

Excavation for Natural Gas Mains and Services



Trench Padding & Backfilling Requirements for Mains

General

Install mains with a minimum of 36" of cover. Exceptions may be made within state and federal codes with the **prior approval** of the Operations Manager. Install plastic pipe with slack so external loading or thermal contraction will not place unnecessary stress on the pipe or joints.

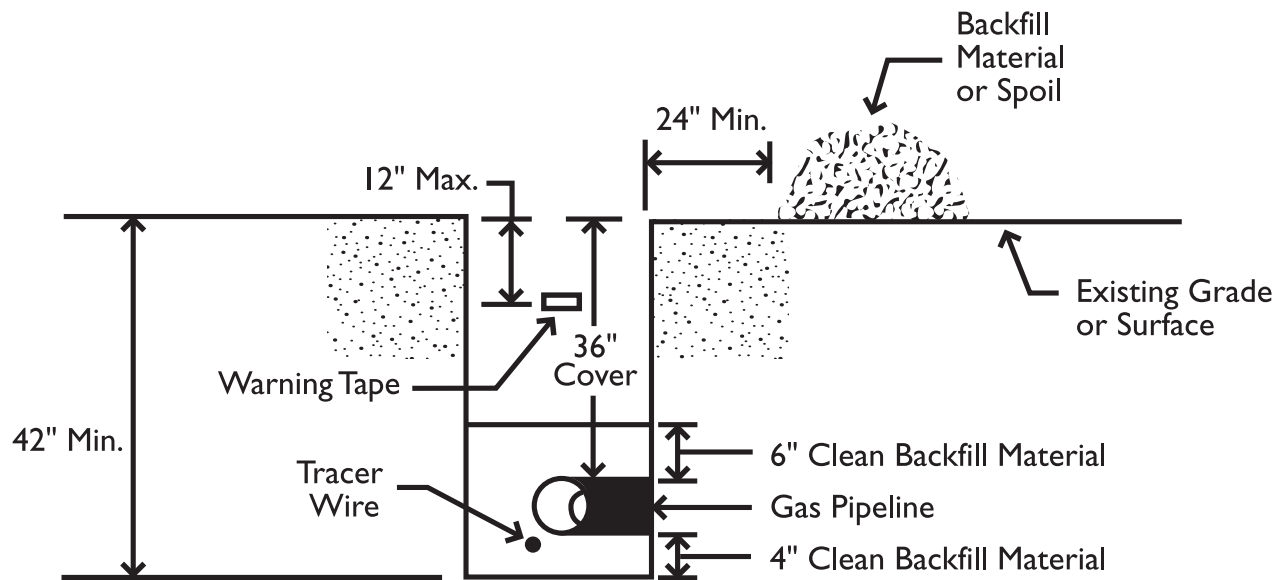
In cases where a stopper fitting or other new material is added to an older main such that the main has less than 24" of cover (or 36" of cover in a Massachusetts state road), the Company or contractor should provide permanent protection such as concrete. Whenever a main will be installed with less than 24" of cover, notify the Operations Manager or his/her designee so that they can request approval from the Department of Public Utilities.

Requirements - See figure 1

- ✓ Remove all excess water from the trench with pumps or equivalent.
- ✓ Place a layer of sand 4" deep in trench bottom before laying the pipe in the trench. The Operations Manager or Company field representative may allow use of clean fill material* instead of sand provided it is clean and free of any objects that may impinge on the pipe.
- ✓ For plastic pipe, install number 12 AWG solid copper wire (tracer wire) with yellow insulating jacket along the length of the main. Keep the tracer wire at least 4" away from the plastic pipe. This wire is used to locate the pipe. If the installation is trenchless, tracer wire may be less than 4" away from the plastic pipe.
- ✓ Place a minimum of 6" of sand over the pipe. The Operations Manager or Company field representative may allow use of clean fill material* instead of sand, provided it is clean and free of any objects that may impinge on the pipe.
- ✓ Place warning tape in the trench not more than 12" below finished grade. The standard warning tape is yellow, non-detectable tape, 6" wide. No warning tape is required if pipe installation is trenchless.
- ✓ Fill the rest of the trench with clean fill material, using the spoil where suitable and acceptable. If the original spoil material is not suitable for use as a sub-grade material when restoring road surfaces, use material required by state or local agencies. Remove all excess spoil in the accepted manner.
- ✓ Properly compact the trench to insure the trench will not settle.
(*See Gas Standard GS10.03 for a description of suitable materials for pipe bedding and final backfill.)

Trench Padding & Backfilling Requirements for Mains

Trench, Padding, & Backfilling Requirements for Polyethylene Gas Mains



- ✓ Trench depth of 42 inches
- ✓ Trench padding (4 inches sand on bottom, 6 inches sand on top)
- ✓ Warning tape (12" below final grade)

figure 1

Trench Padding & Backfilling Requirements for Services

General

Install services with a minimum of 24" of cover. Exceptions may be made within state and federal codes with the prior approval of the Operations Manager. Install plastic pipe with slack so external loading or thermal contraction will not place unnecessary stress on the pipe or joints.

Requirements - See figure 2

- ✓ Remove all excess water from the trench with pumps or equivalent.
- ✓ Place a layer of sand 4" deep in trench bottom before laying the pipe in the trench. The Operations Manager or Company field representative may allow use of clean fill material* instead of sand provided it is clean and free of any objects that may impinge on the pipe.
- ✓ For plastic pipe, install number 12 AWG solid copper wire (tracer wire) with yellow insulating jacket along the length of the service. This wire is used to locate the pipe. Do not physically attach the wire or allow the wire to touch the plastic pipe. Keep the tracer wire at least 4" away from the plastic pipe. If the installation is trenchless, the tracer wire may be less than 4" away from the plastic pipe.
- ✓ Place a minimum of 6" of sand over the pipe. The Operations Manager or Company field representative may allow use of clean fill material* instead of sand, provided it is clean and free of any objects that may impinge on the pipe.
- ✓ Place warning tape in the trench not more than 12" below finished grade. The standard warning tape is yellow, non-detectable tape, 6" wide.
- ✓ Fill the rest of the trench with clean fill material, using the spoil where suitable and acceptable. If the original spoil material is not suitable for use as a sub-grade material when restoring road surfaces, use material required by state or local agencies. Remove all excess spoil in the accepted manner.
- ✓ Properly compact the trench to insure the trench will not settle.

(*See Gas Standard GS10.03 for a description of suitable materials for pipe bedding and final backfill.)

Trench Padding & Backfilling Requirements for Services

Trench Padding & Backfilling Requirements for Gas Services

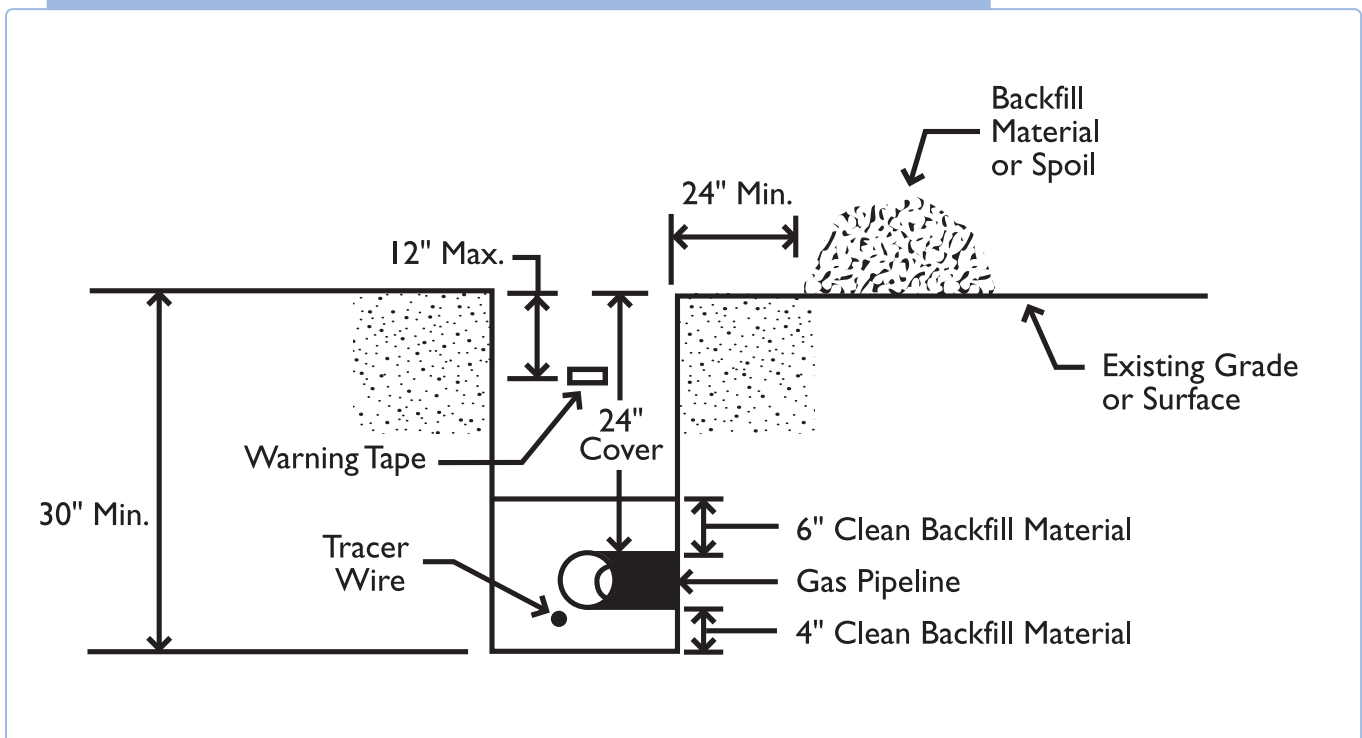
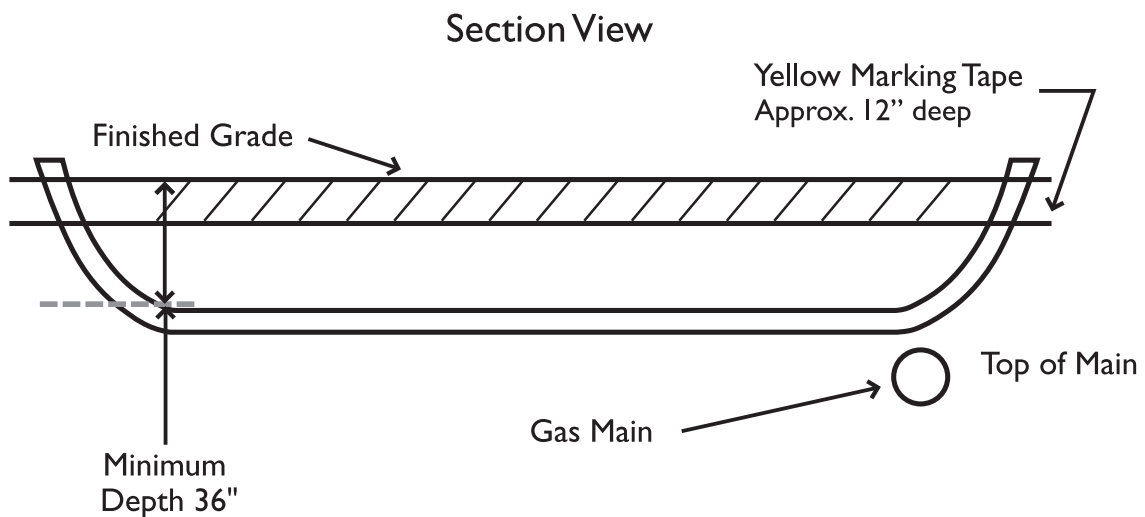
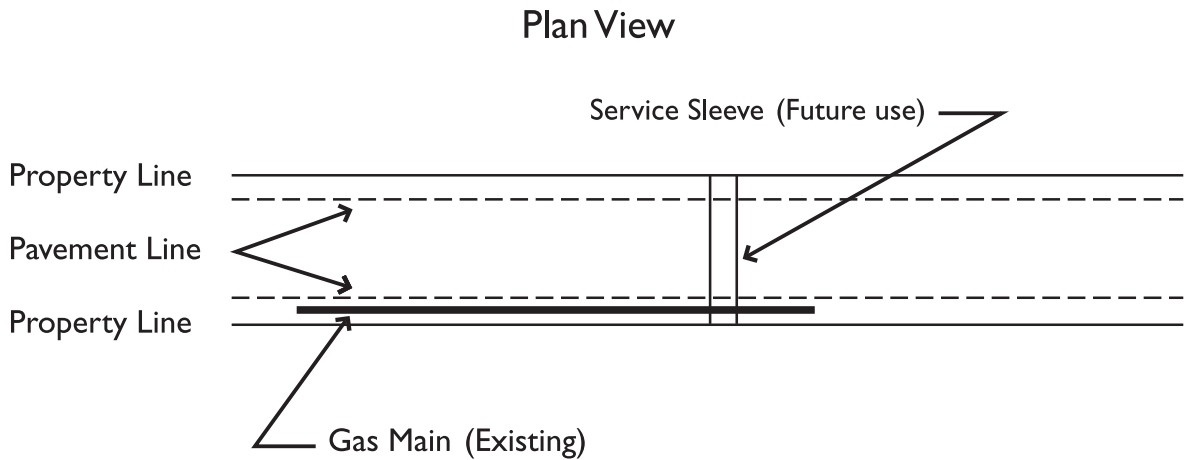


figure 2

Installing Service Sleeves



Service Sleeve

Notes

- ✓ Sleeves must have 36" minimum cover at finish grade
- ✓ Sleeves will be plastic and shall be minimum 2" diameter
- ✓ Ends should be capped or taped to prevent soil and debris from getting in
- ✓ Sleeve terminations must be marked with stakes and labeled
- ✓ Sleeves should be installed 5 feet off water and sewer stubs

Pipe Bedding & Final Backfilling

Material Standards

Pipe bedding and final backfilling should be carried out so that each zone indicated in figure 3 below is in accordance with the recommendations given herein or as specified by the engineer.

Unless otherwise specified by the engineer, the haunching and initial backfilling should be performed before the leak test is completed. The backfilling should be completed following a satisfactory test. In all cases, the haunching and initial backfill material should be placed and compacted to provide support as specified by the engineer.

Soils for Pipe Bedding

To achieve a satisfactory installation of pipe, it is essential to install the pipe with bedding, haunching, and initial backfill materials (see figure 3, below) of characteristics that provide stable and permanent support to the pipe. Soils have been grouped into five broad classes according to their suitability as bedding materials. This grouping with descriptions of soil type (GW, GP, etc.) as per ASTM D-2487, "Standard Method for Classification of Soils for Engineering Purposes," is:

Class I - Angular crushed stone, maximum size of particle, 1-1/2 inches, including materials of regional significance such as marl, coral, crushed shells, cinders, and slag.

Class II - Naturally occurring gravels and coarse sands, containing minimum fines, maximum size of particles 1-1/2 inches, and non-cohesive when wet or dry. These include soil types GW, GP, SW, and SP.

Class III - Naturally occurring fine sands, and mixtures of gravel-clay or sandy clay, including soil types GM, GC, SM, and SC.

Class IV - Very fine soils such as silt, silty-clay, lean clay, and organic clays having a liquid limit of less than 50%, including soil types ML, CL, and OL.

Other soils, such as clays of high plasticity, or having a liquid limit of more than 50%, or containing such a high organic content as soil types MH, CH, OH, or PT are not categorized by the preceding classification system as they are not recommended for bedding, haunching, or initial backfill. If their use is unavoidable, expert engineering guidance should be obtained as to how they should be used and what additional supporting structures may be required.

Class I and II materials should preferably be used for bedding (if required), haunching, and initial backfill. For 6" and smaller pipe, maximum particle size should be 1/2". Care should be taken to insure that haunching material is well placed under the haunches of the pipe and that, in the process, the pipe is not disturbed. The initial backfill should be placed in 6" layers and extend to at least 6" above the top of the pipe. Bedding materials should be compacted as specified by the design engineer.

Class III materials may also be used in the bedding zone. When so used they should be compacted as specified by the engineer, which generally will be to not less than 80% Proctor density as determined by the AASHTO Method T99 for compaction and density of soils. This may normally be accomplished by walking on soil placed in 6-inch layers or by hand-tamping same with wooden tampers.

Class IV materials should be used only with the specific approval of the engineer who will determine their acceptability, depending on the ease of placement and compaction of the particular materials under consideration.

Final Backfill

General - The final backfill, unless otherwise specified, may consist of the excavated material provided it is free of unsuitable matter, such as lumps of clay, stones, construction debris, boulders, (stones over 8 inches in their longest dimension) and frozen clods.

Final Backfill Under Roads - Trenches in the right-of-way of a road should be backfilled to finished grade with an approved granular material to a compaction density of 95% or as specified by the engineer.

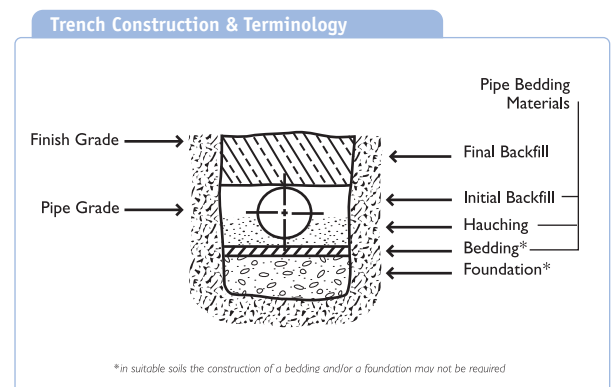


figure 3

