

SECTION 02220
UTILITY EXCAVATION, BACKFILLING & COMPACTING

PART 1 -- GENERAL

1.1 SECTION DESCRIPTION

- A. The provisions set forth in this section shall be applicable to all underground water and wastewater piping installations.
- B. This section includes materials, installation standards, and Contractor responsibilities associated with the furnishing of all labor, materials, equipment and incidentals required to properly perform utility excavation backfilling and compacting for all utility pipelines as shown on the Drawings and as specified herein.
- C. All excavations shall be properly shored, sheeted and braced or cut back at the proper slope to provide safe working conditions, to prevent shifting of material, to prevent damage to structures or other work, and to avoid delay to the work, all in compliance with the Occupational Safety and Health Act (OSHA), the State of Florida Trench Safety Act, and under Section 107 of the Contract Work Hours and Safety Standards Act. In all cases where a conflict exists in the requirements of OSHA, the Florida Trench Safety Act, and these specifications, the requirements of the state agency shall prevail.

1.2 SUBMITTALS

- A. Contractor shall obtain necessary permits for any required dewatering activity in accordance with the applicable governmental agencies. These permits must be submitted to SLCU and Engineer of Record prior to construction.

PART 2 -- PRODUCTS

2.1 MATERIALS:

- A. Fill and backfill material shall be clean, fine earth, rock or sand, free of vegetation.
- B. Material may be from onsite excavation and may be imported. Imported material provided by the Contractor will be at no additional expense, unless specifically stated.
- C. Suitable: Suitable materials for fills shall be classified as A-1, A-3 or A-2-4 in accordance with AASHTO Designation M-145 and shall be free from vegetation and organic material. Not more than 12 percent by weight of fill material shall pass the No. 200 sieve. The Contractor shall furnish all additional fill material required.
- D. Suitable Material to be Placed in Water: Suitable material for fills to be placed in water shall be classified as A-1 or A-3 in accordance with AASHTO Designation M-145.
- E. Unsuitable: Unsuitable materials are classified as A-2-5, A-2-6, A-2-7, A-4, A-5, A-

5, A-7 and A-8 in accordance with AASHTO Designation M 145 or soils which cannot be compacted to specified percentage of maximum density.

PART 3 -- EXECUTION

3.1 EXCAVATION:

A. The maximum amount of open trench permitted in any one location shall be the length necessary to accommodate the amount of pipe installed in a single day. All trenches shall be fully backfilled at the end of each day. Barricades and warning lights meeting OSHA requirements shall be provided and maintained.

B. Trench Dimensions: The minimum width of the trench shall be equal to the outside diameter of the pipe, plus the minimum necessary to obtain proper utility main excavation backfill and compaction requirements; the maximum width of trench, measured at the top of the pipe, shall not exceed the outside pipe diameter plus two feet, unless otherwise shown on the drawing details or approved by the Engineer.

C. Trench Grade: Standard trench grade shall be defined as the bottom surface of the utility to be constructed or placed within the trench. Trench grade for utilities in rock or other non-cushioning material shall be defined as six inches below the outside of the bottom of the utility, which six inches shall be backfilled with extra utility bedding material. Excavation below trench grade that is done in error shall be backfilled to trench grade with granular material and compacted.

D. Utility Bedding: The bottom of the trench shall be shaped to provide a firm bedding for the utility pipe. The utility shall be firmly bedded in undisturbed firm soil, or hand-shaped unyielding material. The bedding shall be shaped so that the pipe will be in continuous contact therewith for its full length and shall provide a minimum bottom segment support for the pipe equal to springline of the pipe or one-half of the outside diameter of the barrel. Special bedding may be required, due to depth of cover, impact loadings, or other conditions.

E. Unsuitable Material Below Trench Grade: Soil unsuitable for a proper foundation encountered at or below trench grade, such as muck or other deleterious material, shall be removed for the full width of the trench and to the depth required to reach suitable foundation material, unless special design considerations receive prior approval from SLCU or Engineer of Record. Backfilling below trench grade shall be in compliance with the applicable provisions of Subsection 3.2, "Backfill", with material as specified under Part 2, "PRODUCTS".

F. Extra Utility-Bedding Material: When rock or other non-cushioning material is encountered at trench grade, excavation shall be extended to six inches below the outside of the bottom of the utility, and a cushion of granular material rock shall be provided. Utility-bedding material shall be installed as specified under Subsection 3.2 of this section.

G. Sheeting and Bracing: In order to prevent damage to property, injury to persons,

erosion, cave-ins, or excessive trench widths, adequate sheeting and bracing shall be provided, as required within these specifications, in accordance with accepted standard practice. When the situation arises, sheeting and bracing shall be used as necessary to protect the integrity of the road shoulder. Sheeting shall be removed when the trench has been backfilled to at least one-half its depth, or when removal would not endanger the construction of adjacent structures. When required, to eliminate excessive trench width or other damage, sheeting, bracing, or shoring shall be left in place and the top cut off at an elevation of 5.0 feet below finished grade or 1.0 foot above the top of the pipe, whichever is less, unless otherwise directed. All sheeting and bracing will be in accordance with OSHA, and the Florida Trench Safety Act.

H. Excavated Material: Suitable material to be used for backfill shall be neatly and safely deposited at the sides of the trenches where space is available. Whenever possible, excavated material near a roadway should be deposited on the right-of-way side of the trench away from the travelway. Where stockpiling of excavated material is required, the Contractor shall be responsible for obtaining the sites to be used and shall maintain the operation to provide for natural drainage and not present an unsightly appearance. Also, the contractor is responsible for transporting the material to and from the stockpile material. All sites shall be restored after fill is removed. No excavated material shall be placed within roadside swales for longer than that days work.

I. Excess Fill Material: Clean excess fill shall be the property of SLCU, should they request same. Otherwise, it will be the property of the contractors to remove from the site. If requested by SLCU, the Contractor shall deliver and stockpile this material to areas designated by SLCU. Resale of excavated material on the project site will not be permitted.

J. Material Disposal: Unsuitable fill material or cleared and grubbed material resulting from the utility installation shall be removed from the work site and disposed of at location(s) secured by the Contractor, and in accordance with the agency having jurisdiction.

K. Borrow: Should there be insufficient satisfactory material from the excavations to meet the requirements for fill material, borrow shall be obtained from pits secured by the Contractor. All borrow shall meet the provisions of these specifications.

L. Rock Excavation: Rock excavation shall be defined as excavation of any hard natural substance which cannot be removed by a one cubic yard bucket and requires the use of explosives and/or special impact tools such as jackhammers, sledges, chisels, or similar devices specifically designed for use in cutting or breaking rock.

M. Dewatering: Utilities shall be laid "in the dry", unless otherwise approved in writing by SLCU and the Engineer of Record. All dewatering activities are to be performed by the Contractor. Trench excavations may be dewatered by using one or more of the following methods: well point system; sumps with pumps or other method(s) as approved by the Engineer. Dewatering systems shall be utilized in accordance with good standard practice and must be efficient enough to lower the water level in advance of the excavation and maintain it continuously to keep the trench bottom and sides firm and dry. If the material encountered at trench grade is suitable for the passage of water without destroying the sides

or utility foundation of the trench, sumps may be provided at intervals at the side of the main trench excavation, with pumps used to lower the water level by taking their suction from said sumps. Discharge from dewatering shall be disposed of in such a manner that it will not interfere with normal drainage of the area in which the work is being performed, create a public nuisance, or form ponding. All discharge shall be in accordance with any SFWMD issued permits. The operations shall not cause injury to any portion of the work completed, or in progress, or to the surface of streets, or to private property. The proposed dewatering method(s) and schedule shall be approved by the Engineer of Record and necessary regulatory agencies prior to construction. Additionally, where private property will be involved, advance permission shall be obtained by the Contractor.

N. Obstructions: It shall be the Contractor's responsibility to acquaint himself with existing conditions and to locate structures and utilities along the proposed utility alignment in order to avoid conflicts. Where actual conflicts are unavoidable, work shall be coordinated with the facility owner and performed so as to cause as little interference as possible with the service rendered by the facility disturbed. All affected utilities shall be notified prior to excavation in their vicinity.

3.2 BACKFILLING:

A. General: Backfill material shall be clean earth fill composed of sand, clay and sand, sand and rock, crushed rock, or an approved combination thereof. Backfilling shall be divided into three specified areas: First, from trench grade to a point 12 inches above the top of the utility, called initial backfill; second, from the top of the pipe zone to the bottom of the subgrade called final backfill; and third, from the bottom of the replacement base course to the replacement surface. Where encasements or other below grade concrete work have been installed, backfilling shall not proceed until the concrete has obtained sufficient strength to support the backfill load.

B. Initial Backfill: Granular material shall be carefully placed and tamped around the lower half (springline) of the utility. Backfilling shall be carefully continued until the fill is 12 inches above the top of the utility in layers not exceeding 6 inches (uncompacted thickness), using the best available material from the excavation, if approved.

The material shall be lowered to within two feet above the top of pipes before it is allowed to fall, unless the material is placed with approved devices that protect the pipes from impact. Initial backfill shall exclude stones, or rock fragments larger than one inch for either ductile iron, HDPE or PVC pipe. Compacting each lift shall be equal to 100% of maximum density as determined by AASHTO T-99.

C. Final Backfill: The remainder of the trench, above initial backfill and below the subgrade, shall be backfilled and compacted in layers not exceeding 12 inches (uncompacted thickness), except that the last two lifts shall not exceed six inches (uncompacted thickness) per lift. Compaction of each lift shall be equal to 100% of maximum density as determined by AASHTO T-99.

D. Shoulder Restoration: All shoulder restoration shall be in accordance with the applicable permit requirements of the agency having jurisdiction.

E. In excavated locations outside a 2(horizontal) to 1(vertical) slope downward from the shoulder line or the back of the curb, backfill (initial and final) shall be compacted to a density equal to 95% of maximum density, as determined by AASHTO T-99, or to natural existing density of the adjacent undisturbed trench embankments, whichever is greater.

F. Protective Concrete Slab: Protective concrete slabs shall be installed over the top of trenches, where required, to protect the installed utility against excessive loads, or when insufficient cover exists.

3.3 COMPACTING:

A. Compaction Methods: Specified compaction shall be accomplished using accepted standard methods (powered tampers, vibrators, etc.), with the exception that the first 12 inches of backfilling over the pipe shall be compacted by hand-operated tamping devices. Flooding or puddling with water to consolidate backfill is not acceptable, except where sugar sand is encountered and the operation has been approved by the Engineer of Record

B. Location of Density Tests: Density tests for determination of the specified densities shall be made every 1000 feet parallel to roadways and at least one test location under each perpendicular roadway cut. Reference the standard construction details for density test requirements for trenches at flexible pavement.

C. Test backfill compaction at each specified location, at the finished backfill surface elevation and at a point 12 to 16 inches beneath the finished surface elevation.

D. Density Tests: Density tests for determination of the above-specified compaction shall be made by a qualified testing laboratory. If any test results are unsatisfactory, the Contractor shall re-excavate, recompact the backfill, and retest, at his expense until the desired compaction is obtained.

Additional compaction tests shall be made to each side of an unsatisfactory test, as directed, to determine the extent of re-excavation and re-compaction necessary. Test results shall be made available to SLCU for their records.

**** END OF SECTION ****