

SECTION 31 12 00 - SITE CLEARING

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of Contract, including General and Supplementary Conditions and Division 01 Specification sections, apply to work of this section.

1.2 SECTION INCLUDES

- A. Provide site clearing, within contract limits, or within other limits if indicated, including:
 - 1. Clearing, removing and disposing of surface features in conflict with new construction.
 - 2. Protection of existing landscape features and improvements to remain.
 - 3. Removal of vegetation.
 - 4. Clearing and grubbing.
 - 5. Removal of at-grade and above-grade improvements including but not limited to: signs, fences, trees, shrubs, poles, lighting, miscellaneous equipment, and other site amenities within the scope of construction.
 - 6. Re-install site amenities indicated on the drawings to be temporarily removed and/or relocated. Consult with the Owner first to determine the desired location for the re-installation.
- B. Installation of temporary 6' high construction fencing around all construction areas. The exact location and quantity shall be verified by the Owner. The installation of temporary construction fence is further explained in section 024120.
- C. Cleaning sediment and debris from the existing storm sewer system as further defined herein.

1.3 RELATED SECTIONS

- A. Section 02 41 20: Selective Site Demolition

PART 2 – PRODUCTS

2.1 TEMPORARY CONSTRUCTION FENCE

- A. Furnish and install temporary metal construction security fence, 6 feet high, with lockable access gates at appropriate locations that facilitate work and site access. An exact quantity is not provided. As a minimum, the Contractor shall provide enough temporary construction fencing to encompass the entire limit of disturbance as noted on the Soil Erosion & Sediment Control Plan. All active work areas shall be fenced to prevent public access until such time as all surfaces are restored to a safe and uniformly graded condition. See section 024120 for additional information.

PART 3 - EXECUTION

3.1 GENERAL

- A. Comply with governing Soil Erosion and Sediment Control Standards.
- B. Provide site clearing, within contract limits, or within other limits if indicated, including:
 - 1. Protection of existing trees, shrubs and other landscape features and improvements to remain.
 - 2. Removal of vegetation.
 - 3. Topsoil stripping and stockpiling.
 - 4. Clearing and grubbing of vegetation.
 - 5. Removal of at-grade and above-grade improvements including but not limited to: signs, fences, pavements, curbing, concrete walkways, trees, shrubs, miscellaneous equipment, and other site amenities within the scope of construction.
 - 6. Cleaning of existing surfaces at the completion of work and as required to adhere to dust control and OSHA safety requirements.
 - 7. Cleaning sediment and debris from all storm sewers located within the construction area and downstream to the nearest outfall, or public sewer main (whichever is closer).
 - 8. Re-install site amenities indicated on the drawings to be temporarily removed and/or relocated. Consult with the Owner first to determine the desired location for the re-installation.
 - 9. Sweep and clean all existing pavement areas within the scope of work to remove sand, gravel, and broken pavement pieces.
- C. Remove all waste materials cleared from the site and dispose of in a legal manner off-site.
- D. Install temporary 6 foot high construction security fencing around all work areas. The exact location and quantity of fencing shall be dictated by the Owner. See Section 02 41 19.

3.2 PROTECTION OF EXISTING IMPROVEMENTS

- A. Provide barricades, covering, or other types of protections necessary to prevent damage to existing improvements indicated to remain in place.
- B. Restore damaged improvements to their same condition as at start of work, as acceptable to Owner of damaged improvements.

3.3 PROTECTION OF EXISTING TREES AND VEGETATION

- A. Protect existing trees and other vegetation indicated to remain in place, against unnecessary cutting, breaking or skinning of roots, skinning and bruising of bark, smothering of trees by stockpiling construction materials or excavated materials within drip line, excess foot or vehicular traffic, or parking of vehicles within drip line. Provide temporary guards to protect trees and vegetation to be left standing. Protective guards shall as a minimum consist of bright orange-colored, 3' high PVC brightly colored snow fence installed around the drip line (perimeter) of existing trees and foliage to remain.
- B. Provide protection for roots over 1-1/2 inches diameter cut during construction operations. Coat cut faces with an emulsified asphalt, or other acceptable coating, formulated for use on damaged plant tissues. Temporarily cover exposed roots with wet burlap to prevent roots from drying out; cover with earth as soon as possible.
- C. Repair or replace trees and vegetation indicated to remain which are damaged by construction operations, in a manner approved by the Owner. Replace trees which cannot be repaired and restored to full- growth status, as determined by arborist. Employ qualified arborist acceptable to Owner to evaluate damage and to repair damages to trees and shrubs.
- D. The construction limits shown are approximate and the contractor shall remove only the minimal amount of site improvements needed for the proper construction of the improvements shown.

3.4 REMOVAL & RELOCATION

- A. Remove trees, shrubs, grass and other vegetation, improvements, and obstructions interfering with new work, and elsewhere on site or premises as specifically indicated. Removal includes digging out stumps and roots.
 - 1. Carefully and cleanly cut roots and branches of trees indicated to be left standing, where such roots and branches obstruct new work. Protect as specified in this section.
 - 2. Completely remove stumps, roots of trees, and other debris within 4 feet of the ground surface in all areas where future pavements or other hard surfaces are proposed.
 - 3. Use only hand methods for grubbing inside drip line of trees indicated to be left standing.

- B. Removal of At-Grade and Above-Grade Improvements: Remove landscape or wood borders, fences, fence post remains, gravel, foliage, and other existing improvements in conflict with new work and elsewhere as specifically indicated. Include removal of crushed stone, gravel, or other bases at slabs, paving, and other work removed under this requirement.
- C. Fill depressions caused by work of this section, except topsoil stripping, with satisfactory well-graded soil aggregate material unless further excavation or earthwork at location of depression is indicated. Place fill material in horizontal layers not exceeding 6 inches loose depth, and thoroughly compact to 95 percent maximum dry density per ASTM D-1557 testing requirements as amended.
- D. The limits of pavement removal shall be clearly measured and marked in the field prior to the removal operation. Pavement shall be cut with a suitable masonry/bituminous saw along the marked limits in order to provide a uniform clean edge. If severe cracking is observed along or within 10 feet of the specified limit of pavement removal, then the limit of pavement removal shall be increased as needed to insure structural stability of adjacent areas. For this reason, it is important for the contractor to visit the project site before submitting his/her bid and examine the condition of areas within the construction limits.
- E. Relocation of at-grade and above-grade site amenities shall include carefully dismantling said amenities and re-installing same at a location identified by the Owner. The contractor shall also furnish and install all required hardware and replacement parts damaged or missing after dis-assembly. Re-installation shall also include proper anchoring and foundations for said amenities in similar fashion as they currently exist.

3.5 CLEANING OF STORM SEWER SYSTEM

- A. Clean sediment and debris from all storm sewer inlets and pipes within the scope of site construction work.
- B. All storm sewers and inlets located downstream of construction areas and/or convey storm water runoff from construction areas shall be cleaned of all sediment and debris regularly and at the completion of the project. The extent of downstream storm sewer cleaning shall be limited to the storm sewer pipes exiting the subject property that connect into the nearest municipal storm sewer system, including the municipal storm sewer structure into which the connection is made.
 - 1. The contractor will be responsible for cleaning additional storm sewers and inlets that are affected by the contractor's work or construction practices.

3.6 DISPOSAL OF WASTE MATERIALS:

- A. Burning on Owner's property is not permitted.
- B. Remove waste materials from Owner's property and dispose of off site in legal manner.

C. Waste materials shall not be buried on the site.

END OF SECTION 311200

SECTION 311500 - TRAFFIC CONTROL

PART 1 - GENERAL

1.1 RELATED DOCUMENTS:

- A. Drawings and general provisions of Contract, including General & Supplementary Conditions.

1.2 SUMMARY

- A. The Contractor will not be allowed to close any roadways to traffic without express written permission from authorities having jurisdiction. The Contractor shall plan and carry out its work to provide for the convenient and safe passage of all vehicular and pedestrian traffic.
- B. All costs involved shall be borne by the Contractor.
- C. It is the Contractor's responsibility to coordinate its work with the Owner to ensure the safe passage of vehicular and pedestrian traffic throughout the project limits, at certain times, until final acceptance of the project by the Engineer. This includes the installation of temporary pedestrian-safe walkways as directed by the Owner.
- D. Maintenance and protection of traffic with minimum interference are of the first importance. The Contractor shall provide, and maintain to the satisfaction of the Owner and/or Engineer, adequate and safe means for passage of vehicular and pedestrian access to all areas of the subject property. There shall be no disruption of access to nearby parking areas, or buildings adjoining or affected by the work, unless authorized in advance by the owner. Sufficient width shall be provided in all traffic lanes to allow safe and convenient turning through them, and the outside edges shall be plainly marked by lights, or other devices approved by the Engineer. The Contractor shall notify the Owner at least 48 hours prior to the time it proposes to begin any work which will interfere with the normal passage of pedestrians and vehicles. Pavement areas shall be kept clean of construction materials at all times.
- E. The Contractor shall provide adequate means of access for fire, police, and emergency vehicles throughout the duration of the project.
- F. Traffic shall be maintained along public roadways during construction. At least one 12-foot lane shall be maintained for traffic during all construction periods and at least two 12 foot lanes at all other times.
- G. Competent watchmen and flag men shall be employed by the Contractor for the protection of any equipment entering, leaving or crossing active traffic lanes or as may be required for the routing of any traffic around or through the construction. Watchmen and flag men will be employed by the Contractor at its own expense.

- H. Install warning cones and barricades along work being performed on or near public roadways to the satisfaction of the local police traffic safety officer. Contact the local police traffic safety office at the commencement of construction for traffic control requirements along public roadways. All cones, signs and barricades must conform to the Manual of Uniform Traffic Control Devices (MUTCD).
- I. Traffic control signage when shown on the drawings has been prepared in accordance with the Manual of Uniform Traffic Control Devices (MUTCD). The installation of all signage shown on the drawings includes, materials, labor, equipment, delivery, hardware, etc., necessary and incidental thereto.

PART 2 - PRODUCTS

2.1 TRAFFIC CONTROL DEVICES

- A. Before beginning work on any stage of the project, the Contractor shall furnish and install all specified warning signs, barricades, wood traffic guides, lights, flares, and other devices necessary, in the opinion of the Engineer and/or the local police department, to protect the public during that phase of its operations.
- B. All regulatory and warning signs shall be in accordance with Chapter 6 of the Manual on Uniform Traffic Control Devices, latest Edition, and shall be supplied and installed by the Contractor as directed by the Engineer. When such signs are no longer required, the Contractor shall immediately and carefully remove and store them on the project site at locations approved by the owner until they are reused on the project or removed by the Contractor.
- C. Barricades shall be painted with diagonal orange and white stripes. The orange color used on barricades shall conform to standard colors as shown on highway color tolerance charts published by the Federal Highway Administration. Conformance will be visually determined by comparison with the highway color tolerance charts using the Munsell Notation according to ASTM D1535. Color tolerance charts are on file in the office of the Department's Sign Architect at 1035 Parkway Avenue, Trenton, New Jersey. Type III A barricades shall not be used adjacent to traffic lanes.
- D. Traffic cones shall be of plastic or rubber, of 28-inch minimum overall height, 1-3/4 inch minimum outside diameter at the top, and 7-1/2 inch minimum outside diameter at the bottom tapering to a 14-inch minimum square base. The minimum weight of the cones shall be 7 pounds exclusive of attachments. They shall be reflective orange with the color molded into the plastic. They shall be kept clean and bright for maximum target value. Traffic cones shall be reflectorized and may be equipped with steady burning lights for nighttime use, if so directed by the Engineer. The cones shall be subject to the Engineer's approval before and during the time of their use on the project.

- E. Low intensity battery operated flashing warning lights shall conform to the Specifications on file at the office of the NJ DOT Department's Bureau of Safety, 1035 Parkway Avenue, Trenton, New Jersey. These Specifications require, in part, that the flashing lights be weather-proof, and reasonably tamper-proof and theft-proof; be equipped with a 7-inch minimum diameter yellow plastic lens; shall operate with a flash rate between 55 and 75 flashes per minute with a flash duration of not less than 18 percent of each flash cycle; each light shall have a minimum effective intensity of 10 candle power and shall be inspected and cleaned daily so as to maintain the lights in proper working condition.
1. High intensity battery operation flashing warning lights shall conform to the Specifications therefore on file at the office of the NJ DOT Department's Bureau of Safety, 1035 Parkway Avenue, Trenton, New Jersey. These Specifications require, in part, that the flashing lights be weatherproof, and reasonably tamper-proof and theft-proof; be equipped with a 7-inch minimum diameter yellow plastic lens; shall operate with a flash rate between 55 and 75 flashes per minute and have a minimum effective intensity of 100 candle power and shall be inspected and cleaned daily so as to maintain the lights in proper working condition.
 2. Flashing warning lights and steady burnlights shall be installed and maintained at such locations as the Engineer or municipal officials may determine are necessary to adequately warn oncoming traffic of the existence of the work zone.
 3. Steady burning lights and low intensity flashing warning lights shall be kept lit from 1 hour before sunset until 1 hour after sunrise, and through all hours of fog, smog, and other adverse atmospheric conditions affording insufficient visibility for the safe operation of traffic. High intensity warning lights shall be operated 24 hours per day.
- F. No work which will interfere with traffic, or restrict the width of pavement available for traffic, shall be performed on Saturdays, Sundays or legal holidays, without prior approval by the Owner.
- G. Except as necessary during actual working hours, and then only with the specific approval of the Owner or Engineer, the Contractor shall not occupy with his equipment, materials or personnel, any roadway or sidewalk area within or adjacent to the project that is open to pedestrian or vehicular traffic.
- H. Competent, trained, and uniformed traffic directors shall be employed at every point where the Contractor's equipment is working immediately adjacent to or is entering, leaving or crossing active traffic lanes. The traffic directors shall be employed continuously for the full time such conditions exist as determined by the Engineer. Traffic directors will be employed by the Contractor at his own expense.
1. The contractor shall contact the local police department to obtain any local requirements for traffic control along public roadways. The contractor shall adhere to whatever traffic control requirements are set forth by the local police department, including but not limited to the part-time hiring of off-duty police officers for traffic control duty at the entrance to the campus. Traffic directors (off-duty police officers) will be employed by the Contractor at its own expense. Determine these costs and include them in the contract.

- I. All signs shall be furnished, erected, and maintained in a substantial manner to be approved by the local police department, and shall be maintained so as to provide maximum visibility and legibility at all times.
- J. Signs, lights, barricades, and all other warning and protective devices shall be established, repaired, relocated, and removed by the Contractor at the locations and times and in the manner directed by the Engineer or local police department having jurisdiction.
- K. Wherever a detour may be established, the Contractor shall obtain approval two weeks in advance from the local police department and shall provide warning signs as necessary in accordance with Chapter 6 of the MUTCD.
 - 1. Should the Contractor feel additional detours are necessary, it will be its responsibility to get prior approval from the Municipality, in the case of local roads or from the State, in the case of State highways, or from the County, in the case of County roads, to route traffic on or off their roads. In addition, the Contractor will be responsible for notifying local police, school boards, fire companies, first aid units, etc., of the detour, prior to its inception, as a condition of approval by the Engineer.
 - 2. If the Contractor uses drums to delineate traffic hazards on the project site, such drums shall be of steel or plastic, approximately 36 inches high and a minimum of 18 inches in diameter. They shall have alternating orange and white reflective stripes, with a minimum of two white stripes per drum. Ballast weight shall not exceed 50 pounds. A drain hole shall be provided near the bottom of the drum to prevent the accumulation of rain water.
- L. Permanent Signs:
 - 1. Signs adjacent to curbed driveways, aisles or parking lots shall not be closer than 2 feet to the face of curb. Signs adjacent to pavement (no curb) shall not be less than 12 feet from the edge of traveled way.
 - 2. Mounting heights for signs shall be no less than 7 feet measured from the bottom of sign to the nearest pavement. The bottom of a secondary sign mounted below another sign as noted above may be one foot less than the appropriate height noted above.

2.2 METHOD OF MEASUREMENT

- A. No separate payment will be made for Supply, Maintenance and Protection of Traffic as described above and in the MUTCD. Payment for all installation, maintenance, lighting, relocation, maintaining breakaway barricades, lights, torches, sandbags, construction signs, traffic cones, drums, vertical panels, barricades Type I, II or III with flashers, provisions for temporary driveways, sidewalks with soil aggregate, Class I-2; temporary curb, temporary bituminous pavement, and all else necessary for and incidental to the maintenance and protection of traffic shall be included in various items listed in the Proposal.
- B. No separate payment for uniformed traffic directors will be made; the cost of which will be included by the Contractor in the price bid for the various items in the proposal.

- C. No separate payment will be made for the items as hereinbefore described including but not limited to, installation, maintenance in good condition, relocation, removal, and disposal of all the items as hereinbefore described; all materials, labor, equipment, and all else necessary therefore or incidental thereto for completion of this item as specified herein.

PART 3 - EXECUTION

3.1 EXECUTION

- A. Maintenance and protection of traffic shall be coordinated with local authorities. Adhere to all traffic control requirements established by the local police department and other regulatory bodies having jurisdiction.
- B. All traffic control devices shall be in operation prior to the commencement of any construction activities in the traveled way.
- C. Any traffic control devices which are lost, stolen, destroyed or deemed unacceptable while their use is required on the project, shall be replaced by the Contractor without additional compensation. Any additional control devices required by field conditions shall be supplied by the Contractor without additional compensation.

END OF SECTION 311500

SECTION 31 20 00 - EARTH MOVING

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of Contract, including General and Supplementary Conditions and Division-01 Specification sections, apply to work of this section.

1.2 SECTION INCLUDES

- A. Provide earthwork & grading required for the project, including:
 1. Unclassified Excavation, subgrade soil removal, replacement fill, backfill and compaction to provide suitable subgrades for pavement construction.
 2. Unclassified Excavation, fill and earthmoving to provide site subgrades required by finish grades shown in sidewalk areas, and along the edge of construction.
 3. Drainage fill course (min. 4" thickness) under all new walkways on grade, under concrete paving, and elsewhere as indicated, to provide a capillary break.
 4. Additional bank run sand fill materials as required.
 5. Removal and disposal of excavated material not required for, or not suitable for, the work.
 6. Backfilling voids resulting from the removal and disposal of existing underground obstructions.
 7. Design and engineering of shoring, sheet piling and bracing related to earthwork.
 8. Grading & preparation of subgrade soils in areas that are to become lawn.
 9. Subgrade reconstruction shall be provided on an "if/where" needed basis in accordance with the plans and with Owner's approval.

1.3 RELATED SECTION

- A. Section 02 41 20: For disposal of excess material
- B. Section 32 91 13: Soil Preparation

1.4 REFERENCED STANDARDS

- A. ASTM American Society for Testing and Materials.
 1. D2487 Test Method for Classification of Soils for Engineering Purposes.
 2. D1556 Standard Test Method for Density and Unit Weight of Soil in Place by the Sand-Cone Method

3. D1557 Standard Test Methods for Laboratory Compaction Characteristics of Soil Using Modified Effort
4. D2167 Field Density Tests, Rubber Balloon Method.
5. D2922 Standard Test Methods for Density of Soil and Soil-Aggregate in place by Nuclear Methods (Shallow Depth).

1.5 SUBMITTALS

- A. Compliance: Submit the following documentation to the Engineer:
1. Schedule for earthwork operations.
 2. Location of site receiving spoil material and certification of acceptance.
 3. Test reports on borrow material and screened top soil.
 4. Proof of scheduling and coordinating earthwork activities with the geotechnical (soils) engineer and testing and inspection company. Provide daily compaction reports on a weekly or semi-weekly basis verifying conformance with the project specifications.

1.6 QUALITY ASSURANCE

- A. The Contractor shall engage the services of a Geotechnical Engineer, licensed in the state of New Jersey, to oversee and certify all earthwork operations. The geotechnical engineer shall certify that suitable soils, as defined herein, are utilized under all pavements. The geotechnical engineer shall certify compaction of all subgrade and foundation preparation. Provide reports as submittals verifying all required compaction densities has been achieved. The geotechnical engineer may use testing reports generated by a Testing Inspection Agency to certify earthwork, but only the Geotechnical Engineer can certify that all earthwork and compaction meets the requirements of these specifications. Certification by a testing laboratory without professional geotechnical engineering certification is not acceptable, and will be rejected.
- B. Contractor shall provide a soils gradational analysis, from the supplier, of any imported soil fill (or on-site soil fill) to be used as structural fill under pavements.
- C. The contractor is responsible for determining all earthwork quantities needed to establish the lines and grades shown on the construction drawings.
- D. The contractor is responsible for determining the amount of onsite soils which are unsuitable and/or in excess of what is required by the construction drawings. Excess suitable and unsuitable soils shall be trucked to the rear of the campus and stockpiled in a location indicated by the Owner.
- E. Debris and other waste material shall be disposed of offsite in a legal manner.

1.7 REGULATORY REQUIREMENTS

- A. Comply with the applicable provisions of codes, standards and specifications referenced in this section.

1.8 PRODUCT HANDLING

- A. Handle and transport materials to avoid dropping and dispersion of material onto public rights of way or other areas outside of the construction area.
- B. Promptly remove materials deposited or eroded onto areas described above, and leave area clean.
- C. Maintain segregation of dissimilar materials.

1.9 PROJECT CONDITIONS

A. Site Information:

- 1. A Soil and Foundation Engineering Report has been prepared for this project by Underwood Engineering Company, dated September 18, 2018. This report is being provided to the contractor for reference.
- 2. Test Pits were performed within the proposed Forebay and Infiltration Basin by Underwood Engineering Group. A report of their findings, dated 9/24/2018, is being provided for reference.
- 3. The Subsurface Investigation revealed the following general conditions on the site:
 - a. 6 inches of topsoil was encountered in lawn areas.
 - b. The underlying soils generally consisted of “loose and medium dense fine to coarse sands with trace to little amounts of silts and trace/little/some/ and amounts of gravel.”
 - d. Groundwater seepage was encountered at depths ranging from about 4 to 8 feet below ground surface. Seasonal high groundwater generally corresponds to the observed groundwater levels.
 - e. Dewatering shall be necessary throughout construction for all excavations.

B. Existing Utilities:

- 1. Protect existing sewers and utilities noted to remain. Provide adequate means of support and protection for remaining utilities during earthwork operations.
 - a. Existing utilities shown on Drawings are based on field observations and mapping obtained from local utility companies. All locations are represented as approximate.
 - b. If excavation locates existing utilities which are to remain and if such utilities are not located as shown on Drawings, record locations and identifications of utilities on Record Document drawings. Provide same information to the Engineer.

- c. Adhere to other utility location requirements specified in other sections of the specifications.
 2. Uncharted, or incorrectly charted, piping or other utilities: If encountered during excavation, consult utility owner immediately for directions. Cooperate with utility companies in keeping services and facilities in operation. Repair damaged utilities to satisfaction of utility owner.
 3. Do not interrupt existing utilities or sewers serving facilities occupied and used by Owner or others, at any time, except when notice has been filed, permission granted, and other conditions satisfied as specified in appropriate Division 01 Section.
 4. Refer to Pre-demolition work as it pertains to utility locations and mark-out.
- C. Use of explosives is not permitted.
- D. Protection of Persons and Property:
1. Perform earthwork operations only after installation of temporary construction fencing, perimeter safety barricades, warning lights and other protective measures as specified and as required by authorities having jurisdiction. Maintain protective measures in fully effective condition throughout the period of earthwork operations.
 2. Protect structures, utilities, sidewalks, pavements, and other facilities from damage caused by settlement, lateral movement, undermining, washout and other hazards created by earthwork operations. This includes the erection of temporary wooden framing to support adjacent structures during trench excavations.
 3. Perform excavation within drip-line of large trees to remain by hand, and protect the root system from damage or dry out. Maintain moist condition for root system and cover exposed roots with wet burlap. Paint root cuts of 1 inch diameter and larger with emulsified asphalt tree paint.
 4. On-site soils which contain more than 10% silt and clay may be difficult to re-handle is allowed to become saturated during rainy periods. Hence, means and methods should be employed to protect the soils from being saturated.

1.10 DEFINITIONS

- A. Earth - Soil, clay, loose stone, hard pan, abandoned foundations, abandoned piping, concrete and masonry rubble, broken paving and other materials, with the exception of boulders and solid rock which require drilling or blasting, or both for removal.
1. Intermittent drilling or ripping performed to increase excavation production shall be considered earth excavation.
- B. Rock Excavation: Consists of the removal and disposal of materials that cannot be excavated using equipment with the same weight and horsepower capacity as a fully operational Caterpillar Excavator Model 330, with a 1-½ cu. yd. bucket, without the need to drill or blast.
1. Typical Rock Material shall be Boulders 1-1/2 cu. yd. or more in volume, solid rock, rock in ledges, and rock hard cementitious aggregate deposits.

- a. Rock excavation shall not include any intermittent drilling or ripping performed to increase production.
 - b. Rock payment lines shall be limited to the following:
 - i. Two feet outside of concrete work for which forms are required, except footings.
 - ii. One foot outside the face of footings.
 - iii. In pipe trenches, 6" below the pipe invert elevation and two feet wider than the inside pipe diameter, but not less than a three foot minimum trench width.
 - iv. Neat outside dimensions of concrete work where no forms are required.
 - v. Under slabs on grade, 6" below bottom of concrete slab.
- C. Suitable Material - Earth, which is capable of being compacted to the required density at the proper moisture content, and which is free of topsoil, roots, trash, debris, frozen material, organic matter and other foreign matter, and has a pH between 5 and 6.5. The size limit of rock as suitable material shall not exceed 4 (four) inches in size. The remainder of rock shall be classified as unsuitable.
- D. Unsuitable Material - Material not classified as "suitable".
- 1. On site bituminous concrete shall be considered unsuitable material and shall be disposed of off-site in a legal manner.

PART 2 - PRODUCTS

2.1 MATERIAL AVAILABILITY

- A. On-site soils are suitable for re-use by the contractor, only in strict conformance with the recommendations of the geotechnical report. Refer to 1.09A above.

2.2 DRAINAGE FILL SUBBASE

- A. Beneath Portland Cement Concrete: Washed, evenly graded mixture of crushed stone, or crushed or uncrushed gravel, with 100 percent passing a 1-1/2 inches sieve and not more than 5 percent passing a No. 4 sieve. Compacted to 95% MPD.

2.3 WATER

- A. Provide water as required to assure proper moisture content for compaction of all subgrade soils and subbase material as specified.

PART 3 - EXECUTION

3.1 EROSION CONTROL

- A. Install and maintain all Soil Erosion & Sediment Control measures prior to land disturbance and maintain throughout the duration of the project until permanent vegetation is established.
- B. Do not permit excavated soils to wash onto roadways or adjacent areas.
- C. Wash and sweep hard surfaces around the site daily to keep dust and scattered soil debris to a minimum.

3.2 EXCAVATION

- A. General Site Excavation is Unclassified, and includes excavation to provide required elevations indicated, regardless of character of materials and obstructions encountered. Perform all site excavation, rough grading, compaction, proof-rolling and placement of fill as needed to achieve the required finished plan elevations. If underground obstructions are encountered during earthwork operations and said obstructions are abandoned and serve no purpose, remove said obstructions to provide suitable clearances for underground utility lines and new surface improvements.
- B. Unsuitable clean fill material may be reused as surface fill around new construction to establish required subgrades prior to the placement of screened topsoil. All excess unsuitable fill that cannot be re-used shall be removed from the project site and disposed of in a legal manner off-site.
- C. Unauthorized excavation consists of removal of materials beyond indicated subgrade elevations or dimensions without specific direction. Unauthorized excavation, and remedial work shall be at Contractor's expense.
 - 1. Backfill and compact other unauthorized excavations as specified for authorized excavations of same classification, unless otherwise directed.
- D. Soft soils should be locally removed and replaced with suitable material as defined herein. In no case shall the size of any particles exceed 4 inches in diameter.
- E. Stability of Excavations: Slope sides of excavations to comply with codes and ordinances having jurisdiction. Shore and brace where sloping is not possible because of space restrictions or stability of material. Maintain sides and slopes of excavations in safe condition until completion of backfilling.
- F. Shoring and Bracing:
 - 1. Comply with local codes and authorities having jurisdiction. Provide materials in good serviceable condition.

2. Provide performance verification, in accordance with the provisions of Part 1 of this section.
 3. Maintain shoring and bracing in excavations throughout period when excavations are open. Carry down shoring and bracing as excavation progresses.
- G. Cold Weather Protection: Protect excavation bottoms against freezing when atmospheric temperature is less than 35 degrees F.
- H. Inclement Weather Protection:
1. Protect all excavations and earthwork areas from damage caused by weather. Maintain smooth site grading throughout construction to insure the proper conveyance of overland storm water flow patterns. Standing water shall not be permitted at any time.
 2. Soils damaged by excessive saturation or other contamination shall be replaced with Granular Material, or as specified by the Engineer at the contractor's expense.

3.3 DEWATERING

- A. Prevent surface water and subsurface water from flowing into excavations and construction areas and surrounding area. Perform any or all of the following means to divert water from construction areas:
1. Install a temporary diversion along the limits of construction to re-direct surface runoff.
 2. Use a bypass pumping system to de-water trenches and foundations.
- B. Do not allow water to accumulate in excavations. De-watering operations shall be continuous throughout the excavation and subsequent fill operations. Remove water to prevent softening of foundation bottoms and soil changes detrimental to stability of subgrades and foundations. Provide and maintain pumps, well points, sumps, suction and discharge lines, and other dewatering system components necessary to convey water away from excavations.
- C. Establish and maintain temporary drainage ditches, pipes, and other diversions to convey rain water and water removed from excavations to collecting or run-off areas. Do not use trench excavations as temporary drainage ditches.
- D. Dewatering of all excavations shall be included in scope of work. Employ the use of filtration measures as required by the soil conservation district to avoid discharging silt laden material into receiving storm sewers and waterways.

3.4 MATERIAL STORAGE

- A. Stockpile excavated materials to be re-used until required. Place, grade and shape stockpiles for proper drainage within the limits of silt fence sediment barrier.

- B. Locate soil storage away from edge of excavations. Do not store within drip line of trees required to remain. Do not store where erosion could result in siltation of excavations, drainage systems, or off-site areas.
- C. Establish and identify separate stockpiles for:
 - 1. Soils suitable for re-use applications.
 - 2. Soils suitable for re-use in landscape areas only.
 - 3. Unsuitable soils accepted for re-use in specific areas.
- D. Promptly remove from the site materials not accepted for re-use.
- E. If severe weather is forecast, which could result in site flooding, the contractor shall remove from the site, all fill piles, surface debris, and other materials that could become dislodged and become buoyant during flooding conditions. All materials shall be stored above the lowest floor elevation of the existing school.

3.5 FILL AND BACKFILL

- A. When performing earthwork in new construction areas, strip all existing topsoil from within and 5 feet beyond all work areas and stockpile same for later re-use in lawn areas. Topsoil is not suitable bearing material for pavements. Do not place fill over existing top soil.
- B. Existing in-place subgrade soils within proposed pavement areas and 5 feet beyond shall be compacted in place to maximum densities and certified by the geotechnical engineer prior to constructing subbase stone or bituminous pavement courses. Subgrade soils remaining shall be thoroughly compacted and certified by the geotechnical engineer.
- C. Verify that subgrade complies with specified characteristics, including composition, elevation, thickness, and compaction.
- D. Place all fill material in layers to required subgrade elevations, for each area classification.
- E. Backfill excavations as promptly as work permits, but not until completion of the following:
 - 1. Acceptance of construction below finish grade including, where applicable, damp-proofing, waterproofing, and perimeter insulation.
 - 2. Removal of trash and debris.
- F. Ground Surface Preparation:
 - 1. Remove vegetation, debris, unsuitable materials, obstructions, and deleterious materials from ground surface prior to fine grading and the placement of topsoil. Plow strips, or break-up, sloped surfaces steeper than 1 vertical to 4 horizontal so that topsoil material will bond with existing surface.

3.6 COMPACTION

A. Moisture Control:

1. Control moisture content of material which shall be compacted to permit compaction at a moisture content within 2 percent of the applicable optimum moisture content.
2. If material becomes too wet for the required compaction, dry material before starting or continuing compaction operations.
3. If material becomes too dry for the required compaction, moisten material before starting or continuing compaction operations.

B. Verify degree of compaction of subgrade and each lift. Do not place successive lift until previous lift is inspected and verified. Top of completed compacted fill shall be subject to final inspection and verification.

C. Procedures:

1. Using compacting equipment (not hauling equipment) make not less than six (6) passes over each section of each layer of fill. Make additional passes and variation in layer thickness if necessary to obtain specified compaction. Each successive pass shall overlap the preceding adjacent pass by 10 percent. Roller passes made on material in unsuitable condition shall not be recognized in judging compliance.
2. Use hand-held compacting equipment in areas not otherwise accessible.

3.7 GRADING

A. General: Uniformly grade areas within limits of grading, including transition to adjacent existing grades. Smooth finished surfaces within specified tolerances, with uniform levels or slopes between indicated elevation points, and between such points and existing grades.

B. Finish surfaces free from irregular surface changes to grades indicated on the Site Grading Plan, and within the following tolerances of required subgrade elevations (Note: plan grades are to final surface):

1. Unpaved Areas:
 - a. Areas to receive topsoil: plus or minus 2 inches.
 - b. Areas not to receive topsoil: plus or minus 1-1/2 inches.
2. Adjacent to walks and Pavements: plus or minus 1/2 inch. Shape surface of areas under walks and pavements to line, grade and cross-section.

C. The final graded surface shall be combed clean and free of debris, sticks, rocks, or foreign matter larger than one (1) inch in dimension. The Engineer will inspect the final grade and require restoration of any areas deemed to be unsatisfactory.

D. Areas adjacent to walkways MUST be graded to provide a smooth transition. No abrupt drop-off or "ankle twisters" will be tolerated. These areas will be inspected by the Engineer for compliance.

- E. General site grading and slope requirements are provided on the drawings. If no proposed grading values are shown then restore surfaces to original condition.

3.8 DRAINAGE FILL COURSE

- A. Place minimum 4" thick processed stone under all slabs on grade, under all concrete paving, sidewalks and elsewhere as indicated.
- B. Place drainage fill material on controlled compacted fill subgrade in layers of uniform thickness, to indicated cross-section and thickness, or if not otherwise indicated, a minimum of 4 inches thick. Maintain optimum moisture content for compacting. Test compaction before constructing other improvements. Furnish test results to the engineer.
- C. Place material in a single layer, except when more than 6 inches thick, place in equal layers, each layer not more than 6 inches or less than 3 inches thick when compacted.

3.9 FIELD QUALITY CONTROL

- A. Geotechnical Oversight:
 - 1. Provide Geotechnical and testing agency oversight and inspections as required by these specifications. The testing shall be performed under the supervision of a licensed geotechnical engineer who shall certify the adequacy of soil and subbase compaction. Any earthwork not inspected and certified by the geotechnical engineer will be rejected.

3.10 MAINTENANCE

- A. Protect newly graded areas from traffic and erosion.
- B. Repair and re-establish grades in settled, eroded, and rutted areas to specified tolerances.
- C. Recondition completed compacted areas which are disturbed by subsequent construction operations or adverse weather. Scarify surface, re-shape, and compact to required density.
- D. Settling: Where settling is measurable or observable at excavated areas during general project warranty period, remove surface (pavement, lawn or other finish), add backfill material, compact, and replace surface treatment. Restore appearance, quality, and condition of surface or finish to match adjacent work, and eliminate evidence of restoration.

3.11 DISPOSAL OF EXCESS AND WASTE MATERIALS

- A. Remove excavated material classified as Unsuitable, except for unsuitable materials accepted for specific re-use, and dispose of same off-site in a legal manner.

B. Excess Suitable and Accepted Unsuitable Excavated Material:

1. Transport all excess material from the site and dispose of same in a legal manner.

END OF SECTION 31 20 00

SECTION 31 50 00 - EXCAVATION SUPPORT

PART 1 - GENERAL

1.1 GENERAL REQUIREMENTS

- A. Drawings and general provisions of Contract, including General and Supplementary Conditions and Division-1 Specification sections, apply to work of this section.
- B. OSHA Code of Federal Regulations: CFR29 Part 1926
- C. Related Sections:
 - 1. Section 02 41 20 – Selective Site Demolition
 - 2. Section 31 20 00 – Earth Moving

1.2 SUMMARY

- A. Extent of trenching, shoring and bracing work includes, but is not limited to, the following:
- B. Shoring and bracing necessary to protect existing structures, walkways, utilities, and other improvements and excavation against loss of ground or caving embankments.
- C. Maintenance of shoring and bracing.
- D. Removal of shoring and bracing, as required.
- E. Types of shoring and bracing system includes, but is not limited to, the following:
 - 1. Sloping System
 - 2. Shield System
 - 3. Shoring System
 - 4. The contractor shall select the type of shoring and bracing based upon field conditions.
- F. Trench excavation, backfill & compaction shall be per construction drawing details.
- H. The project site is in use by the Owner and will be occupied during construction, therefore, construction areas may be congested. Provide and install all trench shoring and bracing as required by OSHA requirements during all excavation work.
- I. Trenches shall not compromise the integrity of adjacent structures or other construction. All adjacent surfaces shall be adequately braced against, collapse, subsidence, settlement, and/or landslide.

1.3 SUBMITTALS [Not Required]

1.4 QUALITY ASSURANCE:

- A. Supervision: Engage and assign supervision of shoring and bracing work to a qualified foundation consultant.
- B. Submit name of engaged consultant and qualifying technical experience to engineer.
- C. Regulations: Comply with local codes and ordinances of governing authorities having jurisdiction. Refer to section 1.1 B.

1.5 JOB CONDITIONS:

- A. Before starting work, check and verify governing dimensions and elevations. Survey condition of adjoining structures per Section 024119, part 3.1. Take photographs to record any prior settlement or cracking of structures, pavements, and other improvements. Prepare a list of such damages, verified by dated photographs, and signed by Contractor and others conducting investigation.
- B. Survey adjacent structures and improvements, establishing exact elevations at fixed points to act as benchmarks. Clearly identify benchmarks and record existing elevations. Locate datum level used to establish benchmark elevations sufficiently distant so as not to be affected by movement resulting from excavation operations.
- C. During excavation, resurvey benchmarks weekly, employing a Land Surveyor licensed in the State of New Jersey. Maintain accurate log of surveyed elevations for comparison with original elevations. Promptly notify Engineer if changes in elevations occur or if cracks, sags or other damage is evident.
- D. The contractor shall recognize the limitations of site access, clearances, etc. The means and methods used by the contractor to complete the work shown on the drawings is left to the experience and discretion of the contractor.
- E. Dewatering of all excavations shall be included in scope of work.

1.6 EXISTING UTILITIES:

- A. Protect existing active sewer, water, gas, electricity and other utility services and structures.
- B. Notify municipal agencies and utility companies having jurisdiction if any work extends into easements or rights-of-way controlled by those entities. Comply with requirements of governing authorities and agencies for protection, relocation, removal and discontinuing of services, as affected by this work.
- C. Replace, restore, re-construct any existing utilities damaged as a result of trenching operations.

- D. Perform underground utility location and mark out in all areas where subsurface penetrations and excavations will occur. Engage private underground utility mark out service to mark out all areas not covered by the NJ One Call Service. Include cost of same in contract.

PART 2 - PRODUCTS

2.1 MATERIALS

- A. General: Provide suitable shoring and bracing materials which will support loads imposed. Materials need not be new, but should be in serviceable condition.
 - 1. If wood is part of shoring system near existing structures, use pressure preservative treated materials or remove before placement of backfill.
- B. Backfill material used in all utility trenches shall be Dense Graded Aggregate, per Section 312000. The back fill material shall be placed in 6" lifts, compacted to 95% modified proctor density (ASTM D-1557) using vibratory compaction equipment.

2.2 DRAINAGE FILL

- A. A drainage fill course of not less than 4 inches thick shall be used under all concrete pavement and concrete surfaces and along trenches under paved surfaces.
 - 1. Material: Washed, evenly graded mixture of crushed stone, or crushed or uncrushed gravel, with 100 percent passing a 1-1/2 inches sieve and not more than 5 percent passing a No. 4 sieve.

PART 3 - EXECUTION

3.1 TRENCHING:

- A. Sawcut existing pavement surfaces (as needed) and remove same, to provide satisfactory clearances and access for pipe installation and associated shoring and bracing procedures. Approximate trench limits are typically shown on the construction drawings. These trench limits (and surface demolition limits) shall be increased as needed to properly install the piping to its desired alignment (and per shoring & bracing requirements) at no additional cost.
- B. Remove existing concrete surfaces along the nearest control joint. If a control joint is not located within 5 feet of the proposed trench wall, sawcut existing surfaces to provide a uniform edge in accordance with 3.1A above.
- C. Excavate subgrade soils to be re-used, to required depths and stockpile inside silt fence area. Any excess fill material shall be disposed of off-site in a legal manner. Compact trench bottom to a firm and unyielding condition.

- D. Under traffic-bearing pavements, backfill and compact trenches with bank run gravel or sand as indicated on the construction drawings.
- E. Restore all disturbed surfaces and adjacent areas in-kind to an equal or better condition than existed prior to construction and/or as indicated on the construction drawings.
- F. Provide trench de-watering at all times to prevent saturation of subgrade soils. Dewatering of all excavations shall be included in scope of work.
- G. Trenches shall not be left open and unattended. Proper barricades and safety measures shall be in place at all times. Trenches shall not be left open overnight.
- H. The proper maintenance of traffic shall be provided at all times. The contractor shall contact the local police department and coordinate traffic detouring requirements, per Section 31 15 00.
- I. Uncharted, or incorrectly charted, piping or other utilities: If encountered during excavation, consult utility owner and Engineer immediately for directions. Cooperate with Owner and utility companies in keeping services and facilities in operation. Repair damaged utilities to satisfaction of utility owner.
 - 1. Do not interrupt existing utilities or sewers serving facilities occupied and used by Owner or others, at any time, except when notice has been filed, and permission granted in writing.

3.2 SHORING

- A. Wherever shoring is required, locate the system to clear permanent construction and to permit forming and finishing of concrete surfaces. Provide shoring system adequately anchored and braced to resist earth and hydrostatic pressures.
- B. Shoring systems retaining earth on which the support or stability of existing structures is dependent must be left in place until the completion of work.

3.3 BRACING

- A. Locate bracing to clear columns, floor framing construction, and other permanent work. If necessary to move a brace, install new bracing prior to removal of original brace.
- B. Do not place bracing where it will be cast into or included in permanent concrete work, except as otherwise acceptable to Engineer.
- C. Install internal bracing, if required, to prevent spreading or distortion to braced frames.
- D. Maintain bracing until structural elements are re-braced by other bracing or until permanent construction is able to withstand lateral earth and hydrostatic pressures.

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- E. Remove sheeting, shoring and bracing in stages to avoid disturbance to underlying soils and damage to structures, pavements, facilities, and utilities.
- F. Repair or replace, as acceptable to Engineer, adjacent work damaged or displaced through installation or removal of shoring and bracing work.

END OF SECTION 315000