

Montgomery County Public Schools Facilities Guide  
DIVISION 2 - SITE WORK

**Conditions of Use/ Responsibility of Data**

These “guideline” specifications are to be used by the A/E as a base document in the development of project/site-specific Division 2 – SITE WORK specifications for Montgomery County Public Schools Construction Projects. They may or may not be complete, correct and/or appropriate for use for any given project. It is the responsibility of the A/E to review these “guideline” specifications and to edit and/or supplement them as required to ensure that they represent the full, complete, correct and code-compliant specifications required for all construction of the project to which they apply. The use of these “guideline” specifications, and/or any information herein, in no way releases the A/E from their contractual responsibility to prepare and provide the full, complete and correct code-compliant contract documents, plans and/or specifications required for construction.

Review and editing of these “guideline” specifications shall be performed by appropriately licensed Maryland professional engineer. Specifications are to be prepared in Microsoft Word, edited using the “Track Changes” feature of that software and submitted to MCPS electronically on a compact Disk for review.

**SECTION 02100 - EARTHWORK AND GRADING**

**PART 1 - GENERAL:**

1.1 RELATED DRAWINGS:

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions, and Division 1, Specification Sections, apply to Work in this section.

1.2 DESCRIPTION OF WORK:

- A. section specifies materials, equipment and Work required to perform earthwork and grading operations for site development including:
  - 1. Rough grading
  - 2. Sediment control measures
  - 3. Excavation of materials and disposal of unsuitable materials
  - 4. Footing and foundation trenches and pits
  - 5. Stability of excavations
  - 6. Removal of water
  - 7. Filling, backfilling and compacting
  - 8. Finish grading
  - 9. Trenching and backfilling for piped utilities
  - 10. Porous fill under concrete slabs
  - 11. Testing and inspections

1.3 RELATED SECTIONS:

- A. Refer to Section 02000 "Clearing", Section 02040 "Demolition", Section 02910 "Lawns" and Section 02920 "Landscape Work and Planting".

#### 1.4 CODES AND REGULATORY REQUIREMENTS:

- A. Contractor shall comply with applicable requirements of governing agencies and/or authorities having jurisdiction.
- B. Latest edition of Maryland Department of transportation, State Highway Administration, Standard Specifications for Construction and Materials (January, 2001) and approved addenda, except Method of Measurement and Basis of Payment, are controlling specifications for Work within State rights-of-way.
- C. Latest Montgomery County Department of Transportation standards and specifications for Work in County rights-of-way and on County property.

#### 1.5 EXAMINATION OF SITE DOCUMENTS

- A. Plans, surveys, measurements, and dimensions under which Work will be performed are believed to be correct. Examine both site and documents and report inconsistencies to Architect prior to beginning Work.

#### 1.6 SPECIAL REQUIREMENTS

- A. Topsoil Removal: No topsoil shall be removed from site without Owner's permission and fill material shall be subject to approval of Geotechnical/Soils Engineer and as further approved by both Architect and Owner.
- B. Soil Erosion and Sediment Control: Implement and maintain soil erosion and sediment control measures and conduct activities in accordance with Montgomery County Department of Permitting Services (MCDPS)-approved Contract drawings. Arrange for and secure required inspections and approvals and provide documentation of same.
- C. Layout and Grades: Layout lines and grade Work in accordance with Contract Documents. Establish permanent benchmarks determined by a Maryland Registered Land Surveyor or Professional Engineer. Maintain established bounds and benchmarks and replace, as directed, any which are destroyed or disturbed.
- D. Maintenance of Traffic: Do not close or obstruct any street, sidewalk, alley or passage-way unless specifically designated to be closed or obstructed on Contract drawings.
- E. Cleaning of Paved Surfaces: Clean and maintain paved roadways, sidewalks, and public thoroughfares on or adjacent to Job Site of dirt, earth and debris spillage from equipment involved in connection with Work at all times.
- F. Existing Utilities:
  - 1. Locate existing underground utilities in areas of Work. If utilities are to remain in place, provide adequate means of support and protection during earthwork operations. Notify Miss Utility 48 hours prior to excavation.

2. Should uncharted or incorrectly charted piping or other utilities be encountered during excavation, consult utility Owner immediately for directions. Cooperate with Owner and utility companies in keeping respective services and facilities in operation. Repair damaged utilities to satisfaction of utility Owner.
3. Do not interrupt existing utilities serving facilities occupied and used by Owner or others, during occupied hours, except when permitted in writing by Owner and then only after acceptable temporary utility services have been provided/if required.
4. Provide minimum of 48-hour notice to Owner and receive written notice to proceed before interrupting any utility.
5. Demolish and completely remove from site existing underground utilities indicated to be removed. Coordinate with utility companies for shut-off of services if lines are active.
6. Underground pipes greater than 4-inches in diameter that are indicated to be abandoned in place shall be filled with flow-able fill and permanently sealed at both ends.

#### 1.7 DEFINITIONS:

- A. Excavation: Removal of earth materials to sub-grade elevations indicated or specified.
- B. Over-Excavation: Removal of earth materials, beyond sub-grade elevations indicated or specified, without written authorization from Architect.
- C. Unsuitable Earth/Material: Defined as topsoil, organic soils, stone greater than 2" (in any direction), rock fragments, ice, snow, construction debris, shrink-swell soils, existing fill, and other material judged unsuitable by geotechnical engineer and material so classified in geotechnical report and soft or unstable earth materials (e.g. muck, soft clays, organic soils, peat, etc.), not meeting requirements of Section 02100.2.1.B.
- D. Unclassified Excavation: Defined as complete removal of materials encountered during excavation including rocks, organic materials, slabs, debris, concrete, paving, slabs etc. All excavation is unclassified.
- E. Fill: Placement of earth materials over existing ground surfaces to sub-grade elevations indicated or specified.
- F. Backfill: Placement of earth materials in excavations to sub-grade elevations indicated or specified.
- G. Soils Engineer: Shall be a Professional Engineer, currently registered in State of Maryland, or shall be an authorized representative of such an engineer.
- H. Trench: Defined as an excavation having vertical sides of any length in which width is not more than 10-feet and whose depth exceeds its width.

- I. Unauthorized Excavation: Defined as removal of materials beyond indicated sub-grade elevations or dimensions saving and, excepting required undercutting, without specific direction of Owner or Architect. Unauthorized excavation, as well as remedial Work directed by Construction Manager or General Contractor, shall be at Contractor's expense.
- J. Finished Grade: Defined as required final grade elevations indicated. Spot elevations shall be given uniformed slopes between points for which finished grades are indicated or between such points and existing established grades.
- K. Sub-grade: Defined as required surface of subsoil, borrow fill or compacted fill. Surface is immediately beneath site improvements, specially dimensioned fill, paving, loam or other surfacing material. See Section 02910, "Lawns" for preparation of landscape areas.
- L. Structure: Defined, within this scope of the Work, to include buildings, foundations, slabs, curbs and gutters, site improvements, and other man-made stationary features occurring above or below ground surface.

#### 1.8 SUBMITTALS:

- A. Density Test Results: Contractor shall submit copies of results of specified density testing to Owner's Representative for review and approval.
- B. Submit location of product manufacture and of harvest, extraction/recovery of primary raw materials.
- C. Submit recycled-content data, designating percentages of post-consumer and post-industrial recycled material.
- D. Test Reports-Excavating: Testing and inspection service will submit following reports directly to Architect from testing services, with copy to Contractor and Owner's representative.
  - 1. Test reports on borrow material.
  - 2. Verification of each footing sub-grade.
  - 3. Field density test reports.
  - 4. One optimum moisture-maximum density curve for each type of soil encountered, but no less than one curve for each 1,000 cubic yards of any particular soil encountered.
  - 5. Report of actual unconfined compressive strength and/or results of bearing.
- E. Documentation of Acceptance of Limits of Disturbance from the Sediment Control Inspector and M-NCPPC Forest Inspector.
- F. Documentation from M-NCPPC Environmental Planning Inspector that site has been prepared and tree protection measures have been installed in accordance with approved Final Forest Conservation or Tree Save Plan.
- G. Copies of inspection reports and violation notices.
- H. Inspection Certification that on-site topsoil has been screened on-site and meets the requirements of this specification.

1.9 PROJECT CONDITIONS:

- A. Existing Subsurface Conditions: Refer to Section 02010 "Subsurface Explorations". All excavation materials shall be "unclassified".
- B. Existing Utilities: Locations of existing utilities are approximate. Locations have been determined from field survey, public utility records and Owner records.
  - 1. Contractor shall be responsible for contacting "Miss Utility", Owner or controlling agencies of existing utilities within construction area for verification of locations, prior to beginning of Work.
  - 2. Contractor shall be responsible for coordination of utility relocation or removal by others with phases of construction activities.

1.10 TESTING AND INSPECTIONS:

- A. Contractor will employ and pay for a qualified Maryland Registered Professional Soils Engineer and testing agency that is acceptable to Owner and Architect to perform soil testing and inspection services for quality control testing during earthwork operations.
- B. Contractor shall provide testing and inspection services in complete compliance with Specification Section 01400 and the following:
  - 1. Agency will be responsible for soil type identification on site, sub-grade monitoring, testing of bearing capacity at each spread footing, monitoring fill operations and requirements and other geotechnical testing
- C. Services of Soils Engineer will not necessarily be on a full time basis, but will include number of visits and tests required to observe performance of earthwork under this Section. If in opinion of Soils Engineer, Work performed under this Section does not meet technical or design requirements stipulated for Work, the Contractor shall make all necessary readjustments to obtain approval.
- D. Earthwork procedures shall be performed in presence of Soils Engineer. Make all submittals in accordance with Section 1.8D above.

1.11 CONSTRUCTION SURVEYS:

- A. Provide survey equipment and qualified personnel for construction surveys. Provide stakes required to perform earthwork operations to sub-grade elevations indicated or specified.

1.12 EARTHWORK BALANCE:

- A. Perform earthwork operations regardless of actual quantities encountered.
  - 1. Excess materials shall be legally disposed of off project property.
  - 2. Off-site borrow shall be provided at no increase to Contract Sum.

**PART 2 - PRODUCTS:**

2.1 MATERIALS:

- A. Provide products manufactured of primary raw materials harvested, extracted/recovered within a 500-mile radius of project site.
- B. Some on-site soils may be suitable for use as structural fill or general fill. Contractor shall provide adequate test data indicating such soils meet requirements of section prior to placement.
- C. Fill material shall be free of deleterious matter such as ice, snow, organics, building rubble, construction debris, shrink-swell soils and rock greater than 2-inches in diameter.
- D. Definitions:
  - 1. Satisfactory/suitable soils are defined as those complying with ASTM D 2487 soil classification groups ML, SM, SC, GC, GP, GW or GM except where modified by geotechnical report.
    - a) Soils shall have a liquid limit less than 40 and a plasticity index less than 20.
    - b) Soils shall have a minimum CBR value of 3.0 and swell shall be less than 1 percent in accordance with ASTM D 1883 when compacted to 98% compaction per ASTM D 1557.
  - 2. Unsatisfactory soil materials are defined as those not meeting requirements above. Unacceptable fill materials include topsoil, organics (OH, OL), high plasticity silts and clays (MH, CH), and those specified in geotechnical report.
- E. Structural Fill: Provide satisfactory/suitable soils or gravel fill, compacted – in-place, to support site improvements and pavement sections.
- F. Dense-graded aggregate base for asphalt pavement support shall meet requirements of GA Base per latest edition of Maryland Department of Transportation, Standard Specifications for Construction and Materials (January 2001) and subsequently approved addenda thereto. Dense-graded aggregate base shall be compacted to at least 95 percent of maximum dry density per ASTM D 698 (AASHTO T-99).
- G. Gravel Fill: Natural or artificially graded mixture of gravel or stone as follows:

<b>Square Mesh Sieves</b>	<b>Percent Passing By Weight</b>
½"	100
¼"	25-60
#10	15-45



- P. Excavation Materials:
1. Classification of Material: All Materials to be excavated on this project are unclassified excavations.
  2. Differing Conditions: Should, during progress of Work, rock or physical conditions substantially differing from those described in project Geotechnical Report and generally recognized as being inherent in Work of such character be encountered, immediately notify Architect of conditions before they are disturbed.
  3. Excess Excavation Materials: Excess materials resulting from excavating operations and not used backfilling shall become property of Contractor and shall be legally disposed of off-site using approved methods to legal disposal sites. No on-site burying will be permitted.
- Q. Sand: Sand shall be clean and free from silt, clay, sticks and other foreign material complying with gradation requirements in ASTM C 33 for fine aggregate.

## 2.2 TOPSOIL

- A. Topsoil stockpiled for re-use (if any) shall be approved prior to incorporation in Work. If quantity of stockpiled topsoil is insufficient, provide additional topsoil as required.
- B. No topsoil is to be removed from site without Owner's permission.
- C. Prior to re-use on-site, stockpiled topsoil shall be screened and inspected by geotechnical engineer for compliance with specifications. Geotechnical engineer shall inspect and certify topsoil prior to its re-use on-site.
- D. Existing or imported topsoil shall be a fertile, friable, sandy loam containing organic matter of 2 percent or greater and shall be capable of sustaining vigorous plant growth. Topsoil shall consist of 60-75 percent sand, 15-30 percent silt, and 5-10 percent clay. It shall be free of add-mixture of subsoil, and contain no stones, lumps, clods of hard earth, slag, cinders, sticks, plants or their roots, trash or other extraneous materials greater than 1" in dimension. Topsoil must also be free of plant parts of Mugwort, Bermuda grass, Quack grass, Johnson grass, nut sedge, poison ivy, Canada thistle, or others as specified. Topsoil shall not be used for planting operations while in a frozen or muddy condition. Topsoil sources shall be tested by a recognized laboratory at expense of Contractor for pH, soil texture and soluble salts. Test results must be presented to Landscape Architect prior to placement of topsoil on site. Topsoil shall contain 3 percent decomposed organic determined by loss on ignition on moisture-free samples dried in accordance with current methods of Association of Official Agricultural Chemists.
- E. Acceptable soil test results:
- |                      |            |
|----------------------|------------|
| 1. pH range:         | 5.8-7.0    |
| 2. Organic Matter    | 10%        |
| 3. Magnesium (Mg)    | 100+ units |
| 4. Phosphorus (P205) | 150+ units |
| 5. Potassium (K20)   | 120+ units |

6. Soluble Salts/Conductivity Not to exceed 450 ppm/0.9 mmhos/cm (in soil); Not to exceed 300 ppm/2.5 mmhos/cm (in high organic mix)
7. Boron not to exceed 3 lbs./acre
8. Manganese not to exceed 50 lbs./acre

E. Topsoil Installation:

1. Topsoil mixture shall not to be spread until underground pipe work and fine sub grading is completed to the satisfaction of Owner in accordance with drawings.
2. Immediately prior to dumping and spreading topsoil mixture, subsurface shall be loosened by disking or by scarifying to depth of at least 5 inches to permit thorough bonding of topsoil. Fine grade areas to be top soiled to new contour grades, less topsoil mixture depth.
3. Add together a mixture of two-thirds sandy loam topsoil and one-third composted sewage sludge by volume to a depth of 4inches and rototill into subsoil. During spreading operation, this mixture shall be raked and stones in excess of one inch in diameter and rubbish shall be removed.
4. Topsoil mixture shall have a minimum thickness of six inches after natural settlement and light rolling and shall conform to grades and elevations as shown on drawings. Do not place topsoil mixture when muddy or frozen conditions exist.
5. Topsoil mixture shall be spread in areas to be sodded or seeded.
6. Obtain topsoil from project site stockpiles established during clearing operations. Obtain additional topsoil required for landscape development from off-site sources and transport to project site at no increase to Contract Sum. Topsoil shall not be delivered in frozen or muddy condition. Topsoil shall be screened before delivery to project site.
7. Transport excess topsoil from project site to off-site disposal areas or relocate excess topsoil stockpiles to locations on project site, where directed by Architect.

**PART 3 - EXECUTION:**

3.1 GENERAL:

A. Familiarization and General Information:

1. Prior to beginning Work, become thoroughly familiar with site, site conditions and portions of Work specified in this section.
2. Contractor shall conduct operations and execute Work in such fashion as not to preclude or obstruct required on-going operations of Owner and site occupant. Contractor shall immediately repair damages to buildings, streets, site improvements and utilities at no expense to Owner.
3. Data on indicated subsurface conditions as specified in geotechnical report, provided by Owner, are not intended as representations or warranties of accuracy or continuity between soil borings. It is expressly understood that Owner will not be

responsible for interpretations or conclusions drawn by Contractor. Data are made available for convenience of Contractor. Additional test borings and other exploratory operations may be made by Contractor at no cost to Owner.

4. Should uncharted, or incorrectly charted, piping or other utilities be encountered during excavation, consult utility Owner immediately for directions. Cooperate with Owner and utility companies in keeping respective services and facilities in operation. Repair damaged utilities to satisfaction of utility Owner.
- B. Blasting: Will not be permitted.
- C. Backfilling prior to approvals:
1. Do not allow or cause any Work to be performed, installed, covered up or enclosed by Work of this section prior to required inspections, tests, and approvals. Contractor is solely responsible for arranging and securing required inspections, tests and approvals.
  2. Should Work be enclosed or covered up before it has been approved, Contractor shall uncover such Work at no additional cost to Owner.
  3. After Work has been completely inspected, tested, and approved, make repairs and replacements necessary to restore Work to condition in which it was found at time of uncovering, at no additional cost to Owner.

### 3.2 CLEARING & SITE PREPARATION

- A. Before start of construction, all topsoil, organic soils, soils mixed with excessive amounts of roots or other organic materials, and all soft, loose, excessively wet or frozen soils shall be removed from building and pavement areas and including at least 5-ft. offsets outside building and pavement lines.
- B. Stockpile suitable materials, topsoil etc. on-site for reuse.
- C. Prepare site for construction by removing topsoil, and existing loose, soft, wet, organic, or otherwise unsuitable materials encountered within building construction limits which shall extend approximately ten feet beyond actual building and paving lines. Tree stumps shall be removed in their entirety. Stockpile topsoil in well-drained piles in locations as approved by Architect for later use. The entire stripped area shall be proof rolled utilizing a heavily-loaded dump truck or other pneumatic-tired vehicle of similar size and weight in presence of Soils Engineer. Proof rolling shall not be performed during or following wet weather conditions. Any unsuitable materials shall be removed and replaced as directed by Soils Engineer.
- D. Remove and dispose of materials resulting from site stripping, and on-site materials not acceptable for use as structural fill in an approved and lawful manner.

### 3.3 GRADING AND TOPSOIL INSTALLATION

- A. Topsoil is to be screened on-site and certified for conformance to specifications by geotechnical/soils engineer prior to placement or spreading of topsoil on site.
- B. Uniformly grade areas covered by project, including transition areas. Finished surface to be smooth, compacted and free from irregular surface changes. Ditches and swales to

readily drain as shown on plans and be free of humps or hollows.

C. Rough Grade or Finish Grade to following tolerances:

1. Rough Grade:  
Building, paved and sidewalk areas..... Plus or minus 0.1 foot  
Landscaped Areas.....Plus or minus 0.3 foot  
Athletic Fields.....Plus or minus 0.2 foot
2. Finish Grade:  
Building, paved and sidewalk areas.....Plus or minus 0.05 foot  
Landscaped Areas.....Plus or minus 0.1 foot  
Athletic Fields.....Plus or minus 0.4 foot

D. Topsoil Installation:

1. Topsoil mixture shall not to be spread until underground pipe work and fine sub-grading is completed to satisfaction of Owner in accordance with drawings.
2. Topsoil mixture shall not to be spread until underground pipe work and fine sub-grading is completed to satisfaction of Owner in accordance with drawings.
3. Immediately prior to dumping and spreading topsoil mixture, subsurface shall be loosened by disking or by scarifying to depth of at least 5 inches to permit thorough bonding. Fine grade all areas to be top soiled to new contour grades, less topsoil mixture depth.
4. Add together a mixture of two-thirds sandy loam topsoil and one-third composted sewage sludge by volume to a depth of 4 inches and rototill into subsoil. During spreading operation, this mixture shall be raked and stones in excess of one inch in diameter and rubbish shall be removed.
5. The topsoil mixture shall have a minimum thickness of six inches after natural settlement and light rolling and shall conform to grades and elevations as shown on plans. Do not place topsoil mixture when muddy or frozen conditions exist.
6. Topsoil mixture shall be spread on areas to be sodded or seeded.

3.4 FILL MATERIAL

- A. Fill material, imported or on-site, shall be free of organic inclusions, such as tree roots, frozen materials debris, cinders, or other deleterious materials. Fill material shall be approved by Soils Engineer and shall be ML or SM per ASTM D-2487. Fill material shall not contain rocks and lumps greater than 6 inches in dimension and not more than 15% of rocks and lumps shall be greater than 2-1/2" in dimension. Altering moisture contents to obtain adequate degrees of compaction shall be performed at no additional cost to Owner.
  1. Provide recycled aggregate (RC-6 concrete) for paving and walkway sub-base and fill material.
- B. Fill material shall be subject to approval of Soils Engineer and as further approved by Owner and Architect.

### 3.5 PROOF-ROLLING

- A. After site clearing and cutting of excavation areas, cleared and cut sub-grades shall be proof-rolled with a fully loaded 10-ton dump-truck in presence of Contractor's testing agency and Owner's Representative. Proof-roll two complete coverage's of building and pavement areas. Soft, loose, or unsuitable areas shall be removed and replaced with suitable compacted material.

### 3.6 PROTECTION AND RESTORATION:

- A. General: Provide protection to prevent settlement, movement, undermining of or erosion to existing site improvements, existing utilities, existing buildings, new site improvements, new buildings and new utilities.
- B. Do not permit heavy equipment to pass over any utility until a minimum of two feet of compacted fill or backfill is placed over the top of utility.
- C. Restore damage resulting from lack of protection or improper installation of protective measures or careless execution of construction activities at no increase to Contract Sum. Restoration Work to be approved by Soils Engineer and Owner's Representative.
- D. Protect structures, utilities, curbs, paving and trees indicated to remain, and other facilities in areas of Work. Barricade open excavations and provide warning lights from dusk to dawn each day. Use barrier gates and orange cones with yellow traffic tape to block off area of construction.
- E. Sheeting and Shoring:
  - 1. Prepare and coordinate any shoring, sheeting and bracing at excavations, as required, to ensure complete safety against collapse and/or displacement of earth at side of excavations. Comply with local safety regulations or in absence thereof, with provisions of AGCA's "Manual of Accident Prevention in Construction."
  - 2. Remove shoring as backfilling operations progress, taking necessary precautions to prevent collapse of excavation sides.
  - 3. Shoring or sheeting will not constitute a condition for which an increase may be made in Contract Sum.
- F. Freezing Temperature: Make no excavations to full depth indicated when freezing temperature may be expected, unless footings or slabs can be placed immediately after excavation has been completed. Protect bottom from frost if placing of concrete is delayed. Should protection fail, remove frozen materials and replace with concrete or gravel fill, as directed. Protect newly placed footings from frost penetration below bottom of footing.
- G. Barricade Open Excavations occurring as part of Work; post with warning lights. Operate warning lights as recommended by authorities having jurisdiction and standard practices.
- H. Protect structures, utilities, sidewalks, pavements, and other facilities from damage caused by settlement, lateral movement, undermining, washout, and other hazards cre-

ated by earthwork operations.

- I. Perform Excavation, within drip-line of large trees to remain, by hand and protect root system from damage or dry out to greatest extent possible. Maintain moist condition for root system and cover exposed roots with burlap. Paint root cuts of 1-inch diameter and larger with emulsified asphalt tree paint.

### 3.7 MEASUREMENT AND PAYMENT

- A. Unanticipated Soil Conditions: If unsuitable bearing materials are encountered at depths greater than indicated on borings and required by Contract Documents, extend excavation deeper and replace excavated material as directed.
- B. If part of excavation is extended, through error, beyond depth and dimensions indicated or specified, Contractor shall provide suitable compacted fill or concrete where directed by Architect up to required level at Contractor's expense.
- C. Excavation and removal of unsuitable materials below sub-grades indicated or as required by Contract Documents will be paid for as an extra only after removal of materials has been authorized by Owner. Quantities of excavation and removal involving an extra or other adjustment of Contract Sum are subject to measurement, verification, and approval by Architect, prior to removal of materials. Volume shall be established from dimensions of cut. Such dimensions shall be submitted to Owner's representative by Contractor for record.

### 3.8 EXISTING UTILITIES:

- A. Notify public utility companies, 48 hours prior to start of earthwork operations. Verify and mark horizontal utility locations prior to start of earthwork operation. Manually excavate and expose utilities as earthwork operations approach marked locations.
- B. Immediately notify Owner's Representative or Architect in event horizontal or vertical utility locations differ from locations indicated. Provide horizontal and vertical details of utility locations as directed by Owner's Representative or Architect. Conflicts with construction are to be determined by Owner's Representative or Architect. Payment for correction of unforeseen conflicts with construction shall be by change order.
- C. Coordinate public utility relocation Work required for public utilities conflicting with construction. Owner's Representative or Architect will provide directions and details required to relocate utilities conflicting with construction.
- D. Do not disconnect or interrupt existing utilities serving existing facilities to remain without notification and authorization of Architect or Owner's representatives.

### 3.9 DEWATERING:

- A. Perform earthwork and grading operations to prevent surface or subsurface water from flowing into excavations, surface or subsurface water from flooding project site or adjacent property and water accumulations detrimental to stability of sub-grades. Provide, install, operate and maintain required pumps, dikes, diversions, Sumps, discharge lines and related equipment required to maintain site, excavations and trenches free of standing water.

### 3.10 EXCAVATION:

- A. Excavation Classifications:

- 1. Excavate materials encountered to sub-grade elevations indicated or specified. Excavation is unclassified. Excavate materials regardless of character of the materials encountered, at no increase to Contract Sum. Remove substrate materials required to achieve proper sub-base, including, but not limited to: soils, organics, abandoned structures, rock, etc.

- B. General:

- 1. Excavate to lines, elevations, and limits indicated on plans and in specifications plus sufficient distance and space to permit erection of forms, shoring and inspections. Placing of concrete footings or foundations on existing fill is not permitted. Remove all existing fill below foundations. Fill any excess cuts under footings and foundation with structural fill. Excavate as required, regardless of type, condition, or moisture content of material encountered. If suitable bearings for foundations are not encountered at depths indicated, immediately notify Architect, protect excavation, and do not proceed further until instructions are given. Exposure of footing sub-grade shall be kept to a minimum. Footing concrete shall be placed on same day of excavation. If excavation must remain open overnight or if rainfall or other precipitation is eminent, protect sub-grade with a 2- to 4-inch-thick mud mat and other protection devices to ensure that excavation remains dry.
  - a. Remove existing man-placed fill in areas of addition and replace with satisfactory/suitable compacted fill.
  - b. Remove existing foundations and structures in areas of excavation and replace with satisfactory/suitable compacted fill.
  - c. The Contractor's testing agency shall evaluate suitability of sub-grades including those for building and wall footings, building slabs, below-grade structures and pavement areas and certify suitability prior to further construction.

- C. Excavation for Footings, Foundations, Slabs and Pavements:

- 1. Grade site so as to prevent water from entering footing excavations and/or ponding on floor sub=grades. Protect excavations from exposure to direct rainfall.
- 2. Contractor shall undercut, repair and restore damaged sub-grades at no additional cost to Owner.
- 3. Extend all sub-grade undercuts at least five (5') feet outside building foundation, footing, slab and pavement lines.

D. Excavation for Trenches:

1. Dig trenches to the uniform width required for particular item to be installed, sufficiently wide to provide ample Working room. Provide 6 to 9 inches of clearance on both sides of pipe or conduit.
2. Excavate trenches to depth indicated or required. Carry depth of trenches for piping to establish indicated flow lines and invert elevations. Beyond building perimeter, keep bottoms of trenches sufficiently below finish grade to avoid freeze-ups.
3. Where rock is encountered, carry excavation 6 inches below required elevation and backfill with a 6 inch layer of crushed stone or gravel prior to installation of pipe.
4. Grade bottoms of trenches as indicated, notching under pipe bells to provide solid bearing for entire body of pipe.

E. Backfill of Trenches

1. Provide suitable compacted material, backfill and/or approved on-site soil material backfill in accordance with detail(s) shown on drawings.
2. Backfill trenches with concrete where trench excavations pass within 18" of column or wall footings and which are carried below bottom of such footings, or which pass under wall footings. Place concrete to level of bottom of adjacent footing.
3. Do not backfill trenches until tests and inspections have been made and backfilling authorized by Architect/Engineer. Use care in backfilling to avoid damage or displacement of pipe systems.

F. Stability of Excavations:

1. Slope sides of excavations to comply with local codes and ordinances having jurisdiction. Shore and brace where sloping is not possible because of space restrictions or stability of material excavated.

3.11 EXCESS WATER CONTROL

A. Unfavorable Weather:

1. Do not place, spread, or roll fill material during unfavorable weather conditions.
2. Do not resume operations until moisture content and fill density are acceptable to Contractor's testing agency.
3. Protect all open excavations as well as slab on grade, sub-grade from damage due to rain or runoff.

B. Flooding:

1. Provide berms or channels to prevent flooding of sub-grade. Promptly remove water collecting in depressions.

C. Softened Sub-grade:

1. Where soil has been softened or eroded by flooding or placement during unfavorable weather, remove damaged areas and recompact or replace with suitable material as required to ensure properly stabilized sub-grade. Replaced or re-compacted sub-grades shall be certified as being satisfactory by Contractors Testing agency.

D. Dewatering:

1. Provide and maintain during construction, ample means and devices to promptly remove and dispose of water from every source entering excavations or other parts of Work. See Section 02240.

### 3.12 SUB-GRADE PREPARATION

A. Sub-grade Preparation: Upon completion of excavation activities, exposed sub-grade should be proof-rolled utilizing a heavily loaded dump truck or other pneumatic-tired vehicle of similar size and weight, in presence of Soils Engineer. Proof-rolling shall not be performed during or following wet weather conditions. Unsuitable materials discovered during proof-rolling operations shall be removed and replaced as specified below. Upon completion of proof-rolling activities and approval of sub-grade by Soils Engineer, exposed sub-grade shall be further prepared as follows:

1. Unpaved Areas: Scarify sub-grade to six-inch depth prior to topsoil placement.
2. Paved Areas: Scarify sub-grade to twelve-inch depth and compact to 95 percent maximum dry density. Density test methods: ASTM D 1557. Remove unsuitable earth, exhibiting excessive weaving during compaction operations, as specified.

### 3.13 FILL AND COMPACTION

A. Fill and Excavation Requirements:

1. Fill or excavate as required under items of constructions in accordance with Specification Section 02100 and as follows:
  - a. In planting areas, sub-grade shall be 12 inches below finish grades with 12 inches of topsoil applied over sub-grade. In lawn areas, sub-grade shall be 4 inches below finished grades with 4 inches of topsoil applied over sub-grade.
  - b. Under concrete sidewalks, sub-grade shall be to bottom of granular fills under sidewalks.
  - c. Under floor slabs on grade, sub-grade shall be at underside of stone or washed gravel moisture barrier below bottom of slab.
  - d. Under building foundations, sub-grade shall be to bottom of footing. Place compacted structural fill to bottom of footing where required, due to undercutting.

- e. Under pavement sections, sub-grade shall be to bottom of base course or graded aggregate base.
  - f. In areas with existing fill materials, sub-grade shall be to bottom of fill. Compacted structural fills shall be used to bring such areas back to required elevations.
2. Construct fills at location and to lines and grades required. Use sheepsfoot rollers, rubber-tired rollers, or other equipment capable of obtaining required density in placing fills. Use power tampers or hand tampers to compact material in areas where rollers are impractical to use.

**B. Backfilling and Compaction:**

- 1. Fill placing operation shall be such that materials when compacted will be blended sufficiently to meet compaction requirements. Suitability of materials is subject to Architect's approval. Dump successive loads of materials, then spread and mix to give horizontal layer of not more than eight inches in loose thickness.
- 2. Do not roll or compact fill material until layer of material has uniform moisture content within two percentage points of optimum moisture content and which will keep under action of rollers, and material in each layer of fill, while being compacted by rolling or tamping equipment, maintained as nearly as practical at that degree of moisture content which is optimum for obtaining required compaction.
- 3. Dry material having moisture content too high for proper compaction, should be modified by aeration until moisture content is lowered to point where satisfactory compaction may be obtained.
- 4. If moisture of fill material is too low, add water to material and thoroughly mix by blading and disking to produce uniform and satisfactory moisture content. In applying water, do not use jets having sufficient force to wash out fine material. Water or aerate fill material, as necessary, and thoroughly mix to obtain a moisture content which will permit proper compaction but remain within  $\pm 2$  percent of optimum moisture content as determined by ASTM Specification D-698.
- 5. After sub-grade has been approved by Soils Engineer, spread specified fill material in horizontal layers not to exceed 8 inches in loose thickness.
- 6. During placement and compaction of fill, scarify and bench existing sub-grades so that a seal plane can not be formed between new fill and existing sub-grade soils. Existing soils shall be scarified to depths of at least 6 inches, and benching generally shall be provided for every 5 ft. height of new fill placed.
- 7. Do not begin backfilling until construction below finish grade has been approved, forms removed, and excavations cleaned of trash and debris. Bring backfill to required grades. Do not place backfill in wet or frozen areas. Do not operate compaction equipment exceeding 3,000 pounds in dead weight for spreading and compacting closer to foundations, curbs, or walls than a distance equal to height of backfill above top of structural members or height of wall; compact area remaining by power-driven hand tampers suitable for material being compacted. Do not place backfills against walls prior to 7 days after completion of walls.

8. After material has been brought to uniform and satisfactory moisture content, compact fill material to maximum dry density requirements specified below.

Zone	Maximum Dry Density Required (%)	Specification
Top 18" of fill placed below foundation and slabs.	100	ASTM D 698
Fill areas within building, 10' from building perimeter, and paved areas	95	ASTM D 698
Back fill at retaining walls	90	ASTM D 698
Other site grading	90	ASTM D 698

9. Special care should be taken in compacting structural fill at interface with natural soils to ensure uniformity of settlement at transition between fill and natural ground.

C. Compaction Testing and Monitoring:

1. Fill placed in building, pavement, and utility excavations shall be tested in accordance with ASTM D 1556 (Sand Cone Method), or ASTM D 2922, or ASTM D 3017 (Nuclear Method) to verify density and moisture content. A minimum of one test per 2,000 square feet of material placed in building areas should be performed on each lift. A minimum of one test per 5,000 square feet of material placed in parking areas should be performed on each lift. A minimum of one test per 100 linear feet of material placed in footings and utility trenches should be performed on each lift. However, no fewer than three tests per day should be performed on each lift.

3.14 OVER-EXCAVATION:

- A. Correct over-excavated areas as directed by Soils Engineer. Remove unsuitable earth encountered as a direct result of over-excavation. Excavate and dispose of all unsuitable earth. Correct excavated area as directed.

3.15 UNSUITABLE EARTH:

- A. Immediately notify Owner's Representative or Architect and Soils Engineer in event unsuitable earth is encountered during earthwork or subsequent construction operations beyond limit of excavation and grading specified in this section. Stop Work within immediate area of unsuitable earth. Do not remove unsuitable earth until written authorization is obtained from Owner's Representative and proper measurements are obtained. Excavate and dispose of unsuitable earth upon receipt of written authorization from Owner's Representative. Backfill excavated area as specified. Payment for unsuitable earth removal and associated backfill operations below design grade to be by change order.

### 3.16 EXCAVATED MATERIAL STORAGE AND DISPOSAL:

- A. General:
1. Excavation is unclassified. Remove substrate materials required to achieve proper sub-base, including, but not limited to: soils, organics, abandoned structures, rock, etc.
  2. Excavate to lines, elevations, and limits indicated on drawings and specifications plus sufficient distance and space to permit erection of forms, shoring and inspections. Placing of concrete footings or foundations on existing fill is not permitted. Remove all existing fill below foundations. Fill any excess cuts under footings and foundation with structural fill. Excavate as required, regardless of type, condition, or moisture content of material encountered. If suitable bearings for foundations are not encountered at depths indicated, immediately notify Architect, protect excavation, and do not proceed further until instructions are given. Exposure of footing sub-grade shall be kept to a minimum. Footing concrete shall be placed on same day of excavation. If excavation must remain open overnight or if rainfall or other precipitation is eminent, protect sub-grade with a 2- to 4-inch-thick mud mat and other protection devices to ensure that excavation remains dry.
    - a. Remove existing man-placed fill in areas of addition and replace with satisfactory/suitable compacted fill.
    - b. Remove existing foundations and structures in areas of excavation and replace with satisfactory/suitable compacted fill.
    - c. Contractor's testing agency shall evaluate suitability of sub-grades including those for building and wall footings, building slabs, below-grade structures and pavement areas and certify suitability prior to further construction.
- B. Stockpile select excavated materials required for fill and/or backfill operations. Stockpile locations to be approved by Owner's Representative or Architect. Shape and grade stockpiles to prevent ponding of surface water. Temporarily stabilize stockpiles as specified on Drawings. Dispose of excess excavation materials as specified.
- C. Excess excavated material shall be legally disposed of by removal from project site.
- D. Site Clearing Debris, Rubble, and Unsuitable Soils: Remove and legally dispose of excavated materials not suitable for re-use on-site as fill or backfill, site clearing debris and rubble resulting from clearing grading and removal operations to an approved off-site disposal area.
- E. Suitable Soils/Materials: Soils and materials suitable for re-use on-site shall remain on job site.
- F. Stockpiling of Excavated Materials suitable for re-use on-site will be permitted where convenient on-site and does not interfere with Work. Stockpiling shall be performed in accordance with approved sediment control plans. In event that stockpiled materials are rendered unsuitable for re-use on-site, Contractor shall remove all unsuitable materials

from site and replace same with suitable soils at no additional cost to Owner.

### 3.17 EARTH FILL:

- A. Existing Ground Surface Preparation: Remove vegetation and topsoil as specified in Section 02000 "Clearing". Proofroll exposed sub-grade utilizing a heavily loaded dump truck or other pneumatic-tired vehicle of similar size and weight, in the presence of Soils Engineer. Proofrolling shall not be performed during or following wet weather conditions.
- B. Existing Sub-grade Preparation: Remove unsuitable earth, upon completion of clearing and proofrolling operations, as specified. Continuously bench existing slopes exceeding four feet horizontal to one foot vertical. Bench sufficiently to accommodate earthmoving and compaction equipment and meet requirements of Maryland Department of the Environment Standards and Specifications for Soil and Erosion Control. Select material, removed as a result of benching operations, may be used for fill and/or backfill as specified.
  - 1. Unpaved Areas: Scarify existing sub-grade to six-inch depth and compact to 92 percent maximum dry density. Density test method: ASTM D 1557.
  - 2. Paved Areas: Scarify existing sub-grade to twelve-inch depth and compact to 98 percent maximum dry density. Density test method: ASTM D 1557. Remove unsuitable earth, exhibiting excessive weaving during compaction operations, as specified.
- C. Fill Placement: Do not place fill material on frozen or muddy sub-grades.
  - 1. Unpaved Areas: Place fill material in loose lifts not exceeding eight-inches.
  - 2. Paved Areas: Place fill material in loose lifts not exceeding eight-inches.
- D. Fill Compaction and Moisture Control: Obtain compaction with approved compaction equipment. Provide compaction equipment of proper size and in proper mechanical operating condition. Fill material shall be moisture conditioned to within two percent of optimum moisture content.
  - 1. Unpaved Areas: Compact each lift to 92 percent maximum dry density. Density test method: ASTM D 1557.
  - 2. Paved Areas: Compact each lift to 98 percent maximum dry density. Density test method: ASTM D 1557.
    - a. Control moisture during placement and compaction operations. Remove and replace or scarify and aerate excessively moist material until required moisture content is obtained. Moisten excessively dry material by applying measured amounts of water uniformly to fill material until required moisture content is obtained.

### 3.18 EARTH BACKFILL:

- A. General: Backfill excavations as promptly as Work permits, but not until completion of inspection, testing and approval by Soils Engineer.
- B. Placement and Compaction: Do not place backfill on frozen or muddy sub-grades.
  - 1. Unpaved Areas: Place backfill material in loose lifts not exceeding twelve inches. Compact each lift to 92 percent maximum dry density. Density test method: ASTM D 1557.
  - 2. Paved Areas: Place backfill material in loose lifts not exceeding eight inches. Compact each lift to 98 percent maximum dry density. Density test method: ASTM D 1557.
  - 3. All material to be moisture conditioned to within two percent of optimum moisture content.

3.19 GRADING:

- A. General: Grade unpaved and paved areas to smooth and uniform surfaces and to prevent ponding of surface water.
  - 1. Unpaved Areas: Areas to receive topsoil shall be graded to allow for installation of 6 inches of topsoil. Refer to Section 02910 "Lawns". Grade slopes exceeding four feet horizontal to one foot vertical, to smooth and uniformly rounded surfaces.
  - 2. Paved Areas: Grade paved area sub-grades to lines, elevations and sections indicated or specified.

3.20 MAINTENANCE. PROTECTION AND REMEDIAL WORK:

- A. Protection of Graded Areas: Protect newly graded areas from traffic and erosion. Keep free of trash and debris. Repair and re-establish grades in settled, eroded, and rutted areas to specified tolerances.
- B. Protection of Existing Conditions: Protect structures, utilities, sidewalks, pavements, and other facilities from damage caused by settlement, lateral movement, undermining, washout, and other hazards created by earthwork operation. Protect all trees shown or scheduled to remain. Comply with tree protection requirements specified in Section 02110 – SITE CLEARING.
- C. Maintenance of Erosion and Sediment Control Measures: Protect and maintain erosion and sediment controls throughout duration of Project until removal is authorized by MCDPS Inspector. Comply with any directives for maintenance of, or modifications to, these measures issued by MCDPS.

- D. 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 at no additional cost to Owner.
- E. 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 of restoration to greatest extent possible.
- F. Clean-Up: Thoroughly clean entire Job Site of trash and other debris. Haul materials away and dispose of off-site in an approved manner.
- G. Maintain all paved access roads in a clean and dust free condition during earthwork or subsequent construction operations. Clean trucks and equipment, removing mud and debris, prior to entering project site access roads and public right-of-way.
- H. Maintain completed areas of project site free of trash and debris. Scarify, regrade and recompact sub-grades damaged or disturbed by adverse weather, soil erosion, settlement and subsequent construction operations.

3.21 TESTING:

- A. Conduct following tests:
  - 1. Laboratory Density Tests:
    - a. Test method: As specified.
    - b. Test interval: One test per each 15,000 s.f., or fraction thereof, of each lift of fill or backfill compacted by other than hand-operated machines, and 1 per each 5,000 s.f., etc, for areas done by hand-operated machines.
  - 2. In-place Field Density Tests:
    - a. Test method: ASTM D 1556-82 or D 2167.
    - b. Density required: As specified.
    - c. Test Interval: One test per 2,000 s.f., or fraction thereof, of compacted sub-grade, or of each lift of fill or backfill compacted by other than hand-operated machines, and 1 per 1000 s.f., etc, for each lift of fill or backfill compacted by hand-operated machines..
- B. Correct Work not conforming to specified densities as directed by Soils Engineer, at no increase to Contract Sum.

3.22 WASTE MANAGEMENT:

- A. Recycle or salvage waste earthwork materials in accordance with Division 1 "Construction Waste Management" requirements.
- B. Completely remove from Site and dispose of in a legal manner debris and excess material resulting from Work of this Section. No top soil shall be removed.

**END OF SECTION**