SECTION 31 00 00

EARTHWORK

PART 1 – GENERAL

1.1 Description

A. Provide facilities, labor, materials, tools, equipment, appliances, transportation, supervision, and related work necessary to complete the work specified in this section, and as shown on the Drawings.

B. Work performed under this Section of the Specifications shall be subject to the conditions found in the Request for Proposals – Safety Complex-Road Construction.

C. The work of this section includes but is not necessarily limited to:

1. Excavation, fill, and backfill, as indicated or required, including compaction.
2. Excavation, as required, to the lines and grades indicated on the Drawings and accepted by the Engineer.
3. Excavation and offsite legal disposal of unsuitable or excess materials unless on-site locations are designated. Excavation shall include removal and satisfactory disposal of all unclassified material encountered throughout the site.
4. Rough grading, including placement, moisture conditioning, and compaction of fills and backfill.
5. Placement of base and subbase course materials under structures, pavements, slabs, and footings, including compaction.
6. Trench excavation, bedding, and backfill for structures, foundations, and utilities, including compaction.
7. The removal, hauling and stockpiling of suitable excavated materials for subsequent use in the work. Stockpiling shall include protection to maintain materials in a workable condition.
8. Rehandling, hauling, and placing of stockpiled materials for use in refilling, filling, backfilling, grading, and such other operations.
9. Protect and preserve all existing buildings, pavements, and utilities to remain.
10. Implementing dust mitigation measures.
11. Environmental controls.
12. Providing products in sufficient quantities to meet the project requirements.
13. Providing adequate pumping and drainage facilities to keep the work area sufficiently dry.
14. Obtain all required permits, licenses, and approvals of

appropriate municipal and utility authorities, prior to commencing the work of this Section, and pay costs incurred therefrom.

D. Provide facilities, labor, materials, tools, equipment, appliances, and related work necessary to provide and maintain erosion and dewatering controls during construction operations. All measures shall be installed and maintained according to plans and other sections of the specifications.

E. Contractor shall be responsible for notifying all affected utility companies before starting work. Comply with the requirements of the New Hampshire "Dig Safe" Utilities Underground Plant Damage Prevention System; telephone 1-888-344-7233.

1.2 Measurement and Payment

A. Measurement and payment requirements per the Request for Proposals – Safety Complex-Road Extension.

1.3 Reference Materials

A. NHDOT Standard Specifications for Road and Bridge Construction.

B. NHDOT Standard Plans for Roadway Construction.

1.4 Submittals

A. The Contractor shall submit written documentation showing conformance of the materials and constructed work with the Specifications.

B. Submit the name of each material supplier and specific type and source of each material. Any change in source throughout the project requires approval of the Owner or Engineer.

C. The Engineer will be responsible for the approval or rejection of the suitability of all materials.

1.5 Laws and Regulations

A. Work shall be accomplished in accordance with regulations of local, county, state and federal agencies or utility company standards as they apply.

1.6 Quality Assurance

A. The Engineer will periodically observe and document the earthwork activities to determine that the work is completed in general accordance with the Project Specifications.

B. The Contractor shall provide a minimum forty-eight (48) hour notice to the Engineer prior to commencing earthwork operations.

C. Approvals given by the Engineer shall not relieve the Contractor of his responsibility for performing the work in accordance with the Contract Documents.

D. Testing (by Contractor’s QC Firm) of on-site backfill, common fill, clean granular fill, structural fill, and aggregate subbase from off- site borrow sources, shall include:

1. Soil Classification (ASTM D2487) – Minimum of one test for each visible change in material, at least one test for every borrow source, and at least one test for every 5,000 tons of clean fill, re-compacted subgrade, and aggregate subbase material placed. One test for the on- site backfill material placed. Testing shall be incidental to the work.

2. Standard Proctor Moisture - Density Curve (ASTM D698) – Minimum of one test for each visible change in material, at least one test for every borrow source, and at least one test for every 5,000 tons of clean fill, re-compacted subgrade, and aggregate subbase material (if less than 30% by weight is retained on the ¾-inch sieve) placed. One test for the on-site backfill material placed. Testing shall be incidental to the work.

E. During performance of the Work, the Contractor shall employ all equipment and services necessary for control of depths, lines, and grades within required tolerances.

F. The Owner may retain and pay for the services of an independent testing and inspection firm and/or a Geotechnical Consultant to perform on-site observation and testing during the various phases of the construction operations. The scope of services will be determined by the Owner and the independent testing and inspection firm and/or the Geotechnical Consultant and will be provided to the Contractor. The Owner reserves the right to modify or waive the services of the independent testing and inspection firm and/or the Geotechnical Consultant. The services of an independent testing firm and/or Geotechnical Consultant may include, but not necessarily be limited to, the following:

1. Observation during excavation and dewatering of controlled fill areas.

2. Laboratory testing and analysis of fill materials as specified herein and proposed by the Contractor for incorporation into the Work.

3. Observation of construction and performance of water content, gradation and compaction tests at a frequency and locations that the independent testing and inspection firm and/or the Geotechnical Consultant may require. The results of these tests will be submitted to the Owner, Engineer, and Contractor on a timely basis so that action can be taken to remedy indicated deficiencies. During the course of construction, the independent testing and inspection firm and/or the Geotechnical Consultant will advise the Owner in writing, if at any time in their opinion, the Work hereunder is of unacceptable quality. Failure of independent testing and inspection firm and/or the Geotechnical Consultant to give notice, shall not excuse the Contractor from latent defects discovered in his work.

G. The Contractor shall make provisions for allowing observations and testing of Contractor’s work by the independent testing and inspection firm and/or the Geotechnical Consultant.

1. The presence of the independent testing and inspection firm and/or the Geotechnical Consultant does not include supervision or direction of the actual work of the Contractor, and his employees or agents. Neither the presence of the independent testing and inspection firm and /or the Geotechnical Consultant, nor any observations and testing performed by them, nor failure to give notice of defects shall excuse the Contractor from defects discovered in his work.

H. Costs related to retesting due to unacceptable qualities of work and failures discovered by testing shall be paid for by the Contractor at no additional expense to Owner, and the costs thereof will be deducted by the Owner from the Contract Sum.

1.7 Coordination

A. The work of this Section shall be coordinated with that of other trades affecting, or affected by, this work, as necessary to assure the steady progress of all work of the Contract.

B. It is hereby understood that the Contractor has carefully examined the site and all conditions affecting work under this Section. No claim for additional costs will be allowed because of lack of full knowledge of existing conditions.

C. Plans, surveys, measurements and dimensions under which the work is to be performed are believed to be correct to the best of the Engineer's knowledge, but the Contractor shall have examined them for himself during the bidding period. The Contractor shall verify dimensions and elevations on the ground and report any discrepancies immediately to the Engineer. Any discrepancies not reported prior to construction shall not be the basis for claims for extra compensation.

D. As construction proceeds, the Contractor shall be responsible for notifying the Owner and Engineer prior to the start of earthwork operations requiring observation and/or testing.

1.8 Permits, Codes And Safety Requirements

A. All work shall conform to the Drawings and Specifications and shall comply with applicable codes and regulations.

B. All work shall comply with the provisions of the Manual of Accident Prevention in Construction of the Associated General Contractors of America, Inc., and the requirements of the Occupational Safety and Health Administration, United States Department of Labor.

C. The Contractor shall procure and pay for all permits and licenses required to complete the work specified herein and shown on the Drawings.

D. The Contractor shall properly maintain all excavations, sheeting, bracing, trench shields or other facilities in a safe condition throughout the project. Sufficient suitable barricades, warning lights, floodlights and signs to protect life and property shall be installed and maintained at all times.

1.9 Layout and Grades

A. All lines and grade work not presently established at the site shall be laid out in accordance with Drawings and Specifications by a Registered Land Surveyor or Professional Engineer employed by the Contractor. The Contractor shall establish permanent benchmarks and replace as directed by the Engineer if any of which are destroyed or disturbed.

B. The words "finished grade" as used herein shall mean final grade elevations indicated on the Drawings. Spot elevations shall govern over proposed contours. Where not otherwise indicated, project site areas shall be given uniform slopes between such points and existing established grades.

C. The word "subgrade" as used herein, means the required surface of subsoil or compacted fill. This surface is immediately beneath the site improvements, specially dimensioned fill, or other surface material.

1.10 Disposition of Existing Utilities

A. Should uncharted, or incorrectly charted, piping or other utilities be encountered during excavation, the Contractor shall notify the Engineer and Utility Owner immediately for directions. The Contractor shall provide sketches of existing conditions if there are variances, as well as any modifications, on "as-built" drawings.

B. Existing utilities serving facilities occupied and used by the Owner shall not be interrupted except when approved in writing, and then only after temporary utility services have been approved and provided.

C. Active utilities existing on the site shall be carefully protected from damage and relocated or removed as required by the work. When an active utility line is exposed during excavation its location and elevation shall be plotted on the record drawings and the Contractor shall notify in writing both the Engineer and the Utility Owner.

D. The Contractor shall cooperate with the Owner and Utility Owner in keeping utility services and facilities in operation. All utilities shall be protected from damage during construction, unless otherwise indicated to be removed or abandoned. If damaged, the utilities shall be repaired as required by the Utility’s Owner at the Contractor's expense. The Contractor shall contact the affected Utility as soon as any damage is uncovered.

E. Inactive or abandoned utilities encountered beneath the footprint of the proposed building shall be removed and replaced/backfilled with properly placed and compacted structural fill. Inactive or abandoned utilities encountered in the proposed pavement areas shall be removed, plugged or capped as approved by the Engineer. The location of such utilities shall be noted on the record drawings and reported in writing to the Engineer.

1.11 Drainage

A. The Contractor shall control the grading in areas under construction on the site so that the surface of the ground will properly slope to prevent accumulation of water in excavated areas and onto adjacent properties.

B. Should surface, rain or groundwater be encountered during the operations, the Contractor shall furnish and operate dewatering measures and equipment to control water levels as required to perform the work. The Contractor shall be responsible for any damage to work or adjacent properties from such water. All piping exposed above surface for this use shall be properly covered to allow foot traffic and vehicles to pass without obstructions.

C. The presence of groundwater, to any degree, will not constitute a condition for which an increase in the contract price may be made.

D. The Contractor shall dispose of accumulated water in accordance with applicable regulations, ordinances, and instructions of the authorities having jurisdiction. The Contractor shall obtain all necessary permits.

PART 2 - PRODUCTS

2.1 Materials

A. Subgrade is the material in excavation (cuts)and fills located below subbase.

B. On-Site Materials

1. Material on the site is the property of the Owner and shall be incorporated in the work if possible.

2. Topsoil/subsoil is not suitable for reuse as Structural Fill, Clean Granular Fill, or Common Fill unless otherwise directed by the Engineer.

3. When approved for use by the Engineer, existing on-site materials shall be segregated from the former forest mat layer prior to reuse.

4. Material not incorporated in the work either because it is unsuitable or the quantity exceeds the project's needs shall be hauled away and disposed of at the Contractor's expense.

5. Material designated to be wasted by the Engineer shall be disposed of by the Contractor.

   a. Contractor shall dispose of contaminated materials in accordance with the Contract Documents and all regulations.

   b. Material designated to be saved by the Engineer shall be stockpiled at a location designated by the Engineer.

   c. Unsuitable material shall consist of grubbings or other materials of a deleterious nature as deemed by the Engineer and in accordance with the Contract Documents.

C. Clean Granular Fill shall meet the approval of the Engineer. Clean fill shall be of such a nature that it will form a stable dense fill. The material shall be essentially free of trash, ice snow, tree stumps, wood, roots, topsoil, organic materials, and other objectionable materials which may be compressible or which cannot be properly compacted. Snow, ice, and frozen soils are not suitable fill materials and shall not be permitted.

1. Material shall be friable soil containing no stone greater than two-thirds (2/3) the loose lift thickness with a maximum stone size of two (2) inches in diameter.
2. Sediments resulting from dredging are not suitable materials for clean fill.
3. All on-site materials proposed to be used as clean fill are subject to Engineer approval.

Contactor should provide documentation (i.e., analytical sample results at a minimum frequency of 1 sample/1,500 tons) that all clean fill material is suitable for use on the Project, is free of Oil and/or Hazardous Materials (OHM), or Site criteria such as MCP RCS-1 criteria as established by the Engineer, and is free from debris or other materials which could render this material unsuitable. Clean Granular Fill shall meet the following gradation requirements:

Sieve Size	Percent Passing by Weight
3-inch	100
¾-inch	60 - 90
No. 4	20 – 70
No. 200	2 - 8

D. Common Fill shall be granular material consisting of hard sand and gravel. Common backfill shall be free of organic matter, trash, roots or other deleterious material and shall contain no stone measuring greater in any dimension than two-thirds of the loose lift thickness, or 8 inches (200 mm), whichever is smaller. Common backfill material shall be capable of forming a firm, stable base when spread and compacted in accordance with this specification. In addition, common backfill shall be non-plastic (plasticity index zero, defined as liquid limit minus plastic limit). Common backfill materials may be obtained from either on-site excavations or from off-site sources. Any materials excavated from the trench and not conforming to this specification shall be properly disposed of as specified and replaced with approved material, as required, at no additional cost to the Owner. Common fill shall meet the following gradation requirements:

Sieve Size	Percent Passing by Weight
6-inch	100
¾-inch	60 - 100
No. 4	20 – 85
No. 200	0 - 25

E. Gravel Fill shall consist of hard, durable gravel free from trash, organic matter, clay, surface coatings, and other deleterious materials. Gravel fill shall have a maximum stone size of two-thirds of the loose lift thickness, or 6 inches, whichever is smaller. That portion passing the 4 inch (100 mm) sieve shall meet the following gradation requirements, as determined by ASTM C 136 and ASTM C 117:

Sieve Size	Percent Passing by Weight
6-inch	100
No. 4	25 - 75
No. 200	0 - 10

F. When approved by the Engineer, gravel fill for pipe bedding shall have a maximum stone size of 1.5 inches.

G. Crushed Stone shall be composed of durable crushed rock consisting of angular fragments, free from a detrimental quantity of thin, flat, elongated pieces or shall be durable crushed gravel stone obtained by artificial crushing of gravel boulders or fieldstone.

1. The crushed stone shall be free from clay, loam, or deleterious material.

2. Crushed stone shall conform to the following gradation:

	Percent Passing by Weight		
Sieve Size	3/8-inch Stone	1/2-inch Stone	3/4-inch Stone
1 inch		-	100
3/4 inch		-	90 - 100
5/8 inch		100	-
1/2 inch	100	85 - 100	10 - 50
3/8 inch	85-100	15 - 45	0 - 20
No. 4	10-30	-	0 - 5
No. 8	10 (max)	0 - 5	-

	Percent Passing by Weight	
Sieve Size	1-1/2-inch Stone	2-inch Stone
2 inch	100	90 - 100
1-1/2 inch	95 - 100	-
1-1/4 inch	-	25 - 50
1 inch	35 - 70	-
3/4 inch	0 - 25	0 - 15
1/2 inch	-	-

H. Riprap. Riprap shall consist of a protective covering of angular shaped stones laid on slopes in front of structures, retaining walls, wingwalls, piers, and elsewhere as required, to insure protection of structures and embankments.

1. Stone used for riprap shall be hard, durable, angular in shape, resistant to weathering and to water action, free from overburden, spoil, shale and organic material, and shall meet the gradation requirements specified.
2. Neither breadth nor thickness of a single stone should be less than one-third its length. Each load of riprap shall be reasonably well-graded from the smallest to the maximum size specified.
3. Rounded stone or boulders will not be accepted.
4. Shale and stone with shale seams are not acceptable.
5. Stone shall be gray or natural in color, no pink rock will be accepted in the Project.

6. Stones smaller than the specified 10 percent size and spalls will not be permitted in an amount exceeding 10 percent by weight of each load.

7. The minimum unit weight of the stone shall be 155 lb/ft3 (2,482 kg/m3) as computed by multiplying the specific gravity (bulk-saturated-surface-dry basis, AASHTO Test T85) times 62.4 lb/ft3.

8. Quality requirements:

   a. The stone shall have a loss of not more than 40 percent after 500 revolutions when tested by AASHTO Test T96.

   b. Stones shall have a loss not exceeding 10 percent with the sulfate test after 5 cycles when tested by AASHTO Test T104.

   c. The stone shall have a loss not exceeding 10 percent after 12 cycles of freezing and thawing when tested by AASHTO Test T103.

   d. The Contractor shall provide documentation that riprap meets all quality and gradation requirements for Engineer approval prior to importing material to the Project Site.

I. Structural Fill shall consist of crushed gravel unless bank-run gravel, clean stone fill is specified on the plans or permitted by the Engineer. ¾ crushed stone may be used in wet conditions as approved by the Engineer. Material shall be free of construction and demolition debris, frozen soil, organic soil, peat, stumps, brush, trash, and refuse and meet the following gradation:

Sieve Size	Percent Passing by Weight
5-inch	100
¼ inch	60-100
No. 4	20 - 80
No. 200	0 - 10

J. Topsoil (stripped from site) or Loam (supplied from off-site) shall be a sandy loam or loam soil classification as defined by the USDA Soil Conservation Service, Soil Classification System consisting of a fertile, friable, natural topsoil/loam typical of locality, without admixture of subsoil, refuse or other foreign materials, shall be obtained from a well-drained arable site, and shall meet ASTM D5268. Material shall be such a mixture of sand, silt and clay particles as to exhibit sandy and clayey properties in about equal proportions. Material shall be free of stumps, roots, heavy or stiff clay, stones larger than 3/4-inch in diameter, lumps, coarse sand, noxious weeds, sticks, brush or other litter, and shall have the following mechanical analysis:

Textural Class	Percent of Total Weight	Average Percent
Sand 0.05 - 2.0 mm dia. range	45 to 75	60
Silt 0.002 - 0.05mm dia. range	15 to 35	25
Clay less than 0.002 mm dia. range	5 to 25	15

1. 95 percent of Topsoil shall pass a 2.0 mm sieve.
2. Topsoil/Loam shall have a pH value in the range of 6.0 to 7.0. If Topsoil/Loam material does not fall within the required pH range, limestone or aluminum sulfate shall be added to bring the pH within the specified limit.
   a. Prior to stripping, the topsoil shall demonstrate, by the occurrence upon it of healthy crops, grass or other vegetative growth, that it is reasonably well drained and that it does not contain toxic amounts of either acid or alkaline elements.
   b. Loam and topsoil shall contain not less than 4 percent nor more than 20 percent organic matter as determined by the loss on ignition of oven-dried samples. Test sample shall be oven-dried to a constant weight at a temperature of 230°F.

      In other portions of these specifications, the words ‘loam’ and ‘topsoil’ are used interchangeably.

2.2 Use of Materials

A. Use of materials shall be as described below and as shown on the plans. Further details can be found in the project plans. Combinations or layering of materials may be necessary in certain instances such as for detention embankments, subsurface disposal areas, and riprap walls as examples.

1. On-Site Materials: On-site materials shall be incorporated in the work if possible.
2. Common Fill: Use common fill as common/subgrade fill in parking areas and roadway embankments; foundation wall backfill if used in conjunction with a bond break and sized/screened to 3-inch minus.
3. Clean Granular Fill: Use clean fill for general grading as backfill, below floor slabs-on-grade; for exterior concrete slabs exposed to frost, at exterior ramps, aprons, and loading bays adjacent to entrances/exits; as footing and foundation wall backfill; backfill behind unbalanced foundation/retaiing walls. Stones larger than two inches (2") shall be removed prior to compaction.

4. Gravel Fill: Use for pipe bedding backfill. Use for material placed "in the wet". Use for backfill behind retaining walls and retaining structures. Use for pipe and utility bedding.

5. Crushed Stone: Use crushed stone as bedding for manholes and catch basin structures (3/4″) and as bedding for piping under wet subgrade conditions. Use for material for stabilized construction entrances (2.0″).

6. Structural Fill: Use structural fill under the culvert and retaining wall footings and in other soil bearing situations; below the foundations and within the building pad.

7. Riprap: Use riprap for slope stabilization and for erosion control in channel bottoms, overflow areas, level spreaders, and where indicated.

8. Topsoil/Loam: Use as fill in designated landscape and lawn areas; if off-site material is required, Loam shall be furnished and installed. Topsoil maybe used as fill in landscape and lawn areas if an excess of topsoil exists on-site.

PART 3 - EXECUTION

3.1 General

A. Excavations, filling, backfilling, and grading shall be to subgrade elevations specified.

B. Excavated materials suitable for backfill shall be stockpiled in an orderly manner sufficiently distant from excavations to prevent overloading, slides, and cave-ins.

C. Excavations shall be done in ways that will prevent surface water and subsurface water from causing flooding or other damage to the site and surrounding area.

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

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

3.2 Examination

A. The Contractor shall examine the areas and conditions under which excavating, filling, and grading are to be performed and notify the Engineer in writing of conditions detrimental to the proper and timely completion of the work. Do not proceed with the work until unsatisfactory conditions have been corrected in an acceptable manner.

3.3 Clearing and Grubbing

A. Cut and remove trees, remove stumps and brush. Legally dispose of off-site.

B. Strip all topsoil, subsoil and other unsuitable materials to its full depth within the Contract limits.

C. Other Specification Sections shall apply to clearing and grubbing under demolition and shall include air quality, erosion control, and hazardous waste.

D. Remove all topsoil, subsoil, vegetative matter, and non-soil materials and, after screening out the roots, rocks greater than 3/4 inch in size, and deleterious debris, separately stockpile the topsoil and subsoil materials.

3.4 Dewatering

A. Dewatering shall be performed in accordance with Section 312319 - Dewatering.

3.5 Excavations

A. Site General Requirements

1. Site excavation shall conform to elevations and dimensions shown within a vertical tolerance of 0.10 feet except as otherwise stipulated in the field by the Engineer or Owner. The Contractor shall excavate to a depth to provide for any subsequent loam, sod, or other specified surface material.

2. Sides and slopes of excavations shall be maintained in a safe condition by sloping, scaling, benching, shelving, or shoring and bracing until completion of backfill placement as applicable, or completion of finished slopes, as shown on the drawings.

3. Provide shoring, sheeting, and bracing of excavations as required to assure complete safety against collapse of the earth at the site of excavations. Alternatively, lay back excavations to suitable slope.

4. Control the grading so that ground is pitched to prevent water from running to excavated areas, damaging other structures, or adjacent properties.

5. Where soil has been softened or eroded by flooding, equipment, traffic, or placement during unfavorable weather, or such other conditions, it shall be removed and replaced by the Contractor with suitable material, and at no cost to the Owner.

6. Exercise care to preserve the material below and beyond the lines of excavation. Where excavation is carried out below indicated grade or beyond the lines of excavation, Contractor shall backfill and compact the over excavation with structural fill to the indicated grade, at no additional cost to the Owner and at the direction of the Engineer.

7. Provide sheeting, shoring and bracing to complete and protect all excavated areas, as required for safety and compliance with OSHA. The Contractor shall adhere to and enforce precautions as outlined in OSHA Regulations, CFR 29, Part 1926.650. Costs for sheeting, shoring, and bracing shall be included as a part of the Contract Price for completing the work and Owner shall make no

separate payment for this work.

8. Excavated materials unsuitable for reuse, surplus excavated rock, and surplus excavated soil not used to fulfill requirements of the Contract, shall become the property of the Contractor and shall be removed from the site in accordance with the regulations and requirements of all municipalities or agencies having jurisdiction over the disposal sites and the route between the project and the disposal sites.

9. Unsuitable materials which are classified as organics such as peat, trash, fill, stumps, debris, material determined to be hazardous, and topsoil and subsoil when determined by Engineer to be unacceptable for incorporation into the work.

10. Do not over excavate below proposed design grades for the purpose of obtaining borrow for use off-site.

3.6 Trench Excavation

A. General

1. Before any trenching operation begins, the line of work shall be cleared and all existing underground utilities and structures located.

2. All utilities encountered during the trenching operation shall be properly protected in accordance with the requirements of the Utility Owner. The Contractor shall bear the costs for any damages to existing utilities caused by the Contractor’s trenching operations.

3. Excavate as necessary for all drainage pipes, utilities, and related structures and appurtenances, and for any other trenching necessary to complete the work.

B. In general, machine excavation of trenches will be permitted with the exception of preparation of pipe beds which will be hand work. Excavate by hand or machine methods to at least six inches (6") below the bottom of pipe or as shown on the Drawings. Excavation to final grade shall be made in such a manner as to maintain the undisturbed bearing character of the soils exposed at the excavation level.

C. Utilities or piping shall not be laid directly on boulders, cobbles, or other hard material. This material shall be removed to a minimum of six inches (6") below the bottom of pipe at all points and backfilled or compacted as specified.

D. Remove unsuitable material encountered at subgrade elevations, backfill with material specified herein and as otherwise indicated on the Drawings, specified, or directed. Compact as specified with approved compactors.

E. In general, the width of trenches shall be kept to a minimum and in the case of piping shall not exceed the sum of the pipe's outside diameter plus 2'-0" to at least twelve inches (12") above the pipe.

F. Excavated material suitable for backfill shall be placed in spoil banks where it will not interfere with work. Spoil banks shall be

located sufficiently back from the edge of trench to prevent excessive loading on the trench wall. Spoil banks shall be confined so that areas reserved for use of vehicles are kept free and material stays within property or easements provided. Where there is insufficient space for material in spoil banks adjacent to excavation, excess material shall be removed to another approved site and brought back when needed.

G. Trench walls shall be sloped, sheathed, shored or suitably braced to conform to all applicable laws, regulations and codes to protect the work being constructed and to provide safe working conditions. Unless otherwise directed, bracing and sheathing shall be removed as trenches and pits are refilled.

H. Trenches shall be kept dry during the placement of all utilities by pumping or other appropriate dewatering procedures as needed.

3.7 Material Storage

A. The Contractor shall stockpile satisfactory excavated material where directed, until required for backfill or fill. The Contractor shall place, grade and shape stockpiles for proper drainage.

B. Materials required in the work shall be located and retained a sufficient distance from the edge of excavations to prevent such materials from falling or sliding back into the excavations and to prevent cave-ins.

C. The Contractor shall dispose of excess soil material and waste materials as herein specified.

3.8 Preparation of Excavation Bottoms

A. General

1. The Contractor shall complete the excavations to the specified or indicated limits and required subgrades.

2. The Contractor shall remove any additional materials below subgrade levels which were not naturally deposited, are disturbed or are unsuitable, as directed by the Engineer.

3. The Contractor shall grade all holes, swales and low points which will not otherwise be removed in the course of the work to the indicated subgrade level.

B. Trenches

1. Compaction equipment used in open areas where space permits shall consist of vibratory rollers, fully loaded ten-wheel dump trucks, pneumatic compactors, or other similar equipment.

2. Compaction equipment for fill against foundation walls and in other confined areas shall be accomplished by means of drum-type, power-driven, hand-guided vibratory compactors operating at 2,000 cycles per minute, or by hand-guided vibratory plate tampers.

3.9 Backfilling and Placement

A. General

1. Areas where excavation has been completed, as determined by

Engineer, shall be backfilled as specified and as shown on the Drawings.

2. Fill materials of the various types specified shall generally be placed and compacted within the limits and to the thickness indicated on the Drawings unless otherwise specified.
3. Prior to placing fill materials, the Contractor shall complete the specified ground surface and subgrade preparation for materials encountered at ground surface and at subgrade levels.
4. Contractor shall keep Record Drawings on the site at all times and neatly and accurately record the exact location of their work as actually installed. This shall include the location and dimensions of underground and concealed Work including vegetated soil cap subgrade elevations.
5. Dewater subgrade areas prior to filling.
6. Control groundwater and surface runoff to minimize disturbance of exposed natural ground surface, previously placed and compacted fill and material being placed.
7. Soil fill moisture shall be maintained at an acceptable working range to allow for proper compaction. The amount of moisture required shall be determined by the Engineer for the material and compaction methods being used. Moisture shall be added to the material during compaction only when it is necessary to increase the percentage of moisture to obtain satisfactory compaction.
8. Do not place fill on frozen ground.
9. Do not place frozen fill.
10. Place fill in uniform horizontal layers and compact immediately after placement. Where the horizontal layer meets a rising slope, the layer shall be keyed into the slope by cutting a bench during spreading of preceding lift.
11. To the extent that is practical, each layer of fill shall be compacted to the specific density the same day it is placed.
12. The Contractor shall minimize voids during placement.
13. Backfill shall be placed within a tolerance of plus or minus 0.10 feet from the locations, elevations, and grades shown on the Drawings.
14. Protect structures and pipes from damage during backfilling operations. Repair damage at no cost to Owner.
15. Placement of fill shall not begin prior to observation and approval of subgrade conditions by Engineer.
16. Protect foundations, footings, and waterproofing during backfilling. Repair damage at no cost to Owner.
17. Prior to backfilling between structures and sheeting, remove unsuitable material, including rubbish, organic materials, or

other debris. Do not commence filling operations until conditions have been observed by Engineer.

18. Backfill shall not be placed against walls until they are braced or have cured sufficiently to develop strength necessary to withstand, without damage, pressure from backfilling and compacting operations.

19. In compacting and other operations, the Contractor shall conduct his operations in a manner to prevent damage to structures due to passage of heavy equipment over and adjacent to structures. Repair damage made by the Contractor, at no additional cost to the Owner.

20. Upon completion of the work, the final ground surface shall be left in a firm, unyielding, true, uniform condition free from ruts. Repair disturbed areas caused equipment traffic at no cost to Owner.

21. The Structural Fill shall be placed and compacted at least three (3) days prior to the placement of the concrete structures. Each layer shall be compacted immediately after placing.

22. Structural fill shall be used as backfill beneath all structure foundations to replace unsuitable material or as backfill beneath structure foundations to meet the depth of the bottom of footings and shall be at least six (6) inches deep.

B. Equipment

1. Compaction equipment used in open areas where space permits shall consist of vibratory rollers, fully loaded ten-wheel dump trucks, pneumatic compactors, or other similar equipment.

2. Compaction equipment for fill against walls and in other confined areas shall be accomplished by means of drum-type, power-driven, hand-guided vibratory compactors operating at 2,000 cycles per minute, or by hand-guided vibratory plate tampers.

C. Riprap

1. The stones shall be placed upon an approved subgrade to the lines and grades shown on the plans and as directed.

2. Each stone shall be carefully placed, by hand or machine as required, on a prepared bed, normal to the slope and firmly bedded thereon.

3. The larger stone shall be placed closely together and the intervening spaces filled with smaller stones in such a manner that the entire surface will form a compact mass.

3.10 Trench backfilling

A. General

1. Trenches shall be backfilled as soon as practicable with suitable approved materials. All trench backfilling shall be done with special care, in the following manner and as the

Engineer may direct from time to time.

2. Backfill material for pipe bedding shall be deposited in the trench, uniformly on both sides of the pipe, for the entire width of the trench to the spring-line of the pipe. The backfill material shall be placed by hand shovels in layers not more than 6 inches (6") thick in loose depth and each layer shall be thoroughly and evenly compacted by tamping on each side of the pipe to provide uniform support around the pipe.

3. Trench backfilling shall be placed so as not to disturb the previously installed pipes, utilities, concrete, and other work within and near the trench. The moisture content of the backfill material shall be such that proper compaction will be obtained. Backfill of trenches within areas of pavement construction shall be made in controlled compacted lifts extending to grades required to establish the proper pavement base courses.

4. Any trenches or excavations improperly backfilled, or where settlement occurs, shall be reopened to the depth required for proper compaction, then refilled and compacted with the surface restored to the required grade and condition, at no additional cost to the Owner.

5. During filling and backfilling operations, pipelines will be checked to determine whether any displacement of the pipe has occurred. If the inspection of the pipelines shows poor alignment, displacement of pipe, or any other defects, the condition shall be remedied by removal, realignment, and backfill of the pipe, in a manner satisfactory to the Engineer at no additional cost to the Owner.

3.11 Compaction

A. General

1. Compaction densities for the backfilling operations shall be the percentage of the maximum density obtainable at optimum moisture content, as determined and controlled in accordance with ASTM Standard 1557 Method D. Laboratory maximum density tests shall be made for each material proposed for use in backfilling for trenches. Field density tests shall be made in accordance with ASTM Standard D1556. All laboratory and field density tests shall be conducted by an approved laboratory.

2. Locations for field density tests shall be as directed by the Engineer. Field density tests may be ordered by the Engineer as the situation warrants.

B. Compaction Requirements

1. The degree of compaction is expressed as a percentage of the maximum dry density at optimum moisture content as determined by ASTM D1557, Method C. The compaction requirements are as follows:

Area	Degree of Compaction
Below footings	95%
Below culvert	95%
Storm Drain Structures	92%
Pipe bedding	85%
Trench backfill	92%
Lawn areas	90%

2. Compaction percentages are based on the laboratory derived Maximum Density Values.

3. If any test fails, it shall be the responsibility of the Contractor to adjust the moisture and recompact the area. The area will be retested.

C. Moisture Control

1. Fill that is too wet for proper compaction shall be harrowed or otherwise dried to a proper moisture content to allow compaction to the required density. If fill cannot be dried within 24 hours of placement, it shall be removed and replaced with drier fill.

2. Fill that is too dry for proper compaction shall receive water uniformly applied over the surface of the loose layer. Sufficient water shall be added to allow compaction to the required density.

3. In no case shall fill be placed over material that is frozen. No fill material shall be placed, spread, or rolled during unfavorable weather conditions. When work is interrupted by heavy rains, fill operations shall not be resumed until the moisture content and the density of the previously placed fill are as specified.

D. Lift Thickness of Material

1. Structural Fill. The Structural Fill shall be placed in layers not to exceed 12 inches (12") in thickness when utilizing heavy compaction equipment, and 8 inches (8") when utilizing light hand-operated compaction equipment and compacted to 95% maximum relative density as determined by AASHTO T99, Method C. The granular material shall be placed in the full width of the excavation with equipment as approved by the Engineer and in such a manner which will not cause segregation and which will require minimum blading or manipulation. The equipment and the method used shall be approved by the Engineer.

2. On-Site Materials and Clean Granular Fill. On-site Materials and Clean Fill to be used as backfill shall be placed in uniform layers not exceeding 12 inches when utilizing heavy compaction equipment, and 8 inches (8") when utilizing light hand-operated compaction equipment, and compacted to the minimum degree of compaction as listed above, as determined by

ASTM D698 with a minimum of three passes of a vibratory compactor or other approved equivalent.

3. Crushed Stone and Gravel Fill. Crushed Stone and Gravel Fill to be used as backfill shall be placed in uniform layers not to exceed 12 inches (9") in thickness when utilizing heavy compaction equipment, and 8 inches (8") when utilizing light hand-operated compacted equipment. Compact with a minimum of four (4) coverages of acceptable compaction equipment. Compact to the minimum degree of compaction as listed above, as determined by ASTM D698.

E. Protection of Fill

1. Protection of compacted fill shall be the responsibility of the Contractor. Newly graded areas shall be protected from the actions of the elements and traffic. Any settlement or washing that occurs prior to acceptance of the work shall be repaired and grades shall be established to the required elevations and slopes. Damage to any compacted lift (including those lifts previously tested and approved by the Engineer) occurring at any time during the course of construction, which is caused by equipment, moisture entering the embankment, or from any other cause, shall be fully repaired by the Contractor prior to placement of overlying materials, at no additional cost to Owner and to the complete satisfaction of the Engineer.

2. In the event of and prior to the commencement of heavy rains, the Contractor shall suspend fill operations immediately and shall take all necessary steps to keep the site as well drained as possible. Fill operations shall not be resumed until the moisture content of the fill is such as to permit compliance with the Specifications.

3. All corrective work or operations necessary to maintain proper moisture control of the fill material shall be at the expense of the Contractor.

F. Grading Tolerances

1. Grading shall be completed to meet or exceed the following tolerances of uniformity*

Location	Tolerance
Final Grade	1 inch
Top of Subgrade Beneath Structures	1 inch

* Uniformity is defined as no variations in the surface materials at the grades and slopes indicated on the Drawings that exceed the listed tolerance over a length of ten feet (10’) horizontally in any direction.

2. The bottom of earth and rock excavations shall be formed to provide a smooth, uniform slope and grade. The bottom of the excavated grade shall be free of pockets, depressions or ridges

that would collect or concentrate water, silts, or other such objectionable material prior to the placement of backfill or other finish materials.

G. Finish

1. Upon completion of the work, ground surface shall be left in a firm, unyielding, true, uniform condition, free of ruts.

3.12 Sheeting and Bracing

A. General

1. Whenever sheeting and bracing will be required, it shall be furnished and installed by the Contractor in accordance with the recommendations of the structural engineer and/or geotechnical engineer engaged by the Contractor.

2. Submit the sheeting and bracing designs to the Owner and the Engineer for the project record. The sheeting and bracing plans and calculations shall bear the professional seals and signatures of the Contractor’s engineers. These plans and calculations shall be submitted prior to the start of work.

3. The Contractor shall furnish and install the required sheeting and bracing in accord with the submitted designs. The Contractor shall include the costs for this work in his bid price for the project. No additional or separate compensation will be allowed.

3.13 Closing Abandoned Underground Utilities

A. The Contractor shall close open ends of abandoned underground utilities, indicated to remain, permanently with closures sufficiently strong to withstand pressures which may result after closing.

B. The Contractor shall close open ends of metallic conduit and pipe with threaded galvanized metal caps or plastic plugs, or other suitable method for the type of material and size of pipe. Do not use wood plugs.

C. The Contractor shall close open ends of concrete and masonry utilities with not less than 8 inch thick brick masonry bulkheads, constructed to completely fill the opening.

3.14 Maintenance

A. Protection of Graded Areas: The Contractor shall protect newly graded areas from traffic and erosion and shall repair and re-establish grades in settled, eroded, and rutted areas to specified tolerances. The Contractor shall keep newly graded areas free of trash and debris.

B. The Work shall be sequenced to minimize disturbance of completed areas.

C. Where completed areas are disturbed by subsequent project operations or adverse weather, the Contractor shall fill and reshape eroded areas until acceptance of the Work.

3.15 Disposal of Excess and Waste Materials

A. The Contractor shall remove waste materials, including excess and unacceptable excavated material, trash and debris, and legally dispose of it off the Owner's property.

(END OF SECTION 31 00 00)

SECTION 31 10 00

DEMOLITION AND SITE CLEARING

PART 1 - GENERAL

1.1 Description

A. This Section specifies requirements for site clearing including demolition of site structures.

B. The work includes but is not necessarily limited to, furnishing all labor, materials, and equipment for:

1. Demolition, removal and final disposal of the on-site structures including existing headwall sections, fencing, drainage pipes, catch basins, bituminous concrete area, manholes, drainage structures, and other incidental structures to be removed as shown on plans.

2. Clearing, grubbing, and stripping.

3. Selective clearing, thinning, and tree removal.

4. Site demolition of signage, light standards, foundations and appurtenances.

5. Removal and abandonment of utilities.

6. Transportation and disposal of material from clearing, grubbing, thinning, stripping, and demolition in approved off-site disposal areas.

7. Filling of voids and excavations resulting from the work.

C. No trees shall be removed without the Engineer’s approval. Any trees removed without Engineer approval shall be replaced at no additional cost to Owner.

1.2 Price and Payment Procedures

A. Measurement and payment requirements per the Request for Proposals – Safety Complex-Road Construction.

1.3 References

A. American National Standards Institute (ANSI)

B. ANSI A10.6: 1983 Demolition Operations - Safety Requirements

1.4 Related Sections

A. Other Specification Sections which directly relate to the work of this Section include:

1. Section 312500 – EROSION AND SEDIMENTATION CONTROLS.

2. Section 310000 - EARTHWORK.

1.5 Site Conditions

A. Site conditions existing during the bidding period will be maintained by the Owner insofar as practical.

B. Actual site condition variations that differ from those of the

bidding period and which affect site clearing operations shall be brought to the attention of the Owner prior to the commencement of any site work.

1.6 Submittals

A. The Contractor shall submit the following information to the Engineer for review before commencing work:

1. Demolition Plan including operational sequence.

a. Procedures for careful removal and disposal of the on-site structures.

b. A detailed description of methods and equipment to be used for each operation and of the sequence of operations.

c. Coordination with other work in progress.

d. Methods of dust control.

e. Methods of noise control.

f. Pedestrian and vehicular traffic and parking control.

g. Statements affirming Contractor provisions for securing the safety of the workers throughout the performance of the work.

2. The Contractor’s schedule shall provide for the following:

a. Uninterrupted progress of Owner’s on-site operations.

b. Coordination with the Owner’s continuing utilization of the site.

3. All permits and notices authorizing site clearing and demolition.

4. Certificates of utility service severances.

5. Permits for transport and disposal of debris.

6. Calculations.

1.7 Regulatory and Safety Requirements

A. The Contractor shall comply with Federal and State regulations for demolition. "Safety requirements shall conform to ANSI A10.6, ‘Demolition Operations - Safety Requirements.’"

1.8 Quality Control

A. The Contractor shall perform site clearing and demolition in a manner that does not disturb existing structures, utilities, or other facilities not indicated to be removed.

1.9 Dust and Debris Control

A. The Contractor shall minimize the spread of dust and debris and avoid the creation of a nuisance or hazard in the surrounding area. Do not use water if it results in dangerous or otherwise objectionable conditions such as, but not limited to, ice, flooding, or pollution.

1.10 Protection

A. Traffic Control Signs: Where pedestrian and driver safety is endangered in the area of removal work, the Contractor shall use traffic barricades with flashing lights and other barriers suitable for restricting access to the work area.

B. Existing Work: The Contractor shall protect existing work which is to remain in place, be reused, or remain the property of the Owner.

C. Facilities: The Contractor shall protect electrical and mechanical services and utilities. If utilities are encountered and the Engineer specifies their removal, The Contractor shall provide approved barricades, temporary covering of exposed areas, and temporary services or connections for electrical and mechanical utilities.

1.11 Areas to be Cleared

A. The Contractor shall complete demolition, clearing, grubbing, and stripping as specified in this Section and as shown on the Drawings.

PART 2 – PRODUCTS – NOT USED

PART 3 - EXECUTION

3.1 Protection

A. The Contractor shall flag the limits of clearing shown on the drawings by accurate field survey with marked stakes or other means acceptable to the Engineer. Trees to remain shall be clearly identified during this staking process. The Engineer shall be notified a minimum of five (5) working days prior to scheduled commencement of clearing operations to review the flagged limits. Adjust the clearing limits as directed by the Engineer.

B. Alignment stakes, grade stakes, witness stakes, boundary markers, bench marks, and tie points shall be preserved until such time as their usefulness has ceased and permission for their destruction is given by the Engineer.

C. The Contractor shall not deface, injure or destroy trees or shrubs, nor remove or cut them without permission. Ropes, cables or guys shall not be fastened to or attached to trees for anchorage unless approved for emergency use. Where such special emergency use is permitted, the Contractor shall wrap the trunk with burlap or rags, and tie softwood cleats over wrapping. The Contractor shall be responsible for any damage resulting from such use.

D. Where trees may possibly be defaced, bruised, injured, or damaged by equipment, dumping or other operations, the Contractor shall protect such trees by placing boards, planks, or poles around them.

E. The Contractor shall protect tree root systems from damage caused by runoff or spillage of noxious materials while mixing, placing, or storing construction materials. The Contractor shall protect root systems from ponding, eroding, or excessive wetting caused by dewatering operations.

F. The Contractor shall not store construction materials, debris, or excavated material inside tree protection zones. The Contractor shall not permit vehicles or foot traffic within tree protection zones and shall prevent soil compaction over root systems.

G. The Contractor shall repair or replace immediately any damage to existing trees or root systems that are to remain. The Contractor shall employ an arborist licensed in New Hampshire to determine the repair and replacement needs and methods for approval by the Engineer.

H. Replace damaged shrubs and other vegetation designated to remain with the same size and species.

3.2 Tree Removal

A. Tree removal shall consist of the felling, trimming, and cutting of trees into sections and the satisfactory disposal of the trees.

3.3 Tree Repair and Replacement

A. The Contractor shall promptly repair trees damaged by construction operations within 24 hours at no additional cost to Owner or Engineer. Trimming or pruning shall be performed in an approved manner. Trimming with axes will not be permitted.

B. The Contractor shall plant and maintain new trees as directed by the Engineer and warranty for 2 years from the date of substantial completion, at no additional cost to the Owner.

3.4 Utilities

A. Notify all corporations, companies, individuals, or local authorities owning or having jurisdiction over utilities running to, through, or across areas to be affected by site clearing operations.

B. If there is a need for interruption of services the following conditions shall apply:

1. Seven working days notice shall be required prior to interrupting utility services.

2. Written permission must be granted by the Owner prior to interrupting utility services.

3. Temporary services may be required prior to interrupting utility services.

C. Before starting, locate and identify existing utilities that are to remain and protect them from damage.

D. For utilities to be disconnected, have utility services disconnected in accordance with the requirements of the utility owner.

3.5 Clearing and Grubbing

A. Clearing shall include cutting, removal, and off-site disposal of trees, bushes, shrubs, stumps, fallen timber, brush, refuse, trash, fencing and other incidental materials not required for

reuse on the site.

B. Clearing shall also include the removal and disposal of debris, refuse, or structures that obtrude, encroach upon, or otherwise obstruct the Work, including existing riprap or armoring within areas designated for clearing.

C. Brush and other vegetation in areas to be cleared shall be cut off flush with or below the original ground surface, except such vegetation as may be indicated or directed to be left standing.

D. The Contractor shall grub the area within the clearing limits to completely remove and dispose of stumps and root systems (roots larger than 3 inches in diameter), except for those to remain.

E. Material to be grubbed, together with logs and other organic material not suitable for subgrade purposes, shall be removed to a depth of not less than 18 inches below the original surface level of the ground in areas indicated to be grubbed.

F. Depressions, excavations and voids resulting from the removal of stumps or roots shall be filled with suitable material and compacted as specified under Section 310000 – EARTHWORK.

3.6 Selective Clearing and Thinning

A. Selective clearing and thinning shall be completed as directed by the Engineer. Approximate limits of selective clearing and thinning are shown on the Drawings.

B. The work shall include the removal of dead and diseased tree limbs and plants, and pruning and removal of live vegetation that interferes with the growth of other trees and plants. Areas of dense growth shall be thinned to provide room for healthy growth.

3.7 Stripping

A. Stripping shall consist of the removal of grass to a depth of at least 3 inches and removal of all topsoil and organic soils to a minimum depth of 6 inches.

B. The Contractor shall remove grass before stripping topsoil.

C. The Contractor shall strip and stockpile topsoil to whatever depths are encountered in a manner to prevent intermingling with underlying subsoil or other waste materials.

D. The Contractor shall remove subsoil and non-soil materials from topsoil, including trash, debris, weeds, roots, and other waste materials.

3.8 Filling Voids

A. Completely fill all voids including, but not limited to: excavation areas, and voids resulting from demolition or removal of structures with suitable material as specified in Section 310000 – EARTHWORK.

B. Areas to be filled shall be free of standing water, frost, frozen, and unsuitable material prior to fill placement.

C. Place and compact fill materials in conformance with the requirements of Section 310000 – EARTHWORK.

D. Grade surface of filled areas to match adjacent grades and slope to provide surface drainage.

3.9 Removal and Abandonment of Utilities

A. Drain pipes designated to be abandoned shall have lines plugged and grouted

B. The Contractor shall remove frames, covers, and grates from manholes, catch basins and gate valves and satisfactorily store and protect them until they are required for reuse in the work. Existing frames, covers, and grates determined by the Engineer to be unsuitable for reuse shall be removed from the site.

3.10 Job Conditions

A. Condition of Structures: The Owner assumes no responsibility for actual conditions of items or structures to be demolished. Conditions existing at the time of commencement of the contract will be maintained by the Owner insofar as is practical. However, variations within the structure may occur by the Owner's removal and salvage operations prior to start of selective demolition work.

B. Damages: The Contractor shall promptly repair all damages caused to adjacent facilities and equipment by clearing and demolition work at no additional cost to the Owner.

C. Traffic: The Contractor shall conduct clearing and demolition operations in a manner to ensure minimum interference with roads, streets, walks, parking lots and other adjacent occupied or used facilities.

D. Utility Services: The Contractor shall maintain and protect existing services.

3.11 Disposal of Demolished Materials

A. The Contractor shall propose for the Engineer's approval, an off-site, legal, disposal location for material generated during clearing and demolition operations.

B. All material generated during clearing and demolition operations shall be disposed of at the approved disposal location.

C. Stripped topsoil shall be stockpiled on site for potential reuse.

D. No burning of any material will be allowed.

E. The use of explosives will not be permitted without specific authorization in writing by the Owner.

F. Underground boring is not permitted on the property without specific authorization in writing by the Owner.

(END OF SECTION 31 10 00)

SECTION 31 23 19

DEWATERING

PART 1 - GENERAL

1.1 Description

A. Work specified in this Section includes, but is not necessarily limited to, furnishing all labor, materials and equipment for dewatering activities necessary to control of surface and subsurface water within the site.

1.2 Price and Payment Procedures

A. Measurement and payment requirements per the Request for Proposals – Safety Complex-Road Construction.

1.3 Dewatering System Requirements

A. The Contractor shall design the water management systems to:

1. Effectively reduce the hydrostatic pressure and lower the groundwater levels to a minimum of 2 feet below the bottom of excavations;
2. Develop a substantially dry and stable subgrade for the proposed work;
3. Prevent damage to adjacent properties, buildings, structures, utilities and other facilities;
4. Retain all sediments on-site within the work area.

B. Pumps and Piping or Hose:

1. The Contractor shall provide pumps and piping or hose capable of removing water from within the Limits of Excavation.
2. The Contractor shall notify the Engineer whenever pumps are added or removed.
3. The Contractor shall provide sufficient pumps and piping or hose to dewater all areas where site clearing, excavation, backfill, and other operations are taking place at any time.

C. The Contractor shall design, provide, install, and operate the Dewatering System. The Engineer shall approve the design prior to procurement or installation of same.

D. Locate dewatering facilities where they will not interfere with utilities and construction work to be done by others.

E. Modify dewatering equipment and procedures when operations are insufficient to maintain a dry excavation or threaten to cause damage to new or existing facilities or adjacent areas.

F. The Dewatering System may include pumps and piping or hose, instrumentation and controls, sumps, wells, well points and temporary diversion devices.

G. The Contractor shall design the collection system for excavation dewatering to minimize collection of suspended

solids.

H. The presence of groundwater, to any degree, will not constitute a condition for which an increase in the contract price may be made.

I. Temporary Diversion Devices – The Contractor shall provide sand bags, coffer dams or other effective temporary diversion devices required to divert water away from excavation areas and to locations where dewatering pumps are installed.

1.4 Submittals

A. None Required.

PART 2 - PRODCUTS

2.1 General

A. The Contractor shall provide, operate, and maintain a dewatering system consisting of pumps, drains, piping instrumentation and controls, sumps, deep wells, well points, temporary diversion devices and any other facilities necessary to control water levels in areas of work, including spare units available for immediate use in the event of equipment breakdowns.

PART 3 - EXECUTION

3.1 General

A. The Contractor shall design, install, operate, and remove the dewatering systems in accordance with applicable federal, state, county and local Laws and Regulations, and generally accepted industry practices.

B. The Contractor shall perform dewatering work when necessary at no additional cost to the Owner.

C. Pumping of large volumes of water from sumps in trenches or excavations, resulting in movement of foundation soil material, will not be permitted.

D. Groundwater shall be continuously maintained at least 2-feet below the working construction grade until earthworks and/or backfilling are complete.

3.2 Surface Water Control

A. Intercept and divert surface water runoff away from excavations through the use of dikes, curbing, walls, ditches, pipes, sumps or other approved means.

B. The Contractor shall collect and prevent surface and subsurface water seepage from entering the excavations. Divert the water to settling basins or other approved equipment required to reduce the amount of fine particles before discharge into drainage pipes and natural water courses. If a drainage system or water course is silted or becomes blocked due to dewatering operation, it shall be cleaned by the Contractor at no additional cost to the Owner.

3.3 Dewatering Excavations

A. The Contractor shall furnish and install the components of the Dewatering System as required to perform the work and keep the site free of standing water or excessively muddy conditions as needed for proper execution of the construction work.

B. Perform dewatering operations to lower the groundwater level in excavations as required to provide a stable, dry subgrade for the prosecution of the proposed work.

C. Maintain dewatering operations in a manner that prevents buildup of excessive hydrostatic pressure and damage to structures and the subgrade.

D. Do not allow water to accumulate in excavations. Contractor shall provide and maintain ample means and devices to remove promptly, and to dispose of properly, all water entering excavations and to keep them dry until the proposed work is completed.

E. The Contractor, in consultation with the Engineer, shall modify the operation procedures on design based on field conditions, if necessary to meet performance requirements of the system.

F. The dewatering areas shall be limited to areas where Work is being conducted and areas where Work is planned for that day.

G. The Contractor shall grade the excavation area using slopes, berms and sumps in conjunction with the dewatering systems to channel water away from the immediate Work areas to minimize dewatering.

H. Do not discharge water to protected environmental resources without treatment to remove suspended solids and sediments.

I. No pipe shall be laid in water. Contractor shall constantly guard against the possibility of flotation of pipe or structures after installation. Backfill or other means shall be placed promptly to prevent this occurrence.

3.4 Disposal of Water

A. The Contractor shall dispose of water pumped or drained from the construction site in a suitable manner to avoid public nuisance, injury to public health, damage to public and private property, and damage to the work completed or in progress.

B. Water discharged from construction and dredging operations shall be directed to sediment settling facilities, sediment filtration devices, or other treatment system or device accepted by the Engineer, prior to discharge to adjacent water courses.

C. The Contractor shall provide suitable temporary channels for water that may flow along or across the construction site.

D. The Contractor shall not allow ground or surface water to enter piped utilities, except where the Owner specifically allows the

use of storm drains for receiving such discharges.

E. Effluent from dewatering operations shall not be discharged directly to wetlands or waterways and shall not be discharged to storm drain systems prior to being filtered through a siltation basin.

F. Discharge shall be such that no erosion occurs.

3.5 Damage

A. The Contractor shall discharge water pumped from excavations in a manner which will not result in damage to adjacent properties.

B. All damage resulting from the dewatering operations, or the failure of the Contractor to maintain the work in a suitably dry condition shall be repaired by the Contractor at no additional cost to the Owner.

C. The Contractor shall take all necessary precautions to protect new work from flooding and flood damage during storms or from other causes.

D. The Contractor shall thoroughly brace or otherwise protect all pipelines and structures which are not stable, against flotation, when necessary.

3.6 Removal of Temporary Works

A. After the temporary works have served their purposes, the Contractor shall remove them or level and grade them to the extent required by the plans and to prevent any obstruction of the flow of water or any other interference with the operation of or access to the permanent work.

(END OF SECTION 31 23 19)

SECTION 31 25 00

EROSION AND SEDIMENTATION CONTROLS

PART 1 - GENERAL

1.1 Summary

A. This Section specifies requirements for temporary and permanent erosion and sedimentation control provisions as they relate to the construction process.

B. The work includes:

1. Providing and maintaining all temporary erosion and sedimentation control measures shown on the Drawings and required by the Engineer during the life of the Contract to control soil erosion and water pollution.

2. The installation and maintenance of additional silt fence, berms, ditches, sedimentation basins, construction exits, fiber mats, catch basin filters, straw, netting, gravel, trenches, mulches, grasses, slope drains, and other approved erosion control devices or methods, needed to protect any areas on or off site.

3. Dust suppression.

C. When the use of siltation fence is ordered, the Contractor shall furnish and place siltation fence as a temporary erosion and pollution control device at locations shown on the plans or ordered by the Engineer. The Contractor shall not use hay bales for siltation barriers unless specifically shown on the Drawings or authorized by the Engineer.

D. When seeding is ordered, the Contractor shall sow seed of the type ordered on the areas as directed by the Engineer.

1.2 Price and Payment Procedures

A. Measurement and payment requirements per the Request for Proposals – Safety Complex-Road Extension.

1.3 References

A. NHDOT Standard Specifications for Road and Bridge Construction

B. Applicable portions of the Town of Plaistow Ordinances and Bylaws

1.4 Definition and Coordination of Erosion and Sedimentation Control Provisions

A. Permanent erosion and sedimentation control measures are defined as those elements that are to be incorporated into the final project product, including but not necessarily limited to such items as: finish paving and landscape, detention basin forebays, sedimentation control structures (Voctechnics, Stormceptor, catch basins, etc.), swales and ditches, berms, and other such items.

B. Temporary erosion and sedimentation control measures are defined as those elements that are required by permit approvals and

necessary to be installed by the Contractor to meet federal, state and local regulations for the construction program, including, but not necessarily limited to, such items as: silt fences, berms, portable sedimentation basins, straw bales, check dams, and other such items, all of which shall be removed by the Contractor after installation of permanent erosion and sedimentation control measures, stabilization of the site, and prior to final completion of the project.

C. The temporary control provisions shall be coordinated with the permanent erosion and sedimentation control features to the extent practical to ensure economical, effective, and continuous erosion and sedimentation controls throughout the construction and post-construction periods.

1.5 Laws and Regulations

A. Copies of these publications are available for inspection at the office of the Engineer.

1.6 Review and/or Inspection of Erosion and Sedimentation Control Measures

A. All construction under this project shall be subject to review and/or inspection by the appropriate local, State and Federal agencies responsible for ensuring the adequacy of erosion and sedimentation control measures.

B. Erosion and sediment controls must be reviewed by a qualified person employed by the Contractor at least once every 7 calendar days or once every 14 calendar days and within 24 hours of the occurrence of a storm event greater than 0.25 inches of rain. The Contractor will be responsible for completing these inspections and documenting the inspections.

1.7 Design Criteria

A. The Contractor shall conduct all construction in a manner and sequence that causes the least practical disturbance of the physical environment.

B. The Contractor shall stabilize disturbed earth surfaces in the shortest practical time and employ any and all such temporary erosion control devices as may be necessary until such time as adequate soil stabilization has been achieved or permanent erosion control devices are operational.

C. The erosion control devices specified herein and indicated on the Drawings represent the minimum required Work for erosion control. The Contractor shall add to these minimum devices any and all measures to effectively prevent migration of sediment from the work area at no additional cost to the Owner.

1.8 Construction Operations

A. When in the opinion of the Engineer it becomes necessary, the Engineer will inform the Contractor of construction procedures and operations that jeopardize erosion and sedimentation control provisions. If these construction procedures and operations are not corrected promptly, the Owner may suspend the performance of any or all construction until corrections have been made, and

such suspension shall not be the basis of any claim by the Contractor for additional compensation from the Owner nor for an extension of time to complete the Work.

1.9 Submittals

A. The Contractor shall submit product data sheets for the following products:

1. Seed Mix for clean stockpiles;
2. 6 millimeter (mm) thick polyethylene for contaminated stockpiles;
3. Straw Bales;
4. Silt Fence; and
5. Catch Basin Inlet Filters

PART 2 - PRODUCTS

2.1 Materials

A. Straw bales.

1. Bales shall be made of straw with forty pounds minimum weight and one hundred and twenty pounds maximum weight. They should be either wire bound or string tied.
2. Wood stakes shall be a minimum of 2-inches by 2-inches nominal size and a minimum of 3-feet long.

B. Silt Fence.

1. The silt fence shall consist of a 3-foot wide continuous length sediment control fabric, stitched to 2 1/2-foot wide, continuous length support netting, and stapled to pre- weathered oak posts installed as shown on the drawings. The oak posts shall be 2-inches by 2-inches by 4.5 feet and shall be tapered. The support netting shall be a woven industrial strength polypropylene geotextile in accordance with Geotextiles - Section 31 05 19.

C. Construction Entrance

1. Crushed stone shall be in accordance with Earthwork – Section 31 00 00.
2. Geotextile shall be a nonwoven geotextile as approved by the Owner and Engineer.
3. The construction entrance shall be installed prior to starting site grading and maintained throughout construction.

D. Catch Basin Inlet Filter

1. Catch basin inlet filters shall be installed as indicated on the plans and at any additional catch basins which may accumulate sediment due to the construction.
2. Filter shall be a nonwoven geotextile as approved by the Owner and Engineer.

PART 3 - EXECUTION

3.1 General Erosion Control Requirements

A. Prior to commencement of the work, the Contractor shall meet with the Engineer to develop a mutual understanding relative to compliance with the provisions of this Section and administration of the erosion and sediment control program.

B. The Contractor shall construct all permanent erosion and sedimentation control features at the earliest practical time as outlined in the accepted schedule. Temporary erosion and sedimentation control measures shall be used to correct conditions that develop during construction which were unforeseen, but are needed prior to installation of permanent erosion and sedimentation control features, or that are needed temporarily to control erosion or sedimentation which develops during construction operations.

C. The Engineer/ Owner has the authority to control the surface area of each material exposed by construction operations and to direct the Contractor to immediately provide permanent or temporary erosion control measures to prevent contamination of adjacent streams, watercourses, lakes, ponds, storm drainage systems or other areas of water impoundment. Every effort shall be made by the Contractor to prevent erosion on the site and abutting properties and roads.

D. Where erosion is likely to be a problem, clearing and grubbing operations shall be scheduled and performed so that grading operations and permanent erosion and sedimentation control features can follow immediately thereafter, if conditions permit; otherwise, temporary erosion and sedimentation control measures will be required between successive construction stages.

E. The Contractor shall operate all equipment and perform all construction operations so as to minimize pollution. The Contractor shall cease any operations that will increase pollution during rainstorms.

F. The Contractor shall place additional erosion and sedimentation controls as required by laws and regulations.

G. The Contractor shall use erosion controls to contain discharge from pumping operations during dewatering operations to prevent silt from entering the storm drains or receiving watercourse.

H. Contractor shall be responsible for controlling erosion within the project area and retaining sediment on-site away from sensitive environmental resources. Any fines, construction delays, remedial actions, or incarceration resulting from the Contractor’s failure to comply with these provisions shall be the responsibility of the Contractor and not the Owner. The Contractor shall remove the erosion control installations upon completion of the Work or if ordered by the Engineer.

I. Failure by the Contractor to control erosion, pollution, and siltation shall be cause for the Owner to employ outside assistance to provide the necessary corrective measures. The cost of such assistance, including engineering costs, will be charged to the Contractor and appropriate deductions made from the Contractor's

monthly progress payment.

J. The Contractor shall remove and properly dispose of sediment from control facilities as required by the Engineer. The Contractor shall modify and improve erosion and sedimentation control facilities and replace deteriorated straw bales and other devices as required by the Engineer.

K. Prior to removal of all siltation fencing and/or sediment control devices, the Contractor shall remove and dispose of all retained silt or other materials at no additional cost to the Owner.

L. Minimum temporary and permanent erosion and sedimentation control measures are shown on the Drawings. The Contractor shall strictly adhere to the minimum provisions shown. Additionally, temporary measures shall be selected and constructed by the Contractor in consultation with the Engineer to accommodate changing field conditions that develop during construction.

M. All disturbed areas shall be re-vegetated by loaming and seeding unless otherwise noted on the approved plan.

N. Slopes with exposed soils shall be stabilized by mulching, seeding or otherwise protected as the work progresses to comply with the intent of this specification. All damaged slopes shall be repaired as soon as possible. The Engineer will limit the surface area of earth material exposed if the Contractor fails to sufficiently protect the slopes to prevent pollution.

O. The Contractor shall at all times have on hand the necessary materials and equipment to provide for early slope stabilization and corrective measures to damaged slopes.

3.2 Dust Suppression

A. The Contractor will be responsible for implementing dust mitigation measures at the direction of the Engineer. Dust mitigation may involve wetting the work area with water/amended water to reduce dust levels or other means as required to achieve acceptable dust thresholds during earthwork. Sprinkling shall be repeated at such intervals as to keep the disturbed area damp at all times. Should dust exceed permissible levels for extended periods of time (i.e., one work day), it may be necessary to halt work until dust mitigation is effective and this work stoppage will not be cause for a delay or claim by the Contractor.

3.3 Erosion and Sedimentation Control – Straw Bales

A. Straw bales shall be installed at the locations, shown on the Drawings and in general as follows:

1. Toe of slope of embankment construction to filter all runoff flowing to off-site discharges.

2. Toe of temporary earthwork stockpile slopes.

3. Across construction ditches prior to entry into drainage system or waterway, and at 50 foot intervals along the remainder of the ditch.

4. Surrounding completed drainage inlets.

5. Other locations shown on the Contract Drawings and required by laws, regulations, and permits.

B. Straw bales shall be installed in line with each bale installed tight against the previous bale to form a continuous barrier. The bales shall be set in a trench approximately 4 inches into the ground. Secure bales in place with two (2) stakes per bale. Stakes shall be driven a minimum of 18-24 inches into the ground. The bales shall be set in a trench approximately 4 inches into the ground.

C. After the bale lines are staked, the end joints shall be chinked with loose hay to close any gaps. Excavated soil shall then be backfilled against the uphill side of the barrier to a depth of 4-inches above the downhill grade.

D. Following compaction of the backfill, loose hay shall be scattered over the surface directly behind the barrier.

E. Soil shall be placed on the upside slope of the bales. Deteriorated, destroyed, or rotted bales shall be replaced immediately. Sediment shall be removed and disposed of periodically from behind the straw bales. Sediment shall be removed from behind the straw bales when it has accumulated to one-half the original height of the bale measured at the low point or if ordered by the Engineer. The accumulated sediment shall not be allowed to rise above the mid-height of the bale. All sediment, straw bales, and appurtenances shall be removed and disposed of at the completion of the Contract.

3.4 Silt Fence

A. Silt fence shall be installed at locations as shown on the Drawings.

B. Silt fence posts shall be spaced eight (8) feet center-to-center or closer. They shall extend at least two (2) feet into the ground. They shall extend at least two (2) feet above ground. Supporting posts shall be spaced 4 feet on center, and driven at least 1 foot into the ground. Posts shall be 1-1/2 inch square or heavier wood posts or standard steel posts.

C. Fabric shall be anchored in a 46-inch deep trench dug on the upslope side of the posts. The trench shall be at least 4 inches wide. The fabric shall be laid in the trench, backfilled, and compacted.

D. Fabric rolls shall be spliced at posts. The fabric shall be overlapped 6 inches, folded over, and then securely fastened to posts by nailing or stapling.

E. Silt fences shall be inspected immediately after each storm event and at least daily during prolonged rainfall.

3.5 Construction Entrance

A. The Contractor shall excavate the area of the entrance to a minimum of 3 inches and clear existing vegetation, roots, and other objectable material.

B. Filter fabric shall then be placed the full widths and length of the entrance followed by stone to the specified dimensions.

C. The Contractor shall maintain the entrance in a condition which will prevent the tracking or flow of dirt or mud onto public right of ways.

3.6 Maintenance of Erosion and Sedimentation Control Measures

A. The Contractor shall check the condition of erosion and sedimentation control devices daily and maintain them in good operating condition. Straw bales shall be replaced when deteriorated.

B. The Contractor shall inspect the condition of diversion dikes and ditches, filter berms, interceptor dikes, sediment basins, and other erosion and sedimentation control devices after each rainstorm and during major storm events. Repairs shall be made as necessary.

C. During construction, temporary outlets of the drainage systems shall direct the flow to temporary or permanent sedimentation basins.

D. Temporary soil erosion and sedimentation control devices shall be removed and adjacent areas outside the limits of grading restored upon completion of the work or when required by the Engineer.

3.7 Removal and Cleanup

A. All temporary erosion control facilities and accumulated sediments shall be removed in a neat and workmanlike manner when all disturbed areas have been satisfactorily stabilized as determined by the Engineer.

B. Straw bales should be broken up and dispersed on the adjacent ground once the Engineer has determined that all disturbed areas are satisfactorily stabilized.

C. Sediments and other earth materials resulting from the installation/operation of the soil erosion and sediment control structures shall not leave the project site unless so directed by the Engineer, but shall be consolidated below the proposed cover soil layer as practicable. Management of sediment shall be performed by the Contractor at no additional expense to the Owner. The Contractor shall perform all sediment management activities in close coordination with the Engineer.

D. The Contractor shall remove or level and grade to the extent required by the plans and to prevent any obstruction of the flow of water or any other interference with the operation of or access to the completed work.

(END OF SECTION 31 25 00)

SECTION 32 92 19

SEEDING

PART 1 - GENERAL

1.1 Description

A. Work specified in this Section includes, but is not necessarily limited to, furnishing all labor, materials, and equipment for site seeding and landscaping.

B. The work includes:

1. Furnishing, spreading, and fine grading of topsoil and loam borrow

2. Application of lime and fertilizers.

3. Seeding and mulching

4. Maintenance of seeded areas.

C. All areas disturbed during construction shall be seeded and/or planted to a condition equal to that prior to the start of construction. All areas to be seeded and/or planted shall have a minimum of 6 inches of approved topsoil.

D. No topsoil shall be placed prior to acceptance of test result submittals by the Engineer.

1.2 Price and Payment Procedures

A. Measurement and payment requirements per the Request for Proposals – Safety Complex-Road Construction.

1.3 Reference Materials

A. Reference Standards

1. NHDOT Standard Specifications for Road and Bridge Construction.

2. NHDOT Standard Plans for Road Construction.

1.4 Submittals

A. Manufacturers Product Data

1. Submit material specifications and installation instructions where applicable attesting that the following materials meet the requirements specified:

a. Fertilizer.

b. Seed.

c. Lime.

B. Soil Test Reports

1. Prior to ordering the topsoil, submit soil test report to the Engineer for review and approval. Do not order materials until approval has been obtained. Delivered materials shall closely match the approved samples.

C. Certificates

1. A manufacturer's Certificate of Compliance to the specifications shall be submitted by the manufacturer’s with each shipment of each type of seed. These certificates shall include the guaranteed percentages of purity, weed content, and germination of the seed; the net weight of seed; and date of shipment. No seed shall be sown until the Contractor has submitted these certificates.

D. Maintenance Manual

1. The Contractor shall submit a written manual prepared for the Owner that outlines a schedule for proper maintenance of the seeded lawns. This maintenance schedule should include timing and methods for mowing, watering, aeration, fertilization, liming, and other lawn maintenance operations.

E. Submittal Schedule

1. Before installation:

a. Manufacturer's product data for seed.

b. Soil test reports.

c. Seed certification.

d. Hydroseed mix.

2. After installation and before acceptance

a. Maintenance Manual.

1.5 Quality Assurance

A. All work shall be performed by personnel experienced in lawn installation under the full time supervision of a qualified foreman.

B. Work shall be coordinated with all other trades on site.

1.6 Delivery, Storage, and Handling

A. Deliver material to the site in original unopened packages, showing weight, manufacturer's name, and guaranteed analysis.

B. Store materials in a manner that their effectiveness and usability will not be diminished or destroyed. Materials shall be uniform in composition, dry, unfrozen, and free flowing. Any material which has become caked or otherwise damaged or which does not meet specified requirements will be rejected.

1.7 Inspection for Acceptance

A. Conditions of Acceptance

1. Acceptance shall be given for the entire portion of the lawn areas. No partial acceptance will be given.

2. Lawns shall exhibit a uniform, thick, well-developed stand of grass. Lawn areas shall have not bare spots in excess of four inches in diameter and bare spots shall comprise no more than

2% of the total area of the lawn.

3. Lawn areas shall not exhibit signs of damage from erosion, washouts, gullies, or other causes.

4. Pavement surfaces and site improvements adjacent to lawn areas shall be clean and shall be free of spills or overspray from placing or handling of topsoil and seeding operations.

B. Inspection and Acceptance

1. Upon written request of the Contractor, the Engineer will inspect all lawn areas to determine completion of work. This request must be submitted at least five days prior to the anticipated inspection date.

2. If the lawn areas are not acceptable, the Engineer will indicate corrective measures to be taken, and shall extend the maintenance period as necessary for the completion of the work. The Contractor shall request a second inspection of the lawns after corrective measures have been accomplished. This process shall be repeated until the total lawn area being inspected is acceptable.

3. When the lawn areas are acceptable, a meeting of the Contractor and Owner's Representative will be arranged to accept the lawn work. A final inspection will be a part of this meeting. At this meeting, the Contractor shall be furnished with a written acceptance of the lawn section being approved. The Contractor shall turn over maintenance of the lawn areas to the Owner at this meeting.

4. Following the acceptance of lawns, the Contractor shall provide the Owner with access to all lawn areas as required for the Owner's maintenance work.

C. Site Cleanup

1. The Contractor shall leave the site in a clean and neat condition. Final acceptance will not be granted until this condition is met.

PART 2 - PRODUCTS

2.1 Soils

A. Topsoil shall conform to the requirements of Section 310000 – Earthwork.

B. Testing shall confirm that the topsoil, obtained from the site or loam from off-site, contains not less than 4% nor more than 20% organic matter as determined by the loss on ignition of oven- dried samples. Test samples shall be oven-dried to a constant weight at a temperature of 230 degrees F. (±5 degrees F.) and certified test results shall be sent to the Engineer by the laboratory for approval.

2.2 Soil Conditioning Materials

A. Lime: Lime shall be an approved agricultural limestone containing no less than 50% total carbonates, and 25% total magnesium with a

neutralizing value of at least 100%. The material shall be ground to such a fineness that 40% will pass through a No. 100 U.S. Standard Sieve, and 98% will pass through a No. 20 U.S. Standard Sieve. The lime shall be uniform in composition, dry and free flowing, and shall be delivered to the site in the original, unopened containers, each bearing the manufacturer's guaranteed analysis. Any lime that becomes caked or otherwise damaged (making it unsuitable for use) will be rejected.

B. Fertilizer: Fertilizer shall be a complete, standard product complying with state and federal fertilizer laws. The fertilizer shall be uniform in composition, dry and free flowing, and shall be delivered to the site in the original, unopened containers, each bearing the manufacturer's guaranteed analysis, and submitted to the Engineer for approval.

1. Fertilizer shall contain the following minimum percentage of available plant food by weight: 10% nitrogen, 10% phosphorus, 10% potash, in which 75% of the nitrogenous elements shall be derived from organic sources or ureaform.

2. Exact percentages of fertilizer may vary in accordance with the soil test report.

3. Any fertilizer that becomes caked or otherwise damaged (making it unsuitable for use) will be rejected.

C. Superphosphate: Superphosphate shall be composed of finely ground phosphate rock, as commonly used for agricultural purposes, and containing not less than 20% available phosphoric acid. Superphosphate shall be delivered to the site in the original, unopened containers, each bearing the manufacturer's guaranteed analysis and submitted to the Engineer for approval. Any superphosphate that becomes caked or otherwise damaged (making it unsuitable for use) will be rejected.

2.3 Water

A. Water shall be furnished by the Contractor, suitable for irrigation, and free from ingredients harmful to plant life. Hoses and other watering equipment required for the work shall be furnished by the Contractor.

2.4 Seed

A. Seed shall be: fresh, clean, and selected from the previous year's crop; shall have a maximum weed seed content of 1%; shall comply with applicable federal and state seed laws; and shall furnished and delivered premixed in unopened containers in proportions consistent with the NHDOT Standard Specifications for Road and Bridge Construction Section 644.

2.5 Mulch

A. Wood Cellulose Fiber Mulch

1. Mulch to cover hydroseeded areas shall be fiber-processed from whole wood chips manufactured specifically for standard hydraulic mulching equipment. Fiber shall not be produced from

recycled material such as sawdust, paper, or cardboard.

2. Moisture content shall not exceed 10%, plus or minus 3%, as defined by the pulp and paper industry standards. Fiber shall have a water holding capacity of not less than 900 grams of water per 100 grams fiber.

3. Mulch shall disperse into a uniform slurry when mixed with water. Mulch shall be nontoxic to plant life or animal life.

4. Mulch shall contain a non-petroleum based tackifier and a green dye for visual monitoring during application, but non-injurious to plant growth.

2.6 Erosion Control Matting for Sloped Areas

A. Matting for erosion control shall be provided on all slopes of 1 foot rise to 2 feet and steeper and shall consist of undyed and unbleached smolder resistant jute yarn woven into a uniform, open, plain weave mesh. Jute matting shall be furnished in rolled strips and shall conform to the following:

1. Width: 48 inches, plus or minus one inch.

2. 78 warp ends per width of cloth.

3. 41 weft ends per yard.

4. Weight: To average between 1.22 lbs. and 1.80 lbs. per linear yard.

5. Tolerance: plus or minus 5%

B. Stakes for pegging erosion control matting shall be sound hardwood approximately 1 inch by 3 inches. Stakes shall be free from insects and fungi and capable of remaining intact in the ground for at least two years.

2.7 Hydroseed Mix

A. The Contractor shall submit a certified statement as to number of lbs. of fertilizer, amounts and types of grass seed, and processed fiber, per 100 gallons of water.

PART 3 - EXECUTION

3.1 Seed Bed Preparation

A. Grade all lawn areas to finish grades as indicated on the Drawings. When no grades are shown, areas shall have a smooth and continual grade between existing or fixed controls and elevations shown on Drawings. Roll, scarify, and rake as required to obtain uniform, even lawn surfaces. All lawn areas shall slope to drain. Finish grades shall be approved by the Engineer.

B. If no new topsoil is required, thoroughly loosen soil in areas to be seeded to a minimum depth of 6 inches with approved power or hand equipment. Remove rocks, debris, clods and other undesirable substances, and maintain grading and drainage patterns.

C. When topsoil is required, place topsoil on previously scarified

subsoil to a minimum depth of 6 inches. Subsoil shall be cleaned of debris and stones larger than 2 inches prior to topsoil spreading.

D. Apply fertilizer, superphosphate, and lime, at rates recommended by the testing agency and approved by the Engineer. Thoroughly and evenly incorporate fertilizer and lime into the soil to a depth of 3 inches by discing or other approved methods. In areas inaccessible to power equipment, fertilizer and lime shall be incorporated into the soil by manual methods. At existing trees, the depth shall be adjusted to avoid disturbance of the tree roots.

E. Seeding shall be done immediately after final grading, provided the bed has remained in a good, friable condition, and has not become muddy or compacted. Any undulations or irregularities in the surface resulting from fertilizing, liming, tilling, or other causes, shall be regraded prior to seeding. The surface shall be free of stones, cleared of all trash, debris, roots, brush, wire, grade stakes, and other objects that would interfere with establishment of lawn and lawn maintenance operations.

3.2 Hydroseed Bed Preparation

A. Prepare seed bed for hydroseeding the same as for seeding, but do not incorporate fertilizer into the top 3 inches of topsoil.

B. Hydroseeding shall be applied with a spray machine designed for this purpose and approved by the Engineer.

3.3 Seeding

A. Seeding shall be done between April 1 to June 1, or between August 15 to October 15, except as otherwise authorized in writing by the Engineer.

B. All disturbed areas not otherwise developed shall be seeded.

C. Seeding shall not be done during windy or inclement weather.

3.4 Manual Seeding

A. Sow lawn seed uniformly with an approved mechanical seeder at the rate of 5 lbs. per 1,000 square feet. Culti-packer or approved similar equipment may be used to cover the seed and to form the seed bed in one operation. In areas inaccessible to the Culti-packer, the seeded ground shall be lightly raked with flexible rakes and rolled with a water ballast roller. Seeding shall be done in two directions at right angles to each other.

B. In areas having slopes 3:1 or steeper, and in drainage swales, the Contractor shall carry out a separate overseeding operation immediately after sowing the specified seed mix. The overseeding shall be sown at the rate of 3 lbs. per 1,000 square feet. Seeded areas requiring additional erosion control, shall be covered with an approved, biodegradable erosion control fabric and the fabric firmly anchored in place.

3.5 Hydroseeding

A. Designated areas shall be hydroseeded only after written approval of the finished grading by the Engineer.

B. Fertilizer shall be added to the hydroseeding slurry at the rate of 5 lbs. per 1,000 square feet.

C. Seed shall be added to the hydroseeding slurry at the rate of 75 lbs. per acre.

D. Wood cellulose fiber mulch shall be added to the hydroseeding slurry at the rate of 2 tons per acre.

E. A mobile tank with a capacity of at least 500 gallons shall be filled with water, and the required amounts of seed, wood cellulose mulch, and fertilizer. The slurry shall be thoroughly mixed by means of positive agitation in the tank. The slurry shall be applied by means of a centrifugal pump using the turret or hose application technique from the mobile tank. The hose or turret shall be equipped with a seeding nozzle of a proper design to ensure even distribution of the solution over the area to be seeded and shall be operated by a person thoroughly familiar with this type of seeding operation.

3.6 Maintenance and Protection

A. Maintenance of seeded areas shall begin immediately after installation. Maintenance includes watering, weeding, mowing and edging, reseeding, disease and insect pest control, repair of all erosion damage, and any other procedures consistent with good horticultural practice, required to ensure normal, vigorous, and healthy growth. Maintenance shall continue until final acceptance of the work.

B. Maintenance shall also include all temporary protection fences, barriers, signs, and all other work incidental to proper maintenance.

C. Scattered bare spots will be allowed up to a maximum of 2% of any lawn area, provided none are larger than 72 square inches. After the grass has sprouted, all bare areas shall be re-seeded repeatedly until all areas are covered with a satisfactory growth of grass. At the time of the first cutting, lawn should be mowed not less than 2-1/2 inches high. Do not remove more than one- third of the grass blade. All lawns shall receive at least three mowings before acceptance.

D. The seeded areas shall be maintained in a continuous moist condition, satisfactory for good germination and growth of grass until acceptance.

E. Six weeks after the seeded areas have become established, fertilizer shall be applied over the entire area.

(END OF SECTION 32 92 20)

SECTION 33 40 00

STORMWATER UTILITIES

PART 1 - GENERAL

1.1 Summary

A. This Section specifies requirements for furnishing and installing the site storm drainage utilities system, as indicated on the Drawings, as specified herein.

1.2 Price and Payment Procedures

A. Measurement and payment requirements per the Request for Proposals – Safety Complex-Road Extension

1.3 References

A. Reference Standards

1. NHDOT Standard Specifications for Road and Bridge Construction
2. NHDOT Standard Plans for Road Construction
3. Applicable portions of the Town of Plaistow Ordinances and Regulations

1.4 Submittals

A. Shop Drawings

1. Materials list of items proposed for the work.
2. Product Data
3. Certificates
   a. Manufacturer’s notarized certificate certifying conformance with the Specifications to accompany shipments.
4. Manufacturer Instructions

B. Closeout and Maintenance Material Submittals per the Request for Proposals – Safety Complex-Road Extension.

1.5 Quality Assurance

A. Provide in accordance with the Request for Proposals – Safety Complex-Road Extension.

1. Record depth and take ties to the locations of the following:
   a. Pipe stub capped ends
   b. Locations of plugged pipes
   c. Manholes and catch basins

1.6 Coordination and Verification

A. The Contractor shall field verify and survey the size, location and elevations of all existing pipe and utility lines prior to ordering of materials for this utility system. A report of the findings of

the verification survey shall be submitted to the Engineer for information and comment.

1.7 Delivery, Storage, and Handling

A. All materials shall be adequately protected from damage during transit. Pipes shall not be dropped.

B. All pipe and other appurtenances shall be inspected before placement in the work and any found to be defective from any cause, including damage caused by handling, and determined by the Engineer to be unrepairable, shall be replaced at no cost to the Owner.

C. Storage and handling of pipes and other system appurtenances shall be in accordance with the manufacturer’s recommendations.

1.8 Inspection

A. The manufacturer/supplier is responsible for the provision of all test requirements specified for each type of pipe. In addition, any pipe may be inspected at the plant for compliance with these specifications by an independent testing laboratory selected and paid by the Owner. The Contractor shall require the manufacturer’s cooperation in these inspections.

B. Inspection of the pipe may also be made after delivery. The pipe shall be subject to rejection at any time on account of failure to meet any of the specification requirements, even though pipe samples may have been accepted as satisfactory at the place of manufacture. Pipe rejected after delivery shall be marked for identification and shall be removed from the site at once.

PART 2 - PRODUCTS

2.1 General

A. All materials for storm drainage utilities system shall be new and unused.

2.2 Pipe

A. High Density Corrugated Polyethylene Pipe and Fittings, Smooth Interior: Shall meet the requirements of ASTM D3350. Four-inch through 10-inch diameter pipe corrugated polyethylene drainage pipe shall meet the requirements of AASHTO M 252. Twelve-inch through 60-inch diameter corrugated polyethylene pipe shall meet the requirements of AASHTO M 294, Types S. Standard Fitting connections shall be fabricated to sizes shown on the Drawings.

1. Pipe joints and fittings shall conform to the requirements of AASHTO M 252 or AASHTO M294. Pipe joints shall be Bell and Spigot soil tight joints and gaskets shall meet the requirements of ASTM F477. Fittings shall also be soil tight and gasketed.

2. Where called for on the Drawings, corrugated pipe shall be slotted or perforated by the manufacturer prior to delivery to the job site. Coupling bands shall conform to the manufacturer's specifications. Couplers shall cover not less than one corrugation on each section of pipe.

2.3 Storm Drain Manholes

A. Precast Concrete Construction:

1. Provide in accordance with NHDOT Standard Specifications for Road and Bridge Construction Section 604 and related sections.

2. Manhole shall be constructed of pre-cast reinforced concrete sections unless otherwise directed by the Engineer.

3. Precast Unit Joint Seals: Preformed butyl rubber O-ring type seals meeting the requirements of ASTM C990.

4. Openings for pipe and materials to be embedded in the walls of the manholes sections for joint seals shall be cast in the sections at the required locations during manufacture. Sections with incorrectly cast and patched pipe openings will be rejected.

5. Openings shall be cast into the manhole sections to receive entering pipes during manufacture. The openings shall be sized to provide a uniform 2 inch maximum annular space between the outside of the pipe wall and the opening in the riser. After the pipe is in position, the annular space shall be solidly filled with nonshrink mortar. Care shall be taken to assure that the openings are located to permit setting of the entering pipe at its correct elevation.

B. Steps:

1. Steps for manholes shall be steel reinforced copolymer polypropylene plastic step with at least a 14-inch wide stepping surface conforming to ASTM C478 and ASTM A615.

C. Manhole Frame and Cover: Grey iron casting conforming to ASTM A48, heavy duty, with word "DRAIN" embossed on cover. Letter size shall be three inches (3 in.). Frame and cover shall have a minimum clear opening of 24 inches and have a minimum weight of 475 pounds.

D. Frames and covers shall be manufactured in the USA.

2.4 Catch Basins

A. Provide in accordance with NHDOT Standard Specifications for Road and Bridge Construction Section 604 and related sections.

B. Brick and concrete block and other materials shall conform to Article 2.03B.

C. Cast iron frames and grate shall conform to ASTM A48, Class 30. When located in accessible ways, grate openings shall meet the requirements of federal, state, and local regulations adopted under the Americans with Disabilities Act (ADA).

D. Frames and grates shall be manufactured in the USA.

2.5 Flared End Sections

A. The Flared End Sections shall be high density polyethylene meeting ASTM D3350.

B. Installation shall be in accordance with the manufacturer’s instructions.

PART 3 - EXECUTION

3.1 General

A. Install storm drain system in accordance with Sections 603 and 604 of the NHDOT Standard Specifications for Road and Bridge Construction.

B. Contractor shall verify the location, size invert and type of existing pipes at all points of connection prior to ordering new utility materials.

C. All materials shall be stored and handled in accordance with the manufacturer's recommendations.

D. Pipe Grade Defined

1. All grades shown shall refer to the invert of the pipe unless otherwise noted. The invert is defined as the inside bottom of the pipe.

E. All pipe shall be laid accurately to the lines and grades shown on the Drawings and in conformance with the pipe manufacturer’s recommendations.

F. As soon as the trench is excavated to the normal grade of the bottom of the trench, the Contractor shall immediately place the bedding material in the trench. The pipe shall be firmly bedded in the compacted bedding material accurately to the lines and grades shown on the Drawings.

G. Laying Pipe: Each length of pipe shall be laid with firm, full and even bearing throughout its entire length, in a prepared trench. Pipe shall be laid with bells upgrade unless otherwise approved by the Engineer.

1. Every length of pipe shall be inspected and cleaned of all dirt and debris before being laid. The interior of the pipe and the jointing seal shall be free from sand, dirt and trash. Extreme care shall be taken to keep the bells of the pipe free from dirt and rocks so that joints may be properly lubricated and assembled. No pipe shall be trimmed or chipped to fit.

2. No length of pipe shall be laid until the proceeding lengths of pipe have been thoroughly embedded in place, to prevent movement or disturbance of the pipe alignment.

3. Take necessary precautions to prevent flotation of the pipe as a result of water in the trench.

H. Notch under pipe bells and joints where required to provide for uniform bearing under entire length of pipe.

I. Excavation, backfilling and compaction shall be as specified in Section 310000 - EARTHWORK.

J. Maintain optimum moisture content of bedding material to attain required compaction density.

K. Pipe Extension: Where an existing pipe is to be extended, the same type of pipe shall be used, unless otherwise approved by the Engineer.

L. Pipe Jointing: All joints shall be made in a dry trench and in accordance with the manufacturer's recommendations and the best practices for type of pipe installed. The ends of the pipe shall be wiped clean with a dry cloth before making the joint.

M. Full Lengths of Pipe: Only full lengths of pipe shall be used in the installation except that partial lengths of pipe may be used at the entrance to structures, and to accommodate the required locations of service connection fittings.

N. Pipe Entrances to Drainage Structures: All pipe entering drainage structures shall be cut flush with the inside face of the structure, and the cut ends of the pipe surface within the structure shall be properly rounded and finished so that there will be no protrusion, ragged edges or imperfections that will impede or affect the hydraulic characteristics of the stormwater flow. The method of cutting and finishing shall be subject to the approval of the Engineer.

O. Protection during Construction: The Contractor shall protect the installation at all times during construction, and movement of construction equipment, vehicles and loads over and adjacent to any pipe shall be performed at the Contractor’s risk.

1. At all times when pipe laying is not in progress, all open ends of pipes shall be closed by approved temporary watertight plugs. If water is in the trench when work is resumed, the plug shall not be removed until the trench has been dewatered and all danger of water entering the pipe eliminated.

3.2 Excavation and Backfilling for Pipes

A. The type of materials to be used in bedding and backfilling and the method of placement shall conform to the requirements of Section 310000 - EARTHWORK, the details shown on the Drawings and the following.

B. Embedment materials are those used for bedding, haunching and initial backfill around pipes as illustrated on the Drawings.

1. All embedment materials should be free from lumps of frozen soil or ice when placed. Embedment materials should be placed and compacted at optimum moisture content.

C. Trench Bedding: Material must be provided to insure proper line and grade is maintained. Unsuitable or unstable materials shall be undercut and replaced with a suitable bedding material, placed in 6 inch lifts. Other methods of stabilization, such as geotextiles may be appropriate and their use must be approved by the Engineer or Owner’s Representative.

1. Provide a stable and uniform bedding for the pipe and any

protruding features of its joints and/or fittings. The middle of the bedding equal to 1/3 of the pipe outside diameter should be loosely placed, with the remainder compacted to a minimum of 95 percent Modified Proctor Density.

D. Haunching: Proper haunching provides a major portion of the pipe's strength and stability. Exercise care to insure placement and compaction of the embedment material in the haunches. For larger diameter pipes (pipes greater than 30 inch diameter), embedment materials should be worked under the haunches by hand. Haunching materials shall be placed and compacted in 6 inch maximum lifts, compacted to 95 percent Modified Proctor Density.

E. Initial Backfill: The initial backfill shall be from the springline to 24 inches above the pipe to provide protection for the pipe from construction operations during placement of the final backfill and protect the pipe from stones or cobbles in the final backfill. Compact initial backfill per Section 310000 - EARTHWORK.

1. Flooding or jetting as a procedure for compaction are not allowed.

F. Final Backfill: The final backfill should be the same material as the proposed embankment or surface finishes. Generally, the excavated material may be used as final backfill. Placement should be as specified for the embankment. In lieu of a specification, the final backfill should be placed in 12 inch maximum lifts and compacted to a minimum 95 percent modified proctor density to prevent excessive settlement at the surface. Compaction should be performed at optimum moisture content.

G. Vehicular and Construction Loads: During construction, avoid heavy equipment loads (greater than 40,000 lbs. per axle) over the pipe. Additional temporary cover should be placed over the pipe for heavy construction load crossings. Hydrohammers or hoe-pak compactors may not be used over the pipe until at least 48 inches of cover have been provided.

3.3 Manholes and Catch Basins - Precast

A. Provide in accordance with Section 604 of the NHDOT Standard Specifications for Road and Bridge Construction.

B. Manholes, Catch Basins, and Drop Inlets: Shall be constructed at the locations and to the lines, grades, dimensions and design shown on Drawings or as required by the Engineer.

C. Precast Concrete Units: Shall be installed in a manner that ensures watertight construction and all leaks in precast concrete structures shall be sealed. If required, precast concrete structures shall be repaired or replaced to obtain watertight construction.

D. Stubs shall be short pieces of pipe cut from the bell ends of the pipe. Stubs shall be plugged with brick masonry unless otherwise directed by the Engineer.

E. Manhole Inverts shall conform accurately to the size of the adjoining pipes.

1. Manhole inverts shall be constructed of 3,500 psi concrete as shown the Drawings.

2. Inverts shall be laid out in smooth diameter curves of the longest possible radius to provide uniform flow channels.

3. Invert shelves shall be graded with a 1 inch drop per one foot length sloped from the manhole walls.

F. Manhole steps shall be accurately positioned and embedded in the concrete when the section is cast. Precast reinforced concrete manhole sections shall be set vertical and with sections and steps in true alignment.

G. All holes in sections used for their handling shall be thoroughly plugged with rubber plugs made specifically for this purpose, or with mortar. The mortar shall be one part cement to 1-1/2 parts sand, mixed slightly damp to the touch, hammered into the holes until it is dense and an excess of paste appears on the surface, and finished smooth and flush with the adjoining surfaces.

H. Precast sections shall be level and plumb with approved joint seals. Water shall not be permitted to rise over newly made joints until after inspection and acceptance. All joints shall be watertight.

I. Openings which have to be cut in the sections in the field shall be carefully made to prevent damage to the riser. Damaged risers will be rejected and shall be replaced at no additional cost to the Owner.

3.4 Manhole Steps

A. Steps shall be cast into the precast walls during manufacture.

B. Steps in brick masonry and concrete units shall be installed as the masonry courses are laid.

3.5 Castings

A. Cast-iron frames for grates and covers shall be well bedded in cement mortar and accurately set to the proposed grades.

B. All voids between the bottom flange and the structure shall be completely filled to make a watertight fit. A ring of mortar, at least one-inch (1 in.) thick and pitched to shed water away from the frame shall be placed over and around the outside of the bottom flange. The mortar shall extend to the outer edge of the masonry all around its circumference and shall be finished smooth. No visible leakage will be permitted.

C. Structures within the limits of bituminous concrete pavement shall be temporarily set at the elevation of the bottom of the binder course. After the binder course has been compacted, the structures shall be set at their final grade. Backfill necessary around such structures after the binder course has been completed shall be made with 3,500 psi concrete.

3.6 Connections to Existing Facilities

A. General Requirements: The Contractor shall make all required

connections of the proposed drainage system into existing drainage system, where and as shown on the Drawings.

B. Compliance with requirements of Owner of Facility: Connections into existing drainage system facilities shall be performed in accordance with the requirements of the Owner of the facility. The Contractor shall comply with all such requirements, including securing of all required permits, and paying the costs thereof.

3.7 Manhole Connections

A. Manhole pipe connections for precast manhole bases may be accomplished by any method described below. The Contractor shall make sure that the outside diameter of the pipe is compatible with the particular pipe connection used.

1. A tapered hole filled with non-shrink waterproof grout after the pipe is inserted. This connection method will not be allowed when connecting PVC pipe to manholes.
2. The LOCK JOINT Flexible Manhole Sleeve cast in the wall of the manhole base. The stainless steel strap and exposed sleeve shall be protected from corrosion with a bitumastic coating.
3. PRESS WEDGE II gasket cast into the wall on the manhole base. The rubber wedge shall only be driven into the V slot from the outside of the manhole.
4. The RES-SEAL, a cast iron compression ring which compresses a rubber “O” ring gasket into a tapered hole in the wall of the manhole base. Exposed metal shall be protected from corrosion with a bitumastic coating.
5. KOR-N-SEAL neoprene boot cast into the manhole wall. The stainless steel clamp shall be protected from corrosion with a bitumastic coating.

3.8 Cleaning, Testing, and Repair

A. The Contractor shall clean the entire drainage system of all debris and obstructions. Cleaning shall include, removal of all formwork from structures, concrete and mortar droppings, construction debris and dirt. The system shall be thoroughly flushed clean and the Contractor shall furnish all necessary hose, pumps, pipe and other equipment that may be required for this purpose. No debris shall be flushed into existing drains, storm recharge chambers, storm drains and/or streams.

B. Testing and Correction of Defective Work: If a mandrel with a minimum length that is greater than the pipe diameter and a minimum diameter of 90 percent of the pipe diameter cannot be pulled through the pipe after seven (7) days of completed trench backfill, the pipe line shall be deemed unacceptable and the pipe lines shall be removed and replaced. The Contractor shall make the necessary repairs or replacements required to permanently provide an open and structurally sound drainage system capable of supporting the anticipated loading from all sources throughout the year.

3.9 Final Inspection

A. Upon completion of the work, and before final acceptance by the Engineer, the entire drainage system shall be subjected to a final inspection in the presence of the Engineer. The work shall not be considered as complete until all requirements for line, grade, cleanliness, mandrel tests, and other requirements have been met.

3.10 Acceptance

A. The Owner reserves the right to accept piped utilities in sections after the satisfactory tests have been made and approved, and to make full use of any part or parts of the system after acceptance of those parts.

B. Until such time as the entire contract has been accepted by the Owner, the Contractor shall be held responsible to rectify any leaks, errors, or other poor workmanship which may be discovered and shall make any necessary repairs, alterations, or adjustments as may be required to properly complete the work.

C. All piping shall be thoroughly cleaned of al silt, debris, and foreign material of any kind prior to final inspection.

(END OF SECTION 33 40 00)

SECTION 32 12 16

ASPHALT PAVING

PART 1 - GENERAL

1.1 Summary

1.2 This work shall cover the composition, mixing, construction upon the prepared subgrade, and the protection of hot asphalt concrete pavement. The hot asphalt concrete pavement shall consist of an aggregate or asphalt base course and asphalt surface course constructed in conformity with the lines, grades, thickness, and cross sections as shown. Each course shall be constructed to the depth, section, or elevation required by the drawings and shall be rolled, finished, and approved before the placement of the next course. Work shall be performed as shown on the Drawings.

1.3 Price and Payment Procedures

A. Measurement and payment requirements per the Request for Proposals – Safety Complex-Road Extension.

1.3 References

A. Reference Standards

1. NHDOT Standard Specifications for Road and Bridge Construction
2. NHDOT Standard Plans for Road Construction
3. Applicable portions of the Town of Plaistow Ordinances and Regulations

1.4 Alignment and Grade Control

A. The Contractor’s Registered Professional Land Surveyor shall establish and control the pavement (aggregate or asphalt base course and asphalt surface course) alignments, grades, elevations, and cross sections as shown on the Drawings.

1.5 Submittals

A. Submit in accordance with the Division 01 General Requirements.

1. Product Data
2. Manufacturer Instructions

1.6 Quality Assurance

A. Provide in accordance with the Request for Proposals – Safety Complex-Road Extension.

PART 2 - PRODUCTS

2.1 Bitumen for Tack Prime Coat

A. Provide in accordance with NHDOT Standard Specifications for Road and Bridge Construction Section 401, 410, and 702.

2.2 Hot Bituminous Pavement (Top and Base)

A. Provide in accordance with NHDOT Standard Specifications for Road and Bridge Construction Section 401, 410, and 702.

PART 3 - EXECUTION

3.1 General

A. The Asphalt Concrete Paving equipment, weather limitations, job-mix formula, mixing, construction methods, compaction, finishing, tolerance, and protection shall conform to the requirements of the appropriate sections of the NHDOT Standard Specifications for Road and Bridge Construction for the type of material specified.

3.2 Subgrade

A. Shape to line and grade and compact with self-propelled rollers.

B. All depressions that develop under rolling shall be filled with acceptable material and the area re-rolled.

C. Soft areas shall be removed and filled with acceptable materials and the area re-rolled.

D. Should the subgrade become rutted or displaced prior to the placing of the subbase, it shall be reworked to bring to line and grade.

E. Proof-roll the subgrade with maximum 45 tonne (50 ton) gross weight dump truck as directed by Engineer or Owner. If pumping, pushing, or other movement is observed, rework the area to provide a stable and compacted subgrade.

3.3 Base Courses

A. Base

1. Spread and compact to the thickness shown on the drawings.

2. Rolling shall begin at the sides and continue toward the center and shall continue until there is no movement ahead of the roller.

3. After completion of the base rolling there shall be no hauling over the base other than the delivery of material for the top course.

B. Thickness tolerance: Provide the compacted thicknesses shown on the Drawings within a tolerance of minus 0.0" to plus 0.5".

C. Smoothness tolerance: Provide the lines and grades shown on the Drawings within a tolerance of 3/16 inch in ten feet.

D. Moisture content: Use only the amount of moisture needed to achieve the specified compaction.

3.4 Top Courses

A. Remove all loose materials from the compacted base.

B. Apply the specified prime coat, and tack coat where required, and allow to dry in accordance with the manufacturer’s recommendations as approved by the Engineer.

C. Spreading:

1. Spread material in a manner that requires the least handling.

2. Where thickness of finished paving will be 76mm (3") or less, spread in one layer.

D. Rolling:

1. After the material has been spread to the proper depth, roll until the surface is hard, smooth, unyielding, and true to the thickness and elevations shown own the drawings.

2. Roll in at least two directions until no roller marks are visible.

3. Finished paving smoothness tolerance:

a. No depressions which will retain standing water.

b. No deviation greater than 1/8" in six feet.

3.5 Final Clean Up

A. Remove all debris, rubbish, and excess material from the work area.

3.6 Closeout Activities

A. Provide in accordance with the Request for Proposals – Safety Complex-Road Extension.

(END OF SECTION 32 12 16)