

SECTION 022020
EXCAVATION AND BACKFILL FOR UTILITIES

1. DESCRIPTION

This specification shall govern all work for excavation and backfill for utilities required to complete the project.

2. CONSTRUCTION

- (1) Unless otherwise specified on the drawings or permitted by the OAR, all pipe and conduit shall be constructed in open cut trenches with vertical sides. Trenches shall be sheathed and braced as necessary throughout the construction period. Sheathing and bracing shall be the responsibility of the Contractor (refer to Section 022022 "Trench Safety for Excavations" of the City Standard Specifications).

Trenches shall have a maximum width of 1' beyond the horizontal projection of the outside surfaces of the pipe and parallel thereto on each side unless otherwise specified.

The Contractor shall not have more than 200' of open trench left behind the trenching operation and no more than 500' of ditch behind the ditching machine that is not compacted as required by the plans and specifications. No trench or excavation shall remain open after working hours.

For all utility conduit and pipe to be constructed in fill above natural ground, the embankment shall first be constructed to an elevation not less than 1' above the top of the pipe or conduit, after which excavation for the pipe or conduit shall be made.

If quicksand, muck, or similar unstable material is encountered during the excavation, the following procedure shall be used unless other methods are called for on the drawings. If the unstable condition is a result of ground water, the Contractor, prior to additional excavation, shall control it. After stable conditions have been achieved, unstable soil shall be removed or stabilized to a depth of 2' below the bottom of pipe for pipes 2' or more in height; and to a depth equal to the height of pipe, 6" minimum, for pipes less than 2' in height. Such excavation shall be carried at least 1' beyond the horizontal limits of the structure on all sides. All unstable soil so removed shall be replaced with suitable stable material, placed in uniform layers of suitable depth as directed by the OAR, and each layer shall be wetted, if necessary, and compacted by mechanical tamping as required to provide a stable condition. For unstable trench conditions requiring outside forms, seals, sheathing and bracing, any additional excavation and backfill required shall be done at the Contractor's expense.

- (2) Shaping of Trench Bottom. The trench bottom shall be undercut a minimum depth sufficient to accommodate the class of bedding indicated on the plans and specifications.
- (3) Dewatering Trench. Pipe or conduit shall not be constructed or laid in a trench in the presence of water. All water shall be removed from the trench sufficiently prior to the pipe

or conduit planing operation to insure a relatively dry (no standing water), firm bed. The trench shall be maintained in such dewatered condition until the trench has been backfilled to a height at least one foot above the top of pipe. Removal of water may be accomplished by bailing, pumping, or by installation of well-points, as conditions warrant. Removal of well-points shall be at rate of 1/3 per 24 hours (every third well-point). The Contractor shall prevent groundwater from trench or excavation dewatering operations from discharging directly into the storm water system. Groundwater from dewatering operations shall be sampled and tested, if applicable, and disposed of, in accordance with City Standard Specification Section 022021 "Control of Ground Water".

- (4) Excavation in Streets. Excavation in streets, together with the maintenance of traffic where specified, and the restoration of the pavement riding surface, shall be in accordance with drawing detail or as required by other applicable specifications.
- (5) Removing Abandoned Structures and Utilities. When abandoned masonry structures or foundations are encountered in the excavation, such obstructions shall be removed for the full width of the trench and to a depth 1' below the bottom of the trench. When abandoned inlets or manholes are encountered and no plan provision is made for adjustment or connection to the new utility, such manholes and inlets shall be removed completely to a depth 1' below the bottom of the trench. In each instance, when abandoned utilities are to be removed, the bottom to the trench shall be restored to grade by backfilling and compacting by the methods provided hereinafter for backfill. Where the trench cuts through utility lines which are known to be abandoned, these lines shall be cut flush with the sides of the trench and blocked with a concrete plug in a manner satisfactory to the OAR.
- (6) Protection of Utilities. The Contractor shall conduct his work such that a reasonable minimum of disturbance to existing utilities will result. Particular care shall be exercised to avoid the cutting or breakage of water and gas lines. Such lines, if broken, shall be restored promptly by the Contractor. When active wastewater lines are cut in the trenching operations, temporary flumes shall be provided across the trench while open, and the lines shall be restored when the backfilling has progressed to the original bedding line of the sewer so cut.

The Contractor shall inform utility owners sufficiently in advance of the Contractor's operations to enable such utility owners to reroute, provide temporary detours, or to make other adjustments to utility lines in order that the Contractor may proceed with his work with a minimum of delay. The Contractor shall not hold the City liable for any expense due to delay or additional work because of utility adjustments or conflicts.

- (7) Excess Excavated Material. All materials from excavation not required for backfilling the trench shall be removed by the Contractor from the job site promptly following the completion of work involved.

(8) Backfill

A. Backfill Procedure Around Pipe (Initial Backfill)

All trenches and excavation shall be backfilled as soon as is practical after the pipes or conduits are properly laid. In addition to the specified pipe bedding material, the backfill around the pipe as applicable shall be granular material as shown on the standard details or as described in the applicable specification section and shall be free of large hard lumps or other debris. If indicated on the plans, pipe shall be encased with cement-stabilized sand backfill as described below. The backfill shall be deposited in the trench simultaneously on both sides of the pipe for the full width of the trench, in layers not to exceed 10" (loose measurement), wetted if required to obtain proper compaction, and thoroughly compacted by use of mechanical tampers to a density comparable to the adjacent undisturbed soil or as otherwise specified on the plans, but not less than 95% Standard Proctor density. A thoroughly compacted material shall be in place between the external wall of the pipe and the undisturbed sides of the trench and to a level 12" above the top of the pipe.

B. Backfill Over 1' Above Pipe (Final Backfill)

UNPAVED AREAS: The backfill for that portion of trench over 1' above the pipe or conduit not located under pavements (including waterlines, gravity wastewater lines, wastewater force mains and reinforced concrete storm water pipe) shall be imported select material or clean, excess material from the excavation meeting the following requirements:

- Free of hard lumps, rock fragments, or other debris,
- No clay lumps greater than 2" diameter
- Moisture Content: +/-3%

Backfill material shall be placed in layers not more than 10" in depth (loose measurement), wetted if required to obtain proper compaction, and thoroughly compacted by use of mechanical tampers to the natural bank density but not less than 95% Standard Proctor density, unless otherwise indicated. Flooding of backfill is not allowed. Jetting of backfill may only be allowed in sandy soils and in soils otherwise approved by the OAR. Regardless of backfill method, no lift shall exceed 10" and density shall not be less than 95% Standard Proctor density. A period of not less than 24 hours shall elapse between the time of jetting and the placing of the top 4' of backfill. If jetting is used, the top 4' of backfill shall be placed in layers not more than 10" in depth (loose measurement), wetted if required to obtain proper compaction, and thoroughly compacted by use of mechanical tampers to the natural bank density but not less than 95% Standard Proctor density (ASTM D698).

If any portion of a utility trench lies within 1' of the back of roadway curb, the trench shall be backfilled per requirements beneath paved areas, including cement stabilization, as stated below.

PAVED AREAS: At utility lines under pavements (including waterlines, gravity wastewater lines, wastewater force mains, and reinforced concrete storm water pipe), and where otherwise indicated on the drawings, trenches shall be backfilled as shown below:

From top of initial backfill (typically 12" above top of the pipe) to 3' below bottom of road base course, backfill shall be select material meeting the requirements of 022100 "Select Material".

Asphalt Roadways

The upper 3' of trench below the road base course shall be backfilled to the bottom of the road base course with cement-stabilized sand containing a minimum of 1.5 sacks of Standard Type I Portland cement per cubic yard of sand uniformly moistened, mixed, and compacted to not less than 95% Standard Proctor density.

Concrete Roadways

The Contractor may elect to backfill the upper 3' of trench below the road base course with cement stabilized sand as noted above, or in the case of storm water pipe or box installation the Contractor may backfill and compact select material to 98% Standard Proctor density (ASTM D698) following City Standard Specification Section 022100.

3. MEASUREMENT AND PAYMENT

Unless otherwise specified on the Bid Form, excavation and backfill for utilities, including select material or cement-stabilized sand backfill, shall not be measured and paid for separately. It shall be considered subsidiary to the items for which the excavation and backfill is required.