

NATURAL RESOURCES CONSERVATION SERVICE  
CONSERVATION CONSTRUCTION SPECIFICATION

**903 – EARTHFILL**

**I. SCOPE**

The work shall consist of borrow excavation, hauling, placing and compacting earthfills required to construct the earthfills as shown on the drawings, or as staked in the field.

**II. SUBGRADE PREPARATION**

Subgrades for earthfill shall be stripped to remove vegetation and other unsuitable materials. The subgrade surfaces shall be graded to remove surface irregularities and shall be scarified parallel to the axis of the fill and loosened to a minimum depth of 2 inches. The moisture content of the loosened material shall be controlled as specified for the earthfill, and the surface materials of the subgrade shall be compacted and bonded with the first layer of earthfill.

Earth abutment surfaces shall be free of loose, uncompacted earth in excess of two inches in depth normal to the slope and shall be at such a moisture content that the earthfill can be compacted against them to ensure a good bond between the fill and the abutments. Subgrade and abutment surfaces shall not steeper than 1 horizontal to 1 vertical.

The sites of the borrow area shall be stripped to sufficient depth to remove all vegetation, roots, brush, sod and other objectionable material. Clearing and disposal methods shall be in accordance with applicable state and county laws with due regards to the safety of persons and property.

**III. EXCAVATION**

**Excavated Material**

To the extent they are needed, all suitable materials from the specified excavations shall be used in the construction of required permanent earthfill. The suitability of materials for specific purposes will be determined by an Engineer.

All surplus or unsuitable excavated materials will be designated as waste and shall be disposed of at the locations shown on the drawings or at sites remote from the project.

**Borrow Excavation**

When the quantities of suitable materials obtained from specified excavations are insufficient to construct the specified fills, additional materials shall be obtained from the designated borrow areas. The extent and depth of borrow pits within the limits of the designated borrow areas shall be as shown on the drawings.

Borrow pits shall be excavated and finally dressed in manner to eliminate steep or unstable side slopes or other hazardous or unsightly conditions, and shall be free draining of any water ponding.

**Bracing and Shoring**

Excavated surfaces too steep to be safe and stable if unsupported shall be supported as necessary to safeguard the work and workmen, to prevent sliding or settling of the adjacent ground, and to avoid damaging existing improvements. The width of the excavation shall be increased if necessary to provide space for sheeting, bracing, shoring, and other supporting installations.

**Structure or Trench Excavation**

Structure or trenched excavation shall be completed to the specified elevations and to sufficient length and width to include allowance for forms, bracing and supports, as necessary, before any concrete or earthfill is placed or any piles are driven within the limits of the excavation.

**IV. PLACEMENT**

**Material**

All material shall be obtained from selected areas as shown on the drawings. Fill materials shall contain no sod, brush, roots, or other perishable or unsuitable material. Cobbles and rock fragments over 3 inches in diameter shall be removed from the material prior to compaction and be disposed of or placed in areas designated.

Fill shall not be placed until the required excavation and subgrade preparation has been completed. Fill shall not be placed upon a frozen surface, nor shall snow, ice, or frozen material be incorporated in the fill.

Fill shall be placed in approximately horizontal layers. The thickness of each layer before compaction shall not exceed 8-inches. Materials placed by dumping in piles or windows shall be spread uniformly to not more than the specified thickness before being compacted. If the surface of any layer becomes too hard and smooth for proper bond with the succeeding layer, it shall be scarified parallel to the axis of the fill to a depth of not less than 2 inches before the next layer is placed.

Fill placed around structures will be brought up at approximately uniform height on all sides of the structure.

The distribution and gradation of materials throughout the fill shall have no lenses, pockets, streaks, or layers of material differing substantially in texture or gradation from the surrounding material. If zoned fills of substantially differing materials are specified; the zones shall be placed according to lines and grades shown on the drawings.

## V. CONTROL OF MOISTURE CONTENT

During placement and compaction of fill, the moisture content of the materials being placed shall be moist so the material will maintain a ball shape when squeezed in the hand. When specified, the moisture shall be maintained within 2 percentage points of optimum as determined by ASTM D-698, and as specified on the "Practice Requirements" sheet.

The application of water to the fill materials shall be accomplished at the borrow areas insofar as practicable. Uniform moisture distribution shall be obtained by disking. Material that is too wet when deposited on the fill shall either be removed or be dried to the desired moisture content prior to compaction.

If the top surface of the preceding layer of compacted fill or a subgrade or abutment surface in the zone of contact with the fill becomes too dry to permit suitable bond, it shall either be removed or scarified and moistened to an acceptable moisture content prior to placement of the next layer of fill.

The proper moisture content for compaction will be determined by inspection during the placement operation.

## VI. COMPACTION

Construction equipment shall be operated over each layer of fill to ensure that the required compaction is obtained. Special equipment shall be used if needed to obtain the required compaction. Compaction shall meet the requirements of the method specified on the "Practice Requirements" sheet and as described below:

1. Sheepsfoot roller - The roller shall have staggered, uniform spaced tamping feet and be equipped with suitable cleaners. The weight of the roller shall not be less than 2,500 pounds per foot of width. The maximum speed shall be less than 3 miles per hour. The entire surface of each layer placed shall receive 4 passes of this equipment.
2. Pneumatically tired equipment. A loaded scraper shall be considered a pneumatic roller. The entire surface of each layer shall receive 6 passes of this equipment.
3. Track Laying Equipment (bulldozer). The entire surface of each layer shall receive 8 passes of this equipment.
4. Compaction shall result in densities equal to or greater than 95 percent of the maximum obtained by laboratory compaction at optimum moisture of like soils in accordance with the procedures given in ASTM D-698, Method A.
5. Compaction shall result in densities equal to or greater than 90 percent of the maximum obtained by laboratory compaction at optimum moisture of like soils in accordance with the procedure given ASTM D-1557, Method A.

Heavy compaction equipment shall not be operated within 2 feet of any structure. The passage of heavy equipment will not be allowed:

- (1) Over cast-in-place conduits within 14-days after placement of the concrete
- (2) Over cradled or bedded precast conduits within 7 days after placement of the concrete cradle or bedding
- (3) Over any type of conduit until the backfill has been placed above the top surface of the structure to a height equal to one-half the clear span width of the structure or pipe or 2 feet, whichever is greater, except as may be specified in the "Practice Requirements sheet"

Fill adjacent to structures, pipe, conduits, and anti-seep collars shall be compacted to a density equivalent to that of the surrounding fill by means of hand tampers or plate vibrators. Hand directed tampers or compactors shall be used on areas not accessible to heavy compaction equipment, fills compacted in this manner shall be placed in layers not greater than 4 inches in thickness before compaction, and shall meet the same density requirement as for the adjacent area.

Compaction of backfill adjacent to structures shall not be started until after the expiration of the following minimum time interval after placement of the concrete:

Counterforts, vertical or near-vertical walls with earth loading on one side only

Walls and counterforts, backfilled on both sides simultaneously 7 days

Anti-seep, collars, conduits, and cantilever outlet bents 3 days

## VII. TESTING

During the course of the work, tests may be made to identify materials, to determine compaction characteristics, to determine moisture content, and to determine density of fill in place. These test results will be used to verify that the fills conform to the requirements of the specifications. Such tests are not intended to provide information required for the proper execution of the work and shall not relieve the landowner or their contractor of the necessity to perform tests for quality control.

Fill not meeting the specified requirements shall be reworked or removed and replaced with acceptable fill.

## VIII. FINISH

After the placement of the earthfills, and spoils the sides and top shall be dressed by final passage of compaction equipment or by dragging to give a smooth surface. The surface area shall be graded to provide surface drainage to flow to desired locations.

## IX. VEGETATIVE COVER

Unless otherwise specified, on the "Practice Requirements" sheet, a protective cover of vegetation shall be established on all disturbed areas. The planting of vegetative materials shall conform to the requirements of Practice Specification 342, Critical Area Planting.

## X. SPECIAL MEASURES

Measures and construction methods shall be incorporated as needed and practical that enhances fish and wildlife values. Special attention shall be given to protecting visual resources and maintaining key shade, food, and den trees.

## XI. CONSTRUCTION OPERATIONS

Construction operations shall be done in such a manner that erosion and air and water pollution are minimized and held within legal limits. The owner, operator, contractor or other persons will conduct all work and operations in accordance with proper safety codes for the type of construction being performed with due regards to the safety of all persons and property.

The completed job shall be workmanlike and present a good appearance.