

SECTION 31 1000 - SITE CLEARING

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.
- B. CAD files will be made available for use in construction staking. Contact the engineer regarding applicable fee and requirements for signing of the CAD File Transfer Agreement.

1.2 SUMMARY

- A. This Section includes the following:
 - 1. Protecting existing trees, shrubs and other vegetation to remain.
 - 2. Removing existing trees, shrubs and other vegetation.
 - 3. Clearing and grubbing.
 - 4. Stripping and stockpiling topsoil.
 - 5. Removing above-grade and below-grade site improvements.
 - 6. Disconnecting, capping or sealing, and abandoning site utilities in place or removing site utilities.
 - 7. Temporary erosion and sedimentation control measures.
- B. Related Sections include the following:
 - 1. Division 31 2000 Section "Earth Moving" for soil materials, excavating, backfilling, and site grading.

1.3 DEFINITIONS

- A. Topsoil: Natural or cultivated surface-soil layer containing organic matter and sand, silt, and clay particles; friable, pervious, and black or a darker shade of brown, gray, or red than underlying subsoil; reasonably free of subsoil, clay lumps, gravel, and other objects more than 2 inches in diameter; and free of subsoil and weeds, roots, toxic materials, or other nonsoil materials.
- B. Tree Protection Zone: Area surrounding individual trees or groups of trees to be protected during construction, and defined by the drip line of individual trees or the perimeter drip line of groups of trees, unless otherwise indicated.

1.4 MATERIAL OWNERSHIP

- A. Except for stripped topsoil or other materials indicated to remain Owner's property, cleared materials shall become Contractor's property and shall be removed from Project site unless otherwise noted on the plans.

1.5 SUBMITTALS

- A. Photographs or videotape, sufficiently detailed, of existing conditions of trees and plantings, adjoining construction, and site improvements that might be misconstrued as damage caused by site clearing.

- B. Record drawings per Division 01 Sections.
 - 1. Identifying and accurately locating capped utilities and other subsurface structural, electrical, and mechanical conditions.

1.6 QUALITY ASSURANCE

- A. Preinstallation Conference: Conduct conference at Project site to comply with requirements in Division 01 Sections.

1.7 PROJECT CONDITIONS

- A. Traffic: Minimize interference with adjoining roads, streets, walks, and other adjacent occupied or used facilities during site-clearing operations.
 - 1. Do not close or obstruct streets, walks, or other adjacent occupied or used facilities without permission from Owner and authorities having jurisdiction.
 - 2. Provide alternate routes around closed or obstructed traffic ways if required by owner or authorities having jurisdiction.
- B. Improvements on Adjoining Property: Authority for performing site clearing indicated on property adjoining Owner's property will be obtained by Owner before award of Contract. Contractor is to confirm that this authority has been obtained before beginning work on adjoining property.
- C. Salvable Improvements: Carefully remove items indicated to be salvaged and store on Owner's premises where indicated.
- D. Utility Locator Service: Notify utility locator service for area where Project is located before site clearing.
- E. Do not commence site clearing operations until temporary erosion and sedimentation control measures are in place.

PART 2 - PRODUCTS

2.1 SOIL MATERIALS

- A. Satisfactory Soil Materials: Requirements for satisfactory soil materials are specified in Division 31 2000 Section "Earth Moving."
 - 1. Obtain approved borrow soil materials off-site when satisfactory soil materials are not available on-site. Contractor is responsible for doing an independent earthwork computation and including all necessary import and/or export of materials in their bid.

PART 3 - EXECUTION

3.1 PREPARATION

- A. Protect and maintain benchmarks and survey control points from disturbance during construction. If said points will be disturbed, establish new points prior to removal.
- B. Locate and clearly flag trees and vegetation to remain or to be relocated.

- C. Protect existing site improvements to remain from damage during construction.
 - 1. Restore damaged improvements to their original condition, as acceptable to Owner.

3.2 TEMPORARY EROSION AND SEDIMENTATION CONTROL

- A. Provide temporary erosion and sedimentation control measures to prevent soil erosion and discharge of soil-bearing water runoff or airborne dust to adjacent properties and walkways, according to requirements of authorities having jurisdiction and the sediment and erosion control drawings, whichever is more stringent.
- B. Inspect, repair, and maintain erosion and sedimentation control measures during construction until permanent vegetation has been established.
- C. Remove erosion and sedimentation controls only after all areas are restored and stabilized.

3.3 TREE PROTECTION

- A. Erect and maintain temporary fencing around tree protection zones before starting site clearing. Remove fence when construction is complete.
 - 1. Do not store construction materials, debris, or excavated material within fenced area.
 - 2. Do not permit vehicles, equipment, or foot traffic within fenced area.
 - 3. Maintain fenced area free of weeds and trash.
- B. Do not excavate within tree protection zones, unless otherwise indicated.
- C. Where excavation for new construction is required within tree protection zones, hand clear and excavate to minimize damage to root systems. Use narrow-tine spading forks, comb soil to expose roots, and cleanly cut roots as close to excavation as possible.
 - 1. Cover exposed roots with burlap and water regularly.
 - 2. Temporarily support and protect roots from damage until they are permanently redirected and covered with soil.
 - 3. Coat cut faces of roots more than 1-1/2 inches in diameter with emulsified asphalt or other approved coating formulated for use on damaged plant tissues.
 - 4. Backfill with soil as soon as possible.
- D. Repair or replace trees and vegetation indicated to remain that are damaged by construction operations, in a manner approved by Architect.

3.4 UTILITIES

- A. Owner will arrange for disconnecting and sealing indicated utilities that serve existing structures before site clearing, when requested by Contractor.
 - 1. Verify that utilities have been disconnected and capped before proceeding with site clearing.
- B. Locate, identify, disconnect, and seal or cap off utilities indicated to be removed.
 - 1. Arrange with utility companies to shut off indicated utilities.
 - 2. Owner will arrange to shut off indicated utilities when requested by Contractor.

- C. Existing Utilities: Do not interrupt utilities serving facilities occupied by Owner or others unless permitted under the following conditions and then only after arranging to provide temporary utility services according to requirements indicated:
 - 1. Notify Architect not less than two days in advance of proposed utility interruptions.
 - 2. Do not proceed with utility interruptions without Architect's written permission.
- D. Excavate for and remove underground utilities indicated to be removed.
- E. Removal of underground utilities is included in Division 33 Sections for covering site utilities.

3.5 CLEARING AND GRUBBING

- A. Remove obstructions, trees, shrubs, grass, and other vegetation to permit installation of new construction.
 - 1. Do not remove trees, shrubs, and other vegetation indicated to remain or to be relocated.
 - 2. Cut minor roots and branches of trees indicated to remain in a clean and careful manner where such roots and branches obstruct installation of new construction.
 - 3. Grind stumps and remove roots, obstructions, and debris extending to a depth of 18 inches below exposed subgrade.
 - 4. Use only hand methods for grubbing within tree protection zone.
- B. Fill depressions caused by clearing and grubbing operations with satisfactory soil material unless further excavation or earthwork is indicated.
 - 1. Place fill material in horizontal layers not exceeding a loose depth of 8 inches, and compact each layer to a density equal to adjacent original ground.

3.6 TOPSOIL STRIPPING

- A. Remove sod and grass before stripping topsoil.
- B. Strip topsoil to whatever depths are encountered in a manner to prevent intermingling with underlying subsoil or other waste materials.
 - 1. Remove subsoil and nonsoil materials from topsoil, including trash, debris, weeds, roots, and other waste materials.
- C. Stockpile topsoil materials away from edge of excavations without intermixing with subsoil. Grade and shape stockpiles to drain surface water. Cover to prevent windblown dust.
 - 1. Stockpile topsoil material in locations approved by the Owner or Architect.

3.7 SITE IMPROVEMENTS

- A. Remove existing above- and below-grade improvements as indicated and as necessary to facilitate new construction.
- B. Remove slabs, paving, curbs, gutters, and aggregate base as indicated.
 - 1. Unless existing full-depth joints coincide with line of demolition, neatly saw-cut length of existing pavement to remain before removing existing pavement. Saw-cut faces vertically.
 - 2. Paint cut ends of steel reinforcement in concrete to remain to prevent corrosion.

3.8 DISPOSAL

- A. Disposal: Remove surplus soil material, unsuitable topsoil, obstructions, demolished materials, other vegetation and waste materials including trash and debris, and legally dispose of them off Owner's property.
 - 1. Burning of materials on project property is prohibited.

END OF SECTION 31 1000

SECTION 31 1012 - FINE GRADING

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.
- B. CAD files will be made available for use in construction staking. Contact the engineer regarding applicable fee and requirements for signing of the CAD File Transfer Agreement.

1.2 SUMMARY

- A. Work included: All labor, materials, necessary equipment and services to complete the Fine Grading work, as indicated on the drawings, as specified herein or both, except as for items specifically indicated as not in contract on the plans.
- B. Related work specified elsewhere:
 - 1. Division 31 2000 Section "Earth Moving."

1.3 SITE INSPECTION

- A. The Contractor shall visit the site and acquaint himself with all existing conditions. The Contractor shall be responsible for his own subsurface investigations, as necessary, to satisfy requirements of this Section. All subsurface investigations shall be performed only under time schedules and arrangements approved in advance by the Landscape Architect or Owner's Representative.

1.4 UTILITIES

- A. Before starting site operations verify that the earlier Contractors have disconnected all temporary utilities which might interfere with the fine grading work.
- B. Locate all existing, active utility lines traversing the site and determine the requirements for their protection. Preserve in operating condition all active utilities adjacent to or transversing the site that are designated to remain.
- C. Observe rules and regulations governing respective utilities in working under requirements of this section. Adequately protect utilities from damage, remove or relocate as indicated, specified or required. Remove, plug or cap inactive or abandoned utilities encountered in excavation. Record location of active utilities.
- D. Contact "Miss Dig" for existing utilities survey confirmation.

1.5 QUALITY ASSURANCE

- A. Requirements of all applicable building codes and other public agencies having jurisdiction upon the work.
- B. Primary emphasis should be given to the aesthetic appearance and functioning of berms and swales, as directed by the Landscape Architect or Owner's Representative. The Contractor shall employ skilled personnel and any necessary equipment to insure that finish grading is smooth, aesthetically pleasing, drains well and is ideal for receiving sod and plant materials.

2.1 MATERIALS

A. Existing Soil:

1. Strip existing topsoil for new construction unless otherwise directed by Owner's Representative, free from debris, sod, biodegradable materials and other deleterious materials. The Contractor shall insure that all existing soil has sufficient percolation and surface drainage to support grasses and plant material and that extreme compaction occurs only in areas to receive paving.
2. In areas to receive seed, verify that soil is scarified to depth of 3 inches and that soil contains enough organic matter to support and encourage rooting of seeded lawn.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Job Conditions

1. Dust control: Use all means necessary to prevent dust from construction operations from being a nuisance to adjacent property owners and from damaging finish surfaces on adjacent building, paving, etc. Methods used for dust control are subject to approval by the Architect or Owner's Representative.
2. Burning: On-site burning will not be permitted.
3. Protection: Use all means necessary to protect curbs, gutters, sprinklers, utilities and vegetation designated to remain, and, in the event of damage, immediately make all repairs, replacements and dressings to damaged plants necessary to the approval of the Landscape Architect. Contractor shall incur all cost for the replacement of damaged objects and vegetation.

3.2 SCHEDULING

- A. Schedule all work in a careful manner with all necessary consideration for adjoining property owners and the public.
- B. Coordinate schedule with other Contractors to avoid conflicts with their work.

3.3 EXCAVATION

- A. Excavate where necessary to obtain subgrades, percolation and surface drainage as required.
- B. Materials to be excavated are unclassified.
- C. Remove entirely any existing obstructions after approval by the Architect's or Owner's Representative.
- D. Remove from site and dispose of debris and excavated material not required.

3.4 GRADING

- A. The Contractor shall establish finished grades as shown on the construction plans and as directed by the Architect, including areas where the existing grade has been disturbed by other work.
- B. Finished grading shall be smooth, aesthetically pleasing, drain well and ready to receive sod and other plant material to full satisfaction of the Owner's Representative, Architect and Construction Manager.

3.5 COMPACTION

- A. Compact each layer of fill in designated areas with approved equipment to achieve a maximum density at optimum moisture, AASHTO T 180 - latest edition.
 - 1. Under buildings, roadways, curbs, walks and other paved areas: compaction shall be to 95% of maximum density.
 - 2. Under landscaped area, compaction shall not exceed 85% of maximum density.
- B. No backfill shall be placed against any masonry or other exposed building surface until permission has been given by the Owner's Representative, and in no case until the masonry has been in place seven days.
- C. Compaction in limited areas shall be obtained by the use of mechanical tampers or approved hand tampers. When hand tampers are used, the materials shall be deposited in layers not more than four inches thick. The hand tampers used shall be suitable for this purpose and shall have a face area of not more than 100 square inches. Special precautions shall be taken to prevent any wedging action against masonry or other exposed building surfaces.

3.6 CORRECTION OF GRADE

- A. Bring to required grade levels areas where settlement, erosion or other grade changes occur. Adjust grades as required to carry drainage away from buildings and to prevent ponding around the buildings and on pavements.
- B. Remove all rock or objectionable material larger than 1 inch in any direction prior to commencing landscaping.
- C. Contractor shall be responsible for stabilizing grades by approved methods prior to landscaping, and shall be responsible for correction of grades as mentioned above, and clean up of any wash outs or erosion.

END OF SECTION 31 1012

SECTION 31 1018 - SOIL EROSION CONTROL

PART 1 - GENERAL

1.1 RELATED REQUIREMENTS

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and other Division 01 Specification Sections, apply to this Section.
- B. CAD files will be made available for use in construction staking. Contact the engineer regarding applicable fee and requirements for signing of the CAD File Transfer Agreement.

1.2 SUMMARY

- A. The work under this Section includes, but not limited to all work necessary for effective soil erosion control in conformance with Part 91, Act 451, PA 1994, the Soil Erosion and Sedimentation Control Act, Michigan Department of Natural Resources Environmental Protection Act guidelines and all pertinent local enforcing agency rules and regulations, having jurisdiction.

B. Related Sections include the following:

- 1. Division 31 2000 Section "Earth Moving."

1.3 STANDARDS

- A. General: Perform all work under this Section in accordance with all pertinent rules and regulations, including, but not necessarily limited to those mentioned above and these Specifications.
- B. Conflicts: Where provisions of pertinent rules and regulations conflict with these Specifications, the more stringent provisions shall govern.

PART 2 - PRODUCTS

2.1 SEED, FERTILIZER, MULCH

- A. Refer to other Specification Section in Part 3.

PART 3 - EXECUTION

3.1 GENERAL

- A. Standards: Provide all materials and promptly take all actions necessary to achieve effective erosion control in accordance with the Soil Erosion and Sedimentation Control Act, Michigan Department of Natural Resources guidelines, local enforcing agency guidelines and these Specifications.
- B. Site evaluation: Prior to start of the Work, conduct a field evaluation of the site along with representatives of the Engineer/Architect and the local enforcing agency.
- C. Permits: Contractor is responsible for obtaining all pertinent permits including a Soil Erosion Control Permit if required from the county or local enforcing agency. Submit the NPDES Notice of Coverage when the soil erosion permit is received if not already done.

3.2 SEEDING AND MULCHING

A. General

1. All bare soil, unless otherwise required by the Contract Documents, shall be seeded, fertilized and mulched to create a protected condition. Use seed mix as indicated on the plans (if different seed mixes are indicated on the civil and landscape plans, the mix indicated on the landscape plans shall override). Critical areas shall be sodded as approved by the Engineer/Architect and as shown on the plans.
2. Seeding and mulching shall be performed immediately upon completion of a phase or section of the Work or as approved by the Engineer/Architect.
3. In all cases, seeding and mulching shall be performed within thirty (30) calendar days from the time the area was first disturbed.
4. During any period of time which the soil is unprotected, provide erosion control structures as necessary to minimize erosion and to keep any eroded soils on the site and out of ditches, rivers, storm sewers and wetlands.
5. Refer to the plans for notes regarding the use of turf reinforcement matting and/or mulch blankets (on all slope exceeding 1 vertical to 10 horizontal).

B. Seed: Seed shall be applied uniformly at a minimum rate of 48 pounds per acre.

C. Fertilizer: Fertilizer shall be applied uniformly at a minimum rate of 250 pounds per acre.

D. Mulch: Mulch shall be uniformly applied at a rate of two (2) tons per acre, or equal, on all seeded areas that have a slope of less than 1 vertical to 10 horizontal. Refer to note A5. above for additional slope stabilization requirements.

3.3 DITCH AND RIVERS

A. When reasonably possible, banks of ditches and rivers disturbed under this Work shall be protected within 24 hours of disturbance, but in no case shall banks be left unprotected more than 7 calendar days.

3.4 STEEP SLOPES

A. Emulsion

1. On slopes greater than 10%, use erosion control blankets or turf reinforcement matting to hold seed in place. Refer to plan notes.

B. Other methods: Chemical self-adhering mulch and other mulch anchoring methods may be used as approved by the Engineer/ Architect.

3.5 SITE IMPROVEMENTS CONSTRUCTION

A. During construction of the site improvements conform to the following general rules:

1. Minimize the amount of earth disturbed at any one time.
2. Establish a construction sequence which includes adequate erosion control.
3. Provide ground cover, even if only temporary, so as to stabilize an area and minimize erosion.
4. As much as practicable, direct storm water away from the construction area. Direct diverted storm water to any stable area.
5. Collect runoff from the site in sediment basins, traps or through filters.
6. Establish an inspection and maintenance schedule, paying special attention to the beginning of the various stages of construction. Employ a certified storm water operator and keep a log of the soil erosion and sedimentation control measures in accordance with the NPDES requirements.
7. Keep in mind that the primary objective is to keep the soil on the site.

8. Once final stabilization of the site is complete, and the governing agency has granted its approval, remove all temporary erosion control structures.
9. Control site runoff during all periods of site construction to ensure that excess surface runoff does not reach adjacent properties. This is especially critical during stages when the land has been stripped but not yet graded.

3.6 CLEANING

- A. Perform cleaning of all areas affected by work under this section and leave the site in a neat and tidy state. Contractor shall keep Adjacent Roads clean and free of debris.

END OF SECTION 31 1018

SECTION 31 2000 - EARTH MOVING

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.
- B. All earthwork operations shall conform to the current Michigan Department of Transportation standards and specifications.
- C. CAD files will be made available for use in construction staking. Contact the engineer regarding applicable fee and requirements for signing of the CAD File Transfer Agreement.

1.2 SUMMARY

- A. This Section includes the following:
 - 1. Preparing subgrades for slabs-on-grade, walks, pavements, lawns, and plantings.
 - 2. Subbase course for concrete walks and pavements.
 - 3. Base course for asphalt paving.
 - 4. Excavation and backfill for utility trenches.
- B. Related Sections include the following:
 - 1. Division 31 1000 Section "Site Clearing" for site stripping, grubbing, removing topsoil, and protecting trees to remain.

1.3 DEFINITIONS

- A. Backfill: Soil materials used to fill an excavation.
- B. Base Course: Layer placed between the subbase course and asphalt paving.
- C. Bedding Course: Layer placed over the excavated subgrade in a trench before laying pipe.
- D. Borrow: Satisfactory soil imported from off-site for use as fill or backfill.
- E. Drainage Course: Layer supporting slab-on-grade used to minimize capillary flow of pore water.
- F. Engineered Fill: Fill placed and compacted to densities specified herein, in a controlled manner using lift thickness limited herein, monitored and tested by the Testing Agency or independent Geotechnical Inspector.
- G. Excavation: Removal of material encountered above subgrade elevations.
- H. Fill: Soil materials used to raise existing grades.
- I. Rock: Rock material in beds, ledges, unstratified masses, and conglomerate deposits and boulders of rock material 3/4 cu. yd. (0.57 cu. m) or more in volume.

- J. Structures: Buildings, footings, foundations, retaining walls, slabs, tanks, curbs, mechanical and electrical appurtenances, or other man-made stationary features constructed above or below the ground surface.
- K. Subbase Course: Layer placed between the subgrade and base course for asphalt paving, or layer placed between the subgrade and a concrete pavement or walk.
- L. Subgrade: Surface or elevation remaining after completing excavation, or top surface of a fill or backfill immediately below subbase, drainage fill, or topsoil materials.
- M. Undercutting: Necessary excavation of poor quality soils which occur below the existing Topsoil and any uncontrolled fill soils as described in the Geotechnical Investigation.
- N. Utilities include on-site underground pipes, conduits, ducts, and cables, as well as underground services within buildings.

1.4 SUBMITTALS

- A. Product Data: For the following:
 - 1. Drainage fabric if required for the project .
 - 2. Separation fabric if required for the project.
- B. Test Reports: Testing Agency shall submit the following reports directly to the architect and shall copy the contractor:
 - 1. Analysis of soil materials, whether procured on or off site, and including fill, backfill, and borrow materials.
 - 2. In-place density test reports.
 - 3. Moisture-density relationship test reports.
 - 4. Compressive strength or bearing test reports.
- C. Material Test Reports: Interpreting test results for compliance of the following with requirements indicated:
 - 1. Classification according to ASTM D 2487 of each on-site or borrow soil material proposed for fill and backfill.

1.5 QUALITY ASSURANCE

- A. Testing Agency Services
 - 1. The Owner will secure and pay for the services of a qualified, independent geotechnical engineer to classify existing soil materials, to recommend and to classify proposed borrow materials when necessary, to verify compliance of materials with specified requirements, and to perform required field and laboratory testing. Geotechnical engineer shall be acceptable to the architect and the owner and shall be licensed to practice in the state in which the project is located.
- B. Pre-excavation Conference: Conduct conference at Project site to comply with requirements in Division 01 Specification Sections for meetings.

1.6 PROJECT CONDITIONS

- A. Existing Utilities: Do not interrupt utilities serving facilities occupied by Owner or others unless permitted in writing by Architect or Owner and then only after arranging to provide temporary utility services according to requirements indicated:
 - 1. Notify Architect and Owner not less than three (3) calendar days in advance of proposed utility interruptions.
 - 2. Do not proceed with utility interruptions without Architect's or Owner's written permission.
 - 3. Contact utility-locator service for area where Project is located before excavating.
- B. Demolish and completely remove from site existing underground utilities indicated to be removed. Coordinate with utility companies to shut off services if lines are active.

PART 2 – PRODUCTS

2.1 SOIL MATERIALS

- A. General: Provide borrow soil materials without additional cost to Owner when sufficient satisfactory soil materials are not available from excavations. Contractor is responsible for doing an independent earthwork calculation and including any import of appropriate fill material required to bring the site to the proposed grades.
- B. Satisfactory Soil Material (ASTM D 2487): Free of stones larger than 2 inches in any dimension, trash, debris, organic material, other objectionable material and classified as follows:
 - 1. GP (poorly graded gravel).
 - 2. GM (silty gravel).
 - 3. GC (clayey gravel).
 - 4. SW (well-graded sand).
 - 5. SP (poorly graded sand).
 - 6. SM (silty sand).
- C. Unsatisfactory Soil Material (ASTM D 2487):
 - 1. SC (clayey sand).
 - 2. CL (lean clay).
 - 3. ML (silt).
 - 4. OL (organic clay).
 - 5. OL (organic silt).
 - 6. CH (fat clay).
 - 7. MH (elastic silt).
 - 8. OH (organic clay).
 - 9. OH (organic silt).
 - 10. PR (peat).
- D. Backfill and Fill: Satisfactory soil materials.
- E. Subbase: Naturally or artificially graded mixture of natural or crushed gravel, crushed stone, and natural or crushed sand; ASTM D 2940; Generally either an MDOT Class II sand or 21AA gravel will meet this requirement. Refer to the plans for specific requirements.
- F. Base: Naturally or artificially graded mixture of natural or crushed gravel, crushed stone, and natural or crushed sand; ASTM D 2940; Generally either an MDOT Class II sand or 21AA gravel will meet this requirement. Refer to the plans for specific requirements.

- G. Engineered Fill: Naturally or artificially graded mixture of natural or crushed gravel, crushed stone, and natural or crushed sand; ASTM D 2940; Generally either an MDOT Class II sand or 21AA gravel will meet this requirement.
 - 1. Clean granular fill meeting MDOT Class II grading requirements.
 - 2. On-site granular deposits within the excavation can be used as engineered fill if approved by the geotechnical engineer and if selective excavation procedures are employed to manage existing clay deposits.
 - 3. Import fill as required to make-up volumes necessary to raise the building site.
 - 4. Refer to the plans for specific requirements.
- H. Bedding: Naturally or artificially graded mixture of natural or crushed gravel, crushed stone, and natural or crushed sand; Generally either an MDOT 3G, 5G, 6A, or 34R will meet this requirement. Bedding requirements of the agencies having jurisdiction over the utility installation take precedence over these specifications.
- I. Drainage Fill: Washed, narrowly graded mixture of crushed stone, or crushed or uncrushed gravel; ASTM D 448; Generally either an MDOT 6A or 34R will meet this requirement. Refer to the plans for specific requirements.
- J. Impervious Fill: Clayey gravel and sand mixture capable of compacting to a dense state.

2.2 ACCESSORIES

- A. Drainage Fabric: Nonwoven geotextile, specifically manufactured as a drainage geotextile; made from polyolefins, polyesters, or polyamides; with minimum properties determined according to ASTM D 4759 and referenced standard test methods.
- B. Separation Fabric: Woven geotextile, specifically manufactured for use as a separation geotextile; made from polyolefins, polyesters, or polyamides; with minimum properties determined according to ASTM D 4759 and referenced standard test methods.

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 created by earthwork operations.
- B. Protect subgrades and foundation soils against freezing temperatures or frost. Provide protective insulating materials as necessary.
- C. Provide erosion-control measures approved by agency having jurisdiction to prevent erosion or displacement of soils and discharge of soil-bearing water runoff or airborne dust to adjacent properties and walkways.

3.2 EXPLOSIVES

- A. Explosives: Explosives are prohibited for use on the Project site.

3.3 EXCAVATION, GENERAL

- A. General: Excavation includes the removal of any materials necessary to achieve the required subgrade elevations and includes reuse or disposal of such materials.

- B. Unnecessary Excavation: The expense of excavation of materials outside of limits indicated or ordered in writing by the architect and the correction thereof to the satisfaction of the architect shall be borne by the contractor.
 - 1. Unnecessary excavation under footings: Either deepen footings to bear on actual subgrade elevation without changing top elevations or place concrete fill up to required elevation, as required by the architect.
 - 2. Unnecessary excavation other than under footings: Either place compacted fill or otherwise correct conditions, as required by the architect.
- C. Approval of Subgrade: Notify the Testing Agency when required elevations have been reached.
 - 1. When required by the architect due to the unforeseen presence of unsatisfactory materials or other factors, perform additional excavation and replace with approved compacted fill material in accordance with the architect's or geotechnical engineer's instructions.
 - 2. Payment for unforeseen additional work will be made in accordance with established unit prices or, if none, in accordance with provisions for changes in the work. No payment will be made for correction of subgrades improperly protected against damage from freeze-thaw or accumulation of water, or for correction of otherwise defective subgrades.
- D. Excavation Stabilization: Slope faces of excavations to maintain stability in compliance with requirements of governing authorities. Do not use shoring and bracing where faces can be sloped.

3.4 EXCAVATION FOR STRUCTURES

- A. Do not proceed with excavations for building structures until Subgrade Preparation operations are complete and tested.
- B. Excavate to indicated elevations and dimensions within a tolerance of plus or minus 1 inch (25 mm). Extend excavations a sufficient distance from structures for placing and removing concrete formwork, for installing services and other construction, and for inspections.
 - 1. Excavations for Footings and Foundations: Do not disturb bottom of excavation. Excavate by hand to final grade just before placing concrete reinforcement. Trim bottoms to required lines and grades to leave solid base to receive other work.
 - 2. Pile Foundations: Stop excavations from 6 to 12 inches (150 to 300 mm) above bottom of pile cap before piles are placed. After piles have been driven, remove loose and displaced material. Excavate to final grade, leaving solid base to receive concrete pile caps.
 - 3. Excavation for Underground Tanks, Basins, and Mechanical or Electrical Utility Structures: Excavate to elevations and dimensions indicated within a tolerance of plus or minus 1 inch (25 mm). Do not disturb bottom of excavations intended for bearing surface.
- C. Coordinate excavations with Dewatering operations as required to allow construction of foundations to dry.

3.5 EXCAVATION FOR WALKS AND PAVEMENTS

- A. Excavate surfaces under walks and pavements to indicated cross sections, elevations, and grades.

3.6 EXCAVATION FOR UTILITY TRENCHES

- A. Excavate trenches to indicated gradients, lines, depths, and elevations.
- B. Excavate trenches to uniform widths to provide a working clearance on each side of pipe or conduit. Excavate trench walls vertically from trench bottom to 12 inches (300 mm) higher than top of pipe or conduit, unless otherwise indicated.

- C. Trench Bottoms: Excavate and shape trench bottoms in accordance with the plans and standard details. Excavate trenches a minimum 4 inches (100 mm) deeper than bottom of pipe elevation to allow for bedding course (excavate deeper as required by the regulating agency). Hand excavate for bell of pipe. Remove projecting stones and sharp objects along trench subgrade.
 - 1. Excavate trenches a minimum 4 inches (100 mm) deeper than bottom of pipe elevation to allow for bedding course (excavate deeper as required by the regulating agency). Hand excavate for bell of pipe. Remove projecting stones and sharp objects along trench subgrade. Provide bedding course per the plan notes and/or details.

3.7 SUBGRADE PREPARATION AND INSPECTIONS

- A. Perform mass earthwork operations to remove all existing topsoil and other organic materials in their entirety within the footprint of the proposed building and pavement areas. Buried objects should be removed in their entirety.
- B. Notify Testing Agency when excavations have reached required subgrade elevations.
- C. Proof-roll subgrade in the presence of the Testing Agency to identify soft pockets and areas of excess yielding. Do not proof-roll wet or saturated subgrades.
 - 1. Completely proof-roll subgrade in one direction repeating proof-rolling in direction perpendicular to the first direction. Limit vehicle speed to 3 mph.
 - 2. Proof-roll subgrade with heavy pneumatic-tired equipment or loaded 10-wheel, tandem-axle truck weighing not less than 15 tons.
 - 3. Excavate soft spots, unsatisfactory soils, and areas of excessive pumping or rutting, as determined by the Testing Agency, and replace with engineered fill as directed.
- D. If Testing Agency determines that unsatisfactory soil is present, continue excavations and replace with compacted backfill or fill materials as directed.
 - 1. Additional excavation and replacement material will be paid for according to Contract provisions for changes in the Work.
- E. Reconstruct subgrades damaged by freezing temperatures, frost, rain, accumulated water, or construction activities.

3.8 UNAUTHORIZED EXCAVATION

- A. Fill unauthorized excavation under foundations or wall footings by extending bottom elevation of concrete foundation or footing to excavation bottom, without altering top elevation. Lean concrete fill may be used at no additional cost to the Owner.

3.9 STORAGE OF SOIL MATERIALS

- A. Stockpile borrow materials and satisfactory excavated soil materials. Stockpile soil materials without intermixing. Place, grade, and shape stockpiles to drain surface water. Cover to prevent windblown dust.
 - 1. Stockpile soil materials away from edge of excavations. Do not store within drip line of remaining trees.

3.10 BACKFILL

- A. Place and compact backfill in excavations promptly, but not before completing the following:
 - 1. Construction below finish grade including, where applicable, dampproofing, waterproofing, and perimeter insulation.
 - 2. Surveying locations of underground utilities for record documents.
 - 3. Inspecting and testing underground utilities.
 - 4. Removing concrete formwork.
 - 5. Removing trash and debris.
 - 6. Removing temporary shoring and bracing, and sheeting.
 - 7. Installing permanent or temporary horizontal bracing on horizontally supported walls.

3.11 UTILITY TRENCH BACKFILL

- A. Place and compact bedding course on trench bottoms and where indicated. Shape bedding course to provide continuous support for bells, joints, and barrels of pipes and for joints, fittings, and bodies of conduits.
- B. Place and compact initial backfill of subbase material, free of particles larger than 1 inch (25 mm), to a height of 12 inches (300 mm) over the utility pipe or conduit. All pipe backfill to be done according to the details shown on the plans or the requirements of the regulating agency.
- C. Fill voids with approved backfill materials while shoring and bracing, and as sheeting is removed.

3.12 FILL

- A. Preparation: Remove vegetation, topsoil, debris, unsatisfactory soil materials, obstructions, and deleterious materials from ground surface before placing fills.
- B. Plow, scarify, bench, or break up sloped surfaces steeper than 1 vertical to 4 horizontal so fill material will bond with existing material.
- C. Place and compact fill material in layers to required elevations as follows:
 - 1. Under grass and planted areas, use satisfactory soil material.
 - 2. Under walks and pavements, use satisfactory soil material as long as the geotechnical engineer deems the material to be suitable and the compaction requirements can be met.
 - 3. Under steps and ramps, use engineered fill.
 - 4. Under building slabs, use engineered fill.
 - 5. Behind walls, use engineered drainage fill.
 - 6. Under footings and foundations, use engineered fill.
 - 7. Over excavated areas, use engineered fill or lean concrete.

3.13 MOISTURE CONTROL

- A. Uniformly moisten or aerate subgrade and each subsequent fill or backfill layer before compaction to within two (2) percent of optimum moisture content.
 - 1. Do not place backfill or fill material on surfaces that are muddy, frozen, or contain frost or ice.

3.14 COMPACTION OF BACKFILLS AND FILLS

- A. Place backfill and fill materials in layers not more than 8 inches (200 mm) in loose depth for material compacted by heavy compaction equipment, and not more than 4 inches (100 mm) in loose depth for material compacted by hand-operated tampers.

- B. Place backfill and fill materials evenly on all sides of structures to required elevations, and uniformly along the full length of each structure.
- C. Compact soil to not less than the following percentages of maximum dry unit weight according to ASTM D 698 and ASTM D 1557:
 1. Under structures, building slabs, steps, and pavements, scarify and recompact top 12 inches (300 mm) of existing subgrade and each layer of backfill or fill material at 95 percent.
 2. Under walkways, scarify and recompact top 6 inches (150 mm) below subgrade and compact each layer of backfill or fill material at 95 percent.
 3. Under lawn or unpaved areas, scarify and recompact top 6 inches (150 mm) below subgrade and compact each layer of backfill or fill material at 88 percent.

3.15 GRADING

- A. General: Uniformly grade areas to a smooth surface, free from irregular surface changes. Comply with compaction requirements and grade to cross sections, lines, and elevations indicated.
 1. Provide a smooth transition between adjacent existing grades and new grades.
 2. Cut out soft spots, fill low spots, and trim high spots to comply with required surface tolerances.
- B. Site Grading: Slope grades to direct water away from buildings and to prevent ponding. Finish Subgrades to required elevations within plus or minus 1 inch.
- C. Grading Inside Grading Lines: Finish subgrade to a tolerance of ½ inch, when tested with a 10 foot straight-edge.
- D. Contractor shall confirm that the proposed grades shown on the plans will not create a ponding water condition (i.e. an unintended low spot or pavement grades of less than 1%).

3.16 SUBSURFACE DRAINAGE

- A. Subsurface Drain: Place a layer of drainage fabric around perimeter of drainage trench. Place a 6 inch course of filter material on drainage fabric to support drainage pipe. Encase drainage in a minimum of 12 inches of filter material and wrap in a drainage fabric, overlapping sides and ends at least 6 inches.
 1. Compact each course of filter material to 95 percent of maximum dry unit weight according to ASTM D 698.
- B. Drainage Backfill: Place and compact filter material over subsurface drain, in width indicated, to within 12 inches of final subgrade. Overlay drainage backfill with one layer of drainage fabric, overlapping sides and ends at least 6 inches.
 1. Compact each course of filter material to 95 percent of maximum dry density according to ASTM D 698.

3.17 SUBBASE AND BASE COURSES

- A. If indicated on the plans or deemed necessary by the geotechnical engineer, install separation fabric on prepared subgrade according to manufacturer's written instructions, overlapping sides and ends.
- B. Under pavements and walks, place subbase course on separation fabric according to fabric manufacturer's written instructions if fabric is called for on the plan or deemed necessary by the geotechnical engineer.
- C. Under pavements and walks, place base on prepared subbase or subgrade as follows:
 1. Place base course material over subbase (or subgrade if subbase is not indicated).

2. Compact subbase and base courses at optimum moisture content to required grades, lines, cross sections, and thickness to not less than 95 percent of maximum dry unit weight according to ASTM D 1557.
 3. When thickness of compacted subbase or base course exceeds 6 inches, place materials in equal layers, with no layer more than 6 inches thick or less than 3 inches thick when compacted.
- D. Pavement Shoulders: Place shoulders along edges of subbase and base course to prevent lateral movement. Construct shoulders, at least 12 inches wide, of satisfactory soil materials and compact simultaneously with each subbase and base layers to not less than 95 percent of maximum dry unit weight according to ASTM D 1557.

3.18 DRAINAGE COURSE

- A. Under slabs-on-grade, if indicated on the plans, place drainage fabric on prepared subgrade according to manufacturer's written instructions, overlapping sides and ends.
- B. Under slabs-on-grade, place drainage course on prepared subgrade and as follows:
1. Compact drainage course to required cross sections and thickness to no less than 95 percent of maximum dry unit weight according to ASTM D 698.
 2. When compacted thickness of drainage course exceeds 6 inches, place materials in equal layers, with no more than 6 inches thick or less than 3 inches thick when compacted.

3.19 FIELD QUALITY CONTROL

- A. Testing Agency: Construction Manager/Owner will engage a qualified independent Geotechnical engineering testing agency to perform field quality-control testing.
- B. Allow testing agency to inspect and to test any subgrades and each fill or backfill layer. Proceed with subsequent earthwork only after test results for previously completed work. Comply with requirements.
- C. Testing agency will test compaction of soils in place according to ASTM D 1556, ASTM D 2167, ASTM D 2922, and ASTM D 2937, as applicable.
- D. When testing agency reports that subgrades, fills, or backfills have not achieved degree of compaction specified, scarify and moisten or aerate and remove and replace soil to depth required, recompact and retest until specified compaction is obtained.

3.20 PROTECTION

- A. Protecting Graded Areas: Protect newly graded areas from traffic, freezing, and erosion. Keep free of trash and debris.
- B. Repair and reestablish grades to specified tolerances where completed or partially completed surfaces becomes eroded, rutted, settled, or where they lose compaction due to subsequent construction operations or weather conditions.
- C. Protect all existing trees, bushes, plants, etc. indicated to remain during construction activities.

3.21 DISPOSAL OF SURPLUS AND WASTE MATERIALS

- A. Disposal: Unless otherwise indicated on the drawings, remove surplus satisfactory soil and waste materials, including unsatisfactory soil, trash, and debris, and legally dispose of it off the Owner's property.
 - 1. Do not burn materials on the Owner's property.

END OF SECTION 31 2000