

TRENCHING & CONDUIT

Scope

This standard describes trench requirements for underground primary and secondary distribution cable systems, including joint use with telephone or CATV cables and conduits.

General

All other circuits installed in any trench containing Springville City Power (SCP) distribution circuits shall maintain the minimum 12 inch separation required by the current edition of the National Electric Safety Code Article 352.

Where trenching is provided by a contractor or customer, inspection of the trench and of conduits by SCP personnel shall be made prior to the installation of the select backfill.

Where county, state or other regulatory agency joint use, trench, backfill or compaction requirements exceed the requirements of SCP, the more stringent requirements shall apply. In no case shall this standard be used as justification to ignore or violate local regulations.

Trenching

The developer is to provide the trench for all required conduit systems and, following installation of the conduit by the Developer, backfill to meet Power Department requirements. The Power Department, under the terms of the City's Line Extension New Connection policy (Resolution 97-12), will install both primary cables (medium voltage 12.47 kV or 4.16 kV) and secondary cables (480 Volts and below).

To assure the final grade has been established, the trenching will be started after the curbs and gutters have been installed unless approved by SCP.

Call Before You Dig

Utah Law Section 54-8A-1 through 54-8A-11 requires the Blue Stakes One Call Location Center be notified at least two working days prior to excavation. The excavation must not be started until locations have been made. Blue Stake One Call Location Center can be contacted by calling either 811 or 1-800-662-4111.

Inspection Fees

The first two trench inspections will be at no cost; all inspections after that will be \$50.00 per inspection.



SPRINGVILLE CITY ELECTRICAL REQUIREMENTS & STANDARDS MANUAL TRENCHING & CONDUIT

ELECTRIC 2.1

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Depth

See chart on Figure 1 for trenching depths. The property owner is responsible at his own cost to insure that the proper burial depth clearance listed below is maintained even after excavation of the property. Any questions on impaired burial depths should be immediately brought to the attention of the Power Department. Under certain conditions, with prior Power Department approval, cable/conduit systems may be buried with less cover provided that mechanical protection is installed by the Developer to the Power Department's specifications.

Width

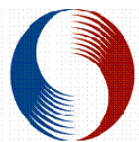
All trenches meet OSHA requirements. Primary/secondary combined trenches shall be a minimum of 18 inches wide at the bottom. Conduit shall be placed in the center of the combined trench. All single primary trenches shall be a minimum of 18 inches at the bottom. House service trenches shall be a minimum of 12 inches wide at the bottom.

Backfill

The developer will be responsible for backfilling trenches he provides. The Developer must provide the required amount of sand to be placed below and above the conduit. A red caution ribbon stating "CAUTION POWER BURIED BELOW" shall be placed on top of the sand. Where trenches cross structural fill, typical of road crossings, the trench backfill shall consist of like kind structural fill. All primary trenches and all road crossing trenches (including trenches for secondary cable) shall be compacted to 95% compaction of the maximum dry density.

Joint Use

Typically, joint use between other utilities of power department trenches is not allowed unless approved by the Power Department. Any joint use between telephone, TV, and other electrical communication cables must be pre-approved by the Power Department and installed in accordance with the Power Department specifications. The Power Department normally will not install electrical cables in a common trench with non-electric utilities such as water, gas, and sewer, unless unusual conditions such as adverse soil or route restrictions exist. All such installations require the prior approval of the Power Department. All installation will comply with the current National Electric Safety Code (NESC).



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System Joint Use Trench

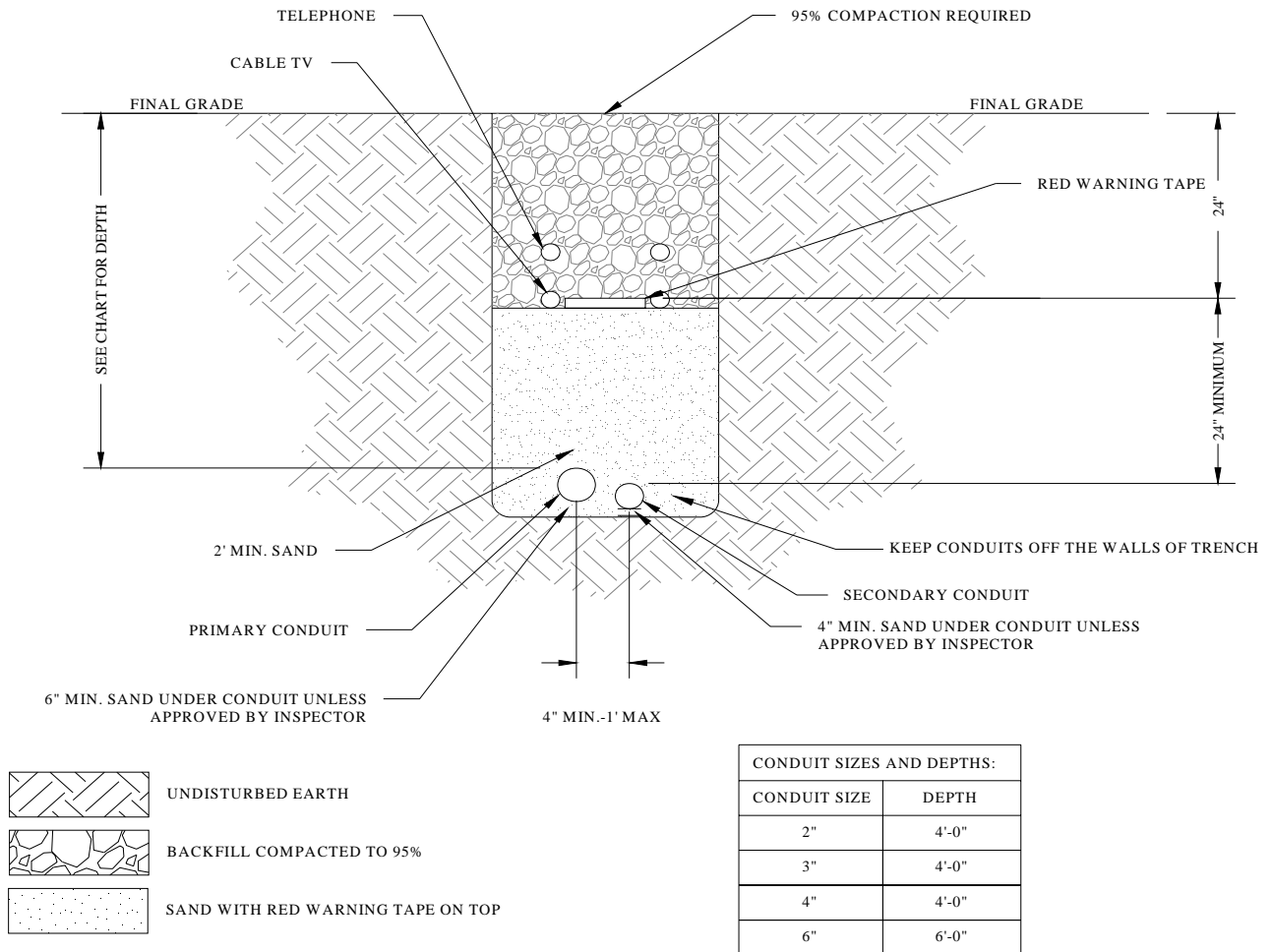


Figure 1 – Trench Cross Section



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Secondary Residential Trench:

The top of the conduit must be a minimum of 2 feet below the top of the back of the curb, or the existing grade.

There must be 4 inches of sand under the conduit.

After the depth inspection has been passed, a second inspection is required to check for a minimum 1 foot of sand on top of the conduit along with a red caution ribbon stating “CAUTION POWER BURIED BELOW”. The entire trench must be level with sand.

The total bend on a single pull cannot exceed 360 degrees.

Residential Conduit Requirements:

For 100 to 150 Amp services 2 inch conduit is required with a trench of 12 inch minimum width.

For 200 Amp services 2 1/2 inch conduit is required.

For services larger than 200 Amps call the Power Department for conduit size.

Metallic elbows are required at the house end of the trench, wrapped with 10 mil corrosion proof tape to the point where the conduit leaves the earth. The metallic riser at the house shall also be taped to final grade

The total bend on a single pull cannot exceed 360 degrees.

Primary System Trench

A minimum of 4 feet deep and 24 inch wide trench from top of conduit to top back of curb, or final grade.

There must be 6 inches of sand under the conduit while maintaining final depth requirement.

After the depth inspection has been passed, a second inspection is required to check for a minimum 2 feet of sand on top of the conduit along with a red caution ribbon stating “CAUTION POWER BURIED BELOW”. The entire width of the trench must be level with sand.

Separation between electric conduits and other utilities in a joint trench is a minimum 2 feet vertical.

All elbows are required to be wrapped metallic 36 inch style for the 3 inch single-phase primary.



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Three-phase runs in 4 inch and larger conduit require the 36 inch long wrapped metallic sweeps.

When installing elbow at transformer, switch, or sectionalizer, the steel elbow will be placed at dirt level inside of electrical structure.

The total bend on a single pull cannot exceed 360 degrees.

Primary System Road Crossing:

Primary system road crossing must adhere to depth requirements. To meet road compaction requirements, 1 foot of sand is acceptable.

Secondary and Street Lights in System Trench:

Minimum of 4 feet deep from top of conduit to top back of curb, or final grade (will measure the lesser of the two).

There must be 4 inches of sand under the conduit.

Secondary conduit must be 3 inch with the exception of conduit for street lighting which shall be 2 inch.

Plastic elbows are only allowed when there are no more than 2 elbows, and the pull is less than 200 feet (2 lots long).

Wrapped rigid metallic elbows are required on pulls greater than 200 feet or pulls with more than 2 elbows.

Conduit

The Power Department requires the use of conduit for all underground primary and secondary cable installations, including lighting circuits. Rigid galvanized steel, IMC and gray electrical grade PVC schedule 40 (underground only) conduit are acceptable materials for conduits installed by the Customer or Developer.

Rigid steel conduit is constructed of galvanized steel and uses threaded connections. It is stronger than other standard conduit materials and is suitable for applications requiring either conductive metal or high strength. Rigid steel conduit increases the reactance of cable installed in the conduit, which increases voltage drop. Rigid steel conduit must be effectively grounded.



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Table 1 has conduit sizes used with standard primary, secondary, and service cables.

Conduit Trade Size (inches)
2
2 ½
3
4
6

Table 1 – Conduit Size

All conduit used for underground services will be sized by SCP at the time of application.

- 100 to 150 Amps – 2 inch
- 200 Amps – 2 ½ inch
- 300 Amps – 3 inch
- 400 Amps – 4 inch

All services larger than 400 Amps will require an instrument transformer cabinet. The cabinet will be installed by the contractor or homeowner to the National Electric Code and OSHA rules. SCP will help establish the location for this cabinet.

SCP will install all instrument transformers and test switches at the customer’s expense.

Business and/or Commercial customers will supply and install conductors for service as required by the NEC. Customer shall also provide termination lugs at the padmount transformer.

Cable pulls longer than 250 feet will need to be pulled by the residential customer.

All underground risers to the meter base will be installed by the homeowner or contractor. The riser will be anchored to the foundation.

All underground primary voltage risers will have a 90-degree rigid steel bend with a minimum radius of 36 inches. Long sweep elbows are not required for residences.

All primary elbows are required to be steel wrapped with 10 mil non-corrosive tape.

All conduits shall be terminated at the open end with plastic bushings.

All below ground metallic conduit must be wrapped with corrosion tape suitable for the application.



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Residential single phase primary conduit must be 3 inch. Secondary conduit shall be 3 inch from transformers to secondary junction boxes and as required by service size from the secondary junction box or transformer to the residence.

All conduit end points shall be sealed or taped to prevent debris from plugging the conduit. The Developer shall be responsible for cleaning or repairing conduits if the Power Department is unable to install or pull the service cable.

Along with conduits extending to secondary junction boxes, each transformer pad and secondary box shall have 10 foot conduit stub outs for interconnection to adjacent homes when required by Springville City Power.

Prior to backfilling, the Developer must notify the Power Department for an inspection, following the inspection the Power Department shall issue a notice to proceed, allowing backfilling.

Backfill

Whenever possible, the soil originally removed from the trench should be used as backfill after sand has been installed.

Sand primary conduits with 24 inches of sand over and 6 inches under with contractor installed red electrical warning tape on top of the sand.

Sand secondary conduits with 12 inches of sand over and 6 inches under with red electrical warning tape on top of the sand.

The sand fill will pass through a 1/4 inch sieve frame.

The sieved residue contains less than five percent rock solids by volume.

The backfill used in the remainder of the trench shall be free of rocks larger than 4 inches in diameter.

No material shall be placed in as fill when either material to be placed or material on which it is placed is frozen.

All trenches shall be backfilled within 48 hours after conduit is installed and notice to proceed is given. Grading shall be reasonably even and free from irregularities, and shall provide positive drainage without ditching or ponding.

Final grade for cable depth purposes is at the bottom of the curb if a curb exists or is planned.

If the grade is to be lowered, the depth of cuts must be added to the specified trench depth.



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Installation of circuits should be postponed in areas where significant changes of grade are anticipated until final grade is allowed to be determined.

Burial Depth

Under normal circumstances, the conduits shall be placed so as to meet or exceed the minimum depths shown in Table 2.

	Minimum Depth to Top of Conduit (inches)
Primary	48
Secondary	48
Residential Services, Stubs, and Drops	24
Street Lights	24

Table 2 – Minimum Depths for Trenching and Conduits

When trenching hillsides the top of the conduit must be 48 inches deep at the minimum depth and the bottom of the trench must be flat.

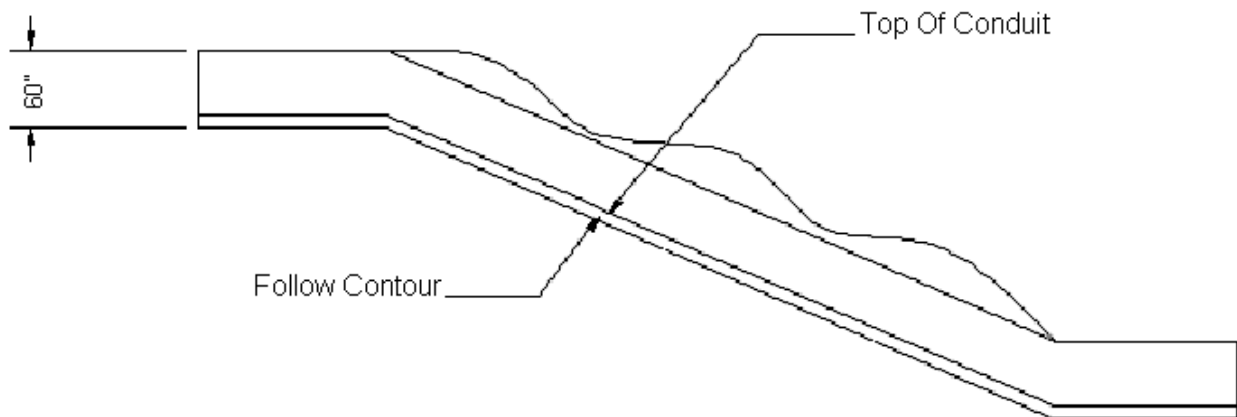


Figure 2 – Hillside Trench