



Public Works Manual

Revised September 2015



Excavation & Utilities

6.04.4 Success and Approval of Revegetation Work

The results of the work of seeding and mulching and other revegetation and landscape work can only be evaluated after a sufficient period of time has elapsed for germination to occur or for live plants to root and become established in the new environment. This period of time is normally a minimum of one growing season and may be as long as two years. The Town of Gypsum will evaluate the work after, what is in their best judgment, a reasonable period of vegetation establishment and will approve the work if, in their best judgment, functional success has been achieved. Deficiencies in functional success shall be corrected.

7.00 EXCAVATION

7.01 SCOPE

The work shall consist of the excavation required by the drawings and specification and disposal of the excavated materials.

7.02 CLASSIFICATION

Excavation will be classified as common excavation or rock excavation in accordance with the following definition or will be designated as unclassified. Common excavation shall be defined as the excavation of all materials that can be excavated, transported, and unloaded by the use of heavy ripping equipment and wheel tractor-scrappers with pusher tractors or that can be excavated and dumped into place or loaded onto hauling equipment by means of excavators having a rated capacity of three cubic yards and equipped with attachments such as shovel, backhoe, bucket, dragline or clam shell appropriate to the character of the materials and the site conditions. Rock excavation shall be defined as the excavation of all hard, compacted or cemented materials the accomplishment of which requires blasting or the use of excavators larger than defined for common excavation. The excavation and removal of isolated boulders or rock fragments larger than one cubic yard in volume encountered in materials otherwise conforming to the definition of common excavation shall be classified as rock excavation. Excavation will be classified according to the above definitions by the Town of Gypsum, based on its judgment of the character of the materials and the site conditions. The presence of isolated boulders or rock fragments larger than one cubic yard in size will not in itself be sufficient cause to change the classification of the surrounding material. For the purpose of this classification, the following definitions shall apply: Heavy ripping equipment shall be defined as rear-mounted, heavy duty, single-tooth, ripping attachment mounted on a tractor having a power rating of at least 300 horsepower (at the flywheel). Wheel tractor-scraper shall be defined as a self-loading (not elevating) and unloading scraper having a struck bowl capacity of 12 to 20 cubic yards. Pusher tractor shall be defined as a track type tractor having a power rating of at least 300 net horsepower (at the flywheel) equipped with appropriate attachments.

7.03 UNCLASSIFIED EXCAVATION

Items designated, as "Unclassified Excavation" shall include all materials encountered regardless of their nature or of the manner in which they are removed. When excavation is unclassified, none of the definitions or classifications stated in Section 2 of this specification shall apply.

7.04 BLASTING

The transportation, handling, storage, and use of dynamite and other explosives shall be directed and supervised by a person of proven experience and ability in blasting operation and who shall be currently licensed and/or permitted for such work by all prevailing government agencies. Blasting shall be done in such a way as to prevent damage to the work or unnecessary fracturing of the foundation and shall conform to any special requirements called for in the specifications.

7.05 USE OF EXCAVATED MATERIALS

To the extent that they are needed, all suitable materials from the specified excavations shall be used in the construction of required permanent earth fill or rock fill. The Town of Gypsum will determine the suitability of materials for specific purposes. The contractor shall not waste or otherwise dispose of suitable excavated materials.

7.06 DISPOSAL OF WASTE OR SURPLUS MATERIALS

All surplus or unsuitable excavated materials will be designated as surplus or waste and shall be disposed of at the locations shown on the plans and/or staked in the field by the Town of Gypsum.

7.07 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. The contractor shall furnish, place and subsequently remove such supporting installations. All excavations shall at all times comply with all applicable rules and regulations of OSHA regarding trench safety. The contractor shall be solely responsible to ensure that all crews working within or around excavations are informed and trained in all applicable rules and regulations of OSHA, and that safety procedures are followed at all times.

7.08 STRUCTURE AND TRENCH EXCAVATION

Structure and trench 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 forms, concrete, pipe, or other structures for which the excavations are intended are placed in the excavation.

7.09 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 shall be as directed by the Town of Gypsum. Borrow pits shall be excavated and finally dressed in a manner to eliminate steep or unstable side slopes or other hazardous or unsightly conditions.

7.10 OVEREXCAVATION

Excavation in earth beyond the specified lines and grades shall be corrected by filling the resulting voids with approved compacted earth fill, except that earth that is to become the subgrade for rip-rap, rock fill, sand and gravel fill, or drain fill may be filled with material conforming to the specifications for the rip-rap, rock, sand and gravel or drain material.

7.11 DEWATERING

Excavations shall be dewatered by pumping at any time when: the presence of water creates a hazard for personnel in the excavation; the water interferes with installation or inspection of the installed utilities; or water mains may be contaminated by groundwater entering the open end of pipes.

7.12 SITE PREPARATION

When trucks are laving site and onto town or county paved street, tracking pads, shall be used as an apron onto street to stop mud and dirt from entering roadway.

8.00 EARTH FILL

8.01 SCOPE

The work shall consist of the construction of earth embankments and other earth fills required by the drawings and specifications.

8.02 MATERIALS

All fill materials shall be obtained from required excavations and designated borrow areas. The selection, blending, routing and disposition of materials in the various fills shall be subject to approval by the Geotechnical Engineer. Fill materials shall contain no sod, brush, roots or other perishable materials. Rock particles larger than the maximum size specified for each type of fill shall be removed prior to compaction of the fill. The types of materials used in the various fills shall be as listed and described in the specifications and drawings as prepared by the Geotechnical Engineer.

8.03 FOUNDATION PREPARATION

Foundations for earth fill shall be stripped to remove vegetation and other unsuitable materials or shall be excavated as specified. Except as otherwise specified, earth foundation surfaces shall be graded to remove surface irregularities and shall be scarified parallel to the axis of the fill or otherwise acceptably scored and loosened to a minimum depth of 12 inches. The moisture content of the loosened material shall be controlled as specified for the earth fill, and the surface materials of the foundation shall be compacted and bonded with the first layer of earth fill as specified for subsequent layers of earth fill. Earth abutment surfaces shall be free of loose, un-compacted earth in excess of 2 inches in depth normal to the slope and shall be at such moisture content that the earth fill can be compacted against them to affect a good bond

between the fill and the abutment. Rock foundation and abutment surfaces shall be cleared of all loose materials and shall be free of standing water when fill is placed upon them. Occasional rock outcrops in earth foundations for earth fill, shall not require special treatment if they do not interfere with compaction of the foundation or placement and compaction of layers of the fill. Foundation and abutment surfaces shall not be steeper than 1 1/2 horizontal to 1 vertical unless otherwise specified. Test pits or other cavities shall be filled with compacted earth fill conforming to the specifications for the earth fill to be placed upon the foundation.

8.04 PLACEMENT

Fill shall not be placed until the required excavation and foundation preparation have been completed and the foundation has been inspected and approved by the Geotechnical Engineer. 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 the maximum thickness specified. Materials placed by dumping in piles or windrows shall be spread uniformly to not more than the specified thickness before being compacted. Hand compacted fill including fill compacted by manually directed power tampers, shall be placed in layers whose thickness before compaction does not exceed the maximum thickness specified for layers of fill compacted by the particular manually directed power tampers being used. Fill placed adjacent to structures shall be placed in a manner that will prevent damage to the structures and will allow the structures to assume the loads from the fill gradually and uniformly. The height of the fill adjacent to a structure shall be increased at approximately the same rate on all sides of the structure. 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. The top surfaces of embankments shall be maintained approximately level during construction, except that a crown or cross-slope of not less than 2 percent shall be maintained to insure effective drainage and except as otherwise directed. Embankments shall be constructed in continuous layers except where openings to facilitate other construction are specifically called for in the plans and specifications.

8.05 CONTROL OF MOISTURE CONTENT

During placement and compaction of fill, the moisture content of the materials being placed shall be maintained within the specified range as determined by the geotechnical engineer. The application of water to the fill materials shall be accomplished at the borrow areas insofar as practicable. Water may be applied by sprinkling the materials after placement of the fill, if necessary. Uniform moisture distribution shall be obtained by disking, blading or other approved methods prior to compaction of the layer. Material that is too wet when deposited on the fill shall be either removed or be dried to the specified moisture content prior to compaction. If the top surface of the preceding layer of compacted fill or a foundation or abutment surface in the zone of contact with the fill becomes too dry to permit suitable bond, it shall be scarified and moistened by sprinkling to an acceptable moisture content prior to placement of the next layer of fill.

8.06 COMPACTION

Fill adjacent to structures shall be compacted to a density equivalent to that of the surrounding fill by means of hand tamping or by manually directed power tampers or plate vibrators. Heavy equipment shall not be operated within 2 feet of any structure. Vibrating rollers shall not be operated within 5 feet of any structure. Compaction by means of drop weights operating from a crane or hoist will not be permitted. The passage of heavy equipment shall not be allowed over any type of conduit until the backfill above the conduit has been placed to a depth of 2 feet. Compacting of fill adjacent to concrete structures shall not be started until the concrete has attained the strength specified by the Geotechnical or Structural Engineer for this purpose. The strength will be determined by compression testing of test cylinders cast by the Geotechnical Engineer for this purpose and cured at the work site in the manner specified in ASTM Method C 31 for determining when structures may be put into service. When the required strength of the concrete is not specified as described above, compaction of fill adjacent to structures shall not be started until the following time intervals have elapsed after placement of the concrete.

Structure Time Interval

Retaining walls	14 days
Walls backfilled on both sides simultaneously	7 days

8.07 REMOVAL AND REPLACEMENT OF DEFECTIVE FILL

Fill placed at densities lower than the specified minimum density or at moisture contents outside the specified acceptable range of moisture content or otherwise not conforming to the requirements of the specifications shall be reworked to meet the requirements or removed and replaced with an acceptable fill. The replacement fill and foundation and abutment surfaces upon which it is to be placed shall conform to all requirements of this specification for foundation preparation, approval, placement, moisture content and compaction.

8.08 TESTING

During the course of the work, the Project Geotechnical Engineer shall perform such tests as are required to identify materials, to determine compaction characteristics, to determine moisture content, and to determine density and stability of fill and subgrade in place. These tests performed by the Project Geotechnical Engineer will be used to verify that the fills conform to the requirements of the specifications. The number and frequency of tests will be established according to standard industry procedures. If the Town of Gypsum is not satisfied with the number, frequency, or results of the tests, the Town of Gypsum may require such additional testing as he judges to be appropriate.

8.09 LIMITS OF CONTRACTOR WORK ACTIVITY

Unless otherwise specified in the plans and specifications or approved by written authorization from the Town of Gypsum, the contractor shall confine all work activity within the boundaries defined by the construction stakes that define "clearing and grubbing", "excavation" and/or "earthfill". When necessary, sites for material and equipment storage outside the work area will be designated by the Town of Gypsum. Destruction of construction stakes through careless

activity of the contractor shall result in replacement of the stakes at the expense of the contractor. The Town of Gypsum shall be the sole judge of whether construction stakes were lost through normal activity or carelessness.

9.00 SHALLOW UTILITIES (UNDER GROUND ELECTRIC, TELEPHONE, CABLE TELEVISION, NATURAL GAS & IRRIGATION)

9.01 SCOPE

Shallow utilities are defined as any wire, pipe conduit or cable and shall include but not be limited to underground electric, telephone, cable television, natural gas and irrigation water systems.

9.02 SPECIAL CONDUIT ENCASEMENT

Any shallow utility which crosses under or is within 5 feet horizontally of any road or street structure, including, pavement, curb and gutter, sidewalk, bike path, or bridge shall be encased in conduit so that repair or replacement of the utility may be accomplished without disturbing the road or street structure.

For natural gas and irrigation water systems, the carrier pipes for the natural gas and irrigation water shall be installed inside of a second pipe having strength equal to or greater than the carrier pipe and of sufficient diameter to allow free movement of the carrier pipe in the event that replacement is required.

It is recommended that consideration be given to the potential for future increase in size/capacity of the respective utility when sizing the conduit.

9.03 SHALLOW UTILITY INSTALLATION

- a. Electric system underground facilities shall be buried a minimum of 4.0 feet below finished grade. Electric system vaults and transformers shall be designed to be located and installed in areas that will not be subject to concentrated surface drainage flow.
- b. Telephone system underground facilities shall be buried a minimum of 2.0 feet below finished grade. Telephone pedestals shall be designed to be located and installed in areas that will not be subject to concentrated surface drainage flow.
- c. Cable television system underground facilities shall be buried a minimum of 2.0 feet below finished grade. Cable television risers and surface facilities shall be designed to be located and installed in areas that will not be subject to concentrated surface drainage flow.
- d. Natural gas system underground facilities shall be buried a minimum of 3.5 feet below finished grade.
- e. Whenever any shallow utility parallels or generally parallels a domestic water or sewer utility, a minimum horizontal separation of 4 feet shall be maintained between the domestic water or sewer main or service and the shallow utility.