SALEM CITY
UNDERGROUND POWER CONSTRUCTION
STANDARD SPECIFICATIONS

The Salem City Power Department has prepared and approved this set of standards and specifications for the purpose of maintaining a safe, consistent, and reliable underground power distribution system. These standards are required to be used by any one who is involved with design or installation of power distribution systems within the Salem City limits.

These standards and specifications will be used as a reference for all underground power distribution systems inspections, which are required as part of Salem City policy, for underground power distribution installation. A power department inspector will inspect all trenches and conduit installation before covering.

Section 1. OVERVIEW

This first section gives basic guidelines to the construction of electrical systems and their design.

A. Salem City will design all new electrical systems.
- Systems will be built as designed.
- Any deviation from the plans will not be accepted without prior arrangements and written authorization.
- Contractor to provide as-builts in electrical format; 3 ½ diskette, AutoCAD format or as approved by City Engineer.

B. Developer will dig trench, lay conduit, install all sleeves for transformers, primary vaults, etc., secondary and fiber optic boxes to Salem City standards as defined here in the following.

C. Salem City power crews will install all wire (with exceptions of service wire from trans. or sec. box to meter base), install all transformers, complete all terminations and make up all grounding and energize.

D. An additional 2" PVC conduit will be laid at the same level as phone and TV for a future fiber optics line. This shall be available to each lot with electrical service.

E. As the construction of the system is developed, a 10' long 2" conduit will be stubbed out from all switches, vaults, transformers, secondary boxes, etc., in order to accommodate future homes, developments, etc. The end of the conduit will be marked as such.

F. Developer will guarantee all trenches from settling for a period of 12 months from completion of project and will be responsible for

the cost of re-leveling, straightening, or raising of any electrical apparatus.

G. In an effort to create a clean and workable system, and in order to help maintain all clearances between electric power cables and natural gas facilities, all new subdivision electric power cables will be designed to run on the north and east side of the roads.

H. In an effort to provide reliable, continuous service, all subdivisions with a combined load in excess of 75 KVA will be built with a loop system. Subdivisions to be built in phases shall provide for a looped system unless written authorization is received from Salem City Power Department.

Section 2. DEFINITIONS

A. Secondary conduits - All conduits with cable ratings of 600 volts or less.

B. Primary conduits - All conduits with cable ratings of more than 600 volts.

C. Burial Depth - Vertical distance from the surface under which cables or conduits are installed to the top of the conduit nearest the surface.

D. Plastic conduits - PVC conduit must be schedule 40 or greater.

E. Sweep - Change in direction of a conduit or group of conduits with a radius bend of 3 feet or more.

Section 3. INSTALLATION FOR PRIMARY AND SECONDARY CONDUITS FOR UNDERGROUND DISTRIBUTION

A. Direct Buried Cables will only be allowed for temporary use and will need prior written permission from Salem City Power Department.

B. All conduits shall be protected against physical damage by providing a 12-inch envelope of 1-inch minus backfill around the conduits.

C. Conduits should be laid in orderly fashion and parallel with other conduits. Conduits shall have a minimum separation of 2". See Table 3.

D. Cable TV, phone, and fiber boxes should be placed according to Table 6.

E. All contractors will abide by OSHA guidelines and adhere to proper shoring and safety practices.

F. Warning tape shall be installed 12 inches below grade and be continuous for the full length of all trenches. The warning tape is to be 6 inches in width and will have the statement " WARNING - BURIED ELECTRICAL CABLE" printed on it.

G. Conduits shall have smooth walls and be sized adequately, as determined by the overall cable diameter and recommended percentage of fill of conduit area, per national electric code 2002.

H. All sweeps shall be long sweeps having a minimum radius of 36".

I. Conduits shall protrude 2-3" into bottom of any sleeve or secondary box.

J. Conduits shall enter secondary boxes at a complete 90 degree angle.

K. Primary Conduits shall enter transformers on the most right side leaving the left side for secondary conduits.

L. All conduits shall enter sleeves in an orderly fashion and shall be installed in such a manner that they are directly under the opening of the sleeve or that they may be aimed in such that wire can be pulled smoothly without any obstructions, sharp angles, or tight bends.

M. Center of trench must be 54" off edge of sidewalk.

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TABLE 1

CONDUIT SIZES FOR SECONDARY CABLE SHALL BE IN ACCORDANCE WITH THE CURRENT NATIONAL ELECTRICAL CODE OR THE TABLE BELOW, WHICH EVER IS MORE STRINGENT.

AWG or MCM	TRIPLEX
#10 THHN	1”
#4 URD	2”
#2 URD	2”
#1/0 URD	2”
#2/0 URD	2”
#4/0 URD	2”
350 URD	3”

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TABLE 2

CONDUIT SIZES FOR PRIMARY CABLES 15 KV, 220 MIL. INSULATION

AWG or MCM	
#2	2”
#1/0	2”
#4/0	2”
500	3”

NOTE: ONLY ONE CONDUCTOR PER CONDUIT WILL BE ALLOWED

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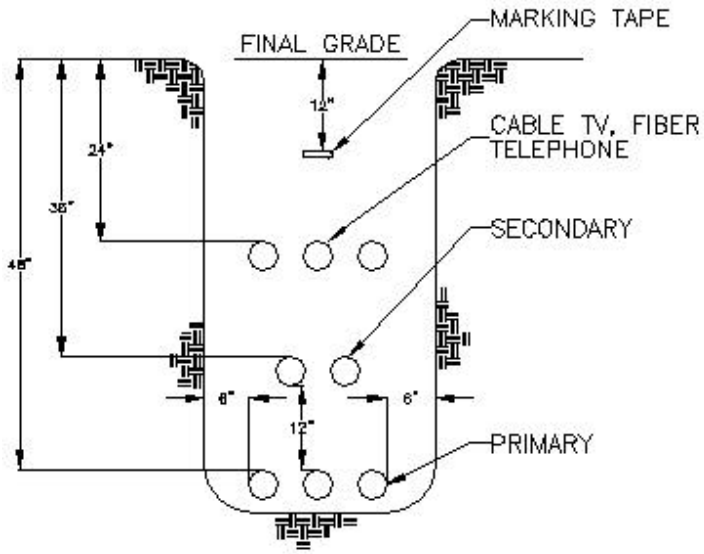
TABLE 3

BURIAL DEPTHS

Burial depths for primary and secondary conduits

FINAL GRADE	
WARNING TAPE	12”
CABLE TV, TELEPHONE, FIBER	24”
SECONDARY	36”
PRIMARY	48”



NOTE: THIS DETAIL IS TO SHOW HORIZONTAL BURIAL DEPTHS ONLY. FOR CLEARANCES TO OTHER UNDERGROUND UTILITIES, SEE TABLE 4

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TABLE 4

CLEARANCES TO OTHER UNDERGROUND UTILITIES

WATER:.....5 FT horizontal 1 FT vertical

SEWER.....5 FT horizontal 1 FT vertical

NATURAL GAS .....5 FT horizontal 1 FT vertical

CABLE TV.....1 FT horizontal 1 FT vertical

PHONE.....1 FT horizontal 1 FT vertical

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Section 4 RISER POLE CONDUITS AND CONSTRUCTION

Conduits for riser poles shall be ridged steel and shall continue up the pole from the ridged sweep to within the last 10 feet of rise. The riser pole conduit must be straight and supported by a stand off bracket. The distance between brackets shall not be greater than ten feet.* Crooked or misaligned conduits will not be accepted. Contractor will install first length of riser up pole and provide all materials.** Only one conductor per conduit will be allowed.

* Salem City to provide stand off brackets and pipe straps for primary risers and steel poles.

** In case of a secondary underground service, contractor will pull wire to panel, insuring plenty of wire left for power crews to complete riser construction and make connection without splicing.

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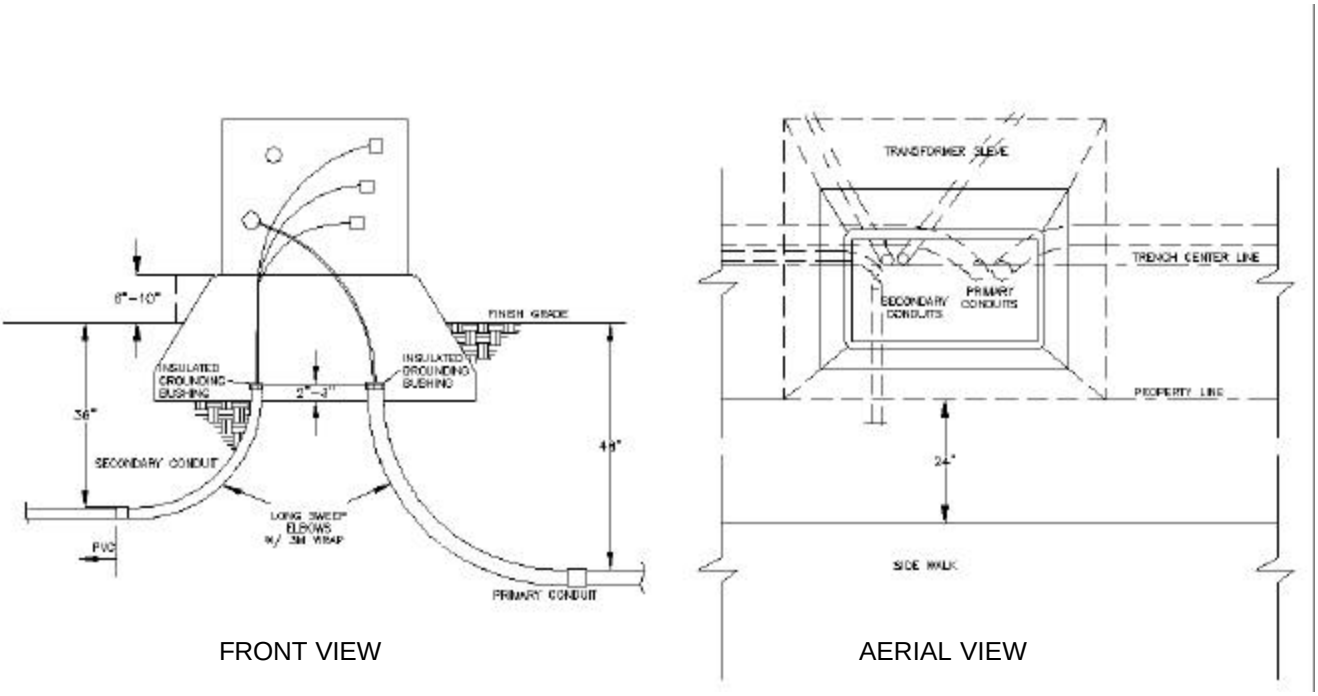
TRANSFORMER SLEEVE INSTALLATION PRACTICES



FRONT VIEW AERIAL VIEW

1. Sleeves shall be level and square with sidewalk.

2. Sleeves shall protrude above grade a minimum of 6 inches and a maximum of 10 inches.

3. Primary conduits entering sleeves shall enter on the most right side.

4. Secondary conduits must enter on the most left side.

5. Conduits must terminate 2-3 inches into bottom of sleeve.

6. Conduits must enter sleeves in such a manner that they are in line with the opening and wire may be pulled smoothly without any obstruction.

7. Front of sleeve shall be 2' off sidewalk. See table 6.

8. All transformer sleeves will be installed with conduit stubs for future services.

9. All underground Rigid Galvanized Steel conduit shall be wrapped with 3m-50 10-mil pipe wrap. Or approved equal.

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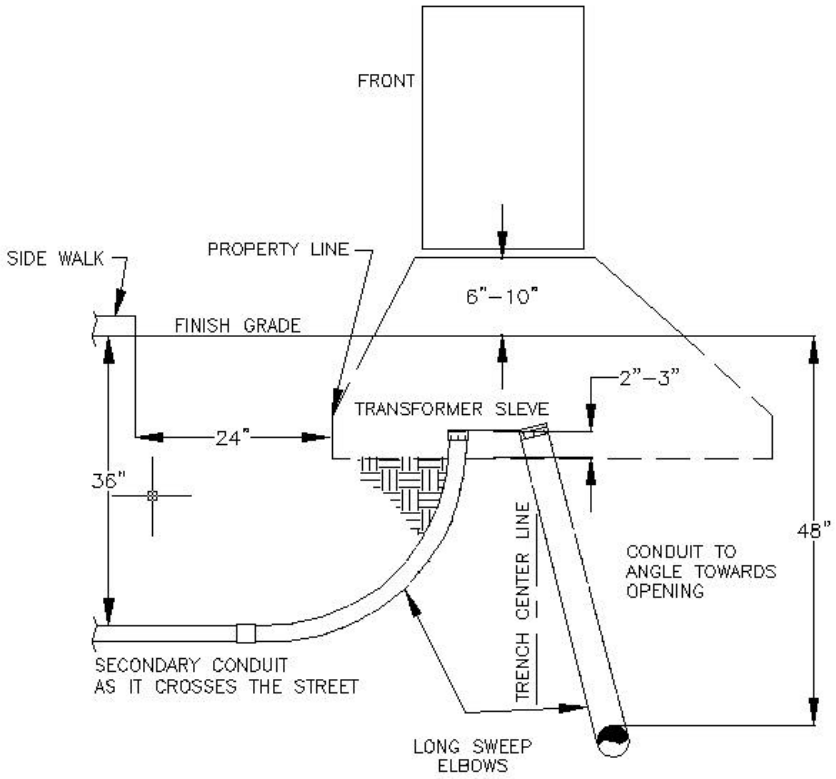

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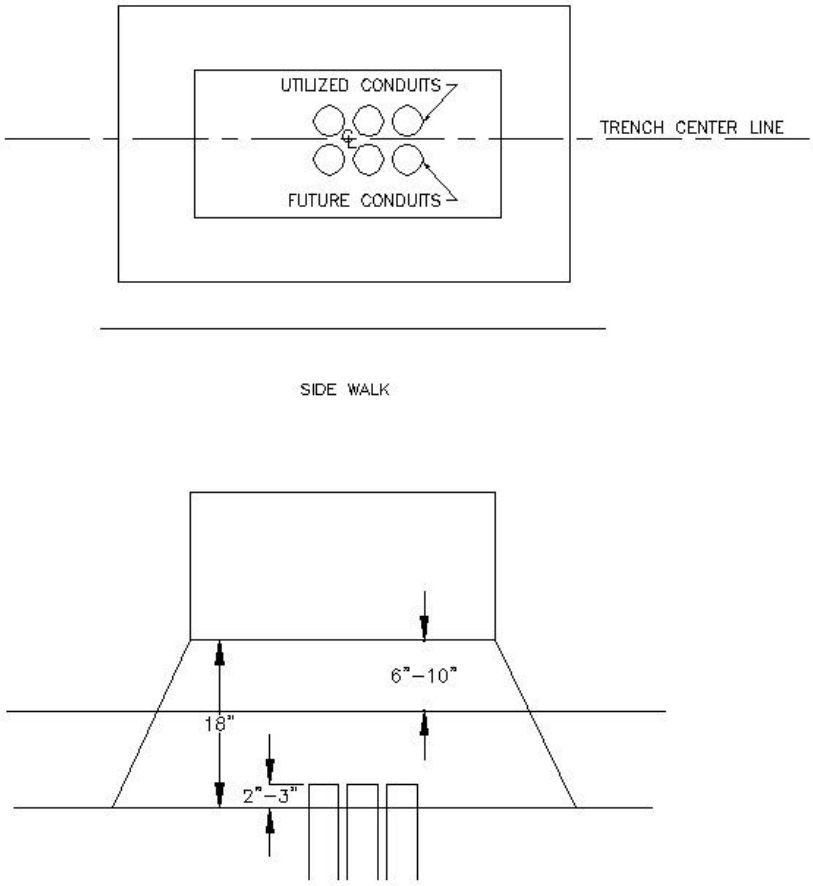
PRIMARY JUNCTION INSTALLATION PRACTICE



1. Sleeves shall be level and square with sidewalk.

2. Sleeve is to be installed inside of easement.

3. Sleeves shall be installed with vault securely fastened on with stainless steel bolts by contractor, to insure proper opening and closing.

4. Sleeves shall be a minimum of 6 and a maximum of 10 inches above grade.

5. Conduits must enter sleeve in the most center portion of the sleeve.

6. Future conduits will be placed in front of utilized conduits to allow future access.

7. Conduits to terminate 2-3 inches above grade in vault sleeve.

8. Vaults to be installed with door opening towards sidewalk.

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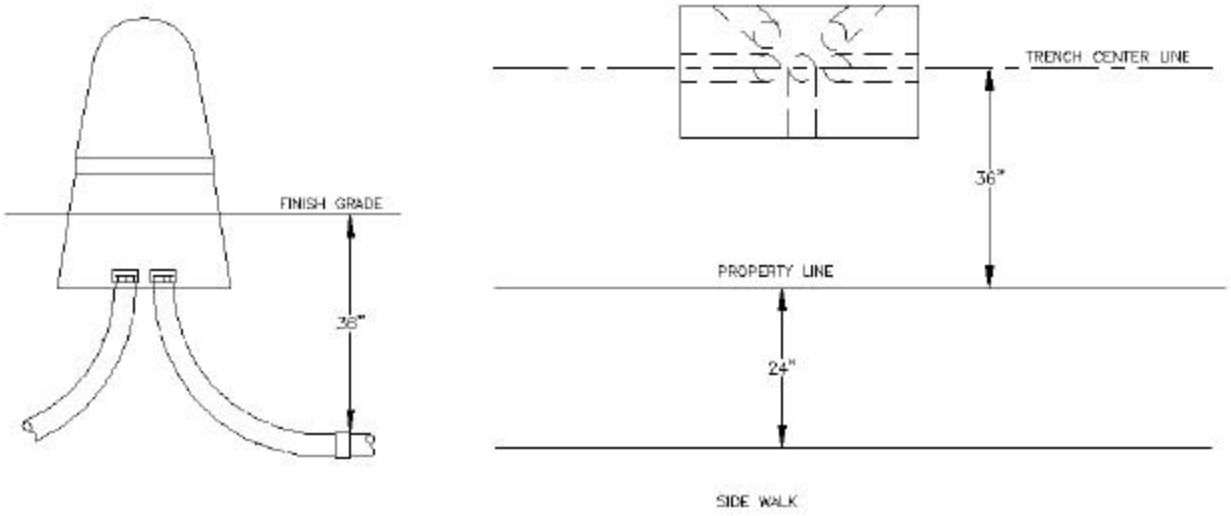
SECONDARY BOX INSTALLATION PRACTICES



1. Secondary boxes shall be level and square with sidewalk.

2. Secondary box sleeves shall be a minimum of 6 inches and a maximum of 10 inches above grade.

3. All conduits must terminate 2-3 inches into bottom of secondary sleeve.

4. Conduits must enter the most center portion of secondary sleeve.

5. Conduits must enter box in the most vertical position.

6. All secondary boxes shall have stubs for future services installed.

7. All secondary boxes shall be dome type.

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EQUIPMENT AND LINE LOCATION AND ROW REQUIREMENTS

1. This standard outlines the location, with respect to property lines, of underground distribution facilities.

2. Back lot line installations.

   Installations along back lot lines will not be allowed.

3. Right-of-way requirements.

   Before any power system design approval, the property or developer will be required to grant the City of Salem the proper easements and rights-of-way.

   The standard requirements are as follows:

   10 feet on the front of each lot or parcel
   5 feet on the sides and back of each lot or parcel

   Multi Building or Condominium

   10 feet around perimeter of each phase or building

   Commercial

   15 feet on the front of each lot or parcel
   7.5 feet on the side and back of lot or parcel

   Common Areas:

   The equipment (i.e. transformers, vaults, switches, etc.) will be installed along access roads as per standards. If installation along access roads cannot be accomplished as determined by the power dept., equipment will be installed with 10 feet of clearance from any permanent structure.

ALL POWER EQUIPMENT WILL BE DESIGNED AND INSTALLED AS PER THE ABOVE IN THESE SPECIFICATIONS IN ORDER TO ENSURE ALL EQUIPMENT FALLS WITH IN THE ESTABLISHED RIGHT-OF-WAYS AND EASEMENTS AND MAINTAIN CONSISTENCY OF EQUIPMENT PLACEMENT THROUGHOUT THE CITY.

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TABLE 5

	Supplied By		Installed By	
	Salem City	**Customer**	**Salem City**	**Customer**
Transformer	X		X	
Trans. Sleeve	X			X
Secondary Box	X			X
Primary Junction	X			X
Prim. Junct. Sleeve	X			X
Riser Pole Material		X See Section 4	X See Section 4	X
Conduits				X
Conductors	X*		X*	
Street Lights	X		X	
Meter Base		X		X
Meter	X		X	
C.T. Can		X		X
C.T.'SS	X		X	
Test Switches		X		X
Service Wire		X		X
Power Pole	X		X	

* Service wires from transformer, secondary box or riser to meter base, installed and supplied by customer.
* C.T. cans will be required on all commercial services over 200 amps.
* All Meter bases and C.T. cans will comply with Salem City Power Department requirements

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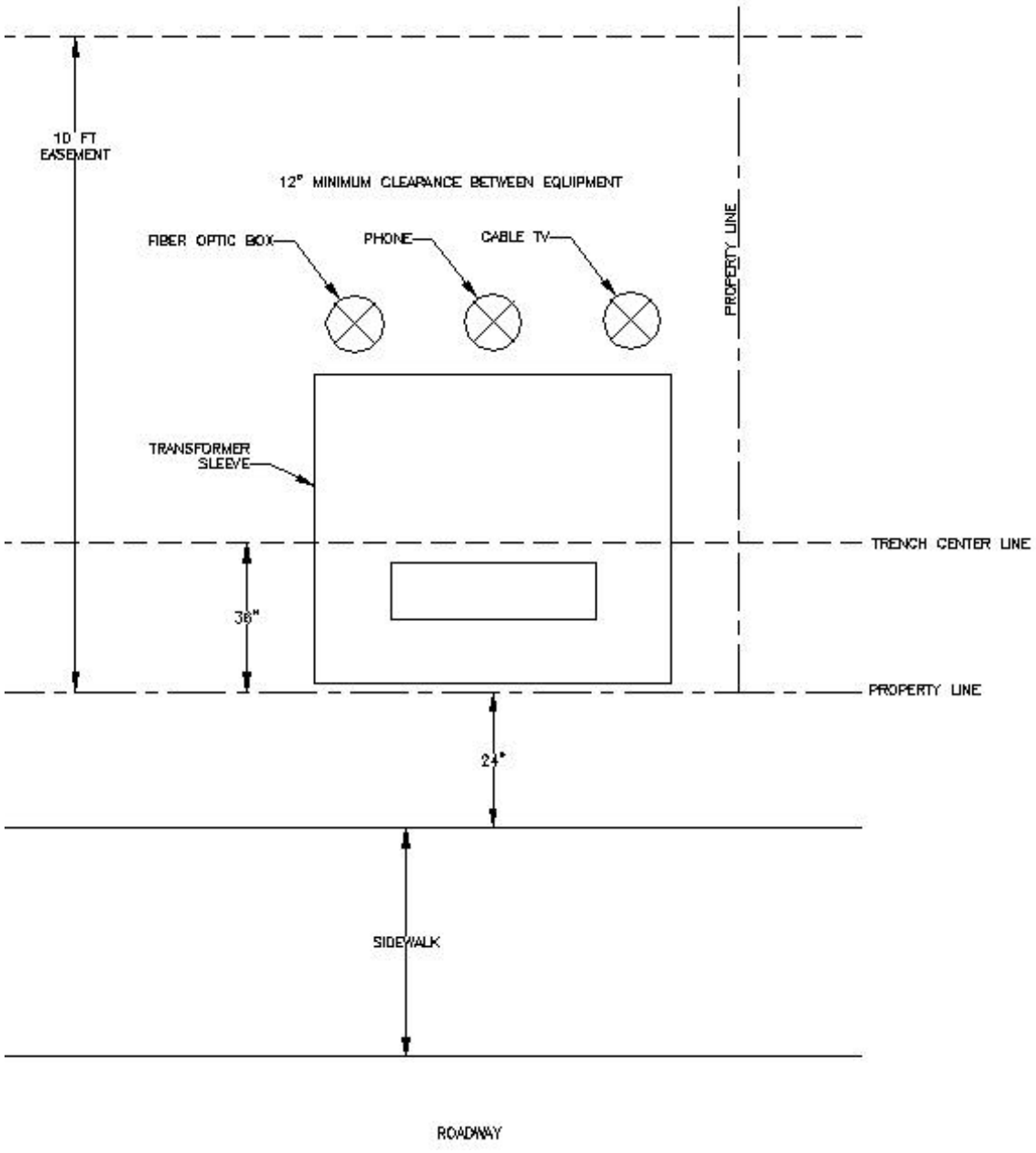
PLACEMENT OF EQUIPMENT IN RELATION TO PROPERTY LINE



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STREET LIGHTING

A. LIGHT FIXTURE & LAMP

All street lighting fixtures shall be HADCO U23-100HPS-120Volt/U34/U13-A. Each light fixture shall also include the optional photocell.

B. MOUNTING POLES AND BASE

All mounting poles and base shall be Ameron VBF 4.1 (213) uncoated anchor base Tenon A5 14 foot concrete pole.

C. LIGHT POLE SPACING

Street lighting will be provided across the street from each fire hydrant, one at every intersection, and located such that the maximum spacing is 175 feet.