

## SECTION 3 STAKING AND TRENCHING CONTENTS

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# UNDERGROUND FACILITIES STAKING REQUIREMENTS

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## 2.0 PURPOSE

This Standard provides the requirements for the staking of utility installations in single-family, multiple resident, and commercial areas.

## 3.0 GENERAL

Utility staking is contingent upon the completion of the following by the developer:

- 3.1 Clearing and cutting streets, sidewalks, and utility easements (if in public R/W), to subgrade.
- 3.2 Establishment of lot corners or an offset for protection and finished street, curb, and sidewalk grades where required.

## 4.0 STAKING PROCEDURE

- 4.1 The developer is to provide and maintain all the staking required in 4.2. See Section 8.0.
- 4.2 Subgrade Stakes: These indicate the offset and grade cut or fill at the following locations as appropriate:
  - a. Property lines and all P.U.E. boundaries.
  - b. Property corners (none on apartments and townhouses).
  - c. Lot pad corners (none on apartments and townhouses).
  - d. Building corners (none on lot sale developments).
  - e. Other locations as required.



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### UNDERGROUND FACILITIES STAKING REQUIREMENTS

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Subgrade stakes are generally correct to within 0.2' which is sufficient precision to stake subgrade. However, care must be exercised when staking a utility location in that a greater degree of precision may be necessary.

- 4.2 It is the **Developer's responsibility** to see that finish grade is staked, in all areas back of sidewalk, where there will be utility installations. If the finish grade is not provided, the minimum trench depth in the unstaked area will be 75" - 80".
- 4.3 Curb and Gutter Stakes: These stakes indicate the offset and grade cut or fill, normally to top of curb. They are set with greater precision and are generally correct to within 0.02'.
- 4.4 Final Lot Corners: These are not normally staked until all construction is complete and are of little use in staking of underground utilities.

## 5.0 LU/DEVELOPER COORDINATION

When approaching the task of providing utilities for a proposed development, the following is normally required:

- 5.1 LU Utility Design Administrator (UDA) reviews information with the developer.
- 5.2 Developer reviews plans with LU, UDA/designer at pre-construction meeting.
- 5.3 If LU does surveying, LU Operating Department checks and releases the project for staking.
- 5.4 The Developer provides the staking and grading necessary for utility installation.
- 5.5 LU UDA or operating personnel and Developer's agents review plans at the project site.
- 5.6 Check standard street improvements and compare with project plans.

R/W width	50	60	70	80
B/C to B/C	41	43	61	67
Back of a 4' sidewalk to R/W line	0.5	4.5	0.5	2.5

- 5.7 Before staking, the Developer shall confirm the location of property corners to ensure that they conform to the proper established street R/W widths.

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## 6.0 ELECTRIC STAKING DETAILS

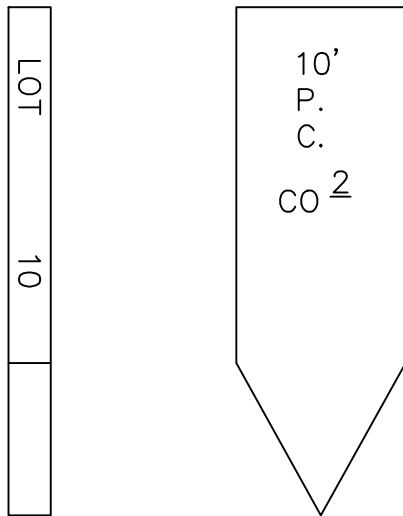
- 6.1 Normally, the electric staking shall include C/L trench, boxes and vaults, lot corners, and all intermediate points as required.
- 6.2 Offset Distance: A distance shall be selected which will ensure the protection of stakes during trenching. This distance is generally 10' to 15' to centerline of trench but may depend on site conditions. The stakes may be placed adjacent to the Developer's subgrade stakes if the offset distance is adequate or may, in fact, be the same if so marked.
- 6.3 Stake Interval: Stakes will be placed normally at or near property corners, but the interval may have to be decreased to 25' or less on curves in order to ensure that the trench will be properly aligned with the curve.
- a. Distance to centerline of underground trench "C/L U/G Elec 15'."
  - b. Distance to centerline of underground box "CTR N-9 box 14 1/2'."
  - c. To corner of underground box (where required) "NE Cor 504 14 1/2'."
- 6.4 General:
- a. Although the center location on small electric boxes and property line structures are normally adequate, in most cases, it will be necessary to stake two corners on the larger boxes. When a box is to be placed against the back face of a sidewalk or any other critical location, care must be exercised to ensure adequate precision in staking.
  - b. On some developments, such as apartments and condominiums, careful coordination with the Developers agent is essential as to the location of structures, such as sidewalks, sewers, etc., and finish grades which are subject to change.

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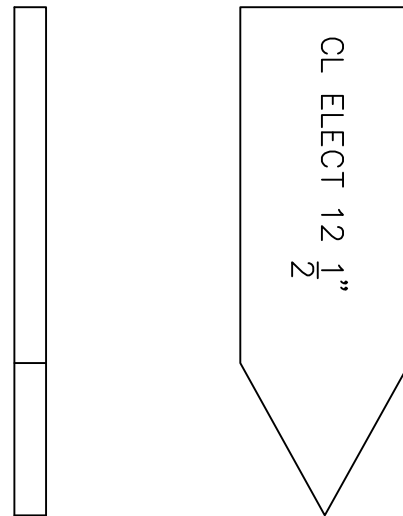
## 7.0 DEVELOPER RESPONSIBILITIES

7.1 Maintenance and Adjustments: *The Developer is responsible for maintenance of all stakes and adjustments of all boxes and pads to proper grade.*

## 8.0 EXAMPLES OF STAKE LETTERING



EXAMPLE 1



EXAMPLE 2



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### **UNDERGROUND FACILITIES STAKING REQUIREMENTS**

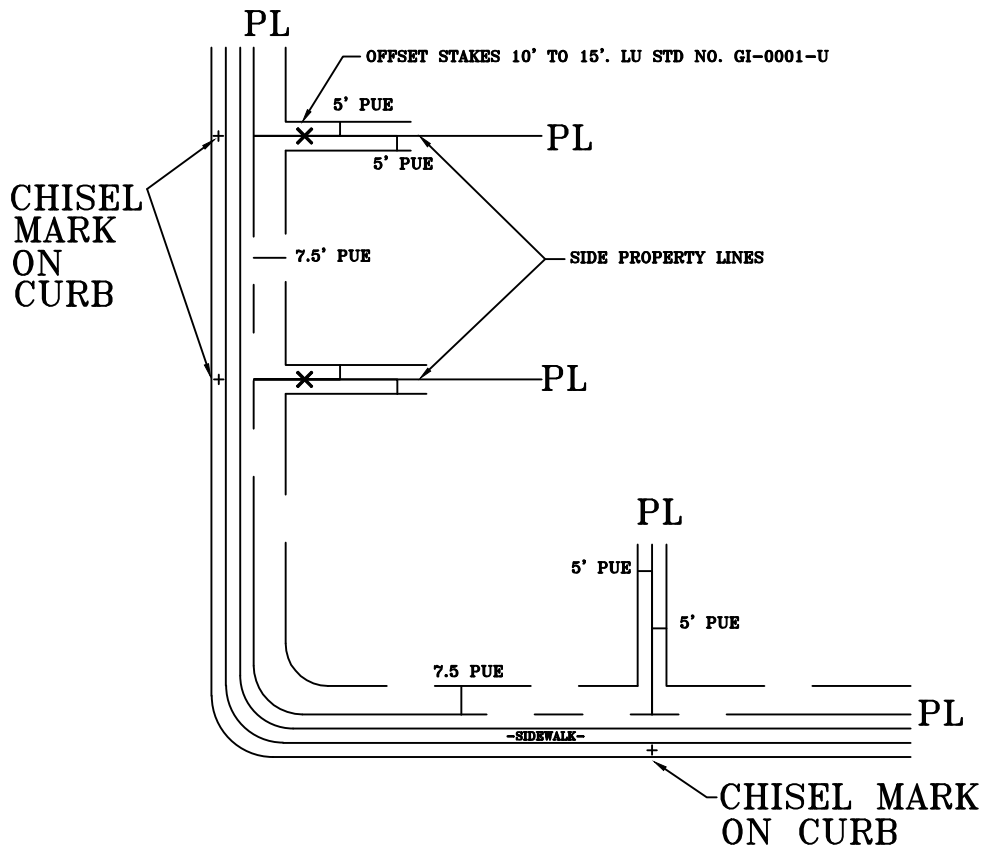
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# SUBDIVISION PUBLIC UTILITY EASEMENT

## STAKING DETAIL



1. APPLICANT TO FURNISH PROPERTY LINE CHISEL MARK ON CURB.
2. FRONT PUE TO BE 7.5', SIDELOT PUE TO BE 5' AND OTHERS AS REQUESTED.
3. OFFSET STAKES 10' TO 15' BY APPLICANT.



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**SUBDIVISION  
PUBLIC UTILITY EASEMENT  
STAKING DETAIL**

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# EXCAVATION AND TRENCHING SAFETY REQUIREMENTS

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- 5.0 REFERENCES

## 2.0 PURPOSE

The purpose of this standard is to outline OSHA requirements as they apply to excavations for Liberty Energy's (LU) underground facilities.

## 3.0 GENERAL EXCAVATION REQUIREMENTS

- 3.1 Prior to opening an excavation, all other utility companies must be contacted, **USA, Call Before You Dig, 1-800-227-2600** to determine if conflicting installations will be encountered, and if so, their location, depth, etc.
- 3.2 Surface encumbrances, such as trees, boulders or construction materials which may create a hazard to persons working on or in excavations, must be made safe before excavation is begun.
- 3.3 Excavated material, from excavations which persons are required to enter, must be stored at least 2 feet from the edge of the excavation or effectively retained by the use of barriers.
- 3.4 The walls and faces of all excavations in which persons are exposed to danger from moving ground shall be guarded by a shoring system, sloping off the ground, or some other equivalent means. Supporting systems shall be designed by a qualified person and meet accepted engineering requirements. Determination of the slope angle or design of the shoring system shall be based on such factors as excavation depth, anticipated changes of the material from exposure or surface loading due to equipment, traffic vibrations or excavated materials. (Refer to Sheet 3.3.11, Table I for minimum sloping requirements and Table II for minimum shoring requirements.)

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- 3.5 Materials used for shoring shall be in good serviceable condition, with timbers sound, and free from large or loose knots and of proper dimensions.
- 3.6 Excavations below the level of the base footing of any foundation or wall shall not be permitted, unless the wall is underpinned and other precautions are taken to insure the stability of adjacent walls.
- 3.7 Water shall not be allowed to accumulate in an excavation. Diversion ditches, dikes, etc., shall be used to prevent the entrance of surface water and to provide drainage of the adjacent area. See LU standard, TE0001U, Section 6.0 for environmental requirements.
- 3.8 Dust conditions shall be kept to a minimum by the use of water or other means.
- 3.9 Ladders used in excavations shall be in accordance with the OSHA subpart concerning the subject. (Part 1926, Subpart "L")

#### **4.0 SPECIFIC TRENCHING REQUIREMENTS**

- 4.1 When persons are required to enter trenches, 4 feet or more in depth, an adequate means of exit, such as a ladder or steps, shall be provided and located so as to require no more than 25 feet of lateral travel.
- 4.2 Trenches in soft or unstable soil, 5 feet or more in depth, must be sloped, shored or otherwise supported by means of sufficient strength to protect persons working in them.
- 4.3 Trenches in hard or compact soil, 5 feet in depth and 8 feet or more in length, shall be shored or the trench sides above the 5 foot level sloped to be not steeper than 1 foot vertical to each 1/2 foot horizontal.
- 4.4 Trenches less than 5 feet deep shall also be protected when examination of the ground indicates hazardous ground movement may be expected.
- 4.5 Additional precautions, by way of shoring and bracing, shall be taken to prevent slides or cave-ins when trenches are dug in locations adjacent to backfilled areas or are subjected to vibration from railroad or highway traffic, the operation of machinery, or any other sources.
- 4.6 Bracing or shoring of trenches shall be carried along with the excavation (see Sections 4.1 & 4.2 for maximums without shoring).

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- 4.7 Cross braces or trench jacks shall be placed in true horizontal position, be spaced vertically, and be secured to prevent sliding, falling or kickouts.
- 4.8 Portable trench boxes or sliding shields may be used, in lieu of a shoring system or sloping. The boxes or shields must be designed, constructed and maintained in a manner equal to or greater than the shoring system required for the trench.
- 4.9 Backfilling and removal of trench supports shall progress together from the bottom of the trench. Jacks or braces shall be released slowly and, in unstable soil, ropes shall be used to pull out the jacks or braces, from above, when all personnel have cleared the trench.

## 5.0 REFERENCES

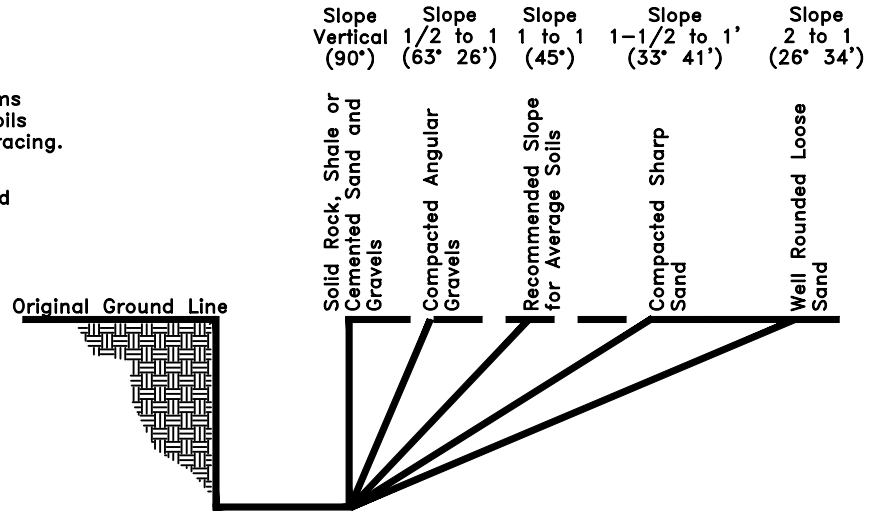
Construction Safety and Health Regulations, Part 1926, Subpart "P".

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**TABLE I  
MINIMUM SLOPING REQUIREMENTS**

NOTE: Clays, Silts, Loams  
or non-Homogenous Soils  
Require Shoring and Bracing.

The Presence of Ground  
Water Requires Special  
Treatment.



**TABLE II  
MINIMUM SHORING REQUIREMENTS**

Size and Spacing of Members												
Depth of trench	Type of Earth	Minimum upright dimensions in inches	Maximum upright spacing in feet	Minimum stringer dimensions in inches	Maximum stringer spacing in feet	Width of Trench (Cross Braces)					Vertical in Feet	Horizontal in Feet
						< 3'	3' to 6'	6' to 9'	9' to 12'	12' to 15'		
Five to Ten Feet	Hard, compact	4 x 4 or 2 x 6	6	-----	-----	2 x 6	4 x 4	4 x 6	6 x 6	6 x 8	4	6
	Likely to crack	4 x 4 or 2 x 6	close sheeting	4 x 6	4	2 x 6	4 x 4	4 x 6	6 x 6	6 x 8	4	6
	Soft, sandy or filled	4 x 4 or 2 x 6	close sheeting	6 x 8	4	4 x 4	4 x 6	6 x 6	6 x 8	8 x 8	4	6
	Hydro-Static pressure	4 x 4 or 2 x 6	close sheeting	6 x 8	4	4 x 4	4 x 6	6 x 6	6 x 8	8 x 8	4	6
10 to 15 Feet	Hard, compact	4 x 4 or 2 x 6	4	4 x 6	4	4 x 4	4 x 6	6 x 6	6 x 8	8 x 8	4	6
	Likely to crack	4 x 4 or 2 x 6	2	4 x 6	4	4 x 4	4 x 6	6 x 6	6 x 8	8 x 8	4	6
	Soft, sandy or filled	4 x 4 or 2 x 6	close sheeting	6 x 8	4	4 x 6	6 x 6	6 x 8	8 x 8	8 x 10	4	6
	Hydro-Static pressure	4 x 4	close sheeting	8 x 10	4	4 x 6	6 x 6	6 x 8	8 x 8	8 x 10	4	6
Trench jacks may be used in lieu of, or in combination with wood braces.												
Shoring is not required in solid rock, hard shale or hard slag.												
Where desirable, steel sheet piling and bracing of equal strength may be substituted for wood.												



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# TRENCH BEDDING & BACKFILL SPECIFICATIONS

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- 4.0 MATERIALS
- 5.0 CONSTRUCTION
- 6.0 FIELD SAMPLING AND TESTING

## 2.0 PURPOSE

This specification provides the requirements and standards for bedding of pipes and conduits, and for trench backfill materials and construction procedures, including testing and inspection.

## 3.0 GENERAL

### 3.1 Standard Test Methods:

The following standard test methods of the American Society for Testing and Materials (ASTM) form a part of this specification and are referred to herein by alphanumeric designation.

ASTM DESIGNATION	TITLE
C136	Sieve Analysis of Fine and Coarse Aggregates
D423	Liquid Limit of Soils
D424	Plastic Limit and Plasticity Index of Soils
D1556	Density and Unit Weight of Soil in Place by the Sand-Cone Method
D1557	Moisture-Density Relations of Soils Using 10-lb. (4.5-kg.) Rammer and 18-in. (457-mm.) Drop
D2419	Sand Equivalent Value of Soils and Fine Aggregate
D2844	Resistant R-Value and Expansion Pressure of Compacted Soils
D2922	Density of Soil and Soil-Aggregate in Place by Nuclear Methods (Shallow Depth)



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MATERIAL SPECIFICATION

## TRENCH BEDDING AND BACKFILL SPECIFICATIONS

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### 3.2 Substitute Test Method:

Where local practice prescribes revised test methods for the ASTM tests listed above, those tests may be substituted for the ASTM designated test method listed upon prior approval from LU.

### 3.3 Material Sources:

3.3.1 New Sources - The contractor or customer, at his own expense, shall have any bedding and backfill materials from sources previously undeveloped, or unfamiliar to LU, tested and certified by an approved, independent materials testing laboratory, per these specifications.

3.3.2 Existing Sources - Bedding and backfill materials from sources previously developed and familiar to LU may be accepted without testing and certification upon written request by the contractor or customer. LU reserves the right to determine the acceptability of all materials proposed for use.

## 4.0 MATERIALS

### 4.1 Electric Conduit Sand Bedding:

Material shall be free of ice, clay, organic matter or other objectionable material, and shall conform to the following standards:

#### 4.1.1 Gradation per ASTM C136:

SIEVE SIZE	PERCENT BY WEIGHT PASSING SIEVE
3/8"	100
#4	90-100
#50	10-40
#100	3-15
#200	0-7

4.1.2 Alternate Electric Conduit Bedding: Upon prior approval from LU, native material may be utilized as bedding for electric conduit. Approval granted per this section in no way relieves the contractor or customer from meeting the requirements of the remaining sections of the specification.

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For LU electric contract jobs, native material conforming to this section must be bid as an alternate material. The native material shall be free of rocks, ice, organic matter or other objectionable material, and shall conform to the following standards:

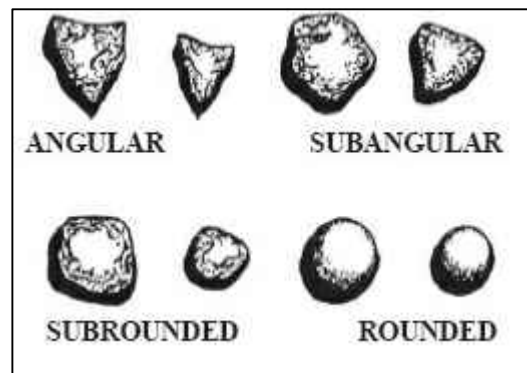
Electric Primary/Secondary Conduit - 100% by weight shall pass 3/8" sieve.

Electric Service Conduit - Native material shall be free of rocks/clods larger than 4" across their greatest dimension.

### **CRITERIA FOR DESCRIBING ANGULARITY:**

**Angular Particles** -Have sharp edges and relatively plane sides with unpolished surfaces. Examples include particles which resemble arrowheads.

**Subangular Particles** -Are similar to angular description but have rounded edges.



**Subrounded Particles** - Have nearly plane sides but have well-rounded corners and edges.

**Rounded Particles** - Have smoothly curved sides and no edges.



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MATERIAL SPECIFICATION

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4.3 Type II Class B Aggregate Base, Roadbase:

Type II shall be a crusher-run, mineral aggregate free of ice, clay, organic matter, or other objectionable material, and shall conform to the following standards:

4.3.1 Gradation per ASTM C136:

SIEVE SIZE	PERCENT BY WEIGHT PASSING SIEVE
1"	100
3/4"	90-100
#4	35-65
#16	15-40
#200	2-10

4.3.2 Liquid Limit per ASTM D423: 35 maximum

4.3.3 Plasticity Index per ASTM D424: Maximum Allowable Plasticity Index (PI) shall be determined by the formula:  $PI = 15 - (S \times 100)$  where "S" is the percent by weight passing the # 200 sieve.

4.3.4 Resistance R-Value per ASTM D2844: 70 minimum

4.4 Class C Backfill, 3/4" minus crushed drain rock:

Class C backfill need not be washed but shall be free of any organic impurities, clay lumps, or unstable substances. The material shall be graded from 3/4" to 3/8" conforming to the following gradation:

4.4.1 Gradation per ASTM C136:

SIEVE SIZE	PERCENT BY WEIGHT PASSING SIEVE
1"	100
3/4"	90-100
3/8"	10-55
#4 **	0-10

\*\* 5% of pan material will be allowed

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4.4.2 Liquid Limit per ASTM D423: 35 maximum

4.4.3 Plasticity Index per ASTM D424: Maximum Allowable Plasticity Index (PI) shall be determined by the formula:  $PI = 15 - (S \times 100)$  Where: "S" is the percent by weight passing the # 200 sieve.

4.4.4 Resistance R-Value per ASTM D2844: 70 minimum

4.5 Native Backfill:

Native backfill shall be excavated native granular material free of ice, clay, debris, organic matter, and rocks larger than 4" across their greatest dimension.

4.6 Substitute Material:

Substitute bedding and backfill materials may only be used if prior written approval from LU is received. In requesting the use of a substitute material, the contractor or customer has been successfully used in similar applications for other utilities or local governmental agencies.

## 5.0 CONSTRUCTION

5.1 Trench Configuration:

Trench configurations shall conform to LU Trench Excavation Standards, TE0001U and TE0003U.

5.2 Material Installation / Repair:

Conduits, pipes, and all apparatus shall be handled, installed, and joined in accordance with LU'S construction standards, and the manufacturer's specifications or recommendations. The contractor or customer, at his own expense, shall repair or replace any conduits, pipes or appurtenances damaged during bedding and backfill operations.

5.3 Sand Bedding:

Sand bedding material, conforming to Sections 4.1 and 4.2, shall be placed in 12" maximum loose lifts and compacted to 90% maximum density per ASTM D1557.

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5.4 Backfill:

5.4.1 **Public Rights-of-Way** - Trenches in established streets, highways, or private paved areas subject to vehicular traffic, shall be backfilled with Type II material, conforming to Section 4.3, and shall be placed in 12" maximum loose lifts and compacted per ASTM D1557. The top two lifts shall be compacted to 95% maximum density and shall extend a minimum of 12" below finish grade. The area above the sand bedding and below 12" from finish grade shall be compacted to 90% maximum density. Developers or the engineer of record are responsible for required compaction tests.

5.4.2 **Private Property** - Trenches on private property and areas not subject to vehicular traffic may be backfilled with native material, conforming to Section 4.4 and shall be placed in 12" maximum loose lifts and compacted to 80% maximum density per ASTM D1557.

5.4.3 **Utility Easements** - Trenches in utility easements which shall be overlain with vaults, transformers, or similar equipment shall be backfilled in accordance with Section 5.4. Boxes shall be backfilled in accordance to 4.4.

5.5 Compaction:

All compaction shall be by hand-operated, plate-type, vibratory, or other suitable hand-tampers in areas not accessible to larger rollers or compactors. Extreme care shall be taken to avoid damage to conduits, pipes, and any appurtenances. Water densification by inundation or jetting shall not be permitted without prior written approval from LU.

5.6 Trench Dewatering:

Where groundwater is encountered, the contractor or customer shall dewater the trench sufficiently to meet the bedding and backfill requirements of Sections 5.3 and 5.4. Dewatering shall continue until backfill has progressed to a minimum of two feet above the groundwater level. LU's inspector(s) may require drain rock (3/4" minus) in addition to the sand bedding depending on condition of trench bed.

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## 5.7 Finish Operations:

5.7.1 Fine Grading - After backfilling, all trenches except those in existing paved areas shall be graded flush with adjacent finish or subgrade elevations.

5.7.2 Temporary Patching - Unless otherwise specified, all pavement cuts shall be temporarily patched with asphaltic concrete to a minimum depth of 2", with the finish grade 1/2" above the grade of the existing asphalt.

5.7.3 Disposition of Excess Materials - Surplus excavated soils, asphalt pavement, concrete and other debris shall be promptly removed from the jobsite and properly disposed of.

## 6.0 FIELD SAMPLING AND TESTING

### 6.1 Materials Testing:

The contractor or customer, at his own expense, shall retain the services of an approved independent materials testing laboratory to perform the following tests:

6.1.1 Moisture-Density Relations - The sand bedding, crushed gravel, and native backfill materials shall be tested for moisture density relations per ASTM D1557, Method D. Test locations will be randomly selected by LU.

6.1.2 Density Tests - The sand bedding, crushed gravel, and native backfill materials shall be tested for density per ASTM D1556 or D2922. Test locations will be randomly selected by LU. The following frequencies shall apply:

Sand Bedding - Tests shall be made at a minimum of one test per lift per 800 lineal feet of trench.

TYPE II Backfill - Tests shall be made at a minimum of one test per lift per 500 lineal feet of trench.

6.1.3 Tests will be reported by specific location: Example: T-pad 1: sand bedding test @ 3' from finish grade.

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6.2 Retesting:

If any test conducted per Sections 6.1.1 and 6.1.2 fails, the area shall be recompact and two additional tests shall be performed. Test locations will be randomly selected by LU at installer cost.

6.3 Reporting:

The results of all tests shall be submitted to LU within 24 hours after the completion of the test.

6.4 Exceptions:

At remote locations or for small installations, as determined by LU, the sampling and testing procedures in Section 6.0 may be waived by LU. Such waiver in no way relieves the contractor or customer from meeting the requirements of the remaining sections of this specification.



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MATERIAL SPECIFICATION

**TRENCH BEDDING  
AND BACKFILL  
SPECIFICATIONS**

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# TRENCH AND EXCAVATION STANDARDS

## 1.0 INDEX

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- 2.0 PURPOSE
- 3.0 GENERAL
- 4.0 TRENCHING GUIDELINES
- 5.0 SAFETY
- 6.0 ENVIRONMENTAL
- 7.0 BOX / VAULT / JUNCTION ENCLOSURE INSTALLATION
- 8.0 PAD INSTALLATION
- 9.0 STREET LIGHT INSTALLATION

## 2.0 PURPOSE

The following Standards provide trench configurations and general requirements and guidelines for trenching and excavation for pipe, conduit, box, and vault installations within LU service territory.

## 3.0 GENERAL


The trench is a critical and integral part of the electrical installation. Trenching needs to be undertaken in a workman-like manner and must meet all applicable City, County, State, and Federal Specifications in addition to the requirements of this Standard. In the case of a conflict, the more rigid Specification or Standard shall apply.

## 4.0 TRENCHING GUIDELINES

### 4.1 Trenching Configurations

Trench configuration drawings attached as part of this standard are the typical configurations used by LU. In cases where a typical configuration does not apply, a trench section drawing shall be provided to the contractor or customer showing necessary dimensions and details. The following general rules apply to all trenches:

- 4.1.1 Backfill:** The top 18 inches minimum of all trenches in streets, highways, or other paved areas shall be backfilled with TYPE II base compacted to 95% maximum density in accordance with LU Specification SUB01X, Section 5.4.1.

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**4.1.2 Bedding:** Compacted sand bedding shall be placed a minimum of 12 inches above and 6 inches below all pipes and conduits.

**4.1.3 Backfill Option:** Either TYPE II or sand bedding material may be used for backfill material in the trench area between 12 inches above the pipe or conduit, and 12 inches below finish grade. In either case, the material shall be compacted to 90% maximum density in accordance with LU specification SUB01X, Section 5.4.

**4.1.4 Warning Tape:** Red warning tape shall be placed in all trenches at least 18" below finish grade and 12" above LU pipe, conduit, or cable.

**4.1.5 Conduit Installation:** Primary conduit shall be installed with a minimum clearance of six inches (6") from the sides of the excavation. Secondary electrical conduit shall maintain a one and one-half inch (1-1/2") clearance from other electrical conduits and a minimum clearance of two inches (2") from the sides of the excavation. All electrical facilities shall be installed with a minimum twelve inches (12") of clearance from any other nonelectric joint trench facility (i.e., gas, water, communications, etc.) See TE0003U Note #16 for other requirements.

#### **4.2 Trench Locations**

Trench locations are typically shown relative to street centerlines, right-of-way lines, or property lines in new and existing developments. It is the responsibility of the contractor or the customer to verify that these reference lines are established and accurate. Where such references are unavailable, alignment shall be established by LU.

#### **4.3 Trench Depth**

Depths shown in the standard trench configurations are minimums. For trenches which fall on a side slope, the depth shall be measured from the low side.

#### **4.4 Dewatering**

Where ground water is encountered during trench excavation, it shall be the responsibility of the contractor or customer to adequately dewater the trench to provide for safe and convenient installation of pipe or conduit. See Section 6.0 of this standard and SUB01X, Section 5.6, for details.

#### **4.5 Other Utilities/Facilities**

**4.5.1 Joint Trenches:** Joint trench construction shall be by mutual agreement

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of all parties involved. Coordination of separate utility/ facility installations in a joint trench shall be by the contractor or the customer.

**4.5.2 Customer facilities** (except fuel / sewage / leach lines) may be installed in a joint trench if (1) approved by all the utilities involved, (2) all clearances are met, and (3) on private property. No customer facilities will be allowed in joint trenches in franchised right-of-ways.

**4.5.3 Existing Utilities:** Prior to commencement of excavation, the contractor or customer shall telephone the Underground System Alert (USA) at 1-800-227-2600. After existing utilities have been located, extreme caution shall be exercised while excavating in their vicinity. Once exposed, pipes, conduits, and cable shall be shored or supported as necessary to prevent damage. The full cost of repair or replacement of damaged utilities shall be borne by the contractor or customer.

**4.6 Installation Procedures**

Pipes, conduits, and cables shall be installed in the trench, in accordance with the manufacturer's recommended procedures, LU Specifications, and/or Standards and accepted practices.

**4.7 Bedding and Backfill**

Pipes, conduits, and cables shall be bedded, and trenches backfilled, in accordance with LU Specification SUB01X. Conduits/trenches should be backfilled the same day as conduit is installed.

## **5.0 SAFETY**

**5.1 Responsibility**

The contractor or customer shall be responsible for initiating, maintaining, and supervising all safety precautions in connection with the implementation of these standards, and shall comply with all applicable laws, rules and regulations of any public authority relative to the safety of persons or property, or their protection from damage, injury, or loss.

**5.2 Shoring or Sloping**

When applicable, trenches shall be shored or their sides sloped, in accordance with LU Standard GI0003U, and Federal Occupational Safety and Health Act (OSHA) requirements.

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### 5.3 Excavated Material

Soil and rock from the trench excavation shall be placed not closer than 24 inches to the edge of the trench.

### 5.4 Protective Gear

All workmen shall have adequate protective gear including, but not limited to, hard hats, gloves, goggles, respirators, boots, etc.

### 5.5 Tools and Equipment

All workmen shall be provided with safe, adequate, and well-maintained tools and equipment, including ladders for trench ingress and egress, in accordance with OSHA requirements.

## 6.0 ENVIRONMENTAL

“In an effort to reduce pollution of Waters of the United States and comply with all requirements as identified in Title 40 Code of Federal Regulations Part 122.26, the following activities will be the sole responsibility of the contractor: Stormwater Discharges associated with Construction Activities, Stormwater Discharges associated with Small Construction Activities, and Stormwater discharges associated with Industrial Activities. All contractors working on behalf of Liberty Utilities CalPeCo Electric or its affiliates will be responsible for the following activities: Filing the Notice of Intent (NOI) with the Nevada Division of Environmental Protection (NDEP), completing a Stormwater Pollution Prevention Plan (SWPPP), providing SWPPP training for applicable personnel, implementing Best Management Practices (BMPs), fulfilling requirements of monitoring, inspections, documentation, and completion of a Notice of Termination (NOT) upon the conclusion of the project. **Any fines, fees, or levies incurred due to incomplete, inadequate, or improper management of the Stormwater Program will be the responsibility of the contractor.** The contractor must also comply with any and all City and County municipal codes and ordinances which grant authority to prohibit pollutants and waste from being deposited on streets and public places, prohibit non-stormwater discharges to the storm drain system, and comply with provisions for protecting hillsides from erosion, sedimentation, or vegetation loss during new development.”

## 7.0 BOX/VAULT/JUNCTION ENCLOSURE (JE'S) INSTALLATION

### 7.1 Application

Selection of the correct type of box or vault involves judgement, taking into account the present and future intended traffic use for the area where the box will be located.

- a. H-10, Incidental (light) Traffic : For use in sidewalks, pedestrian traffic areas, where

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box is placed within 3' of parking lots or driveways where light traffic is expected. For use in private non commercial driveways and parking lots where light vehicular traffic is expected, i.e. driveways in residential subdivisions and parking strips. Incidental Traffic Boxes are not to be installed in traveled areas, i.e. highways, streets, bridges.

- b. H/20 Full Vehicular Traffic: For use in streets, driveways and parking lots where heavy vehicular traffic is expected.

## 7.2 Excavation

Excavation for boxes/vaults/JE's shall be performed by the contractor or customer concurrent with adjacent trench excavation, unless otherwise directed by the LU Engineer, Planner, or Inspector. Size, depth, and alignment of the excavation shall be as shown on the attached Standard Drawings. Boxes/vaults will be set on a 6" min. base of compacted 3/4" drain rock.

## 7.3 Dewatering

Where ground water is encountered during excavation, it shall be the responsibility of the contractor or customer to adequately dewater the excavation to provide for safe and convenient installation of the box/vault/JE's. See Section 6.0.

## 7.4 Installation

### 7.4.1 General:

Boxes/vaults/JE's shall be installed using equipment with adequate load capacity to safely handle the components. No personnel shall be in the excavation during placement. All boxes and vaults shall be set level, squarely aligned with existing or proposed improvements. Exception: the top section/extension/lid may be sloped as stated in Sloped Areas:

### 7.4.2 Unpaved Areas: Boxes/Vaults

- a. Pedestrian Rated: The top section of box/vault will be installed 3" above dirt to accommodate future landscaping. The intent is for the top of box to be 1/2" above final finish grade.
- b. Incidental traffic rated: If box is installed within a 3' radius of driveway or driveway approach apron, the box and surrounding material will match the finish grade of driveway and/ or approach apron.
- c. H10/H20 traffic rated: Box will be installed 1/2" above finish grade with a 12" X 12" concrete wrap around the top section . Concrete will match the grade at the box and slope away at 1/2" for the 12" (24:1) of concrete wrap where it will match the grade of unpaved material.



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#### 7.4.3 Paved Areas:


Boxes/Vaults will be installed 1/4" below finish grade with a concrete wrap around the top section of box/vault/extension. Note: The Tahoe area will meet local codes and concrete will be held down and the topping will match road material or local codes.

#### 7.4.4 Sidewalks:

Boxes/Vaults will be installed 1/4" above sidewalk if box is installed touching sidewalk and flush if installed in sidewalks.

#### 7.4.5 Sloped Areas:

- a. Boxes/Vaults will match the finish grade of driveway/approach if placed within a 3' radius of driveway or driveway approach apron.
  - Box/Vault top section may be sloped and concrete encased with a 12" x 12" section around the top section of box/vault. Reference TE0020U Sloped Box Detail for clarification.
  - The top section of box may be cut to slope, but cut will be limited to the bottom 6" of the top section. The gap or seam between the top section and the first extension will be filled with grout either fine or coarse in accordance with ASTM C-476 with a minimum compression strength of 2000 PSI at 28 days.
- b. Boxes/Vaults set outside of the 3' radius in unpaved areas of slopes of 6:1 (10°) or less will be set to match finish grade to accommodate future landscaping. The intent is for the top of box to be at least 1/2" above final finish grade.
  - Alternate method: Level a 3' radius area around the box. For vaults level an area covering a 3' radius on 3 sides and 8' on street or operability side. Note: box/vault will be set 3" above finish grade to accommodate future landscaping. The intent is for the top of the box to be 1/2" above final finish grade.
- c. Boxes/Vaults set in areas with slopes above 3:1 (20°) will be installed per the following criteria:
  - Box will be set level and protected from slopes with a retaining wall supplied and installed by the applicant.
  - The wall will extend at least 3" above cut slope.
  - Front area will be clear of obstacles for at least 3' for boxes and 10' for vaults. This is for operability and working space.
  - Reference TE0040U for retaining wall specifications.
  - Boxes can be set with the provisions listed above in Sloped Areas "7.4.5a".
- d. Inspector and "on-site" contractor may field determine the proper installation based on customer needs while providing adequate protection for LU facilities.

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- e. Hill holders, (preformed fiberglass or concrete) will be acceptable applications in slopes of 3:1 or less.

#### **7.5 Bedding and Backfill**

Boxes/vaults/JE's shall be bedded and the surrounding excavation backfilled, in accordance with LU Specification SUB01X. Class C (3/4") drain rock may be substituted for sand bedding and backfilling of vaults.

### **8.0 PAD INSTALLATION**

#### **8.1 Excavation**

Excavation for pads shall be performed by the contractor or customer concurrent with adjacent trench excavation, unless otherwise directed by the LU Engineer or Inspector. Size, depth, and alignment of the excavation shall be as shown on Standard Drawings.

#### **8.2 Dewatering**

Where ground water is encountered during excavation, it shall be the responsibility of the contractor or customer to adequately dewater the excavation to provide for safe and convenient installation of the pads. See Section 6.0.

#### **8.3 Installation**

Transformer and switch pads shall be installed using equipment with adequate load capacity to safely handle the components. All pads and enclosures shall be set level, squarely aligned with the base at existing or proposed finish grade. The 10' area in front of all pads (equipment doors) shall be level.

#### **8.4 Bedding and Backfill**

Pads shall be bedded with 8" - 12" Type II subbase, depths as indicated on Standard Drawings, at 95% compaction and the surrounding excavation backfilled, in accordance with LU Specification SUB01X.

### **9.0 STREET LIGHT INSTALLATION**

#### **9.1 Excavation**

Excavation for streetlights shall be performed by the contractor or customer concurrent with adjacent trench excavation, unless otherwise directed by the LU Engineer or Inspector. Size, depth, and alignment of the excavation shall be shown on standard drawings. See SLB02U and SLB12U, Standards substructure, Section 6. For imbedded poles, see sonotube specification shown on the Work Order Drawing. Note: Sonotube may be substituted with PVC water or sewer pipe.



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## 9.2 Dewatering

Where ground water is encountered during excavation, it shall be the responsibility of the contractor or customer to adequately dewater the excavation to provide for safe and convenient installation of the streetlight substructure, sonotube, or precast base. See Section 6.0.

## 9.3 Installation

Precast streetlight bases shall be installed using equipment with adequate load capacity to safely handle the components. All bases shall be set 3" - 6" above proposed finish grade with bolt pattern aligned for proper arm direction as shown on work order drawings, typically 90° off curb line.

## 9.4 Bedding and Backfill

Streetlights, sonotubes and precast bases shall be bedded with Type II subbase for the full depth of component at 90% compaction surrounding the component at a 2' radius in accordance with LU Specification SUB01X.

INSTALLATION DEPTH TABLE FOR STREET LIGHT POLES									
DESCRIPTION	<i>Embedded 30' Steel</i>	<i>Embedded 42' Steel</i>	<i>* 30' Bolted Base</i>	<i>** Embedded Decorative</i>	<i>** Embedded Decorative</i>	<i>*** Monterey Bolted Base</i>	<i>Embedded 20' Round Concrete</i>	<i>Embedded 21' 3" Square Concrete</i>	<i>Embedded 34' 9" Round Concrete</i>
STOCK #	8800-280830	8800-280840	8800-280800	8800-281106	8800-281108	8800-280785	8800-280745	8800-280750	8800-280740
INSTALLED DEPTH	5'	7'	6'	3'	3'	Custom By Developer	3' 7"	4' 3"	5' 3"
* See SLB 02U Section 6 substructure for Base Detail ** See TE0001U Section 3 substructure Page 29 for Decorative Embedded Detail *** Custom field formed by Montreaux Developer									



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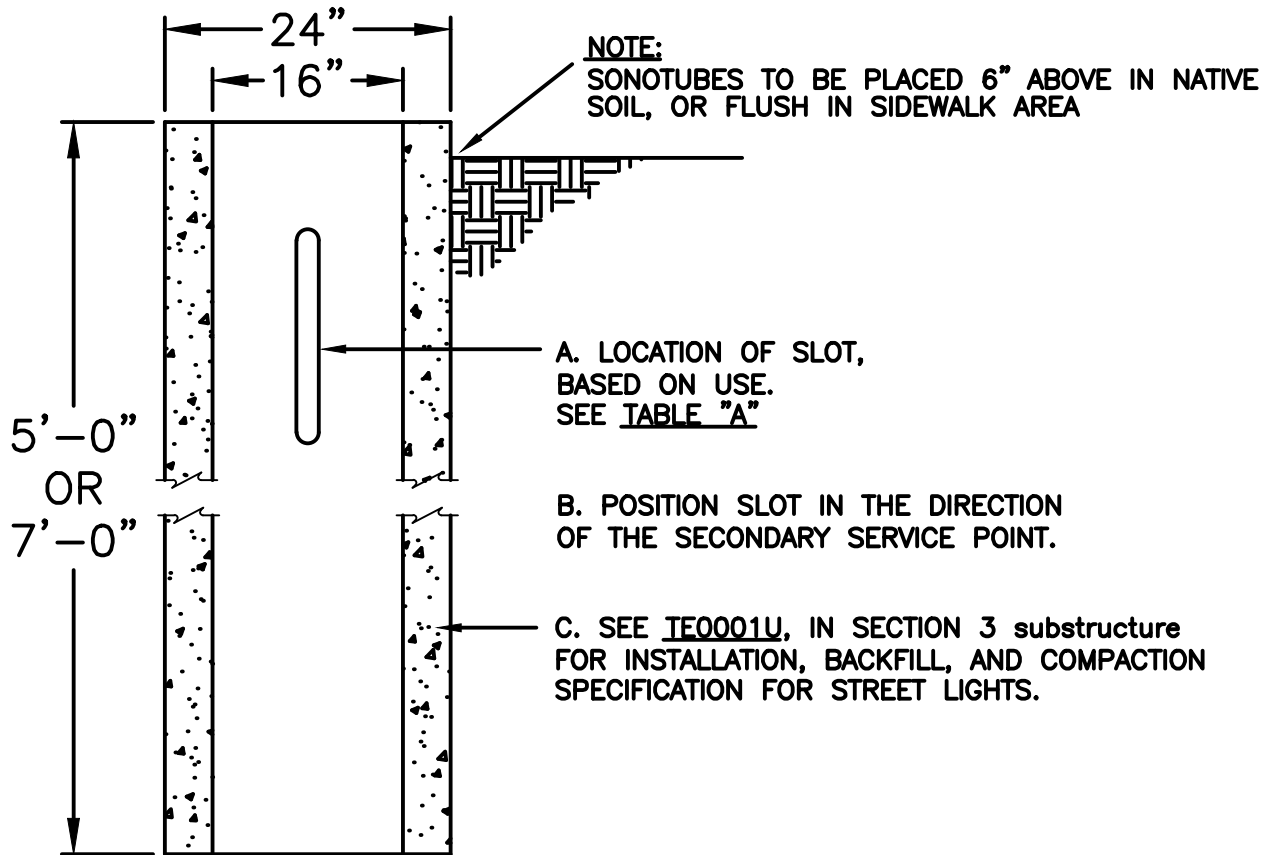
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## 9.5 Embedded Pole and Bolted Base Installation Depth Guide



**Table "A" - Sono Tube Reference Guide**

SONO-TUBE DEPTH	SLOT LOCATION FROM TOP OF TUBE	SLM70U POLE 8800-280830	SLM71U POLE 8800-280830	SLM73U POLE 8800-280840	SLM75U POLE 8800-280840	SLM81U POLE 8800-280830	SLM82U POLE 8800-280740	SLM83U POLE 8800-280740	ODL81U & 83U POLE 8800-281106	ODL87U & 89U POLE 8800-281108	ODL95U POLE 8800-280745	ODL99U POLE 8800-280750
5 FT	3'-0"	X	X	—	—	X	—	—	—	—	—	—
5 FT	1'-6"	—	—	—	—	—	X	X	—	—	X	X
7 FT	3'-0"	—	—	X	X	—	—	—	—	—	—	—
7 FT	1'-6"	—	—	—	—	—	—	—	—	—	—	—
43"	N/A	—	—	—	—	—	—	—	—	—	—	—



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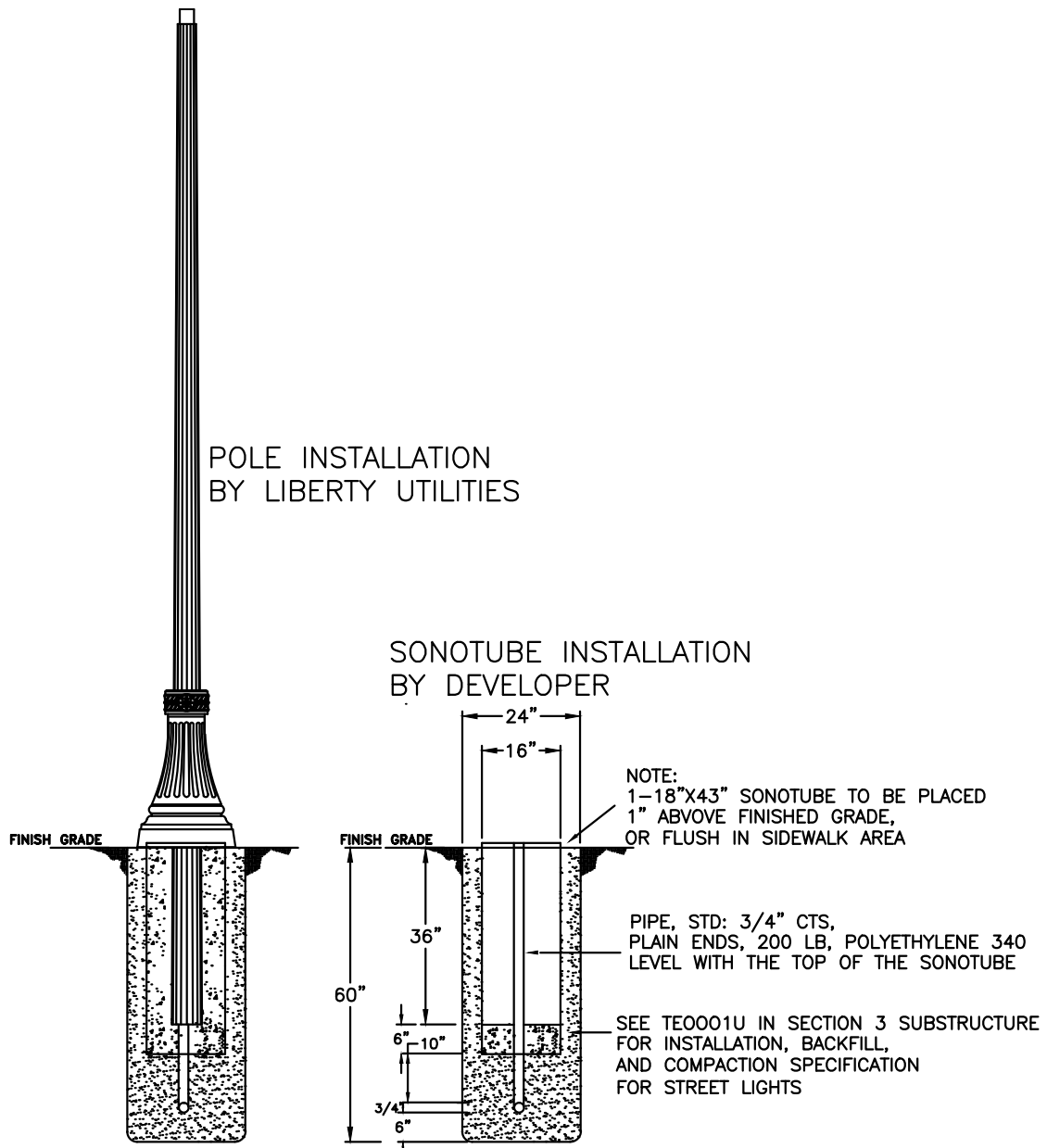
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9.6 Embedded Pole and Sonotube Reference Guide

9.7 Embedded Decorative Steel Pole Installation, And Sonotube Installation For 17' and 19' Embedded Decorative Steel Poles.



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# TYPICAL TRENCH DETAILS

ALL TRENCHES MUST BE APPROVED BY LU FIELD REPRESENTATIVE PRIOR TO ANY CONSTRUCTION.

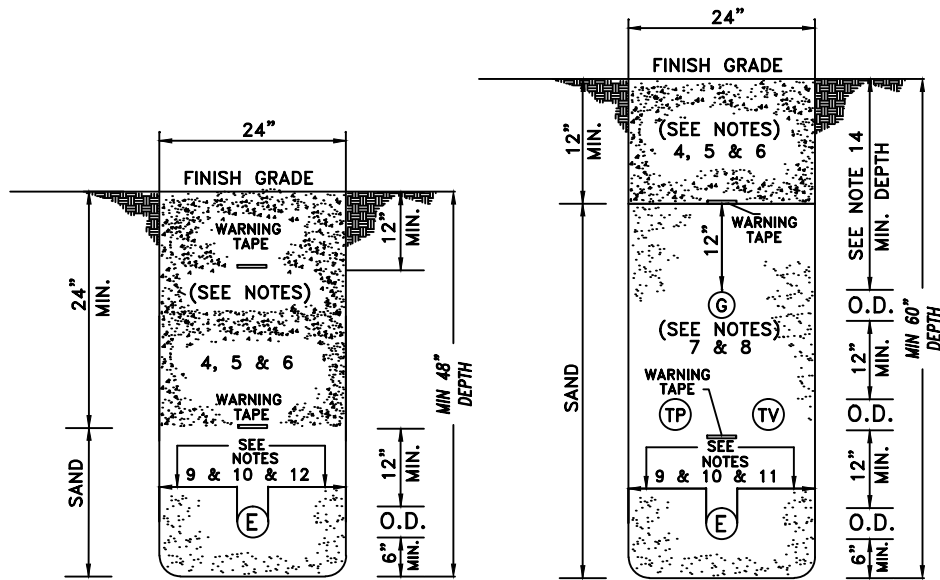
1. ALL TRENCHES MUST CONFORM TO THE LATEST APPLICABLE LU, CITY, COUNTY, STATE, FEDERAL, AND OSHA SPECIFICATIONS AND REQUIREMENTS. IN THE CASE OF CONFLICT, THE MORE RIGID SPECIFICATION OR STANDARD SHALL APPLY. Refer to TE0001U, Section 6.0 for environmental requirements.
2. NATIVE MATERIAL requires 80% compaction. Refer to SUB01X, Section 5.4.2.
3. SAND requires 90% compaction.
4. TYPE II aggregate base, requires 95% compaction.
5. THE TOP 18" of all trenches in ESTABLISHED HIGHWAYS, STREETS, and other PAVED AREAS subject to traffic, shall be backfilled with TYPE II base.
6. THE TOP 18" of all trenches on PRIVATE PROPERTY, (not subject to traffic) may be backfilled with NATIVE MATERIAL. Refer to SUB01X, Section 5.4.2.
7. NO CONDUITS SHALL BE INSTALLED ABOVE OR PARALLEL TO GAS LINES.
8. NONMETALLIC RED WARNING TAPE will be 6" wide, marked "Liberty Utilities Buried Below" and shall be placed in ALL TRENCHES at least 18" below finish grade and 12" above LU conduit.
9. ELECTRIC PRIMARY CONDUIT must be 6" minimum from side of trench. If more than one conduit is installed, maintain a 1-1/2" separation from each electric conduit.
10. ELECTRIC SECONDARY/SERVICE CONDUIT must be 2" minimum from side of trench. If more than one conduit is installed, maintain a 1-1/2" separation from each electric conduit.
11. ELECTRIC PRIMARY OR ANY JOINT TRENCH SHALL HAVE A MINIMUM TRENCH DEPTH OF 60", and maintain a minimum 12" radial clearance from all other utilities (See Sheets 3.6.31 and 3.6.32). Exception: DB REFURBISHMENT, AND WATER.

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12. ELECTRIC ONLY CONDUIT, SERVICE / SECONDARY shall have a minimum trench depth of 48".
  - a. Exceptions/deviations to these trench requirements may be appropriate. Any deviation must be approved by the appropriate local authority if applicable, and the LU Inspector.
13. WET FACILITIES, ( SEWER / STORM DRAIN ), must maintain a 1' radial clearance from LU Electric facilities. Note: Conflicts of wet service crossings will maintain a 1' clearance or reduced clearances will be handled according to 17 below or 12-a above.
14. SS/SD Sanitary Sewer/Storm Drain shall not occupy the same common trench as gas or electric and will be separated by virgin soil during parallel installations.
15. ELECTRIC MUST MAINTAIN 1' RADIAL CLEARANCE FROM ALL FACILITIES. If 1' radial clearance cannot be obtained, electric conduit must be concrete encased for at least 18" each side of conflicting utility, or electric facilities will be protected by means of rigid galvanized steel conduit. This will be done by using PVC to rigid steel transition fittings with rigid steel extending at least 4' each side of conflict. Note: LU's Inspector will provide determination of application to resolve conflict. EXCEPTION: WATER MAINS WILL MAINTAIN 2' RADIAL CLEARANCE FROM ALL ELECTRIC FACILITIES.
16. Whenever possible, locate hydrant on opposite side of street from electric main trench. Refer to TE0045U for details.
17. If field changes are required, all changes must be approved by a LU Inspector.

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# TYPICAL SERVICE TRENCH DETAILS



TYPICAL SECONDARY / SERVICE  
TRENCH ELECTRIC ONLY

TYPICAL SERVICE TRENCH  
JOINT TRENCH APPLICATION

## ENGINEERING NOTES:

- A. If utilities on this sheet are not in a joint trench as shown, raise trench depths and comply with minimum depths and clearances referenced in Typical Trench Details 1-19.
- B. All trenches must be approved by LU prior to any construction.

## UTILITY DESIGNATION AND LEGEND

(TP) TELEPHONE (E) ELECTRIC

(TV) CABLE TV

(O.D.) OUTSIDE DIAMETER



ENGINEERING AND CONSTRUCTION STANDARD

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**TRENCH AND  
EXCAVATION  
STANDARDS**

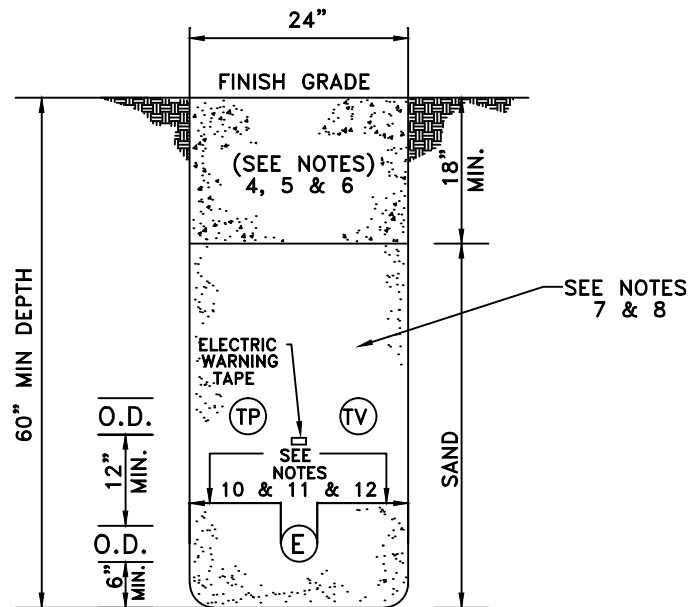
SUBSTRUCTURE

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**TE0003U**

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# TYPICAL MAIN TRENCH DETAILS



TYPICAL SECONDARY OR PRIMARY  
TRENCH ELECTRIC ONLY

## ENGINEERING NOTES:

- A. If utilities on this sheet are not in a joint trench as shown, raise trench depths and comply with minimum depths and clearances referenced in Typical Trench Details 1-19.
- B. All trenches must be approved by LU prior to any construction.

## UTILITY DESIGNATION AND LEGEND

(TP) TELEPHONE (E) ELECTRIC

(TV) CABLE TV

(O.D.) OUTSIDE DIAMETER



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ENGINEERING AND CONSTRUCTION STANDARD

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**TRENCH AND  
EXCAVATION  
STANDARDS**

SUBSTRUCTURE

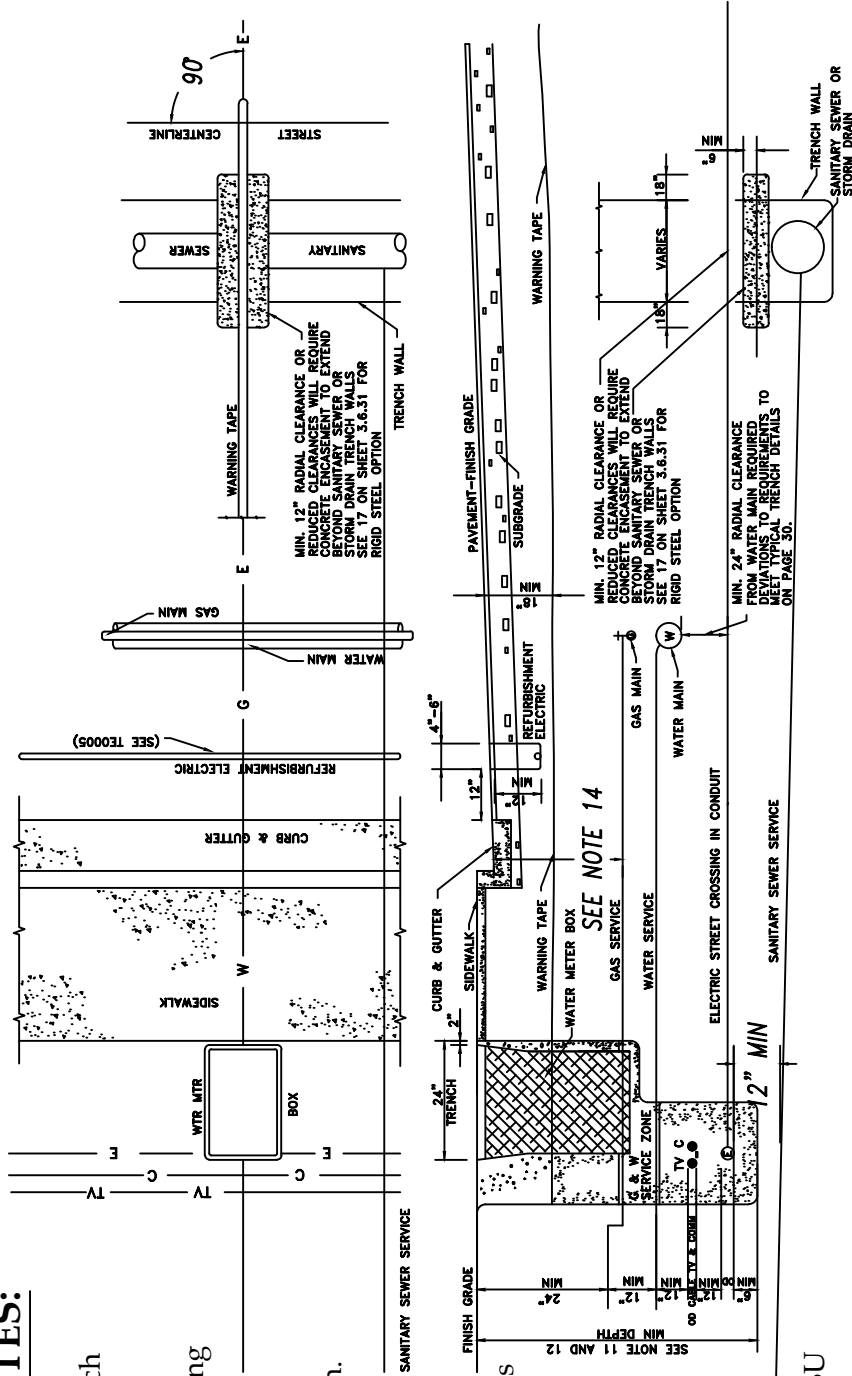
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## CONSTRUCTION NOTES:

- A. See TE0003U for typical trench details.
- B. See SUB01X for trench bedding and backfill specs.
- C. Electric to pass under Gas mains with min. 1' separation.
- D. Applicant to determine and stake finish grade.
- E. Comm/cable TV in conduit is allowed to cross over non-parallel gas services.
- F. Service stubs to cross main trench and over electric whenever possible.
- G. Conflict to facilities will be handled according to TE0003U 17 and 12-a.
- H. Electric may cross over any utility, when a minimum cover of, 48" for primary and, 36" for secondary / service, can be maintained and a 12" minimum radial separations to all other facilities can be maintained. Note: gas must be above electric facilities and water needs a min of 24" radial separation.
- I. Gas and water to adjust depth of service to coincide with their zone at main trench depth measured from finish grade.



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VOLUME 17

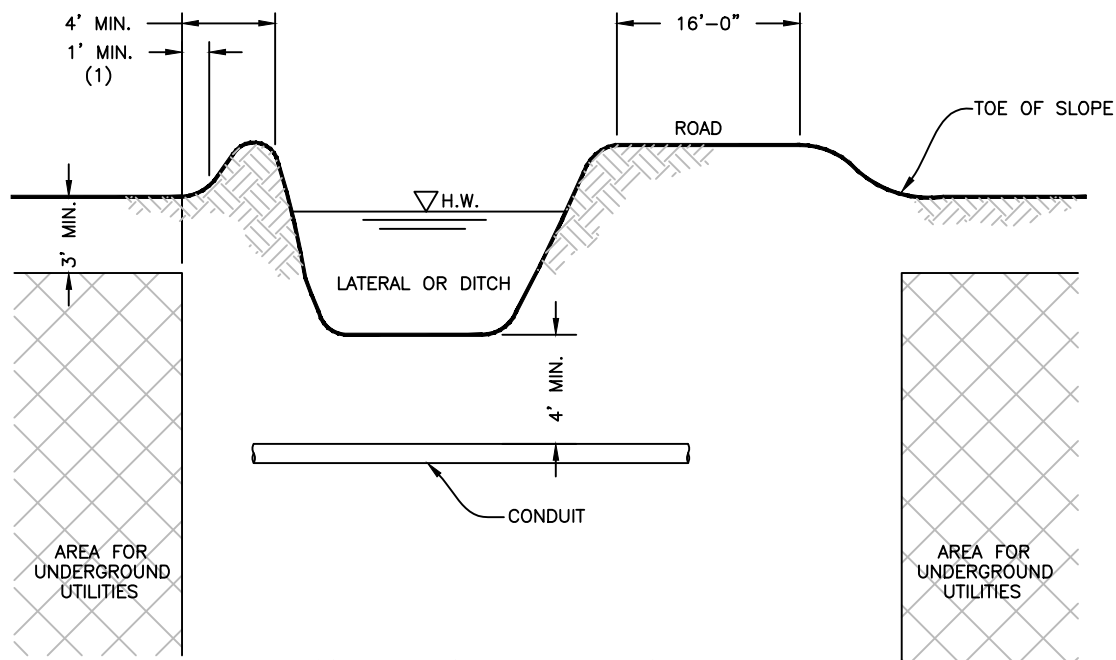
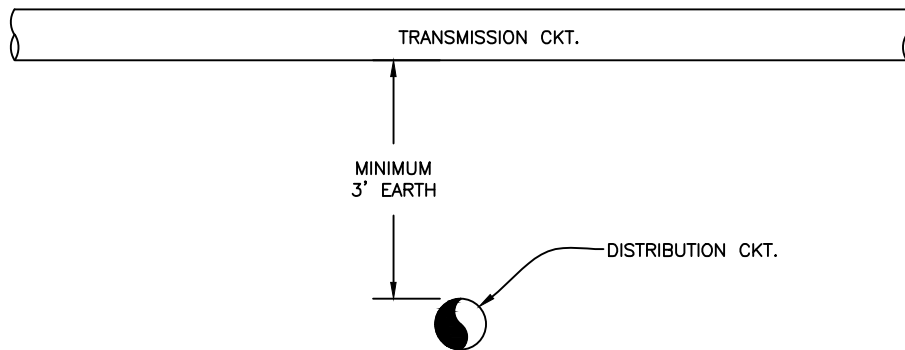
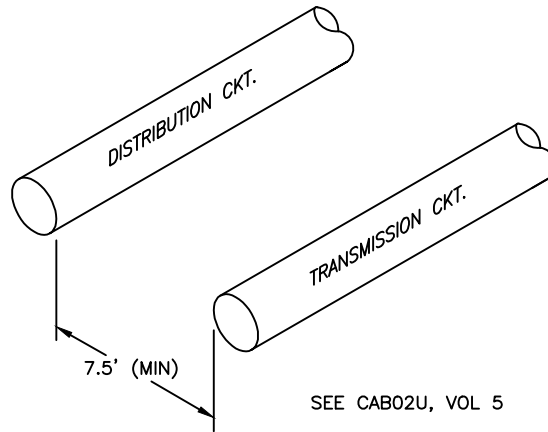
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(1) MINIMUM 1' BEYOND TOE OR 4' BEYOND  
EDGE OF DITCH, WHICHEVER IS GREATER.

**See next page for notes.**

**REFURBISHMENT TRENCH  
DETAIL  
(ABANDON DIRECT BURIAL)**

## Notes:

1. All utility crossings must be exposed (pot holed) and checked for depth in refurbishment construction.
2. Use a 4" rock saw cut for 3" conduit. 4"C will require some trench enlargement. Normal refurbishment trench depth is 28" except when crossing other utilities. Must maintain an 18" minimum depth below the asphalt.
3. Trench slurry backfill shall consist of a fluid, workable mixture of aggregate, cement and water. Red concrete slurry to be 1/4" minus with a 2 sack mix and 4 lbs of red dye per sack.
4. The top elevation of the trench slurry backfill must not exceed the elevation at the bottom of the existing asphalt cement (A.C.) subgrade base. A minimum of one sack slurry mix may be substituted for Type 2 base.
5. The aggregate cement and water shall be proportioned by weight. 188 pounds of cement (2 sack) shall be used for each cubic yard of material. The water content shall be sufficient to produce a fluid, workable mix that will flow and can be pumped without segregation of the aggregate while being placed.
6. Material samples and testing will not be required for concrete slurry produced by an established commercial patch plant with a satisfactory history of quality control.

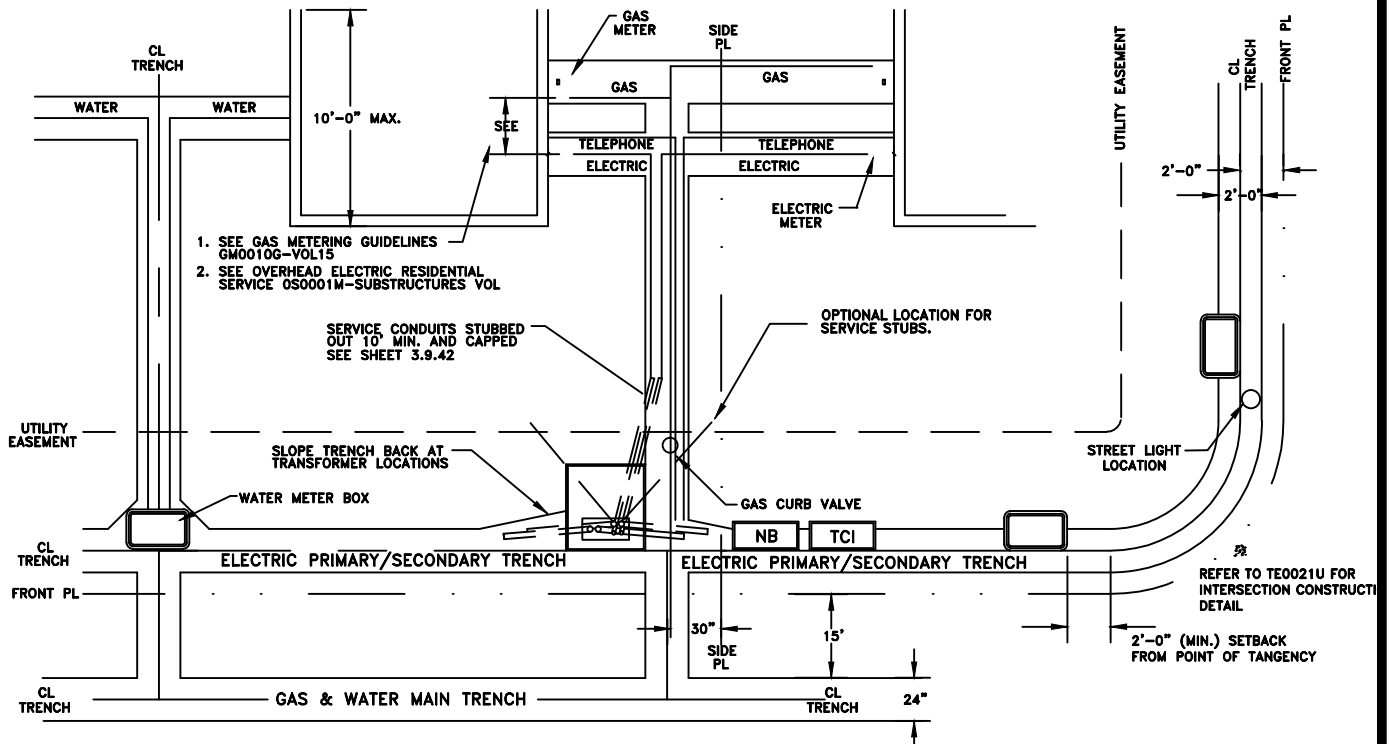
 <b>Liberty Utilities®</b>					ENGINEERING AND CONSTRUCTION STANDARD		3.8.37 OF 48
					<b>REFURBISHMENT TRENCH DETAIL</b>		<b>SUBSTRUCTURE</b>
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							<b><i>TE0005U</i></b>
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# GENERAL UTILITY LOCATION DETAILS

REFER TO SHEETS 3.9.39-3.9.47 FOR SPECIFIC DETAILS

## NOTES:

1. PREFERRED ELECTRIC LOCATIONS ARE TO THE LEFT OF SIDE PROPERTY LINE WHEN LOOKING FROM STREET.
2. PREFERRED GAS LINE LOCATION IS 30" LEFT OF PROPERTY LINE.
3. GAS CURB VALVE WILL BE BEHIND ELECTRIC FACILITIES.
4. OTHER UTILITIES (NB, TCI, ETC.) WILL BE LOCATED TO THE RIGHT SIDE OF PROPERTY LINE.



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ENGINEERING AND CONSTRUCTION STANDARD

## EQUIPMENT LOCATION DETAILS - RESIDENTIAL

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SUBSTRUCTURE

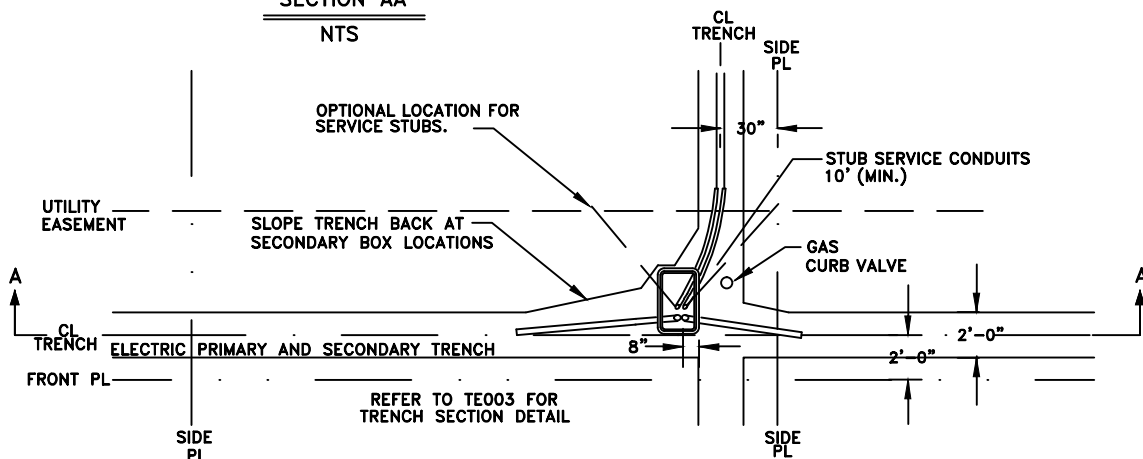
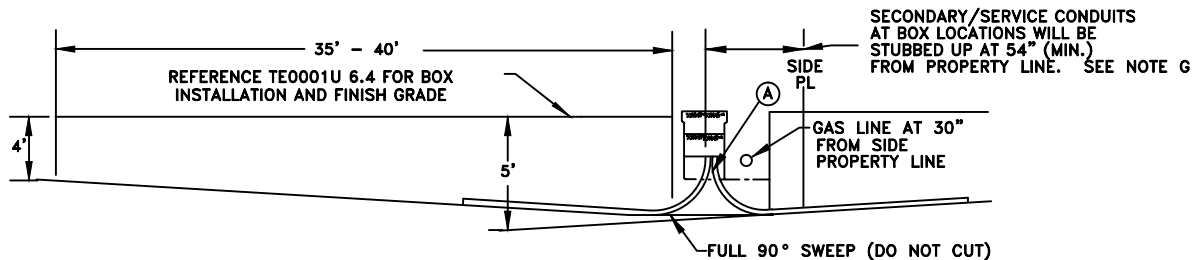
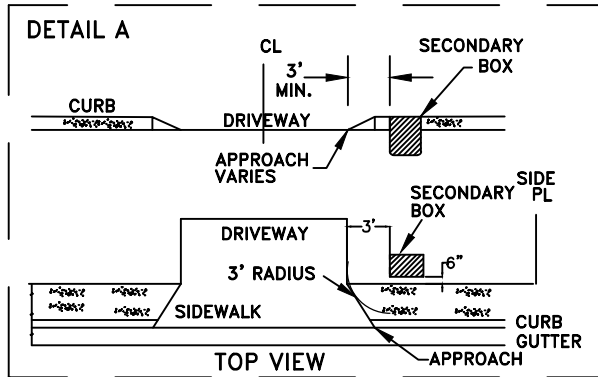
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**TE0020U**

# PREFERRED SECONDARY BOX LOCATION DETAIL

## BOXES WILL BE PLACED PARALLEL TO FRONT PROPERTY LINE

### CONSTRUCTION NOTES:

- (A) LEAVE 4" OF CONDUIT ABOVE BOTTOM OF DEEPEST EXTENSION AND CAP ALL CONDUIT ENDS. WHEN ENTERING SECONDARY BOX, USE 90° SWEEPS. ALL CONDUIT SHALL BE PLACED AT THE SAME END OF BOX, AND AT A MINIMUM OF 4" FROM BOX SIDE WALL.
- (B) ALL BOXES WILL BE INSTALLED OR LOCATED A MINIMUM OF 3 FEET FROM THE VEHICLE ACCESS APPROACH OF ANY DRIVEWAY AND WILL MAINTAIN A 3' RADIAL CLEARANCE FROM ALL DRIVEWAYS, (SEE DETAIL A).
- (C) A TRAFFIC RATED (H10, INCIDENTAL OR H20) BOX AND COVER WILL BE REQUIRED WHEN CONDITIONS IN NOTE B ARE NOT MET OR WHEN DETERMINED BY LU'S INSPECTOR THAT BOX WILL BE SUBJECTED TO VEHICLE LOADS.
- (D) ALL BOX LOCATIONS SHALL BE A MINIMUM OF 4-1/2 FEET BEHIND BACK FACE OF CURB ON STREETS WHERE SIDEWALKS ARE NOT IMMEDIATELY INSTALLED, 6-1/2 FEET FROM EDGE OF PAVEMENT OR 2 FEET BEHIND PROPERTY LINE WHICHEVER IS GREATER.
- (E) LIBERTY UTILITIES MAY REQUIRE RETAINING WALLS OR GUARDPOST INSTALLATION FOR REQUIRED SAFETY OF FACILITIES.
- (F) BOX WILL BE PLACED IN RELATIONSHIP TO FINISH GRADE AS REFERENCED IN TE0001U 6.4.
- (G) MAY BE REDUCED BUT 12" CLEARANCE MUST BE MAINTAINED BETWEEN CONDUIT & OTHER UTILITIES.



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## EQUIPMENT LOCATION DETAILS - RESIDENTIAL

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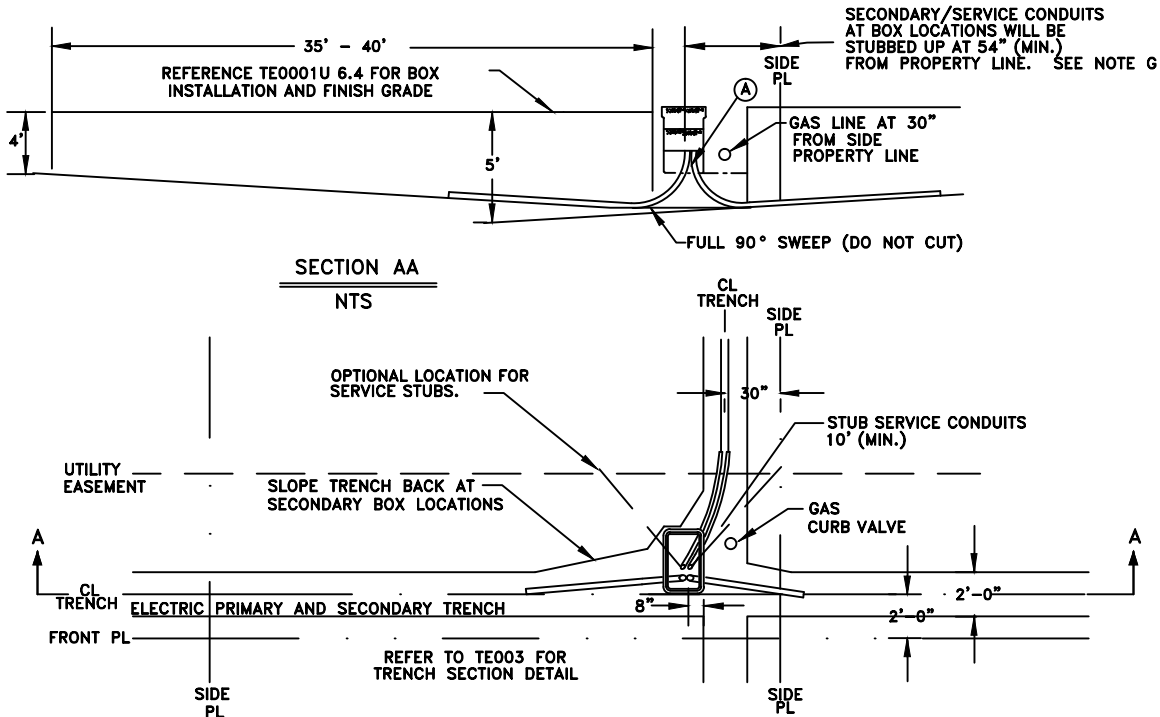
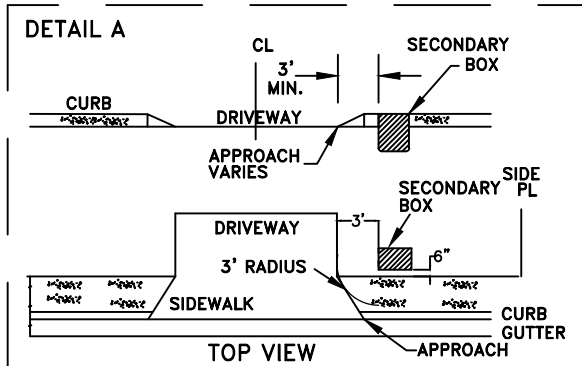
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# ALTERNATE SECONDARY BOX LOCATION DETAIL

## BOXES WILL BE LOCATED PERPENDICULAR TO FRONT PROPERTY LINE

### CONSTRUCTION NOTES:

- (A) LEAVE 4" OF CONDUIT ABOVE BOTTOM OF DEEPEST EXTENSION AND CAP ALL CONDUIT ENDS. WHEN ENTERING SECONDARY BOX, USE 90° SWEEPS. ALL CONDUIT SHALL BE PLACED AT THE SAME END OF BOX, AND AT A MINIMUM OF 4" FROM BOX SIDE WALL.
- (B) ALL BOXES WILL BE INSTALLED OR LOCATED A MINIMUM OF 3 FEET FROM THE VEHICLE ACCESS APPROACH OF ANY DRIVEWAY AND WILL MAINTAIN A 3' RADIAL CLEARANCE FROM ALL DRIVEWAYS, (SEE DETAIL A).
- (C) A TRAFFIC RATED (H10, INCIDENTAL OR H20) BOX AND COVER WILL BE REQUIRED WHEN CONDITIONS IN NOTE B ARE NOT MET OR WHEN DETERMINED BY LU'S INSPECTOR THAT BOX WILL BE SUBJECTED TO VEHICLE LOADS.
- (D) ALL BOX LOCATIONS SHALL BE A MINIMUM OF 4-1/2 FEET BEHIND BACK FACE OF CURB ON STREETS WHERE SIDEWALKS ARE NOT IMMEDIATELY INSTALLED, 6-1/2 FEET FROM EDGE OF PAVEMENT OR 2 FEET BEHIND PROPERTY LINE WHICHEVER IS GREATER.
- (E) LIBERTY UTILITIES MAY REQUIRE RETAINING WALLS OR GUARDPOST INSTALLATION FOR REQUIRED SAFETY OF FACILITIES.
- (F) BOX WILL BE PLACED IN RELATIONSHIP TO FINISH GRADE AS REFERENCED IN TE0001U 6.4.
- (G) MAY BE REDUCED BUT 12" CLEARANCE MUST BE MAINTAINED BETWEEN CONDUIT & OTHER UTILITIES.



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## EQUIPMENT LOCATION DETAILS - RESIDENTIAL

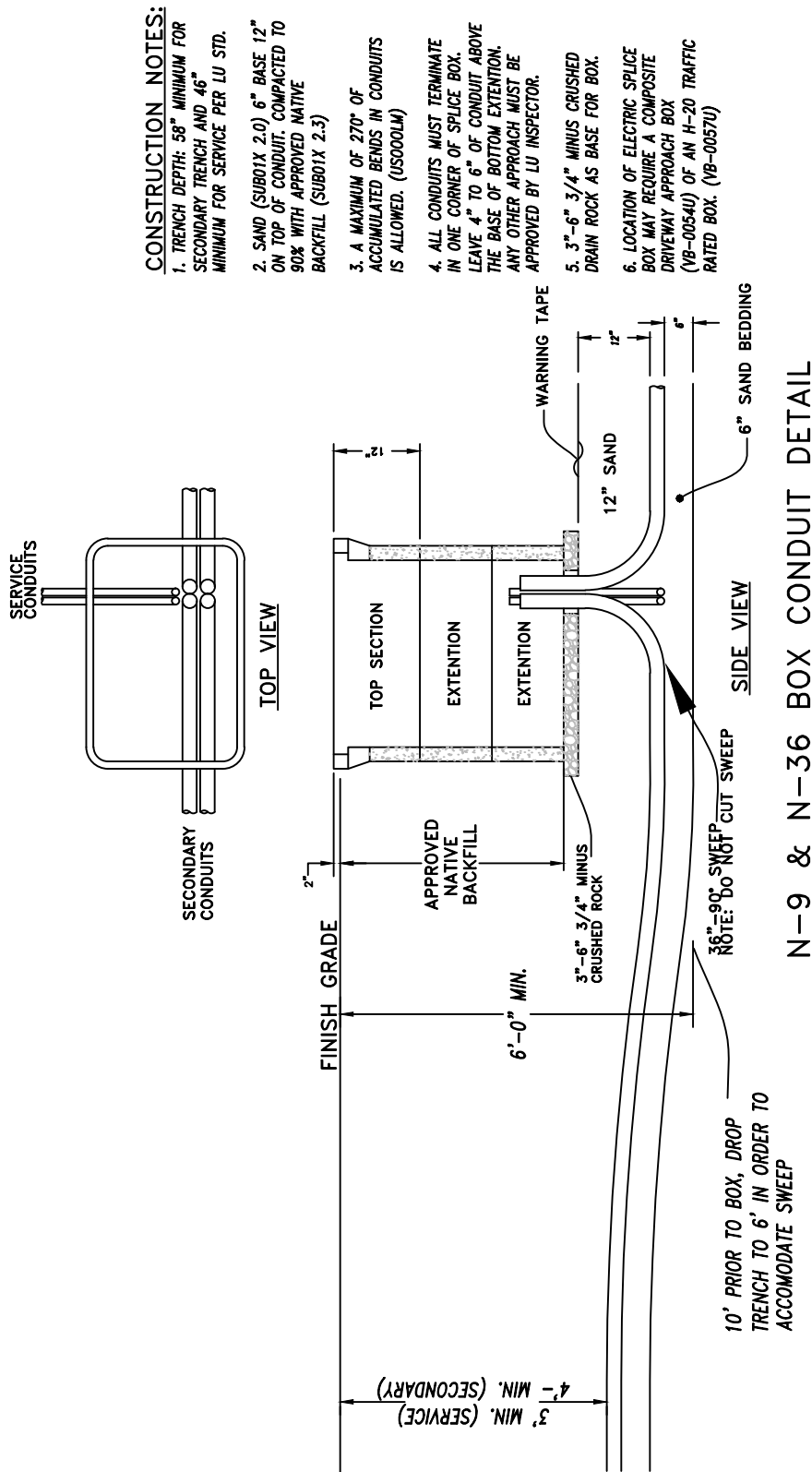
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**TE0020U**

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ENGINEERING AND CONSTRUCTION STANDARD

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# **EQUIPMENT LOCATION DETAILS - RESIDENTIAL**

SUBSTRUCTURE

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**TE0020U**

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## TYPICAL SPLICE BOX INSTALLATION

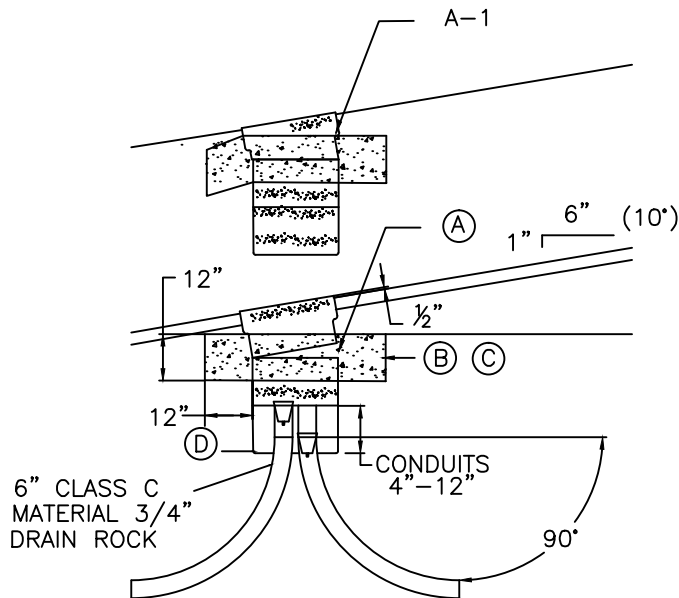
**Example:** Boxes in sloped areas of 6:1 (10°) in unpaved non-traffic/pedestrian applications:

**NOTES:**

- A. The gap or seam between the top section and the first extension will be filled with grout, either fine or coarse in accordance with ASTM C-476 with a minimum compression strength of 2000 PSI at 28 days.
  - A-1. The top section may be cut to match slope but cut will be limited to the bottom 6" of the top section.
- B. A 12" X 12" concrete wrap will be installed around the box top section, 6" above and below pivot point or seam.
- C. The inside surface will be troweled to a smooth "finished" surface.
- D. All excess concrete will be removed from the box cavity.

## General Notes

1. Leave 4"-12" of conduit above bottom of deepest extension. A 1/4" flat polyester pull line w/ sequential footage markings and a minimum 400 lb. breaking strength, to be installed in each conduit by customer. See CD0001U, Section 20 of the Substructure Vol, Conduit Section.
2. Ends of all conduits will be capped or plugged with a temporary plug as referenced in CD0001U, Section 12.0, of substructure, Conduit Section.
3. All conduits shall be placed at same end of box at a minimum of 4" from box side wall.
4. Box will be placed in relationship to "finished" grade as referenced in TE0001U, Section 6.4.



END VIEW



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ENGINEERING AND CONSTRUCTION STANDARD

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## SUBSTRUCTURE

DRAWING NUMBER

**TE0020U**

## EQUIPMENT LOCATION DETAILS - RESIDENTIAL

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# TYPICAL SPLICE BOX INSTALLATION

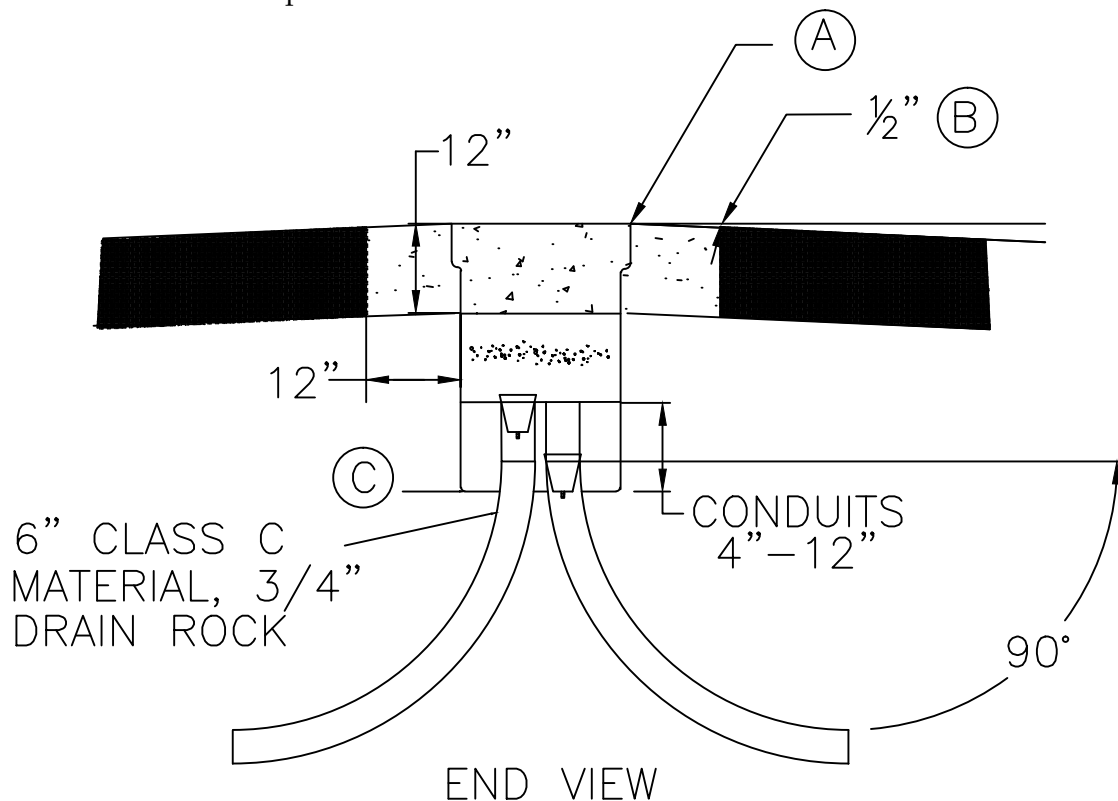
**Example:** Boxes in H10/H20 Unpaved Area Applications:

## NOTES:

- A. Box will be installed 1/2" above finished grade with a 12" x 12" concrete wrap around the top section.
- B. Concrete will match the top of box and slope away at 1/2" per 12" (24:1) where it will match the grade of unpaved material. Note: Exception in the snow removal areas where the box will be installed a minimum of 1/2" below the finish grade to reduce exposure to snow removal equipment.
- C. All excess concrete will be removed from the box cavity.

## General Notes.

- 1. Leave 4"-12" of conduit above bottom of deepest extension. A 1/4" flat polyester pull line w/ sequential footage markings and a minimum 400 lb. breaking strength, to be installed in each conduit by customer. See CD0001U, Section 20 of substructure, Conduit Section..
- 2. Ends of all conduits will be capped or plugged with a temporary plug as referenced in CD0001U, Section 12.0, of substructure, Conduit Section.
- 3. All conduits shall be placed at same end of box at a minimum of 4" from box side wall.



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ENGINEERING AND CONSTRUCTION STANDARD

## EQUIPMENT LOCATION DETAILS - RESIDENTIAL

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SUBSTRUCTURE

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# TYPICAL SPLICE BOX INSTALLATION

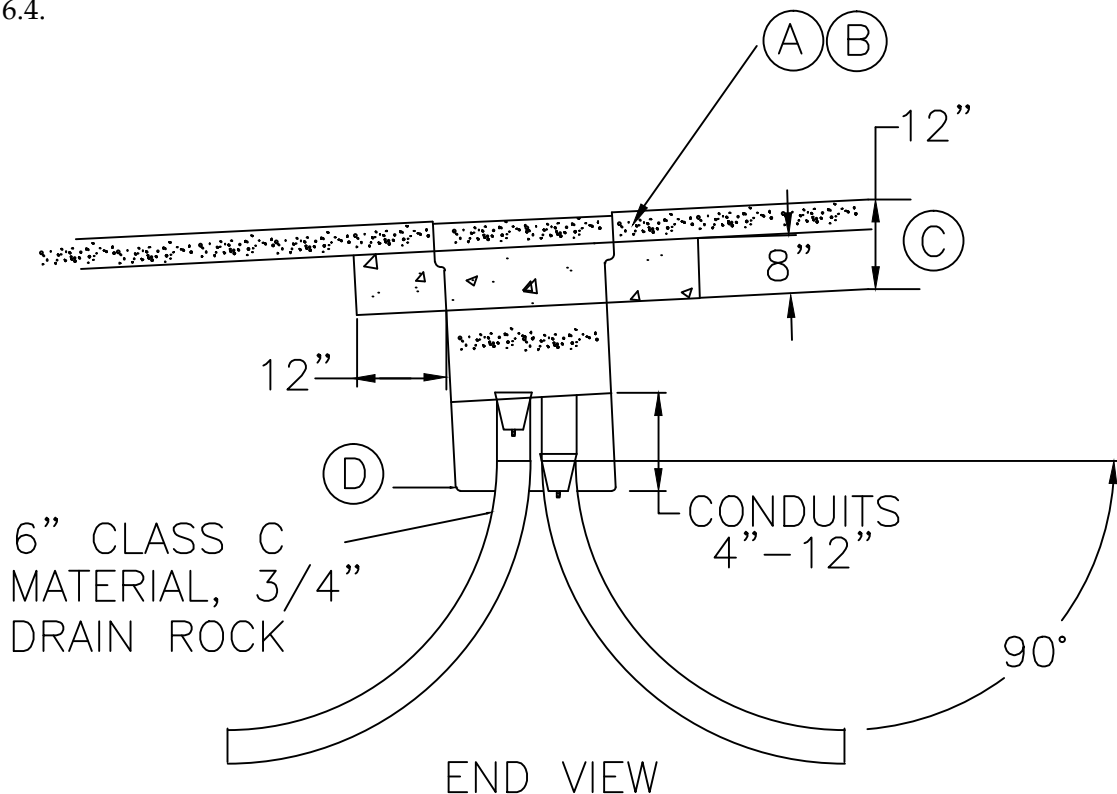
**Example:** Boxes in H10 Paved areas " Residential Driveways":

## Notes:

- A. Box will be installed 1/4", (snow areas 1/2") below finished grade with a 12" x 12" concrete wrap around the top section of box.
- B. The depth of concrete driveway may contribute to the 12" wrap as shown below.
- C. For asphalt applications the 12" x 12" wrap will be held down and the top application will match road material in accordance with local codes.
- D. All excess concrete will be removed from the box cavity.

## General Notes.

- 1. Leave 4"-12" of conduit above bottom of deepest extension. A 1/4" flat polyester pull line w/ sequential footage markings and a minimum 400 lb. breaking strength, to be installed in each conduit by customer. See CD0001U, Section 20 of substructure, Conduit Section..
- 2. Ends of all conduits will be capped or plugged with a temporary plug as referenced in CD0001U, Section 12.0, of substructure, Conduit Section.
- 3. All conduits shall be placed at same end of box at a minimum of 4" from box side wall.
- 4. Box will be placed in relationship to "finished" grade as referenced in TE0001U, Section 6.4.



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ENGINEERING AND CONSTRUCTION STANDARD

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**EQUIPMENT  
LOCATION DETAILS -  
RESIDENTIAL**

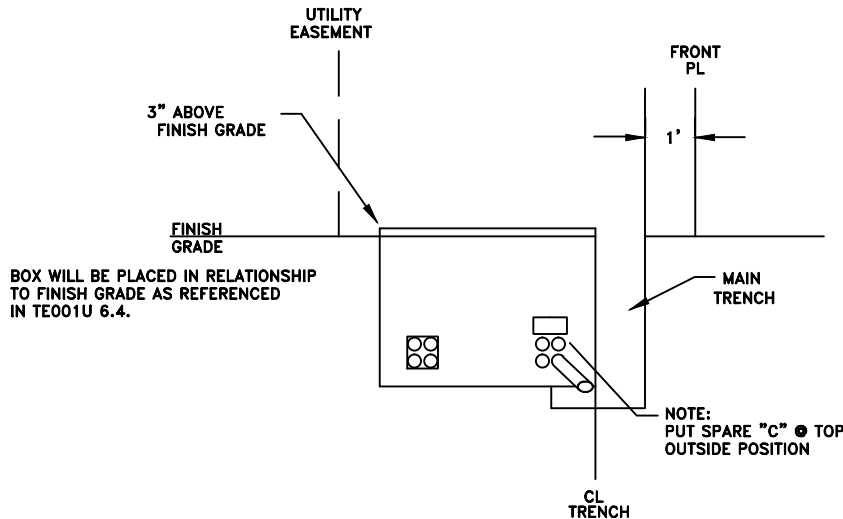
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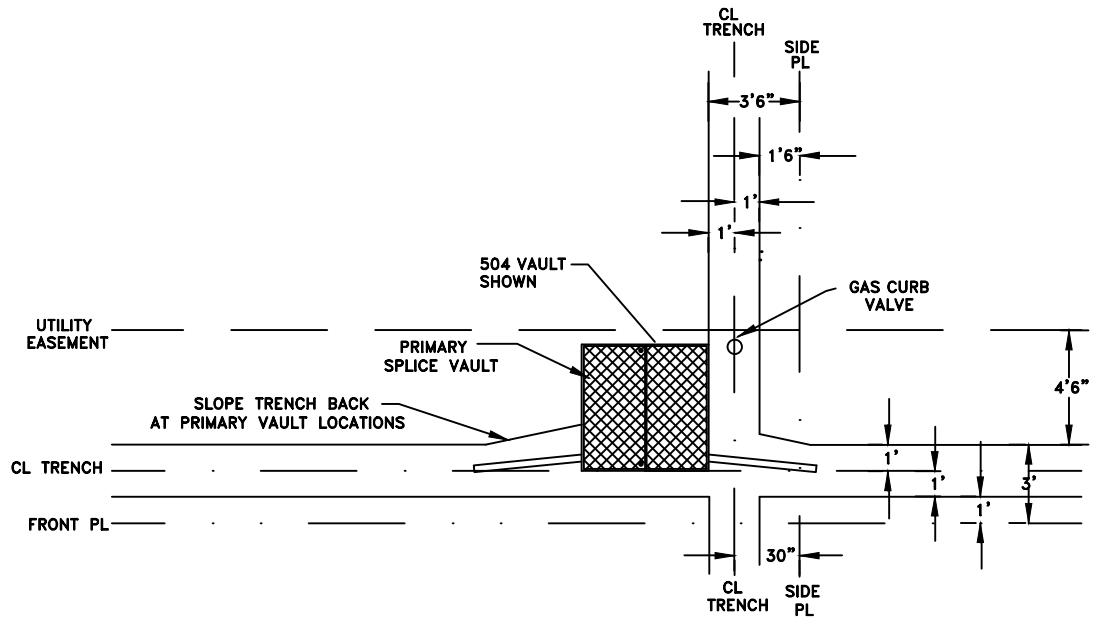
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# PRIMARY VAULT LOCATION DETAIL



## CONSTRUCTION NOTES:

- (A) CONTRACTOR TO DETERMINE AND STAKE FINISH GRADE.
- (B) ALL BOXES WILL BE INSTALLED OR LOCATED A MINIMUM OF 3 FEET FROM THE WIDEST SECTION OF THE APPROACH OF ANY DRIVEWAY, VEHICLE ACCESS OR GARAGE SIDE LOCATION.
- (C) A TRAFFIC RATED (H10 OR H20) BOX AND COVER WILL BE REQUIRED WHEN CONDITIONS IN NOTE B ARE NOT MET OR WHEN DETERMINED BY LU INSPECTOR THAT BOX WILL BE SUBJECTED TO VEHICLE LOADS.
- (D) ALL VAULT LOCATIONS SHALL BE A MINIMUM OF 4-1/2 FEET BEHIND BACK FACE OF CURB ON STREETS WHERE SIDEWALKS ARE NOT IMMEDIATELY INSTALLED 6-1/2 FEET FROM EDGE OF PAVEMENT OR 2 FEET BEHIND PROPERTY LINE WHICHEVER IS GREATER.
- (E) LIBERTY UTILITIES MAY REQUIRE RETAINING WALLS OR GUARDPOST INSTALLATION FOR REQUIRED SAFETY OF FACILITIES.



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## EQUIPMENT LOCATION DETAILS - RESIDENTIAL

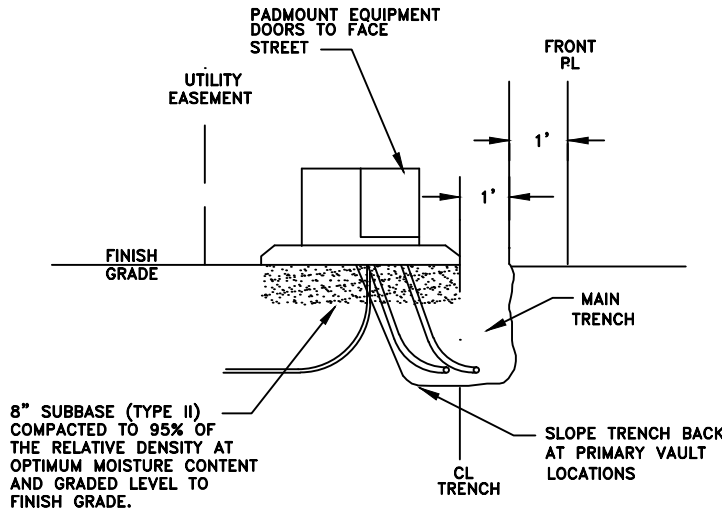
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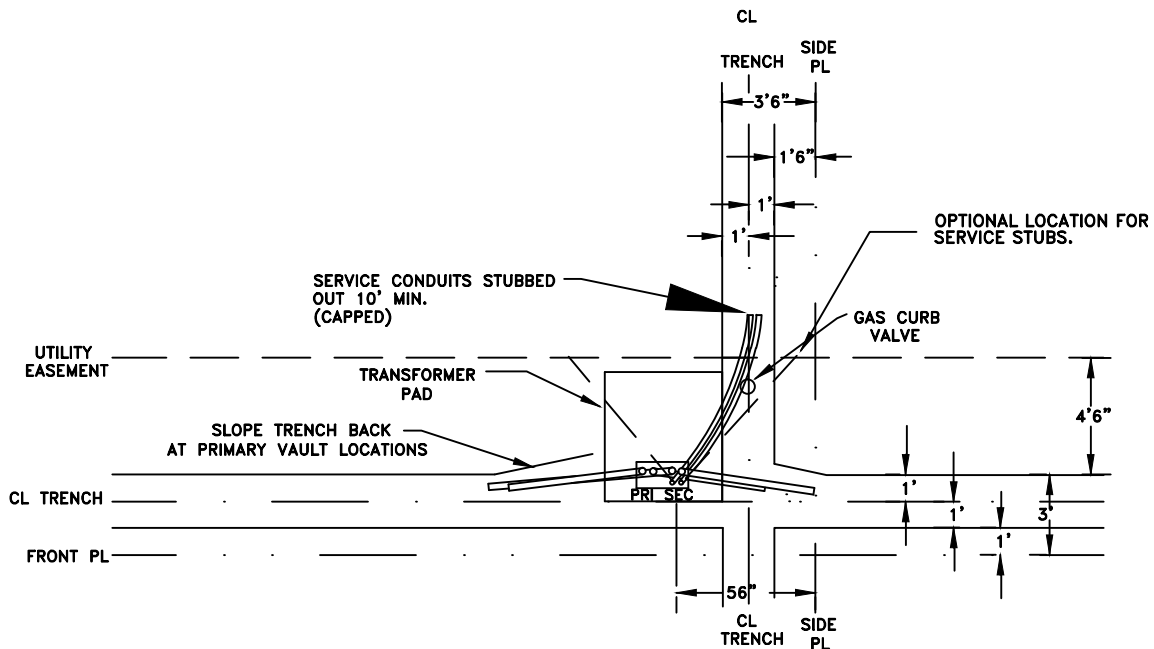
# TRANSFORMER PAD LOCATION DETAIL

## FRONT LOT LINE CONSTRUCTION



### CONSTRUCTION NOTES:

- (A) CONTRACTOR TO DETERMINE AND STAKE FINISH GRADE.
- (B) MAINTAIN 10 FT. CLEAR LEVEL SPACE IN FRONT OF ALL PADMOUNT EQUIPMENT DOORS.
- (C) NO FENCE, COVER OR STRUCTURE TO BE BUILT WITHIN 3'-0" OR 30" OF TRANSFORMER. REFERENCE TE0040U NOTE: 15
- (D) FOR TRANSFORMER GROUNDING DETAIL SEE GD04U. UNDERGROUND, TECHNICAL DATA.
- (E) ALL TRANSFORMER PADS WILL BE INSTALLED A MINIMUM OF 3 FEET FROM THE EDGE OF ANY DRIVEWAY, CURB OR VEHICLE ACCESS.
- (F) ALL PAD LOCATIONS SHALL BE A MINIMUM OF 4-1/2 FEET BEHIND BACK FACE OF CURB ON STREETS WHERE SIDEWALKS ARE NOT IMMEDIATELY INSTALLED 6-1/2 FEET FROM EDGE OF PAVEMENT OR 2 FEET BEHIND PROPERTY LINE WHICHEVER IS GREATER.
- (G) LIBERTY UTILITIES MAY REQUIRE RETAINING WALLS OR GUARDPOST INSTALLATION FOR REQUIRED SAFETY OF FACILITIES.
- (H) SECONDARY/SERVICE CONDUITS AT TRANSFORMER LOCATIONS WILL BE STUBBED UP AT 56" MIN. FROM PROPERTY LINE.
- (I) PRIMARY CONDUITS AT TRANSFORMER WILL BE STUBBED UP AT 71".



### TRANSFORMER PAD LOCATION DETAIL

### FRONT LOT LINE CONSTRUCTION



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ENGINEERING AND CONSTRUCTION STANDARD

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**EQUIPMENT  
LOCATION DETAILS -  
RESIDENTIAL**

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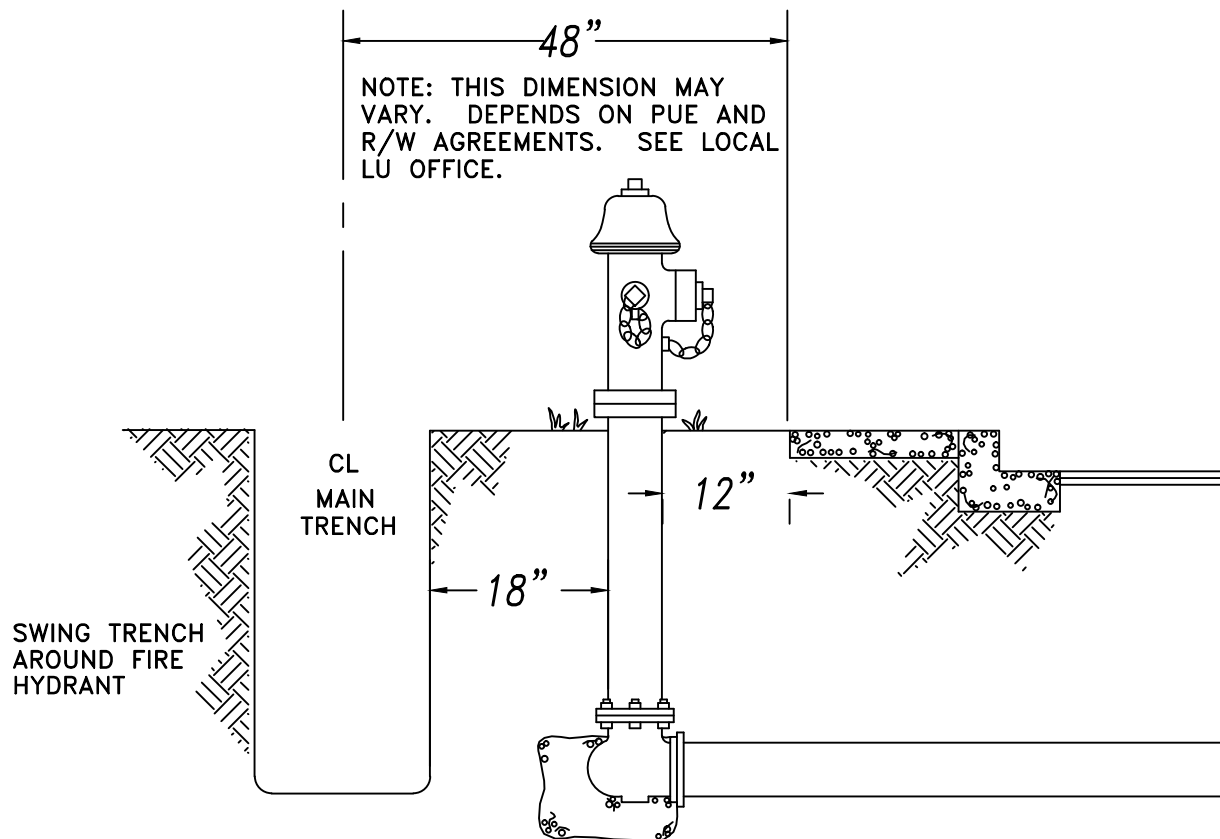
# ELECTRIC TRENCH / HYDRANT

## BYPASS DETAIL

### EXCEPTION SHOWN

GENERALLY HYDRANTS WILL BE LOCATED ON OPPOSITE SIDE OF STREET FROM ELECTRIC MAIN TRENCH.

Note: The 48" dimension may vary depending on PUE and R/W requirements. Please contact the local LU office for exact details.



**Liberty Utilities®**

ENGINEERING AND CONSTRUCTION STANDARD

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**ELECTRIC TRENCH  
HYDRANT BYPASS  
DETAIL**

SUBSTRUCTURE

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**TE0045U**

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LL	ET	JM	08/17	04