICBRW units shall provide a minimum weight of 120 psf wall face area.

F. ICBRW units shall be solid through the full depth of the unit.

G. ICBRW units shall have a depth (front face to rear) to height ratio of 2:1, minimum.

H. ICBRW units shall be capable of being erected with the horizontal gap between adjacent units not exceeding 1/8 inch.

I. ICBRW units shall be interlocked with connecting pins that provide ¾-inch setback from unit below (yielding a 7-degree cant from vertical).

J. ICBRW units shall be sound and free of cracks or other defects that would interfere with the proper placing of the unit or significantly impair the strength or permanence of the structure. Any cracks or chips observed during construction shall fall within the guidelines outlined in ASTM C 1372.

K. Concrete ICBRW units shall conform to the requirements of ASTM 1372 and have a minimum net average 28 days compressive strength of 3000 psi. Compressive

strength test specimens shall conform to the saw-cut coupon provisions of ASTM C140.

L. ICBRW units' molded dimensions shall not differ more than ± 1/8 inch from that specified, as measured in accordance with ASTM C 140. This tolerance does not apply to architectural surfaces, such as split faces.

2.02 INTERLOCKING CONCRETE BLOCK RETAINING WALL UNIT CONNECTION PINS

A. ICBRW units shall be interlocked with connection pins. The pins shall be made for the expressed use with the ICBRW units supplied.

2.03 LEVELING PAD

A. Material for leveling pad shall consist of compacted sand, gravel, or combination thereof (USCS soil types GP,GW, SP, & SW) and shall be a minimum of 6 inches in depth. Lean concrete with a strength of 200-300 psi and 3 inches thick maximum may also be used as a leveling pad material. The leveling pad should extend laterally at least a distance of 6 inches from the toe and heel of the lowermost ICBRW unit.

B. In areas where backfill is subject to water, the leveling pad shall consist of clean, angular processed crushed stone with a maximum stone size of ¾ inches and shall meet gradations as specified in Section 02200 – Earthwork. The crushed stone leveling pad shall be a minimum of 12-inches tin depth.

2.04 REINFORCED BACKFILL SOIL

A. The reinforced soil material shall be free of debris. Unless otherwise noted in the manufacturer's recommendations, the reinforced material shall consist of the inorganic USCS soil types GP, GW, SW, SP, SM, meeting the following gradation, as determined in accordance with ASTM D422:

Sieve Size	Percent Passing
1 inch	100
No. 4	20-100
No. 40	0-60
No. 200	0-35

B. The maximum particle size of poorly-graded gravels (GP) (no fines) should not exceed 3/4 inch unless in accordance with the manufacturer's recommendations and the long-term design strength (LTDS) of the geosynthetic is reduced to account for additional installation damage from particles larger than this maximum.

C. The plasticity of the fine fraction shall be less than 20.

D. The pH of the backfill material shall be between 3 and 9 when tested in accordance with ASTM G 51.

2.05 SUBDRAIN LAYER

A. A subdrain layer should be provided between the ICBRW units and the reinforced backfill in accordance with manufacturer's requirements.

B. The subdrain layer should consist of free-draining material that is clean, angular processed crushed stone with a maximum stone size of ¾ inches and shall meet gradations as specified in Section 02200 – Earthwork.

C. The subdrain layer shall be lined with geotextile fabric and shall meet requirements noted below under Geotextile Filter and shall be in accordance with Section 02240 - Geotextile Fabrics.

D. If subdrain layer calls for drain pipe and weep holes, the drain pipe shall be set to elevations as shown on the plans and the weep holes shall be free draining and set through the ICBRW units per manufacturer's requirements. The drain pipe shall be Schedule 40 PVC Perforated Pipe in accordance Section 02626 – PVC Drainage Pipe and Fittings.

2.06 GEOTEXTILE FILTER

A. Drainage geotextile shall consist of geosynthetic specifically manufactured for use as a permeable soil filter that retains soil while still allowing water to pass throughout the life of the structure. The type and placement of the geotextile filter material shall be in accordance with the manufacturer's recommendations.

PART 3 - DESIGN PARAMETERS

3.01 SOIL

A. The following soil parameters, as determined by the Contractor's Geotechnical Engineer shall be used for the preparation of the final design:

	Unit Weight (γ) (pcf)	Internal Friction Angle (ϕ) (degrees)
Reinforced Fill	100-120	25-35
Retained Soil	90-130	20-40
Foundation Soil	120-140	30-40

(If internal friction angles are not available for the above section, the specifier can provide the USCS soil type classification for the reinforced, retained, and foundation soils and/or attach the geotechnical investigation report for this project.)

B. Should the actual soil conditions observed during construction differ from those assumed for the design, design shall be updated to reflect the actual soil conditions by the Contractor's Geotechnical Engineer.

3.02 DESIGN

A. The design analysis for the final retaining wall plans shall consider the external stability against sliding and overturning, internal stability and facial stability of the reinforced soil mass, and shall be in accordance with acceptable engineering practice, the manufacturer's recommendations, and these specifications. The internal and external stability analysis shall be performed in accordance with the "NCMA Design Manual for Segmental Retaining Walls, 3rd Edition" using the recommended minimum factors of safety in this manual.

B. External stability analysis for bearing capacity, global stability, and total and differential settlement shall be the responsibility of the Contractor's Geotechnical Engineer. The Geotechnical Engineer shall perform bearing capacity, settlement estimates, and global stability analyses based on the final wall design and coordinate any required changes with the Owner.

C. The geosynthetic placement in the wall design shall have 100% continuous coverage parallel to the wall face. Gapping between horizontally adjacent layers of geosynthetic (partial coverage) will not be allowed.

PART 4 - CONSTRUCTION

4.01 INSPECTION

Contractor's field construction supervisor shall have demonstrated experience and be qualified to direct all work at the site.

4.02 EXCAVATION

A. Contractor shall excavate to the lines and grades shown on the project grading plans. Contractor shall take precautions to minimize over-excavation. Over-excavation shall be filled with compacted infill material, or as directed by the Owner, at the Contractor's expense.

B. Contractor shall verify location of existing structures and utilities prior to excavation. Contractor shall ensure all surrounding structures are protected from the effects of wall excavation. Excavation support, if required, is the responsibility of the Contractor.

4.03 FOUNDATION PREPARATION

A. Following the excavation, the foundation soil shall be examined by the Contractor's Geotechnical Engineer to assure actual foundation soil strength meets or exceeds the assumed design bearing strength. Soils not meeting the required strength shall be removed and replaced with infill soils, as directed by the Contractor's Geotechnical Engineer, with submittal for final approval by the Owner.

B. Foundation soil shall be proof-rolled and compacted to 95% standard Proctor density and inspected by the Contractor's Geotechnical Engineer prior to placement of leveling pad materials, with submittal for final approval by the Owner.

4.04 LEVELING PAD CONSTRUCTION

A. Leveling pad shall be placed as shown on the final retaining wall plans with a minimum compacted thickness of 6 inches or 12-inches as shown on the Drawings. The leveling pad should extend laterally at least a distance of 6 inches from the toe and heel of the lowermost ICBRW unit.

B. Granular leveling pad material shall be compacted to provide a firm, level bearing surface on which to place the first course of units. Well-graded sand can be used to smooth the top 1/4 inch to 1/2 inch of the leveling pad. Compaction will be with mechanical plate compactors to achieve 95% of maximum standard Proctor density (ASTM D 698).

4.05 ICBRW UNIT INSTALLATION

A. All ICBRW units shall be installed at the proper elevation and orientation as shown on the final wall plans and details, in accordance with the manufacturer’s recommendations. The ICBRW units shall be installed in general accordance with the manufacturer's recommendations. The specifications and drawings shall govern in any conflict between the two requirements.

B. First course of ICBRW units shall be placed on the leveling pad. The units shall be leveled side-to-side, front-to-rear and with adjacent units, and aligned to ensure intimate contact with the leveling pad. The first course is the most important to ensure accurate and acceptable results. No gaps shall be left between the front of adjacent units. Alignment may be done by means of a string line or offset from base line to the back of the units.

C. All excess debris shall be cleaned from top of units and the next course of units installed on top of the units below.

D. Two connection pins shall be inserted through the pin holes of each upper-course unit into receiving slots in lower-course units. Pins shall be fully seated in the pin slot below. Units shall be pushed forward to remove any looseness in the unit-to-unit connection.

E. Prior to placement of next course, the level and alignment of the units shall be checked and corrected where needed.

F. Layout of curves and corners shall be installed in accordance with the wall plan details or in general accordance with ICBRW manufacturer’s installation guidelines. Walls meeting at corners shall be interlocked by overlapping successive courses.

G. Procedures C. through F. shall be repeated until reaching top of wall units, just below the height of the cap units. Geosynthetic reinforcement, drainage materials, and

reinforced backfill shall be placed in sequence with unit installation as described in Section 4.06, 4.07 and 4.08.

4.06 BACKFILL PLACEMENT

A. The reinforced backfill shall be placed as shown in the final wall plans in the maximum compacted lift thickness of 8 inches and shall be compacted to a minimum of 95% of standard Proctor density (ASTM D 698) at a moisture content within -1% point to +3% points of optimum. The backfill shall be placed and spread in such a manner as to eliminate wrinkles or movement of the geosynthetic reinforcement and the ICBRW units.

B. Only hand-operated compaction equipment shall be allowed within 3 feet of the back of the wall units. Compaction within the 3 feet behind the wall units shall be achieved by at least three passes of a lightweight mechanical tamper, plate, or roller.

C. At the end of each day's operation, the Contractor shall slope the last level of backfill away from the wall facing and reinforced backfill to direct water runoff away from the wall face.

D. At completion of wall construction, backfill shall be placed level with final top of wall elevation. If final grading, paving, landscaping and/or storm drainage installation adjacent to the wall is not placed immediately after wall completion, temporary grading and drainage shall be provided to ensure water runoff is not directed at the wall nor allowed to collect or pond behind the wall until final construction adjacent to the wall is completed.

4.07 ICBRW CAPS

A. ICBRW caps shall be properly aligned and glued to underlying units with adhesive, a flexible, high-strength concrete adhesive. Rigid adhesive or mortar are not acceptable.

B. Caps shall overhang the top course of units by 3/4 inch to 1 inch. Slight variation in overhang is allowed to correct alignment at the top of the wall.

4.08 CONSTRUCTION ADJACENT TO COMPLETED WALL

A. The Owner or Owner's Representative is responsible for ensuring that construction by others adjacent to the wall does not disturb the wall or place temporary construction loads on the wall that exceed design loads, including loads such as water pressure, temporary grades, or equipment loading. Heavy paving or grading equipment shall be kept a minimum of 3 feet behind the back of the wall face. Equipment with wheel loads in excess of 150 psf live load shall not be operated within 10 feet of the face of the retaining wall during construction adjacent to the wall. Care should be taken by the General Contractor to ensure water runoff is directed away from the wall structure until final grading and surface drainage collection systems are completed.

END OF SECTION

SECTION 02900

SPECIAL SOIL MIXTURES

PART 1 – GENERAL

1.01 WORK INCLUDED:

A. Establish a layer of special soil mixtures at thicknesses specified for the purposes of establishing a vegetative support growth as shown in the plans.

B. Note special conditions regarding compaction of special soil mixtures on stormwater BMP side slopes and bottoms.

1.02 SUBMITTALS:

A. Provide representative samples of borrow materials taken from the source. Tag, label, and package the samples as requested by the Engineer. Provide access to the borrow site for field evaluation and inspection.

B. Provide analytical test results at the rate of one (1) for each 1,000 cubic yards of topsoil. Results shall indicate whether sample was taken from the upper or lower portion of the topsoil. All samples shall be representative and analyzed for the following:

- pH
- Nitrogen
- Phosphorus
- Potash
- Grain size
- Organic content
- Bulk density

C. Test results shall be forwarded to the Owner and Engineer for review.

PART 2 – PRODUCTS

2.01 TOPSOIL

A. The support material shall consist of soils suitable for establishing the vegetative cover specified in 02901 Vegetative Support Material. The Contractor is solely responsible for all acquisition, testing, hauling, and placing of the topsoil.

B. Topsoil shall be reasonably free of stumps, roots, and heavy or stiff clay, stones larger than 2-inches in diameter, lumps, coarse sand, noxious weeds, sticks, brush or other litter. It shall be composed of the following percentages of materials:

Loam	90%
Sand	10%

2.02 LOAM

Loam shall consist of loose friable topsoil with no admixture of refuse or material toxic to plant growth. Loam shall be generally free from stones, lumps, stumps, or similar objects larger than 50 mm (2 in) in greatest diameter, subsoil, roots, and weeds. The term as used herein shall mean that portion of the soil profile defined technically as the "A" horizon by the Soil Science Society of America. The minimum and maximum pH value shall be from 5.5 to 7.6. Loam shall contain a minimum of 3 percent and a maximum of 10 percent of organic matter as determined by loss by ignition. Not more than 65 percent shall pass a 0.075 mm (No. 200) sieve as determined by the wash test in accordance with ASTM D 1140. In no instance shall more than 20% of that material passing the 4.75 mm (No. 4) sieve consist of clay size particles.

2.03 PEAT

Peat shall have an ash content of less than 15%, a pH range of 4.9 to 5.2, and a loose bulk density of 0.12 to 0.15 g/cc. Peat shall be free of foreign objects and shall have no particles greater than 1 inch in diameter. The material must be reed-sedge hemic peat, shredded, uncompacted, uniform and clean.

2.04 COMPOST

Compost shall be a stable, humus-like organic material produced by the biological and biochemical decomposition of source separated compostable materials, separated at the point of generation, that may include, but are not limited to, leaves and yard trimmings, food scraps, food processing residuals, manure and/or other agricultural residuals, forest residues and bark, and soiled or non-recyclable paper. Compost shall not be altered by the addition of materials such as sand, soil or glass. Compost shall contain no substances toxic to plants and shall not contain more than 0.1 percent by dry mass of man-made foreign matter. Compost shall pose no objectionable odor and shall not closely resemble the raw material from which it was derived. Compost shall have a minimum organic matter content of 30 percent dry unit weight basis as determined by loss on ignition in accordance with ASTM D 2974. Compost shall be loose and friable, not dusty, have no visible free water and have a moisture content of 35 - 60 percent in accordance with ASTM D 2974. The particle size of compost shall be 100 percent less than 25 mm in accordance with AASHTO T27 and shall be free of sticks, stones, roots or other objectionable elongated material larger than 50 mm in greatest dimension. The pH of compost shall be in the range of 5.5 - 8.0. The maturity of the compost shall be tested and reported using the Solvita compost maturity test and must score 6 or higher to be

acceptable. The soluble salt content of compost shall not exceed 4.0 mmhos/cm as determined by using a dilution of 1 part compost to 1-part distilled water.

2.05 SAND

Sand shall consist of bank run sand conforming to the following requirements determined by ASTM D422:

Sieve Opening	Percent Passing Weight
1-inch	100
1/2-inch	50-100
No.20	20-95
No.50	10-60
No.200	0-8

2.06 BIORETENTION SOIL MIX (RAIN GARDEN FILTER)

Bioretention soil mix shall be reasonably free of stumps, roots, and heavy or stiff clay, stones larger than 2-inches in diameter, lumps, coarse sand, noxious weeds, sticks, brush or other litter. It shall be composed of the following percentages of materials:

Loam	40%
Sand	50%
Compost or peat	10%

2.07 TREE / SHRUB PLANTING SOIL MIX

Tree soil mix shall be reasonably free of stumps, roots, and heavy or stiff clay, stones larger than 2-inches in diameter, lumps, coarse sand, noxious weeds, sticks, brush or other litter. It shall be composed of the following percentages of materials:

Loam	40%
Sand	60%

2.08 EROSION CONTROL MULCH

Erosion Control Mulch shall be comprised of the following mixtures:

Material	% of Mixture
Hardwood Bark Mulch	60
Sand	20
¾” Dia. Processed Gravel	20

Materials shall conform to the requirements set forth in Section 02901 Vegetative Support Materials, Section 02905 Landscape Work and Section 02200 Earthwork.

2.09 BANK STABILIZATION SOIL MIX (BUFFER AREAS)

Slope stabilization soil mix shall be reasonably free of stumps, roots, and heavy or stiff clay, stones larger than 2-inches in diameter, lumps, coarse sand, noxious weeds, sticks, brush or other litter. The bank stabilization soil mix shall consist of two different layers.

1. The top layer shall be composed of the following percentages of materials:

Loam	50%
Erosion Control Mulch	50%

2. The bottom layer shall be composed of the following percentages of materials:

Loam	80%
Sand	20%

2.10 EARTH MOVING EQUIPMENT

Adequate types and number of equipment shall be used to ensure that the topsoil is spread evenly and at the proper depth to all areas intended to be covered.

PART 3 – EXECUTION

3.01 INSTALLATION

A. Special soil mixtures shall be prepared, mixed, hauled, deposited, spread, compacted and raked to a total depth and to the lines and grades shown on the Plans or as directed by the Engineer. Mixtures shall be placed in 6” lifts if the total depth is over 6”.

B. The compaction shall be equivalent to that produced by a hand roller weighing from 75 to 100 pounds per foot of width. The compaction may be obtained by rolling, dragging or any method that produces satisfactory results. All depressions caused by settlement or rolling shall be filled with additional materials and the surfaces shall be regraded and rolled until it presents a reasonably smooth and even finish and is up to the required grade.

C. During hauling operations, all public and private roadway surfaces shall be kept clean and any soil or other dirt, which may be brought upon the surface, shall be removed promptly and thoroughly before it becomes compacted by traffic. If necessary, the wheels of all vehicles used for hauling shall be cleaned frequently and kept clean to avoid bringing any dirt upon the surface.

D. The ground surface shall be fine graded, raked and rolled to prepare the surface of the soils for hydroseeding or planting.

3.02 QUALITY CONTROL:

A. The responsibility for satisfactory results on work carried out under this item rests entirely on the Contractor regardless of the prior approval of the materials and methods on the part of the Engineer.

B. The Contractor shall provide laboratory test results for the topsoil intended for use as specified herein, at a frequency of one (1) round per 1,000 CY of material.

C. The Engineer may randomly sample the borrow material and have a certified analytical laboratory perform testing as described herein. The testing shall be a verification of the results submitted by the Contractor and shall be entirely at the Contractor's expense.

END OF SECTION

SECTION 02901

VEGETATIVE SUPPORT MATERIAL

PART 1 – GENERAL

1.01 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including Division 1 Specifications - General Requirements apply to the work in this section.

B. Section 02910 – "Seeding" of this Specification.

C. Section 02900 – "Special Soil Mixtures" of this Specification.

D. Section 02905 – "Landscape Work" of this Specification

E. Section 02940 – "Trees, Shrubs and Container Plants" of this Specification

1.02 SCOPE OF WORK

A. The Contractor shall furnish all labor, materials, equipment and incidentals to install vegetative support material including but not limited to top soil (loam and sand) that is not identified as Special Soil Mixtures as shown on the Contract Drawings and as directed by the Engineer.

1.03 SUBMITTALS

A. Provide representative samples of borrow materials taken from the source. Tag, label, and package the samples as requested by the Engineer. Provide access to the borrow site for field evaluation and inspection.

B. Provide analytical test results at the rate of one (1) for each 1,000 cubic yards of vegetative support material. Results shall indicate whether sample was taken from the upper or lower 6" of the vegetative support materials. All samples shall be representative and analyzed for the following:

Analysis
pH
Nitrogen
Phosphorus
Potash
Grain size
Organic content
Bulk density

1.04 QUALITY ASSURANCE

A. Use adequate numbers of skilled workmen who are trained and experienced in the necessary crafts and who are completely familiar with the specified requirements and methods required for proper completion of the work under this Section.

B. Use equipment of adequate size, capacity, and quantity to accomplish the work of this Section in a timely manner.

C. Comply with the directions of the Engineer and the requirements of governmental agencies having jurisdiction.

PART 2 – PRODUCTS

2.01 LOAM

A. The top soil or vegetative support layer shall consist of soils suitable for establishing the vegetative cover specified in SECTION 02940 Trees, Shrubs and Container Plants and SECTION 02910 Seeding. Mixing of soils will be allowed so long as the final product meets all required specifications notes in this Section and elsewhere. The Contractor is solely responsible for all acquisition, testing, hauling, mixing and placing of the Vegetative Support Layer.

B. 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.

C. Loam shall contain not less than 4 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.

2.02 SAND

A. Sand shall consist of bank run sand conforming to the following requirements determined by ASTM D422:

Sieve Opening	% Passing Weight
1-inch	100
1/2-inch	50-100
No.20	20-95
No.50	10-60
No.200	0-8

2.03 VEGETAIVE SUPPORT MATERIAL MIXTURE

A. The support mixture shall be reasonably free of stumps, roots, and heavy or stiff clay, stones larger than 2-inches in diameter, lumps, coarse sand, noxious weeds, sticks, brush or other litter. It shall be composed of the following percentages of materials:

Loam	90%
Sand	10%

2.04 EARTH MOVING EQUIPMENT

A. Adequate types and number of equipment shall be used to ensure that the vegetative support material is spread evenly and at the proper depth to all areas intended to be covered without damaging underlying soil layers or structures.

PART 3 – EXECUTION

3.01 INSTALLATION

A. The vegetative support material shall be mixed, hauled, deposited, spread, compacted and raked to the lines and grades shown on the Plans or as directed by the Engineer. The vegetative support material shall be placed in maximum 6” lifts, if the total depth is greater than 6”.

B. The compaction shall be equivalent to that produced by a hand roller weighing from 75 to 100 pounds per foot of width. The compaction may be obtained by rolling, dragging or any method that produces satisfactory results. All depressions caused by settlement or rolling shall be filled with additional materials and the surfaces shall be regraded and rolled until it presents a reasonably smooth and even finish and is up to the required grade.

C. During hauling operations, all public and private roadway surfaces shall be kept clean and any topsoil or other dirt, which may be brought upon the surface, shall be removed promptly and thoroughly before it becomes compacted by traffic. If necessary, the wheels of all vehicles used to hauling shall be cleaned frequently and kept clean to avoid brining any dirt upon the surface.

D. The ground surface shall be fine graded, raked and rolled to prepare the surface of the vegetative support material for hydroseeding or loaming and seeding.

3.02 QUALITY CONTROL

A. The responsibility for satisfactory results on work carried out under this item rests entirely on the Contractor regardless of the prior approval of the materials and methods on the part of the Engineer.

B. The Contractor shall provide laboratory test results for the vegetative support material intended for use at a frequency as specified herein. For each source of loam topsoil, the Contractor shall send approximately 10 pounds of loam topsoil to an approved testing laboratory and have the following tests conducted:

Type of Test	Testing Frequency	Testing Method
Organic percentage	1,000 yd^3	Ignition Test
Grain size	1,000 yd^3	
pH	1,000 yd^3	
Bulk density	Once per source	
Nitrogen concentration	Once per source	
Phosphorus concentration	Once per source	
Potash concentration	Once per source	

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

D. The Engineer shall randomly sample the borrow material and have a certified analytical laboratory perform testing as described herein. The testing shall be a verification of the results submitted by the Contractor and shall be entirely at the Contractor's expense.

END OF SECTION

SECTION 02905

LANDSCAPE WORK

PART 1 - GENERAL

1.01 RELATED DOCUMENTS

A. Drawings and general provisions of Contract, including all Division 1 Specifications - General Requirements apply to the work in this section.

B. Section 02900 Soil Mixtures

C. Section 02920 Loaming and Seeding

D. Section 02940 Trees, Shrubs and Container Plants

E. Section 02575 Restoration of Adjacent Impacted Surfaces

1.02 DESCRIPTION OF WORK

A. Extent of landscape development work is shown on drawings.

B. Excavation, filling and grading required to establish elevations shown on drawings are not specified in this section. Refer to earthwork sections.

1.03 QUALITY ASSURANCE

A. Subcontract landscape work to a single firm specializing in landscape work.

B. Source Quality Control:

1. Ship landscape materials with certificates of inspection required by governing authorities. Comply with regulations applicable to landscape materials.

2. Do not make substitutions. If specified landscape material is not obtainable, submit proof of non-availability to Engineer, together with proposal for use of equivalent material.

3. Package standard products with manufacturer's certified analysis. For other materials, provide analysis by recognized laboratory made in accordance with methods established by the Association of Official Agriculture Chemists, wherever applicable.

4. Provide plants in the quantity shown on the drawings. Provide healthy, vigorous stock, grown in recognized nursery in accordance with good horticultural practice and free of disease, insects, eggs, larvae, and defect such as knots, sun-scaled, injuries, abrasions, or disfigurement.

5. The Engineer may inspect trees and plants either at place of growth or at site before planting, for compliance with requirements for genus, species, variety, size, and quality. Engineer retains right to further inspect trees for size and conditions of balls and root systems, insects, injuries and latent defects, and to reject unsatisfactory or defective material at any time during progress of work. Remove rejected trees immediately from project site.

1.04 SUBMITTALS

A. Submit certificates of inspection as required by governmental authorities. Submit manufacturer's or vendor's certified analysis for soil amendments and fertilizer materials. Submit other data substantiating that materials comply with specified requirements.

B. Submit seed vendor's certified statement for each grass seed mixture required, stating botanical and common name, percentage by weight, and percentages of purity, germination, and weed seed for each grass seed species.

C. Submit typewritten instructions recommending procedures to be established by Owner for maintenance of landscape work for one full year. Submit prior to expiration of required maintenance period(s).

1.05 DELIVERY, STORAGE AND HANDLING

A. Packaged Materials: Deliver packaged materials in containers showing weight, analysis and name of manufacturer. Protect materials from deterioration during delivery, and while stored at site.

B. Trees & Shrubs: Provide freshly dug trees. Do not prune before delivery unless otherwise approved. Do not bend or bind-tie trees or shrubs in such manner as to damage bark, break branches, or destroy natural shape. Provide protective covering during delivery. Do not drop balled and burlapped stock during delivery.

C. Deliver plants after preparations for planting have been completed and plant immediately. If planting is delayed more than 6 hours after delivery, set trees in shade, protect from weather and mechanical damage, and keep roots moist by covering with mulch, burlap, or other acceptable means of retaining moisture.

1.06 JOB CONDITIONS

A. Proceed with the complete landscape work as rapidly as portions of site become available, working within seasonal limitations for each kind of landscape work required.

B. Utilities: Determine location of underground utilities and perform work in a manner which will avoid possible damage. Hand excavate as required. Maintain grade stakes set by others until removal is mutually agreed upon by parties concerned.

C. Excavation: When conditions detrimental to plant growth are encountered, such as rubble fill, adverse drainage conditions, or obstructions, notify Engineer before planting.

D. Planting Time: Plant or install materials during normal planting seasons for each type of landscape work required. Correlate planting with specified maintenance periods to provide maintenance from date of substantial completion.

1.07 SPECIAL PROJECT WARRANTY

A. Warranty trees for a period of one year after date of substantial completion, against defects including death and unsatisfactory growth, except for defects resulting from neglect by Owner, abuse or damage by other, or unusual phenomena or incidents which are beyond Landscape Installer's control.

B. Remove and replace trees found to be dead or in unhealthy condition during warranty period. Make replacements during growth season following end of warranty period. Replace trees and shrubs, which are in doubtful condition at end of warranty period, unless, in opinion of Engineer, it is advisable to extend warranty period for a full growing season.

PART 2 - PRODUCTS

2.01 LOAM

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 concentrations
2. pH
3. Nitrogen concentration
4. Phosphorous concentration
5. Potash concentration

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

D. Loam shall meet requirements set forth in Section 02900 Special Soil Mixtures and 02910 Loaming and Seeding.

E. Obtain loam from local sources or from areas having similar soil characteristics to that found at project site. Obtain loam only from naturally well-drained sites where topsoil occurs in a depth of not less than 4 inches; do not obtain from bogs or marshes.

2.02 SOIL AMENDMENTS

A. 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.

B. Aluminum Sulfate: Commercial grade.

C. Peat Humus: FS Q-P-166 and with texture and pH range suitable for intended use.

D. Bonemeal: Commercial, raw, finely ground; 4% nitrogen and 20% phosphoric acid.

E. Superphosphate: Soluble mixture of treated minerals; 20% available phosphoric acid.

F. Sand: Clean, washed sand, free of toxic materials.

G. Commercial Fertilizer: Complete fertilizer of neutral character, with some elements derived from organic sources and containing following percentages of available plant nutrients:

1. For lawns, provide fertilizer with percentage of nitrogen required to provide not less than 1 lb. of actual nitrogen per 100 sq. ft. of lawn area and not less than 4% phosphoric acid and 2% potassium. Provide nitrogen in a form that will be available to lawn during initial period of growth; at least 50% of nitrogen to be organic form.

2.03 PLANT MATERIALS

A. Provide plants in the quantity shown on the drawings and as specified in Section 02940 Trees Shrubs and Container Plants.

2.04 GRASS MATERIALS

A. Grass seed shall meet requirements set forth in Section 02910 Loaming and Seeding

2.05 WOOD CELLULOSE FIBER MULCH

A. Mulch to cover landscaped areas shall be fiber processed from whole wood chips and clean recycled newsprint in a 1:1 proportion manufactured specially for standard hydraulic mulching equipment. Fiber shall not be produced from recycled material, such as sawdust or cardboard.

B. Moisture content shall not exceed 10 percent, plus or minus 3 percent as defined by the pulp and paper industry standards. Fiber shall have a water holding capacity of not less than 900 grams water per 100 grams fiber.

C. Mulch shall be such that fibers will be dispersed into a uniform slurry when mixed with water. It shall be nontoxic to plant and animal life.

D. Mulch shall contain a non-petroleum based organic tackifier and a bio-degradable green dye to allow for easy visual metering during application and it shall be noninjurious to plant growth.

2.06 SPECIAL SEED MIXES

A. Provide special seed mixes in the quantities specified by specific manufacturers and at locations as shown on the drawings. Special seed mixes shall meet requirements specified in Section 02910 Seeding.

2.07 STRAW AND HAY MULCH

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

1. Hay Mulch shall consist of mowed and properly cured grass, clover or other acceptable plants. No salt hay shall be used.

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

2.08 WOOD BARK MULCH

A. Mulch to cover landscaped areas shall be processed from whole wood chips and clean of debris and waste. Wood mulch shall not be produced from recycled material, such as sawdust or cardboard or other wood waste products.

B. Mulch shall be double shredded hardwood (non-floatable), shall comply with the type and size required by the approved Drawings or as directed by the Owner, and shall be screened to minimize fines.

2.09 STONE MATERIALS – ROUNDED RIVER ROCK, COBBLES & BOULDERS

A. Provide surface stone materials such as rounded river rock, cobbles and boulders in the quantities specified and at locations as shown on the drawings. Stone materials shall meet requirements specified in Section 02200 Earthwork.

2.10 STONE DUST

A. Provide stone dust in the quantities specified and at locations as shown on the drawings. Stone dust shall meet requirements specified in 02200 Earthwork.

2.11 MISCELLANEOUS LANDSCAPE MATERIALS

Anti-Erosion Mulch: Provide clean, seed-free salt hay or threshed straw of wheat, rye, oats or barley.

PART 3 - EXECUTION

3.01 PREPARATION

A. Layout individual tree locations and areas for multiple plantings. Stake locations and outline areas, and secure Engineer's acceptance before start of planting work. Make minor adjustments as may be requested.

B. Preparation for Grass Seeding: After approval of the underlying surface, loam shall be placed on areas as indicated on the drawings. Spread loam to a minimum depth of 6 inches required to meet lines, grades and elevations shown, after light rolling and natural settlement. Remove stones over 1-1/2" in any dimension and sticks, roots, rubbish and other extraneous matter. Limit preparation to areas which will be planted promptly after preparation.

C. Soil Amendments: 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. Fertilizer shall be applied according to the soil test, or without a soil test, at the rate of 1,000 pounds per acre. Loam shall be worked a minimum of 4 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.

D. Fine grade lawn areas to smooth, even surface with loose, uniformly fine texture. Roll, rake and drag lawn areas, remove ridges and fill depressions, as required to meet finish grades. Limit fine grading to areas which can be planted immediately after grading.

E. Moisten prepared lawn areas before planting if soil is dry. Water thoroughly and allow surface moisture to dry before planting lawns. Do not create a muddy soil condition.

F. Restore lawn areas to specified condition if eroded or otherwise disturbed after fine grading and prior to planting.

G. Dispose of subsoil removed from planting excavations. Do not mix with planting soil or use as backfill.

3.02 PLANTING

A. Set balled and burlapped (B&B) stock on layer of compacted planting soil mixture, plumb and in center of pit or trench with top of ball at same elevation as adjacent finished landscape grades. Remove burlap from sides of balls; retain on bottoms. When set, place additional backfill around base and sides of ball, and work each layer to settle backfill and eliminate voids and air pockets. When excavation is approximately 2/3-full, water thoroughly before placing remainder of backfill. Repeat watering until no more is absorbed. Water again after placing final layer of backfill.

B. Dish top of backfill to allow for mulching.

C. Apply anti-desiccant using power spray to provide an adequate film over trunks, branches, stems, twigs, and foliage.

D. Prune, thin out and shape trees and shrubs in accordance with standard horticultural practice. Prune trees to retain required height and spread. Unless otherwise directed by Engineer, do not cut tree leaders, and remove only injured or dead branches.

E. Remove and replace excessively pruned or misformed stock resulting from improper pruning.

F. Gut and stake trees immediately after planting, as indicated.

3.03 SEEDING

A. Seeding shall meet requirements set forth in Section 02910 Seeding and shall be done when weather conditions are approved as suitable, in the periods between April 1 and May 30 or August 15 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 in the locations designated by the Engineer on a calm day by machine. Water seeding (hydroseeding) will be permitted after approval by the Engineer.

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 1/4-inch and rolled with a roller weighing not more than 100 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 square feet the Contractor shall re-seed, roll, and water as necessary to obtain proper germination.

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

3.04 PLACING STRAW MULCH

A. Hay or Straw Mulch shall be loosely spread to uniform depth over all areas designated on the plans, at the rate 4-1/2 tons per acre, or as otherwise directed.

B. Hay or 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.

3.05 PLACING WOOD BARK MULCH

A. General bark mulch areas and landscaped planted areas. Provide not less than 2" thickness of wood bark mulch and work into top of backfill and finish level with adjacent finish grades.

B. Bark mulch in stormwater BMPs: Place bark mulch in thicknesses as recommended by the specific BMP manufacturer/supplier or shall be placed in a minimum 2" thickness if no recommendations are provided.

3.06 TEMPORARY CROP COVER

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 as directed 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.

3.07 MAINTENANCE

A. Begin maintenance immediately after planting.

B. Maintain trees until final acceptance but in no case less than 30 days after substantial completion of planting.

C. Maintain trees and shrubs by pruning, watering, cultivating, and weeding as required for healthy growth. Restore planting saucers. Tighten and repair stake and guy supports, and reset trees and shrubs to proper grades or vertical position as required. Restore or replace damaged wrappings. Spray as required to keep trees and shrubs free of insects and disease.

D. Maintain lawns for not less than the period stated below, and longer as required to establish an acceptable lawn. Seeded lawns, not less than 30 days after completion.

E. Maintain lawns by watering, fertilizing, weeding, mowing, trimming, and other operations such as rolling, regrading, and replanting as required to establish a smooth, acceptable lawn, free of eroded or bare areas.

3.08 CLEANUP AND PROTECTION

A. During landscape work, keep pavements clean and work area in an orderly condition.

B. Protect landscape work and materials from damage due to landscape operations, operations by other contractors and trades and trespassers. Maintain protection during installation and maintenance periods. Treat, repair, or replace damaged landscape work as directed.

3.09 INSPECTION AND ACCEPTANCE

At the beginning of the next planting season after that in which the permanent grass crop is sown, the seeding areas will be inspected. Any section not showing dense, vigorous growth at that time shall be promptly reseeded by the Contractor at this 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.

END OF SECTION

SECTION 02910

SEEDING

PART 1 - GENERAL

1.01 WORK INCLUDED

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

1.02 QUALITY ASSURANCE

A. For each source of seed or plantings, the Contractor shall submit Manufacturer's Certification, Certified Test Reports or Certificates of Compliance for each species or type.

B. These tests shall be at the Contractor's expense. Test results shall be forwarded to the Engineer.

1.03 SUBMITTALS

In accordance with the requirements of the general specifications, the Contractor shall submit one set of information detailing the seed mixes, wetland plants, fertilizers, mulch material, and origin of loam shall be submitted to the Engineer for review.

PART 2 – PRODUCTS

2.01 MATERIALS

A. 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.

B. 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 provisions of the General Laws, Chapter 94, as amended, relating to fertilizers.

C. STRAW/HAY MULCH

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

1. Hay Mulch – Hay Mulch shall consist of mowed and properly cured grass, clover or other acceptable plants. No salt hay shall be used.

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

D. EROSION CONTROL/RESTORATION MIX (MOIST MIX)

1. The "moist" mix shall be New England Erosion Control/Restoration Mix (for Detention Basins and Moist Sites) as processed by New England Wetland Plants, Inc. or approved equal. The mix shall conform to the following requirements:

   Species:
   Virginia Wild-rye (*Elymus virginicus*)
   Creeping Red Fescue (*Festuca rubra*)
   Little Bluestem (*Schizachyrium scoparium*)
   Big Bluestem (*Andropogon gerardii*)
   Switchgrass (*Panicum virgatum*)
   Blue Vervain (*Verbena hastate*)
   Rough Bluegrass/Ticklegrass (*Agrostis scabra*)
   New England Aster (*Aster novae-angliae*)
   Spotted Joe Pye Weed (*Eupatorium maculatum*)
   Boneset (*Eupatorium perfoliatum*)
   Soft Rush (*Juncus effusus*)
   Wool Grass (*Scirpus cyperinus*)

2. The "moist" mix shall be applied in locations shown on the Drawings.

E. CONSERVATION/WILDLIFE MIX – IMPACTED SLOPES

1. The "conservation" mix shall be New England Conservation/Wildlife Mix as processed by New England Wetland Plants, Inc. or approved equal. The mix shall conform to the following requirements:

   Species:
   Virginia Wild-rye (*Elymus virginicus*)
   Little Bluestem (*Schizachyrium scoparium*)

Creeping Red Fescue (*Festuca rubra*)
Big Bluestem (*Andropogon gerardii*)
Partridge Pea (*Chamaecrista fasciculata*)
Deer Tongue (*Panicum clandestinum*)
Switchgrass (*Panicum virgatum*)
Indian Grass (*Sorghastrum nutans*)
Common Sneezeweed (*Helenium autumnale*)
Ox Eye Sunflower (*Heliopsis helianthoides*)
Blue Vervain (*Verbena hastate*)
Common Milkweed (*Asclepias syriaca*)
Flat Topped/Umbrella Aster (*Aster umbellatus*)
Purple Joe Pye Weed (*Eupatorium purpureum*)
Early Goldenrod (*Solidago juncea*)
Golden Alexanders (*Zizia aurea*)

F. NEW ENGLAND ROADSIDE MATRIX UPLAND SEED MIX - BUFFERS

1. The "conservation" mix shall be New England Conservation/Wildlife Mix as processed by New England Wetland Plants, Inc. or approved equal. The mix shall conform to the following requirements:

   Species:
   Virginia Wild-rye (*Elymus virginicus*)
   Panicledleaf Tick Trefoil (*Desmodium paniculatum*)
   Little Bluestem (*Schizachyrium scoparium*)
   Big Bluestem (*Andropogon gerardii*)
   Red Fescue (*Festuca rubra*)
   Indian Grass (*Sorghastrum nutans*)
   Switch Grass (Panicum virgatum)
   Staghorn Sumac (*Rhus typhina*)
   Grey Dogwood (*Cornus racemose*)
   Silky Dogwood (*Cornus amomum*)
   Evening Primrose (*Oenothera biennis*)
   Butterfly Milkweed (*Asclepias tuberosa*)
   Black Eyed Susan (*Rudbeckia hirta*)
   Partridge Pea (*Chamaecrista fasciculate*)
   Hollow-Stem Joe Pye Weed (*Eupatorium fistulosum / Eutrochium fistulosum)*

G. GRASS SEED MIX

1. The grass seed shall be of the previous year's crop and in no case shall the weed seed content exceed 1% by weight.

2. Grass seed shall conform to MHD M6.03.0 for grassplots and islands, and the following requirements:

Seed	Proportion	Germination Minimum	Purity Minimum
Creeping Red Fescue	50%	85%	95%
Kentucky Bluegrass	25%	85%	90%
Domestic Rye	10%	90%	98%
Red Top	10%	85%	92%
Ladino Clover	5%	85%	96%

3. Grass seed shall be furnished and delivered premixed in proportions specified above. Seed shall comply with State and Federal seed laws.

4. A manufacturer's Certificate of Compliance to the specifications shall be submitted with each shipment of seed. Certificates shall include guaranteed percentages of purity, weed content and germination of seed.

H. TEMPORARY COVER CROP

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	0.5 Max.	

PART 3 – EXECUTION

3.01 SURFACE PREPARATION:

A. After approval of the subsurface conditions and grading, the topsoil shall be placed. The topsoil shall conform to Section 02900 Vegetative Support Material.

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. Topsoil/Loam on adjacent impacted areas next to the proposed constructions shall be worked a minimum of 3 inches deep, thoroughly incorporating the lime and fertilizer into the soil. The topsoil 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 after completion shall be a shown on the drawings.

3.02 SEEDING

A. Seeding shall be done when the weather conditions are approved as suitable. Permanent seeding shall be undertaken in the spring from April through May, and in late summer and early fall from August to October 15, 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 in the locations designated by the Engineer on a calm day by machine. Seed shall be sown at the following rates or as approved by the Engineer unless otherwise specified.

Seed Mixes

Moist Mix (New England Erosion Control/Restoration Mix)	35 pounds per acre
New England Conservation/Wildlife Mix	25 pounds per acre
New England Roadside Matrix (Upland)	25 pounds per acre
Grass Seed / Cover Crop	200 pounds per acre

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 ¼ inch and rolled with a roller weighing not more than 100 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 until a dense, healthy growth of perennial lawn grass is established.

G. Prior to acceptance of the project, the Contractor shall be responsible for mowing the grass when necessary to a height of 3 inches when the grass has attained a height of 8 inches.

H. 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 on order of 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.

I. A dense, healthy growth of perennial lawn grass is established when a uniform stand of at least 60 percent of established permanent grass species is determined, with a uniform count of at least 100 plants per square foot.

3.05 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.

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

3.06 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, as described in this section.

END OF SECTION

SECTION 02999

RUBBER RAZOR

PART 1 - GENERAL

1.01 WORK INCLUDED

This section of the specification covers all labor, materials, and equipment necessary for the installation of the rubber razors as indicated on the drawings and as herein specified. All areas disturbed by the Contractor's operations shall be repaired and restored to original condition or as herein specified.

PART 2 – PRODUCTS

2.01 MATERIALS

A. PRESSURE TREATED LUMBER

Pressure treated lumber shall be 2" x 6" and span a length of 1.022 times the width of the road.

B. GALVANIZED NAILS / DECKING SCREWS

Galvanized nails / decking screws shall be at a minimum of 3-inches in length.

C. RUBBER RAZOR

Rubber razors shall be 3/8" thick x 7" high with a length equal to that of the pressure treated lumber. The rubber blades are to be constructed of new or used conveyor belts.

PART 3 – EXECUTION

3.01 SURFACE PREPARATION:

A. The existing pavement shall be sawcut for the excavation / preparation of the rubber razors.

3.02 INSTALLATION

A. Rubber razors shall be installed at a 30-degree angle to the road edge and the outlet shall be pointed towards a stable vegetated area.

B. Gravel shall be packed around the rubber razor to make sure it is installed securely.

C. The outlet of the rubber razors shall be armored with a flared grouping of stones to slow down water before it enters the buffer.

END OF SECTION

SECTION 03300

CAST-IN-PLACE CONCRETE

PART 1 - GENERAL

1.01 WORK INCLUDED

A. Extent of concrete work is shown on drawings. Contractor is responsible for design and installation of all concrete slabs and foundations designed to support the pre-engineered structures as shown on the plans and specified in Section 13120 Pre-engineered Building.

B. The Contractor shall furnish all of the materials for and shall place all concrete, inclusive of all required from work, for the structures shown on the Contract Drawings and such other concrete masonry as may be necessary to fully complete the work called for by this Contract.

C. Class A concrete will, in general, be used for steel reinforced and formed concrete such as foundations, slabs, walls, equipment bases, and manhole sections, and elsewhere when so ordered by the Contracting Officer.

D. Class B concrete will, in general, be used for concrete cradles, concrete backfill when ordered, concrete encasement, mass concrete fill, and elsewhere when ordered by the Contracting Officer.

1.02 REFERENCES

The publications listed below form a part of this specification to the extent referenced. The publications are referred to in the test by the basic designation only.

A. American Society for Testing and Material (ASTM):

ASTM A82	Steel Wire, Plain, for Concrete Reinforcement
ASTM A185	Steel Welded Wire Fabric, Plain for Concrete Reinforcement
ASTM A496	Steel Wire, Deformed for Concrete Reinforcement
ASTM A497	Steel Welded Wire Fabric, Deformed, for Concrete Reinforcement
ASTM A615	Deformed Billet-Steel Bars for Concrete Reinforcement
ASTM C33	Concrete Aggregates
ASTM C94	Ready-Mixed Concrete
ASTM C138	Weight per Cubic Foot, Yield and Air Content (Gravimetric) of Concrete

ASTM C143	Slump of Portland Cement Concrete
ASTM C150	Portland Cement
ASTM C171	Spec. for Waterproof Paper for Curing Concrete
ASTM C231	Air Content of Freshly Mixed Concrete by the Pressure Method
ASTM C260	Air Entraining Admixtures for Concrete
ASTM C494	Chemical Admixtures for Concrete
ASTM C618	Fly Ash and Raw or Calcined Natural Pozzolan for Use as a Mineral Admixture in Portland Cement Concrete
ASTM D994	Preformed Expansion Joint Filler for Concrete (Bituminous Types)

B. American Concrete Institute (ACI):

ACI 301	Curing of the Cement Concrete
ACI 315	Manual of Standard Practice for Detailing Reinforced Concrete Structures
ACI 318	Building Code Requirements for Reinforced Concrete
ACI 347	Recommended Practice for Concrete Framework

C. Corps of Engineers (COE) Publications:

CRD C621	Factory Pre-Mixed Grout

D. New Jersey Department of Transportation Standard Specification for Roads and Bridges, Latest Edition as of Time of Solicitation.

E. U.S. Department of Commerce Commercial Standard:

CS238-61	Polyethylene Sheeting (Construction, Industrial and Agricultural)

F. American Welding Society (AWS):

AWS D1.4	Structural Welding Code – Reinforcing Steel

G. Concrete Reinforcing Steel Institute (CRSI):

CRSI DA4	Manual of Standard Practice

1.03 GENERAL REQUIREMENTS

The work covered under this section shall consist of the furnishing of all labor, materials, and equipment necessary to complete all plain and reinforced cast-in-place concrete work, as called for on drawings and as hereinafter specified.

1.04 SUBMITTALS

A. Drawings: Contractor shall submit detailed drawings showing reinforcing sizes, grades, and splicing and bending details. Drawing shall show support details including types, sizes and spacing.

B. Certifications: Contractor shall submit certified copies of mill reports attesting that the reinforcing steel meets the requirements specified prior to installation of reinforcing steel.

C. Materials List: Contractor shall submit a complete list of all materials proposed to be furnished and installed under this section, demonstrating complete conformance with requirements specified.

D. Reports: Contractor shall submit concrete test reports detailing the testing performed.

1.05 QUALIFICATIONS OF INSTALLERS

Throughout the progress of installation of the work of this section, provide at least one person who shall be thoroughly familiar with the specified requirements, completely trained and experienced in the necessary skills, and who shall be present at the site and shall direct all work performed under this section. In actual installation of the work for this section, use adequate numbers of skilled workmen to ensure installation in strict accordance with the approved design. In acceptance or rejection of the work performed under this section, the Contracting Officer will make no allowance for lack of skill on the part of the workmen.

1.06 STORAGE OF MATERIALS

A. Cement: Cement shall be stored so as to prevent deterioration or contamination. Cement which has become caked, partially set or otherwise deteriorated, damaged or contaminated shall be rejected and removed from the site.

B. Aggregates: The aggregate shall be stored and handled so as to preserve the gradation and cleanliness of the material. Segregation and/or contamination are cause for rejection and the deficient material shall be removed from the site and replaced.

C. Storage of Metal Reinforcement: Metal reinforcement shall be blocked up from the ground at least 4 inches and piled compactly. When required, it shall be placed under cover, as directed.

PART 2 - PRODUCTS

2.01 CEMENT

Portland cement used in this work shall be an approved brand of tested Portland cement meeting the requirements of ASTM C150, Type IA, unless otherwise acceptable to the Contracting Officer. One brand of cement will be used throughout the project.

2.02 FLY ASH

ASTM C618, Type C or Type F. Limit use of fly ash to not exceed 25 percent of cement content by weight.

2.03 NORMAL WEIGHT AGGREGATES

ASTM C33, as herein specified. Provide aggregates from a single source for exposed concrete. For exterior exposed surfaces, do not use fine or coarse aggregate containing spalling, causing deleterious substances.

2.04 WATER

Drinkable.

2.05 ADMIXTURES

Calcium chloride or admixture containing more than 0.1 percent ions are not permitted.

A. Air Entraining Admixture: ASTM C260. Available Products: Subject to compliance with requirements, products which may be incorporated in the work include, but are not limited to, the following:

1. "Sika Aer"; Sika Corp. or approved equal.

2. "MB-VR or MB-AE"; Master Builders or approved equal.

3. "Dorex AEA"; W.R. Grace or approved equal.

4. "EDOCO 2001 or 2002"; EDOCO Technical Products or approved equal.

B. Water Reducing Admixture: ASTM C494, Type B, and contain not more than 0.1 percent chloride ions. Available Products: Subject to compliance with requirements, products which may be incorporated in the work include, but are not limited to, the following:

1. "EUCON WR-75"; Euclid Chemical Co. or approved equal.

2. "Pozzolith 344"; Mater Builders or approved equal.

3. "Plastocrete 160"; Sika Chemical Corp. or approved equal.

4. "Chemtard"; Chem-Masters Corp. or approved equal.

C. High Range Water Reducing Admixture (Super Plasticizers): ASTM C494, Type F or Type G, and contain not more than 0.1 percent chloride ions. Subject to compliance with requirements, products which may be incorporated in the work include, but are not limited to, the following:

1. "WDRDA 19"; W.R. Grace or approved equal.

2. "PSP"; Protex Industries, inc. or approved equal.

3. "Super P"; Anti-Hydro or approved equal.

4. "Sikament"; Sika Chemical Corp. or approved equal.

5. "Mighty 150"; ICI Americas Corp. or approved equal.

6. "Eucon 37"; Euclid Chemical Corp. or approved equal.

7. "PSI Super"; Gifford-Hill or approved equal.

8. "Pozzolith 400"; Master Builders or approved equal.

D. Water Reducing, Non-Chloride Accelerator Admixture: ASTM C494, Type E, and containing not more than 0.1 percent chloride ions. Subject to compliance with requirements, products which may be incorporated in the work include, but are not limited to, the following:

1. "Accelguard 80"; Euclid Chemical Co. or approved equal.

2. "Pozzolith 500"; Master Builders or approved equal.

E. Water Reducing, Retarding Admixture: ASTM C494, Type A, and containing not more than 0.1 percent chloride ions. Subject to compliance with requirements, products which may be incorporated in the work, include, but are not limited to, the following:

1. "EDOCO 20006"; Edoco Technical Products or approved equal.

2. "Pozzolith 300-R"; Master Builders or approved equal.

3. "Eucon Retarder 75"; Euclid Chemical Co. or approved equal.

4. "Daratard"; W.R. Grace or approved equal.

5. "Plastiment"; Sika Chemical Co. or approved equal.

2.06 METAL REINFORCEMENT

Reinforcing bars for the slab on grade shall conform to the requirements of ASTM specifications A615 Grade 60 Deformed.

Welded wire mesh for the slab on grade shall conform to the requirements of ASTM A185. Support for Reinforcement: Provide supports for reinforcement including bolsters, chairs,

spacers, and other devices for spacing, supporting and fastening reinforcing bars and welded wire fabric in place. Use wire bar type supports complying with CRSI Specifications unless otherwise acceptable.

2.07 NON-SHRINK GROUT

GRD-C621, factory pre-mixed grout. Subject to compliance with requirements, products which may be incorporated in the work include, but are not limited to, the following:

1. Non-Metallic

   "Masterflow 713"; Master Builders or approved equal.
   "Sonogrout"; Sonneborn-Contech or approved equal.
   "EUCO-NS"; Euclid Chemical Co. or approved equal.
   "Crystex"; L&M Const. Chemical Co. or approved equal.
   "Sure-Grip Grout"; Dayton Superior Corp. or approved equal.
   "Horngrout"; A.C. Horn or approved equal.
   "Five-Star Grout"; Five-Star Products, Inc. or approved equal.
   "Sika Grout 212"; Sika Corp. or approved equal.

2. Metallic grout will not be allowed.

2.08 LIQUID MEMBRANE FORMING CURING COMPOUND

Type I, Class A. Provide curing compound by one of the following:

1. "Masterseal"; Master Builders or approved equal.

2. "A-H 3 Way Sealer"; Anti-Hydro Waterproofing Co. or approved equal.

3. "Kure-N-Seal"; Sonneborn-Contech or approved equal.

2.09 SHEET MATERIALS

(Moisture Retaining Cover) one of the following complying with ASTM C171.

1. Waterproof Paper

2. Polyethylene Film

3. Polyethylene Coated Burlap

PART 3 - EXECUTION

3.01 FORMWORK

General: Detailed recommendations are given in "Recommended Practice Concrete Formwork" (ACI 347). Earth cuts shall not be used as forms for vertical surfaces. The design and engineering of the formwork, as well as its construction, shall be the responsibility of the contractor.

3.02 CONCRETE

A. Composition: The concrete shall be composed of Portland cement, fine aggregate, coarse aggregate, water, and the admixture, if approved for use.

B. Design of Mixtures: The contractor, at his expense, shall have the approved testing or inspection laboratory prepare the mix designs for the specified concretes. Submit written reports to the Contracting Officer of each proposed mix for each class of concrete at least fifteen (15) days prior to start of work. Do not begin concrete production until mixes have been reviewed by the Contracting Officer.

C. Strength of Concrete: Concrete shall be proportioned and mixed for a strength of 4,000 psi at 28 days for the reinforced foundations.

D. Adjustment to Concrete Mixes: Mix design adjustments may be requested by contractor when characteristics or materials, job conditions, weather, test results, or other circumstances warrant; at no additional cost to the Owner, and as accepted by Contracting Officer. Laboratory test data for revised mix design and strength results must be submitted to and accepted by Contracting Officer before using in work.

E. Water-Cement Ratio: Provide cement for following conditions with maximum water-cement (WC) ratios as follows:

1. Subjected to freezing and thawing: WC 0.50

F. Slump Limits: Proportion and design mixes to result in concrete slump at point of placement as follows:

1. Ramps, slabs, and sloping surfaces: Not more than 3".

2. Concrete containing HRWR (High Range Water-Reducing) admixture (super plasticizer): Not more than 8" after addition of HRWR to verified 2"-3" slump concrete.

3. Other Concrete: Not more than 4".

3.03 ADMIXTURES

Use admixtures for water-reducing and set-control in strict compliance with manufacturer's directions.

A. Use water-reducing admixture for high range water-reducing admixture (super plasticizer) in concrete as required for placement and workability.

B. Use non-chloride accelerating admixture in concrete slabs placed at ambient temperatures below 50°F (10°C).

C. Use air-entraining admixture in exterior exposed concrete, unless otherwise indicated. Add air-entraining admixture at manufacturer's prescribed rate to result in concrete at point of placement having total air content with a tolerance of ±1½ % within following limits:

D. Concrete structures and slabs exposed to freezing and thawing, deicer chemicals, or subjected to hydraulic pressure:

5.0% (moderate exposure): 6.0% (severe exposure) ¾" maximum aggregate.

3.04 CONCRETE MIXES

A. Job Site Mixing: Mix materials for concrete in appropriate drum type batch machine mixer. For mixers of one CY or smaller capacity, continue mixing at least 1½ minutes, but not more than 5 minutes after ingredients are in mixer before any part of batch is released. For mixers of capacity larger than 1 CY, increase minimum 1½ minutes of mixing by 15 seconds for each additional cubic yard or fraction thereof.

B. Provide batch ticket for each discharged and used in work, indicating project identification name and number, date, mix type, mix time, quantity, and amount of water introduced.

C. Ready-Mix Concrete: Comply with requirements of ASTM C94, and as herein specified. During hot weather, or under conditions contributing to rapid setting of concrete, a shorter mixing time than specified in ASTM C94 may be required. When air temperature is between 85°F (30°C) and 90°F (32°C), reduce mixing and delivery time from 1½ hours to 75 minutes, and when air temperature is above 90°F (32°C), reduce mixing and delivery time to 60 minutes.

3.05 PLACING CONCRETE

Concrete shall be placed or deposited in accordance with the following:

A. Depositing: Concrete shall be deposited at slumps not greater than those specified in Paragraph 8.1.5 as nearly as practicable, in its final position so as to avoid segregation due to rehandling or flowing. The concreting shall be carried on at such a rate that the concrete is at all times plastic and flows readily into the spaces between the bars. No concrete that has partially hardened or been contaminated by foreign material shall be deposited, nor shall retempered concrete be used.

B. Time Schedule: When concreting is started, it shall be carried on as a continuous operation until the placing of the panel or section is completed; fresh concrete shall not be deposited on concrete which has hardened sufficiently to cause formation or seams

and planes of weakness within the section. The top surface shall be generally level. When construction joints are necessary, they shall be made as specified hereinafter.

C. Compaction: All concrete shall be thoroughly compacted by suitable means during placing, and shall be thoroughly worked around the reinforcement and embedded into fixtures and corners of forms. Vibrators shall be used to aid in the placement of concrete and they shall be used under experienced supervision, and the forms shall be designed to withstand their action. Where conditions make compacting difficult, or where the reinforcement is congested, batches of mortar containing the same proportions of cement-to-sand as used in the concrete shall first be deposited in the forms to a depth of at least 1 inch.

3.06 TESTING

A. Concrete inspection and testing shall be performed by the Engineer or by an inspection laboratory, designated by the Engineer, engaged and paid for by the Contractor.

B. Quality Control / Quality Acceptance Testing and Inspection shall be done in accordance with SECTION 01600 MATERIAL TESTING & INSPECTION.

C. Testing equipment shall be supplied by the laboratory, and the preparation of samples and all testing shall be performed by the laboratory personnel. Full assistance and cooperation, concrete for samples, and such auxiliary personnel and equipment as needed shall be provided by the Contractor.

D. Slump and Air Content Testing shall be done during the placement of concrete at a frequency as specified in SECTION 01600 MATERIAL TESTING & INSPECTION.

E. A minimum of four compression test cylinders shall be made and tested for each 100 cubic yards of each type and design strength of concrete placed. Two cylinders shall be tested at 7 days, and two at 28 days. If job experience indicates additional cylinder tests or other tests are required for proper control or determination of concrete quality, such tests shall be made.

F. The Engineer shall have the right to reject concrete represented by low strength tests. Rejected concrete shall be promptly removed and replaced with concrete conforming to the specification. The decision of the Engineer as to whether substandard concrete is to be accepted or rejected shall be final.

G. Test cylinders of the concrete shall be made by or under the supervision of the contractor’s superintendent. Unless otherwise noted, the tests of fresh and hardened concrete will be at the expense of the contractor.

H. Tests of Fresh Concrete: Except as otherwise directed by the Contracting Officer, at least 1 test shall be made on fresh concrete for each 50 cubic yards of concrete (or fraction thereof) placed in any one day and in any event not less than 1 test each day concrete is used. Slump shall be determined in accordance with ASTM C143. Air content shall be determined in accordance with ASTM C138 or C231.

I. Tests of Hardened Concrete: When a test of fresh concrete is conducted as in Paragraph 8.3.1, specimens shall also be molded for compressive tests in conformance to ASTM C31, not less than three specimens shall comprise a strength test. Compressive strength tests shall be made in accordance with ASTM C39.

J. Age of Strength Test: The age of test for strength shall be 7 days.

K. Strength Test Conformance of Molded Specimens: To conform to the requirements of the specifications, the average strength of laboratory cured specimens as well as the average of any 5 consecutive strength tests shall be equal to or greater than the specified strength, and not more than 1 strength test in 10 shall have an average value less than 90 percent of the specified strength.

L. Test Data: All test data shall be furnished to the Engineer, in duplicate, for verification.

3.07 PREPARATION OF EQUIPMENT AND PLACE OF DEPOSIT

A. Before placing concrete, all equipment for mixing and transporting the concrete shall be cleaned, all debris and ice shall be removed from the spaces to be occupied by the concrete, forms shall be thoroughly wetted (except where the surrounding atmosphere is below 40°F) of oiled, and the reinforcement shall be thoroughly cleaned of ice or other coatings. Water shall be removed from place of deposit before concrete is placed. All reinforcement, forms, ground, and other surfaces with which the concrete is to come in contact shall be free from frost. Concrete shall not be deposited during rain unless adequately protected and, in any case, preparation shall be on hand to protect newly placed concrete from rain until it has hardened sufficiently so that it will not be damaged.

B. Conveying: Concrete shall be conveyed from the mixer to the place of final deposit by methods which will prevent the separation or loss of the materials. Equipment for chuting, pumping and pneumatically conveying concrete shall be of such size and design as to insure a practically continuous flow of concrete at the delivery end and without separation of the materials.

3.08 CURING

Concrete shall be cured as follows:

A. Normal Conditions: Concrete shall be prevented from drying for at least the first 7 days after placing. If the use of an (approved) admixture promotes an early strength gain, moist curing may be discontinued after 3 days. See Paragraph 13 of this section.

B. Cold Weather Conditions: Whenever the temperature of the surrounding air is below 40°F, all concrete shall be maintained at a temperature of not less than 50°F for at least 72 hours, or for as much time as is necessary to insure proper curing of the concrete. The housing, covering, or other protection used in connection with curing shall remain in place and intact at least 72 hours after the artificial heating is discontinued. No dependence shall be placed on salt or other chemicals for the prevention of freezing. The

approved practices for winter concreting shall be as outlined in ACI 306. The use of plastic ("Visqueen" or equal) covering will not be permitted.

C. Hot Weather Conditions: Protection against loss of moisture from the surface of the concrete shall be accomplished by keeping the surface continuously wet. One or more of the following methods shall be used:

1. Surface remaining in contact with the forms.

2. Covering with burlap or cotton mats kept continuously wet.

3. Covering with paper of suitable type.

4. Continuous sprinkling of the exposed surfaces.

5. Use of an impervious membrane consisting of approved liquid sealing compound applied in an atomized form after surface water has entirely disappeared but surface is still moist. Compounds shall form an effective seal which will prevent evaporation of moisture from concrete for the full curing period. Compound shall be approved by the Contracting Officer.

3.09 METAL REINFORCEMENT

A. Unless otherwise indicated, reinforcing steel shall be handled and placed in accordance with the recommendations of the Building Code Requirements, ACI 315. Steel reinforcement shall be fabricated to shapes and dimensions shown and shall conform to the requirements of ACI 318. Reinforcement shall be cold bent unless otherwise authorized. Bending may be accomplished in the field or at the mill. Bars shall not be bent after embedment in concrete. Safety caps shall be placed on all exposed ends of vertical concrete reinforcement bars that pose a danger to life safety.

B. Welded Wire Fabric: Welded wire fabric shall conform to ASTM A185 or ASTM A497.

C. Wire Ties: Wire ties shall be 16-gauge or heavier black annealed steel wire.

D. Cleaning, Straightening, and Rebending: Metal reinforcement at the time the concrete is placed, shall be free from rust, scale, or other coating that will destroy or reduce the bond. Metal reinforcement shall not be straightened or rebent without the approval of the Engineer. Bars may not be straightened by reheating. Bars with kinks or improperly fabricated shall not be used; they shall be returned to the fabricator and new material provided at no additional cost.

E. Placing Reinforcement: Metal reinforcement shall be accurately placed and adequately secured in position by wire ties and metal chairs and spacers in conformance with ACI 315, Chapter 7. Reinforcement shall be free from loose rust and scale, dirt, oil, or other deleterious coating that could reduce bond with the concrete. Reinforcement shall be placed in accordance with ACI 318 at locations shown plus or minus one bar diameter. Reinforcement shall not be continuous through expansion joints and shall be as indicated through construction or contraction joints. Concrete coverage shall be as indicated or as required by ACI 318. If bars are moved more than one bar diameter to avoid interference

with other reinforcement, conduits or embedded items, the resulting arrangement of bars, including additional bars required to meet structural requirements, shall be approved before concrete is placed.

F. In no case shall the clear distance between bars be less than 1 inch, nor less than 1 1/3 times the maximum size of the coarse aggregate.

G. Splices in Reinforcement: Splices of reinforcement shall conform to ACI 318 and shall be made only as required or indicated. Splicing shall be by lapping or by mechanical connection. Necessary splices not shown on drawings shall be lapped sufficiently to develop the strength of the bars by bond, and the bars shall be securely wired. Splices in adjacent bars shall be staggered. Adjacent sheets of wire mesh shall be lapped at least 6 inches and securely wired. The clear distance between bars shall also apply to the clear distance between a contact splice and adjacent contact splices or bars. Mechanical butt splices shall be in accordance with the recommendation of the manufacturer of the mechanical splicing device. Butt splices shall develop 125 percent of the specified minimum yield tensile strength of the spliced bars of the smaller bar in transition splices.

H. Supports: Bar supports for formed surfaces shall be designed and fabricated in accordance wit CRSI DA4 and shall be steel or precast concrete blocks. Precast concrete blocks shall be not less than 4 inches square when supporting reinforcement on ground. Precast concrete block shall have compressive strength equal to that of the surrounding concrete. Where concrete formed surfaces will be exposed to weather or where surfaces are to be painted, steel supports within ½ inch of concrete surface shall be plastic protected or of stainless steel. Concrete supports used in concrete exposed to view shall have the same color and texture as the finish surface. For slabs on grade, supports shall be precast concrete blocks, plastic coated steel fabricated with bearing plates, or specifically designed wire-fabric supports fabricated of plastic.

I. Welded-Wire Fabric: Welded-wire fabric shall be placed in slabs as indicated. Fabric placed in slabs on grade shall be continuous between expansion, construction, and contraction joints. Lap splices shall be made in such a way that the overlapped area equals the distance between the outermost crosswires plus 2 inches. Laps shall be staggered to avoid continuous laps in either direction. Fabric shall be wired or clipped together at laps at intervals not to exceed 4 feet. Fabric shall be positioned by the use of supports.

J. Dowels: Dowels shall be installed in slabs on grade at locations indicated and at right angles to joint being doweled. Dowels shall be accurately aligned parallel to the finished concrete surface and rigidly supported during concrete placement. One end of dowels shall be coated with a bond breaker.

3.10 DEFECTIVE MATERIALS AND/OR WORKMANSHIP

Concrete work which is not properly formed, true, plumb or level, or which fails to meet specified minimum compressive strength, shows poor workmanship, or contains foreign substances shall be deemed to be defective and shall be removed from the site as directed by the Contracting Officer, and replaced with new material, at no additional cost to the Owner.

3.11 JOINTS

A. Expansion joints between concrete slabs and joints that abut against vertical surfaces, and joints in walkways where indicated, shall have premolded joint filler strips ½ inch thick the full depth of the slab. Edges of joints shall be finished slightly rounded.

B. Construction joints not specifically indicated shall be so made and located so as to avoid any unnecessary impairment of the strength of the structure. Where a construction joint is to be made, the surface of the placed concrete shall be thoroughly cleaned and all laitance removed.

C. Construction joints not specifically indicated shall be provided in large slabs on grade by pouring each slab in alternate checkerboard sections approximately 625 square feet in area, or contraction joints may be sawed or formed by the insertion of fiber expansion joint strips after concrete has been placed. Sawed joints shall be cut approximately ¼ the thickness of the slab. Fiber joint strips shall be held in alignment with special metal forms designed for the purpose. The metal forms shall be removed after concrete has taken its initial set.

3.12 CONCRETE FINISHING

A. Rough Form Finish:

1. Provide as-cast rough form finish to formed concrete surfaces that are to be concealed in the finish work or by any other construction.

2. Standard rough form finish shall be the concrete surface having the texture imparted by the form facing material used, with tie holes and defective areas repaired and patched, and all fins and other projections exceeding ¼ inch in height rubbed down or chipped off.

B. Smooth Form Finish:

1. Provide as-cast rough form finish for formed concrete surfaces that are to be exposed to view, or that are to be covered with a coating material applied directly to concrete, or a covering material applied directly to concrete, such as waterproofing, dampproofing, painting, or other similar system.

2. Produce a smooth form finish by selecting form material to impart a smooth, hard, uniform texture and arranging them orderly and symmetrically with a minimum of seams.

3. Repair and patch defective areas with all fins and other projections completely removed and smoothed.

3.13 CONCRETE CURING AND PROTECTION

A. General: Protect freshly placed concrete from premature drying and excessive cold or hot temperatures. Start initial curing as soon as free water has disappeared from concrete

surface after placing and finishing. Weather permitting, keep continuously moist for not less than 7 days. Begin final curing procedures immediately following initial curing and before concrete has dried. Continue final curing for at least 7 days in accordance with ACI 301 procedures. Avoid rapid drying at end of final curing period.

B. Curing Methods: Perform curing of concrete by curing and sealing compound, by moist curing, by moisture-retaining cover curing, and by combinations thereof, as herein specified. Provide moisture curing by following methods:

1. Keep concrete surface continuously wet by covering with water.

2. Continuous water-fog spray.

3. Covering concrete surface with specified absorptive cover, thoroughly saturating cover with water and keeping continuously wet. Place absorptive cover to provide coverage of concrete surfaces and edges, with 4" lap over adjacent absorptive covers.

Provide moisture-cover curing as follows:

1. Cover concrete surfaces with moisture-retaining cover for curing concrete, placed in widest practicable width with sides and ends lapped at least 3" and sealed by waterproof tape or adhesive. Immediately repair any holes or tears during curing period using cover material and waterproof tape.

Provide curing and sealing compound to interior slabs with resilient flooring, carpet over cushion, or left exposed; and to exterior slabs, walks, and curbs, as follows:

1. Apply specified curing and sealing compound to concrete slabs as soon as final finishing operations are complete (within 2 hours). Apply uniformly in continuous operation by power-spray or roller in accordance with manufacturer's directions. Recoat areas subjected to heavy rainfall within 3 hours after initial application. Maintain continuity of coating and repair damage during curing period.

2. Do not use membrane curing compounds on surfaces which are to be covered with coating material applied directly to concrete, liquid floor hardener, waterproofing, dampproofing, membrane roofing, flooring (such as ceramic or quarry tile, glue-down carpet), painting, and other coatings and finish materials, unless otherwise acceptable to Contracting Officer.

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

D. Curing Unformed Surfaces: Cure unformed surfaces, such as slabs, floor topping, and flat surfaces by application of appropriate curing method.

1. Final cure concrete surfaces to receive liquid floor hardener or finish flooring by use of moisture-retaining cover, unless otherwise directed.

3.14 SEALER AND DUSTPROOFER

Apply a second coat of specified curing and sealing compound only to surfaces given a first coat.

3.15 OVERLOADING

No part of the work shall be overloaded by placing materials thereon before concrete has attained sufficient hardness to support same. Contractor will be held responsible for all overloading.

END OF SECTION

SECTION 03302

FIELD CONCRETE

PART I - GENERAL

1.01 WORK INCLUDED

A. This section of the specifications covers all concrete and all related items necessary to place and finish the concrete work designated as Field Concrete or Fill Concrete.

1.02 RELATED WORK

Section 02200 - Earthwork

1.03 REFERENCES

The following standards form a part of this specification:

American Concrete Institute (ACI)

ACI 305	Recommended Practice for Hot Weather Concreting
ACI 306	Recommended Practice for Cold Weather Concreting
ACI 315	Details and Detailing of Concrete Reinforcement
ACI 318	Building Code Requirements for Reinforced Concrete

American Society for Testing and Materials (ASTM)

ASTM C33	Concrete Aggregates
ASTM C40	Test for Organic Impurities in Fine Aggregates for Concrete
ASTM C94	Ready-Mixed Concrete
ASTM C143	Test for Slump of Portland Cement Concrete
ASTM C150	Portland Cement
ASTM C260	Air Entraining Admixtures for Concrete
ASTM A615	Deformed and Plain Billet-Steel Bars for Concrete Reinforcement

1.04 SUBMITTALS

Six (6) copies of the statement of materials constituting the design of mixes for each size aggregate as required by ASTM C94 shall be submitted to the Engineer within one week following award of the Contract.

PART 2 - PRODUCTS

2.01 CONCRETE

A. All concrete, reinforced or non-reinforced shall have a 28-day compressive strength of 3,000 psi unless otherwise noted on the design drawings. A minimum of 6 sacks of cement per cubic yard and a maximum water cement ratio of 5.5 gallons per sack shall be used.

B. Concrete shall conform to ASTM C94. The Contractor shall be responsible for the design of the concrete mixtures. Slump shall be a maximum of 4 inches and a minimum of 2 inches, determined in accordance with ASTM C143.

C. No additional admixtures shall be used unless approved by the Engineer.

D. No additional water, except for the amount indicated by the design mix shall be added to the concrete without the prior permission of the Engineer.

E. The use of calcium chloride is not permitted.

2.02 REINFORCING

Reinforcing shall conform to ACI 315, 318, and ASTM A615. All steel reinforcing bars shall be Grade 60. All reinforcing bars shall be cold bent in accordance with the proper radii established by ACI.

2.03 CEMENT

The cement shall be an approved brand of American manufactured Portland Cement, Type II conforming to the applicable requirements of ASTM C150.

2.04 AGGREGATES

A. Except as otherwise noted, aggregate shall conform to the requirements of ASTM C33.

B. Maximum size aggregate shall be 3/4-inch.

C. Fine aggregate shall conform to ASTM C40.

2.05 ADMIXTURES

A. All concrete (unless otherwise directed) shall contain an air entraining agent. Air entrained concrete shall have air content by volume of 4% to 8% for 3/4-inch aggregate.

B. Air entraining agent shall be in accordance with ASTM C260.

PART 3 - EXECUTION

3.01 PREPARATION

A. Before placing concrete, forms and the space to be occupied by the concrete shall be thoroughly cleaned, and reinforcing steel and embedded metal shall be free from dirt, oil, mill scale, loose rust, paint or the material which would tend to reduce the bond.

B. Earth, concrete, masonry, or other water permeable material against which concrete is to be placed shall be thoroughly saturated with water immediately before concrete is placed.

C. No concrete shall be placed until the consolidation of the ground and the arrangement and details of forms and reinforcing have been inspected and approved by the Engineer.

3.02 FILL CONCRETE

A. Fill concrete shall be placed in those locations as indicated on the design drawings. Fill concrete shall consist of materials as previously specified but shall have a minimum of 28-day compressive strength of 3,000 psi.

B. Before fill concrete is placed the following procedures shall be used to prepare surfaces; all dirt, scum and laitance shall be removed by chipping and washing. The clean, roughened base surface shall be saturated with water, but shall have no free water on the surface. A coat of 1:2 cement-sand grout, approximately 1/8-inch thick, shall be well scrubbed into the thoroughly dampened concrete base. The concrete fill shall be placed immediately, before grout has dried or set.

C. Fill concrete shall be brought to lines and grades as shown on the design drawings.

3.03 CONCRETE PLACING DURING COLD WEATHER

A. Concrete shall not be placed on frozen ground, and no frozen material or material containing ice shall be used. Materials for concrete shall be heated when temperature is below 40 degrees F, or is expected to fall to below 40 degrees F within 73 hours, and the concrete after placing shall be protected by covering, heat, or both.

B. All details of Contractor's handling and protecting of concrete during freezing weather shall be subject to the approval and direction of the Engineer. All procedures shall be in accordance with provisions of ACI 306.

3.04 CONCRETE PLACING DURING HOT WEATHER

A. Concrete just placed shall be protected from the direct rays of the sun and the forms and reinforcement just prior to placing, shall be sprinkled with cold water. The Contractor shall make every effort to minimize delays which will result in excessive mixing of the concrete after arrival on the job.

B. During periods of excessively hot weather (90 degree F or above), ingredients in the concrete shall be cooled insofar as possible and cold mixing water shall be used to maintain the temperature of the concrete at permissible levels all in accordance with the provisions of ACI 305. Any concrete with a temperature above 90 degree F, when ready for placement, will not be acceptable, and will be rejected.

3.05 FIELD QUALITY CONTROL

A. Concrete inspection and testing shall be performed by the Engineer or by an inspection laboratory, designated by the Engineer, engaged and paid for by the Contractor.

B. Quality Control / Quality Acceptance Testing and Inspection shall be done in accordance with SECTION 01600 MATERIAL TESTING & INSPECTION.

C. Testing equipment shall be supplied by the laboratory, and the preparation of samples and all testing shall be performed by the laboratory personnel. Full assistance and cooperation, concrete for samples, and such auxiliary personnel and equipment as needed shall be provided by the Contractor.

D. Slump and Air Content Testing shall be done during the placement of concrete at a frequency as specified in SECTION 01600 MATERIAL TESTING & INSPECTION.

E. A minimum of four compression test cylinders shall be made and tested for each 100 cubic yards of each type and design strength of concrete placed. Two cylinders shall be tested at 7 days, and two at 28 days. If job experience indicates additional cylinder tests or other tests are required for proper control or determination of concrete quality, such tests shall be made.

F. The Engineer shall have the right to reject concrete represented by low strength tests. Rejected concrete shall be promptly removed and replaced with concrete conforming to the specification. The decision of the Engineer as to whether substandard concrete is to be accepted or rejected shall be final.

END OF SECTION

SECTION 04100

MORTAR AND GROUT

PART 1 - GENERAL

1.01 DESCRIPTION:

Section specifies mortar and grout materials and mixes.

1.02 RELATED WORK:

A. Mortar used in Section:

1. Section 02620 – HIGH DENSITY POLYETHYLENE DRAINAGE PIPE

2. Section 02625 – PVC GRAVITY PIPE AND FITTINGS

3. Section 02601 – CATCH BASINS AND MANHOLES

4. Section 03302 – FIELD CONCRETE

1.03 TESTING LABORATORY-CONTRACTOR RETAINED:

A. Engage a commercial testing laboratory approved by Resident Engineer to perform tests specified below.

B. Submit information regarding testing laboratory's facilities and qualifications of technical personnel to Resident Engineer.

1.04 TESTS:

A. Test mortar, grout, and materials specified.

B. Certified test reports.

C. Identify materials by type, brand name and manufacturer or by origin.

D. Do not use materials until laboratory test reports are approved by Resident Engineer.

E. After tests have been made and materials approved, do not change without additional test and approval of Resident Engineer.

F. Testing:

1. Test materials proposed for use for compliance with specifications in accordance with test methods contained in referenced specifications and as follows:

2. Mortar:

a. Test for compressive strength and water retention; ASTM C780.

b. Mortar compressive strengths 28 days as follows:

Type M: Minimum 17230 kPa (2500 psi) at 28 days.

Type S: Minimum 12400 kPa (1800 psi) at 28 days.

Type N: Minimum 5170 kPa (750 psi) at 28 days

3. Grout:

a. Test for compressive strength; ASTM C1019.

b. Grout compressive strength of 13790 kPa (2000 psi) at 28 days.

4. Cement:

a. Test for water soluble alkali (non-staining) when non-staining cement is specified.

b. Non-staining cement shall contain not more than 0.03 percent water soluble alkali.

5. Sand: Test for deleterious substances, organic impurities, soundness and grading.

6. High Bond Mortar: Test for compressive strength, tensile strength, flexural strength, and brick bond strength.

G. During progress of work, testing laboratory specified in Section TESTING LABORATORY SERVICES, takes and tests samples as specified in that section. Testing procedures and test methods in ASTM C780.

1.05 SUBMITTALS:

A. Submit in accordance with Section 01340, SAMPLES AND SHOP DRAWINGS.

B. Certificates:

1. Testing laboratory's facilities and qualifications of its technical personnel.

2. Indicating that following items meet specifications:

a. Portland cement

b. Masonry cement

c. Mortar cement

d. Hydrated lime

e. Fine aggregate (sand).

f. Coarse aggregate for grout.

g. Color admixture

C. Laboratory Test Reports:

1. Mortar, each type.

2. Grout, each type.

3. Admixtures.

D. Manufacturer's Literature and Data:

1. Cement, each kind.

2. Hydrated lime.

3. Admixtures.

4. Liquid acrylic resin.

1.06 PRODUCT DELIVERY, STORAGE AND HANDLING:

A. Deliver masonry materials in original sealed containers marked with name of manufacturer and identification of contents.

B. Store masonry materials under waterproof covers on planking clear of ground, and protect damage from handling, dirt, stain, water and wind.

1.07 APPLICABLE PUBLICATIONS:

A. Publications listed below form a part of specification to extent referenced. Publications are referenced in text by basic designation only.

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

C40-04 Organic Impurities in Fine Aggregates for Concrete

C91-03 Masonry Cement

C109-02 Compressive Strength of Hydraulic Cement Mortars (Using 2-in. or 50-MM Cube Specimens)

C144-03 Aggregate for Masonry Mortar

C150-04 Portland Cement

C207-04 Hydrated Lime for Masonry Purposes

C270-03 Mortar for Unit Masonry

C307-03	Tensile Strength of Chemical - Resistant Mortar, Grouts, and Monolithic Surfacing
C321-00	Bond Strength of Chemical-Resistant Mortars
C348-02	Flexural Strength of Hydraulic Cement Mortars
C404-03	Aggregate for Masonry Grout
C476-02	Grout for Masonry
C595-03	Blended Hydraulic Cement
C780-02	Preconstruction and Construction Evaluation of Mortars for Plain and Reinforced Unit Masonry
C979-99	Pigments for Integrally Colored Concrete
C1019-03	Sampling and Testing Grout
C1329-04	Mortar Cement

PART 2 - PRODUCTS

2.01 HYDRATED LIME:

ASTM C207, Type S.

2.02 AGGREGATE FOR MASONRY MORTAR:

A. ASTM C144 and as follows:

1. Light colored sand for mortar for laying face brick.

2. White plastering sand meeting sieve analysis for mortar joints for pointing and laying of structural facing tile units except that 100 percent passes No. 8 sieve, and not more than 5 percent retained on No. 16 sieve.

B. Test sand for color value in accordance with ASTM C40. Sand producing color darker than specified standard is unacceptable.

2.03 AGGREGATE FOR MASONRY GROUT:

ASTM C404, Size 8.

2.04 BLENDED HYDRAULIC CEMENT:

ASTM C595, Type IS, IP, I (PM).

2.05 MASONRY CEMENT:

A. ASTM C91. Type N, S, or M.

B. Use white masonry cement whenever white mortar is specified.

2.06 MORTAR CEMEMT:

ASTM C1329, Type N, S or M.

2.07 PORTLAND CEMENT:

A. ASTM C150, Type I.

B. Use white Portland cement wherever white mortar is specified.

2.08 LIQUID ACRYLIC RESIN:

A formulation of acrylic polymers and modifiers in liquid form designed for use as an additive for mortar to improve physical properties.

2.09 WATER:

Water shall be potable, free of substances that are detrimental to mortar, masonry, and metal.

2.10 POINTING MORTAR:

A. For Cast Stone or Precast Concrete: Proportion by volume; one part white Portland cement, two parts white sand, and 1/5 part hydrated lime.

B. Pointing Mortar for Glazed Structural Facing Tile:

1. Proportion by volume: One part white Portland cement, two parts of graded white sand passing Number 50 sieve, and 1/8 part hydrated lime.

2. Pointing mortar in shower: Add aluminum tri-stearate, calcium stearate, or ammonium stearate in amount of two percent of weight of cement used.

2.11 MASONRY MORTAR:

A. Conform to ASTM C270.

B. Admixtures:

1. Do not use mortar admixtures, except for high bond mortar, and color admixtures unless approved by RESIDENT ENGINEER.

2. Submit laboratory test report showing effect of proposed admixture on strength, water retention, and water repellency of mortar.

3. Do not use antifreeze compounds.

C. Colored Mortar:

1. Maintain uniform mortar color for exposed work throughout.

2. Match mortar color in approved sample or mock-up.

D. Color Admixtures:

1. Proportion as specified by manufacturer.

2.12 HIGH BOND MORTAR:

A. Mixture by volume, one-part Portland cement, and 1/4-part hydrated lime, three-parts sand, water, and liquid acrylic resin.

B. Mortar properties when tested in accordance with referenced specifications.

1. Compressive Strength, ASTM C109: Minimum 19,305 kPa (2800 psi), using 50 mm (2 inch) cubes.

2. Tensile Strength, ASTM C307: 3861 kPa Minimum (560 psi), using the 25mm (1 inch) briquettes.

3. Flexural Strength, ASTM C348: Minimum 6067 kPa (880 psi), using flexural bar.

4. Bond Strength, ASTM C321: Minimum 2965 kPa (430 psi), using crossed brick.

2.13 GROUT:

A. Conform to ASTM C476 except as specified.

B. Grout type proportioned by volume as follows:

1. Fine Grout:

a. Portland cement or blended hydraulic cement: one part.

b. Hydrated lime: 0 to 1/10 parts.

c. Fine aggregate: 2-1/4 to three times sum of volumes of cement and lime used.

2. Coarse Grout:

a. Portland cement or blended hydraulic cement: one part.

b. Hydrated lime: 0 to 1/10 parts.

c. Fine aggregate: 2-1/4 to three times sum of volumes of cement and lime used.

d. Coarse aggregate: one to two times sum of volumes of cement and lime used.

3. Sum of volumes of fine and coarse aggregates: Do not exceed four times sum of volumes of cement and lime used.

2.14 COLOR ADMIXTURE:

A. Pigments: ASTM C979.

B. Use mineral pigments only. Organic pigments are not acceptable.

C. Pigments inert, stable to atmospheric conditions, non-fading, alkali resistant and water insoluble.

PART 3 - EXECUTION

3.01 MIXING:

A. Mix in a mechanically operated mortar mixer.

1. Mix mortar for at least three minutes but not more than five minutes.

2. Mix grout for at least five minutes.

B. Measure ingredients by volume. Measure by the use of a container of known capacity.

C. Mix water with dry ingredients in sufficient amount to provide a workable mixture which will adhere to vertical surfaces of masonry units.

D. Mix water with grout dry ingredients in sufficient amount to bring grout mixture to a pouring consistency.

E. Mortar that has stiffened because of loss of water through evaporations:

1. Re-tempered by adding water to restore to proper consistency and workability.

2. Discard mortar that has reached its initial set or has not been used within two hours.

F. Pointing Mortar:

1. Mix dry ingredients with enough water to produce a damp mixture of workable consistency which will retain its shape when formed into a ball.

2. Allow mortar to stand in dampened condition for one to 1-1/2 hours.

3. Add water to bring mortar to a workable consistency prior to application.

3.02 MORTAR USE LOCATION:

A. Use Type M mortar for precast concrete panels, and waterproof parging below grade, and engineered reinforced unit masonry work.

B. Use Type S mortar for masonry containing vertical reinforcing bars (non-engineered), masonry below grade, masonry solar screens and setting cast stone.

C. For brick veneer over frame back up walls, use Type N portland cement-lime mortar or Type S masonry cement or mortar cement mortar.

D. Use Type N mortar for other masonry work, except as otherwise specified.

E. Use Type N mortar for tuck pointing work.

F. Use pointing mortar for items specified.

3.03 GROUT USE LOCATIONS:

A. Use fine grout for filling wall cavities and cells of concrete masonry units where the smallest dimension is 50 mm (2 inches) or less.

B. Use either fine grout or coarse grout for filling wall cavities and cells of concrete masonry units where the smallest dimension is greater than 50 mm (2 inches).

C. Do not use grout for filling bond beam or lintel units.

END OF SECTION

SECTION 05500

METAL FABRICATIONS

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 work of this section.

1.02 DESCRIPTION OF WORK

A. This specification covers all labor, materials, and equipment operations to be provided for the fabrication and installation of all shop fabricated metal items including, but not limited to, the following:

1. Miscellaneous metal items as specified or indicated on the drawings.

2. Bolts, brackets, fastenings, and rough hardware for this work.

3. Cutting, fitting, drilling, and tapping this work for other trades.

4. Prime painting and galvanizing work.

5. Steel grating, plates, and supporting steel.

B. Extent of metal fabrications is indicated on drawings and schedules.

1.03 REFERENCES

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

ASTM A 36 Specification for Structural Steel

ASTM A 500 Specification for Hot-Formed Welded and Seamless Carbon Steel Structural Tubing

ASTM A 53 Specification for Pipe, Steel Black, and Hop-Dipped Zinc Coated Welded and Seamless

ASTM A 108 Specification for Steel Bars, Carbon, Cold-Finished, Standard Quality

ASTM A 48 Specification for Gray Iron Castings

ASTM A 153 Specification for Zinc Coating on Iron and Steel Hardware

ASTM A 307 Specification for Carbon Steel Bolts and Studs

ASTM A 569 Specification for Steel, Carbon (0.15 Maximum, Percent), Hot-Rolled Sheet and Strip, Commercial Quality

B. American Welding Society (AWS):

AWS D1.1 Structural Welding Code Standard

C. Federal Specifications (FS):

FS-RR-G-1602 (Rev. C.) Grating, Metal, Other Than Bar Type

FS-FF-S-325 (Basic: Int Am 3; Notice 1) Shield, Expansion; Nail, Expansions: and Nail, Drive Screw (Devices, Anchoring, Masonry).

FS-FF-B-561 (Rev C) Bolts, (Screw), Lag

FS-FF-W-84 (Rev A; Am 3) Washers, Lock (Spring)

FS-FF-W-92 (Rev B) Washer, Flat (Plain)

1.04 QUALITY ASSURANCE

A. Preassemble items in shop to greatest extent possible to minimize field splicing and assembly. Disassemble units only as necessary for shipping and handling limitations. Clearly mark units for reassembly and coordinated installation.

B. Qualify welders in accordance with AWS D1.1 using procedures, materials and equipment of the type required for the work.

1.05 SUBMITTALS

A. Product Data: Submit manufacturer's specifications, anchor details and installation instructions for products used in miscellaneous metal fabrications, including paint products and grout.

B. Shop Drawings: Submit shop drawings of fabricated work showing details of construction and placement including hardware, fittings and fastenings. The manufacturer’s standard drawings may be submitted in lieu of especially prepared shop drawings, if the manufacturer’s standard drawings show the required details. Approval of the shop drawings or manufacturer’s standard drawings will not relieve the Contractor of any responsibility for accuracy of dimensions and detail.

C. Where materials or fabrications are indicated to comply with certain requirements for design loadings, include structural computations, material properties and other information needed for structural analysis. All stairs to be designed and detailed in accordance with Building Code requirements. Submit calculations

and drawings sealed by a registered professional structural engineer in the State .

D. Samples: Submit 2 sets of representative samples of materials and finished products as may be requested by Engineer.

E. Certificates: Submit notarized certificate from manufacturer of steel gratings certifying that gratings are capable of supporting AASHTO loading as indicated.

1.06 DELIVERY, STORAGE AND PROTECTION

Protect from corrosion, deformation and other types of damage. Store items in an enclosed area free from contact with soil and weather. Remove and replace damaged items with new items.

PART 2 - PRODUCTS

Unless otherwise specified on the drawings and specifications, all steel shall be ASTM A 36 and all thinner sections (under 3/16" thick) ASTM A 569.

2.01 STEEL TUBING

Hot-formed, welded, or seamless: ASTM A 501.

2.02 FASTENERS

A. All fasteners shall be hot-dip zinc-coated per ASTM A 153.

B. Bolts and nuts: Regular hexagon-head type, ASTM A 307, Grade A for hand rails.

C. Lag bolts: Square-head type, Fed. Spec. FF-B-561.

D. Plain washers: Round, carbon steel, Fed. Spec. FF-W-92.

E. Masonry anchorage devices: Expansion shields, Fed. Spec. FF-S-325.

F. Lock washers: Helical spring type carbon steel, Fed. Spec. FF-W-84.

2.03 GRATINGS

A. Steel angles: ASTM A 36.

B. Gratings: FS-RR-G-1602.

2.04 WELDING MATERIALS

AWS D1.1, materials and equipment of the type required for materials being welded.

2.05 TOUCH-UP PRIMER FOR GALVANIZED SURFACES

Repair surfaces of zinc coating that have been damaged, during delivery, storage or installation, by thoroughly wire brushing the damaged areas and removing all loose and cracked zinc coating, then paint the cleaned areas with two coats of zinc dust, zinc oxide primer. Touch up zinc dust coated surfaces with the same material as the coating.

PART 3 - EXECUTION

3.01 FINISH/PAINTING

All steel items and hardware shall be hot-dip galvanized.

3.02 CLEAN UP

Debris shall be removed and transported off site in a manner that prevents spillage on streets or adjacent areas. Local regulations regarding hauling and disposal or recycling shall apply.

END OF SECTION

Appendix A

NHDES Shoreland Permits

The State of New Hampshire
Department of Environmental Services

Robert R. Scott, Commissioner

August 19, 2021

TOWN OF WOLFEBORO & WENTHWORTH WATERSHED ASSOC
PO BOX 629
WOLFEBORO NH 03894

Re: Accepted Shoreland Permit by Notification (RSA 483-B)
NHDES File Number: 2021-02663
Subject Property: 693 Gov Wentworth Hwy, Wolfeboro, Tax Map #000182, Lot #000010

Dear Applicant:

On August 18, 2021, the New Hampshire Department of Environmental Services (NHDES) Shoreland Program received the above-referenced Shoreland Permit by Notification (SPBN). In accordance with RSA 483-B:5-b, I and Env-Wq 1406.19, on August 19, 2021, the NHDES accepted the SPBN. The enclosed SPBN form is your permit. Any individual conducting work under this permit is advised to post a copy of the enclosed SPBN form on site in a prominent location, visible to inspecting personnel, at all times during construction.

Only the impacts shown on the submitted plans and accepted by NHDES as part of the SPBN are authorized under RSA 483-B. Any and all impacts not shown on the accepted plans or permitted through another SPBN or Shoreland Permit Application will render this SPBN invalid and will be in violation of RSA 483-B.

Please note that this SPBN cannot be amended. Prior to any change to the size or location of the proposed impacts, please contact me at Peter.J.Conti@des.nh.gov or (603) 271-0872 to determine the appropriate method to obtain any additional approval under RSA 483-B:5-b as may be required. Please do not hesitate to contact me as noted above if you have additional questions.

Sincerely,

Peter J. Conti
Shoreland/Shoreline Specialist, Shoreland Program
Wetlands Bureau, Land Resources Management
Water Division

Enclosure

cc: Nick Shaw, Comprehensive Environmental Inc
Municipal Clerk

NHDES-W-06-039

SHORELAND PERMIT BY NOTIFICATION (PBN) NOTIFICATION FORM

Water Division/Land Resources Management

Shoreland Program

Check the Status of your PBN

RSA/Rule: RSA 483-B/Env-Wq 1400

RECEIVED
Administrative Use Only
AUG 19 2021
NHDES
LAND RESOURCES MANAGEMENT

Administrative Use Only

☑ PBN Accepted, Expires: 8/18/2026	
☐ PBN Rejected	Reviewer's Initials: PJC
File No.: 2021-02663	Admin's Initials: RS
Check No.: 26441	Amount: $ 200.00

This form requests authorization to excavate, fill, or construct new structures within the protected shoreland, which is 250 feet landward of the reference line of public waters, as regulated under RSA 483-B. Refer to the cover sheet to determine your eligibility to use this form in lieu of the standard Shoreland Permit Application. **Please note:** Notification packages missing required components will be rejected and the fee will not be returned.

SECTION 1 - PROPERTY OWNER (RSA 483-B:5-b; Env-Wq 1406.17)			
LAST NAME, FIRST NAME, M.I.: Town of Wolfeboro & Wentworth Watershed Association			
MAILING ADDRESS: PO Box 629	TOWN/ CITY: Wolfeboro	STATE: NH	ZIP CODE: 03894
PHONE: 603-569-5970	EMAIL: planningdirector@wolfeboronh.us		
SECTION 2 - PROJECT LOCATION (RSA 483-B:5-b; Env-Wq 1406.17)			
ADDRESS: 693 GOV WENTWORTH HWY	TOWN/ CITY: Wolfeboro	STATE: NH	ZIP CODE: 03894
WATERBODY NAME: Lake Wentworth	TAX MAP/ LOT: MAP: 000182 LOT: 000010		
SECTION 3 - CONTRACTOR OR AGENT (Env-Wq 1406.17)			
LAST NAME, FIRST NAME, M.I: Shaw, Nick			
MAILING ADDRESS: 21 Depot Street	TOWN/ CITY: Merrimack	STATE: NH	ZIP CODE: 03054
PHONE: 603-424-8444	EMAIL: nshaw@ceiengineers.com		
SECTION 4 - PROJECT DESCRIPTION (Env-Wq 1406.17)			

Provide a **brief** description of the proposed project including square footage of impacts and dimensions of new structures.

The application is for a permit to perform a water quality improvement project funded through the NHDES Watershed Assistance Grant program by performing minor excavation, grading and installation of stormwater control measures along the shore of Lake Wentworth above the reference line and within previously disturbed areas.

TOTAL SQUARE FEET OF IMPACT: 7,765 TOTAL SQUARE FEET OF NET CHANGE IN IMPERVIOUS AREA: 0

Total impact area is determined by the sum of all areas disturbed by excavation, fill, and construction. Examples include, but are not limited to: constructing new driveways, constructing new structures, removing or replacing structure foundations, grading, and installing a new septic system or well.

SECTION 5 - PBN CRITERIA (RSA 483-B:5-b; Env-Wq 1406.05)
Check one of the following project type criteria.

☐ 1. This project impacts less than 1,500 square feet in total, with a net increase in impervious area, if any, of no more than 900 square feet. *PBN Impact Limit: 1,500 square feet/ Fee: $400.*

☒ 2. This project is proposed for the purpose of stormwater management improvements, erosion control, or environmental restoration or enhancement. *PBN Impact Limit: None/ Fee: $200.*

☐ 3. The project is for the maintenance, repair, and improvement of public utilities, public roads, and public access facilities. *PBN Impact Limit: None/ Fee: $400.*

☐ 4. The project consists of geotechnical borings, test wells, drinking water wells or is a site remediation project and meets the requirements of Env-Wq 1406.05. *PBN Impact Limit: None / Fee: $400.*

SECTION 6 - FEE (RSA 483-B:5-b; Env-Wq 1406.16)

Consult Section 5 to determine fee. Make checks and money orders payable to "Treasurer - State of NH". Undated checks **cannot** be accepted. TOTAL FEE: $200

SECTION 7 - PHOTOS (RSA 483-B:5-b; Env-Wq 1406.16)

☒ Dated photographs of each area proposed to be impacted are required for all projects.

SECTION 8 - PLAN REQUIREMENTS (RSA 483-B:5-b; Env-Wq 1406.16)
Check YES or NO to **all** statements, and review the applicable plan requirements. If your plans do not include the information that is required, your notification will be rejected.

☒ YES		**Required for all projects:** A clear and detailed plan of work depicting, at a minimum, all impact areas, the reference line, and property lines. Plans that are not to scale must show all relevant dimensions and distances from the reference line and dimensions.
☐ YES ☒ NO		This project proposes an increase in impervious (i.e. non-permeable) area. Plans must include the dimensions and locations of **all** existing and proposed impervious surfaces on the lot that are within 250 feet of the reference line. Decks are typically considered impervious.
☐ YES ☐ NO	< 20%	This project proposes an increase in impervious area, and the total post-construction impervious area on the lot within 250 feet of the reference line will not exceed 20%.
☐ YES ☐ NO	20 – 30%	This project proposes an increase in impervious area such that the total impervious area of the lot within 250 feet of the reference line will be greater than 20% but less than 30%. Plans must include a stormwater management system that will infiltrate increased stormwater runoff from development per RSA 483-B:9, V(g)(2) and in accordance with Env-Wq 1500.
☐ YES ☐ NO	> 30%	This project proposes an increase in impervious area such that the total impervious area on the lot within 250 feet of the reference line will be greater than 30%. Plans must include a stormwater management system designed and certified by a professional engineer to account for all new development, **and** plans must demonstrate how the vegetation point score is met per RSA 483-B:9, V(g)(1,3).
☒ YES ☐ NO		This project proposes impacts within 50 feet of the reference line. Plans and photos must show each area of the waterfront buffer that will be impacted, including groundcover, and calculate the tree and sapling point scores in accordance with the Vegetation Management Fact Sheet.
☒ YES ☐ NO		This project proposes impacts between 50 and 150 feet of the reference line. Plans must depict the 25% area of the woodland buffer to be designated and maintained as natural woodland. See the Vegetation Management Fact Sheet.

☐ YES ☒ NO	This project proposes to install or expand an accessory structure, such as a patio or shed, within 50 feet of the reference line. All plans *must* demonstrate that the height, size, and setback limitations for accessory structures will be met. These limitations are described within the Accessory Structure Fact Sheet. The shoreland frontage on this lot is: linear feet. ☐ N/A – There is no direct frontage on this lot.
☐ YES ☒ NO	This project proposes a pervious (i.e. permeable) surface technology. Plans must include the location and type of the surface and a cross-section depicting the construction method, materials, and specifications as to how this surface will be maintained as a pervious technology. The notification must also include a maintenance plan describing how the surfaces will be maintained pervious.

SECTION 9 - CONDITIONS (Env-Wq 1406.20; RSA 483-B:9, V, (d))
Initial each of the required conditions below.

NS 1. Erosion and siltation control measures shall: be installed prior to the start of work; be maintained throughout the project; and remain in place until all disturbed surfaces are stabilized.

NS 2. Erosion and siltation controls shall be appropriate to the size and nature of the project and to the physical characteristics of the site, including slope, soil type, vegetative cover, and proximity to wetlands or surface waters.

NS 3. No person undertaking any activity in the protected shoreland shall cause or contribute to, or allow the activity to cause or contribute to, any violations of the surface water quality standards established in Env-Ws 1700 or successor rules in Env-Wq 1700.

NS 4. Any fill used shall be clean sand, gravel, rock, or other suitable material.

NS 5. For any project where mechanized equipment will be used, orange construction fence shall: be installed prior to the start of work at the limits of the temporary impact area as shown on the plans approved as part of a permit or accepted as part of the permit by notification; be maintained throughout the project; and remain in place until all mechanized equipment has been removed from the site.

SECTION 10 - CERTIFICATIONS (Env-Wq 1406.18)
Initial each of the required certifications below.

NS 1. The property owner shall sign the notification form below.

NS 2. The signature(s) shall constitute certification that: the information provided is true, complete, and not misleading to the knowledge and belief of the signer; the signer understands that any permit by notification obtained based on false, incomplete, or misleading information is not valid; the project as proposed complies with the minimum standards established in RSA 483-B:9, V and will be constructed in strict accordance with the proposal; the signer accepts the responsibility for understanding and maintaining compliance with RSA 483-B and these rules; the signer understands that an accepted shoreland permit by notification shall not exempt the work proposed from other state, local, or federal approvals; the signer understands that incomplete notifications shall be rejected and the notification fee shall not be returned; and the signer is subject to the applicable penalties in RSA 641, *Falsification In Official Matters*.

NS 3. The signature of the property owner certifies that the property owner has authorized the agent to act on the property owner's behalf for purposes of the notification. (☐ Not Applicable)

SECTION 11 - REQUIRED SIGNATURE (RSA 483-B:5-b; Env-Wq 1406.18)

SIGNATURE (OWNER): Gregory Pierce, REB.	PRINT NAME LEGIBLY: Gregory C. Pierce	DATE: 8.9.21
SIGNATURE (AGENT, IF APPLICABLE): Nicholas Shaw	PRINT NAME LEGIBLY: Nicholas Shaw	DATE: 8/9/21

Appendix B

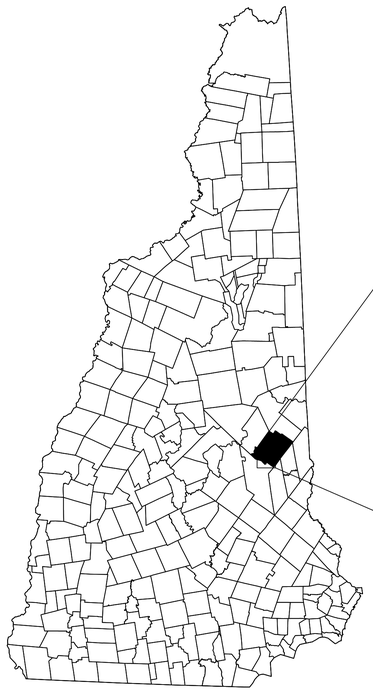
NHDES Wetland Permits

Wetland Permit will be provided by the Town to the selected contractor

TOWN OF WOLFEBORO

LAKE WENTWORTH/CRESCENT LAKE WATERSHED MANAGEMENT PLAN - PHASE IV
CAMP PIERCE BIRCHMONT
WOLFEBORO, NH

AUGUST 2021



LOCUS SCALE 1" = 600'

SHEET	TITLE
C-1	EXISTING CONDITIONS
C-2	PROPOSED CONDITIONS
C-3	PERCHED BEACH PROFILE
D-1	EROSION CONTROL DETAILS
D-2	PROJECT DETAILS
D-3	PROJECT DETAILS

COMPREHENSIVE ENVIRONMENTAL INCORPORATED • MERRIMACK, NEW HAMPSHIRE

GENERAL NOTES

No.	Revision/Issue	Date

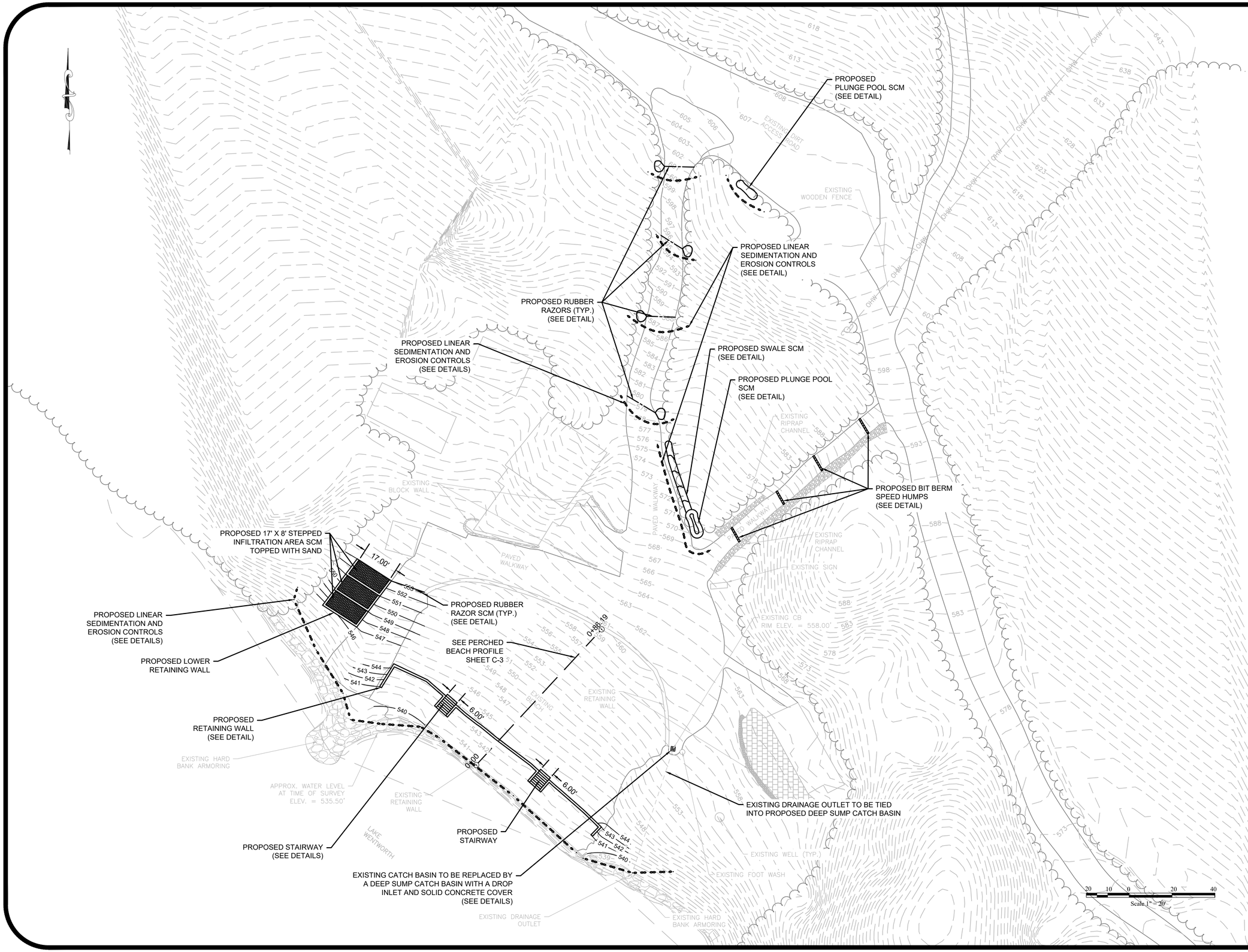
COMPREHENSIVE ENVIRONMENTAL INCORPORATED

21 Depot Street
MERRIMACK, NH 03054

EXISTING CONDITIONS PLAN VIEW

Town of Wolfeboro, NH

Project No.: 219-15 Date: 11/17/2020	Sheet
Drawn By: NBS Checked By: ML	C-1
Scale: AS NOTED	



GENERAL NOTES

No.	Revision/Issue	Date

COMPREHENSIVE ENVIRONMENTAL INCORPORATED

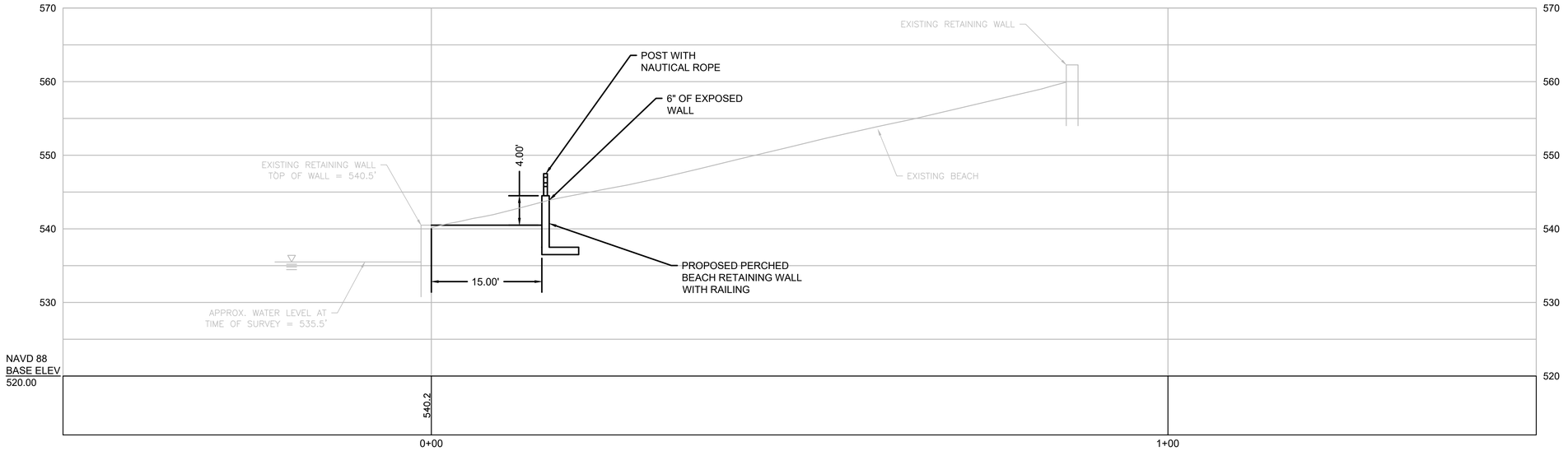
21 Depot Street
MERRIMACK, NH 03054

PROPOSED CONDITIONS PLAN VIEW

Town of Wolfeboro, NH

Project No.: 219-15	Sheet
Date: 12/30/2020	C-2
Drawn By: NBS	
Checked By: ML	
Scale: AS NOTED	

PERCHED BEACH - ALTERNATIVE 1



8 4 0 8 16

Scale 1" = 8'

GENERAL NOTES

No.	Revision/Issue	Date

COMPREHENSIVE ENVIRONMENTAL INCORPORATED

21 Depot Street
MERRIMACK, NH 03054

PERCHED BEACH
PROFILE

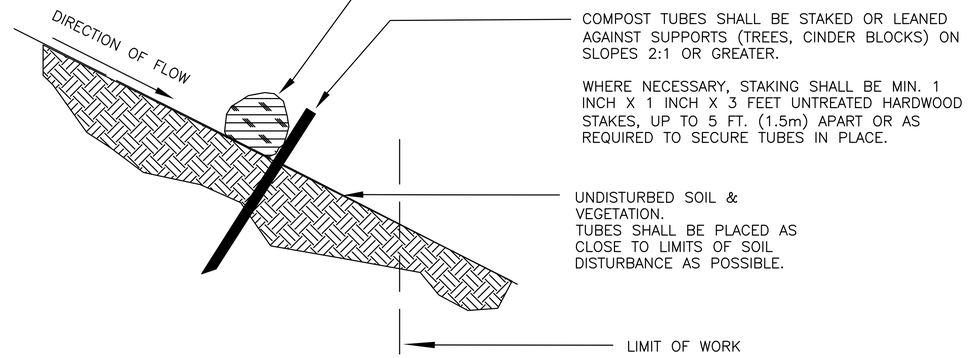
Town of Wolfeboro, NH

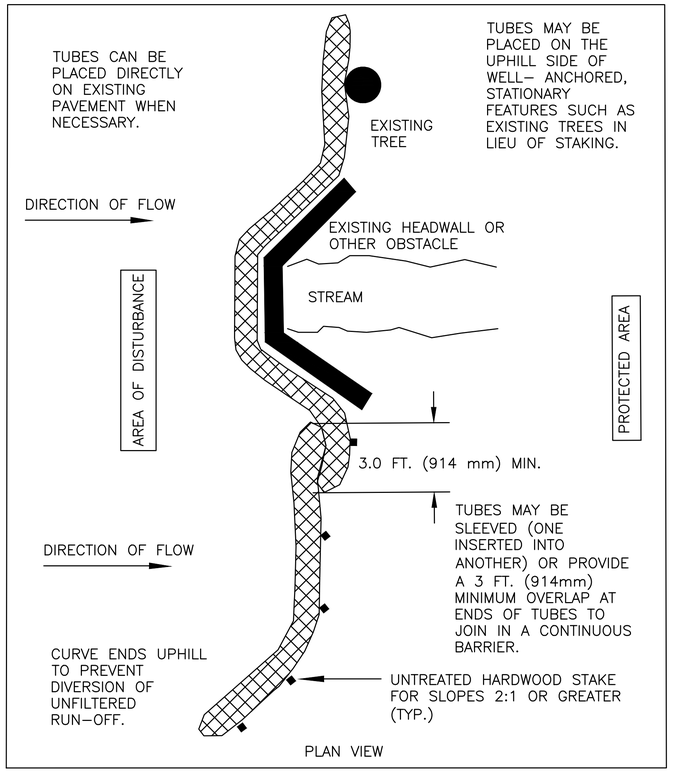
Project No.: 219-15
Date: 12/30/2020
Drawn By: NBS
Checked By: ML
Scale: AS NOTED

Sheet
C-3

GENERAL NOTES:

1. PROVIDE A MINIMUM TUBE DIAMETER OF 12 INCHES (300mm) FOR SLOPES UP TO 50 FEET (15.24m) IN LENGTH WITH A SLOPE RATIO OF 3H:1V OR STEEPER. LONGER SLOPES OF 3H:1V MAY REQUIRE LARGER TUBE DIAMETER OR ADDITIONAL COURSING OF FILTER TUBES TO CREATE A FILTER BERM. REFER TO MANUFACTURER'S RECOMMENDATIONS FOR SITUATIONS WITH LONGER OR STEEPER SLOPES.
2. INSTALL TUBES ALONG CONTOURS AND PERPENDICULAR TO SHEET OR CONCENTRATED FLOW.
3. TUBE LOCATION MAY BE SHIFTED TO ADJUST TO LANDSCAPE FEATURES, BUT SHALL PROTECT UNDISTURBED AREA AND VEGETATION TO MAXIMUM EXTENT POSSIBLE.
4. DO NOT INSTALL IN PERENNIAL, EPHEMERAL OR INTERMITTENT STREAMS.
5. ADDITIONAL TUBES SHALL BE USED AT THE DIRECTION OF THE ENGINEER.
6. ADDITIONAL STAKING SHALL BE USED AT THE DIRECTION OF THE ENGINEER.





LINEAR SEDIMENTATION AND EROSION CONTROL DETAIL

SCALE: N.T.S.

GENERAL NOTES

No.	Revision/Issue	Date

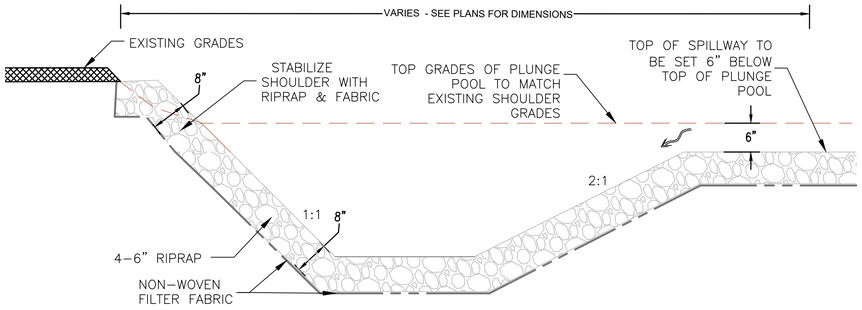
COMPREHENSIVE ENVIRONMENTAL INCORPORATED

21 Depot Street
MERRIMACK, NH 03054

EROSION CONTROL DETAILS

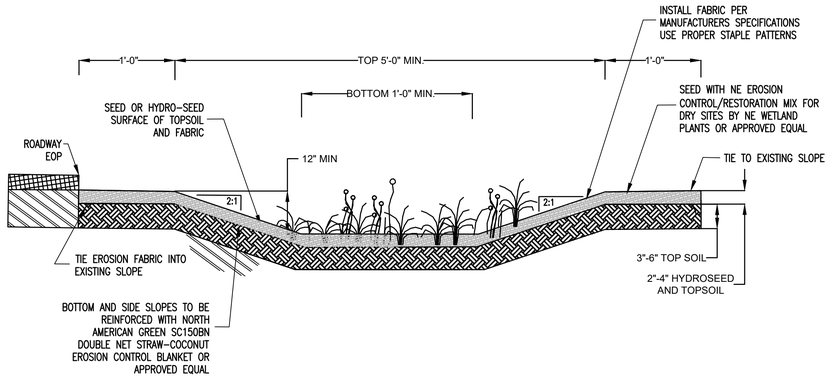
Town of Wolfeboro, NH

Project No.: 219–15 Date: 4/2/2021 Drawn By: NBS Checked By: ML Scale: AS NOTED	Sheet D-1



PLUNGE POOL TYP. DETAIL

SCALE: N.T.S.

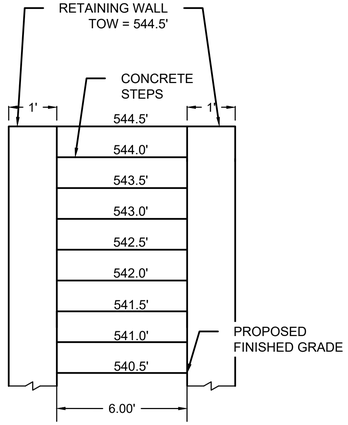


VEGETATED SWALE TYP. DETAIL

SCALE: N.T.S.

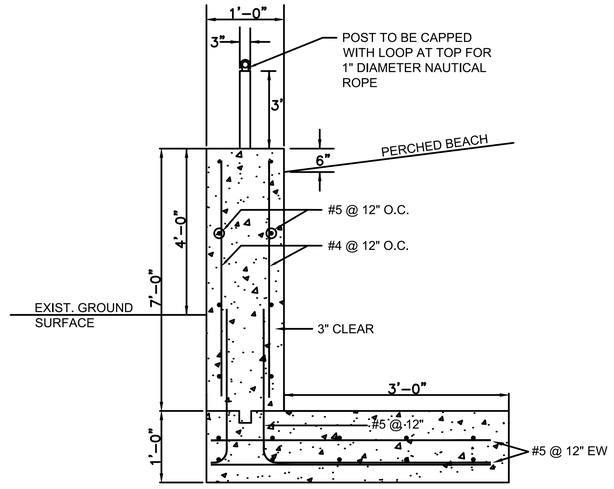
NOTE:

1. RETAINING WALL DETAIL IS FOR CAST-IN-PLACE OPTION
2. CONTRACTOR TO SUBMIT ALTERNATE PROPOSALS BASED ON:
   a. CAST-IN-PLACE WALL;
   b. PRECAST/PREFABRICATOR BIG BLOCK RETAINING WALL OR APPROVED EQUAL
   c. VERSA-LOCK WALL PER MANUFACTURER'S SPECIFICATIONS AND DIRECTIONS
3. RETAINING WALL TO BE TEXTURED AS SHOWN USING SCOTT SYSTEM #187 TUSCAN RIVER ROCK FORMLINERS OR APPROVED EQUAL FOR CAST-IN-PLACE AND PRECAST OPTIONS



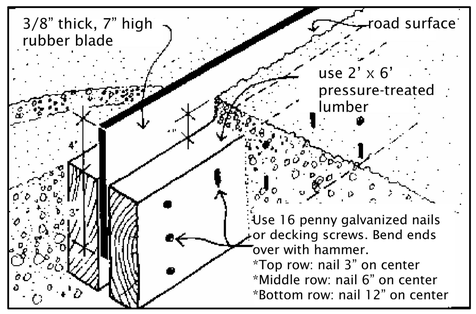
CONCRETE STEPS CROSS-SECTION

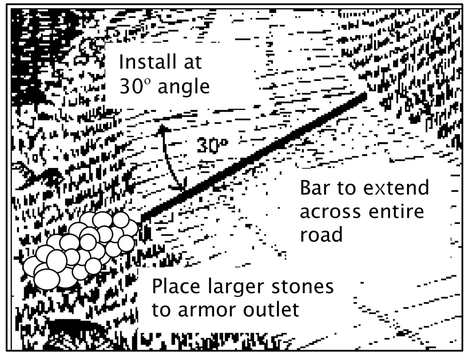
SCALE: N.T.S.



RETAINING WALL DETAIL

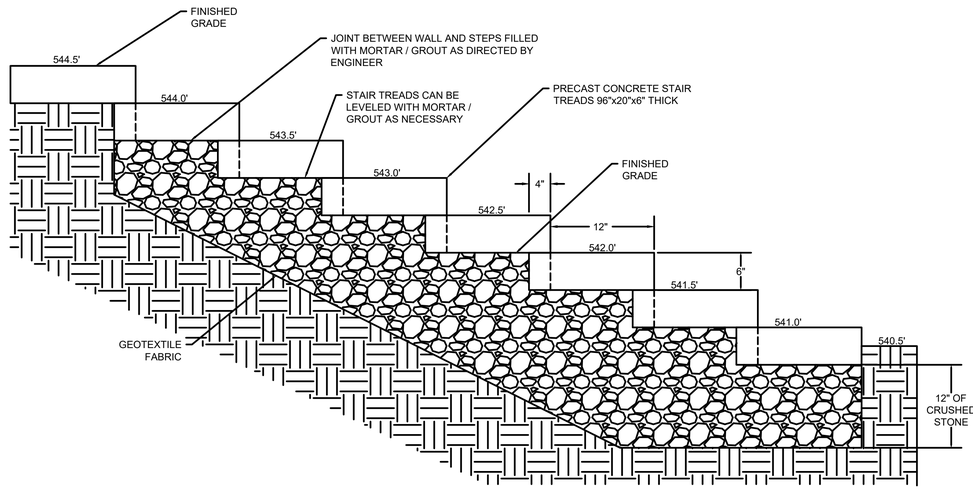
SCALE: N.T.S.





RUBBER RAZOR DETAILS (TYP.)

SCALE: N.T.S.



CONCRETE STEPS PROFILE VIEW

SCALE: N.T.S.

GENERAL NOTES

No.	Revision/Issue	Date

COMPREHENSIVE ENVIRONMENTAL INCORPORATED
21 Depot Street
MERRIMACK, NH 03054

PROJECT DETAILS

Town of Wolfeboro, NH

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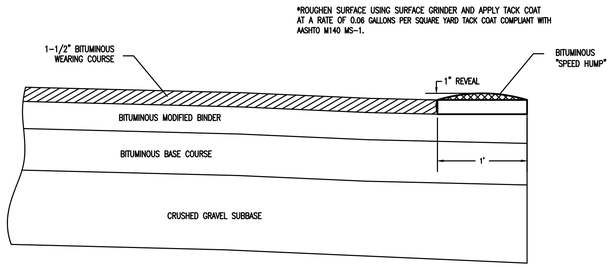
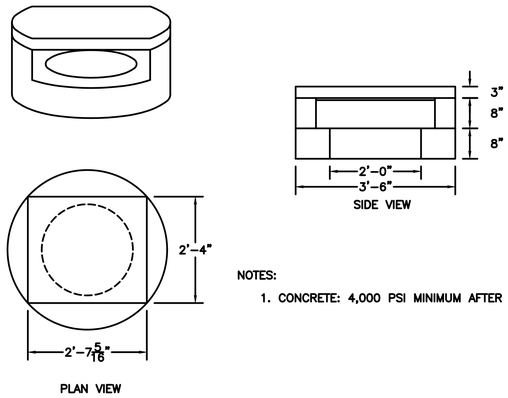


BIT BERM SPEED HUMP DETAIL

SCALE: N.T.S.

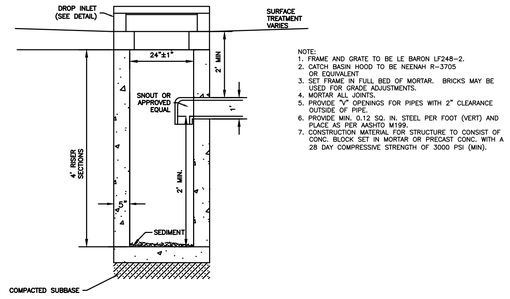


NOTES:

1. **CONCRETE: 4,000 PSI MINIMUM AFTER 28 DAYS.**

DROP INLET DETAIL

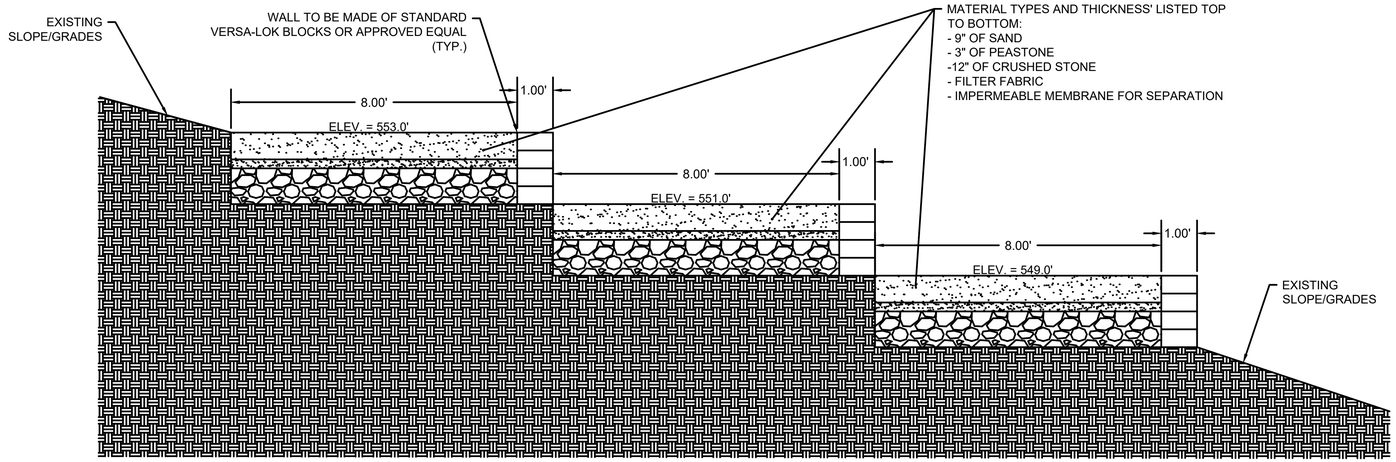
SCALE: N.T.S.



NOTE:
1. FRAME AND GRATE TO BE LE BARON LF248-2.
2. CATCH BASIN HOOD TO BE NEENAH R-3705 OR EQUIVALENT.
3. SET FRAME IN FULL BED OF MORTAR. BRICKS MAY BE USED FOR GRADE ADJUSTMENTS.
4. MORTAR ALL JOINTS.
5. PROVIDE 4" OPENINGS FOR PIPES WITH 2" CLEARANCE OUTSIDE OF PIPE.
6. PROVIDE MIN. 0.12 SQ. IN. STEEL PER FOOT (VERT) AND PLACE AS PER AASHTO M199.
7. CONSTRUCTION MATERIAL FOR STRUCTURE TO CONSIST OF CONC. BLOCK SET IN MORTAR OR PRECAST CONC. WITH A 28 DAY COMPRESSIVE STRENGTH OF 3000 PSI (MIN).

DEEP SUMP CATCH BASIN TYP. DETAIL

SCALE: N.T.S.



INFILTRATION AREA DETAIL

SCALE: N.T.S.

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