

Specifications for EXCAVATING, FILLING AND GRADING

PART 1: GENERAL

1.1 SCOPE:

Related Work Specified Elsewhere

1. Selection of Independent Testing Laboratory: Section IA.
2. Clearing of Site: Section 2A.
3. Soil Poisoning for Subterranean Termite Control: Section 2C.
4. Combination Concrete Curb and Gutter, Concrete Paving and Sidewalks: Section 2E.
5. Trenching and Backfilling for Underground Sanitary Sewer, Storm Sewer, Water and Gas Supply, and Lawn Sprinklers Systems: Section 15A.

1.2 REGULATORY AGENCY:

The Independent Testing Laboratory, selected in accordance with Section IA of these specifications, shall perform and evaluate all soil tests specified in this section. The Independent Testing Laboratory shall designate a Registered Soil Engineer to perform the specified on-site inspections and tests. The Independent Testing Laboratory, in conjunction with the Registered Soil Engineer shall, through their tests, inspections, and evaluations, regulate the selecting, placement and compaction of fill material to ensure compliance with the Contract Documents. Inspection and testing services provided by the Independent Testing Laboratory shall not relieve the contractor of his responsibilities for performing the work in accordance with the plans and specifications.

1.3 SUBMITTALS:

The Testing Laboratory shall send three (3) copies of all soil test reports, evaluations, and certificates called for to the Architect and one copy each to the Contractor and Structural Engineer.

1.4 ENVIRONMENTAL CONDITIONS:

Concrete footings and slabs shall not be placed on frozen ground. If freezing weather is expected, do not excavate to the full depth required unless footings or slabs are immediately placed. If footings and slabs cannot be immediately placed, protect completed excavations from frost.

1.5 PROTECTION:

- a. Shoring, sheeting, and bracing shall be provided under conditions specified hereinafter to prevent erosion, caving or gulying of sides of excavations.
- b. Surface drainage: provide for surface drainage during the period of construction in a manner to avoid creating a nuisance to adjacent areas. Keep all excavations free of water during the entire progress of the work, regardless of the cause, source or nature of the water.
- c. Protect all benchmarks and monuments from damage. If they are damaged, replace.
- d. Protect newly graded areas from erosion or gulying caused by rain. Any damage that occurs shall be repaired and grades reestablished to the indicated elevations and slopes. Refill all areas where settlement occurs.

PART 2: PRODUCTS

2.1 MATERIALS:

- a. Borrow material shall be selected, laboratory approved material. Fill material, whether from onsite or offsite, shall consist of clean soil free of organic matter. Fill soil shall exhibit a maximum dry density, as determined by ASTM C 698 (Standard Proctor) of at least 100 pounds per cubic foot and shall have a plasticity index (ASTM # 423 and # 424) of less than 30. The natural moisture content of proposed fill shall not vary from the optimum moisture (ASTM D 698) by more than 5 percentage points. Fill material shall not contain rocks larger than 6 inches in largest dimension.
- b. Gravel fill to form a capillary water barrier under concrete floor slabs shall be clean, non-porous rock or gravel uniformly grade and of a size that will pass a o-inch mesh screen and be retained on a No. 4 mesh screen.
- c. Excavated material approved by the Registered Soil Engineer for use as fill or backfill shall be free of stones larger than 2 inches in longest dimension, roots and organic matter.

2.2 SOURCE QUALITY CONTROL:

Sampling and Testing of Borrow Material:

In order to determine the acceptability of proposed fill material from offsite or on-site, the contractor shall submit samples of proposed fill material to the Independent Testing Laboratory. Samples shall be submitted at least five working days prior to the beginning of work at the site. Each sample shall consist of at least 50 pounds of soil and a sealed jar containing at least 500 grams of soil for moisture content determinations. A sample shall be submitted for each 2 feet vertically throughout the depth to be excavated in the borrow area.

PART 3: EXECUTION

3.1 PRELIMINARY SITE INSPECTION:

- a. Immediately after the site is cleared as specified in Section 2A, the entire site within the limits of work shall be inspected by the Registered Soil Engineer to determine if there exist any soft zones.
- b. Soft zones shall be located by proofrolling the entire site with a heavily loaded dump truck, minimum of 10 tons gross weight or similar pneumatically tired vehicle normal to excavation work.
- c. All soft zones detected shall be eliminated by either excavating and backfilling or continued rolling, as recommended by the Registered Soil Engineer.

3.2 ROUGH GRADING:

Cut or fill and machine grade the site area. Fill material shall be deposited and compacted as hereinafter specified. Rough grade elevations and levels shall be approximately 8 inches below finish floor line under building, 2 inches below bituminous paving, to the underside of other surface areas, and 4 inches below finished grade in areas to receive topsoil.

3.3 FILL PLACEMENT:

- a. Fill material must meet the requirements previously specified. Fill material not meeting this specification shall not be used without the written consent of the Architect.
- b. Fill shall be placed in horizontal lifts not exceeding 8 inches in loose thickness. All fill, including fill supporting structural foundations, floor slabs, sidewalks, driveways, embankments, and utility trench

backfill shall be compacted to 95 percent of its maximum dry density as determined by the Modified Proctor Compaction Test (ASTM D-1557-66T). During filling operations, the contractor shall have at the site equipment capable of spreading and compacting the fill in accordance with the requirements of this paragraph. The Registered Soil Engineer shall supervise and direct the structural fill operations to the extent he deems necessary.

- c. After rough grading is completed, all fill areas for subgrade of floor slabs, structural foundation or paving, shall be kept free of standing water and otherwise protected from loss of density due to weather or construction operations. Immediately prior to placing foundations, the Registered Soil Engineer shall inspect the subgrade. All areas which have been disturbed by inclement weather or the construction operations shall be scarified and recompactd to the specified density.

3.4 COMPACTION TESTING OF FILLS:

The required field testing of fill material shall be performed by the Independent Testing Laboratory previously selected. Fill within building areas shall be tested at a frequency of at least one test per 2000 square feet for each two feet of fill depth, with a minimum of two tests per two feet of fill depth. The remaining fill area shall be tested at a frequency of at least one test per two feet of depth.

3.5 RESPONSIBILITIES OF CONTRACTOR:

The Contractor shall be responsible for the following items:

1. Deliver samples of proposed fill soil to the testing laboratory for resting.
2. Notify the architect and testing laboratory when stripping will be completed. Twenty-four hours' notice prior to placing fill is required.
3. Notify the architect and the testing laboratory twenty-four hours in advance of when density tests will be required.
4. Establish and maintain sufficient reference points to provide, when requested, horizontal locations and elevations of test locations.

3.6 RESPONSIBILITIES OF TESTING LABORATORY:

The testing laboratory shall:

1. Perform all laboratory compaction tests, inspection and supervision as specified herein.
2. Submit test reports and evaluations and inspection reports as previously specified.
3. Provide a Registered Soil Engineer to inspect subgrade prior to fill placement, provide engineering assistance and supervision and provide other engineering services as specified.

3.7 EXCAVATION FOR BUILDINGS AND STRUCTURES:

- a. **Excavated material** that is suitable and approved shall be used for fills and backfills indicated or required. All unsuitable material, and all surplus excavated material not required for site grading or backfill, shall be removed from the site. The location of dump and length of haul shall be the Contractor's responsibility.
- b. **Excavate to elevations and dimensions indicated.** If suitable bearing is not encountered at the depth indicated on drawings for foundations, the architect shall be notified immediately. Should additional undercutting or excavation be required, such additional work shall fall under the provisions of Article 12.1.6 of the General Conditions.
- c. **Obstructions:** Completely remove all existing obstructions from under new foundations; remove obstructions elsewhere within building lines to a depth of 6 inches below the depth of excavation indicated on the drawings.
- d. **Rock Excavation:** Material to be excavated is assumed to be earth and other materials that can be removed by power shovel, bulldozer, or other normal equipment to excavation work, but not requiring the use of explosives or drills. If rock is encountered within the limits of excavation, the Contract Price will be adjusted. When the rock is encountered the contractor shall immediately notify the Architect and shall not proceed further until instructions are given and measurements made for the purpose of establishing volume of rock excavation.

- e. **Footing Trenches:** Where soil conditions will permit, footing trenches may be excavated to the exact dimensions of the concrete and side forms omitted.

3.8 EXCAVATION EMBANKMENT AND BRACING:

- a. The contractor shall accept full responsibility for all excavations. He shall protect all excavation embankments against collapse. Where possible, embankments over 5 feet high shall be made at a slope not greater than 1 horizontal to 1 vertical or, where the soil is very sandy or wet, the slope should be not greater than 2 horizontal to 1 vertical. Steeper slopes than those suggested herein may be employed when the work is done under the supervision of a Registered Soil Engineer. Where it is not possible to provide a safe embankment slope, all banks shall be temporarily supported and maintained secure until permanent support has been provided. Where ditches or trenches are over 5 feet deep, cross bracing and shoring shall be provided to prevent collapse.
- b. The contractor shall provide bracing systems designed by a registered engineer experienced in such designs and acceptable to the Architect. The design drawings shall show the work and sequence in its entirety and be submitted to the Architect prior to commencing the work. Where no specific information is available, the bracing system shall be designed to resist the active earth pressures as set forth on pages 13-18 of the CRSI Design Handbook Volume II, 1965 Edition.
- c. To prevent caving, or settlement of earth adjacent to excavations and for the protection of persons as well as property, shoring, bracing, and other similar work shall be provided and installed to meet the conditions in each particular case and shall be left in place until construction has reached a point where backfills behind walls or in ditches have been made and the need for shoring and bracing eliminated.
- d. The contractor shall prevent the accumulation of water at the toe of slopes, in ditches, and in footing excavations. He shall furnish equipment and labor to remove such water from the site.

3.9 DISPOSITION OF UTILITIES:

- a. Rules and regulations governing the respective utilities shall be observed in executing all work under this section.

- b. Active utilities shown on the Drawings shall be adequately protected from damage and removed or relocated only as indicated or specified. Where active utilities are encountered but are not shown on the drawings, the Architect shall be advised and the utilities protected, supported, or relocated as directed by the Architect. The Contract Price will be adjusted for this additional work.

3.10 BACKFILLING FOR BUILDINGS AND STRUCTURES:

- a. Before placing backfill, remove all debris subject to termite attack, rot or corrosion and all other deleterious materials from areas to be backfilled.
- b. Deposit backfill in layers not more than 8 inches thick. Place the fill material in successful horizontal layers in loose depth as specified, for the full width of the cross section. Thoroughly compact each layer by rolling or pneumatic tamping after a light sprinkling with water.
- c. The finished subgrade shall be brought to elevations indicated and sloped to drain water away from the building walls. Fill to required elevations any areas where settlement occurs.

3.11 GRAVEL FILL UNDER SLAB:

Place and compact a gravel fill to a minimum thickness of four inches. Level top to required elevation to receive floor slab. Protect finished fill from traffic until sub slab is placed.

3.12 FINISH GRADING:

Shape the site as required by cutting and filling to form slopes, swales, ditches and to conform to grades, contours and elevations on the drawings.

3.13 PLACING TOPSOIL:

Evenly spread topsoil to a depth of four inches over all areas to be placed.