Division 31

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SECTION 310510
EARTHWORK

PART 1 GENERAL

1.01 SUMMARY

A. Excavating

B. Preparing Subgrade for Fill, Foundations, Pavement

C. Placing and Compacting Soil and Aggregate Fill, Drainage Course, Subbase, Base

D. Backfilling at Structures, Utilities and Appurtenances

E. Grading

1.02 REFERENCES

ASTM (American Society for Testing and Materials)

A. D 422 Particle Size Analysis for Soils

B. D 698 Laboratory Compaction Characteristics of Soil Using Standard Effort D 1241 Specification for Soil-Aggregate Subbase, Base and Surface Courses

C. D 2216 Moisture Content of Soil and Rock

D. D 2487 Classification of Soils for Engineering Purposes

E. D 2922 Density of Soil and Soil-Aggregate In Place by Nuclear Methods

F. D 2940 Graded Aggregate Material for Bases or Subbases for Highways or Airports

G. D 3017 Water Content of Soil and Rock In Place by Nuclear Methods

H. E 1643 Installation of Water Vapor Retarders Used in Contact with Earth or Granular Fill Under Concrete Slabs

I. OSHA (Occupational Safety and Health Administration) , 29 CFR Part 1926

1.04 DEFINITIONS

A. *Additional Excavation* is the removal and disposal of material encountered below the Subgrade elevation indicated on the Drawings as authorized in writing by the Engineer.

B. *Excavation* is the removal and disposal of material encountered above the Subgrade elevation indicated on the Drawings. Excavation also includes removal and disposal of hard, compacted or cemented material down to eight inches below the Subgrade Elevation indicated on the Drawings if required in the judgment of the Engineer.

C. *Fill* is Soil and Aggregate Material placed according to these Specifications to raise the subgrade elevation to the elevation indicated on the Drawings.

D. *Maximum Density* is the maximum dry density determined by ASTM D 698.

E. *Optimum Moisture Content* is the moisture content that corresponds to the Maximum Density.

F. *Rock* is all hard, compacted or cemented material that in the judgment of the Engineer requires blasting or cannot be ripped using a Cat 330 with a heavy-duty, single-tooth ripping attachment. Material identified as having standard penetration resistance, as determined by ASTM D1586, greater than 600 blows/ft is defined as "rock".

G. *Structure* is any building, foundation, slab, curb, utility or appurtenance permanently installed above or below the ground surface.

H. *Subgrade* is the undisturbed earth or compacted fill immediately below the drainage course, subbase, or topsoil.

I. *Unauthorized Excavation* is the removal or disposal of any material other than Excavation or Additional Excavation.

J. *Unsuitable* is material that does not comply with these specifications.

1.05 SUBMITTALS

A. Test Reports
   1. Classification of Soil and Aggregate Materials for each specified purpose
   2. Compaction Characteristics of Soil and Aggregate Materials for use as Fill
   3. In Place Density Determinations for Fill

B. Project Record Documents
   1. Plan drawing of final Subgrade and buried Structure elevations

1.06 QUALITY ASSURANCE

A. Qualifications
   1. Subject to Engineer approval

B. Regulatory Requirements
   1. Notify potential owners of Underground Utilities of Excavation Schedule at least three days prior to initial Earthwork or earlier if required by law.
   2. Perform all Excavation in accordance with Department of Labor, Occupational Health and Safety Administration Standards for Excavation - 29 CFR 1926

C. Pre-Installation Conference
   1. Coordinate with the Engineer at least one week prior to the initial Earthwork to confirm the receipt of Material samples and to present a schedule of Earthwork.

1.07 PROJECT/SITE CONDITIONS

A. Environmental Requirements
   1. Perform Earthwork only when air temperature is above 28°F.
   2. Perform Earthwork only when moisture conditions allow compliance with these specifications and do not promote deterioration of Subgrade or completed Work.
   3. Perform Earthwork only during the hours from sunrise to sunset except as otherwise

specified in writing by the Engineer

4. Perform Earthwork only when wind conditions do not cause Soil or Aggregate dust to leave the site of the Work.

B. Existing Conditions

1. Review the geotechnical exploration of the site.
2. Promptly and before such conditions are disturbed, notify the Owner in writing of subsurface or latent physical conditions at the site differing from those indicated in this contract, or unknown physical conditions at the site, of an unusual nature, differing materially from those ordinarily encountered and generally recognized as inherent work of the character provided for in this contract. The Owner shall investigate the conditions, and if he finds that such conditions do materially so differ and cause an increase or decrease in the contractor's cost of, or the time required for, performance of any of the work under this contract, whether or not as a result of those conditions, an equitable adjustment shall be made and the contract modified in writing accordingly. No claim of the contractor under this clause shall be allowed unless the contractor has given the notice required above. No claim by the contractor for an equitable adjustment shall be allowed if ascertained after final payment under this contract.

C. Field Measurements

1. Survey cross-sections prior to and following the completion of Work Items to compute any rock excavation quantities. (Load counts, Weight tickets or other material quantity estimates not based on surveyed cross sections will not be accepted as evidence of rock excavation quantities.) Survey cross-sections for general excavation shall be submitted for records, however, the quantity of these excavations are included as a lump sum item and will not affect the Contract Price.

PART 2 PRODUCTS

2.01 MATERIALS

A. Select Granular Fill: Stockpiled, sound, durable, sand, gravel, stone, or blends of these materials, free from organic and other deleterious materials. Comply with the gradation and material requirements specified below:

Sieve		**Percent Passing**
Sieve Size	**Size opening (mm)**	
2 inch	50.8	100
1/4 inch	6.35	30-65
No. 40	0.425	5-40
No. 200	0.075	0-10

1. Magnesium Sulfate Soundness Test: 20 percent maximum loss by weight after four test cycles.
2. Plasticity Index: The plasticity index of the material passing the No. 40 mesh sieve shall not exceed 5.0.
3. Elongated Particles: Not more than 30 percent, by weight, of the particles retained on a 1/2 inch sieve shall consist of flat or elongated particles. A flat or elongated particle is defined as one which has its greatest dimension more than three times its least dimension.

B. Subbase Course Type 2: Stockpiled, crushed ledge rock or approved blast furnace slag.

Comply with the gradation and material requirements specified below:

Sieve		Percent Passing
Sieve Size	**Size opening (mm)**	
2 inch	50.8	100
1/4 inch	6.35	25-60
No. 40	0.425	5-40
No. 200	0.075	0-10

1. Magnesium Sulfate Soundness Test: 20 percent maximum loss by weight after four test cycles.
2. Plasticity Index: The plasticity index of the material passing the No. 40 mesh sieve shall not exceed 5.0.
3. Elongated Particles: Not more than 30 percent, by weight, of the particles retained on a 1/2 inch sieve shall consist of flat or elongated particles. A flat or elongated particle is defined as one which has its greatest dimension more than three times its least dimension.

C. Selected Fill: Sound, durable, sand, gravel, stone, or blends of these materials, free from organic and other deleterious materials. Comply with the gradation requirements specified below:

Sieve		Percent Passing
Sieve Size	**Size opening (mm)**	
4 inch	101.6	100
No. 40	0.425	0-70
No. 200	0.075	0-15

D. Suitable Material (Fill and Backfill for Landscaped Areas): Material consisting of mineral soil (inorganic), blasted or broken rock and similar materials of natural or man-made origin, including mixtures thereof. Maximum particle size shall not exceed 2/3 of the specified layer thickness prior to compaction. NOTE: Material containing cinders, industrial waste, sludge, building rubble, land fill, muck, and peat shall be considered unsuitable for fill and backfill, except topsoil and organic silt may be used as suitable material in landscaped areas provided it is placed in the top layer of the subgrade surface.

E. Cushion Material: Shall consist of clean, hard, durable, uncoated particles, free from lumps of clay and all deleterious substances and shall meet the following gradation requirements:

Sieve Size		*Percent Passing*
Sieve Size	**Size opening (mm)**	
1/4 inch	6.35	100
No. 60	0.25	0-35
No. 100	0.15	0-10

F. Rip Rap: Fine, Light, Medium or Heavy Stone Filling that complies with DOT Article 620-2.02 for stone filling.

G. Pea Gravel: Comply with DOT Article 703-02 for screened gravel.

Sieve		*Percent Passing*
Sieve Size	**Size opening (mm)**	
1/2 inch	12.7	100
1/4 inch	6.35	90-100
1/8 inch	3.17	0-15
No. 200 Sieve	0.075	0-1

H. Pipe Bedding: Equal Blend of No.1 and No. 2 Crushed Stone that complies with material requirements of DOT Article 703-02, crushed stone only.

Sieve		*Percent Passing*
Sieve Size	**Size opening (mm)**	
1-1/2 inch	38.1	100
1 inch	25.4	95-100
½ inch	12.7	45-60
¼ inch	6.35	0-15

I. No. 1 Coarse Aggregate: Crushed Stone that complies with material requirements of DOT Article 703-02 and meets the following gradation.

Sieve		*Percent Passing*
Sieve Size	**Size opening (mm)**	
1 inch	25.4	100
1/2 inch	12.7	90-100
1/4 inch	6.35	0-15

J. No. 2 Coarse Aggregate: Crushed Stone that complies with material requirements of DOT Article 703-02 and meets the following gradation.

Sieve		*Percent Passing*
Sieve Size	**Size opening (mm)**	
1-1/2 inch	38.1	100
1 inch	25.4	90-100
1/2 inch	12.7	0-15

K. Warning Tape: FL Industries Blackburn/Holub's Type YT6, or Seton Nameplate Corporations Type 6 ELE, imprinted with message suited to item buried below.

2.02 GEOTECHNICAL FABRICS

A. Filter Fabric (GeoTextile)
1. Drainage and Erosion Control: Amoco 1199 & 2019, Maccaferri MacTex MX140 & MX155, Mirafi 140N & 160N, Fiberweave 403 & 404 or equivalent.
2. Separation for foundation drains, underdrains, undercuts: GeoTex 801, Contech Construction Products Inc. C-180, Synthetic Industries Geotex 250ST & 315ST, Mirafi Geolon HP570 & HP1500 or equivalent.
3. Separation/Stabilization beneath pavements: Amoco 4551, Bonded Fibers Products PN080, Maccaferri Gabions MacTex MX275 & 340, Mirafi 160N & 180N or equivalent.

PART 3 EXECUTION

3.01 EXCAVATION

A. Excavate Soil to the Subgrade Elevation indicated on the Drawings after clearing, grubbing and stripping topsoil.

B. If Rock, as defined in this Section and the specifications is encountered, excavate below the Subgrade Elevation indicated on the Drawings.

C. The unit price for rock excavation shall apply to all types of rock. There shall be no price adjustment based on the hardness or type of rock.

3.02 PREPARATION FOR STRUCTURES AND FILL

A. Protect structure foundation area from disturbance by heavy equipment traffic.

B. Establish temporary surface drainage improvements in conjunction with Erosion and Sediment Control Measures so that work areas do not impound water.

C. Proof roll subgrade after clearing, grubbing and stripping topsoil and before placing any fill using a completely loaded dump truck, or a fully ballasted rubber tired proof roller weighing at least 25 tons.

D. Proof roll in two perpendicular directions using two complete overlapping coverages of each part of the surface to receive a Structure or Fill.

E. Proof roll only under the observation of the Engineer or the representative designated by the Engineer.

F. Over-excavate any weak, soft or otherwise unsuitable areas that, in the sole judgment of the Engineer, do not adequately withstand proof rolling until adequate subgrade is achieved.

3.03 FILL PLACEMENT AND COMPACTION

A. Bench existing slopes steeper than one vertical to four horizontal so that nearly horizontal benches at least six inches deep at the cut side are created.

B. Scarify to a depth of at least six inches, moisture condition and recompact all existing surfaces to receive fill except as otherwise specified in writing by the Engineer.

C. Spread fill in nearly horizontal lifts no more than eight inches thick, loose measure (four inches maximum lift thickness for fill and backfill in confined areas to be compacted using equipment smaller than specified for areas 15 feet or more wide under section 2.02 A).

D. Moisture Condition the fill so that its actual moisture content is within two percentage points of the Optimum Moisture content.

E. Compact each lift of fill Material using at least three and as many additional complete, overlapping coverages by the Compaction Equipment as necessary to achieve an actual dry density of at least 98 percent of the (Standard Proctor) Maximum Dry Density.

F. Operate Compaction Equipment at a speed no greater than a slow walk and otherwise in accordance

with the manufacturers' recommendations for the characteristics of the Soil or Aggregate being used.

G. Cooperate with the Engineer as he observes the compaction process and performs in place density tests to measure the in place density of each compacted lift at a frequency of approximately one test per 2,000 square feet of surface area.

H. Scarify, moisture condition and recompact any zone of any lift that does not exhibit a density at least equal to that specified.

I. Place succeeding lifts, following these Specifications, only after the entire lift exhibits at least the specified density.

J. Remove and replace or scarify, moisture condition and recompact all fill which experiences saturation, desiccation, freezing or deterioration due to traffic.

K. Use alternative material or placement and compaction procedures if the fill is unstable, weaves under the tires or tracks of construction equipment or exhibits characteristics that would reasonably be expected to cause poor performance of the fill or supported structures.

3.04 GRADING

A. Place Fill to at least the elevation indicated on the Drawings.

B. Trim all cut and compacted surfaces to within 0.05 feet of the elevation indicated on the Drawings.

3.05 BACKFILL

A. Place Soil and Aggregate Materials for Backfill in lifts no less than three inches thick and no more than six inches thick, loose measure.

B. Place backfill on both sides of footings, buried walls and utilities so that there is no more than an eight inch difference in fill height on opposite sides of the structure.

C. Place backfill simultaneously with adjacent fill where practical to do so.

D. Use Compaction Equipment specified for areas less than 15 feet wide to compact backfill within six feet of structures.

3.06 DRAINAGE COURSE, SUBBASE, BASE

A. Place Soil and Aggregate Materials for Drainage Course, Subbase and Base in lifts no less than three inches thick and no more than six inches thick, loose measure.

B. Compact Soil and Aggregate Materials for Drainage Course, Subbase and Base using six complete, overlapping passes of the Compaction Equipment specified for the width of the zone being compacted.

C. Thoroughly moisten but do not saturate Base Material to receive Portland cement concrete footings, slabs and pavement immediately prior to concrete placement. Wherever a vapor barrier is used follow the requirements of the manufactures or at a minimum ASTM E 1643 for placement, protection, and repair of the vapor retarder (as needed).

D. Notify the Engineer at least 24 hours prior to the placement of any concrete footings or slabs and obtain his acknowledgment that the surface is prepared to receive concrete.

3.07 COHESIVE FILL

A. Place Soil Materials for Cohesive Fill in lifts no less than three inches thick and no more than six inches thick, loose measure. Place backfill on both sides of footings, buried walls and utilities so that there is no more than an eight inch difference in fill height on opposite sides of the structure

B. Place Soil Materials for Cohesive Fill around storm water management facilities in lifts no greater than six inches loose measure.

C. Compact each lift of Cohesive Fill Material using at least three and as many additional complete, overlapping coverages by the Compaction Equipment as necessary to achieve an actual dry density of at least 90 percent of the (Standard Proctor) Maximum Dry Density.

3.08 FIELD QUALITY CONTROL

A. Control quality of Work in progress and completed Work.

B. Contractor shall provide independent observation and testing services.

C. Cooperate with independent observation and testing services.

3.09 PROTECTION

A. Protect stockpiles from saturation by grading stockpile surfaces to drain and rolling those surfaces with a smooth drum roller, by covering stockpiles with plastic sheeting or other measures adequate to maintain the stockpiled material in a condition suitable for the intended use.

B. Protect fills in progress from saturation by maintaining a positive slope on the fill surface and by rolling the fill surface with a smooth drum roller at the end of each day of operation and whenever precipitation is predicted.

C. Protect footing Subgrade from saturation and physical disturbance by placing a lean concrete mudmat if adverse weather conditions are likely to occur. Note that this measure may not protect Subgrade from deterioration due to freezing.

END OF SECTION

SECTION 311000
SITE PREPARATION - CLEARING, GRUBBING, AND TOPSOIL REMOVAL

PART 1 GENERAL

1.01 SCOPE OF WORK

A. The CONTRACTOR shall furnish all labor, materials, tools, supervision, transportation, installation equipment, and incidentals necessary to complete the work specified herein and shown on the Drawings. The work shall include, but not be limited to:
   1. Clearing and grubbing the limits shown on the Drawings of trees, tree roots, brush, and incidental debris in the limits required for construction;
   2. Chipping all cleared brush and small trees;
   3. Stripping topsoil from work areas;
   4. Transporting the topsoil to stockpiles at locations approved by the OWNER
   5. Stabilizing the topsoil stockpiles.

1.02 DEFINITIONS

A. Structures and Surface Features: Existing structures and surface features including signs, posts, fences, trees, shrubs, landscaped surface features, and other miscellaneous items.

B. Utilities: Existing gas mains, water mains, steam lines, electric lines and conduits, telephone and other communication lines and conduits, sewer pipe, cable television, other utilities, and appurtenances.

C. Clearing and Grubbing: Cutting and disposing of trees, brush, windfalls, logs, and other vegetation, and removing and disposing of roots, stumps, stubs, grubs, logs, and other timber.

D. Salvaged Topsoil: Natural loam, sandy loam, silt loam, silty clay loam, or clay loam humus-bearing soils available from overlying portions of areas to be excavated for construction.

E. Hard Fill: Crushed concrete, block, brick and inert materials resulting from demolition. Hard fill does not include wood, gypsum wall board, or putrescible material of any type.

PART 2 PRODUCTS

2.01 MATERIALS

A. Materials to be cleared and grubbed include trees, roots, shrubs, and any debris or other foreign matter that is neither topsoil nor suitable for backfill, as determined by the Engineer.

B. Topsoil shall be that of surface material consisting of organic soils that typically occurs at the site to a depth of approximately 4 inches beneath ground surface.

PART 3 EXECUTION

3.01 PREPARATION

A. Provide three (3) working days notice to owners of existing utilities, structures, and surface features prior to beginning construction.

B. Provide protection and support during construction for existing utilities, structures, and surface features.

C. Remove obstructions such as mounds of dirt, stone or debris located within limits of construction. Obstructions such as culverts, end walls, signs, fencing, etc., may be removed if replaced when need for removal is completed. Replace to original condition.

3.02 CLEARING AND GRUBBING

A. Clearing and grubbing shall only be performed in areas identified within the limits of disturbance on the Drawings and as directed and approved by the OWNER. Appropriate erosion and sedimentation controls shall be in place before the start of clearing.

B. Do not remove or cut down trees unless located within limits of excavation as indicated on Drawings. Obtain ENGINEER's approval for all shrubs and trees to be removed.

C. Do not trim trees unless located within easements or rights-of-way shown on Drawings. Cut interfering tree roots and branches 1 in. or greater in diameter perpendicular to direction of growth on tree side of trench.

D. If weather conditions are unsuitable for clearing and grubbing, as determined by the OWNER, CONTRACTOR shall cease operations until permission to resume operations is obtained from the OWNER.

E. The CONTRACTOR shall clear and maintain all areas required for access to and execution of work.

F. Grubbing shall consist of the removal and disposal of stumps, roots, and debris from the work area(s) as shown on the Drawings. The CONTRACTOR shall remove grubbed material from the site. Dispose of materials removed by clearing and grubbing in accordance with applicable Local, State and Federal regulations.

G. The CONTRACTOR shall protect all existing structures and all utilities which are to remain. CONTRACTOR shall be liable for any and all damages caused by clearing and grubbing operations.

3.03 TOPSOIL REMOVAL

A. Topsoil may be removed from the areas within the limits of disturbance as indicated on the Drawings upon request by the CONTRACTOR and approval by the Engineer. The depth of topsoil removal shall be determined by CONTRACTOR conducted testing and evaluation of the soils encountered and approved by the Engineer.

B. Before stripping or removing topsoil, the CONTRACTOR shall mow or otherwise remove all heavy grass, weeds, or other vegetation over areas from which topsoil is to be removed. The Engineer shall determine whether excessive vegetation is present prior to any stripping operations. Appropriate erosion and sedimentation controls shall be in place before the start of topsoil removal.

C. Equipment and methods of operation employed shall be chosen with the intent of avoiding lifting subsoil or other unsuitable material.

D. Strip stockpile areas of vegetation prior to stockpiling.

E. Stripped topsoil shall be free from clay, stones, vegetation, and debris.

3.04 TOPSOIL STOCKPILING

A. The CONTRACTOR shall keep topsoil separate from other excavated materials. Topsoil shall be completely removed to the required depth from the designated area before beginning excavation or fill placement work in the area. Topsoil shall not be removed to a depth greater than directed by the Engineer.

B. Topsoil shall be stockpiled on well drained land in an area identified by CONTRACTOR and acceptable to the OWNER. Topsoil shall be placed in stockpiles of neat conformations and having side slopes no steeper than 4H:1V. The surface of each topsoil stockpile shall be shaped and tracked at the end of each working day.

C. The topsoil stockpiles shall be isolated by surrounding them with silt fence.

3.06 EXCESS MATERIAL

A. The CONTRACTOR shall at the CONTRACTOR’s expense:

1. Stockpile excavated material suitable for backfill on site.
2. Place material as ordered by ENGINEER on-site.
3. Remove material not required by OWNER from the Site and provide for proper disposal meeting all Local, State, and Federal regulations.

END OF SECTION

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SECTION 312500
VEGETATIVE MEASURES FOR EROSION AND SEDIMENT CONTROL

PART 1 GENERAL

1.01 SCOPE OF WORK

A. The Contractor shall furnish all labor, materials, tools, supervision, transportation, installation equipment, and incidentals required to provide vegetative measures for erosion and sediment control. Work will include applying fertilizer, applying seed and mulch and maintaining all seeded areas as specified herein and as shown on the Drawings.

B. The work shall include fertilizing, seeding and mulching for those areas shown on the Drawings and all areas disturbed by the Contractor. This Specification assumes that the method of seeding will be hydroseed. Alternative methods of seeding may be used based on prior approval of the Owner.

C. Contractor's schedule for seeding and mulching shall be sequenced such that seeding is completed in time to provide maximum growth during this construction season.

1.02 REFERENCE STANDARDS

A. All work for this section shall be performed in strict accordance with "New York State Standards and Specifications for Erosion and Sediment Control", NYSDEC, August 2005 or most recent edition, (i.e., Standards). The Standards are incorporated herein by reference.

1.03 SUBMITTALS

A. Topsoil borrow source name/address and pre-qualification analysis, if off-site material is required.
B. Manufacturer's Certificate of Compliance for seed and fertilizer mixtures
C. Procedure for applying vegetative stabilization
D. Wood cellulose fiber contents and manufacturer name
E. Seeding and Fertilizing Schedule

PART 2 PRODUCTS

2.01 MATERIALS

A. Off-Site Topsoil

1. Topsoil shall be of high quality containing approximately 1/3 humus, 1/3 sand and 1/3 loam.
2. Topsoil shall have at least 20 percent fine textured material (passing the No. 200 sieve) and not more than 15 percent clay.
3. Topsoil treated with soil sterilants, pesticides, insecticides or herbicides shall not be used.
4. Topsoil shall be relatively free of stones over 1-1/2 inches diameter, trash, noxious weeds such as nutsedge and quackgrass, and will have less than 10 percent gravel by volume.
5. Topsoil containing soluble salts greater than 500 ppm shall not be used.
6. Furnished topsoil shall be fertile, friable, natural topsoil typical of the topsoil of the locality, and shall be obtained from a well-drained site that is free of flooding and from which no topsoil has previously been stripped. The area from which topsoil is to be taken shall possess

such uniformity of soil, depth, color, and other characteristics to offer assurance that when removed in commercial quantities that the soil shall be homogeneous in nature and shall meet the requirements of this Section. Topsoil shall not be delivered to the site or used while in a frozen or muddy condition. Topsoil as delivered to the site shall have a pH between 6.0 and 7.6. Lime shall be applied and incorporated with the topsoil as indicated by testing and as directed by the Owner before the topsoil is delivered to the working area.

B. Fertilizer

1. Fertilizer shall be standard commercial grade fertilizer meeting the requirements of all State and Federal regulations and standards of the Association of Office Agricultural Chemists. Fertilizer shall be delivered to the site in original, properly labeled, unopened, clean, containers each showing the manufacturer's guaranteed analysis conforming to applicable fertilizer regulations and standards. Fertilizer shall be 10-10-10, unless otherwise approved by the Owner or specified in the Contract Documents.

C. Seed

1. Seed shall be labeled in accordance with USDA Rules and Regulations under the Federal Seed Act and applicable State seed laws. Seed shall be furnished in sealed bags or containers bearing the date of the last germination, which date shall be within a period of 6 months prior to commencement of seeding operations. No seed shall be used unless properly labeled and no seed shall be used after its date of expiration. Seed shall be from same or from the previous year's crop; each variety of seed shall have a purity of not less than 85%, a percentage of germination not less than 80%, shall have a weed seed content of not more than 1% and contain no noxious weeds. The above percentages are by weight.
2. Except where noted on plans, the seed shall be furnished and delivered premixed pursuant to the Mix # 6 in the “New York State Standards and Specifications for Erosion and Sediment Control” (NYSDEC, August 2005 or most recent edition) specification for Permanent Critical Area Plantings or other applicable seed mixture specified in the NYSDEC “Permanent Critical Area Plantings” specification. A manufacturer's certificate of compliance to the specified mixes shall be submitted by the manufacturer for each seed mix. These certificates shall include the guaranteed percentages of purity for each type of seed in the mix, weed content, and germination of the seed, and also the net weight and date of shipment. No seed may be sown until the Contractor has submitted the certificates.

D. Mulch

1. Mulch shall comply with the “New York State Standards and Specifications for Erosion and Sediment Control” (NYSDEC, August 2005 or most recent edition) specification for Mulching.
2. Mulches shall not contain sticks larger than 1/4-inch diameter or other materials that could prevent matting during application. No mulch shall be used within 48 hours after cutting. Mulch shall be free from mold and other objectionable material and shall be in an air-dry condition suitable for placing with mulch blower equipment.
3. Wood fiber mulch for anchoring shall be wood cellulose processed into a uniform fibrous physical state. Wood cellulose fiber shall contain a green dye that will provide easy visual inspection for uniformity of the slurry spread. The wood cellulose fiber, including dye, shall contain no growth or germination-inhibiting properties. It shall be manufactured in such a manner that, after addition and agitation in slurry tanks with water, the fibers in the material

become uniformly suspended to form a homogeneous material. When sprayed over straw mulch, the material shall allow absorption and percolation of moisture. The manufacturer shall submit a certificate that the wood cellulose fiber meets the following requirements:

Quantity	Specification Limit
Particle Length	0.375 inch maximum
Particle Thickness	0.047 inch maximum
Net Dry Weight Content	minimum stated on bag
pH	4.0 to 8.5

Quantity	Specification Limit
Ash Content	1.6% maximum
Water Holding Capacity	90% minimum

The material shall be delivered in packages of uniform weight and bear the name of the manufacturer, the net weight, and a supplemental statement of net weight content.

4. Alternative mulches and anchoring materials meeting the requirements of the New York Standards and Specifications are acceptable, subject to approval by the Owner.

PART 3 EXECUTION

3.01 APPLICATION

A. For all areas to be permanently seeded, the following steps shall be implemented.

1. Topsoil shall be applied as specified in 3.02(A), below.
2. Fertilizer shall be applied at a minimum rate of 600 pounds per acre. Fertilizer shall be disced into topsoil surfaces to a depth of 3 to 5 inches.
3. Mulch will be applied at the rates specified in the "New York State Standards and Specifications for Erosion and Sediment Control" (NYSDEC, August 2005 or most recent edition) specification for Mulching. Also, lime will be applied, if needed, at the rates determined by the Owner based on results of soils tests.
4. As an alternative to seeding and mulching, hydroseeding may be performed using mixture of seed/fertilizer (at previously defined application rates) and wood fiber cellulose (at a rate of 2000 pounds per acre). The wood cellulose fiber shall be mixed with water at a maximum rate of 50 pounds of wood cellulose fiber per 100 gallons. The Contractor is responsible for cleaning all structures and paved areas of unwanted deposits of the hydroseed mixture.

B. For all areas to be temporarily seeded, the same steps shall be implemented except that neither topsoil nor fertilizer shall be used, unless otherwise approved by the Engineer.

3.02 INSTALLATION

A. Where topsoil is required, it shall be applied as follows.

1. The Contractor shall maintain previously established elevations and grades, as shown on the Drawings in a true and even condition.

2. The subgrade shall be raked and all rubbish, sticks, roots, and stones larger than 6 inches shall
be removed. Subgrade surfaces shall be raked or otherwise loosened immediately prior to being covered with topsoil. Before placement of topsoil, all construction work in the immediate area shall have been completed.

3. Topsoil shall be uniformly placed over approved areas and lightly rolled. No topsoil shall be spread in water or while frozen or muddy.

4. Lime shall be applied to topsoil in a preparation area at the rates indicated by soil testing to bring the topsoil pH to a range of 6.0 to 7.6. Lime may not be mixed with fertilizer for application Lime shall be mixed/spread evenly throughout the topsoil.

5. After topsoil has been spread, it shall be carefully prepared by scarifying or harrowing and hand raking. All stiff clods, lumps, roots, litter and other foreign material shall be removed from the area and disposed of by the Contractor. During the preparation efforts, all depressions caused by settlement or debris removal voids shall be filled with additional topsoil and the surface shall be regraded until a smooth and even finished grade is created.

6. The Contractor shall maintain the specified depth of topsoil from the time it is placed until seeding and securing of the mulch are completed.

B. No seeding shall be done on frozen ground or when the temperature is 32°F or lower. Schedules for seeding and fertilizing must be submitted to the Owner for approval prior to beginning the work. Seeding shall be done within twenty-four hours following soil preparation. Mulch materials shall be applied on seeded areas immediately after seeding.

C. Before seeding, all gullies, washes, or disturbed areas that develop subsequent to final dressing of topsoil shall be repaired. All areas shall be loosened by discing, harrowing, or other approved methods immediately prior to seeding. For areas flatter than 3 horizontal:1 vertical (3:1), the topsoil shall be loosened to a depth of 3 inches. For areas 3:1 and steeper, the topsoil shall be loosened to a depth of 1 inch.

D. In order to prevent unnecessary erosion of newly topsoiled and graded slopes and unnecessary siltation of drainage ways, the Contractor shall develop a seeding schedule such that temporary or permanent seeding and mulching in disturbed areas that are not under active excavation will completed as soon as practicable in areas of the site where stabilization has temporarily or permanently ceased, but in no case more than 14 days after the construction activity in that portion of the site has temporarily or permanently ceased, unless earth-disturbing activities will be resumed within twenty-one days. Exceptions include slopes greater than 10 percent and wetland areas, which will be stabilized within one-work day following cessation of activity. When protection of newly topsoiled and graded areas is necessary at a time which is outside of the normal seeding seasons, the Contractor shall protect those areas by whatever means necessary, as approved by the Owner, and shall be responsible for prevention of siltation in the areas beyond the limit of work.

E. All utility line trenches will be backfilled at the end of each workday.

3.03 MAINTENANCE, AND PROVISIONAL ACCEPTANCE

A. The Contractor shall keep all seeded areas watered and in good condition, reseeding all seeded areas if and when necessary until a good, healthy, uniform growth is established over the entire area seeded. The Contractor shall maintain all temporarily seeded areas in an approved condition throughout the project and shall maintain permanently seeded areas for a period of one calendar year after the date of Owner's acceptance of the work.

B. The permanently seeded and fertilizer areas will be inspected to verify that the grass has successfully been established based on the following criteria.

1. No bare spots exist larger than one square foot.
2. No more than 5 percent of total area has bare spots.
3. Any areas not meeting these criteria shall be reseeded and/or refertilized by the Contractor at no extra cost to the Owner until all seeded areas meet these criteria.

END OF SECTION

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SECTION 312510
STRUCTURAL MEASURES FOR EROSION AND SEDIMENT CONTROL

PART 1 GENERAL

1.01 SCOPE OF WORK

A. The Contractor shall furnish all labor, materials, tools, supervision, transportation, installation equipment, and incidentals required to provide structural measures for erosion and sediment control during and upon completion of construction as specified herein and as shown on the Drawings.

B. The work shall include construction and maintenance of temporary and permanent erosion control structures for those areas shown on the Drawings and all areas disturbed by the Contractor. The work will include, but is not necessarily limited to installation and maintenance of the following structural measures:

1. silt fencing
2. stone check dams
3. culvert inlet protection
4. Erosion control blankets (temporary and permanent)
5. stone & block drop inlet protection
6. curb drop inlet protection
7. grate filters (inlet)
8. HDPE culvert inlet protection
9. Combo silt fence/check dam inlet protection

C. Contractor is responsible to control all run-off from the work areas

1.02 REFERENCE STANDARDS

A. All work for this section shall be performed in strict accordance with "New York State Standards and Specifications for Erosion and Sediment Control", NYSDEC, August 2005 or most recent edition, (i.e., Standards). The Standards are incorporated herein by reference.

B. Selected materials specified in Section 2.01 below shall meet the material requirements of the "New York State Standards and Specifications for Erosion and Sediment Control", NYSDEC, August 2005 or most recent edition.

PART 2 PRODUCTS

2.01 MATERIALS

A. Silt Fence Fabric

1. Silt fence fabric shall be woven and consist of monofilaments of polypropylene treated with ultraviolet light stabilizers. The fabric shall have sleeves through which either steel or 2-inch square wood posts can be inserted.
2. Silt fence fabric shall be inert to chemicals commonly found in soils and to hydrocarbons.
3. Silt fence fabric shall be resistant to mildew, rot, insects, and rodent attack.
4. Silt fence fabric shall conform to the following test criteria:

Property	Unit	Test Method	Minimum Accepted Value
Grab Strength	lbs	ASTM D 1682	90
Elongation at Failure	%	ASTM D 1682	50 (max.)
Mullen Burst Strength	psi	ASTM D 3786	200 (min)
AOS	U.S. Sieve No.	ASTM D 4751	60 - 80
Ultraviolet Stability	%	ASTM D 4355	90
Puncture Strength	lbs	ASTM D 4833	100
Slurry Flow Rate	gal/min/sq.ft	ASTM D 4151	0.3

B. Silt Fence Posts

1. Wood shall be composed of sound quality hardwood with a minimal cross section area of 3.0 square inches.
2. Wood posts shall be a minimum of 36 inches.
3. Steel posts shall be standard T & V section weighing not less than 1.00 pound/linear foot.

C. Check Dams

1. Height shall not greater than two (2) feet. Center shall be maintained nine (9) inches lower than abutments at natural ground elevation.
2. The check dams shall be spaced as necessary in the channel so that the crest of the downstream dam is at the elevation of the toe of the upstream dam.
3. Stone Size: use graded stone 2 to 15 inches in size. NYSDOT Light Stone Fill meets these requirements.

D. Erosion Control Blankets

1. Temporary biodegradable erosion control blankets for slopes 1:1 and greater shall be North American Green C125BN or equivalent or as specified in the Stormwater Pollution Prevention Plan
2. Temporary biodegradable erosion control blankets for slopes 3:1 and 2:1 shall be North American Green S150 or equivalent or as specified in the Stormwater Pollution Prevention Plan.

2.02 QUALITY CONTROL

A. Contractor shall provide manufacturer's certificates for Silt Fence.

PART 3 EXECUTION

3.01 SILT FENCE

A. Silt fence shall be installed as shown on the Drawings, in the locations shown on the Drawings and down slope of any area before disturbance by construction activities. As shown on the Drawings, the silt fence fabric panels shall be installed loosely with adjacent panels overlapped a minimum of 12 inches. Silt fence material shall be embedded at least 6 in.

beneath ground surface and shall extend upward at least 16 in. above the disturbed area ground surface. The top edge of the fabric shall be reinforced or shall have a 1 inch tuck.

B. Accumulated silt and debris shall be removed by the Contractor from behind the face of the silt fence when the silt deposits reach approximately one third the height of the fence. Clogged or damaged fabric shall be immediately replaced.

3.02 CHECK DAM MAINTENANCE

A. The check dams should be inspected after each runoff event. Correct all damage immediately. If significant erosion has occurred between structures a liner of stone or other suitable material should be installed in that portion of the channel.

B. Remove sediment accumulated behind dam as needed to allow channel to drain though the stone check dam and prevent large flows from carrying sediment over the dam, replace stones as needed to maintain the design cross section of the structures.

3.03 EROSION CONTROL BLANKETS

A. Installed pursuant to manufactures recommendations.

3.04 INLET PROTECTION

A. The inlet protection structure should be inspected after each runoff event. Correct all damage immediately.

B. Remove sediment accumulated behind the inlet protection structure as needed. Replace stones as needed. Check materials for proper anchorage and secure as necessary.

3.06 PROVISIONS FOR EROSION CONTROL DURING CONSTRUCTION

A. Contractor shall implement erosion control measures around all areas to be disturbed prior to disturbing ground in the area, to the satisfaction of the Owner. The Engineer will routinely inspect erosion control structures to confirm that Contractor is maintaining these features.

B. The Contractor shall take sufficient precautions during construction to minimize the run-off of polluting substances such as silt, clay, wastes, fuels, oils, bitumens, and calcium chloride into surface waters. Special precautions shall be taken in the use of construction equipment to prevent operations that promote erosion.

C. The temporary drainage ditches, silt fences, and other erosion and sedimentation control features shall be maintained in the locations shown on the Drawings and at other incidental locations identified by the Owner or Engineer.

D. Disposal of drainage from the site shall be at a location approved by the Owner. Under no circumstances whatsoever shall drainage be pumped, discharged, or otherwise allowed to leave the site until silt and other sedimentary materials have been removed according to the erosion and sediment control measures described in these specifications. Particular care shall be taken to prevent the discharge of unsuitable drainage to wetland areas.

SECTION 312510
STRUCTURAL MEASURES FOR EROSION AND SEDIMENT CONTROL

END OF SECTION

SECTION 315000 - EXCAVATION SUPPORT AND PROTECTION

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

A. Section includes temporary excavation support and protection systems.

1.3 PREINSTALLATION MEETINGS

A. Preinstallation Conference: Conduct conference at project site.

1. Review geotechnical report.
2. Review existing utilities and subsurface conditions.
3. Review coordination for interruption, shutoff, capping, and continuation of utility services.
4. Review proposed excavations.
5. Review proposed equipment.
6. Review monitoring of excavation support and protection system.
7. Review coordination with waterproofing.
8. Review abandonment or removal of excavation support and protection system.

1.4 ACTION SUBMITTALS

A. Product Data: For each type of product.

1. Include construction details, material descriptions, performance properties, and dimensions of individual components and profiles, and calculations for excavation support and protection system.

B. Shop Drawings: For excavation support and protection system, prepared by or under the supervision of a qualified professional engineer.

1. Include plans, elevations, sections, and details.
2. Show arrangement, locations, and details of soldier piles, piling, lagging, tiebacks, bracing, and other components of excavation support and protection system according to engineering design.
3. Indicate type and location of waterproofing.
4. Include a written plan for excavation support and protection, including sequence of construction of support and protection coordinated with progress of excavation.

1.5 FIELD CONDITIONS

A. Interruption of Existing Utilities: Do not interrupt any utility serving facilities occupied by Owner or others unless permitted under the following conditions and then only after arranging to provide temporary utility according to requirements indicated:

1. Notify Engineer no fewer than two days in advance of proposed interruption of utility.
2. Do not proceed with interruption of utility without Engineer's written permission.

B. Project-Site Information: A geotechnical report has been prepared for this Project and is available for information only. The opinions expressed in this report are those of a geotechnical engineer and represent interpretations of subsoil conditions, tests, and results of analyses conducted by a geotechnical engineer. Owner is not responsible for interpretations or conclusions drawn from the data.

1. Make additional test borings and conduct other exploratory operations necessary for excavation support and protection according to the performance requirements.
2. The geotechnical report is included elsewhere in Project Manual.

PART 2 - PRODUCTS

2.1 PERFORMANCE REQUIREMENTS

A. Provide, monitor, and maintain excavation support and protection system capable of supporting excavation sidewalls and of resisting earth and hydrostatic pressures and superimposed and construction loads.

1. Contractor Design: Design excavation support and protection system, including comprehensive engineering analysis by a qualified professional engineer.
2. Prevent surface water from entering excavations by grading, dikes, or other means.
3. Install excavation support and protection systems without damaging existing buildings, structures, and site improvements adjacent to excavation.
4. Continuously monitor vibrations, settlements, and movements to ensure stability of excavations and constructed slopes and to ensure that damage to permanent structures is prevented.

2.2 MATERIALS

A. General: Provide materials that are either new or in serviceable condition.

B. Structural Steel: ASTM A 36/A 36M, ASTM A 690/A 690M, or ASTM A 992/A 992M.

C. Steel Sheet Piling: ASTM A 328/A 328M, ASTM A 572/A 572M, or ASTM A 690/A 690M; with continuous interlocks.

D. Cast-in-Place Concrete: ACI 301, of compressive strength required for application.

E. Reinforcing Bars: ASTM A 615/A 615M, Grade 60 (Grade 420), deformed.

F. Tiebacks: Steel bars, ASTM A 722/A 722M.

PART 3 - EXECUTION

3.1 PREPARATION

A. Protect structures, utilities, sidewalks, pavements, and other facilities from damage caused by settlement, lateral movement, undermining, washout, and other hazards that could develop during excavation support and protection system operations.

1. Shore, support, and protect utilities encountered.

B. Install excavation support and protection systems to ensure minimum interference with roads, streets, walks, and other adjacent occupied and used facilities.

1. Do not close or obstruct streets, walks, or other adjacent occupied or used facilities without permission from Owner and authorities having jurisdiction. Provide alternate routes around closed or obstructed traffic ways if required by authorities having jurisdiction.

C. Locate excavation support and protection systems clear of permanent construction so that construction and finishing of other work is not impeded.

3.2 SOLDIER PILES AND LAGGING

A. Install steel soldier piles before starting excavation. Extend soldier piles below excavation grade level to depths adequate to prevent lateral movement. Space soldier piles at regular intervals not to exceed allowable flexural strength of wood lagging. Accurately align exposed faces of flanges to vary not more than 2 inches from a horizontal line and not more than 1:120 out of vertical alignment.

B. Install wood lagging within flanges of soldier piles as excavation proceeds. Trim excavation as required to install lagging. Fill voids behind lagging with soil, and compact.

C. Install wales horizontally at locations indicated on Drawings and secure to soldier piles.

3.3 SHEET PILING

A. Before starting excavation, install one-piece sheet piling lengths and tightly interlock vertical edges to form a continuous barrier.

B. Accurately place the piling, using templates and guide frames unless otherwise recommended in writing by the sheet piling manufacturer. Limit vertical offset of adjacent sheet piling to 60 inches. Accurately align exposed faces of sheet piling to vary not more than 2 inches from a horizontal line and not more than 1:120 out of vertical alignment.

C. Cut tops of sheet piling to uniform elevation at top of excavation.

3.4 TIEBACKS

A. Drill, install, grout, and tension tiebacks.

B. Test load-carrying capacity of each tieback and replace and retest deficient tiebacks.

1. Have test loading observed by a qualified professional engineer responsible for design of excavation support and protection system.

C. Maintain tiebacks in place until permanent construction is able to withstand lateral earth and hydrostatic pressures.

3.5 BRACING

A. Bracing: Locate bracing to clear columns, floor framing construction, and other permanent work. If necessary to move brace, install new bracing before removing original brace.

1. Do not place bracing where it will be cast into or included in permanent concrete work unless otherwise approved by Architect.
2. Install internal bracing if required to prevent spreading or distortion of braced frames.
3. Maintain bracing until structural elements are supported by other bracing or until permanent construction is able to withstand lateral earth and hydrostatic pressures.

3.6 FIELD QUALITY CONTROL

A. Promptly correct detected bulges, breakage, or other evidence of movement to ensure that excavation support and protection system remains stable.

B. Promptly repair damages to adjacent facilities caused by installation or faulty performance of excavation support and protection systems.

3.7 REMOVAL AND REPAIRS

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

1. Remove excavation support and protection systems to a minimum depth of 48 inches below overlying construction and abandon remainder.
2. Fill voids immediately with approved backfill compacted to density specified in Section 312000 "Earth Moving."
3. Repair or replace, as approved by Architect, adjacent work damaged or displaced by removing excavation support and protection systems.

END OF SECTION