

Section 1 - Trench and Backfill

1.1 General

All trenching and backfill within the City of Gridley shall be performed in accordance with these Design and Construction Standards, the City of Gridley Standard Details, and the approved improvement plans. Trench excavation, bedding, backfill, and compaction shall be suitable for the intended utility and surface condition and shall be constructed to provide long-term structural support and minimize future settlement.

All trenching within City rights-of-way shall conform to the City's Standard Details and these standards. Where conflicts occur, the Standard Details and approved plans shall govern unless otherwise approved by the City Engineer.

Jetting of trenches is not permitted unless specifically approved in writing by the City Engineer.

1.2 Trenching Operations

All trenching operations shall comply with all applicable Federal and State safety requirements, including Cal/OSHA regulations. Domestic Water Excavation and Trenching Earthwork required to construct water pipelines, facilities and appurtenances shall be performed to the lines and grades shown on the approved project plans and as specified below:

A. Excavations

Pipeline excavations shall be open-cut trenches, unless otherwise specified on the approved improvement plans. Excavations shall conform to all applicable Federal and State safety requirements. All work shall be conducted in such a manner as to prevent damage to new and existing facilities or adjoining property. The contractor shall appoint a designated "competent person" during construction.

For water mains the trench shall be excavated a minimum of 6 inches below the outside diameter of the pipe per elevation on the approved plans. For water services the trench shall be excavated a minimum of 4 inches below the outside diameter of the pipe per elevation on the approved plans. For both water mains and services, if rocky or unyielding soil is encountered the trench shall be over excavated by 12 inches and backfilled with bedding material.

B. Trench Width

The trench bottom width shall be at a minimum the outside diameter of the pipe plus 12 inches and at a maximum the outside diameter of the pipe plus 4 feet and shall comply with the Standard Details or as approved by the City. If rocky or unyielding soil is encountered the trench width shall be increased by 12 inches. A minimum clearance of 6 inches shall be maintained between the pipe and the trench wall.

C. Compaction

Compaction of the trench shall conform to the Standard Details. Compaction test results shall be supplied to the City Inspector upon request. Jetting of trenches is not allowed.

D. Weather

Trenching during inclement weather should be avoided when possible. If trenching during inclement weather is required, trenches shall be excavated only as far as pipe can be laid and backfilled during the course of the day.

E. Existing Roadways

Trenching in existing roadways shall be limited to the length of pipe that can be laid that day. No open trenches shall be left overnight. Exposed trenches shall be plated and backfilled as approved by the City Inspector.

F. Excess Material

Excess material and materials determined unsuitable for backfill by the City Inspector shall be removed from the project site.

G. Dewatering

Dewatering for the installation of structures and pipelines shall commence when groundwater is first encountered and shall be continuous until the excavation is backfilled. Best Management Practices (BMP's) including but not limited to scouring and erosion measures shall be used to eliminate sediment-laden discharges in accordance with the approved SWPPP.

1.3 Sanitary Sewer Excavation and Trenching

Earthwork required to construct sewer pipelines, facilities and appurtenances shall be performed to the slopes and grades shown on the approved project plans and as specified in the following:

A. Excavations

Pipeline excavations shall be open-cut trenches, unless otherwise specified on the approved improvement plans, and as specified on the Standard Details. Excavations shall conform to all applicable Federal and State safety requirements. All work shall be conducted in such a manner as to prevent damage to new and existing facilities or adjoining property. The contractor shall appoint a designated "competent person" during construction.

The trench shall be excavated a minimum of 3 inches below the outside diameter of the pipe per elevation on the approved plans for 12 inch diameter pipe or less. For pipes with a diameter greater than 12 inches it shall be excavated a minimum of 4 inches. If rocky or unyielding soil is encountered the trench shall be over excavated by 4 inches and backfilled with bedding material.

B. Trench Width

The trench bottom width shall be at a minimum the outside diameter of the pipe plus 2 feet and at a maximum the outside diameter of the pipe plus 4 feet and shall comply with the Standard Details or as approved by the City. A minimum clearance of 6 inches shall be maintained between the pipe and the trench wall.

C. Compaction

Compaction of the trench shall conform to the Standard Details. Compaction test results shall be supplied to the City Inspector upon request. Jetting of trenches is not allowed.

D. Weather

Trenching during inclement weather should be avoided when possible. If trenching during inclement weather is required, trenches shall be excavated only as far as pipe can be laid and backfilled during the course of the day.

E. Existing Roadways

Trenching in existing roadways shall be limited to the length of pipe that can be laid that day. No open trenches shall be left overnight. Exposed trenches shall be plated or backfilled as approved by the City inspector.

F. Excess Material

Excess material and materials determined unsuitable for backfill by the City Inspector shall be removed from the project site.

G. Dewatering

Dewatering for the installation of structures and pipelines shall commence when groundwater is first encountered and shall be continuous until the excavation is backfilled. Best Management Practices including but not limited to scouring and erosion measures shall be used to eliminate sediment-laden discharges in accordance with the approved SWPPP.

1.4 Storm Drain Excavation and Trenching

All drainage improvements shall conform the following requirements:

A. Excavation

Pipeline excavation shall be open-cut trenches, unless otherwise specified on the approved improvement plans. All excavations shall adhere to all applicable Federal and State safety requirements. All work shall be conducted in such a manner as to prevent damage to new and existing facilities or adjoining property.

The trench shall be excavated a minimum of 3 inches below the outside diameter of the pipe per elevation on the approved plans for 12 inch diameter pipe or less. For pipes with a diameter greater than 12 inches it shall be excavated a minimum of 4 inches. If rocky or unyielding soil is encountered the trench shall be over excavated by 4 inches and backfilled with bedding material.

B. Trench Width

For pipes with an outside diameter of 30 inches or less the trench width shall be outside diameter plus 16 inches. For pipes with an outside diameter greater than 30 inches the trench width shall be equal to the outside diameter multiplied by 1.25 plus 12 inches. A minimum clearance of 6 inches shall be maintained between the pipe and the trench wall.

C. Compaction

Compaction of the trench shall conform to the Standard Details. Compaction test results shall be supplied to the City upon request. Jetting of trenches is not allowed.

D. Weather

Trenching during inclement weather should be avoided when possible. If trenching during inclement weather is required, trenches shall be excavated only as far as pipe can be laid and backfilled during the course of the day.

E. Existing Roadways

Trenching in existing roadways shall be limited to the length of pipe that can be laid that day. No open trenches shall be left overnight. Exposed trenches shall be plated or backfilled as approved by the City inspector.

F. Excess Material

Excess material and materials determined unsuitable for backfill by the City Inspector shall be removed from the project site.

G. Dewatering

Dewatering for the installation of structures and pipelines shall commence when groundwater is first encountered and shall be continuous until the excavation is backfilled. Best Management Practices including but not limited to scouring and erosion measures shall be used to eliminate sediment-laden discharges in accordance with the approved SWPPP.

1.5 Trench and Backfill

Trench backfill within the City street right-of-ways shall conform to the Standard Details. Moisture content shall be controlled to obtain the optimum density for the soil type encountered. All compaction testing shall conform to ASTM D1557-78 test methods. Trench and backfill compaction shall be tested and certified by a licensed geotechnical engineer at the Developer's or Contractor's expense. Certification shall be provided to the City Inspector prior to the construction of surface improvements.

Backfill for joint utility trench shall be clean sand or $\frac{3}{4}$ " aggregate base uniformly graded with a minimum sand equivalent of 25 or Class 2 Aggregate Base. Compacted to 95% relative compaction.

Following paving operations and where utility valve clusters are present, standard mechanical compaction efforts and equipment may have limited access to achieve adequate compaction per these Standards. In these cases, it is authorized that controlled low-strength material (CLSM) may be used within the valve excavation area to just below the required concrete collar height. Once cured, placement of concrete collar and/or HMA paving operations may progress.

A. Existing Streets

Longitudinal trenches for dry utilities (CATV, telephone, gas, electric, traffic signal and signal interconnect cable) shall be excavated 6 inches clear from the gutter lip.

Following the patching of the trench with asphalt concrete, the street surface shall be CLSM sealed from the gutter lip to the edge of the bike lane stripe (usually 4 feet wide). If the bike lane stripe is obliterated in any manner by the construction process, it shall be replaced with thermoplastic per these Standards. If the dry utility trench impacts the travel line due to crossings the street surface shall be CLSM sealed from the gutter lip to the edge of the travel lane.

B. Jetting

Compaction of trench backfill by jetting methods is **NOT** allowed in City right-of-way areas or over dedicated storm, sewer or water easements or mains. Jetting of joint utility trenches behind the right-of-way and within public Utility easements may be allowed under specific

conditions and upon the written approval of the City's Construction Inspector and the Geotechnical Engineer.

C. Material

Material for backfilled trenches shall contain no organic material and no rocks or soil lumps exceeding 4 inches in diameter with the following qualifications:

- Cobbles in the initial backfill (the first 1 foot above the pipe bedding covering the pipe) shall be 3 inch maximum diameter.
- An exception to the 4 inch maximum diameter cobble is where cobbles exceed 4 inches in diameter and are predominant (as determined by the City's Inspector and Geotechnical Engineer). In this condition, 8 inches in diameter is the maximum size cobble allowed.
- The maximum cobble size shall not be greater than that of the depth of the maximum compaction lift, for the type of equipment used.

CLSM cement backfill, controlled low-strength material or dry mix "Popcorn" may be used on a case-by-case basis. The Contractor shall submit a proposed design mix to the City Inspector for review and approval prior to placement.

Native soil shall not be used for bedding or backfilling of utility conduits or chases within the City right-of-way, but only select bedding materials as discussed in these Specifications and per the Standard Details.

D. Placement of Material

Equipment shall be a size and type satisfactory to the on-site geotechnical engineer and the City's Inspector. Impact-type pavement breakers or compactors (hydro-hammers) shall not be used within 5 feet of the top of any type pipe. Material for mechanically compacted backfill shall be placed in horizontal lifts which, prior to compaction, shall not exceed the depths specified below for the type of equipment employed. Actual maximum lift depth will vary with soil conditions and compaction equipment. The Contractor shall consult with a geotechnical engineer to determine the appropriate maximum depths. The Contractor shall be responsible for verifying compaction requirements for each lift.

E. Typical Compaction Equipment and Maximum Lift Depths Achieved by Proper Compaction

Maximum lift depth of 4 inches, equipment type:

Portable, engine driven pneumatic type (wacker) Portable vibratory plate

Maximum lift depth of 12 inches, equipment type:

Backhoe mounted sheep-foot Vibratory smooth wheeled roller

Vibratory smooth wheel roller with pneumatic tires

Maximum lift depth of 18 inches, equipment type:

Impact, free-fall or stomping equipment (hydro-hammer)

F. Pipe Bedding References

See Standard Detail DR-10 for Storm Drain.

See Standard Detail W-15 for Water Main.

See Standard Detail W-16 for Water Services.

See Standard Detail SS-05 for Sewer Main and Services (within ROW).