

SCOPE

- I ↗ 1.1 This practice covers the requirements for site preparation, general earthwork, and preparation of tank subgrades, tank dikes and roadway subgrades. Requirements for dredging or land reclamation are not covered herein.
- I 1.2 An asterisk (*) indicates that additional information from the Owner, or approval by the Owner is required.

SUMMARY OF ADDITIONAL REQUIREMENTS

- I 2.1 **Table 1** lists the standards which shall be used with this practice as applicable.

TABLE 1

STANDARDS	
ASTM Standards	
D1140	Amount of materials in Soils Finer than the No. 200 (75 µm) Sieve
D1556	Density of Soil in Place by the Sand Cone Method
D1557	Laboratory Compaction Characteristics of Soil Using Modified Effort [56,000 ft-lbf/ft ³ (2,700 KN-m/m ³)]
D2167	Density and Unit Weight of Soil in-Place by Rubber Balloon Method
D2922	Density of Soil and Soil-Aggregate in Place by Nuclear Methods (Shallow Depth)
D2937	Density of Soil in Place by the Drive-Cylinder Method
D4253	Maximum Index Density and Unit Weight of Soils Using a Vibratory Table
D4254	Minimum Index Density and Unit Weight of Soils and Calculation of Unit Density
D4318	Liquid Limit, Plastic Limit, and Plasticity Index of Soils

CLEARING, GRUBBING, DRAINAGE

- I 3.1 Local regulations shall be consulted regarding whether testing of excavated material for contaminants is required before disposal.
- R,C * 3.2 **Clearing**, at the specified work areas, shall include the removal of all trees, bushes, and other vegetation, to within 6 in. (150 mm) above the natural grade. It shall also include the removal of dense growths of ground plants, matted dead vegetation, and rubbish resting on natural grade.
Clearing shall also include the specified removal of any existing structures, foundations, buried service piping and conduits.
- R,C * 3.3 **Grubbing**, at the specified work areas, shall include the excavation and complete removal of tree stumps, also the excavation and removal of all other plant life and included root structures, plus rubbish, **to a depth of 6 in. (150 mm) below natural grade.**
Exceptions to the 6 in. (150 mm) depth for grubbing are as follows for the specific work areas shown below:
 - a. **Drainage ditches** shall be grubbed to a depth no less than 1 ft (300 mm) beneath the finished sides and bottom.
 - b. **Roadway areas** shall be grubbed to a depth of 3 ft (900 mm) below finished grade but not more than 2 ft (600 mm) below natural grade.
 - c. **Areas directly under tankage** shall be grubbed to a depth of 2 ft (600 mm) below the tank bottom but not less than 6 in. (150 mm) below natural grade over the entire tank bottom.
 - d. **Areas under earth dikes for tankage and pit areas around tankage** shall be grubbed to a depth of 2 ft (600 mm) below finished grade but not less than 6 in. (150 mm) below natural grade.
 - e. **Embankment slopes** shall be grubbed to a depth of 1 ft (300 mm) beneath the finished slope.
 - f. **Areas for piping between unit area limits and ditches, and along roads**, shall be grubbed to a depth of 2 ft (600 mm) below finished grade but not less than 6 in. (150 mm) below natural grade.
- R * 3.4 All **organic material**, including trees, stumps, roots, and brush shall be burned or removed from the Owner's property.

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EXCAVATION

- I,R 4.1 **Rock, if encountered in pipe trenches**, shall be removed to 6 in. (150 mm) below bottom of pipe.
- 4.2 If **trench bottom materials** are soft, they shall be removed and replaced with coarse granular material, leveled and compacted to the prescribed grade.
- R * 4.3 If **soft or unstable materials** are encountered near the bottom of a foundation excavation, the Owner's Engineer shall be advised immediately. Measures taken to remedy such conditions shall be approved by the Owner's Engineer.
- R 4.4 If a **structure or foundation is founded on rock**, the rock shall be stripped clean and cut level, stepped or serrated.
- I 4.5 **Surplus materials** shall be disposed of as fill if suitable or transported to designated spoil areas.
- R 4.6 **Foundation excavations** shall be kept free of water until either a seal slab or the foundation is placed. Any water softened soils shall be removed prior to pouring the foundation.
- R * 4.7 When **excavation is made below or adjacent to any underground utilities**, equipment, or structures, these items shall be substantially supported in a manner acceptable to Owner's Engineer. As soon as work requiring excavation is complete, the excavation shall be filled and suitably compacted so that the utilities, equipment, or structures will be left in good working condition with no danger of settlement.

FILL, BACKFILL, AND COMPACTION

FILL

- R 5.1 **Fill** shall include acceptable salvaged soil or rock obtained from excavation at the site, or from outside sources. Restrictions in the use of specific types of fill are as follows:
 - a. Use of fill having an Attenberg liquid limit greater than 50, and a plasticity index greater than 25, requires approval by the Owner's Engineer.
 - b. Only cohesionless material shall be used where deposition is in water.
 - c. No fine, silty sand shall be used for the outer 12 in. (300 mm) (sides and top) of road subgrade.
 - d. No fine, silty sand shall be used within 6 in. (150 mm) of the finished surfaces of unlined ditches.
- R 5.2 **Placement of fill and backfill** to the specified lines, grades, and dimensions shall be as follows:
 - a. All fill shall be placed in 8 in. (200 mm) maximum thickness loose lifts.
 - b. Fill shall not be placed against walls until the mortar or concrete has attained sufficient strength to support the load.

BACKFILL

- I 5.3 **Backfill in pipe trenches** shall not include stones or foreign materials which could damage the pipe, until a 1 ft (300 mm) cover is obtained over the pipe.

COMPACTION

- R 5.4 **Compaction of fill and backfill** shall be as follows unless otherwise specified:
 - a. Compact to 95% maximum density per ASTM D1557.
 - b. Gravel and other large materials not adaptable to density tests shall be well compacted as approved by the Owner's Engineer.
 - c. Lesser degrees of compaction shall be used where the specified compaction density would be injurious to the buried structure or piping, and with the approval of the Owner's Engineer.
 - d. In-place density shall be determined by one or more of the methods given by ASTM D1556, D2167, D2922, and D2937.
 - e. All fill which does not meet the compaction requirements shall be recompacted or removed and replaced.

GRADING

- R 6.1 **Rough grading** shall be carried to within a vertical tolerance of 0.2 ft (60 mm) of final lines, grades, and slopes.
- R 6.2 **Final grades** shall be carried to the lines, grades, and slopes shown on the drawings, within a tolerance of 0.1 ft (30 mm).