DIVISION 01
GENERAL REQUIREMENTS

SECTION 01 2010

MEASUREMENT AND PAYMENT

PART 1 GENERAL

1.1 SECTION INCLUDES

A. Definition and description of measurement and payment criteria for the Bid Items to be used for the work.

B. Supplement to Section 01 2010 - Measurement and Payment: Equipment List

1.2 PAY ITEMS

A. LUMP SUM

1. Payment for lump sum Work shall be made in accordance with the accepted Schedule of Values.

2. An unbalanced or front-end loaded schedule will not be acceptable.

3. Payment for lump sum Work covers all Work required to complete the work as shown or specified that is not covered under the unit price items and shall be based on the breakdown included in the approved Schedule of Values.

4. Summation of the complete Schedule of Values shall equal the Contract Price for the lump sum.

1.3 UNIT PRICE ITEMS

A. Payment for Work governed by unit prices will be made based on the actual measurements and quantities accepted by the Owner, multiplied by the unit price for Work that is incorporated in, or made necessary by, the Work.

1.4 BASE BID ITEM

Description - Contractor shall perform all work as shown on the Drawings and called for in the Specifications to install a complete functional splash pad facility including, but not necessarily limited to, the following:

Mobilization, Site Preparation, and Close-out: Mobilize all necessary personnel, tools and equipment; prepare the Project Site as shown on the Drawings, as called for in the Specifications, and as required to complete the work in a safe and controlled manner; establish and maintain temporary facilities or work practices as shown on the Drawings, as called for in the Specifications, and as required to complete the work including, but not necessarily limited to, administrative facilities, fencing, barriers, erosion and sedimentation controls and related facilities. At the conclusion of work restore and stabilize affected areas and fully demobilize all temporary facilities, equipment, and materials; complete close-out as shown on the Drawings and as called for in the Specifications.

Site Demolition: Demolish and completely remove those improvements and appurtenances as called-for in the Specifications and/or shown on the Drawings. Provide for the off-site removal and legal disposal of all demolition waste.

Site Excavation and Grading: Provide all required clearing, material import/export, earthwork, grading, filling, compaction, and testing, of earth materials to the lines and grades depicted on the Drawings and/or as may be required to construct the improvements.

Utilities: Provide for the installation of site utilities as indicated on the Drawings, including water supply, drainage, infiltration system, electrical services, filter/circulation lines, backwash lines, pump chambers and sanitary sewer discharges. Coordinate with local authorities and utility providers as required and install all utility systems in accordance with applicable codes, the standards of each utility owner and/or the splash pad equipment manufacturer.

Splash Pad Facility: Provide for all concrete installation and finishing; installation of drains and splash pad water elements/features; installation of water quality management system, water containment system, traps and diverters, and supporting equipment; connections to utilities; fencing systems; landscaping and restoration; and other improvements as shown on the Drawings and as called for in the Specifications. Install those system components identified in the Specifications, and install those system components not specified, but required to achieve a complete functioning system in accordance with all applicable codes. The items included in the Equipment List attached and hereby incorporated into this Specification Section, shall be procured by the Owner.

Incidental work: Contractor shall include in his price for this Bid Item all incidental work items required to complete the work as shown on the Drawings and as called for in the Specifications. Incidental work shall be defined as all work not otherwise specified but obviously necessary for the proper completion of the work, including, but not necessarily limited to, permitting, fees, meetings, submittals, construction layout, measurements, testing, inspections, general project coordination, health and safety, and project documentation.

Equipment Procured by Owner: The items included in the Equipment List attached and hereby incorporated into this Specification Section, will be procured by the Owner. The Contractor's scope of work will include transport of this equipment from the Owner's facility located at: Glastonbury Parks Maintenance Garage, 1086 New London Turnpike Glastonbury, Connecticut, to the Project Site.

1. Measurement - This item will be measured for payment on a Lump Sum basis.

2. Payment - The Lump Sum payment under this item will be considered full compensation, including Contractor's overhead and profit, for all labor, equipment, materials, supplies, supervision and other fees required for the work. Payment for this lump sum item will be made based on the percentage of work completed, as determined by Engineer.

1.5 DEDUCT BID ITEMS

A. Deduct Alternate No. 1: Town to Remove Pergola and Concrete Pavement

1. Description - The Owner will provide for the demolition of the existing pergola and concrete pavement as indicated on the Drawings.

2. Measurement - This alternate item will be measured as a Lump Sum deduct from the Base Bid.

3. Payment - This is a deduct item and there is no payment. This alternate item represents the amount to deduct (subtract) from the Base Bid if the Owner provides for the demolition of the existing pergola and concrete pavement as indicated on the Drawings.

B. Deduct Alternate No. 2: Cut and Cap Existing Irrigation Only as Required to Install Proposed Work. Town to Replace.

1. Description - In lieu of removal and replacement of the irrigation system as required to install the proposed Work, cut and cap existing irrigation only as required to install the proposed Work.

2. Measurement - This alternate item will be measured as a Lump Sum deduct from the Base Bid.

3. Payment - This is a deduct item and there is no payment. This alternate item represents the amount to deduct (subtract) from the Base Bid to cut and cap existing irrigation only as required to install the proposed Work in lieu of complete removal of the irrigation system.

C. Deduct Alternate No. 3: Loam and Seed Disturbed Areas Outside of Pool Enclosure.

1. Description -In lieu of Contactor providing sod for all disturbed areas outside of the pool enclosure as indicated on the Drawings, Contactor will provide for loam and seed on all disturbed areas outside of the pool enclosure as indicated on the Drawings.

2. Measurement- This alternate item will be measured as a Lump Sum deduct from the Base Bid.

3. Payment - This is a deduct item and there is no payment. This alternate item represents the amount to deduct (subtract) from the Base Bid if the Contactor provides for loam and seed in lieu of sod on all disturbed areas outside of the pool enclosure as indicated on the Drawings.

1.6 UNIT PRICE ITEMS

A. UP Bid Item 1 - Exploratory Excavations

1. Description: Conduct exploratory excavations in accordance with Specification Section 02 3219 - Exploratory Excavations, as requested by Engineer.

2. Measurement - This Unit Price item will be measured for payment on a Per Hour basis, measured as the actual number of hours of exploratory excavation work completed.

3. Payment - Payment under this item will be considered full compensation, including Contractor’s overhead and profit, for all layout, labor, equipment, materials, supplies, supervision and other fees required for the work. Payment for this unit price item will be made based on the actual number of hours of exploratory excavation work completed, as determined by Engineer multiplied by the unit rate (per hour) bid.

B. UP Bid Item 2 - Pipe in Trench, complete, 2-4 inch

1. Description: Install 2-inch to 4-inch PVC conduit underground as requested by Engineer, including all required layout, preparation, excavation, stockpiling, conduit material, placement, installation, joining, bedding, backfill, compaction and surface restoration as requested by Engineer.

2. Measurement - This Unit Price item will be measured for payment on a per Linear Foot basis, measured as the actual linear feet of 2-inch to 4-inch PVC conduit in-place, installed.

3. Payment - Payment under this item will be considered full compensation, including Contractor's overhead and profit, for all layout, labor, equipment, materials, supplies, supervision and other fees required for the work. Payment for this unit price item will be made based on the actual number of linear feet of 2-inch to 4-inch PVC conduit in-place, installed multiplied by the unit rate (per Linear Foot) bid.

C. UP Bid Item 3 - Pipe in Trench, complete, 4-6 inch

1. Description: Install 4-inch to 6-inch PVC conduit underground as requested by Engineer, including all required layout, preparation, excavation, stockpiling, conduit material, placement, installation, joining, single pull rope, bedding, backfill, compaction and surface restoration as requested by Engineer.

2. Measurement - This Unit Price item will be measured for payment on a per Linear Foot basis, measured as the actual linear feet of 4-inch to 6-inch PVC conduit in-place, installed.

3. Payment - Payment under this item will be considered full compensation, including Contractor's overhead and profit, for all layout, labor, equipment, materials, supplies, supervision and other fees required for the work. Payment for this unit price item will be made based on the actual number of linear feet of 2-inch to 4-inch PVC conduit in-place, installed multiplied by the unit rate (per Linear Foot) bid.

D. UP Bid Item 4 - Sod

1. Description: Install sod as requested by Engineer, including all required sod material, planting bed preparation, installation, rolling, initial fertilizing and watering as requested by Engineer.

2. Measurement - This Unit Price item will be measured for payment on a per Square-Foot basis, measured as the actual square-feet of sod installed.

3. Payment - Payment under this item will be considered full compensation, including Contractor's overhead and profit, for all layout, labor, equipment, materials, supplies, supervision and other fees required for the work. Payment for this unit price item will be made based on the actual number of square feet of sod in-place multiplied by the unit rate (per Square Foot) bid.

E. UP Bid Item 5 - Chain Link Fence, 6-foot High

1. Description: Install 6-foot high chain link fence as requested by Engineer, including all required layout, preparation, excavation, stockpiling, concrete footings, fencing materials (line post, fabric and all required appurtenances) placement, installation, backfill, and surface restoration as requested by Engineer.

2. Measurement - This Unit Price item will be measured for payment on a per Linear Foot basis, measured as the actual linear feet of 6-foot high chain link fence installed.

3. Payment - Payment under this item will be considered full compensation, including Contractor's overhead and profit, for all layout, labor, equipment, materials, supplies, supervision and other fees required for the work. Payment for this unit price item will be

made based on the actual number of linear feet of 6-foot high chain link fence installed, multiplied by the unit rate (per Linear Foot) bid.

F. UP Bid Item 6 - Chain Link Fence, 4-foot High

1. Description: Install 4-foot high chain link fence as requested by Engineer, including all required layout, preparation, excavation, stockpiling, concrete footings, fencing materials (line post, fabric and all required appurtenances) placement, installation, backfill, and surface restoration as requested by Engineer.

2. Measurement - This Unit Price item will be measured for payment on a per Linear Foot basis, measured as the actual linear feet of 4-foot high chain link fence installed.

3. Payment - Payment under this item will be considered full compensation, including Contractor's overhead and profit, for all layout, labor, equipment, materials, supplies, supervision and other fees required for the work. Payment for this unit price item will be made based on the actual number of linear feet of 4-foot high chain link fence installed, multiplied by the unit rate (per Linear Foot) bid.

G. UP Bid Item 7 - Concrete Flatwork

1. Description: Install 5-inch thick WWF-reinforced concrete (either slab or walkway configuration) as requested by Engineer, including all required layout, preparation, excavation, stockpiling, base material placement and compaction, formwork, placement, installation, finishing, backfill and surface restoration as requested by Engineer.

2. Measurement - This Unit Price item will be measured for payment on a per Square-Foot basis, measured as the actual square feet of 5-inch thick WWF-reinforced concrete (either slab or walkway configuration) installed.

3. Payment - Payment under this item will be considered full compensation, including Contractor's overhead and profit, for all layout, labor, equipment, materials, supplies, supervision and other fees required for the work. Payment for this unit price item will be made based on the actual number of square feet of 5-inch thick WWF-reinforced concrete (either slab or walkway configuration) installed multiplied by the unit rate (per Square Foot) bid.

H. UP Bid Item 8 - Bituminous Pavement Patch

1. Description: Install 4-inch thick bituminous pavement patch over a 6-inch thick layer of compacted Processed Aggregate Base as requested by Engineer, including all required layout, preparation, edge saw-cutting, excavation, stockpiling, base material placement and compaction, tack-coat, bituminous pavement placement and compaction and finishing as requested by Engineer.

2. Measurement - This Unit Price item will be measured for payment on a per Square-Foot basis, measured as the actual square feet of 4-inch thick bituminous pavement patch over a 6-inch thick layer of compacted Processed Aggregate Base installed.

3. Payment - Payment under this item will be considered full compensation, including Contractor's overhead and profit, for all layout, labor, equipment, materials, supplies, supervision and other fees required for the work. Payment for this unit price item will be made based on the actual number of square feet of 4-inch thick bituminous pavement patch

over 6-inch thick layer of compacted Processed Aggregate Base multiplied by the unit rate (per Square Foot) bid.

PART 2 PRODUCTS

NOT USED

PART 3 EXECUTION

NOT USED

END OF SECTION

Supplement to Section 01 2010 - Measurement and Payment

Equipment List

Quantity	Equipment Description
3	#VOR-611.2008R05 Activation Bollard
2	#VOR-0220.2008R01 Tube No1
7	#VOR-321.4000R01 Directional Jet No2 (EM)
1	#VOR-7549.2008R01 Flower No1
1	#VOR-7658.2008R02 Frog No5
4	#VOR-301.4000R03 Geyser (EM)
4	#VOR-7512.0000R01 Jet Stream No1 (EM)
3	#VOR-1001.4000R02 PlaySafe Drain No1
1	#VOR-7217.2008R02 Snail No4
1	#VOR-7578.2008R03 Sun Spray No1
1	#VOR-7242.2008R01 Twin Splash
1	#VOR-7582.20008R04 Waterbug No3

Mechanicals:

2	#VOR-44100.0000R01 Under Ground Chemical Reservoir, 50 gallons.
1	#VOR-5322.0000R02 Debris Trap HDPE with Rain Diverter Valve.
1	#VOR-5312.0000R07 Water Containment System, 2,000-gallon, double loop
1	#302070B.A000R06 Water Quality Management System, includes: 1. Domepack 2. Double Loop System 3. 5HP Feature Pump 4. 3HP Filtration Pump 5. (1) Sand Filter 6. (15) Solenoid Valves 7. Maestro Controller - 230V 1 Phase Power

SECTION 01 3223

SURVEYING

PART 1 GENERAL

1.1 SUMMARY

A. Section Includes

1. Layout surveys required for the control and completion of the work.

2. Established primary control to be used by Contractor for establishing lines and grades required for the work.

3. Surveys to compute quantities of work performed.

4. Survey and drawing work required to complete As-Built drawings.

B. Owner has established primary control to be used by Contractor for establishing lines and grades required for the work. Primary control consists of control points in the vicinity of the work as described and indicated on the Drawings.

C. Contractor shall coordinate work between all Subcontractors, sections, and trades required for the proper completion of the work.

D. Contractor shall coordinate work between all Contractors, sections, and trades required for the proper completion of the work.

E. Contractor is responsible for all health and safety.

1. Preserve and maintain primary control points. Primary control points damaged or destroyed by contractor may be reestablished by Construction Manager, and the expense of reestablishment will be deducted from amounts due, or to become due, to Contractor.

1.2 REFERENCES

A. Reference herein to any technical society, organization, group or regulation are made in accordance with the following abbreviations and, unless otherwise noted or specified, all work under this Section shall conform to the latest edition as applicable.

B. Code of Federal Regulations (CFR).

1. 29 CFR 1926, Safety and Health Regulations for Construction.

C. State of Connecticut.

1. Standard Specifications for Roads, Bridges, Facilities and Incidental Construction, Form 818, 2020 and any supplements.

1.3 SUBMITTALS

A. Survey Control Plan – a complete plan for the surveying required to lay out the work, including methods and time tables for establishing lines and grades.

B. Surveyor Qualifications – resumes of qualifying experience for the Professional Land Surveyor who will be responsible for the supervision and direction of all of Contractor's survey work.

C. Quantity Surveys – accompanying progress payment requests, submit a copy of applicable quantity survey notes and computations and an itemized statement for work performed or placed during the progress period measured on the basis of surveying.

D. Survey Books – within 2 days of completing and reducing notes for a survey or portion of survey, submit a copy of such notes. Within 2 days of completing a field survey book, submit a copy of the original field survey book.

E. Daily Notes – if requested by ENGINEER, submit a copy of the workday's survey notes at the conclusion of that workday.

F. As-Built Survey: Provide as-built drawings showing the final conditions of the project. Drawings shall bearing seal of the Professional Land Surveyor in responsible charge. The final as-built drawings shall consist of:

1. One (1) set of electronic CADD drawing files in the specified format. Provide survey results electronically as described herein.

2. One (1) set of mylar drawings.

3. Two (2) sets of blue-line prints of mylars.

4. One (1) set of the approved working as-built drawings.

G. Qualifications

1. Provide experienced construction surveyors. Survey work shall be under the supervision and direction of a Professional Land Surveyor who is registered in the State of Connecticut and has a minimum of 5 years responsible charge of construction surveys for construction similar in nature to that required by this contract. Maintain sufficient qualified personnel to perform required surveying work. All survey work performed by Contractor shall be subject to field and office review by Engineer.

H. Layout of Work

1. Layout of work shall be included in individual pay items and will not be paid separately.

2. Contractor may use Owner established control points to establish all lines and grades necessary to control the Work. Contractor must verify the accuracy of control point prior to relying on them to complete the work. Contractor shall notify the OWNER within seven (7) days if there any discrepancies are discovered.

3. Establish, place, and replace as required, such additional monuments, control points, survey stakes, markers, and other controls as may be necessary for control, mapping,

intermediate checks, and guidance of construction operations. Perform additional surveys as required for foundation mapping.

I. Quantity Surveys

1. Perform all original ground surveys as required to depict existing conditions prior to construction and to determine quantities of work for payment.

2. Quantity Surveys shall be considered incidental to the work and will not be paid separately.

3. Notify Engineer at least 24 hours before performing a survey and, unless specifically waived, surveys shall be performed in the presence of an authorized representative of Engineer.

4. Quantity Survey shall include:

a. Survey original ground surface for appurtenant structures and below embankment to 1-foot contours.

b. Plot plan of original ground at 1″ = 50′.

c. Cross sections shall be plotted on full size (22" x 34") drawings at a scale acceptable to Engineer.

d. One (1) reproducible and two (2) prints of each drawing shall be provided to Engineer.

J. Perform such surveys and computations as are necessary to determine quantities of work performed or placed during each progress payment period, and perform all surveys necessary for Engineer to determine final quantities of work in place.

1.4 QUALITY ASSURANCE

A. Use adequate numbers of skilled workmen who are thoroughly trained and experienced in the necessary crafts and who are completely familiar with the specified requirements and the methods needed for proper performance of the work of this Section.

1.5 AS-BUILT SURVEY

A. From established survey control, and construction baseline as shown on the drawings, conduct a topographic survey of the project area after construction is complete. Survey shall include locations of cutoff walls, sheet piling, fill, pavement, manholes, fencing and other physical features installed during the construction.

B. Collect sufficient survey data to accurately represent the project scope and area.

C. Generate one-foot contours throughout the site and show breaks in slope and other notable features.

1.6 CONTRACTOR SURVEYS

A. Surveys required:

1. Field layout of the work.

2. Structures – Stake out structures; checks prior to and during construction.

3. Slope staking – Each 50 feet on tangent; each 25 feet on curves; restake every5 feet in elevation.

4. Cross section – Each 100 feet on tangent, each 50 feet on curves. Original, final, and intermediate as required, for structure sites and other locations as necessary for quantity surveys.

5. As-Built Survey – Survey the "as-built" locations (horizontal coordinates and elevations) of:

a. Centerline and shoulders of road.

b. Location and elevation of all walkways.

c. Corner points of all above and below grade structures and center points of all manhole covers.

d. Finished grades to at least 10 feet beyond new work.

e. Toe of slope and edge of slab or structure.

f. Topography – Topography of completed site grading. Perform mapping in accordance with quantity surveys.

1.7 RECORDS

A. Survey data shall be recorded in accordance with recognized professional surveying standards. Original field notes, computations, and other surveying data shall be recorded in standard survey field books. Notes or data not in accordance with standard formats will be rejected. Illegible notes or data, or erasures on any page of a field book will be considered sufficient cause for rejection of part or all of the field book. Therefore, rejection of part or all of a field book may necessitate resurveying. Corrections by ruling or lining out errors will be satisfactory.

1.8 WORKING AS-BUILT DRAWINGS AND FINAL AS-BUILT DRAWINGS.

A. Contractor shall revise 2 sets of paper drawings by red-line process to show the as-built conditions during the prosecution of the project. These working as-built marked drawings shall be kept current on a weekly basis and at least one set shall be available on the jobsite at all times. Changes from the contract plans which are made in the work or additional information which might be uncovered in the course of construction shall be accurately and neatly recorded as they occur by means of details and notes. Final as-built drawings shall be prepared after the completion of each definable feature of work. The working as-built marked prints and final as-built drawings will be jointly reviewed for accuracy and completeness by the Engineer and the Contractor prior to submission of each monthly pay estimate. If the Contractor fails to maintain

the working and final as-built drawings as specified herein, the Engineer will deduct from the monthly progress payment an amount representing the estimated cost of maintaining the as-built drawings. This monthly deduction will continue until an agreement can be reached between the Engineer and the Contractor regarding the accuracy and completeness of updated drawings. The working and final as-built drawings shall show, but shall not be limited to, the following information:

1. The actual location, kinds, and sizes of all sub-surface utility lines and irrigation lines. In order that the location of these lines and appurtenances may be determined in the event the surface openings or indicators become covered over or obscured, the as-built drawings shall show, by offset dimensions to two permanently fixed surface features, the end of each run including each change in direction. Valves, splice boxes, and similar appurtenances shall be located by dimensioning along the utility run from a reference point. The average depth below the surface of each run shall also be recorded.

2. Correct grade, elevations, cross section, or alignment of roads, earthwork, structures or utilities if any changes were made from contract plans.

3. Changes in details of design or additional information obtained from working drawings specified to be prepared and/or furnished by the Contractor; including but not limited to fabrication, erection, installation plans and placing details, pipe sizes, insulation material, dimensions of equipment foundations, etc.

4. The topography, invert elevations, and grades of drainage installed or affected as part of the project construction.

5. Changes or modifications which result from the final inspection.

6. Where contract drawings or specifications present options, only the option selected for construction shall be shown on the final as-built prints.

7. If borrow material for this project is from sources on Owner property, or if Owner property (or property that Owner has obtained easement for) is used as a soil disposal area, the Contractor shall furnish a contour map of the final borrow area and disposal area elevations.

8. Systems designed, enhanced or modified in any way by Contractor, such as irrigation systems.

9. Modifications (change order price shall include the Contractor’s cost to change working and final as-built drawings to reflect modifications) and compliance with the following procedures.

    a. Directions in the modification for posting descriptive changes shall be followed.

    b. A Modification Circle shall be placed at the location of each deletion.

    c. For new details or sections which are added to a drawing, a Modification Circle shall be placed by the detail or section title.

    d. For minor changes, a Modification Circle shall be placed by the area changed on the drawing (each location).

e. For major changes to a drawing, a Modification Circle shall be placed by the title of the affected plan, section, or detail at each location.

f. For changes to schedules, a Modification Circle shall be placed either by the schedule heading or by the change in the schedule.

g. The Modification Circle size shall be 1/2 inch diameter unless the area where the circle is to be placed is crowded. Smaller size circle shall be used for crowded areas.

10. Survey shall be provided in AutoCAD Version 2004 or newer, as well as in electronic format written for import into Microsoft Excel or in a digital format as directed by the Engineer. Digital Survey data for the as-built survey should include:

a. Copy of field notes and sketches of the survey.

b. Hard copy description of layers.

c. Signed and sealed hard copy base map and contour plot.

d. Provide digital information on compact disk with hardcopy printout; information should be provided in .DWG format (AutoCAD 2004 or later). Data should be provided in 3D format (northing, easting, elevation, or Y, X, Z).

e. Drawing scale: Minimum one (1) inch = fifty (50) feet.

f. Preferred layering:

1) Repetitive symbols made into blocks, and defined on layer 0.

2) All entities shall be drawn “by layer” as opposed to individual properties.

3) Use one line type and one color per layer as opposed to numerous colors/linetypes on a single layer.

4) Preface each layer with the initials of the Survey company (example, Survey Company: SC “layername”).

5) Database text annotation will be coordinated so the text will be rightreading.

6) Place text on separate layers.

1.9 DEGREE OF ACCURACY

A. Degree of accuracy shall be of an order high enough to satisfy tolerances specified for the Work. and the following:

1. Structure points shall be set within 0.01 foot, except where installation or operation considerations require tighter tolerances.

2. Cross-section points shall be located within 0.1 foot, horizontally and vertically.

3. Vertical elevation surveys shall close within 0.05 foot times the square root of the circuit length in miles.

4. Earthwork shall be within 0.1 foot vertical of locations shown on the Drawings.

PART 2 PRODUCTS – NOT USED

PART 3 EXECUTION – NOT USED

END OF SECTION

SECTION 01 3300

SUBMITTAL PROCEDURES

PART 1 GENERAL

1.1 SUMMARY

A. Section Includes

1. Requirements and procedures for preparing and transmitting data to Engineer.

2. Various submittals are specified under applicable Specification Sections.

B. Unless otherwise stipulated herein, all submittals requiring review for conformance with the design documents shall be transmitted by mail to the following address:

BSC Group
655 Winding Brook Drive
Glastonbury, CT 06033
Attention: Michael Kluchman, PLA

or by or electronic mail to the following address:

mkluchman@bscgroup.com

1.2 DEFINITIONS

A. Conforms: The term “Conforms,” when applied by the Engineer to the Contractor’s submittals, drawings or documents, shall mean the submittals, drawings or documents are satisfactory from the standpoint that the Engineer has not observed any statement or feature that appears to deviate from the Specifications requirements. The Contractor shall retain the entire responsibility for complete conformance with all of the Specification’s requirements.

B. Conforms As Noted: The term “Conforms As Noted” when applied by the Engineer to the Contractor’s submittals, drawings or documents, shall mean the submittals, drawings or documents conform as defined above, except that the changes shown are necessary to be in conformance with the Specification’s requirements. On the basis that the Contractor shall retain the entire responsibility for compliance with all of the Specification’s requirements, the Contractor shall either:

1. Incorporate the changes into its work, drawings or documents if the change does not affect the Contractor’s responsibility under warranty.

2. Inform the Engineer that the changes cannot be made without prejudice to the Contractor’s responsibility under the warranty and resubmit with explanations of the reasons therefore.

C. Does Not Conform or Revise and Resubmit: The terms “Does Not Conform” or “Revise and Resubmit” when applied by Engineer to Contractor’s submittals, drawings or documents, shall mean the submittals, drawings or documents are not satisfactory from the standpoint that the

Engineer has observed statements or features that appear to deviate from the Specifications requirements.

1.3 CONTRACTOR RESPONSIBILITIES

A. Prepare submittals and review for accuracy prior to submission, and respond to Engineer's action.

B. Determine and verify:

1. Field measurements;

2. Field construction criteria; and

3. Conformance to Specifications.

C. Coordinate each submittal with requirements of Work and of Contract Documents.

D. Notify Engineer in writing, at time of submission, of any deviations in submittals from requirements of drawings, Specifications and Contract Documents.

1.4 SUBMITTAL PROCEDURES

A. Coordinate preparation and processing of submittals with performance of construction activities. Unless a specific submittal time-frame is specified in the related specification Section, transmit each submittal sufficiently in advance of performance of related construction activities to avoid delay.

1. Coordinate each submittal with phases of the Work that require sequential activity.

2. Coordinate transmittal of different types of submittals for related elements of the Work so processing will not be delayed by the need to review submittals concurrently for coordination.

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

3. At a minimum, submittals shall be provided to Owner and Engineer in duplicate. Additional requirements for the number of submittals are contained in the specific Specification Sections.

4. Processing: Allow sufficient review time so that installation will not be delayed as a result of the time required to process submittals, including time for re-submittals.

a. Allow five (5) working days for initial review. Allow additional time if processing must be delayed to permit coordination with subsequent submittals. The Engineer will promptly advise the Contractor when a submittal being processed must be delayed for coordination.

b. Any submittals which may require review and/or approval by an outside Agency (Town, utility, etc.) shall be allocated a minimum of twenty (20) working days. The Owner shall not be held responsible for any delay associated with the approval or rejection of any substitution or other revisions proposed by the Contractor.

c. If an intermediate submittal is necessary, process the same as the initial submittal.

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

e. No extension of Contract Time will be authorized because of failure to transmit submittals to the Engineer sufficiently in advance of the Work to permit processing.

B. Submittal Preparation: Place a permanent label, cover page or title block on each submittal for identification. Indicate the name of the entity that prepared each submittal on the label, cover page or title block.

1. Provide a space approximately 4″ x 5″ on the label, cover page or beside the title block to record the Contractor's review and approval markings and the action taken.

2. Include the following information on the label for processing and recording action taken:

a. Submittal name, number and topic.

b. Date of submission.

c. Name and address of Contractor.

d. Number and title of appropriate Specification Section annotated in accordance with this Section.

e. Drawing number and detail references, as appropriate.

f. Identification of revisions on re-submittals.

C. Submittal Transmittal: Package each submittal appropriately for transmittal and handling. Transmit each submittal from Contractor to Engineer using a transmittal form. Submittals received from sources other than Contractor will be returned without action.

1. All submittals shall be sent with an official transmittal.

2. With each submittal, provide the Specification Section or sheet number the item submitted is found under and a descriptive generic name based on its content.

3. Number each transmittal consecutively starting with 001. If requested by Engineer, match the submittal numbering indicated on the Submittal Schedule or Submittal Log.

4. All submittals shall be numbered conforming to the following example, with each component separated by a dash (-):

Submittal Numbering Format

A	B	C	D
001	01 5713	Silt Fence	New
002	31 2310	Granular Fill	New
002A	31 2310	Granular Fill	Resubmitted
002B	31 2310	Granular Fill	Additional Information

a. The chronological identification number assigned to the submittal package.

b. The Specification Section or sheet number the item submitted is found under.

c. Keyword(s) from the descriptive generic submittal name.

d. The status of the submittal.

Example

001-01 5713-Silt Fence-New

5. When re-submitting a rejected submittal or additional information, identify submittal with the original submittal number followed by a letter, starting with "A" and continuing for each subsequent re-submittal, to designate the additional submission(s).

6. On the transmittal, record relevant information and requests for data. On the form, or separate sheet, record deviations from Contract Document requirements, including minor variations and limitations. Include Contractor's certification that information complies with Contract Document requirements.

7. Distribution: Following response to the initial submittal, Contractor shall print and distribute copies to the Subcontractors and other parties required to comply with scheduled dates. Post copies in the Project meeting room and temporary field office.

8. When revisions are made, distribute to the same parties and post in the same locations. Delete parties from distribution when they have completed their assigned portion of the Work and are no longer involved in construction activities.

1.5 SUBMITTAL SCHEDULE

A. As part of the development and acceptance of Contractor's construction schedule, prepare a schedule of submittals, complete and accurate to the best of Contractor's ability. Submit the schedule to the Engineer within five (5) business days following Contractor's receipt of the Notice of Award.

B. Coordinate submittal schedule with the list of subcontracts, schedule of values and the list of products as well as the Contractor's construction schedule.

C. Prior to each submittal, carefully review and coordinate all aspects of each item being submitted and verify that each item, and the submittal for it, conforms in all respects with the requirements

of the Contract Documents. By affixing his signature to each submittal, Contractor is certifying that this coordination has been performed.

D. Coordinate the schedule with all necessary subcontractors to ensure their understanding of the importance of adhering to the approved schedule and their ability to so adhere. Coordinate as required to ensure the grouping of submittals as appropriate.

E. Distribution: Following response to initial submittal schedule, print and distribute copies to the Engineer, Subcontractors, and other parties required to comply with submittal dates indicated. Post copies in the Project meeting room and field office.

1. When revisions are made, distribute to the same parties and post in the same locations. Delete parties from distribution when they have completed their assigned portion of the Work and are no longer involved in construction activities.

F. Tracking: Provide Engineer, at the beginning of each month, a list of all submittals over the previous month. Include the date each submittal was sent to Engineer, the content of each transmittal and the disposition of the submittal.

1.6 ENGINEER'S ACTION

A. Except for submittals for record, information or similar purposes, where action and return is required or requested, the Engineer will review each submittal, mark to indicate action taken, and return promptly.

1. Compliance with specified characteristics is the Contractor's responsibility.

B. Action Stamp: The Engineer will stamp each submittal with a uniform, self-explanatory action stamp. The stamp will be appropriately marked, as follows, to indicate the action taken:

1. No Exceptions Taken or Conforms: The term "No Exceptions Taken" or "Conforms," when applied by the Engineer to the Contractor's submittals, drawings or documents, shall mean the submittals, drawings or documents are satisfactory from the standpoint that the Engineer has not observed any statement or feature that appears to deviate from the Contract Specifications, Drawings, or other applicable Contract Documents. That part of the Work covered by the submittal may proceed provided it complies with requirements of the Contract Specifications, Drawings, or other applicable Contract Documents; final acceptance will depend upon that compliance. Contractor shall retain the entire responsibility for complete conformance with such Contract Specifications, Drawings, or other applicable Contract Documents.

2. Conforms As Noted or Furnish as Corrected: The term "Conforms as Noted" or "Furnish as Corrected" when applied by the Engineer to the Contractor's submittals, drawings or documents, shall mean the submittals, drawings or documents conform as defined above, except that the changes shown are necessary to be in conformance with the Contract Specifications, Drawings, or other applicable Contract Documents. That part of the Work covered by the submittal may proceed provided it complies with notations or corrections on the submittal and requirements of the Contract Specifications, Drawings, or other applicable Contract Documents; final acceptance will depend on that compliance. On the basis that, Contractor shall retain the entire responsibility for compliance with all of the Specification's requirements, the Contractor shall either:

a. Incorporate the changes into its work, drawings or documents if the change does not affect the Contractor's responsibility under warranty.

b. Inform the Engineer that the changes cannot be made without prejudice to the Contractor's responsibility under the warranty and resubmit with explanations of the reasons therefore.

3. Does Not Conform or Revise and Resubmit: The terms "Does Not Conform" or "Revise and Resubmit" when applied by Engineer to Contractor's submittals, drawings or documents, shall mean the submittals, drawings or documents are not satisfactory from the standpoint that the Engineer has observed statements or features that appear to deviate from the Contract Specifications, Drawings, or other applicable Contract Documents. Contractor shall not proceed with that part of the Work covered by the submittal, including purchasing, fabrication, delivery, or other activity. In response to this stamp, Contract shall either:

   a. Revise the submittal to conform with the Contract Specifications, Drawings, or other applicable Contract Documents and re-submit.

   b. Update the submittal with additional information as required and re-submit.

   c. Prepare a new submittal in accordance with notations and/or the requirements of the Contract Specifications, Drawings, or other applicable Contract Documents and re-submit.

4. Rejected: The term "Rejected," when applied by Engineer to Contractor's submittals, drawings or documents, shall mean the submittals, drawings or documents are not satisfactory from the standpoint that the Engineer has observed statements or features that appear to deviate from the Contract Specifications, Drawings, or other applicable Contract Documents. Contractor shall not proceed with that part of the Work covered by the submittal, including purchasing, fabrication, delivery, or other activity. Submittals that are rejected shall be revised as required to conform with the Contract Specifications, Drawings, or other applicable Contract Documents.

   a. Do not permit submittals marked "Rejected" to be used at the Project site, or elsewhere where Work is in progress.

5. Other Action: Where a submittal is primarily for information or record purposes, special processing or other activity, the submittal will not be returned unless specifically requested and will be marked "Action Not Required" on Contractor's record of submittal. Submittals which are prepared but are not required will not be processed.

PART 2 PRODUCTS – NOT USED

PART 3 EXECUTION – NOT USED

END OF SECTION

SECTION 01 5713

TEMPORARY EROSION AND SEDIMENTATION CONTROLS

PART 1 GENERAL

1.1 SUMMARY

A. Section Includes:

1. Installation of temporary erosion and sedimentation control measures
2. Maintenance of temporary erosion and sedimentation control measures.
3. Monitoring of site condition and installation of supplemental temporary erosion and sedimentation control measures.
4. Sediment removal and disposal
5. Temporary seeding or other surface stabilization measures.
6. Removal of temporary erosion and sedimentation control measures.
7. Monitoring, documentation, and recordkeeping.
8. Installation of permanent erosion control materials.
9. Final cleanup.

B. Erosion and sediment control techniques include, but are in no way limited to, silt fence, hay bales, drainage structure inserts/filters, mulching with hay/straw, netting/matting, grassing, stone dikes/berms/check-dams, compost blankets and berms, barriers, diversions, traps, basins, and appurtenances which will ensure that erosion and sediment pollution will be either eliminated or maintained within acceptable limits.

C. The measures specified herein are the minimum requirements which Contractor shall comply to control erosion and siltation throughout execution of the work. Contractor shall provide additional work if necessary, to control erosion and siltation throughout the duration of the construction as conditions dictate, or as directed by Engineer.

D. Contractor shall coordinate work between all Contractors, sections, and trades required for the proper completion of the work.

E. Contractor is responsible for all health and safety.

1.2 SUBMITTALS

A. Submit material specifications and shop drawings for all materials furnished under this Section.

B. Prior to the start of the construction, submit schedule for the construction of required stormwater detention basins, temporary and permanent erosion and sedimentation control measures, clearing and grubbing, grading, structures at watercourses, construction, and paving.

C. During construction, submit to Engineer schedule changes that affect timing of construction.

D. Submit copies of all inspection and maintenance report forms.

1.3 REFERENCES

A. Reference herein to any technical society, organization, group or regulation are made in accordance with the following abbreviations and, unless otherwise noted or specified, all work under this Section shall conform to the latest edition as applicable.

B. Regulations of Connecticut State Agencies (RCSA)

1. 22a-315-10 through 19, Soil and Water Conservation

C. Connecticut Department of Energy and Environmental Protection (DEEP)

1. Connecticut Guidelines for Soil Erosion and Sediment Control, DEEP Bulletin 34, State of Connecticut Council on Soil and Water Conservation, 2002.

D. State of Connecticut Department of Transportation (ConnDOT)

1. Standard Specifications for Roads, Bridges, Facilities and Incidental Construction, Form 818, 2020 and any supplements.

1.4 PERMIT CONDITIONS

A. Contractor and Subcontractors are bound to comply with any project-related permits obtained by Owner or Engineer for the work of the project. Such permits will affect performance of the work, and Contractor and Subcontractors are bound to comply with requirements of such permit and representations contained in permit application as though Contractor and Subcontrator were the Permittee/permit-holder. Requirements and conditions set forth in Owner or Engineer-obtained project-related permits and permit applications shall be binding on Contractor just as any Specification would be.

1.5 QUALITY CONTROL

A. Contractor shall be responsible for the timely installation and maintenance of all sedimentation control devices necessary to prevent the erosion of soil or movement of sediment from construction activities to off-site areas via surface runoff or underground drainage systems. Measures in addition to those shown on the Drawings necessary to prevent the movement of sediment off site shall be installed, maintained, removed, and cleaned up at the expense of Contractor.

B. Where additional erosion and sedimentation control measures are required beyond what is indicated on the Drawings or herein, comply with applicable sections of the Connecticut Guidelines for Soil Erosion and Sediment Control, DEEP Bulletin 34, State of Connecticut Council on Soil and Water Conservation, 2002.

C. Engineer has the authority to order immediate, additional, temporary control measures to prevent contamination of adjacent streams or other watercourses, or other areas of water impoundment and damage by erosion.

D. If Engineer observes construction procedures and operations that jeopardize erosion control provisions, Engineer will notify Contractor. If such construction procedures and operations are not corrected promptly, Engineer 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 Contractor for additional compensation, nor for an extension of time to complete the Work.

E. Should construction materials be washed away or otherwise rendered ineffective in the opinion of Engineer during the progression of the Work, Contractor shall replace the installations at no additional cost to the Owner.

1.6 COORDINATION WITH PERMANENT EROSION CONTROL PROVISIONS

A. Coordinate temporary erosion and sedimentation control measures with permanent erosion control features to the extent practical to ensure economical, effective and continuous erosion control throughout construction and post-construction periods.

PART 2 PRODUCTS

2.1 HAY BALES

A. Hay bales shall be made of cut hay with forty (40) pounds minimum weight and 120 pounds maximum weight. Bales shall be free of rotten or degraded hay, significant splits or voids. Hay bales shall be held together with a minimum of two bands made of either wire or heavy twine.

B. Stakes to anchor the bales shall be a minimum of 36 inches long and made of hardwood with a minimum dimension of 1½-inch by 1½-inch normal size. Metal stakes may be used instead of wooden stakes. Metal stakes shall be round, “U,” “T,” “L,” or “C” shaped with a minimum weight of 0.5 pounds per foot.

C. Replace individual hay bales upon loss of 30% of original mass or volume, whichever is less.

2.2 SILT FENCE

A. Woven Polypropylene geotextile having a minimum weight of 3.1 ounces per square yard conforming to the following:

1. Mechanical and Physical Properties of Silt Fence Geotextile

Mechanical Properties	Test Method	Unit	Minimum Average Roll Value
Weight	ASTM D3776	oz/yd^2	5.6
Grab Tensile Strength	ASTM D4632	Pounds	60
Grab Elongation (Max percent)	ASTM D4632	Percent (%)	15–30
Trapezoidal Tear	ASTM D4533	Pounds	30
Puncture	ASTM D4833	Pounds	30
Mullen Burst	ASTM D3786	psi	150–200
Permittivity	ASTM D4491	Sec^{-1}	0.15
Flow Rate	ASTM D4491	gal/min/ft2	15–20
Apparent Opening Size	ASTM D4751	(U.S. Sieve)	30–35
UV Resistance (at 500 hours)	ASTM D4355	% strength retained	70

B. Silt fence shall be constructed of a minimum thirty-six (36) inch wide continuous woven geotextile. The material shall have a high sediment filtration capacity, high slurry flow and minimum clogging characteristics. Edges of the fabric shall be finished to prevent the outer fibers from pulling away from the geotextile. Geotextile shall be free of defects or flaws that significantly affect its physical and/or filtering properties.

C. Fabric shall be securely fastened to stakes a minimum of 42 inches long and made of hardwood with a minimum dimension of 1½ inch by 1½ inch normal size such that a 6 to 8 inch length of fabric is unattached at the bottom for anchorage in soil. Metal stakes may be used instead of wooden stakes. Metal stakes shall be round, "U," "T," "L," or "C" shaped with a minimum weight of 0.5 pounds per foot. Stakes shall be spaced not greater than ten feet apart. When required, wire or another type of support shall be constructed between the geotextile fabric and the posts to improve the load carrying capacity of the silt fence.

2.3 CATCH BASIN INSERT

A. Manufactured "bag type" catch basin insert of woven polypropylene geotextile with integral lifting loops or straps conforming to the following:

1. Mechanical and Physical Properties of Catch Basin Insert

Mechanical Properties	Test Method	Unit	Minimum Average Roll Value
Grab Tensile Strength	ASTM D4632	Pounds	315
Grab Elongation (Max percent)	ASTM D4632	Percent (%)	30 (max)
Trapezoidal Tear	ASTM D4533	Pounds	40x50 (min)
Puncture	ASTM D4833	Pounds	135 (min)
Mullen Burst	ASTM D3786	psi	420 (min)
Permittivity	ASTM D4491	gal/min/sq ft	0.7
Flow Rate	ASTM D4491	gal/min/ft2	50 (min)
Apparent Opening Size	ASTM D4751	(U.S. Sieve)	20-40
UV Resistance (at 500 hours)	ASTM D4355	% strength retained	80 (min)

Note: Catch basin inserts for catch basins with curb openings shall be equipped with integral curb deflector.

2.4 STRAW MULCH

A. Straw mulch shall be comprised of threshold straw of oats, wheat, barely, or rye that is free from noxious weeds, mold or other objectionable material. Straw mulch shall contain at least 50 percent by weight of material to be 10-in or longer. Straw shall be in an air-dry condition and suitable for placement with blower equipment. Straw mulch shall be utilized on all newly graded areas with slopes exceeding 5% to protect areas against washouts and erosion unless other erosion control measures are provided.

2.5 FILTER BERM COMPOST

A. Where establishing vegetation is not planned, compost shall be a decomposed, weed free organic matter source derived from agricultural, food, or industrial residuals; biosolids (treated sewage sludge); yard trimmings; or source-separated or mixed solid waste. Compost shall possess a moisture content of 30 to 60% and a organic matter content of 25 to 100%. The maximum particle length shall be 6″, and 100% passing a 3″, 90 to 100% passing a 1″, 70% to 100% passing a 3/4″, and 30% to 75% passing a 1/4″ screen. However, no more than 50% passing a 1/4″ screen in high rainfall/flow rate situations.

B. Where establishing vegetation is planned, compost shall be use a well decomposed, stable, weed free organic matter source derived from agricultural, food, or industrial residuals; biosolids (treated sewage sludge); yard trimmings; or source-separated or mixed solid waste. Compost shall possess a moisture content of 30 to 60%, a pH of 6.0 to 8.5 and an organic matter content of 25 to 65%. The maximum particle length shall be 6″, and 100% passing a 3″, 90 to 100% passing a 1″, 70% to 100% passing a 3/4″, and 30% to 75% passing a 1/4″ screen. However, no more than 60% passing a 1/4″ in high rainfall/flow rate situations. It shall contain no substances toxic to plants, shall possess no objectionable odors, and shall not resemble the raw material from which it was derived.

2.6 COMPOST SOIL BLANKET

A. Compost soil blankets may be utilized on slopes of up to 2:1.

B. Slightly scarify slopes and remove large clods, rocks, stumps, roots larger than 2 inches in diameter and debris on slopes, where vegetation is to be established. This soil preparation step may be eliminated where approved by the Landscape Architect/Designer, or where seeding or planting isn't planned. Track (compact) slope using a bulldozer before applying compost.

C. Apply compost at the following rates:

Compost Application Rates

Annual Rainfall/Flow Rate	Total Precipitation & Rainfall Erosivity Index	Application Rate for Slopes to be Vegetated (Note 1)	Application Rate for Slopes not being Unvegetated
Low	1″–25″ & 20–90	½″–¾ ″	1″–1½″
Average	26″–50″ & 91–200	¾″–1″	1½″–2″
High	51″ and above, & 201 and above	1″–2″	2″–4″

D. Lower application rates indicated for slopes to be vegetated should only be used in conjunction with seeding, and for compost blankets applied during the prescribed planting season for the particular region.

E. Compost shall be uniformly applied using an approved spreader unit, including bulldozers, side discharge manure spreaders, etc. Track (compact) the compost layer using a bulldozer or other appropriate equipment. (This step may be eliminated where impractical or where deemed unnecessary by the Landscape Architect/Designer.) Alternatively, apply compost using a pneumatic (blower) unit, or other unit that propels the product directly at the soil surface, thereby preventing water from moving between the soil-compost interface. Thorough watering may be used to improve settling of the compost. Apply compost layer approximately 3 feet (90 cm) over the top of the slope, or overlap it into existing vegetation.

F. On highly unstable soils, use compost in conjunction with appropriate structural measures.

G. Dry or hydraulic seeding may be completed following compost application, as required, or during the compost application itself, where a pneumatic unit is used to apply the compost.

2.7 STONE CHECK DAM

A. Stone shall be graded as follows:

Gradation of Stone for Check Dam (ConnDOT M.01.01 Grading No. 3)

Sieve	Percent Passing by Weight
2 1/2″	100
2″	90–100
1 1/2″	35–70
1	0–15
1/2″	0–5

Stone shall be sound, tough, durable, angular, not subject to disintegration, on exposure to water, or weathering, be chemically stable and shall be suitable in all other respects for the purpose intended.

B. Geotextile may be used under the stone to provide a stable foundation and to facilitate removal of the stone.

2.8 EROSION CONTROL SEED MIXTURE

Erosion Control Seed

Species (Note 1)	Application Rate, Pounds Per Acre	Application rate, Pounds Per 1,000 sf	Optimum Seed Depth, inches (Note 2)	Optimum Seeding Dates (Note 3)
Annual ryegrass Lolium multiflorum	40	1.00	0.5	3/1–6/15 and 8/1–10/15
Perennial ryegrass Lolium perenne	40	1.00	0.5	3/15–7/1 and 8/1–10/15
Winter Rye Secale cereale	120	3.00	1.00	4/5–7/1 and 8/15–10/15
Oats Avena sativa	86	2	1	3/1–6/15 and 8/1–9/15
Winter Wheat Triticum aestivum	120	3	1	4/15–7/1 and 8/15–10/15
Millet Echinochloa crusgalli	20	.5	1	5/15–7/15
Sudangrass Sorghum sudanese	30	.7	1	5/15–8/1
Buckwheat Fagopyrum esculentum	15	.4	1	4/1–9/15
Weeping lovegrass Eragostis curbula	5	.2	.25	6/1–7/1
ConnDOT All Purpose Mix	150	3.4	.5	3/1–6/15 and 8/1–10/15

Notes:

1 – Listed species may be used in combinations to obtain a broader time spectrum. If used in combinations, reduce each species planting rate by 20% of that listed

2 – Seed at twice the indicated depth for sandy soils.

3 – May be planted throughout summer if soil moisture is adequate or can be irrigated. Fall seeding may be extended 15 days in the coastal towns

2.9 EROSION CONTROL MATTING

A. Temporary Erosion Control Blanket shall be 1) Curlex® Excelsior Blanket, as manufactured by American Excelsior Company, 2) ERO-MAT® V75S(FD), as manufactured by Verdyol Plant Research, Ltd., or 3) Landlok® S2 RD, as manufactured by SI® Geosolutions, or 4) approved equal.

B. Degradable Erosion Control Fabric Netting shall be Landlok® 407 GR, as manufactured by 1) SI® Geosolutions, or 2) GeoJute® as manufactured by Belton Industries, Inc., or 3) BioNet® S150BN™ Double Net Straw Blanket, as manufactured by North American Green, or 4) approved equal.

C. Long-Term and Non-degradable Turf Reinforcement Mats shall be 1) Pyramat®, as manufactured by SI® Geosolutions, or 2) Recyclex® Turf Reinforcement Matting, as manufactured by American Excelsior Company, or 3) Vmax3 C350™, as manufactured by North American Green, or 4) approved equal.

D. Erosion control matting shall be secured with staples or an alternative attachment device such as geotextile pins or plastic pegs as recommended by the manufacturer. The Contractor shall submit a sample of the alternative attachment device for the Engineer's approval prior to installation.

PART 3 EXECUTION

3.1 GENERAL

A. Install erosion and sedimentation control measures as shown on the Drawings prior to any site disturbance.

B. No work shall be started until erosion control schedules and installation have been accepted by Engineer.

C. Engineer has the authority to control the surface area of each material exposed by construction operations and to direct Contractor to immediately provide permanent or temporary pollution control measures to prevent contamination of adjacent watercourses or other areas of water impoundment. Every effort shall be made by Contractor to prevent erosion on the site and abutting properties or areas.

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

E. Contractor shall limit as necessary the surface area of the earth material exposed to sufficiently maintain and protect the slopes to prevent pollution. 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 sediment control features can follow immediately thereafter, if

conditions permit; otherwise, temporary control measures will be required between successive construction stages.

F. Erosion control measures shall be maintained by Contractor, and he shall remove such installations only upon completion of the work and the site is stabilized or when authorized to do so by Engineer.

G. Contractor shall operate all equipment and perform all construction operations so as to minimize pollution. Contractor shall cease any of his operations, which will increase pollution during rainstorms.

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

3.2 HAY BALES

A. Hay bales shall be positioned as indicated on the Drawings and/or as necessary to prevent off site movement of sediment produced by, or as a result of, construction activities, or as direct by the Engineer.

B. Hay bales shall be utilized on all catch basins and drainage facilities on the Project Site to prevent the entry of sediments or other debris. Maintain such protection throughout execution of the work until such drainage facilities have been abandoned/removed.

C. Bales shall be placed lengthwise with ends of adjacent bales tightly abutting one another to form a continuous barrier. Bales shall be entrenched to a depth of 4 inches and backfilled, with the backfill placed toward the potential source of runoff and sediment. All bales shall be installed so that bindings are oriented around the sides rather than along the tops and bottoms. Each bale shall be anchored with a minimum of two stakes, driving the first stake in each bale towards the previously laid bale to drive the bales together. Stakes must be driven a minimum of 18 inches into the ground. Loose hay shall be inserted between bales as required to prevent water from escaping between the bales.

3.3 GEOTEXTILE SILT FENCE

A. Install a filter fabric silt fence prior to construction and remove after full surface restoration has been achieved. Install silt fence as indicated on the Drawings and/or as necessary to prevent off site movement of sediment produced by, or as a result of, construction activities.

B. Install as follows:

1. Hand shovel excavate a small trench a minimum of six inches wide by six inches deep on the upslope side of the desired fence line location.

2. Unroll the siltation fence system, position the post in the back of the trench (downhill side), and hammer the post at least 12 inches into the original ground.

3. Fabric rolls shall be spliced at posts. The fabric shall be overlapped six inches, folded over and securely fastened to posts.

4. Lay the bottom 6 inches of the fabric into the trench to prevent undermining by storm water run-off.

5. Backfill the trench and compact. Compaction is necessary to prevent the run-off from eroding the backfill.

6. For slope and swale installations, extend the ends of the trench sufficiently up slope such that the bottom end of the fence will be higher than the top of the lowest portion of the fence.

3.4 CATCH BASIN INLET SEDIMENT CONTROL

A. Install catch basin inlet sediment control devices in each exiting catch basin as long as it remains in use in accordance with manufacturer's guidelines at the locations shown on the Drawings.

B. A catch basin sediment filter shall be installed and changed/cleaned per the manufacturer's recommendations, or as directed by Engineer during construction.

C. New catch basins shall have a filter installed immediately upon completion of construction. In addition, a hay bale, or similar, barrier shall be installed around the new basin and maintained in place until binder is placed or disturbed areas draining to it are stabilized.

D. Catch basins with curb openings shall have filter fabric covering the opening and the edges of the fabric shall be secured. A filter boom shall also be placed over the opening.

3.5 TEMPORARY SEDIMENT BASINS

A. Temporary sedimentation basins shall be employed as required during construction. Sedimentation shall be periodically removed from the basins and from behind erosion and sedimentation control devices. The Contractor shall direct all possible site runoff to the temporary sedimentation basins.

B. The temporary sedimentation basins shall be maintained from the start of construction until construction of the permanent detention basins is completed and perimeter areas are stabilized.

3.6 TEMPORARY MULCHING

A. Apply temporary mulch to areas where rough grading has been completed but final grading is not anticipated to begin within 30 calendar days of the completion of rough grading or where final grading has been completed but seeding is not anticipated for 20 days.

1. Straw/Hay Mulch

   Exposure Period: 6 months

   Application Method: By hand or machine

   Application Rate: 110 lbs/1,000 square feet.

2. Bark Chips/Shredded Bark

   Exposure Period: Less than one year

   Application Method: By hand or machine

   Application Rate: 6 cubic yards /1,000 square feet.

3.7 TEMPORARY EROSION CONTROL MATS

A. Erosion control mats shall be furnished, installed, maintained, and later removed in ditches or swales, on embankment slopes, and excavation slopes at the locations shown on the Drawings in accordance with the manufacturer's recommendations.

B. All areas shall be smooth graded and compacted. Remove all rocks, dirt clods, vegetation and other obstructions that may cause damage to the mats.

C. Unroll mats parallel to the direction of water flow and lay flat against the ground. Overlap roll ends 1–2 feet with upslope mat on the top to prevent uplift of mat end by water flow. Overlay adjacent edges of mat by six inches. Extend mat 2–3 feet above the crest of steep slopes and anchor by excavating a 6-inch-deep trench, and secure end of mat in trench, backfill and compact. Secure mat to the ground using staples or pins furnished by manufacturer of mat.

D. When no longer required, as determined by the Engineer, temporary erosion control mats shall become the property of the Contractor and be removed and properly disposed.

E. Ground disturbances, including holes and depressions caused by the installation and removal of the temporary erosion control blanket shall be backfilled and repaired.

3.8 INSPECTIONS AND MAINTENANCE

A. Contractor is responsible to maintain the sediment and erosion control features at all times throughout the project duration and until the completion certification and approval has been issued.

B. Regular erosion and sediment control system inspections shall be conducted by Contractor throughout the project duration. At a minimum, Contractor shall conduct daily inspections and maintain erosion control systems in good operating condition. Report the results of the inspection and the recommended maintenance and/or repair requirements to Engineer.

C. Additional inspections may be required and/or directed prior to, or immediately following, a storm event >0.1 inches. Repairs shall be made as necessary.

D. In the event that the sedimentation and erosion control measures employed by Contractor prove to be inadequate as determined by the Engineer, Contractor shall adjust operations to the extent necessary to prevent erosion and sediment transport.

E. Surface water shall be pumped to maintain excavations free of water. Comply with applicable requirements of the Connecticut Department of Environmental Protection, specifically those requirements related to the management of stormwater and dewatering wastewaters associated with construction activities.

F. Hay bales and/or silt fences.

1. Remove accumulated sediment once it builds up to one-half of the height of the bale or fabric.

2. Replace damaged or degraded bales as necessary or when directed by the Engineer.

3. Replace damaged fabric, or patch with a 2-ft minimum overlap. Overlaps may only be made at fence posts.

4. Make other repairs as necessary to ensure that the bales/fence is filtering all runoff.

G. Erosion Control Mats shall be inspected at least once a week. Areas where the mat has become dislodged from the soil surface or become torn shall be re-graded and re-seeded as necessary and the mat re-installed. When repetitive failures occur at the same location review conditions and modify erosion control measures to reduce failure rate. Temporary erosion control blanket damaged during the progress of work or resulting from the Contractor's vehicles, equipment, or operations shall be repaired or replaced at the expense of the Contractor.

H. Clean catch basin inlet sediment control devices in accordance with manufacturer's guidelines.

I. Any catch basins that collect sediment as a result of Contractor's work shall be thoroughly cleaned out by Contractor.

END OF SECTION

SECTION 01 5714

TEMPORARY DUST CONTROL

PART 1 GENERAL

1.1 SECTION INCLUDES

A. Furnishing and spreading water, calcium chloride, and/or mulch on the subgrade, or in other areas of a Project Site or associated off-site areas, for the purpose of controlling dust emissions.

B. The requirements set forth in this section of the specifications apply to all phases and areas of construction.

C. Contractor is responsible for all health and safety.

1.2 REFERENCES

A. Reference herein to any technical society, organization, group or regulation are made in accordance with the following abbreviations and, unless otherwise noted or specified, all work under this Section shall conform to the latest edition as applicable.

B. Regulations of Connecticut State Agencies (RCSA)

1. RCSA Section 22a-174-1 through 43, Abatement of Air Pollution.

C. ASTM International (ASTM)

1. ASTM D98, Standard Specification for Calcium Chloride.

PART 2 PRODUCTS

2.1 MATERIALS

A. Only water, calcium chloride, and mulch are approved for dust control. No asphalt or petroleum-based products may be utilized for dust control.

B. Water used shall be clean, non-polluted water obtained from sources approved by Engineer.

C. Calcium chloride, ASTM D98. Calcium chloride in pellet form and flake form shall be acceptable.

1. Calcium chloride shall be packaged in moisture proof bags or in airtight drums with the manufacturer, name of product, net weight, and percentage of calcium chloride guaranteed by the manufacturer legibly marked on each container.

2. Engineer may reject calcium chloride failing to meet the requirements of the aforementioned specifications or which has become caked or sticky in shipment.

D. Mulch

1. Straw mulch: Threshold straw of oats, wheat, barely, or rye that is free from noxious weeds, mold or other objectionable material. Straw mulch shall contain at least 50 percent by weight of material to be 10-in or longer.

2. Wood chips: Processed tree trimmings free of trash or other physical contaminants such as metal and plastic.

PART 3 EXECUTION

3.1 GENERAL

A. Dust control shall be the responsibility of Contractor and dust control operations shall meet the requirements of the State of Connecticut Department of Environmental Protection.

B. Construction sequencing shall be organized and conducted in a manner to leave existing pavement or ground coverings in place until just prior to earth excavation for the purpose of minimizing the migration of dust beyond the Project Limits into the surrounding area.

C. Engineer reserves the right to conduct active dust monitoring using visual methods and may utilize particulate measurement equipment during the course of the work. If the amount of fugitive dust and/or particulate generated during the work is deemed unacceptable in the Engineer's judgment or exceeds baseline Project Site conditions at Engineer's monitoring locations, Engineer may require Contractor to stop work and implement corrective measures. No claim for delay will be considered for work stoppage based upon the results of Engineer's active dust monitoring results.

D. Stockpiled materials from which particle have the potential of becoming airborne shall be securely covered with a temporary waterproof covering made of polyethylene, polypropylene, hypalon, or approved equal. The covers must be in place at all times when work with the stockpiles is not occurring.

E. Subcontractor shall sweep all adjacent roads and neighboring parking lots and driveways that are impacted by the work. Whenever dirt is tracked from the site it shall be cleaned as necessary to prevent it from becoming a nuisance or hazard. At a minimum, adjacent streets shall be swept once per week.

3.2 WATER

A. The application of water shall be under the control of Engineer at all times. It shall be applied only at the locations, and at such times, and in the amount as may be directed by Engineer. Quantities of water wasted or applied without authorization will not be paid for.

B. Use of water will not be permitted when it will result in, or create, hazardous or objectionable conditions such as ice, flooding or pollution.

C. Contractor shall have available and maintain in an operable condition at all times, sufficient equipment for the purpose of applying water for dust control.

D. Watering equipment shall consist of pipelines, tanks, tank trucks, distributors, pumps, meters, hose or other devices, approved by Engineer, which are capable of applying a uniform spread of water over the surface. A suitable device for a positive shut-off and for regulating the flow of water shall be located so as to permit positive operator control.

E. Applications of water for dust suppression include, but are not necessarily limited to, the following:

1. Demolition activities, material handling, material processing, and loading.

2. Earthwork.

3. Open excavation faces and dust-prone areas of the work.

4. Temporary access roads and roadway surfaces within and around the Project Site.

3.3 CALCIUM CHLORIDE

A. Calcium chloride shall be applied only at the locations, at such times and in the amount as may be directed by the Engineer and only in areas that will not be adversely affected by the application. Refer to Section 01 3543 – Environmental Protection.

B. Calcium chloride shall be uniformly applied at the rate of one and one-half (1½) pounds per square yard (lb/yd2) or at any other rate as directed by Engineer. Application shall be by means of a mechanical spreader, or other approved methods. The number and frequency of applications shall be to Engineer's satisfaction.

3.4 MULCH FOR DUST CONTROL

A. Coordinate the use of mulch for dust control with erosion and sedimentation control measures.

B. Straw mulch shall be applied at a rate of 100 pounds per 1,000 square feet (100 lb/1,000 ft2).

C. Wood chips or wood mulch shall be applied at such a rate as to form a layer one (1) inch thick.

3.5 OTHER DUST CONTROL MEASURES

A. A temporary seed mixture may be spread in lieu of, or in addition to mulch over areas where the suspension of grading work in disturbed areas is expected to be more than 30 calendar days and as directed by Engineer.

END OF SECTION

SECTION 01 7124

AS-BUILT SURVEY

PART 1 GENERAL

1.1 SUMMARY

A. Section includes:

1. Final Survey of completed construction.

2. Preparation of “As-Built” Drawings after construction is completed.

B. Contractor shall coordinate work between all Contractors, sections, and trades required for the proper completion of the work.

C. Contractor is responsible for all health and safety.

1.2 REFERENCES

A. Reference herein to any technical society, organization, group or regulation are made in accordance with the following abbreviations and, unless otherwise noted or specified, all work under this Section shall conform to the latest edition as applicable.

B. Code of Federal Regulations (CFR).

1. 29 CFR 1926, Safety and Health Regulations for Construction.

C. State of Connecticut, Regulations of Connecticut State Agencies (RCSA)

1. Sections 20-300b-1 through 20-300b-20, Standards for Surveys and Maps in the State of Connecticut.

1.3 SUBMITTALS

A. Surveyor: Submit name and qualifications of Professional Land Surveyor who will be responsible for the work of this Section.

B. Certificates: Submit a certificate signed by a Connecticut-licensed Land Surveyor (PLS) certifying that the location and elevation of improvements comply with the Contract Documents and any approved changes in the work.

C. Final Survey: Prepare and submit two (2) copies of the final as-built survey.

D. Project Record Documents: Submit other pertinent documentation as may be required or appropriate.

1.4 QUALITY ASSURANCE

A. Use adequate numbers of skilled workmen who are thoroughly trained and experienced in the necessary crafts and who are completely familiar with the specified requirements and the methods needed for proper performance of the work of this Section.

B. Surveyor: Engage a Land Surveyor licensed as a Professional Land Surveyor (PLS) in the State of Connecticut to perform survey work.

PART 2 PRODUCTS – NOT USED

PART 3 EXECUTION

3.1 FINAL SURVEY

A. Provide Improvement Location Survey to depict the horizontal and vertical location of all new construction.

3.2 AS-BUILT DRAWINGS

A. Prepare final As-Built Drawings which accurately depict the final configuration of all new construction. Document by means of appropriate details and notes all changes from the Drawings or Specifications which were made in the work or additional information which was uncovered in the course of construction.

B. As-Built Drawings shall depict the horizontal and vertical location of above-grade and below grade construction. Collect sufficient survey data to accurately represent the project scope and area.

1. Location: Survey shall include locations of all physical features installed during the construction with appropriate labelling.

a. Subsurface construction shall depict the actual location, depth, and configuration.

b. Utilities shall include type, size, material of construction, horizontal location and depth below finished ground surface. Include all appurtenances such as valves, tees, cleanouts, etc. Include reference to permanent surface improvements.

c. Include field changes of dimension and detail.

d. Include detail not on original Contract Drawings.

e. Include changes or modifications which result from punch lists or final inspection.

2. Topographic data: From established survey control, conduct a topographic survey of the project area after construction is complete. Generate one-foot contours throughout the area of work and show breaks in slope and other notable features.

a. Pedestrian routes shall depict sufficient topographic data to confirm compliance with handicapped accessibility requirements.

b. Accessible Routes: A minimum of three (3) elevations at each edge and centerline (cross-section), spaced at a minimum of 5 feet along the route.

c. Ramps: Elevation shall be depicted with a minimum of three (3) elevations at bottom and top of each sloped segment. Elevation of landings associated with a ramp shall be depicted with a minimum of four (4) elevations at each corner.

d. Curb Ramps: Elevation shall be depicted with a minimum of three (3) elevations at bottom and top of the accessible ramp section. Elevation of flare (wings) sections

(wings) shall be depicted with a minimum of three (3) elevations at each triangle corner.

e. Accessible Parking Spaces: Elevation of the parking area and Access Isle shall be depicted with a minimum of four (4) elevations at each corner, respectively.

C. Submit two prints of the final as-built drawings to Engineer prior to submittal of Application for Final Payment.

END OF SECTION

SECTION 01 7700

PROJECT CLOSE-OUT

PART 1 GENERAL

1.1 SUMMARY

A. Section Includes:

1. Substantial Completion.
2. Warranties.
3. Inspections.
4. Final cleaning.
5. Final Acceptance.
6. Commissioning and Training
7. Project record documents.

1.2 SUBMITTALS

A. Submit Close-Out Submittals as indicated herein. Provide other Close-Out submittals that may be called-for in other Specification Sections.

1.3 SUBSTANTIAL COMPLETION

A. Preliminary Procedures: Before requesting inspection for Certification of Substantial Completion, complete the following (list exceptions in the request).

B. In the Application for Payment that coincides with, or first follows, the date Substantial Completion is claimed, show 100 percent completion for the portion of the Work claimed as Substantially Complete. Include supporting documentation for completion as indicated in the Contract Documents and a statement showing an accounting of changes to the Contract Sum if applicable.

C. If 100 percent completion cannot be shown, include a list of incomplete items, the value of incomplete construction, and reasons the Work is not complete.

D. Submit warranties, workmanship bonds, maintenance agreements, testing results, final certifications, and similar documents.

E. Obtain and submit releases enabling the Owner unrestricted use of the work and access to services and utilities; include occupancy permits, operating certificates and similar releases.

F. Deliver spare parts, extra stock, equipment, and similar items required.

G. Complete start up testing of systems, and instruction of the Owner’s operating and maintenance personnel. Discontinue or change over and remove temporary facilities from the site, along with construction tools, mock ups, and similar elements.

H. Complete final clean up requirements, including touch up painting. Touch up and otherwise repair and restore marred exposed finishes.

I. Coordinate temporary erosion and sedimentation control measures with permanent erosion control features to the extent practical to ensure economical, effective and continuous erosion control post-construction.

1.4 INITIAL CLOSE-OUT INSPECTION

A. On receipt of a request for inspection, Engineer will either proceed with inspection or advise Contractor of unfilled requirements.

B. Following Initial Inspection, Engineer will prepare a list of items to be completed or corrected ("Punch List").

C. Engineer will prepare a Certificate of Substantial Completion following Initial Inspection, or advise Contractor of construction that must be completed or corrected before the certificate will be issued. If a Certificate of Substantial Completion is issues, the Punch List will be attached.

1.5 WARRANTIES

A. Submit written warranties to Engineer prior to the date certified for Substantial Completion. If the Certificate of Substantial Completion designates a commencement date for warranties other than the date of Substantial Completion for the Work, or a designated portion of the Work, submit written warranties upon request of Engineer.

1.6 FINAL CLEANING

A. Remove all temporary controls unless otherwise indicated to remain.

B. Remove tools, construction equipment, machinery, and surplus materials.

C. Remove and properly dispose of all garbage, rubbish, litter, and other substances.

D. Clean exposed surfaces of installed equipment and similar items.

1.7 FINAL CLOSE-OUT INSPECTION

A. On receipt of a request for Final Inspection, Engineer will either proceed with inspection or advise Contractor of unfilled Punch List requirements.

B. Results of the Final Inspection will form the basis of requirements for final acceptance.

C. Engineer will repeat Final Inspection following notation of Punch List items that must be completed or corrected.

1.8 FINAL ACCEPTANCE

A. Preliminary Procedures: Before requesting final acceptance and final payment, complete the following (list exceptions in the request).

1. Submit the final payment request with releases and supporting documentation not previously submitted and accepted.

2. Submit an updated final statement, accounting for final additional changes to the Contract Sum if applicable.

3. Submit Consent of Surety to final payment, and final lean releases (lien waiver) from all suppliers, subcontractors, and second-tier subcontractors.

B. Following completion of acceptable Close-Out Inspection and receipt of all required Close-Out Submittals, Engineer will prepare a certificate of final acceptance.

1.9 COMMISSIONING AND TRAINING

A. Provide for the start-up and commissioning of the entire system as required and as may be called-for by the manufacturer’s instructions.

1. Adjust all components of the system for proper operation within manufacturer's published tolerances.

2. Adjust equipment including water requirements, for smooth operation.

3. Confirm proper operation of all valves, controllers, switches, pumps, filters and similar equipment.

4. Touch up minor damage on equipment surfaces caused by installation. Replace damaged components that cannot be repaired to satisfy warrant or to the satisfaction of Engineer of Owner.

1.10 RECORD DOCUMENT SUBMITTALS

A. Record Drawings: In addition to Record Drawing requirements that may be defined in individual Specification Sections, at a minimum, maintain a clean, undamaged set of blue or black line white prints of Contract Drawings and Shop Drawings. Mark the set to show the actual installation where the installation varies substantially from the Work as originally shown. Mark whichever Drawing is most capable of showing conditions fully and accurately. Where Shop Drawings are used, record a cross reference at the corresponding location on the Contract Drawings. Give particular attention to concealed elements that would be difficult to measure and record at a later date.

1. Mark record sets with red erasable pencil; use other colors to distinguish between variations in separate categories of the Work.

2. Mark new information that is important to the Owner, but was not shown on Contract Drawings or Shop Drawings.

3. Note related Change Order numbers where applicable.

4. Organize record drawing sheets into manageable sets, bind with durable paper cover sheets, and print suitable titles, dates and other identification on the cover of each set.

5. Upon completion of the project, submit (2) copies of Record Drawings to Engineer.

B. Record Product Data: Maintain one copy of each Product Data submittal. Mark these documents to show significant variations in actual Work performed in comparison with information submitted. Include variations in products delivered to the site, and from the manufacturer’s installation instructions and recommendations. Give particular attention to concealed products

and portions of the Work which cannot otherwise be readily discerned later by direct observation. Note related Change Orders and mark up of Record Drawings and Specifications.

1. Upon completion of mark up, submit complete set of record Product Data to Engineer.

C. Miscellaneous Record Submittals: Refer to other Specification Sections for requirements of miscellaneous record-keeping and submittals in connection with actual performance of the Work. Immediately prior to the date of Substantial Completion, complete miscellaneous records and place in good order, properly identified and bound or filed, ready for continued use and reference. Submit to Engineer.

PART 2 PRODUCTS – NOT USED

PART 3 EXECUTION – NOT USED

END OF SECTION

DIVISION 02
EXISTING CONDITIONS

SECTION 02 3219

EXPLORATORY EXCAVATIONS

PART 1 GENERAL

1.1 SUMMARY

A. Section Includes:

1. Excavation of test pits where it may be necessary to locate or examine soils, groundwater, drains, pipes, rock, utilities, subsurface structures, or any other obstacles or subsurface conditions.

2. Stockpiling, management, and disposal of surplus or unsuitable material.

3. Backfilling and compacting of test pits with suitable material.

B. Exploratory excavations shall be conducted where shown on the Drawings, where directed or approved by Engineer, and as Contractor may deem necessary to locate or examine subsurface conditions as part of his work.

C. Contractor shall coordinate work between all Subcontractors, sections, and trades required for the proper completion of the work.

D. Contractor is responsible for all health and safety.

1.2 PAYMENT

A. Exploratory excavation work conducted by Contractor for his use or as specifically called-for on the Drawings or in the Specifications shall be considered incidental work and shall be included in Contractor's base price for the project. Contractor shall be responsible for any required backfilling with suitable materials, disposal of unsuitable excavated materials, and restoration of the excavation area.

B. Exploratory Excavation requested by Engineer shall be paid for in accordance with Contractor's Unit Price bid for "Exploratory Excavations" per Section 01 2010 - Measurement and Payment.

1.3 REFERENCES

A. Reference herein to any technical society, organization, group or regulation are made in accordance with the following abbreviations and, unless otherwise noted or specified, all work under this Section shall conform to the latest edition as applicable.

B. United States Code of Federal Regulations (CFR).

1. 29 CFR 1926, Safety and Health Regulations for Construction.

1.4 SAFETY

A. Contractor shall conduct all excavation activities in conformance with applicable regulations, including those relating to warning signs, excavation safety, sheeting, shoring, and stabilization.

B. Contractor shall provide and maintain barricades, signs, lights, etc., required for the protection of personnel, materials and property. Temporary barricades, etc. shall conform all applicable codes and regulations, and shall be lighted at night with lanterns, flares and reflectorized paint as required for safety. Adapt barricades, signs, lights, etc. to evolving site conditions throughout the progress of the work.

C. Provide other safety devices as required, including adaptation of such safety devices to changing site conditions, to prevent unauthorized entry to construction areas and open excavations. Provide warning signs and other temporary construction safety devices necessary for proper completion of the work in compliance with applicable safety regulations.

D. Contractor shall properly design and furnish all labor, materials, equipment, and tools necessary to construct permanent or temporary excavation support systems, including, but not necessarily limited to, sheet piling, trench shields, trench boxes, timber trench shoring, pneumatic/hydraulic shoring, steel sheeting or sheeting using other materials, sloping, and benching.

E. Any time an excavation is to remain open, at a minimum, provide full enclosure with safety barriers and fencing, warning signs, and additional safety control measures as appropriate for the condition.

1.5 SUBMITTALS

A. Submit record data of observations noted in test pits, including photographs, diagrams, and descriptive notes.

1.6 QUALITY ASSURANCE

A. Use adequate numbers of skilled workmen who are trained and experienced in the necessary crafts and who are completely familiar with the specified requirements and methods required for proper performance of the work in this Section. Use equipment of adequate size, capacity and quantity to accomplish the work of this Section in a timely manner.

B. Utility Mark-out

1. Prior to commencing work, comply with utility mark-out requirements of the Call-Before-You-Dig System (1-800-922-4455).

2. Verify the location of all subsurface utilities marked through the Call-Before-You-Dig System.

3. Not all subsurface facilities or structures will be identified through the Call-Before-You-Dig System. Confirm the location of other subsurface utilities and other subsurface facilities or structures prior to commencing work. Field-mark utilities as required.

C. Utility Coordination

1. Inform all utility owners of the necessity of test pit work. Prove reasonable advance notice to allow for coordination.

2. Coordinate the excavation of all test pits with the respective utility owners having facilities in the vicinity of the test pit location.

3. If so desired by the respective utility owners, all or part of the work under this Section may be accomplished by their crews and/or supervised by them.

D. Utility Protection

1. Safeguard and protect from damage any utility to remain in service. Before excavating near any utility, notify the utility owner, coordinate protective work, and comply with the utility owners' requirements.

2. Where utilities are encountered, notify Engineer and document location and type of utility before proceeding with work in such area.

3. When uncharted or incorrectly charted piping or utilities are encountered during excavation, stop work and notify Engineer immediately. Cooperate with the utility owners in maintaining their utilities in operation prior to resuming work.

E. Retaining Structures

1. Provide bracing, shoring, sheeting, sheet piling, underpinning or other retaining structures necessary to guard against any movement or settlement of existing or new construction, utilities, paving, light standards, piping or conduit. Assume responsibility for the strength and adequacy of retaining structures, and for the safety and support of construction, utilities or paving, and for any movement, settlement or damage thereto.

1.7 SEQUENCING

A. Contractor shall provide Engineer a minimum two (2) day notice prior to test pit excavation. Notify Engineer prior to backfill.

B. If test pits are required during the work to evaluate unforeseen conditions, notify Engineer as soon as the need for such work is known.

C. Notify Engineer and/or utility companies of any conflicts or other conditions observed which may require design revisions, relocations, and/or adjustment. No work shall be started within areas where conflicts or other conditions are observed which require design revisions, relocations, and/or adjustment until authorized by Engineer.

PART 2 PRODUCTS – NOT USED

2.1 SOILS

A. Refer to Section 31 2310 – Earthwork.

PART 3 EXECUTION

3.1 EXCAVATION

A. Test pit excavation and backfill shall comply with applicable provisions of earthwork and excavation as indicated in other applicable Specification Sections.

B. Excavation of test pits shall be accomplished by such means as are required to ensure that underground utilities or structures which may be encountered are not damaged.

C. Contractor shall measure and record the size, configuration, exact horizontal and vertical location of all utilities, pipes or other conditions/obstacles encountered.

D. Contractor shall be solely responsible for any damages incurred during excavation operations. Any such damages shall be repaired or replaced by Contractor to the satisfaction of the facility owner/operator, responsible/administering agency, and/or Engineer. Whether repair and/or replacement is Conducted by Contractor or must be conducted by owner/operator or responsible/administering agency, any and all costs thereof, including those costs associated with planning, coordination and owner/operator or responsible/administering agency personnel, shall be borne by Contractor.

E. Where an existing pavement has been removed for test pit excavation, the surface shall be restored in accordance with the Drawings and Specifications. In all other areas, the surface of test pit areas shall be backfilled and the surface restored to a condition equal to original, unless otherwise indicated by Engineer.

END OF SECTION

DIVISION 03
CONCRETE

SECTION 03 3200

SITE CAST-IN-PLACE CONCRETE

PART 1 GENERAL

1.1 SUMMARY

A. Section includes

1. Site cast-in-place concrete, including but not necessarily limited to, sidewalks, ramps, driveways, curbing, pads, bases, retaining walls, and thrust blocks.

2. All facilities, labor, materials, tools, equipment, appliances, transportation, supervision, and related work necessary to complete the Work shown on the Drawings and as specified herein.

B. Contractor shall coordinate work between all Contractors, sections, and trades required for the proper completion of the work.

C. Contractor is responsible for all health and safety.

1.2 REFERENCES

A. Reference herein to any technical society, organization, group or regulation are made in accordance with the following abbreviations and, unless otherwise noted or specified, all work under this Section shall conform to the latest edition as applicable.

B. Code of Federal Regulations (CFR).

1. 29 CFR 1926, Safety and Health Regulations for Construction.

C. ASTM International (ASTM)

1. ASTM A615 – Standard Specification for Deformed and Plain Carbon-Steel Bars for Concrete Reinforcement.

2. ASTM A706 – Standard Specification for Low-Alloy Steel Deformed and Plain Bars for Concrete Reinforcement

3. ASTM A767 – Standard Specification for Zinc-Coated (Galvanized) Steel Bars for Concrete Reinforcement

4. ASTM A775 – Standard Specification for Epoxy-Coated Steel Reinforcing Bars.

5. ASTM A996 – Standard Specification for Rail-Steel and Axle-Steel Deformed Bars or Concrete Reinforcement.

6. ASTM A1064 – Standard Specification for Carbon-Steel Wire and Welded Wire Reinforcement, Plain and Deformed, for Concrete.

7. ASTM C29 – Standard Test Method for Bulk Density (“Unit Weight”) and Voids in Aggregate

8. ASTM C31 – Standard Practice for Making and Curing Concrete Test Specimens in the Field.
9. ASTM C33 – Standard Specification for Concrete Aggregates.
10. ASTM C39 – Standard Test Method for Compressive Strength of Cylindrical Concrete Specimens.
11. ASTM C42 – Standard Test Method for Obtaining and Testing Drilled Cores and Sawed Beams of Concrete.
12. ASTM C70 – Standard Test Method for Surface Moisture in Fine Aggregate.
13. ASTM C94 – Standard Specification for Ready-Mixed Concrete.
14. ASTM C117 – Standard Test Method for Materials Finer than 75-um (No. 200) Sieve in Mineral Aggregates by Washing.
15. ASTM C127 – Standard Test Method for Density, Relative Density (Specific Gravity), and Absorption of Coarse Aggregate.
16. ASTM C128 – Standard Test Method for Density, Relative Density (Specific Gravity), and Absorption of Fine Aggregate.
17. ASTM C136 – Standard Test Method for Sieve Analysis of Fine and Coarse Aggregates.
18. ASTM C138 – Standard Test Method for Density (“Unit Weight”), Yield, and Air Content (Gravimetric) of Concrete.
19. ASTM C143 – Standard Test Method for Slump of Hydraulic-Cement Concrete.
20. ASTM C150 – Standard Specification for Portland Cement.
21. ASTM C156 – Standard Test Method for Water Retention by Concrete Curing Materials.
22. ASTM C171 – Standard Specification for Sheet Materials for Curing Concrete.
23. ASTM C172 – Standard Practice for Sampling Freshly Mixed Concrete.
24. ASTM C173 – Standard Test Method for Air Content of Freshly Mixed Concrete by the Volumetric Method.
25. ASTM C192 – Standard Practice for Making and Curing Concrete Test Specimens in the Laboratory.
26. ASTM C231 – Standard Test Method for Air Content of Freshly Mixed Concrete by the Pressure Method.
27. ASTM C233 – Standard Test Method for Air-Entraining Admixtures for Concrete.
28. ASTM C260 – Standard Specification for Air-Entraining Admixtures for Concrete.
29. ASTM C309 – Standard Specification for Liquid Membrane-Forming Compounds for Curing Concrete.

30. ASTM C311 – Standard Methods of Sampling and Testing Fly Ash and Natural Pozzolans for Use as a Mineral Admixture in Portland Cement Concrete.

31. ASTM C387 – Standard Specification for Packaged, Dry, Combined Materials for Mortar and Concrete.

32. ASTM C494 – Standard Specification for Chemical Admixtures for Concrete.

33. ASTM C566 – Standard Test Method for Total Evaporable Moisture Content of Aggregate by Drying.

34. ASTM C595 – Standard Specification for Blended Hydraulic Cements.

35. ASTM A615 – Standard Specification for Deformed and Plain Carbon-Steel Bars for Concrete Reinforcement.

36. ASTM C618 – Standard Specification for Coal Fly Ash and Raw or Calcined Natural Pozzolan for Use in Concrete.

37. ASTM C685 – Standard Specification for Concrete Made by Volumetric Batching and Continuous Mixing.

38. ASTM C171 – Standard Specification for Sheet Materials for Curing Concrete.

39. ASTM C803 – Standard Test Method for Penetration Resistance of Hardened Concrete.

40. ASTM C920 – Standard Specification for Elastomeric Joint Sealants.

41. ASTM C979 – Standard Specification for Pigments for Integrally Colored Concrete.

42. ASTM C989 – Ground Granulated Blast-Furnace Slag for Use in Concrete Mortars.

43. ASTM C1064 – Standard Test Method for Temperature of Freshly Mixed Hydraulic-Cement Concrete.

44. ASTM A1078 – Standard Specification for Epoxy-Coated Steel Dowels for Concrete Pavement.

45. ASTM D1751 – Standard Specification for Preformed Expansion Joint Filler for Concrete Paving and Structural Construction (Nonextruding and Resilient Bituminous Types).

46. ASTM D1752 – Standard Specification for Preformed Sponge Rubber Cork and Recycled PVC Expansion Joint Fillers for Concrete Paving and Structural Construction.

47. ASTM D2628 – Standard Specification for Preformed Polychloroprene Elastomeric Joint Seals for Concrete Pavements.

48. ASTM D4397 – Standard Specification for Polyethylene Sheeting for Construction, Industrial, and Agricultural Applications.

49. ASTM D5249 – Standard Specification for Backer Material for Use with Cold- and Hot-Applied Joint Sealants in Portland-Cement Concrete and Asphalt Joints.

50. ASTM D5893 – Standard Specification for Cold Applied, Single Component, Chemically Curing Silicone Joint Sealant for Portland Cement Concrete Pavements.

51. ASTM E329 – Standard Specification for Agencies Engaged in the Testing and/or Inspection of Materials Used in Construction.

D. Concrete Reinforcing Steel Institute (CRSI).

1. CRSI Manual of Standard Practice, latest edition.

E. State of Connecticut

1. 2018 Connecticut State Building Code, including all Amendments, Supplements, and Errata.

F. American Concrete Institute (ACI)

1. ACI 224R – Control of Cracking on Concrete Structures.

2. ACI 224.3R – Joints in Concrete Construction.

3. ACI 301 – Specifications for Structural Concrete.

4. ACI 302.1R – Guide for Concrete Floor or Slab Construction.

5. ACI 304R – Guide for Measuring, Mixing, Transporting, and Placing Concrete.

6. ACI 305R – Guide to Hot Weather Concreting.

7. ACI 306R – Guide to Cold Weather Concreting.

8. ACI 308R – Guide to Curing Concrete.

9. ACI 318-14 - Building Code Requirements for Structural Concrete

10. ACI 318R-14 - Commentary on Building Code Requirements for Structural Concrete

G. American Welding Society (AWS).

1. AWS A5.1/A5.1M (2004; Errata 2004) Carbon Steel Electrodes for Shielded Metal Arc Welding.

2. AWS D1.4/D1.4M (2005; Errata 2005) Structural Welding Code – Reinforcing Steel.

1.3 SUBMITTALS

A. Sampling and Testing Laboratory – Submit name and qualifications of commercial sampling and testing laboratory for Engineer's approval. Submit applicable documentation of credentials, licenses, etc.

B. Testing Agency – Submit name and qualifications of third-party in-field quality control Testing Agency for Engineer's approval. Submit applicable documentation of credentials, licenses, etc.

C. For each type of specially furnished concrete provide a description of methods and the sequence of placement.

D. Manufacturer's catalog data for the following items shall include printed instructions for admixtures, bonding agents, epoxy-resin adhesive binders, waterstops, and liquid chemical hardeners:

1. Concrete Aggregates.
2. Portland Cement.
3. Ready-Mix Concrete.
4. Form Facing Materials.
5. Reinforcement Materials.
6. Joint Materials.
7. Water-Vapor Barrier Subgrade Cover.
8. Bonding Materials.
9. Finish Materials.
10. Concrete Curing Materials.
11. Form release agent.
12. Concrete coloring additive.
13. Elastomeric joint sealant.
14. Preformed joint filler

E. Submit samples of the following:

1. Preformed joint filler.
2. Manufacturer's color charts showing full range of colors available.
3. Cured samples of elastomeric join sealants in the color(s) selected.

F. Design Data

1. Mix Design data for each class of Ready-Mix Concrete shall be submitted at least 15 calendar days prior to start of specified work.
2. Mix Design data for each type of integrally-colored concrete mix called-for shall be submitted at least 15 calendar days prior to start of specified work.

G. Test Reports

1. Submit test reports for all testing conducted under this Section.

H. Certificates

1. Submit certificates for the following:
   a. Concrete Design Mixes.
   b. Concrete Aggregates.

c. Welding Procedures. Welding Procedures shall be in accordance with AWS D1.4/D1.4M. Certificates for Welder Qualifications shall be in accordance with the paragraph entitled, "Qualifications for Welding Work," of this section.

d. Mill certificates for Steel Bar.

2. Certificates for concrete shall contain project name, title/number, date, name of Contractor, name of concrete testing service, source of concrete aggregates, material manufacturer, brand name of manufactured materials, material name, values as specified for each material, and test results.

I. Manufacturer's Instructions

1. Installation instructions shall indicate the manufacturer's recommended method and sequence of installation for the following items:

a. Admixtures

b. Bonding Materials

c. Waterstops

d. Liquid Chemical Hardener

J. Joint Plan

1. Prior to initiation of concrete flatwork, submit proposed Construction Joint plan to Engineer for review and approval. Coordinate such plan with the joint patterns depicted on the Drawings.

K. Delivery Tickets: Ready-mixed concrete manufacturer shall provide delivery tickets with each load of concrete delivered to the Project Site. Delivery tickets shall provide the following information:

1. Project name printed on ticket.

2. Name of producer, identification of plant.

3. Date and time of day.

4. Type of material.

5. Cubic yards of material loaded into truck.

6. Project number, purchase order number, name of Contractor (if Contractor other than producer).

7. Truck number for specific identification of truck.

8. Individual aggregate, cement, water weights (masses) and any admixtures shall be printed on plant tickets.

9. Water/cement ratio.

10. Additional water allowance in gallons based on water/cement ratio for mix.

1.4 QUALITY ASSURANCE

A. Dimensions, locations, and details of equipment pads, anchors, supports, and similar features indicated on the Drawings are approximate. Manufacturer's approved shop drawings of equipment to be supported, anchored, or contained thereby shall be consulted for exact location, size and details.

B. Obtain each specified material from same source and maintain high degree of consistency in workmanship throughout Project.

C. Use adequate numbers of skilled workmen who are trained and experienced in the necessary crafts and who are completely familiar with the specified requirements and methods required for proper performance of the work in this Section. Use equipment of adequate size, capacity and quantity to accomplish the work of this Section in a timely manner.

D. Welder qualifications: Welder qualifications shall be verified in accordance with AWS D1.4/D1.4M or under an equivalent qualification test approved in advance. Welders shall be permitted to do only the type of welding for which each is specifically qualified.

E. Concrete testing: Concrete testing shall be performed by an approved Testing Agency/Testing Laboratory experienced in sampling and testing of concrete. Testing Agency/Testing Laboratory shall meet the requirements of ASTM E329.

1.5 MOCKUPS

A. Where mockups are called-for, comply with the following:

1. At location on the Project Site selected by Engineer, place and finish 100 square foot mockup section for examination. Mockup to be constructed by the installer who will actually perform the work for the Project.

2. For accurate color, the quantity of concrete mixed to produce the sample should not be less than 3 cubic yards (or not less than 1/3 the capacity of the mixing drum on the ready-mix truck) and should always be in full cubic yard increments. Excess material shall be discarded according to local regulations.

3. For colored concrete, record the amount of integral colorant, dray colorant, or chemical stain needed per square foot of application to establish coverage rates for the work.

4. Construct mockup using processes and techniques intended for use on permanent work, including curing procedures. Include samples of control construction, and expansion joints in sample panels.

5. Retain samples of cements, sands, aggregates and color additives used in mockup for comparison with materials used in remaining work.

6. Accepted mockup provides visual standard for all work.

7. Mockup shall remain through completion of work for use as a quality standard for finished work.

8. Provide suitable protections to preclude damage to mockup.

9. Remove mockup when directed.

1.6 TESTING

A. Quality control testing during construction shall be the responsibility of Contractor via Testing Agency and Testing Laboratory as applicable. Contractor shall retain and pay for the services of such Testing Agency/Testing Laboratory to perform all testing in accordance with applicable standards.

B. Testing shall include sampling and testing concrete materials proposed for use in the work and testing the design mix for each class of concrete.

C. Tests will be required to determine whether the concrete being produced complies with the standard of quality and strength as specified.

D. Additional Tests: Additional testing of in-place concrete shall be conducted when test results indicate that specified concrete strengths and other characteristics have not been attained. Additional testing shall consist of cored cylinders to determine adequacy of concrete or other non-destructive testing methods that may be approved by Engineer. Contractor shall pay for all such additional testing. Any holes made shall be patched by the Contractor at their expense.

E. Testing Standards

1. Sampling: ASTM C172. Collect samples of fresh concrete to perform tests specified.

2. Concrete aggregate materials proposed for use in the work shall be sampled and tested in accordance with ASTM C33.

3. Portland Cement shall be sampled and tested in accordance with ASTM C150.

4. Slump Tests: ASTM C143. Take concrete samples during concrete placement. The maximum slump may be increased as specified with the addition of an approved admixture provided that the water-cement ratio is not exceeded.

    a. Frequency: Perform tests at commencement of concrete placement, when test cylinders are made, and for each batch (minimum) or every 20 cubic yards (maximum) of concrete unless otherwise specified or called-for.

5. Air Content: ASTM C231 (primary method) or ASTM C173 (secondary method).

    a. Frequency: Test air-entrained concrete for air content at the same frequency as specified for slump tests.

6. Temperature Tests: ASTM C1064.

    a. Frequency: Test the concrete delivered and the concrete in the forms. Perform tests in hot or cold weather conditions (below 50 degrees F and above 80 degrees F) for each batch (minimum) or every 20 cubic yards (maximum) of concrete, unless otherwise specified or called-for, until the specified temperature is obtained, and whenever test cylinders and slump tests are made.

7. Compressive Strength Tests: ASTM C39. Make five test cylinders for each set of tests in accordance with ASTM C31. Take precautions to prevent evaporation and loss of water from the specimen. Test two cylinders at 7 days, two cylinders at 28 days, and hold one cylinder in reserve.

a. Frequency: Samples for strength tests of each mix design (class) of concrete placed each day shall be taken not less than once a day regardless of amount of concrete placed, nor less than once for each 150 cubic yards of concrete, nor less than once for each 2,000 square feet of surface area for slabs (including walks and sidewalks) or walls.

b. Standard: Each strength test result must be the average of two cylinders from the same concrete sample tested at 28 days. If the average of any three consecutive strength test results is less than f′c or if any strength test result falls below f′c by more than 450 psi, take a minimum of three cored cylinder samples from the in-place work represented by the low-test cylinder results and test. Concrete represented by core test is considered structurally adequate if the average of three cores is equal to at least 85 percent of f′c and if no single core is less than 75 percent of f′c. Retest locations represented by erratic core strengths. Remove concrete not meeting strength criteria and provide new acceptable concrete. Repair core holes with nonshrink grout. Match color and finish of adjacent concrete

8. Cored cylinders: ASTM C42.

9. Penetration: ASTM C803.

F. Concrete Replacement: Failure of any test or to follow proper installation procedures will require that the concrete be removed and properly replaced at the Contractor's expense.

1.7 DELIVERY, STORAGE AND HANDLING

A. Schedule delivery of concrete to provide consistent mix times from batching until discharge. Mix times shall meet manufacturers' written recommendations.

B. Packaged materials shall be delivered to the project site in their original, unopened package or container bearing label clearly identifying manufacturer's name, brand name, material, weight or volume, and other pertinent information. Packaged materials shall be stored in their original, unbroken package or container in a weather-tight and dry place until ready for use in the work.

C. Unpackaged aggregates shall be stored to avoid excessive segregation, contamination with other materials or other size aggregates, or freezing.

D. Reinforcement and other metal items shall be protected from corrosion and shall be kept free from ice, grease, and other coatings that would destroy or reduce bond.

E. Colored Admixture: Comply with manufacturer's instructions. Deliver colored admixtures in original, unopened packaging. Store in dry condition.

1.8 PROJECT CONDITIONS

A. Pre-Job Conference

1. One week prior to placement of concrete, Contractor shall coordinate and host a coordination meeting to discuss concrete application schedule, materials, and methods.

B. Environmental Requirements

1. Avoid placing concrete if rain, snow, or frost is forecast within 24-hours.

2. Protect fresh concrete from rain, moisture, and freezing.

3. Schedule placement to minimize exposure to wind and hot sun before curing materials are applied.

PART 2 PRODUCTS

2.1 PORTLAND CEMENT

A. Cement: ASTM C150. One brand and type of cement shall be used for formed concrete having exposed-to-view finished surfaces.

B. Unless otherwise specified, cement shall be Type IA.

2.2 READY-MIX CONCRETE

A. Ready Mix Concrete: Portland Cement Concrete, air-entrained, ASTM C94.

1. Compressive Strength:

a. Unless otherwise indicated, minimum compressive strength at 28 days shall be 4,000 psi minimum.

b. Sidewalks, stairs and landings, pedestrian and vehicle ramps, and curbing: Minimum compressive strength at 28 days shall be 4,400 psi minimum.

2. Water/cement ratio: Maximum 0.45.

3. Air content by volume: 6 percent ± 1 percent, ASTM C231 (primary method) or ASTM C173 (secondary method).

4. Slump: no less than 2 inches, not greater than 4 inches, ASTM C143.

5. Standard Color: Natural light grey.

B. Aggregate

1. Coarse aggregate: ASTM C33. Broken stone or gravel consisting of clean durable fragments of uniform quality throughout. It shall be free from soft, disintegrated pieces, mud, dirt, organic or other injurious material. Coarse aggregate of a size retained on a 1-inch square opening sieve shall not contain more than 8% of flat or elongated pieces, whose longest dimension exceeds five times their maximum thickness.

2. Fine aggregate: ASTM C33. Sand consisting of clean, hard, durable, uncoated particles of quartz or other rock, free from lumps of clay, soft or flaky material, loam, organic or other injurious material. Fine aggregate shall contain not more than 3% of material finer than a #200 sieve, ASTM C117.

C. Water: Potable quality.

D. Admixtures

1. Concrete shall contain a water reducing agent, ASTM C494, to minimize cement and water content of the concrete mix at the specified slump.

2. Air-Entraining Admixtures: ASTM C260.

3. Pozzolan: Fly ash or other pozzolans used as admixtures shall conform to ASTM C618, Class C or Class F with 4 percent maximum loss on ignition. Pozzolan may be used to replace a maximum of 15 percent (15 %) of cement by weight.

4. No calcium chloride or admixtures containing calcium chloride shall be added to the concrete. No admixtures other than those specified shall be used in the concrete without the specific written permission of Engineer in each case.

2.3 FORMS

A. Forms shall be substantially built and adequately braced so as to withstand the liquid weight of concrete without deforming. All linings, studding, walling and bracing shall be such as to prevent bulging, spreading, or loss of true alignment while pouring and displacement of concrete while setting.

B. All edge forms for sidewalk pavements, curbs and gutters shall be of sufficient rigidity and adequately braced to accurately maintain line and grade. Form work shall be designed so that sections may be fastened together to prevent vertical or horizontal movement of ends.

C. Forms for curved sections shall be so constructed and placed that the finish surface of walls and edge of sidewalks, curbs and gutters will not deviated appreciably from the arc of the curve.

D. Exposed vertical and horizontal edges of the concrete in structures shall be chamfered as indicated on the Drawings by the placing of moldings in the forms.

E. Forms for Exposed Finish: Plywood, metal, metal-framed plywood faced, or other acceptable panel materials. Form work materials shall produce a smooth, continuous, straight, and level surface.

1. Plywood shall be APA A-A, A-B or A-C, Class 1, Exterior Grade. Thickness shall be as required to prevent movement or deformation but shall not be less than 5/8″ thick.

F. Forms for Non-Exposed Finish: Plywood, metal, metal-framed plywood faced, or other acceptable panel materials. Form work materials shall produce a generally smooth, continuous, straight, and level surface. Grain patterns or similar imperfections are acceptable. Lumber shall be dressed on at least two edges and one side.

1. Plywood shall be at least B-B, Class 1, Exterior Grade. Thickness shall be as required to prevent movement or deformation but shall not be less than 5/8″ thick.

G. Cylindrical Forms: Wax-impregnated strippable fiber forms or plastic, ABS or PVC, forms.

H. Form Ties: Provide prefabricated, adjustable length galvanized steel snap-off ties, with brackets, cones, corner locks and other accessories as necessary.

I. Form Release Agent: Commercial formulation compounds that will not bond with, stain or adversely affect concrete.

2.4 REINFORCEMENT MATERIALS

A. Reinforcing Bars: ASTM A615, Grade 60 unless otherwise indicated.

B. Galvanized Reinforcing Bars: ASTM A767, Class II with galvanizing before fabrication.

C. Weldable Reinforcing Bars: ASTM A706, Grade 60 unless otherwise indicated. Maximum carbon content shall be 0.55 percent.

D. Epoxy-Coated Reinforcing Bars: ASTM A775, Grade 60 unless otherwise indicated.

E. Steel Wire: ASTM A82, 16 gauge or heavier black annealed wire.

1. Ties for epoxy-coated bars shall be vinyl-coated or epoxy-coated.

2. Ties for zinc-coated bars shall be zinc-coated.

F. Welded Wire Reinforcement (WWR)

1. Sidewalks: Plain wire, ASTM A1064 as indicated on the Drawings.

2. Concrete Pavement: Plain wire, ASTM A1064 as indicated on the Drawings.

G. Supports for Reinforcement

1. Supports shall include bolsters, chairs, spacers, and other devices necessary for proper spacing, supporting, and fastening reinforcing bars and wire reinforcement in-place. Conform with CRSI Manual of Standard Practice for corrosion-resistant, plastic-protected wire, epoxy-coated, or stainless-steel supports.

2. For exposed-to-view concrete surfaces and where support legs are in contact with forms, provide supports with plastic protection (CRSI, Class1) or stainless steel protection (CRSI, Class 2).

H. Dowel Bars: Plain (smooth) high-chrome steel bar, ASTM A615 Grade 60 with full-length plastic sleeve as a combined unit, dimensions as indicated on the Drawings.

1. Where epoxy-coated dowels are called for: ASTM A1078.

I. Bar/Dowel Adhesive: Two component (1:1 ratio), 100% solids, high modulus, moisture-insensitive structural epoxy gel designed specifically for bonding bars, dowels, and bolts in concrete.

2.5 JOINT MATERIALS

A. Preformed Joint Filler Strips, Sidewalks and Concrete Paving.

1. Where no joint sealant is called-for: Nonextruding and resilient bituminous type conforming to ASTM D1751, 1/2-inch-thick, one piece for the full depth and width of the joint.

2. Where joint sealant is called-for: Nonextruding and resilient nonbituminous type conforming to ASTM D1752, Type I (sponge rubber) or Type II (cork), 1/2 inch thick, allowance for sealant at top and extending for the full depth and width of the joint.

B. Preformed Joint Filler Strips, General Use/Isolation Joints

1. Polyethylene, closed-cell expansion joint filler, ASTM D4819, Type II.

C. Joint Sealant Compound, ASTM C920

1. Self-Leveling (Type SL; Grade “P”)

a. Cold-applied and self-leveling, Type S or Type M elastomeric polymer sealant.

2. Gun-Grade (Non-Sage; Grade “NS”)

a. One-component (Type S) high-performance moisture-curing polyurethane sealant specifically formulated for bonding to masonry and concrete.

3. Traffic Bound areas: T sealant.

4. Non-Traffic Bound areas: NT sealant.

5. Color: As approved by Engineer.

6. Backer material: ASTM D5249, closed cell.

2.6 CONCRETE BONDING MATERIALS

A. Aqueous-phase, film-forming, nonoxidizing, freeze and thaw-resistant compound suitable for brush or spray application conforming to ASTM C932.

B. Epoxy-Resin Adhesive Binder: Two-component, penetrating high solids, epoxy-based primer/bond coat, 100% solids, moisture-tolerant, ASTM C881, Types I, II, and V, Grade-2, Class C and AASHTO M-235.

2.7 CONCRETE CURING MATERIALS

A. Curing shall be by moist curing (preferred) or by use of curing compound. Sodium Silicate curing compounds shall be used where required by the weather, approved construction schedules and construction that is not adaptable to damp curing.

B. Curing compound shall be a resin-base, white pigmented compound, ASTM C309, Type 2.

C. Curing compounds shall contain a fugitive dye or when hot weather conditions dictate, a fugitive heat reflecting pigment.

D. Moisture-Retaining Cover:

1. Waterproof paper, ASTM C171, regular or white.

2. Polyethylene sheeting, ASTM C171.

3. Polyethylene-coated burlap consisting of a laminate of burlap and a white opaque polyethylene film permanently bonded to the burlap. Burlap: ASTM C171, Class 3. Polyethylene film: ASTM C171.

4. When tested for water retention in accordance with ASTM C156, weight of water lost 72 hours after application of moisture retaining covering material shall not exceed 0.039 gram per square centimeter of the mortar specimen surface.

E. Water: Potable Quality.

F. Membrane-Forming Curing Compound

1. Liquid type, ASTM C309, Type 1, clear, Type 2, white, pigmented.

2.8 BOND BREAKER

A. Asphalt felt conforming to ASTM D2626, Type I or 6-mil polyethylene sheeting, ASTM D4397.

2.9 SEALER

A. Consolideck® Saltguard® silane/siloxane water repellent and chloride screen as manufactured by Prosoco, Inc., 3741 Greenway Circle, Lawrence, KS 66046, or approved equal. Gloss or flat sealer type as selected by Owner.

PART 3 EXECUTION

3.1 GENERAL

A. Verify site conditions before proceeding with the work. Field check the accuracy of the Drawings and inspect structures, utilities, and other site features prior to start of work and notify Engineer in writing, of any hazardous conditions and/or discrepancies.

B. Provide construction techniques in accordance with applicable provisions of ACI 224R, ACI 224.3R, and ACI 302.1R-04.

C. Engineer shall be notified of concrete placement sufficiently in advance of start of operation to allow their representative to complete preliminary inspection of the Work, including subgrade, forms, and reinforcing steel, if used.

D. Adjacent work, etc., shall be protected from stain and damage during entire operation. Damaged and stained areas shall be replaced or repaired to equal their original conditions at the contractor's expense. No concrete walks shall be poured after 12 noon unless a guard is visibly stationed nearby to prevent graffiti. Contractor shall be responsible for replacing any graffiti if he fails to provide adequate protection.

E. Concrete surface shall be protected from traffic or damage until surfaces have hardened sufficiently. If necessary, 1/2-inch thick plywood sheets shall be used to protect exposed surfaces.

F. Retempering of concrete is not permitted.

G. Contractor is responsible for the protection and resetting of all existing utility covers/castings to finish grade; as well as, setting all new utility covers/castings to finish grade prior to placement of concrete. The repair of any settlement, or protrusion above finish grade, shall be the responsibility of Contractor at no additional cost to Owner.

3.2 PREPARATION OF SUBGRADE

A. Compact and bring area to required subgrade elevation in accordance with Section 31 2310 – Earthwork. Provide for final fine grading, and compaction of areas as required to form a firm, uniform, accurate and unyielding subgrade at required elevations and to required lines.

B. Existing subgrade material, which will not readily compact as required, shall be removed and replaced with satisfactory materials in accordance with Section 31 2310 – Earthwork.

C. Subgrade of areas to receive concrete shall be recompacted as required to bring the top 8 inches of material, immediately below the base course, to a compaction at optimum moisture content of at least 95 percent (95%) of maximum density, as determined by ASTM D1557. Subgrade compaction shall extend for a distance of at least 1 foot beyond pavement edge.

D. Materials shall not be stored or stockpiled on subgrade.

E. Disposal of debris and other material excavated under this section, and material unsuitable for, or in excess of requirements for, completing work of this section shall be disposed of off-site.

F. Prepared subgrade shall be inspected and approved by Engineer Representative before installation of the gravel base course. Disturbance to subgrade caused by inspection procedures shall be repaired under this Section of the Specification.

3.3 AGGREGATE BASE COURSE

A. Prepare aggregate base course for concrete in accordance with Section 31 2310 – Earthwork and as shown on the Drawings.

B. Width of base course shall be greater than or equal to the width of concrete surface, if continuous lateral support is provided during rolling. The width of base course shall extend at least 2 x base thickness beyond the edge of the course above, if it is not so supported.

C. Aggregate shall be applied in lifts less than or equal to 6 inches thick, compacted measure. Each lift shall be separately compacted to specified density.

1. Material shall be placed adjacent to wall, manhole, catch basin, and other structures only after they have been set to required grade and level.

2. The base shall be wetted and rolled or tamped after the spreading of each lift.

3. Rolling shall begin at the sides and progress to the center of crowned areas, and shall begin on the low side and progress toward the high side of sloped areas. Rolling shall continue until material does not creep or wave ahead of roller wheels.

4. Surface irregularities, which exceed 1/2-inch, as measured by means of a 10-foot long straightedge, shall be replaced and properly re-compacted.

D. Density: Base course shall be compacted at optimum moisture content to not less than 95 percent of maximum density as determined by ASTM D1557.

E. Subgrade and base course shall be kept clean and uncontaminated. Less select materials shall not be permitted to become mixed with gravel. Materials spilled outside pavement lines shall be removed and the area repaired.

F. Portions of subgrade, or of construction above, which become contaminated, softened, or dislodged by the passing of traffic, or otherwise injured, shall be cleaned, replaced, or otherwise repaired to conform to the requirements of this specification before proceeding with the next operation.

3.4 FORMS

A. Forms shall be securely staked, braced and held firmly to the required line and grade and shall be sufficiently tight to prevent leakage of mortar. All forms shall be cleaned and oiled or wetted before concrete is placed against them.

B. Assemble formwork to permit easy stripping and dismantling without damaging concrete.

C. Complete and approve formwork. Remove debris and foreign material from interior of forms before start of concrete placing.

D. Set edge forms or bulkheads and intermediate screed strips for slabs to obtain indicated elevations and contours in finished slab surface and must be strong enough to support vibrating bridge screeds or roller pipe screeds if nature of specified slab finish requires use of such equipment. Align concrete surface to elevation of screed strips by use of strike-off templates or approved compacting-type screeds.

E. The maximum cross slope for sidewalks shall be 2.0 percent, sloped towards the gutter. Verify formwork prior to concrete placement. Make corrections as required and bring discrepancies to attention of Engineer.

3.5 JOINTS

A. Locate joints as located on the Drawings, as shown on Engineer-approved joint plan. Conform with applicable sections of ACI 224.3R.

B. Construction Joints: Effected at the end of a pour, lift, or at the end of a day's concrete placement. This type of joint is a plane surface between two distinct sections of concrete.

1. Construction Joints shall be ½ inch wide and full depth of slab.

2. Joint filler: Unless otherwise specified, Construction Joints shall be constructed with joint filler. Joint filler shall extend the full depth of the slab and shall extend the full length of the joint. Use of multiple pieces of joint material of lesser dimensions to make up required depth and width of joint will not be permitted.

3. Where joints are to receive filler, recess joint filler 1/4-inch below finish surface or as otherwise indicated on the Drawings.

4. Where called-for on the Drawings, install dowels at Construction Joints.

C. Isolation Joints: Installed at intersections of structures on any type including but not limited to buildings, walks with steps, pre-cast concrete curb, light foundations, walls, pads, slabs at footings, or other structures. Isolation Joints shall not be required where concrete flatwork abuts granite curbing.

1. Isolation Joints shall be ½ inch wide.

2. Joint Filler: All Isolation Joints shall be constructed with joint filler. Joint filler shall extend the full depth of the slab and shall extend the full length of the joint. Use of multiple pieces of joint material of lesser dimensions to make up required depth and width of joint will not be permitted.

3. Where joints are to receive filler, recess joint filler 1/4-inch below finish surface or as otherwise indicated on the Drawings.

D. Control/Contraction Joints: Installed to form a weakened plane in a concrete member to provide a reduction in member thickness for the purpose of controlling shrinkage stresses to that specific area. Control/Contraction Joints shall be synonymous with "Dummy Joints."

1. Control/Contraction Joints shall be tooled or saw-cut, as directed by Engineer.

a. Tooled joints: Tool-form joint into the concrete 1 inch in depth, but in no case less than 25 percent of slab depth. Joint width shall be 1/4-inch. Each side of tooled joint shall be dressed to match final overall slab finish. Joint shall be made after concrete is finished and when the surface is stiff enough to support the weight of workmen without damage to the slab, but before the slab has achieved its final set.

1) Where tooled joints are to receive joint sealant, provide 1/2-inch wide tooled joint and install backer rod material to create 1/4-inch recess below finished surface.

b. Saw-cut joints: Saw-cut joint into concrete 1 inch in depth, but in no case less than 25 percent of slab depth. Joint width shall be 1/8-inch. Cut joint using rotary saw within 4 to 12 hours after the concrete has been finished.

3.6 STEEL REINFORCEMENT

A. Install steel reinforcement as shown on the Drawings in accordance with ACI 318.

B. Before being placed in position, reinforcing shall be thoroughly cleaned of loose mill and rust scale, dirt, ice, and other foreign material, which may reduce the bond between the concrete and reinforcing. Where there is a delay in placing concrete after reinforcement is in place, reinforcement shall be re-inspected and cleaned when necessary.

C. Welded Wire Reinforcement

1. Where WWR is called-for, install material in the upper 30 to 40 percent (30%–40%) of the overall slab thickness, or at the nearest depth below top of slab as required to achieve a minimum of 2-inches of cover.

2. Adjacent sheets of welded wire reinforcement shall lap 6 inches.

D. Reinforcing bar

1. Any bar showing cracks after bending shall be discarded.

2. Minimum Cover: 2 inches, except where concrete is cast against and permanently exposed to earth minimum cover shall be 3 inches.

3. For slab-type construction, reinforcing bars shall be elevated off the base material by use of supports as specified herein.

4. Adjacent reinforcement bars shall lap a distance equivalent to 40 bar diameters. All laps shall be tied.

E. Joints

1. Construction Joints: Reinforcement shall not continue through construction joints. Allow for 2-inches of cover at end of slab. Where called-for on the Drawings, install pins at Construction Joints per detail.

2. Isolation Joints/Expansion Joints: Allow for 2-inches of cover at end of slab.

3. Control/Contraction Joints: Cut at least one-half of reinforcement at joints.

F. Reinforcing shall be securely wired in the position called for, and shall be maintained in that position until concrete is placed and compacted.

3.7 PLACEMENT

A. Before placing concrete, forms and the space to be occupied by the concrete shall be thoroughly cleaned, and reinforcing steel and embedded metal shall be free from dirt, oil, mill scale, loose rust, paint, and other material which might tend to reduce bond.

B. Existing concrete, earth, forms, and other water-permeable material against which new concrete is to be placed and shall be thoroughly damp when concrete is placed. There shall be no free water on the surface.

C. Concrete shall arrive at the job site in a timely manner so that no additional water will be required to produce the desired slump. When conditions develop that require the addition of water to produce the desired slump, permission of the Engineer must be obtained. The concrete shall be transported from the mixer to its place of deposit by a method that will prevent segregation or loss of material.

D. Concrete, which has set, or partially set, before placement shall not be employed.

E. Existing concrete, earth, and other water-permeable material against which new concrete is to be placed shall be thoroughly damp when concrete is placed. There shall be no free water on surface.

F. Concrete shall be thoroughly spaded and tamped to secure a solid and homogeneous mass, thoroughly worked around reinforcement and into corners of forms.

G. When joining fresh concrete to concrete which has attained full set, the latter shall be cleaned of foreign matter, and mortar scum and laitance shall be removed by chipping and washing. Clean, roughened base surface shall be saturated with water, but shall have no free water on surface. A coat of 1:1 cement-sand grout, approximately 1/8-inch thick shall be well scrubbed into thoroughly dampened concrete base. New concrete shall be placed immediately, before grout has dried or set.

3.8 FINISHING

A. Concrete flatwork surfaces shall be screened off and finished true to line and grade, and free of hollows and bumps. Surface shall be dense, smooth, and at exact level and slope required.

1. Finished concrete surface for concrete subbase shall be woodfloated to a slightly rough surface. Surface shall not deviate more than 1/4-inch in 10 feet.

2. Finished concrete surface for concrete pavement, walks, and pads shall be wood-floated and steel troweled to a smooth surface. Surface shall not deviate more than 1/8-inch in 10 feet.

B. Unless otherwise indicated, horizontal surfaces of concrete surfaces, which will be exposed, shall be given a light broomed finish, with direction of grooves in concrete surface perpendicular to length of concrete band, slab or pad. After concrete has set sufficiently to prevent coarse aggregate from being torn from the surface, but before it has completely set, brooms shall be drawn across it to produce a pattern of small parallel grooves. Broomed surface shall be uniform, with no smooth, unduly rough or porous spots, or other irregularities. Coarse aggregate shall not be dislodged by the brooming operation.

C. Immediately following finishing operations, arises at edges and both sides of expansion joints shall be rounded to a ¼ inch radius. Control joints to be tooled shall be scored into slab surface with scoring tool. Adjacent edges of control joint shall be same time be finished to a ¼ inch radius.

D. Where finishing is performed before the end of the curing period, concrete shall not be permitted to dry out, and shall be kept continuously moist from time of placing until end of curing period, or until curing membrane is applied.

3.9 CURING

A. Cure in accordance with ACI 308R.

B. Concrete shall be kept continuously damp from time of placement until the end of the specified curing period.

C. Water shall not be applied to curing concrete within 24 hours after initial placement. Any water shall be applied only to maintain damp conditions. Do not add water during floating and troweling operations.

D. Between finishing operations, the surface shall be protected from rapid drying by covering with a material specified herein. Surface shall be damp when the covering is placed over it, and shall be kept damp by means of fine-spray of water, applied as often as necessary to prevent drying after the initial 24-hour cure period.

E. Concrete surfaces shall be cured by completely covering them with curing paper or an application of a curing compound.

1. Concrete cured using waterproof paper shall be completely covered with paper with seams lapped and sealed with tape. Concrete surface shall not be allowed to become moistened between 24 and 36 hours after placing concrete. During curing period surface shall be checked frequently, and sprayed with water as often as necessary to prevent drying, but not earlier than 24 hours after placing concrete.

2. If concrete is cured with a curing compound, the compound shall be applied at a rate of 200 square feet per gallon, in two applications perpendicular to each other.

3. Curing period shall be seven days minimum. Full-strength shall be considered after 28 days.

F. Only if additional protection is required, the surface should remain uncovered for at least 4 days, after which time new and unwrinkled non-staining reinforced waterproof Kraft curing paper may be used.

3.10 COLD WEATHER CONCRETING

A. Comply with ACI 306R Guide to Cold Weather Concreting.

B. Materials for concrete shall be heated for concrete, which is mixed, placed or cured when the mean daily temperature is below 40 degrees F or is expected to fall below 40 degrees F within 72 hours. The concrete, after placement, shall be protected by covering, heat, or both.

C. Details of handling and protecting concrete during freezing weather shall be subject to the approval of Engineer.

3.11 HOT WEATHER CONCRETING

A. Comply with ACI 305R: Guide to Hot Weather Concreting.

B. Concrete just placed shall be protected from the direct rays of the sun and the forms and reinforcement just prior to placement shall be sprinkled with cold water. Every effort shall be made to minimize delays that will result in excessive mixing of the concrete after arrival on the job.

C. During periods of excessively hot weather (95□F, or above), ingredients in the concrete shall be cooled insofar as possible and cold mixing water shall be used to maintain the temperature of the concrete at permissible levels all in accordance with the provisions of ACI 305R. Any concrete with a temperature below 95□F, when ready for placement, will not be acceptable, and will be rejected.

D. Temperature records shall be maintained throughout the period of hot weather giving air temperature, general weather conditions (calm, windy, clear, cloudy, etc.) and relative humidity. Records shall include checks on temperature of concrete as delivered and after placing in forms. Data should be correlated with the progress of the Work so that conditions surrounding the construction of any part of the structure can be ascertained.

3.12 PROTECTION

A. Concrete surface shall be protected from traffic or damage until surfaces have hardened sufficiently. If necessary, ½ inch thick plywood sheets shall be used to protect the exposed surface.

3.13 CLEAN UP

A. Remove all debris, residuals, and materials at the conclusion of the work. Dispose of all materials in accordance with applicable waste management regulations.

3.14 SEALANT

A. Apply concrete sealer to all sidewalks, steps, and pads after cure period in accordance with manufacture's guidelines.

END OF SECTION

DIVISION 31
EARTHWORK

SECTION 31 2310

EARTHWORK

PART 1 GENERAL

1.1 SUMMARY

A. Section includes:

1. Preparation and grading subgrades for slabs-on-grade, walks, pavements, and landscaping.

2. Excavating and backfilling for structures.

3. Excavation and backfilling for underground utilities and associated appurtenances.

4. Excavation, backfill and compaction for the demolition/removal of subsurface utilities and improvements.

5. Earth retention systems.

B. Contractor shall coordinate work between all Subcontractors, sections, and trades required for the proper completion of the work.

C. Contractor is responsible for all health and safety.

1.2 GENERAL

A. Contractor is advised that lines and grades, as shown on the Drawings, are subject to change. Although it is intended to adhere to what is shown on Drawings, Engineer reserves the right to make changes in lines and grades of utilities or other subsurface construction when such changes may be necessary or advantageous.

B. In open trenching on public roadways, Contractor shall be governed by the conditions, restrictions and regulations made by the local or state authority as applicable. All such regulations shall be in addition to those set down in the Specifications.

1.3 EXCAVATION CLASSIFICATIONS

A. Excavation - Excavation shall be unclassified and no consideration will be given to the nature of the materials. Excavation shall comprise and include the satisfactory removal and disposal of all materials encountered regardless of the nature of the materials and shall be understood to include but not limited to earth, fill, boulders, foundations, pavements, curbs, piping, cobbles, stones, footings, bricks, concrete, previously abandoned drainage structures and utility structures abandoned and not removed by the utility and debris.

B. Common Excavation - Excavation of all materials that can be excavated, moved, loaded, transported, and unloaded using heavy equipment or that can be excavated and dumped into place or loaded onto hauling equipment by excavation equipment (shovel, bucket, backhoe, dragline, or clam shell) or moved with dozer-type equipment, appropriate to the material type, character, and nature of the materials. The presence of isolated boulders or rock fragments larger than 1 cubic yard is not in itself sufficient cause to change the classification of the surrounding material. All Common Excavation shall be included in the Base Bid.

C. Rock Excavation - Rock Excavation as defined herein. The excavation and removal of isolated boulders or rock fragments larger than 1 cubic yard encountered in materials otherwise conforming to the definition of Common Excavation shall be classified as rock excavation. The presence of isolated boulders or rock fragments larger than 1 cubic yard is not in itself sufficient cause to change the classification of the surrounding material.

1.4 REFERENCES

A. Reference herein to any technical society, organization, group or regulation are made in accordance with the following abbreviations and, unless otherwise noted or specified, all work under this Section shall conform to the latest edition as applicable.

B. State of Connecticut Department of Transportation (ConnDOT)

1. Standard Specifications for Roads, Bridges, Facilities and Incidental Construction, Form 818, 2020 and any supplements.

C. Code of Federal Regulations (CFR)

1. 29 CFR 1926, Safety and Health Regulations for Construction

D. American Concrete Institute (ACI)

1. ACI 229R-99 - Controlled Low-Strength Materials (CLSM).

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

1. AASHTO Method T 90 - Determining the Plastic Limit and Plasticity Index of Soils.

2. AASHTO T104 - Standard Method of Test for Soundess of Aggregate by Use of Sodium Sulfate or Magnesium Sulfate.

3. AASHTO Method T146 - Standard Method of Test for Wet Preparation of Disturbed Soil Samples for Test.

F. ASTM International (ASTM).

1. ASTM D422 - Standard Test Method for Particle-Size Analysis of Soils.

2. ASTM D1556 - Standard Test Method for Density and Unit Weight of Soil in Place by the Sand-Cone Method.

3. ASTM D1557 - Standard Test Methods for Laboratory Compaction Characteristics of Soil Using Modified Effort (56,000 ft-lbf/ft3(2,700 kN-m/m3)).

4. ASTM D2487 - Standard Classification of Soils for Engineering Purposes (Unified Soil Classification System).

5. ASTM D2922 - Standard Test Methods for Density of Soil and Soil-Aggregate in Place by Nuclear Methods (Shallow Depth).

6. ASTM D3017 - Standard Test Method for Water Content of Soil and Rock in Place by Nuclear Methods (Shallow Depth).

7. ASTM D6938 - Standard Test Method for In-Place Density and Water Content of Soil and Soil-Aggregate by Nuclear Methods (Shallow Depth).

1.5 DEFINITIONS

A. Backfill: Soil material or flowable concrete used to fill an excavation.

B. Bedding Course: Layer placed over the excavated sub-grade in a trench before laying pipe.

C. Benching: A method of limiting cave-in potential by excavating the sides of an excavation to form one or a series of horizontal levels or steps, usually with vertical or near-vertical surfaces between levels.

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

E. Clearing: Clearing shall consist in the felling, cutting up, and satisfactory disposal of trees and other vegetation designated for removal in accordance with these specifications.

F. Drainage Course: Layer supporting basement grade used to minimize capillary flow of pore water.

G. Earth Retention Systems: Any structural system, such as sheeting and bracing or cofferdams, designed to retain in-situ soils in place and prevent the collapse of the sides of an excavation in order to protect employees and adjacent structures.

H. Excavation: Any man-made cut, cavity, trench, or depression in an earth surface, formed by earth removal.

1. Additional Excavation: Excavation beyond required dimensions or below subgrade elevations that is requested and/or directed by Engineer. Additional Excavation and replacement material will be paid for according to Contract provisions for changes in the Work.

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

3. Unauthorized Excavation: Excavation below the elevations specified on the plans, beyond the limits indicated on the plans, or where no dimensions are indicated, beyond depths, elevations, and dimensions reasonably necessary for construction of the work without the request and/or direction of the Engineer. Unauthorized excavation, as well as any remedial work directed by Engineer, or if applicable Geotechnical Engineer, shall be without additional compensation.

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

J. Finished Grade: The proposed final elevations shown on the Drawings or called for in the Specifications.

K. Geotechnical Engineer: A qualified and licensed entity designated for the project as the authority on the assessment, design, and oversight of soil and/or rock conditions and construction affected by such conditions.

L. Geotechnical Testing Agency: An independent testing agency employed by Owner, or by Contractor is called-for, and qualified according to ASTM E 329 to conduct soil materials and rock-definition testing, as documented according to ASTM D 3740 and ASTM E 548.

M. Grubbing: Grubbing shall consist of the removal of roots 1 ½ inch and larger, organic matter and debris, and stumps having a diameter of three inches or larger, to a depth of at least 18 inches below the surface and or subgrade; whichever is lower, and the disposal thereof.

N. Protective System: A method of protecting employees from cave-ins, from material that could fall or roll from an excavation face or into an excavation, or from the collapse of adjacent structures. Protective systems include earth retention systems, sloping and benching systems, shield systems, and other systems that provide the necessary protection.

O. Regular Excavation: Removal and disposal of any and all material above subgrade elevation, except solid rock and undercut excavation, located within the limits of construction.

P. Rock: Solid ledges, bedded deposits, unstratified masses and conglomerations of material so firmly cemented as to possess the characteristics of solid rock which cannot be removed without systematic drilling or hoe ramming. All boulders containing a volume of more than one (1) cubic yard shall be considered rock.

Q. Rock Excavation: Removal and satisfactory disposal of Rock, which, in the opinion of Engineer, cannot be excavated except by drilling, wedging, jack hammering or hoe ramming or the excavation of boulders or rock fragments containing a volume of more than one (1) cubic yard. The presence of isolated boulders or rock fragments larger than 1 cubic yard is not in itself sufficient cause to change the classification of the surrounding material.

R. Licensed Professional Engineer: A person who is licensed as a professional engineer in the state where the work is to be performed. However, a professional engineer, registered in any state is deemed to be a "registered professional engineer" within the meaning of this standard when approving designs for "manufactured protective systems" or "tabulated data" to be used in interstate commerce.

S. Satisfactory Materials: Earth material that meets the classification, use, and/or gradation requirements herein that does not contain limestone, shale, clay, ash, slag, friable material, organic or vegetative materials, topsoil, wood, trash, broken concrete, masonry rubble, trash, refuse, or frozen materials.

T. Shield System: A structure that is designed to withstand the forces imposed on it by a cave-in and thereby protects employees within the structure. Shields can be permanent structures or can be designed to be portable and moved along as work progresses. Additionally, shields can be either pre-manufactured or job-built in accordance with 29 CFR 1926.652(c)(3) or (c)(4). Shields used in trenches are usually referred to as "trench boxes" or "trench shields."

U. Sloping: A method of protecting employees from cave-ins by excavating to form sides of an excavation that are inclined away from the excavation so as to prevent cave-ins. The angle of incline required to prevent a cave-in varies with differences in such factors as the soil type, environmental conditions of exposure, and application of surcharge loads.

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

W. Sub-grade: Surface or elevation remaining after completing excavation, or top surface of a fill or backfill immediately below drainage fill.

X. Surplus Material: Excavated acceptable material that cannot be utilized elsewhere on the site as backfill or embankment fill, or as otherwise directed by the Engineer.

Y. Temporary Dewatering System: A system to lower and control water to maintain stable, undisturbed subgrades at the lowest excavation levels. Dewatering shall be provided for all pipelines, structures and for all other miscellaneous excavations.

Z. Testing Laboratory: A qualified entity engaged to perform specific laboratory tests.

AA. Testing Agency: A qualified entity engaged to collect samples, perform specific in-field tests, and/or inspections. The Testing Laboratory may provide the services of the Testing Agency.

BB. Trench: A narrow excavation (in relation to its length) made below the surface of the ground. In general, the depth is greater than the width, but the width of a trench (measured at the bottom) is not greater than 15 feet.

CC. Unsatisfactory Material: Soil material that contains organic silt, peat, vegetation, wood or roots, stones or rock fragments over six (6) inches in diameter or exceeding 40 percent by weight of the backfill material, porous biodegradable matter, loose or soft fill, construction debris, or refuse, or material which cannot be compacted to the specified or indicated density.

1.6 SUBMITTALS

A. Testing Laboratory - Submit name and qualifications of commercial testing laboratory for Engineer’s approval. Submit applicable documentation of credentials, licenses, etc.

B. Testing Agency - Submit name and qualifications of third-party in-field quality control Testing Agency for Engineer’s approval. Submit applicable documentation of credentials, licenses, etc.

C. Site Characterization of Off-Site Borrow Sources: The following information shall be submitted to Engineer for review at least two weeks prior to use of an off-site borrow source:

1. Location and name of the borrow source site.

2. Owner and contact information for the borrow source site.

3. Present and past usage of the source site and materials.

4. Any previously existing report(s) associated with an assessment of the source site as relates to the presence of oils, hazardous materials, or other organic and non-organic constituents which may be considered contaminants.

5. Location within the site from which the material will be obtained.

D. Chemical Testing Data: For each type/classification of earth material proposed and each source of earth material proposed: Submit a letter signed by an authorized representative of material supplier stating that such proposed material is free of oils, hazardous materials, or other organic and non-organic constituents which may be considered contaminants.

E. Material Testing Data: Provide results for all proposed bedding, fill, aggregates, and backfill. Submit complete laboratory reports.

1. Gradation analysis.

2. Soil classification and Moisture-Dry Density Curve.

3. Loss on Abrasion.

4. Soundness.

F. Samples: 50-pound sample of each type of off-site bedding, fill, aggregates, and backfill that are proposed for use at the Project Site in an air-tight container for the testing laboratory, a minimum of two weeks prior to delivery of such material to the site. Use of these proposed materials by Contractor prior to testing and approval or rejection shall be at Contractor's risk.

G. Product Data

1. Plastic warning tape.

2. Separation fabric, filter fabric, geogrids, or similar geotextiles.

H. Field Testing Results

1. Compaction test results keyed to date and specific location of testing. Provide Engineer with copies of testing reports within 24 hours of field test.

1.7 SAFETY

A. Contractor shall conduct all excavation activities in conformance with applicable regulations, including those relating to warning signs, excavation safety, sheeting, shoring, and stabilization.

B. Contractor shall provide and maintain barricades, signs, lights, etc., required for the protection of personnel, materials and property. Temporary barricades, etc. shall conform all applicable codes and regulations, and shall be lighted at night with lanterns, flares and reflectorized paint as required for safety. Adapt barricades, signs, lights, etc. to evolving site conditions throughout the progress of the work.

C. Provide other safety devices as required, including adaptation of such safety devices to changing site conditions, to prevent unauthorized entry to construction areas and open excavations. Provide warning signs and other temporary construction safety devices necessary for proper completion of the work in compliance with applicable safety regulations.

D. Contractor shall properly design and furnish all labor, materials, equipment, and tools necessary to construct permanent or temporary excavation support systems, including, but not necessarily limited to, sheet piling, trench shields, trench boxes, timber trench shoring, pneumatic/hydraulic shoring, steel sheeting or sheeting using other materials, sloping, and benching.

E. Any time an excavation is to remain open, at a minimum, provide full enclosure with safety barriers and fencing, warning signs, and additional safety control measures as appropriate for the condition.

1.8 QUALITY ASSURANCE

A. Use adequate numbers of skilled workmen who are trained and experienced in the necessary crafts and who are completely familiar with the specified requirements and methods required

for proper performance of the work in this Section. Use equipment of adequate size, capacity and quantity to accomplish the work of this Section in a timely manner.

B. Utility Mark-out

1. Prior to commencing work, comply with utility mark-out requirements of the Call-Before-You-Dig System (1-800-922-4455).

2. Verify the location of all subsurface utilities marked through the Call-Before-You-Dig System.

3. Not all subsurface facilities or structures will be identified through the Call-Before-You-Dig System. Confirm the location of other subsurface utilities and other subsurface facilities or structures prior to commencing work. Field-mark utilities as required.

C. Codes and Standards: Perform the work of this Section in accordance with all applicable codes, standards, and the requirements of authorities having jurisdiction.

D. Engineer reserves the right to perform all in-field testing specified in this Section and reserves the right to determine the suitability of all materials to be used for fills and reject any fill not meeting the specifications.

E. Field Density testing and subgrade observation shall be performed by the designated entity.

F. Weather Limitations:

1. Material excavated when frozen or when air temperature is less than 32 degrees Fahrenheit (32 F) shall not be used as fill or backfill until material completely thaws.

2. Material excavated during inclement weather shall not be used as fill or backfill until after material drains and dries sufficiently for proper compaction.

G. Vibration

1. Vibration producing activities such as operation of heavy construction equipment, vibratory compaction, etc. may be required. Contractor is advised that structures are located close to the proposed work and that construction activities shall be conducted so as to preclude damage to these structures and undue annoyance to occupants.

2. Contractor has liability for, and shall bear all costs associated with, any damage caused to existing structures, buildings and/or services as a result of any construction activity. This extends to responding to any claims of vibration-induced damage. It is Contractor's sole decision how to manage the risk of vibration-induced damage, and what, if any, surveys, monitoring, or other activities are undertaken.

1.9 TESTING

A. All sampling and testing shall be the responsibility of Contractor via Testing Agency and Testing Laboratory as applicable. Contractor shall retain and pay for the services of such Testing Agency/Testing Laboratory to perform all pre-construction testing and field testing in accordance with applicable standards.

B. Borrow and Fill: Contractor shall provide testing as defined below.

1. Gradation analysis for each type of borrow and on-site fill materials by ASTM D422.

2. Soil classification (ASTM D2487) and Moisture-Dry Density Curve (Proctor Test-Modified) by ASTM D1557 for all proposed fill and backfill materials at the frequency specified below:

    a. For suitable soil materials removed during Trench Excavation, perform one test for every 1,000 cubic yards of similar soil type. Similarity of soil types will be as determined by the Engineer.

    b. For borrow materials, perform tests from each proposed source, at a rate of one test for every 1,000 cubic yards of soil type. Similarity of soil types will be as determined by the Engineer.

3. Loss on Abrasion: Where called-for, AASHTO Method T 96.

4. Soundness: Where called-for, AASHTO Method T 104.

C. Compaction Testing: Contractor shall conduct compaction testing (i.e. ASTM D2922 and ASTM D3017 or ASTM D1556) at the frequency indicated below.

1. Trench: 1 test per lift, every 1,000 square feet or 200 feet of trench.

2. Embankment: 1 test per lift, every 1,000 square feet.

3. Additional compaction testing may be required when there is evidence of a change in the quality of moisture control or the effectiveness of compaction.

4. If testing indicates that compacted fills are below specified density, additional compaction and/or replacement of material shall be provided at no expense to Owner.

D. Chemical Testing: Prior to delivery of any earth material to the Project Site, Contractor shall conduct chemical testing to demonstrate that such material is free of oils, hazardous materials, or other organic and non-organic constituents which may be considered contaminants.

1.10 EXCAVATED MATERIAL

A. Placement

1. Excavated material shall be so placed as not to interfere with travel or movement on existing streets, driveways, sidewalks or other areas designated to remain undisturbed. Excavated material shall not be deposited on private property without the written consent of the property owner(s) and approval of Engineer.

2. No excavated material shall be stored on top of installed pipe, other subsurface construction, or within the drip-line of trees.

3. Contractor shall consider surcharge loads when stockpiling excavated material adjacent to excavations, and take any measure required to prevent cave-in, including but not limited to, excavation support systems and/or alternative stockpiling locations.

B. Satisfactory Material excavated at the Project Site may be used for Common Fill or Backfill on other parts of the Work, if specifically approved by Engineer. Engineer or Geotechnical

Engineer shall determine what is Satisfactory Material or Unsatisfactory Material where questions arise.

C. Contractor shall be responsible for the proper disposal of all Unsatisfactory Material. Engineer or Geotechnical Engineer shall determine what is Satisfactory Material or Unsatisfactory Material where questions arise.

1.11 SHEETING, SHORING AND BRACING

A. Provide earth retention systems as required by federal, state and local regulations. Shoring and bracing of trenches and other excavations shall be in accordance with the latest OSHA Standards and interpretations, and all other applicable codes, rules and regulations of federal, state and local authorities.

1.12 DRAINAGE

A. At all times during construction, Contractor shall temporarily provide, place and maintain ample means and devices with which to remove promptly, and dispose of properly, all water entering trenches and other excavations, or water that may flow along or across the site of the Work, and keep said excavations dry until the structures, pipes, and appurtenances to be built therein have been completed to such extent that they will not be damaged. At the conclusion of the work, Contractor shall remove such temporary means and devices.

B. All groundwater which may be found in the trenches and foundation excavations, and any water which may get into them from any cause whatsoever, shall be pumped or bailed out, so that the trench shall be dry during pipe laying and backfilling and during the placement of concrete.

C. All water pumped or drained from the Work shall be managed in accordance with applicable discharge permits, without undue interference with other work or damage to pavements, other surfaces, or property.

1.13 COORDINATION

A. Prior to commencing earthwork operations, meet with representatives of governing authorities, Engineer, testing entity, and other pertinent entities.

1. Review earthwork procedures and responsibilities including Contractor's schedule of operations, scheduling observation and testing procedures and requirements.

2. Notify participants at least three (3) working days prior to convening conference. Record discussions and agreements and furnish copies to each participant.

3. Contractor shall at all times so conduct his work as to insure the least possible inconvenience to the general public and the residents in the vicinity of the work. Fire hydrants on or adjacent to the work shall be kept accessible to firefighting equipment at all times. Temporary provisions shall be made by Contractor to ensure the proper functioning of all gutters, sewer inlets, and drainage ditches, which shall not be obstructed except as approved by Engineer.

B. Benchmark/Monument Protection: Protect and maintain benchmarks, monuments or other established reference points and property corners. If disturbed or destroyed, replace at no cost to Owner.

C. Provide five (5) days advance notice to Engineer and testing entity for any proposed earthwork operation requiring observation and/or testing.

PART 2 PRODUCTS

2.1 SOIL MATERIALS

A. All materials used in the work of this Section shall be Satisfactory Material, and any material that does not meet this classification shall be considered an Unsatisfactory Material and shall not be used.

B. Unsatisfactory Soils: Soil materials not meeting the requirements for Satisfactory Soils.

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

2.2 COMMON FILL/ORDINARY BORROW

A. Earth materials classified by ASTM D 2487 as GW, GP, GM, GP-GM, GW-GM, GP-GC, SW, SP, and SM that are free of clay and with less than twenty (20) percent of material by weight that passes the No. 4 sieve passing the No. 200 sieve.

B. Common Fill material is subject to the approval of Engineer and may be either material removed from excavations or borrow from off site. It shall have physical properties such that it can be readily spread and after it has been placed and properly compacted, it will form a dense, stable fill.

C. Common Fill shall not be used at locations where use of a specific earth material is called-for.

2.3 BANK RUN GRAVEL

A. Granular material, well graded from fine to coarse, obtained from approved natural deposits and unprocessed, except for the removal of unacceptable material and stones larger than the maximum size permitted.

B. Bank Run Gravel shall be graded as follows:

Gradation of Bank Run Gravel (ConnDOT Grading “C”)

Sieve	Percent Passing by Weight
1 ½”	100
¾”	45-80
¼	25-60
No. 10	15-45
No. 40	5-25
No. 100	0-10
No. 200	0-5

2.4 GRANULAR FILL

A. Broken or crushed stone, gravel, or a mixture thereof.

B. Broken or crushed stone

1. The product resulting from the artificial crushing of rocks, boulders or large cobblestones, substantially all faces of which have resulted from the crushing operation. Broken or crushed stone shall consist of sound, tough, durable stone, reasonably free from soft, thin, elongated, laminated, friable, micaceous or disintegrated pieces.

C. Bank or crushed gravel

1. Sound, tough, durable particles of crushed or uncrushed gravel, free from soft, thin, elongated or laminated pieces and vegetable or other deleterious substances. Crushed gravel shall be the manufactured product resulting from the deliberate mechanical crushing of gravel with at least 50% of the gravel retained on the No. 4 sieve having at least one fractured face.

D. Granular Fill shall be graded as follows:

Gradation of Granular Fill (ConnDOT Grading "A")

Sieve	Percent Passing by Weight
3 ½"	100
1 ½"	55-100
1/4"	25-60
No. 10	15-45
No. 40	5-25
No. 100	0-10
No. 200	0-5

E. Reclaimed material shall not be considered acceptable for use as granular fill.

2.5 SCREENED GRAVEL AND CRUSHED STONE

A. Screened gravel, well graded in size from 3/8 inch to 3/4 inch. The gravel shall consist of clean, hard, and durable particles or fragments. Crushed rock of suitable size and grading may be used instead of screened gravel.

B. Screened Gravel shall be graded as follows:

Gradation of Screened Gravel (ConnDOT Gradation No. 6)

Sieve	Percent Passing by Weight
1"	100
3/4"	90-100
1/2"	20-55
3/8"	0-15
No. 4	0-5

2.6 SUBBASE

A. Bank or Crushed Gravel

1. Sound, tough, durable particles of crushed or uncrushed gravel, free from soft, thin, elongated or laminated pieces. It shall be hard and durable enough to resist weathering, traffic abrasion and crushing.

2. Bank or crushed gravel for subbase shall be graded as follows:

Gradation of Bank or Crushed Gravel Subbase (ConnDOT Gradation "B")

Sieve	Percent Passing by Weight
5"	100
3 1/2"	90-100
1 1/2"	55-95
1/4"	25-60
No. 10	15-45
No. 40	5-25
No. 100	0-10
No. 200	0-5

B. Crusher-Run Stone

1. Sound, tough, durable broken stone. It shall be reasonably free from soft, thin, elongated, laminated, friable, micaceous or disintegrated pieces.

2. Loss on Abrasion: The crusher-run stone shall show a loss on abrasion of not more than fifty percent using AASHTO Method T 96.

3. Crusher-run stone shall for subbase shall be graded as follows:

Gradation of Crusher Run Stone Subbase (ConnDOT Gradation "A")

Sieve	Percent Passing by Weight
3 1/2"	100
1 1/2"	55-100
1/4"	25-60
No. 10	15-45
No. 40	5-25
No. 100	0-10
No. 200	0-5

2.7 PROCESSED AGGREGATE BASE

A. Coarse aggregates and fine aggregates shall be combined and mixed by approved methods so that the resulting material shall conform to the following gradation:

Gradation of Processed Aggregate Base

Sieve	Percent Passing by Weight
2 1/2”	100
2”	95-100
3/4”	50-75
1/4”	25-45
No. 40	5-20
No. 100	2-12

B. Coarse Aggregate: Either gravel, broken stone or a combination thereof. When tested by means of the Los Angeles Machine, using AASHTO Method T 96, the coarse aggregate shall not have a loss of more than 50%.

1. If gravel is used for the coarse aggregate, it shall consist of sound, tough, durable particles of crushed or uncrushed gravel or a mixture thereof, free from soft, thin, elongated or laminated pieces, lumps of clay, loam and vegetable or other deleterious substances.

2. If broken stone is used for the coarse aggregate, it shall consist of sound, tough, durable fragments of rock of uniform quality throughout. It shall be free from soft disintegrated pieces, mud, dirt, organic or other injurious material.

3. Soundness for Gravel and Broken Stone: When tested by magnesium sulfate solution for soundness using AASHTO Method T 104, the coarse aggregate shall show a loss of not more than 15% at the end of 5 cycles.

C. Fine Aggregate: Natural sand, stone sand, screenings or any combination thereof. The fine aggregate shall be limited to material 95% of which passes a No. 4 (4.75-mm) sieve having square openings and not more than 8% of which passes a No. 200 (75-μm) sieve. The material shall be free from clay, loam and deleterious materials.

1. Plasticity: When natural sand is used, the fine aggregate shall conform to the following:

   a. When the fraction of the dry sample passing the No. 100 mesh sieve is 4% or less by weight (mass), no plastic limit test will be made.

   b. When the fraction of the dry sample passing the No. 100 mesh sieve is greater than 4% and not greater than 8% by weight (mass), that fraction shall not have sufficient plasticity to permit the performing of the plastic limit test using AASHTO Method T 90.

   c. When the fraction of the dry sample passing the No. 100 mesh sieve is greater than 8% by weight (mass), the sample will be washed; and the additional material passing the No. 100 mesh sieve shall be determined by AASHTO Method T 146, except that the No. 100 mesh sieve will be substituted for the No. 40 mesh sieve where the latter is specified in AASHTO Method T 146. The combined materials that passed the No. 100 mesh sieve shall not have sufficient plasticity to permit the performing of the plastic limit test using AASHTO Method T 90.

2. Plasticity: When screenings or any combination of screenings and natural sand or any combination of stone sand and natural sand are used, the following requirements shall apply:

a. When the fraction of the dry sample passing the No. 100 mesh sieve is 6% or less by weight (mass), no plastic limit test will be made.

b. When the fraction of the dry sample passing the No. 100 mesh sieve is greater than 6% and not greater than 10% by mass, that fraction shall not have sufficient plasticity to permit the performing of the plastic limit test, using AASHTO Method T 90.

c. When the fraction of the dry sample passing the No. 100 mesh sieve is greater than 10% by weight (mass), the sample shall be washed; and additional material passing the No. 100 mesh sieve shall be determined by AASHTO Method T 146, except that the No. 100 mesh sieve shall be substituted for the No. 40 mesh sieve where the latter is specified in AASHTO Method T 146. The combined materials that have passed the No. 100 mesh sieve shall not have sufficient plasticity to permit the performing of the plastic limit test using AASHTO Method T 90.

2.8 BEDDING

A. Slabs on grade

1. Granular Fill unless otherwise indicated.

B. Utilities

1. Unless otherwise indicated, bedding shall consist of screened gravel, maximum size 3/4 inches and minimum size 3/8 inches.

2. PVC drain or pressure pipe less than 6-inched in diameter: bedding shall consist of screened gravel, maximum size 1/2 inch and minimum size 1/4 inch.

3. Thermoplastic Pipe: Unless otherwise indicated, ASTM D2321, bedding, haunching, and initial backfill material shall be placed in six-inch lifts and be Class IA, IB, or II embedment material unless otherwise approved by Engineer.

4. When clay, wet, soft or silty soil conditions prevail, 3/4-inch crushed stone shall be used for bedding of pipe.

2.9 SAND

A. Sand shall consist of clean, hard, durable, uncoated particles of quartz or other rock. It shall not contain more than 3% of material finer than a #200 sieve.

B. Organic Impurities: Fine aggregate subjected to the colorimetric test shall not produce a color darker than Gardner Color Standard No. 11, using AASHTO T 21. If the fine aggregate fails to meet this requirement, the provisions of AASHTO M 6, Section 5.2, will govern.

C. Sand shall be uniformly graded as follows:

Gradation of Sand

Sieve	Percent Passing by Weight
3/8”	100
No. 4	95-100
No. 8	80-100
No. 16	50-85
No. 30	25-60
No. 50	10-30
No. 100	2-10

D. The above gradation represents the extreme limits which shall determine suitability for use from all sources of supply. The gradation from any one source shall be reasonably uniform and not subject to the extreme percentages of gradation specified above. For the purpose of determining the degree of uniformity, a fineness modulus determination will be made upon representative samples from any source. Fine aggregate from any one source having a variation in fineness modulus greater than 0.20 either way from the fineness modulus of the representative sample will be rejected.

2.10 FLOWABLE CONCRETE FILL/BACKFILL (FLOWFILL)

A. Cementitious material, ACI 229R, comprised of cement, aggregates, fly ash, water, and admixtures, capable of being poured or pumped, self-leveling, self-curing to specified strengths.

B. Excavatable flowfill: Concrete strength shall be liquid enough to flow, be self-leveling and excavatable by hand methods. Unless otherwise specified, excavatable flowfill shall have a minimum 28 day compressive strength of 30 psi, and shall not exceed 100 psi.

C. Non-excavatable flowable: Concrete strength shall be liquid enough to flow and be self-leveling and excavatable by machine equipment. Unless otherwise specified, non-excavatable flowfill shall have a minimum 28-day compressive strength of 125 psi, and shall not exceed 200 psi.

2.11 DETECTABLE WARNING TAPE

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

1. Red: Electric power lines, electric power conduits and other electric power facilities.

2. Yellow: Gas, oil petroleum products, steam, compressed air, compressed gas and all other hazardous materials.

3. Blue: Water.

4. Orange: Communication lines or cables, including but not limited to telephone, fire signals, cable television, and electronic controls.

5. Green: Storm drainage and sanitary sewer systems, including force mains and other non-hazardous materials.

6. Brown: Chilled Water and Other.

PART 3 EXECUTION

3.1 PREPARATION

A. Notify "Call-Before-You-Dig" to request a utility mark-out for the Project Site prior to any earth disturbance. Provide written confirmation to Engineer that such mark-out has been completed.

B. Verify site conditions before proceeding with demolition work. Field check the accuracy of the Drawings and inspect structures, utilities, and other site features prior to start of work and notify Engineer in writing, of any discrepancies or hazardous conditions.

C. Take precautions for preventing injuries to persons or damage to property in or about the work. Protect structures, utilities, sidewalks, pavements and other improvements from damage caused by settlement, lateral movement, undermining, washout and other hazards created by earthwork operations.

D. Protect sub-grades and foundation soils against freezing temperatures or frost. Provide protective insulating materials as necessary.

E. Provide erosion-control measures to prevent erosion or displacement of soils and discharge of soil-bearing water runoff or airborne dust to adjacent properties and walkways.

F. When excavations are to be made in paved surfaces, the pavement shall be removed so as to provide a clean uniform edge with a minimum disturbance of remaining pavement. Saw cutting the pavement to provide a clean, uniform edge shall unless otherwise indicated.

G. If pavement is removed in large pieces, it shall not be mixed with other excavated material, but shall be disposed of away from the site of the Work before the remainder of the excavation is made.

3.2 CLEARING AND GRUBBING

A. Clear, grub, remove, and dispose of all vegetation and debris within the limits of construction, as designated on the plans or as required by Engineer. Contractor shall remove only those trees and shrubs absolutely necessary to allow for the construction. The work shall also include the preservation from injury of defacement of all vegetation or object designated to remain.

3.3 PROTECTION OF EXISTING FEATURES

A. General

1. Protect all existing improvements from damage unless those improvements are specifically designated for permeant removal, relocation, or temporary removal and replacement.

2. As excavation approaches underground structures, digging by machinery shall be discontinued and the excavation shall be done by means of hand tools.

3. Pavements: On paved surfaces to remain, do not use or operate tractors, bulldozers, or other power operated equipment, the treads or wheels of which are so shaped as to cut or

otherwise damage such surfaces. All surfaces, which have been damaged by Contractor's operations, shall be restored to a condition at least equal to that in which they were found immediately prior to the beginning of operations. Suitable materials and methods shall be used for such restoration.

B. Utilities

1. Existing utilities remaining in service, including those remaining in service until after relocation, and relocated utilities shall be protected from damage. Before excavating near any existing utilities, notify the utility owner, coordinate protective work and comply with the utility owners' requirements. Coordinate with respective utility owners/operators as required.

2. Safeguard and protect from damage or movement any existing services, utilities, and utility structures uncovered or encountered which are to remain in service.

3. All utility services shall be supported by suitable means so that the services shall not fail when tamping and settling occurs.

4. Where known utilities are encountered, notify Engineer and document location and type of utility before proceeding with work in such area.

5. When uncharted or incorrectly charted piping or utilities are encountered during excavation, stop work and notify Engineer immediately. Cooperate with the utility owners in maintaining their utilities in operation prior to resuming work.

C. Retaining Structures: Provide bracing, shoring, sheeting, sheet piling, underpinning or other retaining structures necessary to guard against any movement or settlement of existing or new construction, utility systems, paving, or other improvements. Assume responsibility for the strength and adequacy of retaining structures, and for the safety and support of construction, utilities or paving, and for any movement, settlement or damage thereto. Retain the services of a licensed engineer as required to design bracing, shoring, sheeting, sheet piling, underpinning or other retaining structures.

D. Replacement and Relocation

1. In case of damage, Contractor shall notify the appropriate party so that proper steps may be taken to repair any and all damage done. When the Owner does not wish to make the repairs themselves, all damage shall be repaired by Contractor, or, if not promptly done by him, Engineer may have the repairs made at the expense of Contractor.

2. If certain existing structures are encountered that in the opinion of Engineer require temporary or permanent relocation or removal, Engineer may order in writing that Contractor undertake all or part of such work or to assist the Owner in performing such work. For such occurrences, Contractor shall be compensated as applicable, as extra work.

3. In removing existing structures, Contractor shall use care to avoid damage to the material, and Engineer shall include for payment only those new materials, which, in his judgment, are necessary to replace those unavoidably damaged.

4. The structures to which the provisions of the preceding two paragraphs shall apply include structures which (1) are not indicated on the Drawings or otherwise provided for, (2) encroach upon or are encountered near and substantially parallel to the edge of the

excavation, and (3) in the opinion of Engineer will impede progress to such an extent that satisfactory construction cannot proceed until they have been changed in location, removed (to be later restored), or replaced. (See Item 3.19, "Sub Surface Obstructions" also).

3.4 DEWATERING

A. Comply with all applicable permit requirements.

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

C. Protect sub-grades from softening, undermining, washout and damage by rain or water accumulation.

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

2. Install de-watering system to keep subgrades dry and convey ground water away from excavations.

3.5 EXCAVATION

A. Dust Control: During the progress of the Work, Contractor shall conduct his operations and maintain the area of his activities in order to minimize the creation and dispersion of dust. Refer to Section 01 5714- Temporary Dust Control.

B. Excavate to the exact elevations shown on the plans, or as directed by Engineer. Where no dimensions are indicated, make excavations in such manner, and to such depths, elevations, and dimensions, that will give suitable room for construction of the work indicated on the Drawings. As applicable for utility installations, comply with trench limits shown on the Drawings.

C. Furnish and place all sheeting, bracing, and supports, and render the bottom of the excavation firm and dry, and in all respects, acceptable for construction of the work.

D. If Contractor excavates below the elevations specified on the plans, beyond the limits indicated on the plans, or where no dimensions are indicated, beyond depths, elevations, and dimensions reasonably necessary for construction of the work, Contractor shall bring the excavation back to the proper elevation and/or dimension by backfilling with Suitable Material that is approved by Engineer in accordance with the backfilling provisions specified herein. Engineer, or if applicable Geotechnical Engineer, shall have sole authority in determining the specific composition of such Suitable Material.

1. Any increase in cost resulting from Unauthorized Excavation, including but not necessarily limited to backfilling, haul-off, increasing the size of footings or foundations, testing, schedule impact, or administrative impact shall be at Contractor’s sole expense.

E. If utilities are to be laid in new embankments, or other new fill areas which are more than 12 inches deep below the invert of the pipe, the fill material shall be placed and properly compacted to final grade or to a height of at least 3 feet above the top elevation of the pipe, whichever is the lesser, before laying pipe. Particular care shall be taken to ensure maximum consolidation of material under the pipe location. The pipe trench shall then be excavated as though in undisturbed material.

3.6 TRENCH EXCAVATION

A. In general, trenches shall be excavated to such depth as will provide a cover depth as indicated on the Drawings from finished grade to the top of the pipe barrel. Deeper trenches shall be provided where necessary on account of the conformation of the ground and to permit the alignment of the pipe without undue deflection of joints.

B. Trenches shall be excavated by hand or machinery to the width and depth indicated on the Drawings and specified herein. Depth shall account for thickness of the pipe and thickness of bedding. All loose materials shall be removed from the bottom of the trench so that the bottom of the trench will be in an undisturbed condition.

C. If in the opinion of Engineer, the material at or below the depth to which excavation for structures and pipes would normally be carried is unsuitable for foundation, it shall be removed to such widths and depths as directed and replaced with suitable material.

D. Trench widths shall be 3 feet greater than the nominal inside diameter of pipe for such diameters of 36 inches or less. For diameters greater than 36 inches, the width shall be 4 feet greater than nominal inside diameter. Trench excavation for manholes, catch basins, drop inlets, etc. shall be two (2) feet outside the neat lines of the foundations. These limits may be adjusted for field conditions at the direction of Engineer.

E. Bedding for pipe and utility structures will be as detailed on the Drawings.

3.7 APPROVAL OF SUBGRADE

A. Notify Engineer, and Geotechnical Engineer if applicable, when excavations have reached required subgrade elevation.

B. If Engineer and, if applicable, Geotechnical Engineer determines that Unacceptable Material is present, continue excavation of such Unacceptable Material and replace with approved Satisfactory Materials as directed. The replacement of Unacceptable Material with Satisfactory Materials will be paid for as a change in the work according to applicable provisions of the contract.

C. Protect subgrade from disturbance at all times. Reconstruct sub-grades damaged by freezing temperatures, frost, rain, accumulated water or construction activities, as directed by Engineer. Excavation and replacement with structural fill of any disturbed or softened materials resulting from inadequate preparation, inadequate dewatering, or inadequate protection, shall be at Contractor’s sole expense.

3.8 TUNNELING

A. In general, excavation shall be made in open cut from the surface and Contractor shall not be allowed to do any tunneling without obtaining permission from Engineer, and then only according to methods approved by him, and at no additional cost to the Owner. This permission will only be given where a line is to be laid to a point behind the curb, across a paved street, or where, in the opinion of the Engineer, it is necessary to tunnel short sections on account of proximity of adjacent walls, utilities, structures, to avoid important roots of trees or large masses of roots, or to ensure against root damage endangering the life of trees near the pipeline location. Such excavations then can be made in alternate sections of open cut and tunnel, the length of the tunnel sections to be specified by Engineer. These tunnel sections shall be cut underneath

to a wedge with its edge horizontally across the pipe, and backfilled tightly by ramming and tamping from each end.

3.9 FILL AND BACKFILL

A. Fill: Contractor shall remove loam and topsoil, loose vegetable matter, stumps, large roots, etc., from areas upon which embankments will be built or material will be placed as fill to adjust subgrade prior to final grading.

B. Backfill: Common Fill material may be used as backfill when indicated on the Drawings or when authorized by Engineer (or as applicable Geotechnical Engineer) if Contractor can achieve required minimum dry density after compaction. Backfilling shall be done as promptly as is consistent with non-injury to pipe or structures, but no backfilling shall be done before Engineer (or as applicable Geotechnical Engineer) gives permission.

C. Frozen material shall not be placed in any fill or backfill, nor shall any fill or backfill be placed upon frozen material. Previously frozen material shall be removed, or shall be otherwise treated as required, before new fill or backfill is placed.

D. After the subgrade has been prepared, fill material shall be placed thereon and built up in successive layers not exceeding twelve (12) inches before compaction until it has reached the required elevation.

1. When gravel fill or other material is used for foundation of structures, it shall be spread in layers of uniform thickness not exceeding six (6) inches before compaction.

E. Upon completion of filling and backfilling, all surplus material shall be removed and surfaces to remain which are affected in any way by the work restored to the condition in which they were before ground was broken. All surplus materials shall become the property of Contractor. If Contractor fails to promptly remove such surplus materials, Engineer may have the same done and charge all associated costs to Contractor, including deduction from payments due.

3.10 BACKFILLING UTILITIES

A. As soon as practical after utility has been placed into bedding and joints properly made, backfilling shall begin, and shall continue without delay.

B. Placement of bedding over pipe prior to placement of backfill shall be as indicated on the Drawings. Hand-place bedding at the sides of the pipe and to the limits indicated on the Drawings over the pipe. Bedding placed over pipe shall be in 6-inch layers, leveled along the length and width of the trench and thoroughly compacted with approved tampers.

C. Install warning tape as indicated o the Drawings unless otherwise specified by the utility owner/operator.

3.11 BACKFILLING AT STRUCTURES

A. No backfill shall be deposited against concrete until the concrete has obtained sufficient strength to withstand the earth pressure placed upon it and in no case less than seven days, nor before carrying out and satisfactorily completing the tests for watertight structures specified elsewhere.

B. Prior to placing backfill, subgrade shall be thoroughly compacted. Soft or loose material evident during compaction shall be removed and replaced with Granular Fill or other approved fill material.

C. Fill placed around arches, rigid frames, box culverts and piers shall be deposited on both sides of the structure to approximately the same elevation at the same time. Each layer of backfill shall be spread to a thickness not exceeding 6 inches deep after compaction and shall be thoroughly compacted by the use of power rollers or other motorized vehicular equipment, by tamping with mechanical rammers or vibrators, or by pneumatic tampers. Any equipment not principally manufactured for compaction purposes or which is not in proper working order in all respects shall not be used within the area described above.

D. Bring backfill to sub-grade elevations. Slope backfill at exterior of building to drain water away from building.

3.12 COMPACTION

A. Each layer of fill or backfill material shall be compacted by the use of compaction equipment consisting of rollers, compactors or a combination thereof. Earth-moving and other equipment not specifically manufactured for compaction purposes will not be considered as compaction equipment. At such points as cannot be reached by mobile mechanical equipment, or where such equipment is not permitted, the materials shall be thoroughly compacted by the use of suitable power- driven tampers.

B. Previously placed or new materials shall be moistened by sprinkling, if required, to ensure proper bond and compaction. No compacting shall be done when the material is too wet, from either rain or application of water, to compact it properly. At such times the work shall be suspended until the previously placed and new materials have dried out sufficiently to permit proper compaction, or such other precautions shall be taken as may be necessary to obtain proper compaction.

C. Special attention shall be given to compaction in places close to walls where motorized vehicular compaction equipment cannot reach. Within 3 feet of the back face of walls and within a greater distance at angle points of walls, each layer of backfill shall be compacted by mechanical rammers, vibrators or pneumatic tampers.

D. Each layer of fill or backfill shall be compacted at optimum moisture content. No subsequent layer shall be placed until the specified compaction is obtained for the previous layer.

E. Compaction Density: Compaction density shall be expressed as a percentage of maximum dry density at optimum moisture content according to ASTM D 1557 Method C. Density indicated is minimum required.

1. Under structures, building slabs, and steps: 95 %

2. At building foundations: 95 %

3. Utilities, below pipe centerline: 95%

4. Utilities below unpaved surface, above pipe centerline: 92%

5. Utilities below paved surface, above pipe centerline: 95%

6. Embankments: 92%

7. Landscaped areas: 90 %.

8. Natural grass athletic fields and similar recreational fields: 93%

3.13 SUBSURFACE OBSTRUCTIONS

A. As a general rule, sub-surface obstructions encountered along the route of the pipeline shall be considered as follows:

1. Crossing Obstruction: All pipes, conduits, wires, etc. of whatever nature whose centerline lies at an angle of 20 degrees or greater to the centerline of the pipe being installed shall be considered as crossing obstructions and shall be protected, or repaired or replaced if damaged, or relocated, all at no additional cost to the Owner.

2. Interfering Obstructions: All pipes, conduits, wires, etc. of whatever nature whose centerline lies at an angle of less than 20 degrees, but more than 5 degrees to the centerline of the pipe being installed, shall be considered as interfering obstructions. Costs for supporting such obstructions in place during installation of the new pipe shall be paid for by the Owner. Costs for supporting interfering obstructions shall not be construed to include any costs for excavation. Repairing or replacing damaged interfering obstructions, or relocation shall be accomplished at no additional cost to the Owner.

3. Parallel Obstructions: All pipes, conduits, wires, etc. of whatever nature whose centerline lies at an angle of 5 degrees or less, or is truly parallel and less than 0.5 feet offset from outside the normal trench limits, as specified in Subarticle 3.5 B. of this Section, of the pipe being installed, shall be considered parallel obstructions. Costs for supporting such obstructions in place during installation of the new pipe, including excavation, may be paid for by the Owner, or Owner may elect to pay for the cost of replacing such obstructions. Should Owner first elect to pay the cost of supporting the obstruction and then elect to pay the cost of replacing the obstruction, approved costs for supporting the obstruction, including excavation, incurred prior to electing replacement costs shall also be paid. After Owner elects to pay replacement costs, only replacement costs will be paid for all additional work in the vicinity of the parallel obstruction.

4. Angle measurement between centerline of obstructing pipe, conduit, wire, etc. and centerline of the pipe being installed shall be taken from between the horizontal projection of the centerlines at ground surface. Parallel offset distance between centerline of obstructing pipe, conduit, wire, etc. and the outside of normal trench limits of the pipe being installed shall be taken from between the horizontal projection of the centerlines and outside trench limit at ground surface.

END OF SECTION

DIVISION 32
EXTERIOR IMPROVEMENTS

SECTION 32 9200

TURF AND GRASS

PART 1 GENERAL

1.1 SECTION INCLUDES

A. Provide all labor, materials, equipment, services, and perform all operations necessary to complete the work of this section as indicated within the drawings and specified herein which shall include, but is not limited to, the following:

1. Supplying screened loam.
2. Supplying root zone mix.
3. Preparation and spreading of stockpiled topsoil (if available).
4. Fine grading.
5. Fertilizers and additives as necessary.
6. Sodding.
7. Seeding.
8. Erosion Control Matting.
9. Maintenance including watering.
10. Warranty

B. Contractor is responsible for all health and safety.

1.2 QUALITY ASSURANCE

A. The Contractor must be a member in good standing of the Associated Landscape Contractors of America.

B. The Contractor must show previous evidence of having successfully installed and maintained landscape projects of similar scope to the subject project with regard to quantities of seeding involved, complexity and a minimum of five (5) years experience on projects similar to this one. The Owner’s Representative shall have the right to review the qualifications and references of the Contractor for approval to work on this project.

C. Source Quality Control:

1. Analysis and standards: Package standard products with manufacturers certified analysis. For other materials, provide analysis by recognized laboratory made in accordance with methods established by the Association of Official Agriculture Chemists, wherever applicable.

D. Within 30 days after award of Contract and before any seeding materials are delivered to the job site, submit to the Owner a complete list of all seeding and other items proposed to be installed. At least 10 days prior to shipment delivery of materials, the Contractor shall submit to the Owner a one (1) cubic foot representative sample, certifications, certified test results for materials as specified below. The Contractor shall provide a listing of the addresses (locations) identifying the origin of the soil to be delivered. If the origin is from multiple locations, test results must be provided for each source as well as the blended final product and all locations shall be provided at the time of submission of required information specified above. No material shall be ordered or delivered until the required submittals have been submitted and approved by the Owner. Delivered materials shall closely match the approved samples. Approval shall not constitute final acceptance. The Owner reserves the right to reject, on or after delivery, any material that does not meet these specifications.

E. Existing Topsoil from Stockpile may be used providing it can be made to comply with the specifications for screened loam. The Contractor shall provide representative samples for testing and approval. Two (2) test samples of shall be taken and analyzed from each potential loam borrow pit and two each shall be taken and analyzed of existing topsoil stockpiled on site. Site of sample shall comply with testing lab requirements. Contractor shall deliver samples to testing laboratory, have testing report sent directly to the Owner's Representative and pay all costs. Report shall be submitted at least one (1) month before any loaming is to be done.

1. Mechanical and chemical analysis shall be by a public extension service agency or a certified private testing laboratory in accordance with the current "Standards" of the Association of Official Agriculture Chemists and acceptable to the Landscape Architect.

2. Soil test report shall include a mechanical sieve analysis with soil classification. Organic content shall be reported. Chemical analysis shall include pH (1:1 soil-water ratio), buffer pH, Soluble Salts (1:2 soil-water ratio), Nitrate Nitrogen, Ammonium Nitrogen, Phosphorus, Potassium, Calcium, Aluminum, Magnesium, Manganese, Ferric Iron and Sulfate.

3. Test report shall clearly recommend appropriate additives including limestone and fertilizer requirements.

1.3 SUBMITTALS

A. Soil analysis in accordance with the current "Standards of the Association of OFFICIAL Agricultural Chemists".

B. Provide watering and fertilizing schedule to Landscape Architect for approval.

C. Provide two marked up prints to the Landscape Architect indicating square footages for all lawn areas with quantities of all soil additives and sod for each area prior to beginning work.

1.4 PROJECT CONDITIONS

A. All areas to be seeded shall be inspected by the Contractor before starting work and any defects, such as incorrect grading, etc., shall be reported to the Landscape Architect prior to beginning this work. The commencement of work by the Contractor shall indicate his acceptance of the areas to be seeded, and he shall assume full responsibility for the work of this Section.

1.5 REFERENCES

A. The work shall conform to the codes and standards of the following agencies, publications as further cited herein:

B. AAN: American Association of Nurserymen, Inc., “Standards for Nursery Stock” ANSI Z60.1—1980, or current edition.

C. ASTM: ASTM International (ASTM), 1916 Race Street, Philadelphia, Pennsylvania, 19103, USA as Published in “Compilation of ASTM Standards in Building Codes”.

D. BHCU: Bailey Hortorium of Cornell University, 1976, Hortus Third, A Concise Dictionary of Plants Cultivated in the United States and Canada (for nomenclature).

E. NAA: National Arborist Association, 3537 Stratford Road, Wantagh, New York, 11793, USA, as published in “Standards for Pruning Shade Trees...”, 1979, or latest edition (for pruning standards).

F. USDA: United States Department of Agriculture, 1941 Yearbook, “Climate and Man” (for average last frost date at locality).

1.6 QUALITY CONTROL/QUALIFICATIONS

A. Provide affidavits from manufacturers major suppliers where required by these Specifications.

B. Fine grading and installation of sod shall be done under the supervision of a qualified foreman acceptable to the Landscape Architect.

1.7 DELIVERY, STORAGE AND HANDLING

A. Deliver all items to the site in their original containers with all labels intact and legible at time of Owner’s inspection.

B. Immediately remove from the site all seeding materials, which are not true to name, and all materials, which do not comply with the provisions of this Section of these Specifications.

C. Use all means necessary to protect seeding materials before, during, and after installation and to protect the installed work and materials of all other trades.

D. Packaged Materials: Deliver packaged materials in containers showing weight, analysis, and name of manufacturer. Protect materials from deterioration during delivery, and while stored at site.

PART 2 PRODUCTS

2.1 SCREENED LOAM

A. Screened Loam shall be “coarse sandy loam” determined by mechanical analysis (ASTM D-422) and based on the USDA Classification System. Screened Loam has the following mechanical analysis:

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

Coarse Sandy loam shall have: less than 30% fine/very fine sand, and 50% or more medium/coarse/very coarse sand.

B. Screened Loam shall be a natural product consisting primarily of natural topsoil, free from subsoil, and obtained from an area which has never been stripped, as noted above, the location of the source of the Loam must be submitted to the Landscape Architect. Screened Loam shall not contain less than 3 percent nor more than 10 percent organic matter as determined by the loss on ignition of oven-dried samples, at 100°C ± 5°C. To adjust organic matter content, the soil may be amended, prior to site delivery, by the addition of composted leaf mold or peat moss. Use of organic amendments is accepted only if random soil sampling indicates a through incorporation of these materials. No mixing or amending of Loam will be permitted on site. The Loam shall not be delivered when in a wet or frozen condition.

C. Screened Loam shall consist of fertile, friable, natural loam capable of sustaining vigorous plant growth. Loam shall be without admixture of subsoil, and refuse, resulting in a homogeneous material free of stones greater than ½″ in the longest dimension, be free of lumps, plants, glass, roots, sticks, excessive stone content, debris, and extraneous matter. Screened Loam shall fall within the pH range of 6.0 to 6.5 except as where noted on plans and details. It shall be uncontaminated by salt water, foreign matter and substances harmful to plant growth. The maximum soluble salt index shall be 100. Screened Loam shall not have levels of aluminum great than 200 parts per million.

D. If limestone is required to amend the screened loam to bring it within a pH range of 6.0 to 6.5 no more than 200 pounds of limestone per 1,000 square feet of loam, incorporated into the soil, or 50 pounds of limestone per 1,000 square feet of loam, surface application, within a single season.

E. The Owner will reject any material delivered to the site that, after post-delivery testing, does not meet these specifications. If the delivered screened loam does not meet the specifications stated in this document the delivered screened loam will be removed by the Contractor at the Contractor’s expense and at the time of rejection.

F. The Contractor shall take representative samples of topsoil from the site and from topsoil to be hauled in and shall submit samples to a Soil Testing Laboratory for chemical analysis, and physical analysis. The Contractor shall indicate to the testing agencies that turf is to be planted and who the Owner is. The Contractor shall forward to the Owner two copies of analysis and recommendations of the testing agencies.

G. Topsoil, which has been stockpiled on the site, may be used provided it can be made to comply with these Specifications herein for screened loam.

H. All loam provided from off-site sources shall be brought to the site meeting all specification requirements. There must be no mixing or amending of soil on site. No loam shall be spread prior to screening. The loam must not be handled or moved when in a wet or frozen condition.

I. To assure loam borrow purchased and topsoil stockpiled fulfills specified requirements regarding textural analysis, organic matter content, and pH, soil testing results will be obtained by the Contractor and submitted to the Owner's Representative for approval one (1) month before any soil is delivered to the site.

2.2 SOIL ADDITIVES

A. Sand shall be clean sand, free of deleterious materials. Sand shall meet AASHTO M-6 or ASTM C33 with grain size of 0.02″–0.04″.

B. Commercial fertilizer, peat, humus or other additives shall be used to counteract soil deficiencies as recommended by the soil analysis and as directed by the Owner's Representative.

C. If stored at the site, protect fertilizer from the elements at all times.

D. Fertilizer shall be commercial fertilizer, based upon soil tests. Fertilizer mixture containing at least sixty percent (60%) of organic material.

1. Percentages of nitrogen, phosphorous and potash shall be based on laboratory test recommendations as approved by the Landscape Architect. For purpose of bidding, assume ten percent (1 0%) nitrogen, twenty percent (20%) phosphorus and six percent (6%) potash by weight. At least fifty percent (50%) of the total nitrogen shall contain no less than three percent (3%) water-insoluble nitrogen.

2. Fertilizer shall be delivered to the site, mixed as specified, in the original unopened standard size bags showing weight, analysis and name of manufacturer. Containers shall bear the manufacturer's guaranteed statement of analysis, or a manufacturer's certificate of compliance covering analysis shall be furnished to the Landscape Architect. Store fertilizer in a weatherproof place and in such a manner that it will be kept dry and its effectiveness will not be impaired.

3. Fertilizer shall be applied in two (2) applications. The first application shall be within one (1) week before the sodding at the rate of thirty-five (35) pounds per thousand (1,000) square feet harrowed into the top two (2) inches of sod bed. The second application shall be done as a maintenance application.

4. At least four (4) days shall lapse after the application of lime and fertilizer before sodding shall begin.

E. Humus shall be natural humus, reed peat or sedge peat. It shall be free from excessive amounts of zinc, low in wood content, free from hard lumps and in a shredded or granular form. According to the methods of testing of A.O.A.C., latest edition, the acidity range shall be approximately 5.5 pH to 7.5 pH and the organic matter shall be not less than 85% as determined by loss on ignition. The minimum water absorbing ability shall be 200% by weight on an oven-dry basis.

F. Manure shall be well-rotted, unbleached stable manure not less than eight months and not more than two years old. It shall be free from sawdust, shavings or refuse of any kind and shall not contain over twenty-five (25) percent straw. The Contractor shall furnish information as to the kind of disinfectant or chemicals, if any, that may have been used in storage of the manure.

G. Lime: Natural dolomitic limestone containing not less than 85 percent of total carbonates with a minimum of 30 percent magnesium carbonates, ground so that not less than 85 percent of total carbonates with a minimum of 30 percent magnesium carbonates, ground so that not less than 90 percent passes a 10-mesh sieve and not less than 50 percent passes a 100-mesh sieve.

H. Superphosphate shall be composed of finely ground phosphate rock as commonly used for agricultural purposes containing not less than 18% available phosphoric acid. Superphosphate shall be applied with the fertilizer at the rate of twenty (20) pounds per thousand (1,000) square feet. At least four (4) days shall lapse after the application of lime and fertilizer before sodding shall begin.

I. Aluminum Sulfate: Commercial grade.

J. Bonemeal: Commercial, raw, finely ground; 4 percent nitrogen and 20 percent phosphoric acid.

K. Water: The Contractor shall be responsible for furnishing his own supply of water to the site at no extra cost. If possible, the Owner will furnish the Contractor upon request with an adequate source and supply of water at no charge. However, if the Owners water supply is not available or not functioning, the Contractor will be held responsible to furnish water.

1. Water shall be free from impurities injurious to vegetation.

2.3 SEED

A. Lawn Areas

1. Seed mixture shall be fresh, clean, new crop seed. Grass shall be of the previous year's crop and in no case shall weed seed content exceed 1% by weight. The seed shall be furnished and delivered in the proportion specified below in new, clean, sealed and properly labeled containers. All seed shall comply with State and Federal seed laws. Submit manufacturers Certificate of Compliance. Seed that has become wet, moldy or otherwise damaged will not be acceptable.

a. Manufacturer: Pearl's Premium or an equivalent seed blend to the following:

Purity	Seed Species	Germination Rate
19.75%	Dakota Tall Fescue	90%
19.75%	Frontier Perennial Ryegrass	92%
19.65%	Deepblue Kentucky Bluegrass	88%
19.65%	Harpoon Hard Fescue	80%
19.65%	Carmen Chewings Fescue	90%
01.47%	Inert Matter	

00.05%	Other Crop Seed
00.03% (max.)	Weed Seed

2. Seed mixture to be applied at the following rate:

   a. Five (5) pounds per 1,000 square feet.

3. Seed shall be mixed by a dealer.

2.4 EROSION CONTROL MATTING

A. Shall be on all slopes 2:1 and greater in slope.

B. Jute mesh shall be a uniform, open, plain weave cloth of undyed and unbleached single jute yarn. The yarn shall be of a loosely twisted construction and it shall not vary in thickness more than one-half its normal diameter. Jute mesh shall be furnished in rolled strips and shall meet the following requirements:

Width—48 inches, plus or minus one inch
78 warp—ends per width of cloth (minimum)
41 weft—ends per yard (minimum)
Weight shall average 1.22 pounds per linear yard with a tolerance of plus or minus 5%.

C. Staples shall be U-shaped and shall be approximately six inches long and one inch wide. Machine made staples shall be of No. 11 gauge or heavier steel wire. Handmade staples shall be made from 12-inch lengths of No. 9 gauge or heavier steel wire.

2.5 SOD

A. After the preparation of the areas to be sodded has been approved by the Landscape Architect, the Contractor shall sod the areas as specified herein. The Contractor shall sod with nursery-grown sod composed of Bluegrass as follows:

Rye Grass and Gettysburg Perennial Ryegrass	20% (Endophytic)
P 104 Kentucky Bluegrass	16%
America Kentucky Bluegrass	16%
Glade Kentucky Bluegrass	16%
Challenger Kentucky Bluegrass	16%
Touchdown Kentucky Bluegrass	16%

B. Submit blend percentages and names to Landscape Architect for approval. The sod shall be grown by a recognized turf farm which meets the approval of the Landscape Architect. The approved farm must, in turn, certify in writing that they are the Contractor’s selected supplier.

C. Sod shall be furnished in either of the following dimensions:

1. In rectangular sod strips measuring twelve (12) inches or sixteen (16) inches in width and from four (4) feet or six (6) feet in length, stored in rolls with the grass top side inverted so that the topsoil side is to the exterior. Note: These smaller strips will only be acceptable for filling in smaller areas if needed.

D. All sod furnished shall be living sod containing at least seventy percent (70%) of thickly matted grasses as specified, and free from noxious weeds.

E. Any sod with growth of more than two (2) inches in height shall be mowed to a height of from one and one-half (1½%) to two (2) inches not more than five (5) days prior to harvesting. The sod shall be machine cut at a uniform soil thickness of from one-half (½) to three-quarter (¾) inches, excluding top growth and thatch at time of cutting. The maximum allowable deviation from the widths and lengths specified shall be five percent (5%). No broken pads or torn and uneven ends shall be accepted. Standard size sections of sod shall be strong enough to support their own weight and retain their size and shape when suspended vertically with a firm grasp on the upper eighteen percent (18%) of the section. Sod shall not be harvested when its moisture content (excessively wet or dry) may adversely affect its survival.

F. Sod shall be harvested, delivered and installed within a period of thirty-six (36) hours. Sod not installed within this time period shall be inspected by the Landscape Architect and shall not be installed prior to his approval. Any sod not approved by the Landscape Architect shall be removed from the site by the Contractor and a fresh sod supply shall be furnished at no extra cost to the Owner.

PART 3 EXECUTION

3.1 PREPARATION OF PLANTING SOIL

A. Mix specified soil amendments and fertilizers with topsoil and/or loam borrow at rates specified by testing agency. Delay mixing of fertilizer if planting will not follow placing of planting soil within a few days.

B. Loam, organic material and bonemeal for plant backfill for both planting beds and individual plants shall be thoroughly premixed in the proportions of one (1) part of organic material with seven (7) parts of loam together with ten (10) pounds of bonemeal per cubic yard of mixture.

C. Maintain at all times during the planting operations one or more stockpiles of approved loam borrow or topsoil from stockpile.

3.2 FINE GRADING AND LOAMING

A. After the areas to be loamed have been brought to rough grade, and immediately prior to spreading the screened loam or topsoil, the subgrade shall be loosened by disking or rototilling to a depth of at least three inches to permit bonding of the loam to the subsoil. Remove all stones greater than one (1) inch in diameter and all debris or rubbish. Such material shall be removed from the site, at no additional cost to the Owner.

B. Provide a minimum depth of six (6) inches of planting soil in all areas indicated for seeding and all areas disturbed by excavation and construction operations.

C. Screened loam borrow or screened topsoil from stockpile shall be placed and spread over approved areas to a depth sufficiently greater than six inches so that after natural settlement and light rolling, the completed work will conform to the lines, grades, and elevations indicated. Supply additional loam, after testing and approval as may be needed, to give the specified depths and finished grades under the Contract without additional cost to the Owner.

D. Disturbed areas outside the limit of seeding shall be spread with six (6) inches of screened loam or screened topsoil to the finished grade as specified herein above.

E. No subsoil or loam shall be handled in any way if it is in a wet or frozen condition.

F. Sufficient grade stakes be set for checking the finished grades. Stakes must be set in the bottom of swales and at top of slopes. Grades shall be established which are accurate to one tenth of a foot either way. Connect contours and spot elevations with an even slope.

G. After loam has been spread, it shall be carefully prepared by scarifying or harrowing and hand raking. All large stiff clods, lumps, brush, glass, roots, stumps, litter and other foreign matter, and stones over one inch in diameter shall be removed from the loam. Loam shall also be free of smaller stones in excessive quantities as determined by the Owner's Representative.

H. The whole surface shall then be rolled with a hand roller weighing not more than 100 pounds per foot of width. During the rolling, all depressions caused by settlements or rolling shall be filled with additional loam and the surface shall be regraded and rolled until it presents a smooth and even finish to the required grade.

I. Contractor shall obtain Owner's Representatives written approval of fine grading and bed preparation before doing any seeding or sodding.

3.3 SEEDING

A. All areas indicated on the plan shall be loamed and seeded only after written approval of the Owner's Representative of bed preparation. All disturbed areas outside the limit of seeding shall be seeded.

B. Immediately before seeding, the ground shall be restored, as necessary, to a loose friable condition by dicing or other approved method to a depth of not less than 2″. The surface shall be cleared of all debris and of all stones 1″ or more in diameter.

C. Seeding shall be done only during the period from April 1 to May 30 or August 15 to October 15. The actual planting of seed shall be done, however, only during periods within this season which are normal for such work as determined by weather conditions and by accepted practice in this locality. At his option, and on his responsibility, the Contractor may plant seed under unseasonable conditions at no increased cost to the Owner.

D. Seeding of lawns shall be done only by experienced workmen under the supervision of a qualified foreman.

E. Soil additives shall be spread and thoroughly incorporated into the layer of loam by harrowing or other methods approved by the Owner's Representative. The following soil additives shall be incorporated.

1. Spread ground limestone as required by soil analysis to achieve a pH of 6 to 6.5, but the maximum amount applied shall be one pound per square yard.

2. Spread fertilizer at the rate of forty (40) pounds per one thousand (1,000) square feet or more as required by soil analysis.

3. Spread Superphosphate at the rate of twenty (20) pounds per one thousand (1,000) square feet.

4. Incorporate humus in the soil as required by soil analysis prior to delivery to site. Contractor shall have loam retested with organic matter incorporated and shall obtain approval prior to brining any loam on the site.

F. Seed only when the bed is in a friable condition, not muddy or hard.

G. Seed all areas to be seeded with specified grass seed, sowing evenly with an approved mechanical seeder at the rate of 6 pounds per 1,000 square feet. Sow 3 pounds per 1,000 square feet in one direction and 3 pounds per 1,000 square feet at right angles to the first seeding. Spread seed when soil is moist. Cultipacker, or approved similar equipment, may be used to cover the seed and to firm the seedbed in one operation. In areas inaccessible to cultipacker, the seeded ground shall be lightly raked and rolled in two directions with a water ballast roller. Extreme care shall be taken during seeding and raking to insure that no change shall occur in the finished grades and that the seed is not raked from one spot to another. Hydroseeding is an acceptable manner of seeding, providing the Contractor certifies in writing that the hydro-seed fertilizer mix is as herein specified and applied at the equivalent rate of 6 pounds per 1,000 square feet.

H. If covering and rolling is not properly accomplished by the seeding machine, the seed shall be lightly raked into the ground, after which the ground shall be rolled with a five hundred pound roller and thoroughly and evenly watered with a fine spray to penetrate the soil to a depth of at least two (2) inches.

I. Promptly after seeding, wet the seedbed thoroughly, keeping all areas moist throughout the germination period.

J. Mulch shall be placed immediately after seeding. Straw or salt marsh hay that has been thoroughly fluffed shall be spread evenly and uniformly at the rate of two to three tons per acre. Lumps and thick mulch materials shall be thinned. All mulch anchor stakes, strings and matting shall be removed before final acceptance of lawns. In addition, following mulching, all slopes of 3:1 or greater shall be covered with jute, biodegradable tobacco netting or approved equal. Securely stapled in place. Overlap all joints in netting a minimum of 6″.

K. Hydroseed mix: All work shall be installed using an approved spraying machine specifically used for this purpose. Amounts of fertilizer used shall be as the testing agency recommendations prescribe and as directed by the Owner’s Representative. The Contractor shall submit to the Owner’s Representative for approval prior to the start of any seeding work, a certified statement as to the number of pounds and types of fertilizer, amounts and types of grass seed and processed fiber per one hundred (100) gallons of water.

1. Hydromulch shall be Terra-Sorb GB or approved equal

a. Add Terra-Sorb to the hydroseed tank at the rate of sixty (60) pounds per acre.

3.4 EROSION CONTROL MATTING

A. Jute mesh shall be placed within 48 hours after finish grading or topsoiling of an area is completed. If seeding is specified, within 24 hours after seeding of an area is completed. The jute mesh shall be placed in a manner that will minimize disturbance of the underlying soil. All equipment and application processes shall be approved by the LANDSCAPE ARCHITECT prior to use.

B. The surface shall be smoothed and all gullies and potholes backfilled prior to applying jute mesh. All rocks or clods larger than two inches in size and all sticks and other foreign material that will prevent contact of the jute mesh with the surface shall be removed. If the surface is extremely dry, the ENGINEER may require watering prior to placement.

C. Jute mesh shall be placed uniformly, in contact with the underlying soil, at the locations shown on the Drawings or directed by the LANDSCAPE ARCHITECT. The top edge of each strip shall be anchored by placing a tight fold of mesh vertically in a six-inch-deep slot or trench in the soil and tamping and stapling in place. Edges of adjacent strips shall be lapped six inches with a row of staples at a maximum interval of three feet in the lapped area. Bottom edges shall be lapped 12 inches over the next lower strip, if applicable, or buried as specified for top edges.

D. Check slots shall consist of separate four foot strips of jute mesh placed at right angles to the direction of water flow immediately prior to placing the general covering of jute mesh. Check slots shall be anchored by burying the top edge of the strip as described above.

E. Check slots shall be spaced so that one check slot, or junction slot of the jute mesh occurs every 75 feet on gradients of less than 4% and every 50 feet on gradients of more than four percent. On slope drains, a check slot or an end slot shall occur every 25 feet unless otherwise specified.

F. Edges of jute mesh shall be buried around the edges of catch basins and other structures.

G. Jute mesh shall be held in place by wire staples driven vertically into the soil. The mesh shall be fastened at intervals not more than three feet apart in three rows for each strip of mesh, with one row along each edge and one row alternately spaced in the middle. All ends of the mesh and check slots shall be fastened at six inch intervals across their width.

H. The Contractor shall maintain the areas covered by jute mesh until final acceptance of the project. Prior to final acceptance, any damaged areas shall be reshaped as necessary, reseeded, if applicable; and the jute mesh satisfactorily repaired or replaced.

3.5 MAINTENANCE FOR SEEDED AREAS

A. Maintenance shall begin immediately after any area is seeded and shall continue until final acceptance, but in no case, less than the following period.

1. Sixty (60) days after substantial completion of seeding.

a. Maintenance may continue until the next growing season if in the opinion of the Owner’s Representative the season enters a winter dormancy and no maintenance should continue.

b. Seeded lawns shall be maintained until all areas have a close stand of grass which has received a minimum of three mowings, has no bare spots greater than two inches in diameter, and at least 90% of the grass established shall be permanent grass species.

B. Maintenance shall include reseeding, mowing, watering, weeding and fertilizing.

C. Watering of Seeded Areas:

1. First Week: The Contractor shall provide all labor and arrange for all watering necessary to establish an acceptable lawn. In the absence of an adequate rainfall, watering shall be performed daily or as often as necessary during the first week and in sufficient quantities to maintain moist soil to a depth of at least two inches.

2. Second and Subsequent Weeks: Water seeded areas as necessary to supplement natural rain to the equivalent of one (1) inch rainfall per week The Contractor shall water the lawn as required to maintain adequate moisture, in the upper two inches of soil, necessary for the promotion of deep root growth.

3. Watering shall be done in a manner, which will provide uniform coverage, prevent erosion due to application of excessive quantities over small areas, and prevent damage to the finished surface by the watering equipment. The Contractor shall furnish sufficient watering equipment to apply one complete coverage to the seeded areas in an eight (8) hour period.

D. Protection:

1. Seeded areas shall be protected by stakes and caution tape or snowfence as directed by the Landscape Architect. Wire shall not be used.

2. Barriers must be raised immediately after seeding and shall be maintained until acceptance.

E. Reseeding: After the grass in seeded areas has appeared, all areas and parts of areas which, in the opinion of the Owner's Representative, fail to show a uniform stand of grass, for any reason whatsoever, shall be reseeded and such areas and parts of areas shall be seeded repeatedly until all areas are covered with a satisfactory growth of grass. Reseeding together with necessary grading, fertilizing, and trimming shall be done at the expense of the Contractor.

F. Mowing:

1. At the time of the first cutting, there shall be a uniform stand between 3″ and 3½″ high, and mower blades shall be set between 2½″ and 3″ high.

2. Mowing shall include removal of clippings.

G. Fertilizing: A second application of fertilizer, as specified herein, shall be applied after one (1) season of growth of a minimum of two (2) months duration, but only during the months of April, May, August or September. Fertilizer shall be applied at the rate of thirty (30) pounds per one thousand (1,000) square feet.

H. Liming: If more than one initial application of limestone is required by the soils analysis to bring the pH of the stockpiled topsoil/loam borrow to a specified range, the Contractor shall be responsible for all additional required lime applications.

3.6 SODDING

A. SOD BASE PREPARATION

1. Personnel for lawn work shall be familiar with sodding and lawn construction and be under the constant supervision of a qualified foreman.

2. After acceptance of sub-base as prepared, the Contractor shall do whatever additional grading is necessary to bring the sub-base to a true smooth slope, parallel and six (6) inches below finished grade for all areas to be sodded.

3. The top four (4) inches of the sub-base immediately prior to being covered with topsoil shall be raked or otherwise loosened and shall be free from stones, rock, and other foreign material three (3) inches or greater in dimensions.

4. There shall be sufficient grade stakes as determined by the Landscape Architect to insure correct line and grade of sub-base and of finished grade.

5. Sub-base shall be inspected and approved by the Landscape Architect before placing of topsoil.

6. Topsoil shall be placed and spread over approved areas to a depth sufficiently greater than necessary for the required thickness so that after natural settlement and light rolling, the completed work will conform to the lines, grades and elevations indicated. Supply additional loam, after testing and approval as may be needed to give the specified depths and finished grades under the contract without additional cost to the Owner.

7. After topsoil has been spread, it shall be carefully prepared by scarifying or harrowing and band raking. All large still clods, lumps, brush, roots, stumps, litter and other foreign matter, and stones over one (1) inch in diameter shall be removed from the topsoil and also be free of smaller stones in excessive quantities as determined by the Landscape Architect.

B. SODDING

1. After the preparation of the areas to be sodded has been reviewed by the Landscape Architect, the Contractor shall sod the areas as specified herein.

2. In accordance with the rectangular sod strips measuring twelve (12) inches or sixteen (16) inches in width and from four (4) feet to six (6) feet in length the following provisions shall apply:

    a. All sod shall be placed with close joints and no overlapping by whatever method is chosen. Sod shall be laid in strips, edge to edge, with the lateral joints staggered. All minor or unavoidable openings in the sod shall be closed with sod plugs. However, sod laid with joints determined by the Landscape Architect to be too large shall be lifted and re-laid to the Landscape Architect’s satisfaction at no extra cost to the Owner. On slope areas exceeding twenty-five percent (25%) gradient, the Contractor shall secure sod by pegging each strip five (5) feet on center.

3. In accordance with the “Big Roll” method of furnishing and installing sod, the following provisions shall apply:

a. Only sod harvested with a "Big Roll" (Sod-O-Matic) harvester as supplied by the Tuckahoe Turf Farm or the Kingston Turf Farm, or equal, shall be permitted.

b. Sod so harvested shall be stored, delivered and unloaded while rolled on the manufacturer's specially made tubes which permit the rolling and storage of three (3) sixteen (16) inch wide sod strips, a maximum of fifty (50) feet in length and stored side by side.

c. The topsoil shall not be moist at the time of installation; however, it shall contain sufficient moisture so as not to be powdery or dusty, both as determined by the supplier's representative.

d. The sod shall be uniformly distributed over the prepared topsoil bed and pulled tightly against the edges of previously laid sections by laborers with garden rakes so as to insure tight joints and to prevent drying of the sod at the joints.

e. All sod shall be placed with close joints with no overlapping by whatever method is chosen. The overlapping of existing lawn with new sod along limit of work lines shall not be permitted. All new work shall abut existing lawn to match existing grades along a cut and prepared edge. Sod shall be laid in strips, edge to edge, with the lateral joints staggered. All minor or unavoidable openings in the sod shall be closed with sod plugs or with topsoil. However, sod laid with joints determined by the Landscape Architect to be too large shall be lifted and re-laid in accordance with these specifications at no extra cost to the Owner. On slope areas exceeding a twenty-five percent (25%) gradient, the Contractor shall secure sod by pegging each strip five (5) feet on center.

f. The sod must be watered on the same working day on which it is installed. If necessary, the Contractor shall provide special crews after normal working hours to accomplish such watering at no extra cost to the Owner. After this initial watering, the Contractor shall be required to provide or install and maintain a system of temporary pipe, sprinklers and service connections which are adequate to water the sod weekly with the equivalent of one (1) inch rainfall. During the first week of the sod installation, watering shall be accomplished daily with a sufficient quantity of water to penetrate through the sod and into the sub-base. If the sod is watered by normal rainfall or if weather conditions dictate, the Contractor may, at his discretion, eliminate or increase watering during a given week. However, such action by the Contractor shall in no way waive the Contractor's responsibility for the growth and health of the grass until final acceptance of the sodding.

g. If, in the opinion of the Landscape Architect, rolling of the sod is required to properly joint the sod to the bed after the sod is laid and twenty-four (24) to forty-eight (48) hours after initial watering, the Contractor shall roll the required area with a roller which weighs from seventy-five (75) to one hundred (100) pounds per square foot of roller width at no extra cost to the Owner.

h. The completed sodded surface shall be true to finish grades shown and even and firm at all points.

3.7 CLEANUP AND PROTECTION

A. During seeding work, keep pavements clean and work area in an orderly condition.

B. Protect seeding work and materials from damage due to landscape operations, operations by other Contractors or trades, and trespassers.

1. Maintain protection during installation and maintenance periods. Treat, repair, or replace damaged landscape work as directed.

3.8 ACCEPTANCE AND WARRANTY PERIOD OF SEEDED AREAS

A. The Owner Representative shall inspect all work for Acceptance upon written request of the Contractor. The request shall be received at least 10 calendar days before the anticipated date of inspection. Upon completion and re-inspection of all repairs or renewals necessary in the judgment of the Owner, he shall certify in writing to the Contractor as to the Acceptance of the work.

B. The 60 day mown lawn maintenance will commence after all necessary corrective work and clean-up has been completed at substantial completion, and the Landscape Architect has accepted the lawn areas.

C. Contractor shall request that the Owner's Representative inspect the seeded or sodded areas at the end of a one-year Warranty period provided by the contactor after acceptance. Contractor shall weed, re-seed, lime, apply disease or insect controls, water, fertilize, or resod as required to meet the requirements indicated above, and maintain repaired or refurbished lawns and seeded areas in the manner required and methods indicated above until establishment and acceptance of the corrected work.

3.9 ACCEPTANCE IN PART

A. The work may be accepted in parts when it is deemed to be in the Owner's best interest to do so and when approval is given to the Contractor in writing to complete the work in parts. Acceptance and use of such areas by the Owner shall not waive any other provisions of this Contract.

3.10 CLEANUP

A. When any of this work is done while buildings are occupied, pavements shall be kept clear at all times, broom cleaned to prevent tracking dirt into buildings.

B. After completion of all planting operations, dispose of all debris and excess material to the satisfaction of the Owner. All pavements shall be swept and hosed clean.

3.11 FINAL INSPECTION AND ACCEPTANCE

A. Upon written notice from the Contractor, the Owner's Representative shall review the work and make a determination if the work is substantially complete.

1. Notification shall be at least 10 days prior to the date the contractor is requesting the review.

B. The date of substantial completion of the planting shall be the date when the Owner's Representative accepts that all work in Turf and Grass sections is complete.

C. The Seeded Areas Warranty period begins at date of written notification of substantial completion from the Owner's Representative. The date of substantial completion may be different than the date of substantial completion for the other sections of the project.

3.12 MAINTENANCE FOR SODDED AREAS

A. Maintenance shall begin immediately after sod is installed and shall continue in accordance with the following:

1. Sod shall be maintained until final acceptance of the project or a minimum of eight weeks, whichever is longer.

2. In the event that lawn operations are completed too late in the fall for adequate growth of grass, maintenance shall continue into the following spring growing season at least eight weeks.

3. Water sodded areas as necessary to supplement natural rain to the equivalent of one (1) inch rainfall per week and as follows:

   a. Lawns shall be watered in a satisfactory manner during and immediately after installation and not less than twice per week, until acceptance.

   b. Suitable water for planting and maintenance of lawns shall be provided by the General Contractor.

   c. The Contractor shall furnish his own hose and hose connections from the outlets where water is furnished. Provide all necessary watering equipment.

   d. Adjust approved schedule to fit weather and soil conditions.

   e. Mow grass as required. Remove grass clippings.

   f. Apply specified fertilizer over entire lawn area after six (6) weeks at rate of fifteen (15) pounds per one thousand (1,000) square feet.

   g. Eliminate weeds by methods approved by the Landscape Architect; pre-emergent and post-emergent herbicides, EPA approved, are preferred.

   h. Repair bare spots and/or damage resulting from erosion, gullies, washouts, or other causes by filling with topsoil, tamping, re-fertilizing and re-sodding by the Contractor at his expense, if such damage occurs prior to acceptance. Sod shall be of same seed mixture as specified. If not weed-free, spraying shall be required.

4. At no time after the placement of the root-zone-mix or sod shall heavy equipment or vehicles not intended for the express purpose of turf maintenance be driven over the turf establishment area. If this occurs, sod shall be removed from the entire compacted area, the root-zone-mix shall be scarified, compacted to the specified compaction level, and sod shall be replaced as outlined in this section of the specifications at no cost to the owner.

3.13 CLEANUP AND PROTECTION

A. During seeding work, keep pavements clean and work area in an orderly condition.

B. Protect seeding work and materials from damage due to landscape operations, operations by other Contractors or trades, and trespassers.

1. Maintain protection during installation and maintenance periods. Treat, repair, or replace damaged landscape work as directed.

3.14 ACCEPTANCE

A. The Owner shall inspect all work for Acceptance upon written request of the Contractor. The request shall be received at least 10 calendar days before the anticipated date of inspection. Upon completion and re-inspection of all repairs or renewals necessary in the judgment of the Owner, he shall certify in writing to the Contractor as to the Acceptance of the work.

3.15 ACCEPTANCE IN PART

A. The work may be accepted in parts when it is deemed to be in the Owner's best interest to do so and when approval is given to the Contractor in writing to complete the work in parts. Acceptance and use of such areas by the Owner shall not waive any other provisions of this Contract.

3.16 CLEANUP

A. When any of this work is done while buildings are occupied, pavements shall be kept clear at all times, broom cleaned to prevent tracking dirt into buildings.

B. After completion of all planting operations, dispose of all debris and excess material to the satisfaction of the Owner. All pavements shall be swept and hosed clean.

3.17 FINAL INSPECTION AND ACCEPTANCE

A. At the end of the guarantee period, the Owner will inspect all guaranteed work for the Final Acceptance upon written request of the Contractor. The request shall be received at least 10 calendar days before the anticipated date for final inspection.

B. Upon completion and re-inspection of all repairs or renewals necessary in the judgment of the Owner at that time, he shall certify in writing to the Contractor as to the Final Acceptance of the project.

3.18

END OF SECTION