

SECTION 200 - EXCAVATION, FILLING & GRADING

200.01 DESCRIPTION

Work consists of all labor, materials, equipment and services necessary for and incidental to the execution and completion of earthwork as indicated on the drawings and specified herein. The extent of excavation, filling and grading is shown on the drawings. Preparation of subgrade for slabs and pavements is part of this work. Backfilling around facilities such as structures, curbs, pavements, etc., is also included as part of this work.

200.02 REFERENCE STANDARDS

MDSHA	Section 916
AASHTO	M145 and T180
ASTM	A36, A328, D1556, and D2321
OSHA	Requirements
NRCS-MD	Code 378 Pond Standards and Specifications
M-NCPPC	Section 723 – Landscape Soil Section 728 – Athletic Fields

200.03 DEFINITIONS

- A. Rock Excavation: Rock excavation consists of removal and disposal of mineral materials that cannot be excavated without the use of explosives or pneumatic equipment. It is not removable by use of a Caterpillar model D-8 Bulldozer or equivalent with a single-tooth ripper. Typical materials classified as rock are, solid rock, rock in ledges, and rock hard aggregate. Intermittent drilling performed to increase production but not necessary to permit excavation of material encountered will be classified as earth excavation.
- B. Earth Excavation: Removal of any mineral materials not classified as rock.
- C. Unsuitable Materials: Debris, man-made or fabricated materials, concrete spoil, decayable material, and soft, expansive or unstable matter which cannot be field compacted to densities specified herein.

200.04 MATERIALS

- A. Fill and backfill (Refer to section 916 - MDSHA, Standard Specifications, latest version)

Minimum requirements:

1. Cohesionless materials shall be classified in accordance with AASHTO M145 as either A-3 (sand) or A-2 (sand and fines), and the minimum dry unit weight shall not be less than 110 PCF maximum dry density as determined by ASTM D-1566 and AASHTO T180.
2. Cohesive materials shall be classified in accordance with AASHTO M145 as either A-4

(silt), A-5 (silt), A-6 (clay) or A-7 (clay) with a minimum dry unit weight not less than 105 PCF maximum dry density as determined by ASTM D1566 and AASHTO T180..

3. Backfill and Fill Materials: Satisfactory soil materials approved by the M-NCPPC Construction Manager and free of rock or gravel larger than 2 inches (within the top 12 inches of subgrade) in any dimension, debris, waste, frozen materials, organic and other deleterious matter.
 4. For topsoil please refer to Section 723 Landscape Soil.
- B. Sheeting, shoring and bracing materials shall be timber, steel or aluminum , or a combination thereof, designed as required by a Professional Engineer registered in the State of Maryland, to retain the earth around structures, prevent cave-in and settlements, and to fulfill all safety requirements.
1. Timber shall be structural grade with minimum working stress of 1,100 psi.
 2. Steel sheet piling shall conform to requirements of ASTM A328, continuous interlocking type. Struts, bracing and all other accessories required for the sheet piling system shall meet requirements of ASTM A36.

200.05 SUBMITTALS

Test Reports for Excavating, Filling, and Grading. The Contractor shall be responsible for hiring a Geotechnical Engineer to carry out soil testing for all structural fills and pond embankments and as required. The soil testing service shall submit two (2) copies of the following reports directly to the M-NCPPC Construction Manager, with a copy to the Contractor.

- A. Verification of each footing compaction of the subgrade.
- B. Field density test reports.
- C. One optimum moisture-maximum density curve for each type of soil encountered.
- D. Report of actual unconfined compressive strength and/or results of bearing tests of each 8” stratum tested.
- E. Summary of all testing and certification (sealed by a Maryland licensed Professional Engineer) that construction was completed in accordance with contract drawings and specifications.

200.06 QUALITY ASSURANCE

- A. The Contractor must supply evidence of having performed similar fine grading work on at least three (3) other sites especially in regard to maintaining the degree of accuracy outlined in the grading specifications.
- B. The equipment used shall be capable of producing work within the grading tolerance as specified within this specification.

200.07 CONSTRUCTION

A. Site Information:

1. Data on indicated subsurface conditions received from the geotechnical company are not intended as representations or warrants of continuity of such conditions between soil borings. It is expressly understood that M-NCPPC will not be responsible for interpretations or conclusions drawn by Contractor. Data are made available for the convenience of the Contractor.
2. Additional test borings and other exploratory operations may be made by Contractor at no cost to M-NCPPC.

B. Existing Utilities: Locate existing underground utilities in the areas of work. If utilities are to remain in place, provide adequate means of protection during earthwork operations.

1. Should piping or other utilities be encountered during excavation, consult the M-NCPPC Construction Manager immediately for directions as to procedures. Cooperate with M-NCPPC and utility companies in keeping respective services and facilities in operation. Repair damaged utilities to satisfaction of the utility company and M-NCPPC.
2. Do not interrupt existing utilities serving facilities occupied and used by the Commission or others, except when permitted in writing by the M-NCPPC Construction Manager and then only after acceptable temporary utility services have been provided.

C. Use of Explosives: Use of explosives is prohibited. If there are no other options, the use of explosives may be authorized with prior written permission from M-NCPPC and any authorities having jurisdiction. The Contractor is solely responsible for handling, storage, and use of explosive materials when their use is permitted.

D. Protection

1. Safety: Provide protective measures necessary for the safety of work personnel, the public and adjacent property. The Contractor shall be responsible to prevent cave-ins, collapse of walls, structures and slopes, both on and adjacent to the site.
2. Standards: Comply with regulations of local authorities having jurisdiction, including all applicable OSHA requirements.
3. Repair: Include the removal of damaged materials and replacement with new materials (as required by original Contract Documents) where such materials are affected by settlement or other damage.

E. Site Preparation

1. Excavation consists of cutting, removing, filling, compacting and grading of material encountered when establishing required grade elevations in accordance with plans and specifications that are not classified rock excavation or unauthorized excavation. All topsoil must be removed from all areas prior to grading. Topsoil shall be stripped, stockpiled and re-spread onsite on the unpaved areas.
2. Rock Excavation outside of these limits shall be carried out only at the discretion and direction of the M-NCPPC Construction Manager. If rock is not removed during the process of normal digging and ripping, then extend the excavation to expose the rock surface within the limit of original excavation. The Contractor shall contact the M-NCPPC Construction Manager or his representative for further direction.
3. Unauthorized excavation consists of removal of materials in excavation under footings, foundation bases, retaining walls, slabs, slopes, site grading by extending indicated bottom elevations of footings or indicated subgrade elevations or indicated line grades or dimensions without specific direction of the M-NCPPC Construction Manager. All unauthorized excavation including remedial work such as backfilling and compacting with earth or gravel, lean concrete fill or any other material to bring elevations to grades as specified and to the satisfaction of the M-NCPPC Construction Manager, shall be carried out at the Contractor's expense.
4. Additional excavation: When excavation has reached the required grades, subgrade elevations and lines, notify the M-NCPPC Construction Manager, who will inspect the site. If unsuitable bearing materials are encountered at required elevations, the M-NCPPC Construction Manager and/or Geotechnical Engineer may require further (deeper) excavation and replacement of unsuitable (excavated) material.
 - a. All areas to be paved will be proof rolled at subgrade in the presence of the M-NCPPC Construction Manager or Inspector. If deemed necessary, bad soils below subgrade will be undercut and replaced as described below. At the end of each day undercutting is performed, the Contractor shall certify, in writing, the quantity, in cubic yards, of undercutting performed in agreement with the M-NCPPC Inspector. Both parties shall sign the certification, which shall be submitted to the M-NCPPC Construction Manager.
 - b. Type 1 Undercutting: Wherever possible, remove unsuitable soils and distribute on-site in locations designated by the M-NCPPC Construction Manager; otherwise materials will be hauled off-site at no additional cost to M-NCPPC. Suitable soils will be placed in the undercut area from on-site sources: as directed by the M-NCPPC Construction Manager. Refer to appropriate compaction section.
 - c. Type 2 Undercutting: Wherever possible, remove unsuitable soils and distributed on-site in locations designated by the M-NCPPC Construction Manager; otherwise materials will be hauled off-site at no additional cost to M-NCPPC. CR-6 stone or other select borrow material, as approved by M-NCPPC Construction Manager, will be hauled in and used as replacement material. Refer to appropriate compaction

section.

5. Stability of Excavations: Slope sides of excavations to comply with local codes and ordinances having jurisdiction. Shore and brace where sloping is not possible due to space restrictions or stability of materials excavated. Maintain sides of slopes of excavations in safe conditions until completion of backfilling.
6. Dewatering:
 - a. Prevent surface water and subsurface or groundwater from flowing into excavations and flooding project site and surrounding area.
 - b. Do not allow water to accumulate in excavations. Remove water to prevent softening of subgrades, foundation bottoms, undercutting footings, and soil changes detrimental to stability of subgrades and foundations. Provide and maintain pumps, sumps, suctions and discharge lines, and other dewatering system components necessary to convey water from excavations.
 - c. Convey water removed from excavations to collecting or run-off areas with approval of MCDPS Inspector and M-NCPPC Construction Manager. All water shall be discarded into stabilized sediment trapping devices. Provide and maintain temporary drainage ditches and other diversions outside excavation limits for each structure. Do not use trench excavations as temporary drainage ditches.
 - d. Contractors shall be aware of low areas that are likely to experience groundwater seeps and take appropriate measures to properly dewater excavations in those areas.
 - e. Dewatering will be the responsibility of the contractor and shall be done in conformance with best management practices and shall be incidental to the contract. M-NCPPC shall not pay for areas requiring undercutting due to insufficient dewatering practices.
7. Material Storage:
 - a. Stockpile and protect satisfactory excavated materials, until required for backfill or fill. Place, grade and shape stockpiles for proper drainage.
 - b. Locate and retain soil materials away from edge of excavations.
 - c. Dispose of excess unsatisfactory and/or waste materials as specified hereinafter.
8. Excavation for Structures:
 - a. Conform to elevations and dimensions shown within a tolerance of plus or minus one (1) inch and extending sufficient distance from footings and foundations to permit placing and removal of concrete formwork, installation of services, other construction and for inspection.

- b. In excavating for footings and foundations, do not disturb bottom of excavation. Excavate by hand to final grade just before concrete is placed. Trim bottoms to required lines and grades to leave solid base to receive other work.
 - c. Concrete footings, foundations and like structures shall be placed at the elevations shown on the drawings or as specified. Buried walls of former structures, which may exist where footings, foundations, etc., are to be placed, are to be removed to 1 foot below the elevations of bottoms of such footings, foundations, etc. When this has been accomplished, the M-NCPPC Construction Manager shall inspect such walls and if they find them to be structurally sound, removal shall cease. However, if the M-NCPPC Construction Manager considers further removal necessary, the Contractor shall proceed until suitable conditions are reached. The Contractor shall accomplish such removal to the elevations of bottoms of footings, foundations, etc., as part of the contract; however, he shall be paid for required removal 1 foot below these elevations. Also, if due to the character of the soil or to encountering utilities or obstacles not known to exist, the M-NCPPC Construction Manager orders other additional excavation performed, the Contractor shall be paid for such work, as well as for further removal of walls, in accordance with applicable unit prices listed in the Bid or Proposal. However, the Contractor will not be paid for excessive excavation as a result of an error on their part.
 - d. All topsoil shall be removed from areas where footings, foundations, pavement or structures are to be built. If the topsoil extends deeper than proposed elevations, then follow procedure given in the Additional Exaction section of this.
9. Excavation for Stone, Concrete, and Bituminous Pavements: Cut surface under pavements to comply with cross-sections, elevations and grades as shown. All excavated areas, which are to be paved, shall be compacted in accordance with paragraph 12 the Fills and Backfills section of this specification
- a. Where rock is encountered, carry excavation 1 foot below subgrade and backfill with suitable material approved by the Geotechnical Engineer.
 - b. All topsoil under areas to be paved with stone, asphalt or concrete or similar paving materials, shall be removed. If unsuitable material is encountered, all unsuitable material shall be removed until suitable soil is encountered as directed by the M-NCPPC Construction Manager. At that point the M-NCPPC Construction Manager shall inspect the soil and if the suitable soil is located below than the required elevations for sub-base, sub-grade etc., the M-NCPPC Construction Manager shall direct the use of replacement material to bring grades up to required elevations. Such backfill materials shall be compacted in accordance with specifications for compaction until required density is achieved before proceeding with the next step. Follow procedure given in the Additional Excavation section of this specification.
10. Excavation for Ditches: Cut ditches to cross-sections and grades as shown on the plans. Deposit excavated materials to prevent cave-ins or material falling or sliding into ditch.

Keep ditches free of debris until final acceptance of the work.

11. Cold Weather Protection: Protect excavation bottoms against freezing when atmospheric temperature is less than 35 degrees F.

12. Fills and Backfills:

- a. Improved unpaved areas: Areas on which fill is to be placed shall be stripped of all topsoil and then scarified prior to placement of fill. Fill material shall be placed in 8-inch (maximum thickness before compaction) layers to be continuous and horizontal over the entire length of fill. Each layer of fill shall be compacted by an approved power roller. Compaction shall be carried out at optimum moisture content to a dry density of 85% for non-structural areas. See Section 723 Landscape Soil for compaction of landscape or grass areas. See Section 322 Storm Drainage and Stormwater Management for installation and backfill requirements for SWM and Drainage Pipes. For slopes steeper than 3:1 please see plans for specifications or follow instructions given by M-NCPPC Construction Manager. The dry density of the compacted fill shall be determined by ASTM D1556 and AASHTO T180. The moisture content of the compacted embankment layers shall be as mentioned elsewhere. The remaining embankment shall be suitable earth fill, free from stones that will be retained on a sieve with 3-inch square openings or as directed by the M-NCPPC Construction Manager and compacted as specified above. Soft spots identified by the M-NCPPC Construction Manager during proof rolling will be undercut and backfilled. Proof rolling and compaction equipment shall meet the requirements as mentioned elsewhere. Payment for undercutting and backfilling to eliminate soft spots shall be made in accordance with the Contract provisions affecting the work.
- b. Paved surfaces and slab backfill: Compact after proof rolling and each layer of backfill or fill materials to 95% maximum dry density.
- c. Footings and Foundations: When permitted by M-NCPPC Construction Manager, sub-foundation concrete, CR-6 stone or other suitable materials, as approved by M-NCPPC Construction Manager, can be placed under footings and foundations and shall be compacted to not less than 95% maximum density.
- d. Athletic Fields: See Section 728 Athletic Fields for compaction information.
- e. Pond embankments: Construction for stormwater management facilities and other pond embankments shall be completed in accordance with NRCS-MD Code No. 378 Pond Standards/ Specifications and MCDPS Water Resources Section requirements.
- f. Moisture Control: The soils used in fill and backfill shall be moistened or aerated to within 2% of the optimum at no additional cost to the M-NCPPC.
 - 1) Where the soil layer is too dry, the Contractor shall apply water uniformly using

approved equipment to increase the moisture content to within 2% of the optimum.

- 2) Where the soil layer is too wet, the Contractor shall dry the soils by plowing or discing to aerate the soil and reduce the moisture content to within 2% of the optimum.
- g. Tests including classification, fill placement, and soil compaction shall be made under the supervision of the M-NCPPC Construction Manager or Inspector. Compaction Equipment shall be subject to approval by the M-NCPPC Construction Manager and shall meet the following criteria based on soil type as follows:
- 1) Cohesionless Soils: Vibratory drum compactors weighing in excess of five (5) tons and capable of providing minimum impact force 30,000 lbs. at minimum frequency of 100 vpm with smooth drum. The maximum speed shall not exceed five (5) mph and a minimum of three (3) passes is required for all areas.
 - 2) Cohesive Soils: Sheepsfoot or tamping rollers shall consist of metal drums or shells, not less than four (4) feet in diameter, equipped with self-cleaning tamping feet. Tamping rollers shall make at least four (4) complete coverages of the material being compacted and rolling shall continue until the tamping feet "build-up" or "walkout" of the surface. Operating speeds of tamping roller shall not exceed five (5) mph.

13. Fine Grading

- a. Uniformly grade areas within the limits of disturbance under this section, including the adjacent transition areas. Smooth finish surface within specified tolerances; compact in accordance with the Fills and Backfills section of this specification, with uniform levels or slopes between points where elevations are shown, or between such points and existing grades.
- b. Ditches: Finish ditches to ensure proper flow and drainage.
- c. Grassed Areas: Finish areas to receive topsoil to within not more than 1 inch above or below the required subgrade elevations.
- d. Pavements: Shape subgrade under pavement to line, grade and cross-section, with finish surface not more than 1/2 inch above or below the required subgrade elevation, duly compacted when tested with a 10' straightedge.
- e. Athletic Fields: The field shall be graded on the specified slope to a specified plane to the other or any point between the sides of said plane. If specified on the plans, the plane may require to be graded to a tolerance of 1/4 inch when measured from side-to-side or end-to-end.

- f. Grading Surface of Fill under Building Slabs: Grade smooth and even, free of voids, compacted as specified, and to required elevation. Provide final grades within a tolerance of 1/2 inch when tested with a 10-foot straightedge.
- g. Grading Surface for SWM or Drainage pipes: Tolerance for final grades shall be within a tenth (1/10) foot. Top six (6) inch of soil must be approved topsoil for vegetated or wooded areas. Refer to Section 322 Storm Drainage and Stormwater Management for additional information.

14. Maintenance

- a. Protection of Graded Areas: Protect newly graded areas from traffic and erosion and keep free of trash and debris. Repair and re-establish grades in settled, eroded, and/or rutted areas to specified tolerances.
- b. Reconditioning Compacted Areas: Where completed compacted areas are disturbed by subsequent construction operations or adverse weather, scarify surface, reshape, and compact to required density prior to further construction.

15. Disposal of Excess and Waste Materials shall be the removal from M-NCPPC Property and disposed in an approved disposal location. Remove waste materials, including unacceptable excavated material, trash, and debris from the M-NCPPC property and legally dispose of it. Off-site disposal shall be considered incidental to contract.

200.08 MEASUREMENTS AND PAYMENT

Payment will be full compensation for all material, labor, equipment, tools and incidental items necessary to complete the work. Payment shall be made on a unit rate or lump sum basis as indicated in the bid items. The determination of rock excavation shall be measured in the field by M-NCPPC and paid for as Unit Price per cubic yard or method acceptable to the M-NCPPC Construction Manager. The rock excavation as measured in the field shall be deducted from the volume of Excavation item provided it is within the grading limits of the area.