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OVERHEAD ELECTRIC RESIDENTIAL SERVICE

1.0 INDEX

2.0 PURPOSE

The purpose of this standard is to assist the customer and his engineer and/or contractor in planning for an acceptable location and type of termination for overhead service from LU's overhead electric distribution system.

3.0 LIMITS

The requirements of this standard are limited to single or multiple dwelling residences with a **400A maximum** single phase entrance. If the length of service is such that it would prove electrically prohibitive, a transformer and primary extension may be required, in which case, LU's overhead line extension rule will be applied. LU will install a single span of service drop from its pole to the customer's permanent approved support, provided the customer has made an application for service and LU's distribution pole line is located on the customer's premises or in an easement (public or private) adjoining said premises.

4.0 CUSTOMER RESPONSIBILITY

The customer shall furnish, install and maintain, at his expense, the riser conduit, service entrance conductor, service insulator/attachment, weather head, service equipment and grounding in accordance with all Local and State Codes. Service drop support shall be constructed to provide proper clearance.
Panels greater than 200 amps require prior LU approval.

See LU Standard, RM0001M, Metering Section and LU Standard ENG04U, Underground Volume, for generator transfer switch requirements.

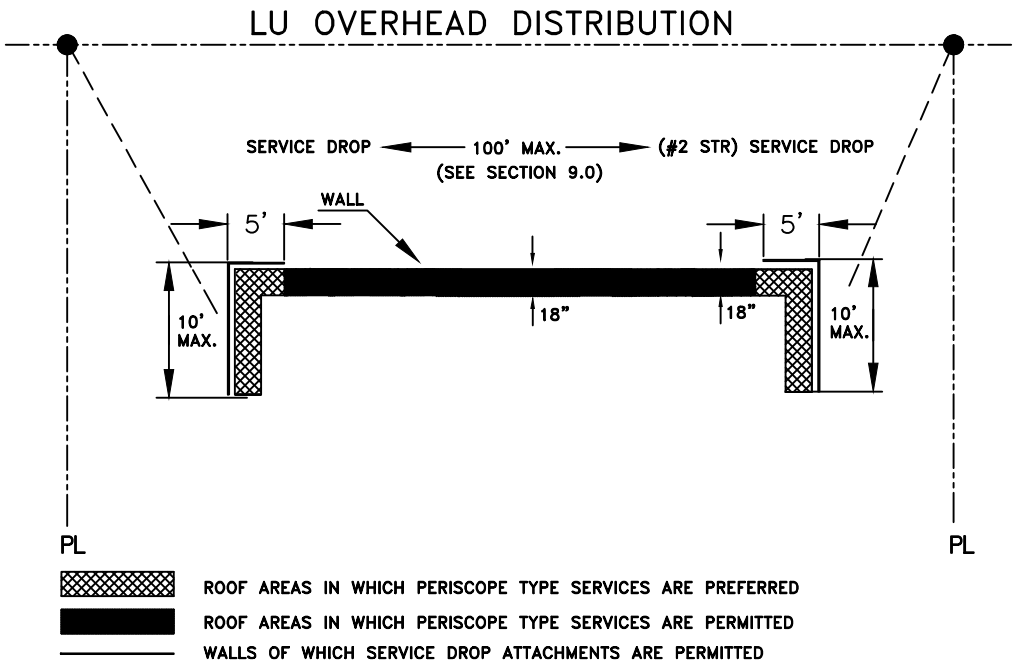
5.0 LU RESPONSIBILITY

LU will furnish, install and maintain the service drop conductors, cable connectors to service entrance conductors and meters.

6.0 SERVICE AND METER LOCATION

All service drop locations shall be approved by LU prior to construction of the service entrance. The location of the point of attachment of the service drop at the building shall be such that it can be reached with a single span, (100 feet maximum - #2 TP, heavy snow loading area shall be a maximum of 75 feet - #2 TP, 50' - 2/0 TP, 30' - 4/0 TP. Refer to OVERHEAD, GEN02T, Section 11.) from LU's pole with no overhang of adjacent property and with proper clearances maintained. This point of attachment will normally be on the building wall or on a periscope through the roof facing the nearest LU line through the roof. When it is impractical to attach the service drop below the level of the weather head, the termination shall **not** consist of more than 3 feet of exposed wire and shall **not** extend around the corner of the building. See section 8.0 for installation details.

Meter facilities shall be located within the first ten feet of structure. The meter location must not be fenced or otherwise obscured from view of meter readers, or impair the access of operations personnel. Where LU allows the meter facilities to be fenced, the customer shall provide a means for direct access by LU personnel, (i.e., easily opened, unobstructed gate).



NOTES:

1. If a preferred location is not practicable, consult LU in regard to an alternate location.

2. ***All service locations are subject to LU approval.*** Installation of additional facilities at the customer's expense or future relocation at his expense may be prevented by early consultation of LU.

3. For heavy snow areas, see sheet 7.2.9 and 7.2.10, of this standard.

4. A **36"x 36"x 78"** working space in front of all meters is required to permit installation and provide a safe working environment for LU personnel. ***Very limited exceptions from this requirement must be approved by LU.***

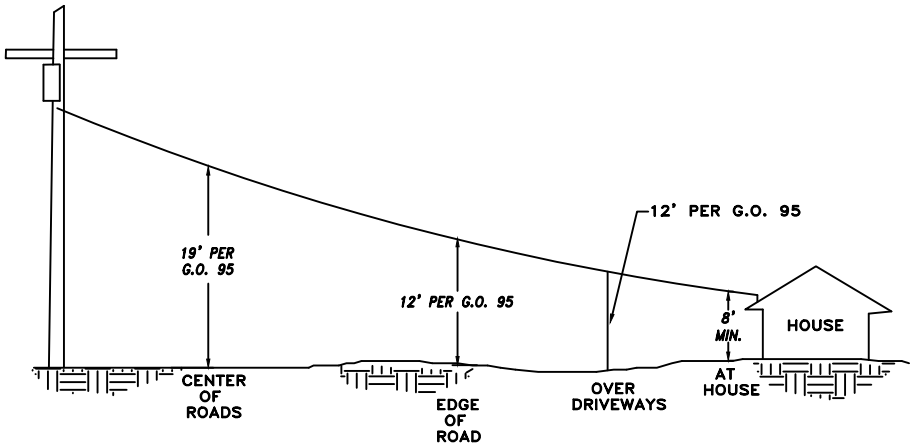
5. The customer for architectural reasons may conceal or recess the service entrance and meter in through the outside wall where permitted by local codes. For detailed clearance requirements, see Section 5.2 of GM0001M, Electric Metering General, Substructures Vol., Section 8.

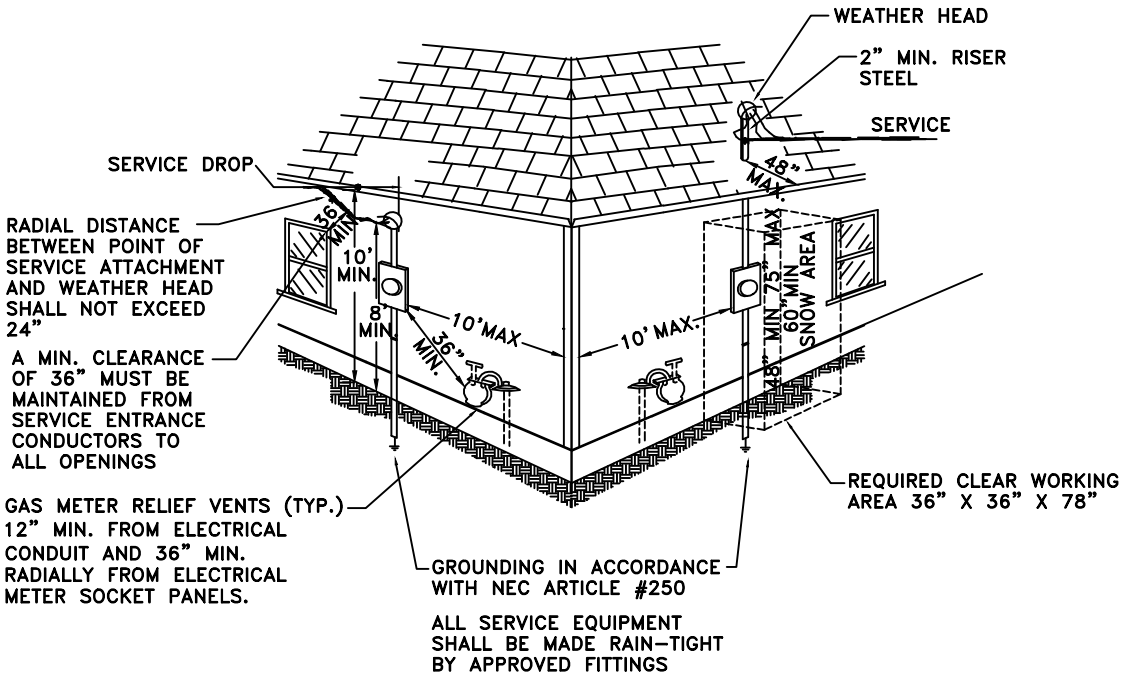
6. For detailed service equipment requirements, see RM0001M, Electric Metering Residential, substructure, Section 8.

7.0 CLEARANCES

The minimum acceptable clearances for overhead service drops are outlined in G.O. 95 and CALTRANS requirements. Upon request, your LU representative will specify a point of attachment which will provide the required clearance of the service wires above thoroughfares and structures and from windows, doors, and exits of buildings.

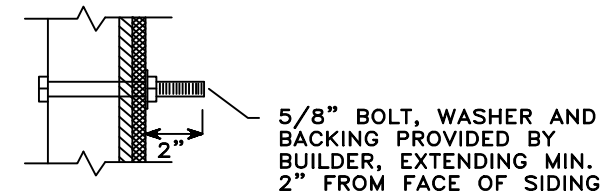
8.0 SERVICE ATTACHMENTS AND WEATHER HEADS



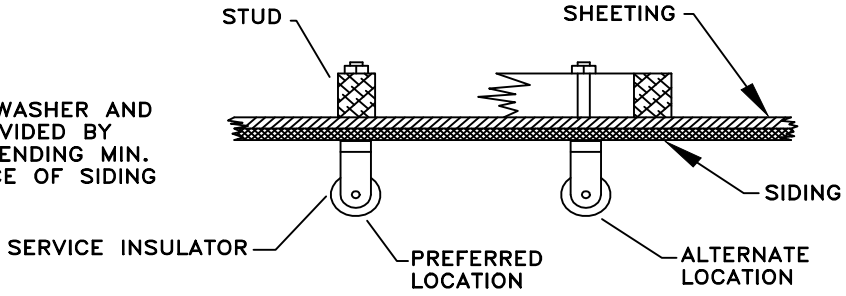


BUILDING CLEARANCES
SERVICE DETAILS

Two types of service attachments are used by LU, service insulators attached to the building and periscopes which extend above the roof. Typical methods of attaching residential overhead service are illustrated in this section. Where the building is high enough to permit proper clearance, the service insulator can be located on roof rafters or wall studs. Customer will provide backing for the service insulator (min. 2" x 4"), securely anchored to building frame. Service insulator will not be attached to roof fascia or wall sheeting unless proper backing is provided. **Customer to provide and install the service insulator and attachments**. ***Screw type insulators are not approved***.



SIDE VIEW



TOP VIEW

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ENGINEERING & CONSTRUCTION STANDARD

OVERHEAD ELECTRIC RESIDENTIAL SERVICE

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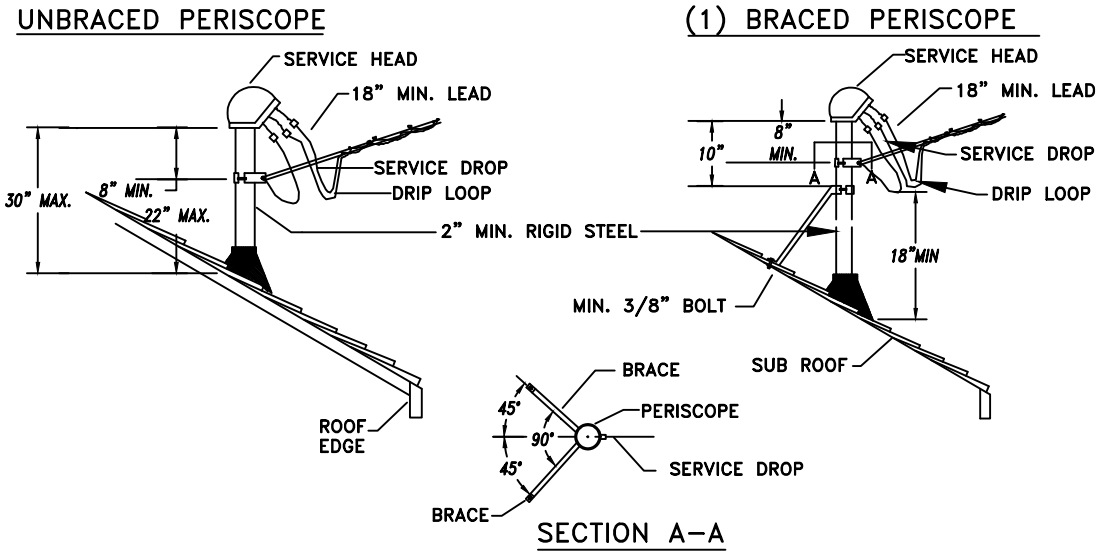
SUBSTRUCTURE

DRAWING NUMBER

OS0001M

A periscope should be used when proper clearances cannot be maintained with service knob attachment. **Periscope to be minimum 2" rigid steel securely fastened to building stud**. Periscope to extend minimum of 26" above roof.



1. *Periscope to be installed per GO 95 Sec V 54.8* Periscope structures projecting over 30" above the roof (for snow loading areas, see Sheet 7.2.9) must be braced against the normal pull of the service drop conductors (see Section 4.0). Bracing will also be required for larger conductors or longer spans. Bracing, when required, shall consist of two galvanized steel members installed at approximately 90° spread. Minimum size brace shall be 1¼" x 1¼" x 1/8" galvanized steel angle. Periscope bracing shall be anchored through sub-roof with minimum 3/8" galvanized carriage bolts.
2. **Riser conduit will not have couplings above the roof.**
3. Service weather heads shall **not** be located on the exterior face of any wall which is less than 2' from any common property line. Point of attachment of service drop must be high enough to meet required clearance. (Sheet 7.2.6, Section 7.0 - Clearances for details).
4. Alternate service attachment points must not be more than 24" from weather head.
5. Service conductors **must extend a minimum of 18"** from weather head to provide for the make-up of the required drip loop.
6. **The conductor service insulator and attachment will be provided and installed by the customer.** ***Screw type insulators are not approved.***

9.0 SPECIAL SERVICE REQUIREMENTS FOR HEAVY SNOW LOADING AREAS

In areas of heavy snow loading the customer shall locate the service entrance in such a manner so that storm damage will be kept to a minimum. Heavy snow areas are defined in general as areas above 6,000 feet elevation. Check with local LU office for snow loading requirements.

a. ***Span length of service drop to be a maximum of 75 feet (#2 triplex). Larger conductor will require shorter length.***

b. Weatherhead should be located on the garage side of the structure and as high as practical to keep clear of snow.

c. Service drop will be attached at house gable (preferred location) to protect services from snow sliding off the roof.

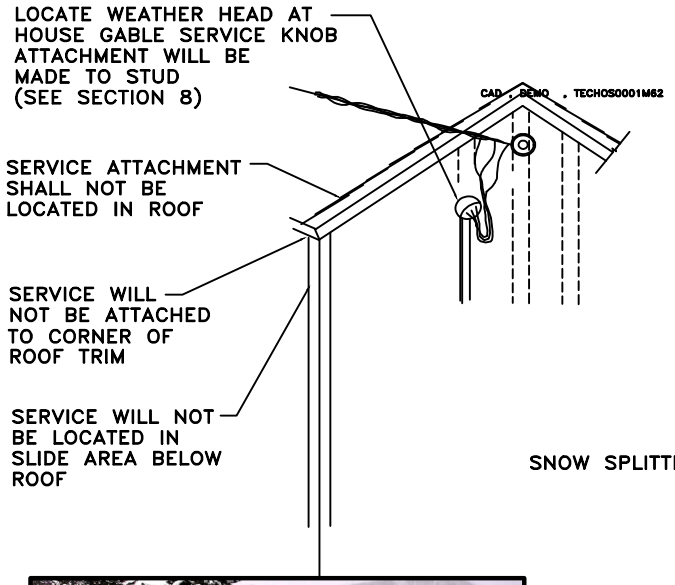
d. Meter equipment is to be located on gable side of house within 3' of a snow/ plowed area.

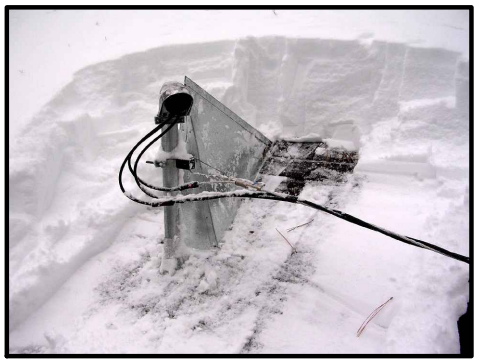
e. *Periscope service entrance per NEC, Article #230 and must be approved by LU prior to installation.*

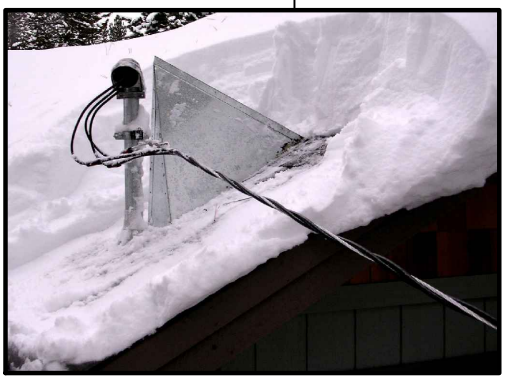
f. Snow splitters are required to be provided and installed by the customer (roofing contractor). Snow splitters must protect the periscope, weather head and any associated bracing. Snow splitters may be purchased though a local sheet metal shop. Please provide the shop with the slope of your roof and the information included under note 1 of the next page. See details next page.

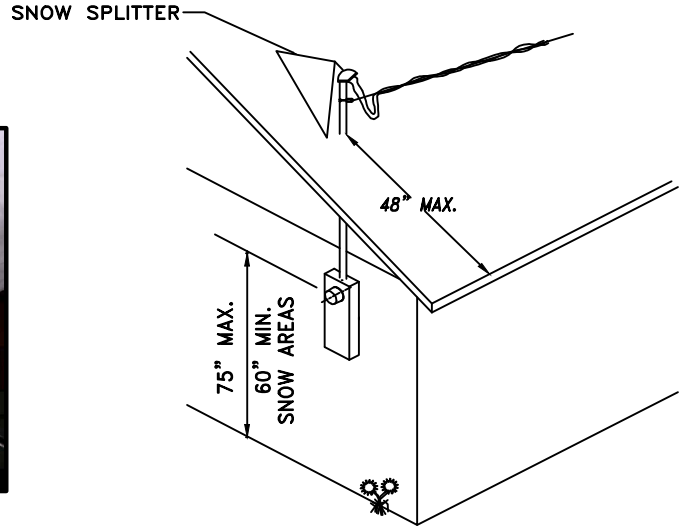
g. New services will ***NOT*** be attached to trees.

h. Screw-type insulators will **not** be allowed for new services. All new services attached to the house will be a 40-S insulator bolted to a reinforced location as determined by LU, see Section 8.0.









NOTES:

1. Snow splitters must completely cover the periscope and bracing to protect it.
   1) Minimum 10" wide at the base.
   2) Minimum 20 gauge sheet metal.
   3) 4" flange, rolled edge, for roof attachment without shingles.
   4) ¾- 1" flange for roof attachment with shingles.
   5) 4" max. on center attachment points along flange for roof attachment.
   6) Height to match height of weather head.

2. Periscope to be installed per *GO 95 Sec V 54.8*. If periscope extends over 30" (less than 30" is preferred) above roof, a minimum 2" galvanized steel riser pipe, braced with 1½" x 1½" x 3/16" galvanized angle iron, anchored through the sub-roof with 1/2" minimum galvanized bolts is required.

3. **All other requirements of Sections 7.0 and 8.0 are applicable.**

UNDERGROUND ELECTRIC RESIDENTIAL SERVICE

1.0 INDEX

2.0 PURPOSE

The purpose of this standard is to assist the customer and his engineer and/or contractor in planning for an acceptable location and type of termination for underground service from LU's overhead or underground electric distribution system.

3.0 LIMITS

The requirements in this standard are limited to single or multiple dwelling residences with a ***maximum of 1000 Amp, single phase service*** entrances. In areas where LU establishes and maintains an underground distribution system or where required by local ordinances, service laterals will be underground only. If the length of service is such that it would prove electrically prohibitive, a transformer may be required on the customer's property; in which case, LU's underground line extension rules will be applied.

4.0 CUSTOMER'S RESPONSIBILITY

See NEC, Article 700, LU Standard, RM0001M, Metering Section and LU Standard ENG04U, Underground Vol, for generator transfer switch requirements.

The customer is required to provide and maintain or to make arrangements and pay for the trench excavation, backfill, conduits with pull lines and any required substructures (pull boxes or vaults) and transformer pads on his property in accordance with LU specifications. See notes in Section 7.0, 9.0 & 10.0.

Prior to backfilling trench, LU must inspect service conduit in the trench to confirm installation and backfill material. Please contact local LU office to schedule inspection. The customer will provide all easements and right of ways to install LU facilities. It is the customer's responsibility to install service equipment with proper grounding in accordance with provisions of the GO 95/128 Codes.

5.0 LU RESPONSIBILITY

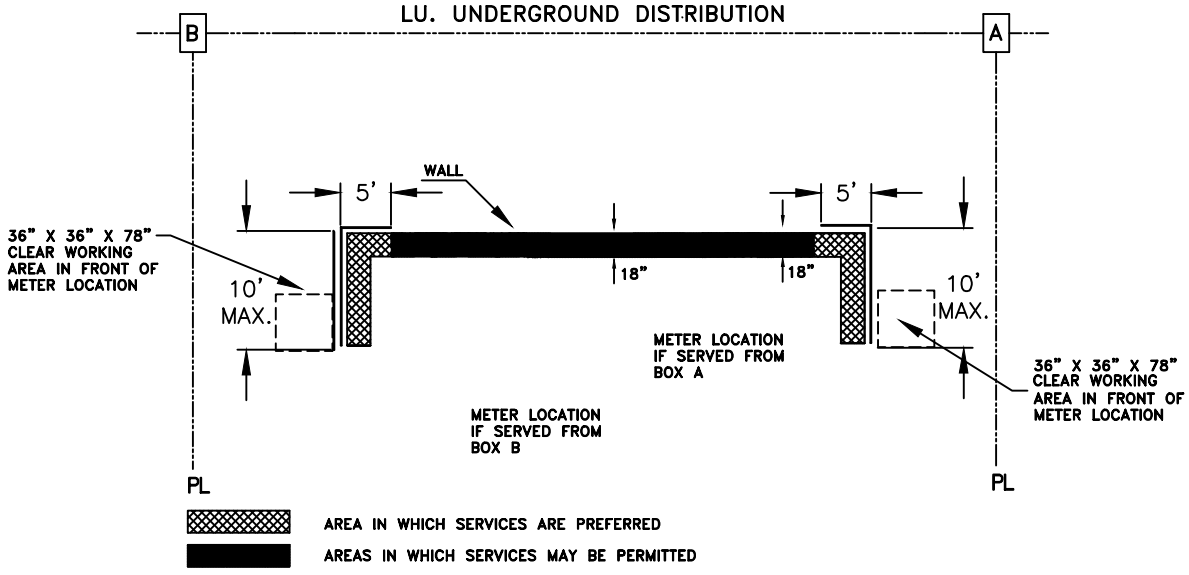
LU will furnish (subject to the provisions of Rule 15), install, and maintain all cables from LU's service connection point, (last box, pole or transformer), to the customer's service termination point.

6.0 LOCATION OF TERMINATION FACILITIES

NOTE: ***All service locations must be approved by LU***. Installation of additional facilities or future relocation at the customer's expense may be prevented by early consultation with LU.

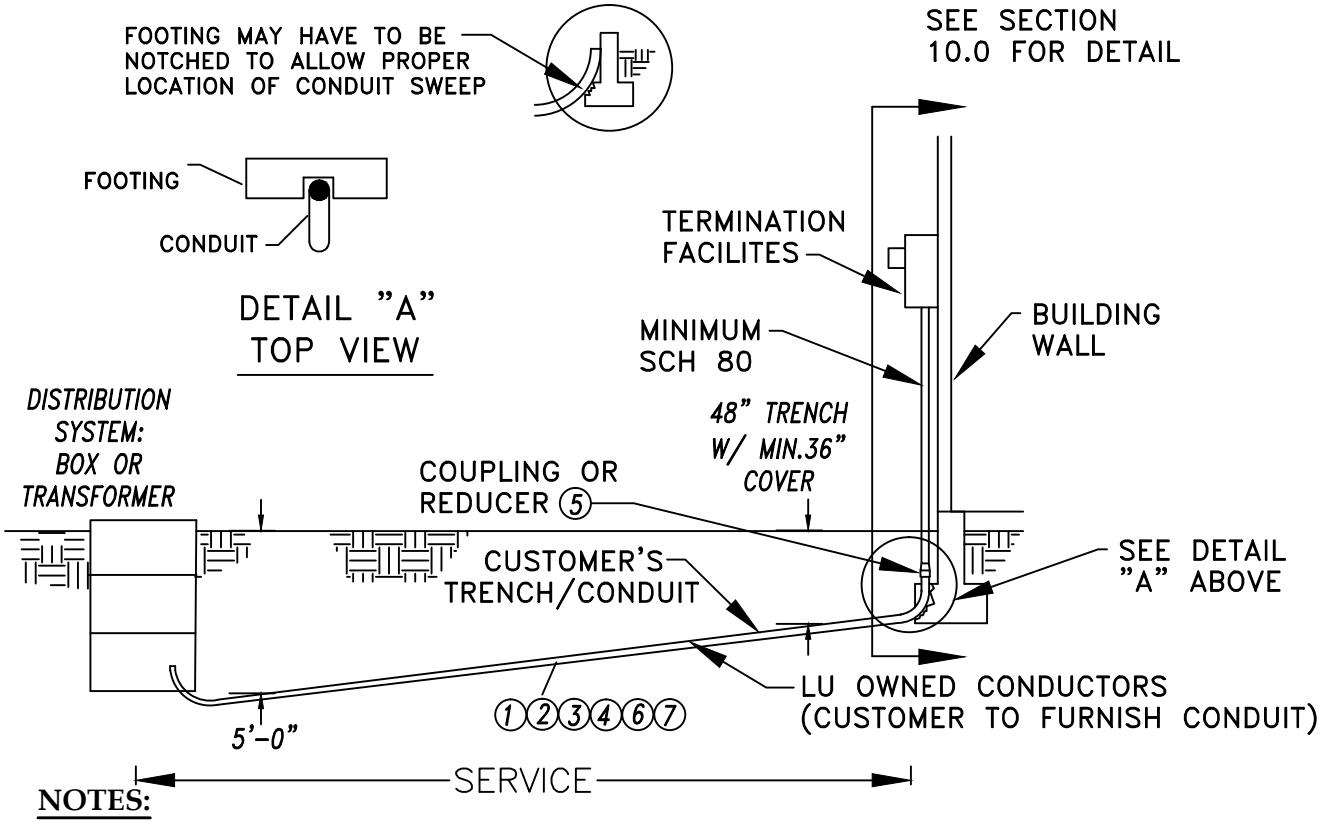
The customer shall provide service termination or meter facilities within the first 10' of structure. The service location must not be fenced or otherwise obscured from view of meter readers or the access of operations personnel. Where LU allows the meter facilities to be fenced, the customer shall provide a means for direct access by LU personnel (i.e., easily opened, unobstructed gate).

The customer for architectural reasons may conceal or recess the service entrance and meter panel where permitted by local codes. For detailed clearance requirements, see Section 5.2 of GM0001M, Electric Metering, General, substructure, Section 8.



7.0 UNDERGROUND SERVICES FROM UNDERGROUND DISTRIBUTION SYSTEM

The customer will be served with an underground service if his site or lot is located within an area that is supplied with existing underground distribution system or if required by local ordinances.



NOTES:

1. Minimum conduit size shall be:

Panel Size	Length of Service	Conduit Size	Wire Size
100 amp	All	3"	#2 Tx.
200 amp	Under 75'	3"	2/0 Tx.
200 amp	Over 75'	3"	4/0 Tx.
400 amp	All	3"	350 Tx.
600 amp	All	4"	750 Tx
800 amp	All	2-3"	2-350 Tx

* Note: Minimum conduit sizing requirements vary within LU's service territory, depending on local requirements and normal construction practices. The customer should consult with the local LU representative to confirm the required service conduit size **prior** to commencing construction. For additional conduit sizing details, refer to CB0003U, 600V underground cable and conduit selection guide,Substructure, section 4.

2. **A maximum of 270° of accumulated bends is allowed.** Pull boxes will be required if more bends are necessary.

3. Underground conduit must be rigid steel, or electrical, gray, PVC (minimum ANSI/ASTM F512, DB-120). ***DB-120 conduit can not be exposed***. For more detail, see CD0004U, Conduit Application Standard, substructure, Section 4.

4. Minimum 36" radius sweep for 3" conduits. **Sweep material to match first section of riser material.** Example: PVC to PVC, steel to steel.

5 Reducers, when needed, shall be a tapered, smooth wall design to facilitate cable pulling and must be located below grade, at the ***top*** of the elbow below the customer's service termination equipment.

6. For services over 100' in length, additional pull boxes may be required. Contact local LU office for acceptable layout.

7. A 1/4" polyester, pull line with sequential footage markings and minimum breaking strength of 400 pounds to be installed in each conduit by customer at time of conduit installation.

8. Pull line shall extend 3 feet from the conduit end at the service panel, and 5 feet from the conduit at the secondary service box.

9. A ***36"x 36"x 78"*** *working space* in front of all meters is required to permit installation and provide a safe working environment for LU personnel. ***Very limited exceptions from this requirement must be approved by LU.***

8.0 UNDERGROUND SERVICE FROM OVERHEAD DISTRIBUTION SYSTEM

If the customer is located in an area served by an overhead system and prefers to have the service installed underground, or if the local ordinance requires underground service, the service may be provided by means of a riser installed on an existing pole. Customer shall contact local LU office for trench and riser requirements regarding location on pole.

NOTES: ***(Customer to provide and install)***

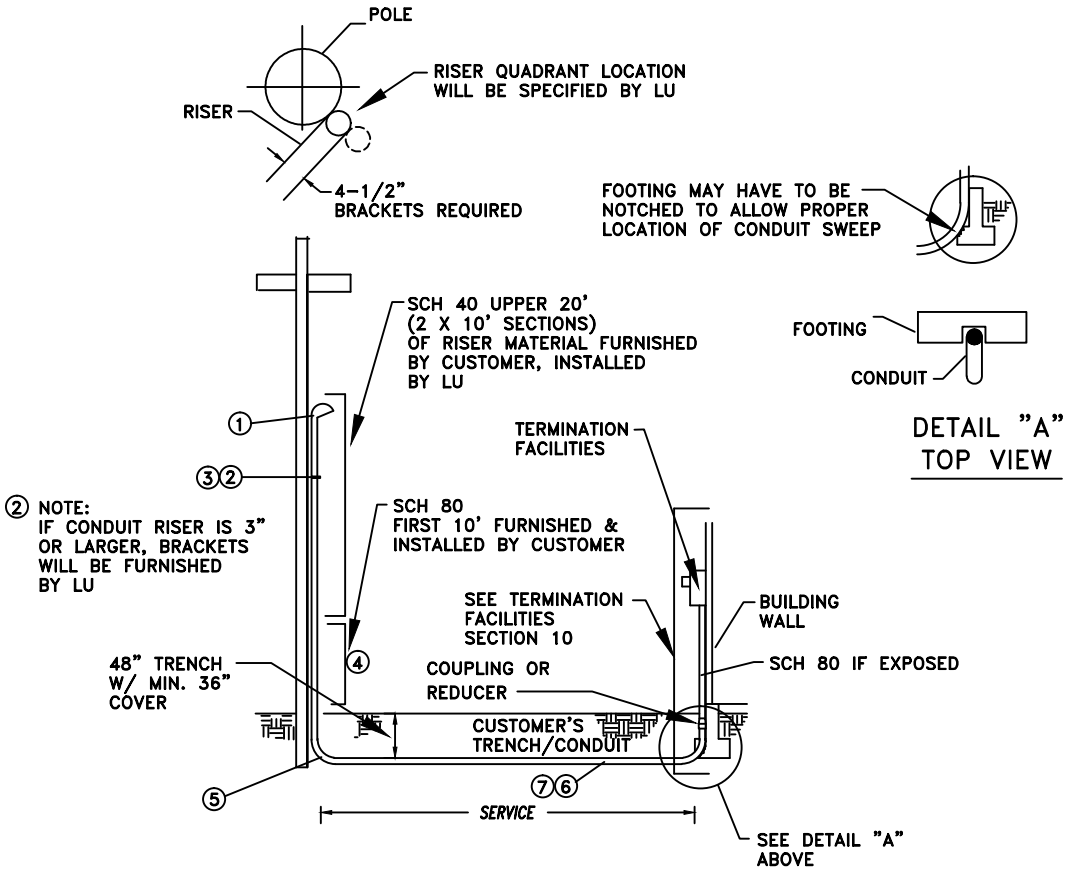
1. Weatherhead.
2. Steel not allowed in upper section.
3. Minimum Schedule 40 PVC electrical, gray, conduit. Straps, every 30". If conduit riser is 3" or larger, *standoff brackets will be provided and installed by LU.*

4 . Rigid steel, or Schedule 80 PVC electrical , gray, conduit for the first 10' above ground.

5. Minimum 36" radius sweep for 3" conduits. **Sweep material to match first section of riser material**. Example: PVC to PVC, steel to steel.

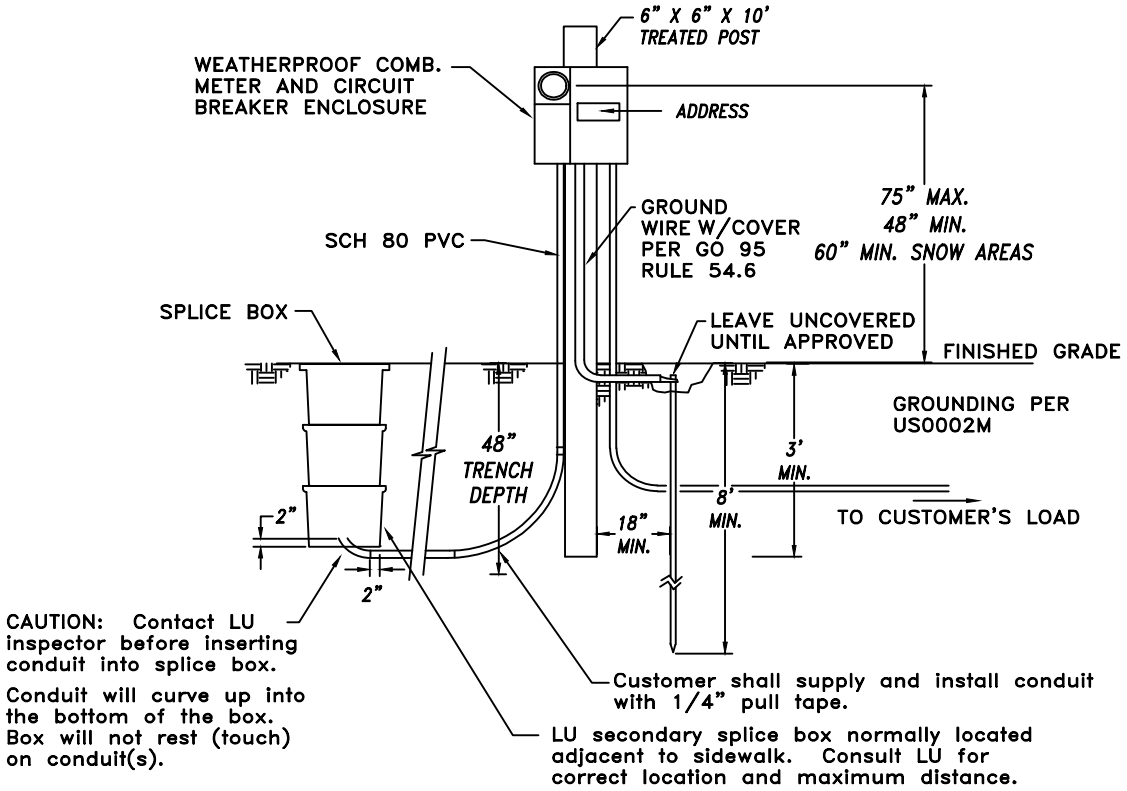
6. Minimum ANSI/ASTM F512, DB-120 electrical, gray, w/ a 1/4" polyester, pull line with sequential footage markings and minimum breaking strength of 400 pounds to be installed by customer . ***DB-120 conduit can not be exposed.***

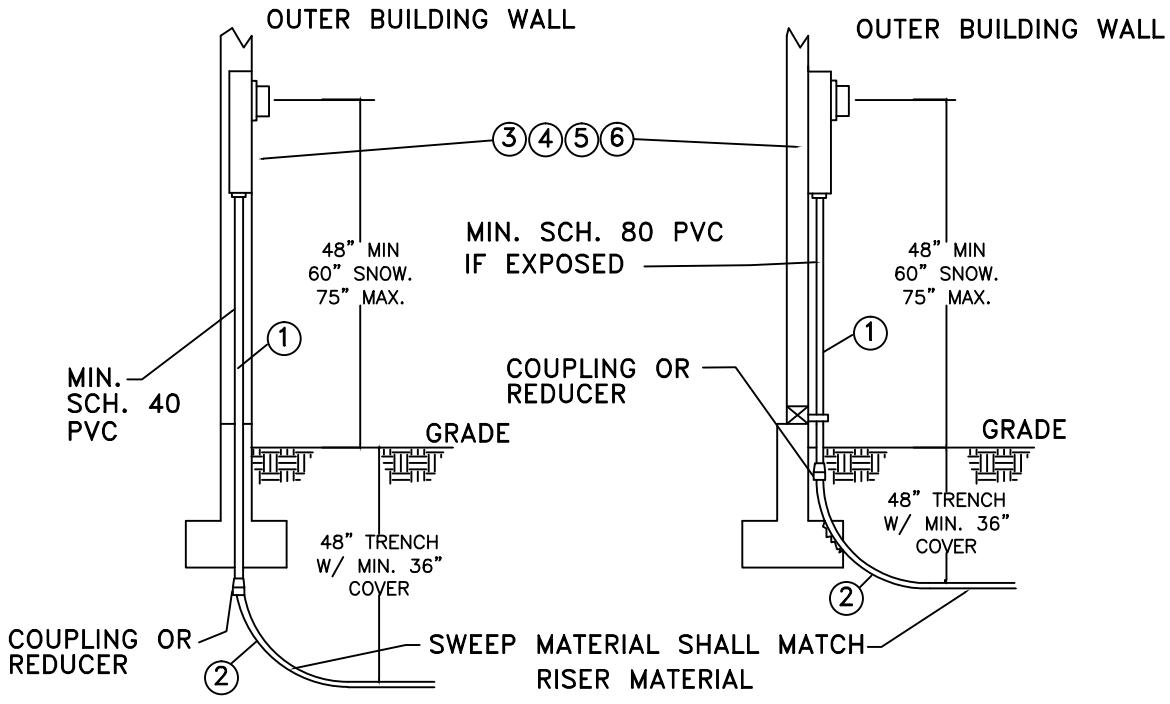
7. If service is over 75' in length from base of pole, an N-36 box (see VB0052U) may be required at/near the base of pole.



9.0 PERMANENT U/G SERVICE ON A WOOD POST

An approved manufactured steel pedestal is the preferred construction but a terminating facility of 200 amps (maximum) single phase self-contained meter/service panel **attached to a 6" x 6" x 10' full length 'pressure treated' wood or redwood post is acceptable. Posts/pedestals shall be located out of the way of vehicular traffic. See the detailed drawing on the next sheet.**





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ENGINEERING & CONSTRUCTION STANDARD

UNDERGROUND ELECTRIC RESIDENTIAL SERVICE

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SUBSTRUCTURE

DRAWING NUMBER
US0001M

10.0 TERMINATION FACILITIES

For detailed meter equipment dimensions & requirements, see RM0001M, substructure, section 8, electric metering residential.

NOTES: *(Customer to provide and install)*

1. Conduit riser shall be minimum Schedule 40 PVC electrical, gray, conduit if recessed or minimum Schedule 80 PVC electrical, gray, conduit if exposed. For further details see CD0004U, Conduit Application Guide.
2. Minimum 36" radius sweep for 3" conduits. Sweep material to match first section of riser material. Example: PVC to PVC, steel to steel.
3. The socket and enclosure of termination point shall be specially designed to receive service cable from underground source. ***Combination designed service panels are acceptable as long as they meet LU requirements for under ground feed.***
4. Termination enclosure (pull section) to include termination lugs located below meter socket.
5. A working space (36" x 36" x 78" high) in front of all meters is required to permit metering installation and provide a safe working environment for personnel.
6. The meter location will have an assigned address.

11.0 TRENCHING

See TE0003U, substructure, section 3, and your LU representative for more detailed information.

OVERHEAD ELECTRIC CUSTOMER OWNED SERVICE POLE

1.0 INDEX

2.0 PURPOSE

This standard outlines the minimum requirements for installation of an overhead electric service to a customer owned service pole having a 100 Amp, 200 Amp or 400 Amp single phase service entrance. These requirements have been established in the interest of safety to the public and the workmen, and are applicable to all customer owned service poles. LU cannot establish service to poles which do not meet these requirements. ***The maintenance of the customer owned service pole is the sole responsibility of the customer.***

3.0 LIMITS

Overhead service is limited to areas served by an overhead electric distribution system and where not required by local ordinance to have underground services.

4.0 CUSTOMER RESPONSIBILITY

The customer shall furnish, install and maintain at his expense, the pole, service entrance conductors, service attachment devices/insulators, service riser conduit and weather head, service

equipment, grounding and guying if required, and all other material required beyond LU's service drop, in accordance with applicable Local, State and National codes. The pole shall be of sufficient height and construction to provide the minimum clearances.

5.0 LU RESPONSIBILITY

LU will furnish, install and maintain, upon completion and final approval inspection of the customer pole, the service drop conductor, cable connectors for service entrance conductors and the meter.

6.0 PERMANENT SERVICE POLE

A service pole will be considered to be permanent when the installation is expected to remain for a period longer than one year. Permanent wood poles shall be furnished and installed by the customer. **LU will, as a last resort and at *customer's expense*, set the pole, exclusive of wiring and service entrance equipment, if customer is unable to have the pole set by a private contractor.** Poles may be rectangular or circular in cross section and shall be solid (not laminated). Rectangular poles shall be a minimum cross section of 6" x 6" nominal. Circular poles shall have a minimum top circumference of 16". The minimum acceptable length shall be 20' and must be set a minimum of 4' in the ground. A longer pole may be required to obtain the required clearances. Untreated redwood, butt-treated cedar and full treated Douglas Fir are acceptable. Clearances are based on conductor temperature at 60°F (15°C), no wind, with final unloaded sag in wire or conductor.

7.0 LOCATION

The pole shall be placed in such a location that the **service drop will not** cross-over portions of adjacent property, buildings or trailers on customer's premises unless a clearance of 8' minimum can be maintained over said building or trailer. The service pole shall be a minimum of 10' from LU's pole and a maximum of 100' (75' max. in heavy snow areas, with conductors larger than #2 STR triplex requiring shorter lengths).

8.0 SERVICE DROP CLEARANCES

Service drop shall maintain minimum clearance set by GO-95 and/or any State, Local. Refer to LU Standard CLE01T, Volume 3, for detailed information:

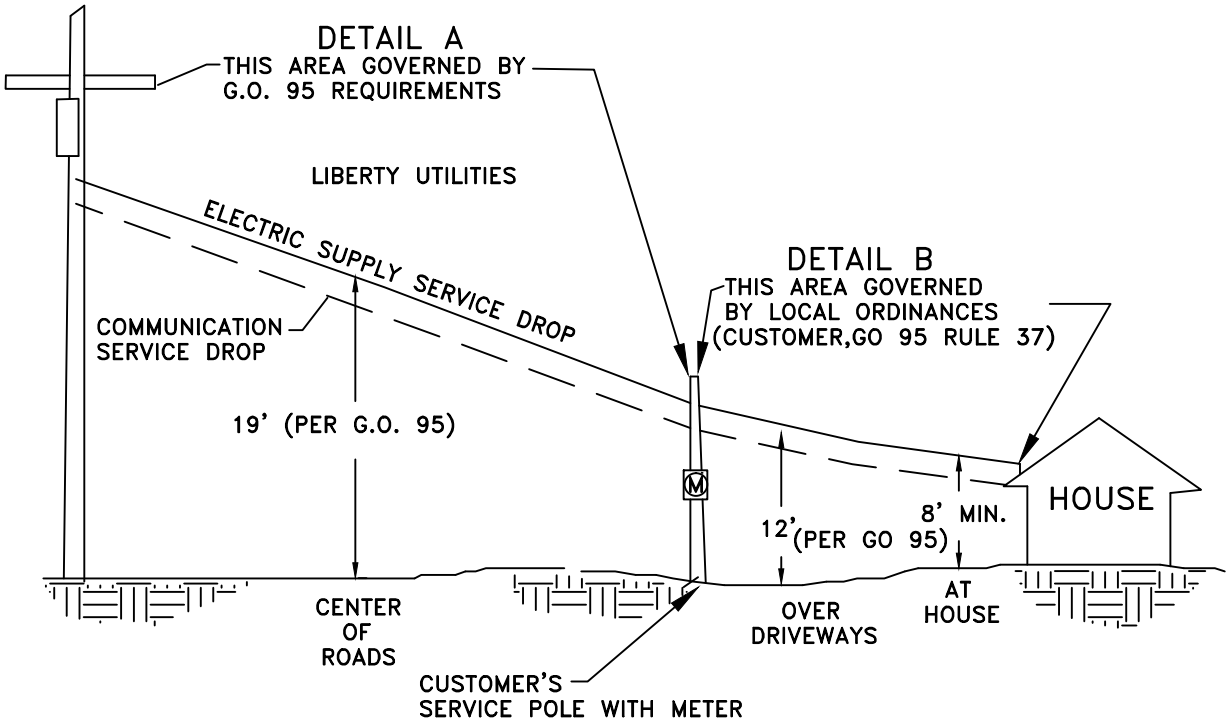
A. 18' minimum over center of streets in California per GO-95.
See detail A

B. 15' minimum over residential property and driveways, and those commercial areas not subject to truck traffic where the voltage is limited to 300 volts to ground.

18' minimum over public streets, alleys, roads, parking areas subject to truck traffic, driveways on other than residential property, and other land traversed by vehicles such as cultivated, grazing, forest and orchard

C. For crossing over other utilities, contact local LU office for minimum clearances.

NOTE: Elevation at point of attachment shall be such that all required vertical clearances can be maintained with allowance for normal conductor sag.



9.0 SERVICE ENTRANCE CONDUCTORS

The service entrance conductors shall be continuous, without splices, and shall be of a size and type to provide not less than the minimum standard as specified in Local, State and National codes. The neutral conductor must be insulated and securely connected to the neutral terminal of the meter socket and must be continuous from the weather head to the service entrance switch. Service entrance conductors must extend a minimum of 18" from the service head to provide for the make-up of the required drip loop.

10.0 RISER CONDUIT

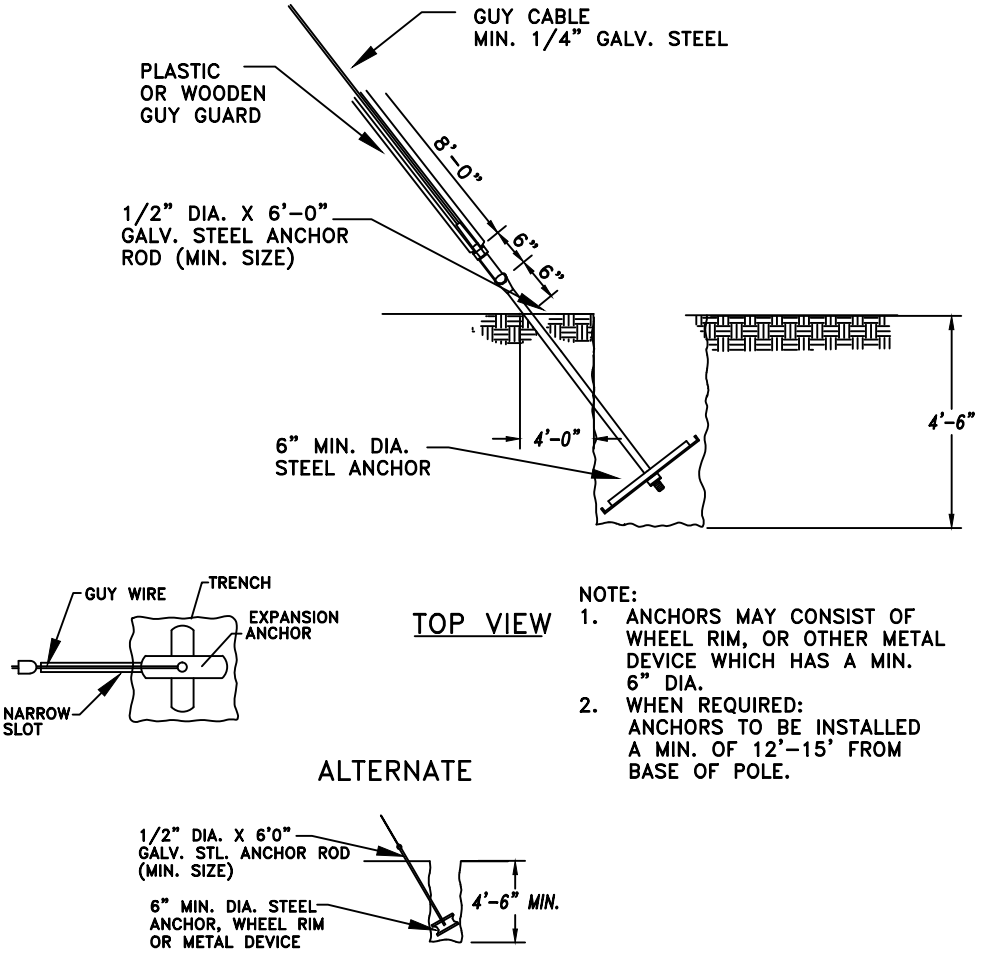
Preferred secondary riser conduit is to be "non-conductive" PVC, sch. 40, material and will be sized per GO 95.

11.0 SERVICE ENTRANCE SWITCH

All equipment must comply with Local, State and GO 95.

12.0 GUYING

Where service drops cross a road or for spans of 75' or greater, or for service conductors larger than #2 str. al. triplex, the customer's pole shall be guyed against the pull of the service drop. When exposed to traffic, guys shall have a substantial wood, metal or suitable plastic guard, not less than 8 ft. in length, securely attached to the guy cable.

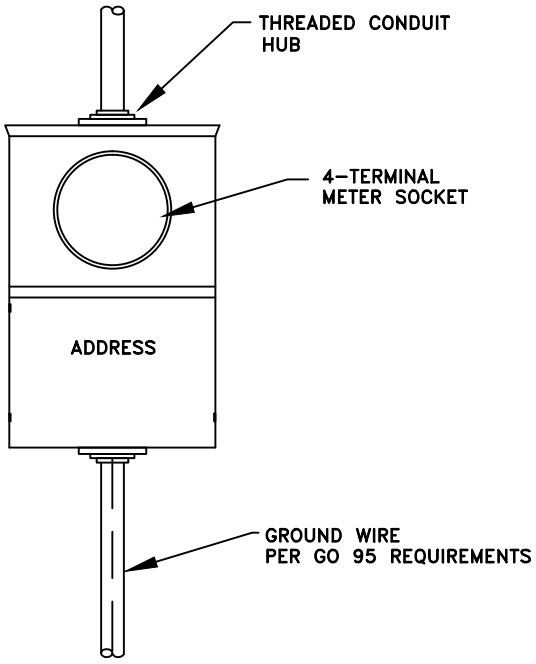


13.0 METERING

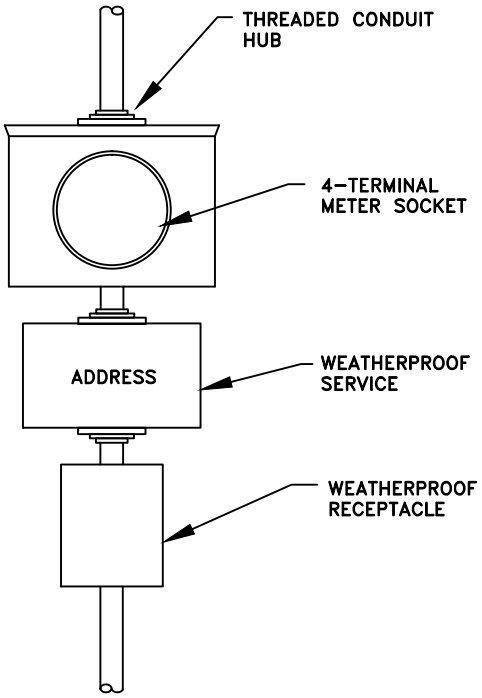
The customer shall furnish, install and wire the meter socket. ***The meter socket shall face the street or point of access***. See GM0001M, Electric Metering, General, (Metering Section), Section 5.3 for label requirements.

NOTE:ALL WIRING/MATERIAL ON LOAD (CUSTOMER'S) SIDE OF METER SOCKET MUST BE IN ACCORDANCE WITH ALL LOCAL, STATE AND GO 95.

120/240V 3–WIRE WITH WATT HOUR METER, SERVICE SWITCH AND RECEPTACLE IN WEATHERPROOF CABINET.



120/240V 3–WIRE WITH WEATHERPROOF SERVICE SWITCH AND RECEPTACLES.



The meter location will have an assigned address.

14.0 GROUNDING

Ground all the exposed "non-current" carrying metal parts per GO 95 RULE 54.6 requirements or other Local and State Codes.

15.0 MATERIALS

Material Furnished By Customer:

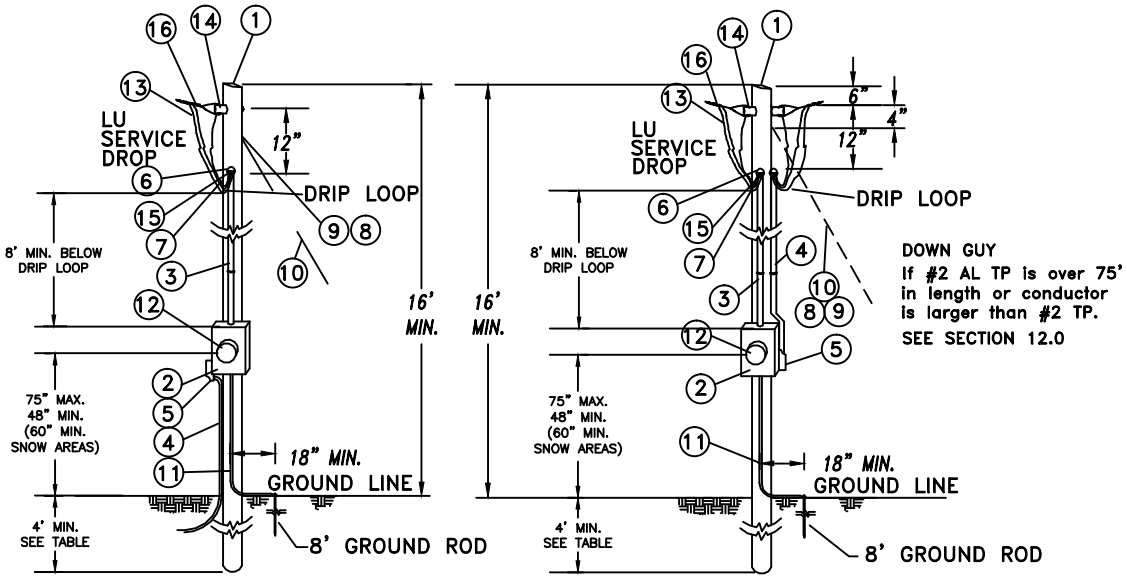
1. Wood pole, length as required.
2. Meter socket, main service switch.
3. Conduit, Sch.40 PVC min.
4. Conduit, Customer (load) side, Sch. 40 PVC min. **Steel not allowed.**
5. Conduit fittings.
6. Weather Head (service head).
7. Wire, insulated per GO 95 requirements.
8. Eye bolt 5/8" dia. length as required.
9. Washers (2): 5/8", 2-1/4" sq. - for guy.
10. Guy Material: 1/4" Galv. w/ Steel Anchor.
11. Grounding per GO 95.
14. Insulator (bolted clevis, 1-5/8" bolt).

Material Furnished By LU

12. Meter.
13. Service drop wire.
15. Service drop connectors.
16. Source wedge clamp.

POLE LENGTH (FT.)	DEPTH (FT.) IN FIRM SOIL
20*	4
25	4–1/2
30	5
35	5–1/2
40	6
*20' POLE HEIGHT NOT FOR VEHICULAR TRAFFIC USE	

NOTE: PVC REQUIRED TO INSULATE LINEMAN WHILE CLIMBING POLE.



SERVICE DROP CABLE TO UNDERGROUND LINE

SERVICE DROP CABLE TO OVERHEAD LINE

Liberty Utilities	ENGINEERING AND CONSTRUCTION STANDARD	7.4.23 OF 86
	OVERHEAD ELECTRIC CUSTOMER OWNED SERVICE POLE	SUBSTRUCTURE
		DRAWING NUMBER ***CP0001M***

DRAWN	DESIGN	SUPR	DATE	REV
LL	ET	JM	08/17	04

COMMERCIAL - INDUSTRIAL SERVICES

1.0 INDEX

2.0 PURPOSE

The purpose of this standard is to inform customers, engineers, architects and contractors of the requirements for the establishment of overhead or underground electrical service to any new multi-resident, commercial or industrial structure. These requirements have been designed to enable Liberty Utilities (LU) to maintain uniform, safe and reliable service to all customers.

3.0 GENERAL REQUIREMENTS

The type and size of service will depend on customer requirements and available LU facilities. *The available type, fault duty and voltage of service should be determined prior to purchase of any service equipment.* For a service of 201 amperes or greater, the customer shall furnish and install a termination/current transformer cabinet and related equipment as specified in LU Standard CM0001M, Electric Metering—Commercial and Industrial or a service section as specified in Standard SB0001M, Electric Switchboards 0-600 volts.

The service disconnecting means shall have a minimum rating of 100 amperes. An Underwriter's Laboratories Listed or recognized, heavy duty meter socket is required on all services of 200 amperes. ***Meter by-pass facilities are required as shown in CM0001M.***

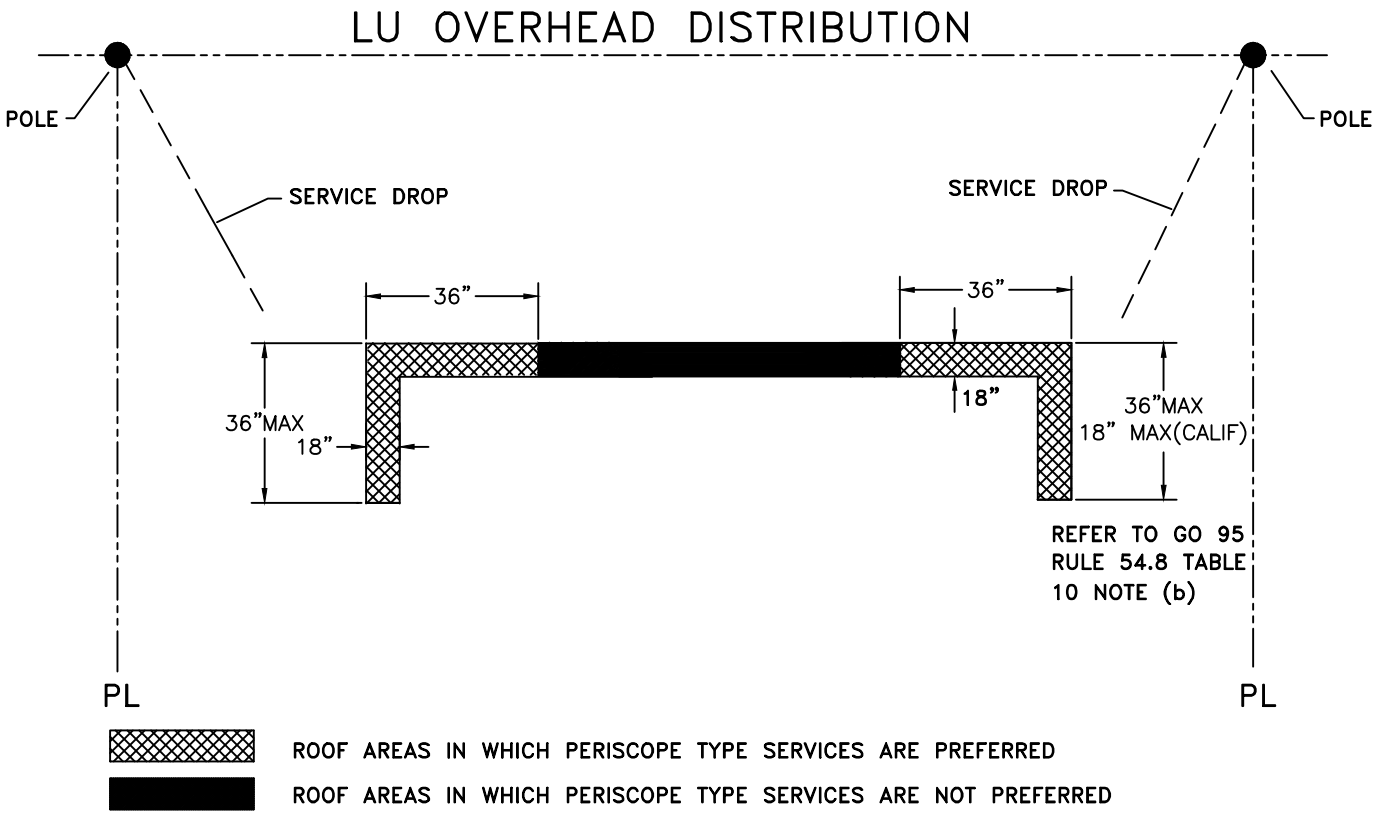
Application for electrical service must be made at the local LU office prior to bid of project, allowing **as much lead time as possible**, so that arrangements can be made for meter locations, load, voltage and fault duty information can be compiled and any necessary line extension contracts

prepared and cash advance made prior to actual construction of any utility facilities. All installations must be in compliance with local codes and ordinances effect for the location of services. LU rules, regulations and specifications will also apply. Customer installations must be approved by the local 'Building Inspector' in all areas, prior to the connection of service or setting of meter(s).

4.0 OVERHEAD SERVICE AND METER LOCATION

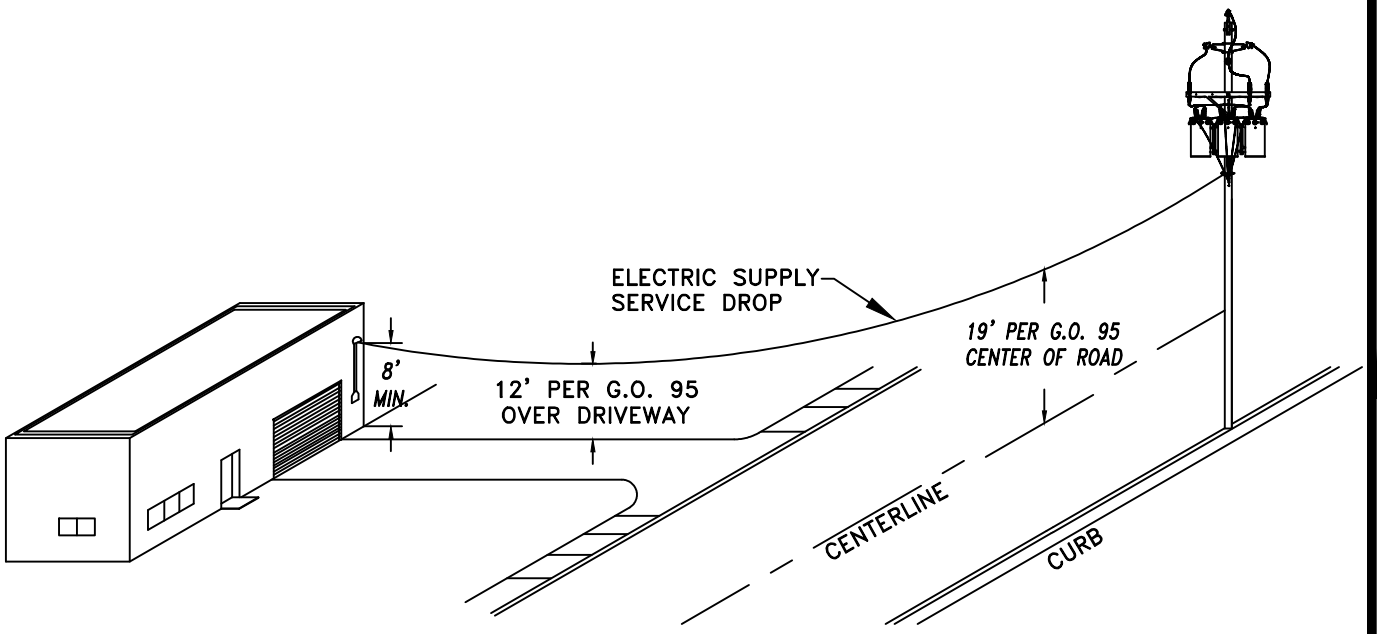
All service drop locations shall be approved by LU prior to construction of the service entrance. The location of the point of attachment of the service drop at the building shall be such that it can be reached with a single span, 100 feet (#2 TX)(75'-2/0 TX) maximum from LU pole with no overhang of adjacent property and with proper clearances maintained. This point of attachment will be on the building wall or a periscope through the roof facing the nearest LU line. When it is impractical to attach service drop below the level of the service head, the termination shall not consist of more than 3 feet of exposed open wire and shall not extend around the corner of the building. A minimum of 18" of service entrance conductor shall be extended out of the service head for the make-up of the required drip loop.

Overhead 3-phase services are limited to 600 amp(208V) and 400 amp(480V) panels with 30' max. of 2 - 4/0 Quadruplex service conductors.



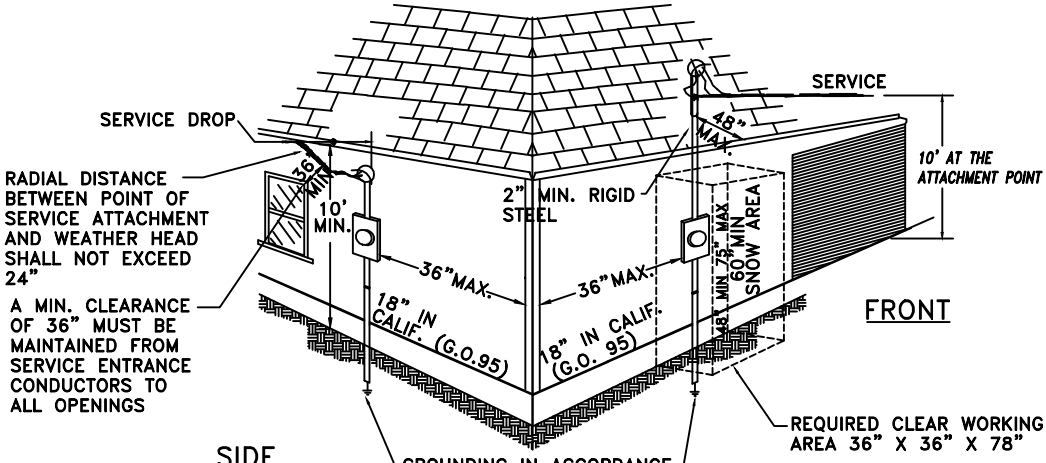
5.0 CLEARANCES

The minimum acceptable clearances for overhead service drops are outlined in GO 95 RULE 37 Table 1. Upon request, your LU representative will specify a point of attachment which will provide the required clearance of the service wires above thoroughfares and structures and windows, doors, and exits of buildings.



SERVICE DETAILS

ELECTRIC METER SOCKETS MUST HAVE A 36" HORIZONTAL MINIMUM CLEARANCE FROM GAS METERS, RELIEF VENTS



DRAWN	DESIGN	SUPR	DATE	REV
LL	ET	JM	08/17	04

Liberty Utilities®

ENGINEERING AND CONSTRUCTION STANDARD

600 AMP 3Ø SWITCH PAD WELL DETAIL

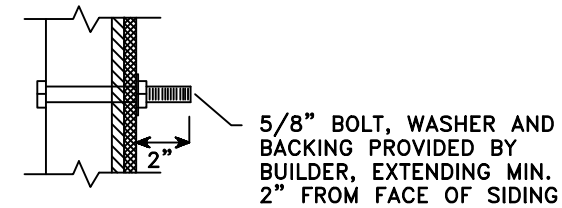
7.5.26 OF 86

SUBSTRUCTURE

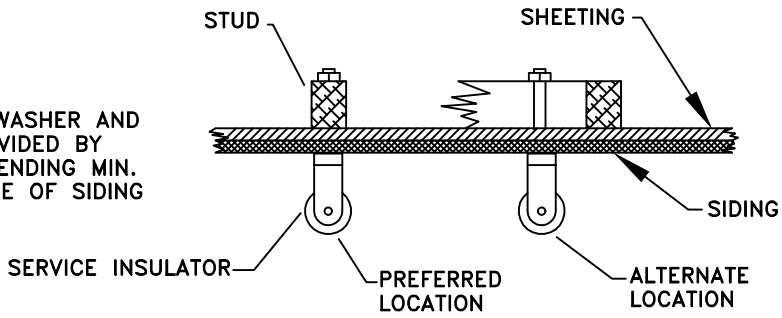
DRAWING NUMBER
CI0001M

6.0 OVERHEAD SERVICE ATTACHMENTS AND SERVICE HEADS

Two types of service attachments are used by LU: service insulators which are attached to the building and periscopes which extend above the roof. Typical methods of attaching low voltage overhead service drops are illustrated in this section. Where the building is high enough to permit proper clearance, the service insulator can be located on roof rafters or wall studs. The customer will provide proper backing for the service insulator (min. 2" x 4"), securely anchored to the building frame. Service insulator will not be attached to roof fascia or wall sheathing, unless proper backing is provided.



SIDE VIEW

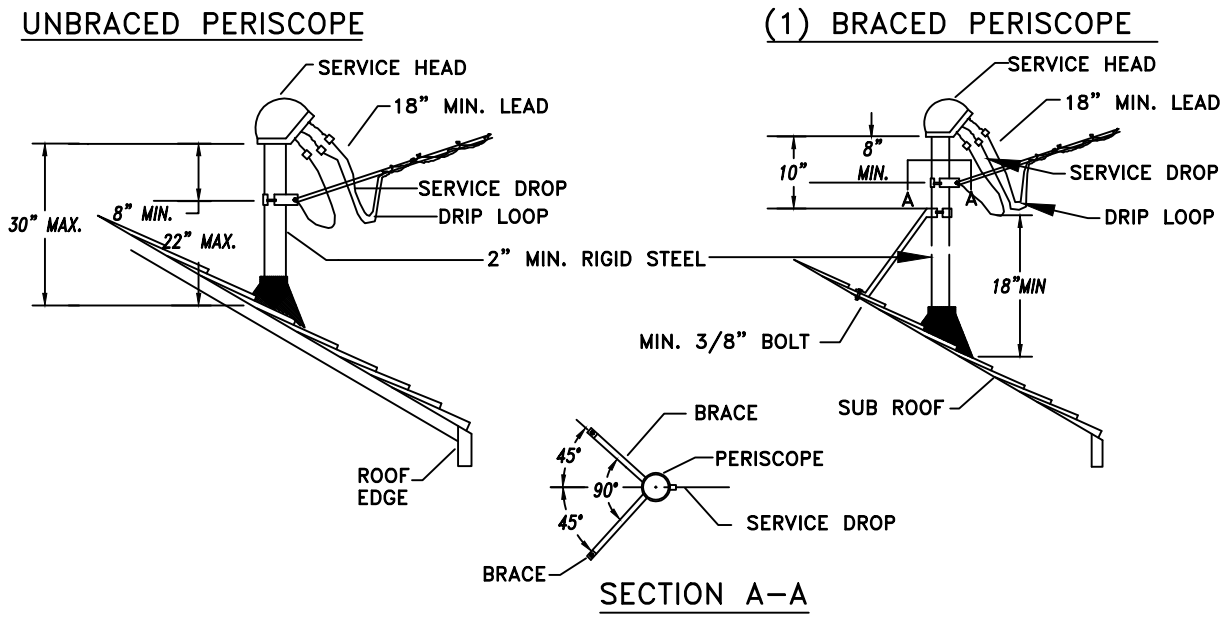


TOP VIEW

NOTES:

1. ***The customer will provide and install the service insulator and attachment.***
2. Service drop shall be attached to the wall facing the nearest LU pole line.
3. ***All service locations are subject to LU approval.*** Installation of additional facilities at the customer's expense or future relocation at his expense may be prevented by early consultation with LU.
4. If a preferred location is not practicable, consult LU in regard to an alternative location.
5. A working space (36" x 36" x 78" high) in front of all meters is required to permit metering installation and provide a safe working environment for LU personnel. Any exception from this requirement must be approved by LU.
6. For service equipment details, see CM0001M, Electric Metering- Commercial and Industrial.

A periscope should be used when proper clearances cannot be maintained with a service insulator attachment. ***Periscope to be minimum 2" rigid steel or IMC securely fastened to building stud.*** Periscope to extend a minimum of 26" above roof.

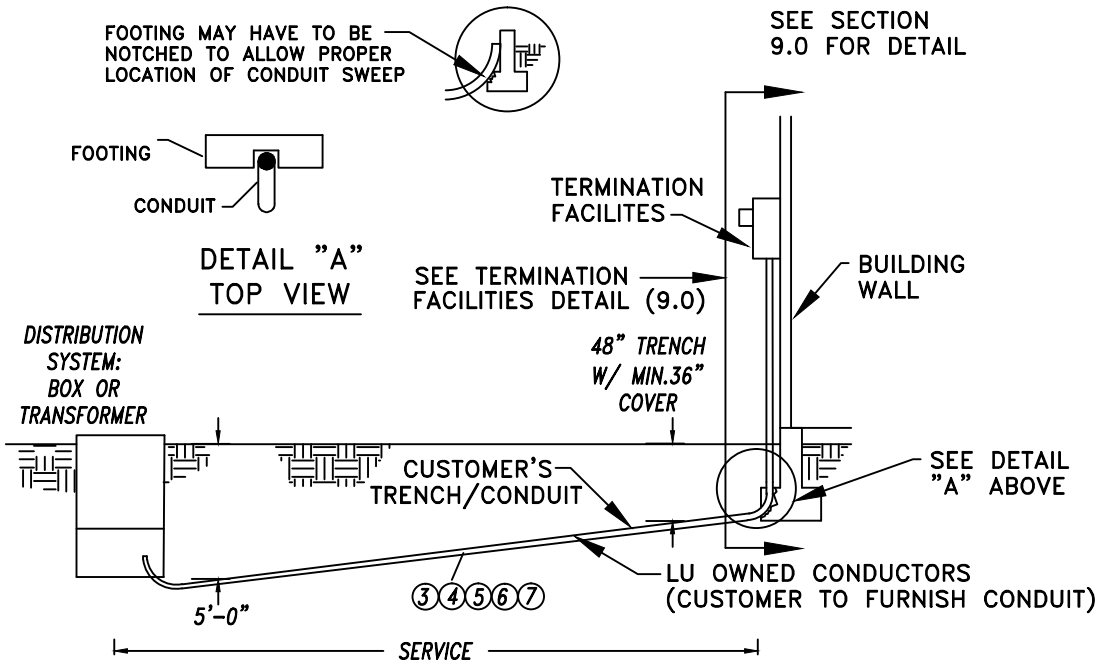


NOTES:

1. Periscope to be installed in accordance with GO 95 RULE 54.8. Periscope structures projecting over 30" above the roof must be braced against the normal pull (see Section 4.0) of the service drop conductors. *Larger conductor or longer spans may also require bracing*. Bracing, when required, shall consist of two galvanized steel members installed at approximately 90° spread. Minimum size brace shall be 1-1/4" x 1-1/4" x 1/8" galvanized steel angle. Periscope bracing shall be anchored through sub-roof with minimum 3/8" galvanized carriage bolts.
2. **Riser conduit couplings not allowed above the roof.**
3. Service weather head shall not be located on the exterior face of any wall which is less than 2 ' from any common property line. Point of attachment of service drop must be high enough to meet required clearance. Section 5.0 - Clearances.
4. Where practical, service drops should be attached below the level of service head. The termination point of service drop conductors should not be located more than 24" from service head.
5. Service conductor should extend minimum 18" from service head for the make-up of the required drip loop.
6. *Customer to provide and install the service insulator and attachment.*

7.0 U/G SERVICES FROM U/G DISTRIBUTION SYSTEM

The customer will be served with an underground service if his site or lot is located within an area that is supplied with existing underground distribution system or if required by local ordinance.

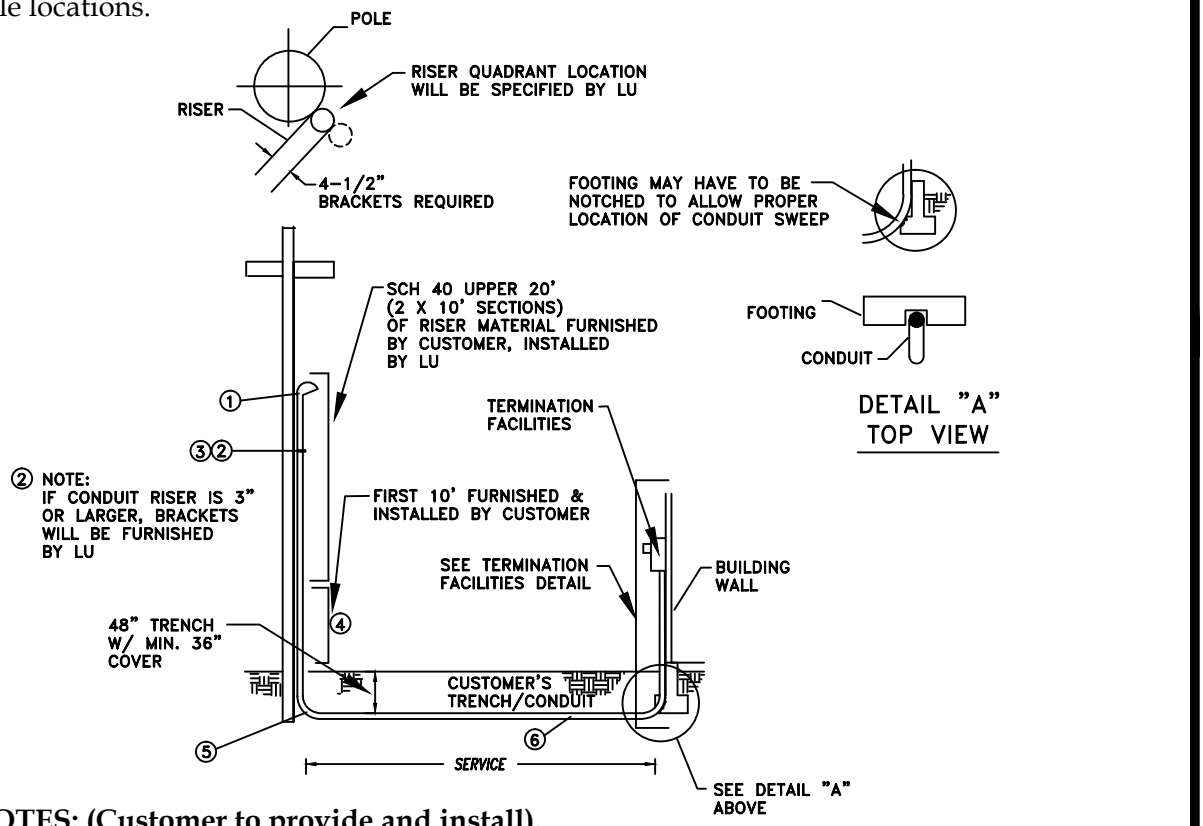


NOTES: ***(Customer to provide and install)***

1. For number/sizing of conduit details, see CB0003U, 600V U/G Cable and Conduit Selection Guide.
2. ***Maximum service distance and conduit bends are to be determined by the local customer service planner or inspecto***r. Generally pull boxes will be required for more than 75' of service or more than 270 degrees of accumulated bends (using five foot sweeps). Contact the local LU office for an acceptable layout.
3. U/G conduit must be electrical, gray, PVC (minimum ANSI/ASTM F512, DB-120). ***DB-120 conduit can not be exposed***. For more detail see CD0004U, Conduit Application Standard.
4. A 1/4" polyester, pull line with sequential footage markings and minimum breaking strength of 400 pounds to be installed in each conduit by customer at time of conduit installation.
5. ***Services should be no longer than 60'*** from transformers or additional conduits/cable runs may be required, see CB0003U.
6. Commercial / Industrial Services greater than 2001 amps will be installed in cable trench, see GI0011U, Cable Trench Installation Guide.

8.0 U/G SERVICE FROM O/H DISTRIBUTION SYSTEM

If the customer is located in an area served by an overhead system and prefers to have the service installed underground, or if the local ordinance requires underground service, the service may be provided by means of a riser installed on an existing pole. This service arrangement is limited to 1-4" riser conduit, (600 amp service max.) consult LU for details. The customer should contact their local LU office for trench and riser pole locations.

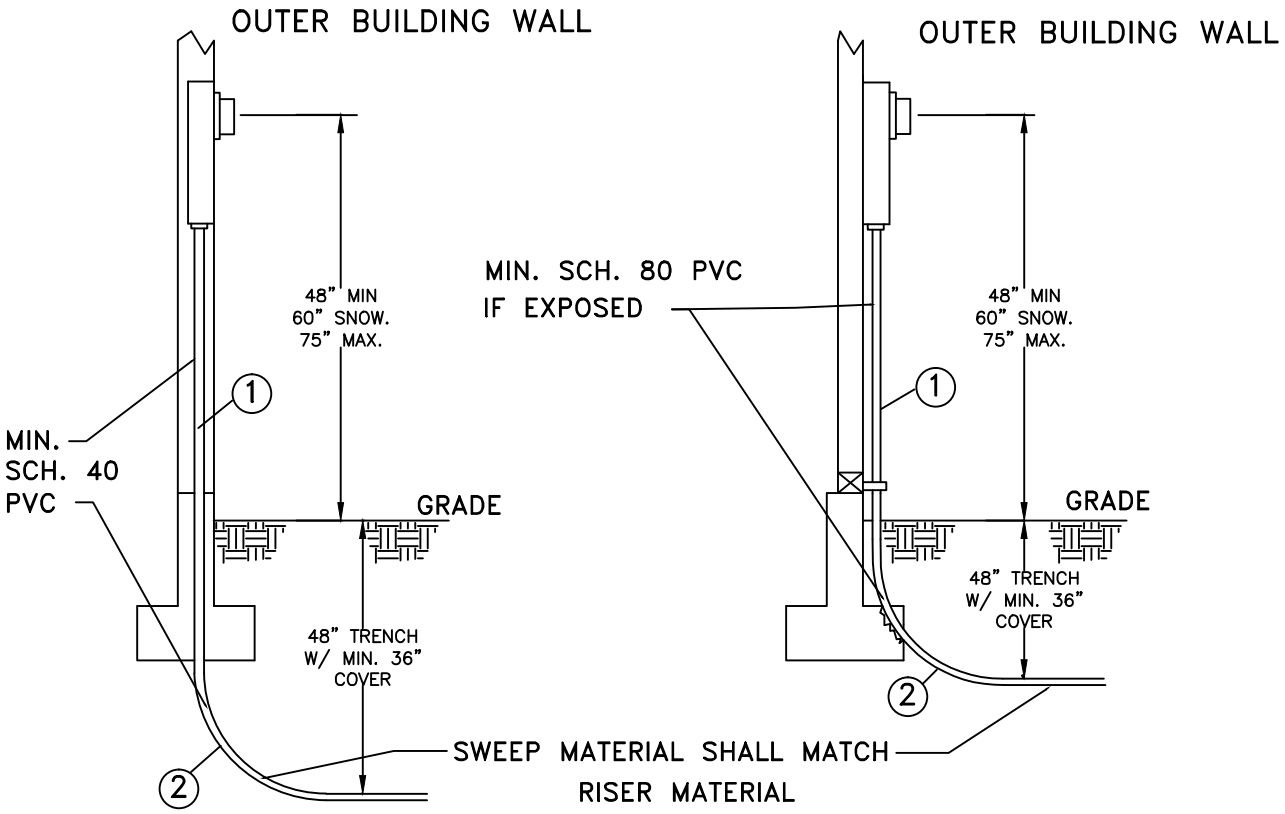


NOTES: (Customer to provide and install).

1. Weatherhead.
2. Steel conduit not allowed in upper section.
3. Minimum Schedule 40 PVC electrical, gray, conduit. Straps every 30". If conduit riser is 3" or larger, *standoff brackets to be provided and installed by LU.*
4. Rigid steel, or Schedule 80 PVC electrical, gray, conduit for first 10' above ground.
5. Minimum 36" radius sweep. **Sweep material to match first section of riser material (pvc to pvc, steel to steel).**
6. Minimum ANSI/ASTM F512, DB-120 electrical, gray, conduit w/ a 1/4" polyester, pull line with sequential footage markings and minimum breaking strength of 400 pounds to be installed by customer. ***NOTE: DB-120 conduit cannot be exposed.***

9.0 TERMINATION FACILITIES DETAIL

For detailed meter equipment requirements, see CM0001M, Electric Metering – Commercial-Industrial.



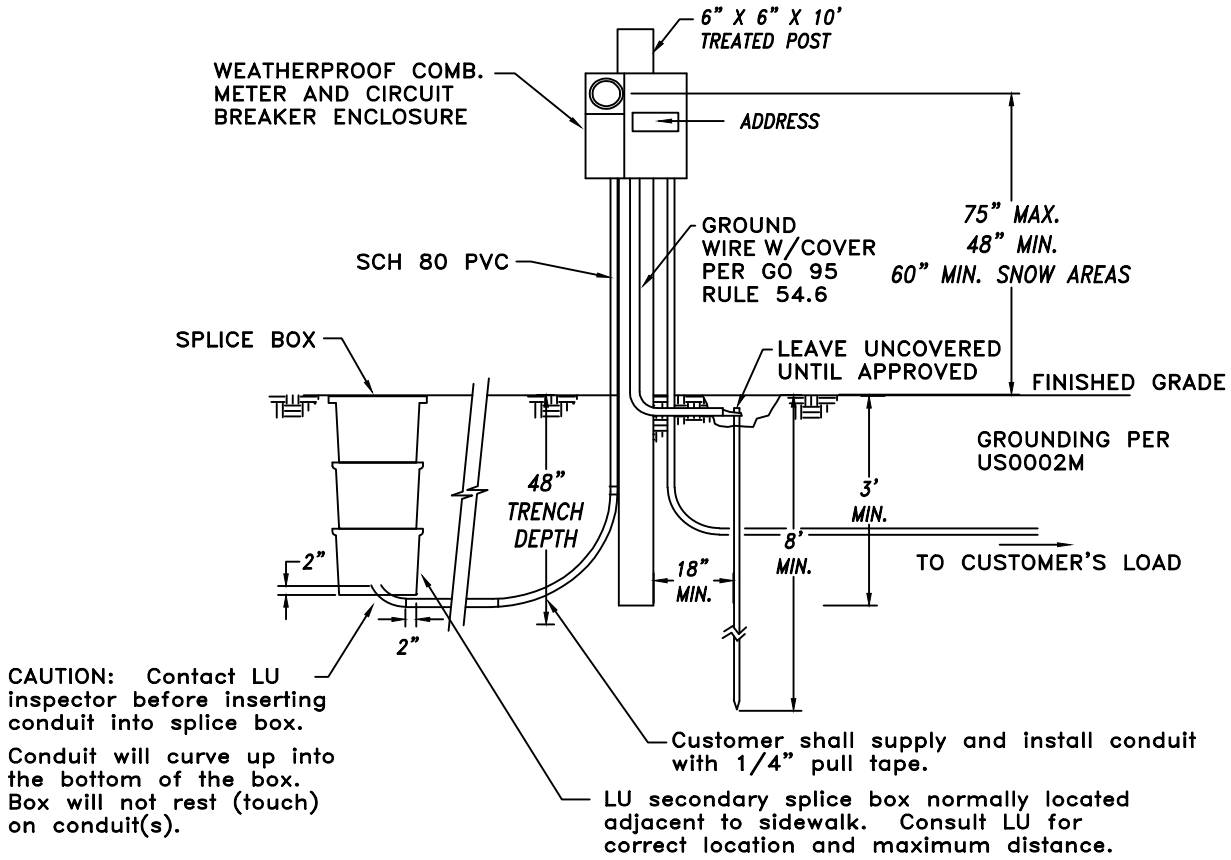
NOTES: (Customer to provide and install)

1. Conduit riser shall be minimum Schedule 40 PVC electrical conduit (gray) if recessed or minimum Schedule 80 PVC electrical, gray, conduit if exposed. For further details, see CD0004U, Conduit Application Guide.
2. Conduit sweep material must be the same as riser material and have minimum 36" radius.
3. The socket and enclosure of termination point shall be specifically designed to receive service cable from underground source.
4. A working space (36" x 36" x 78" high) in front of all meters is required to permit metering installation and provide a safe working environment for personnel.
5. **The meter location will have an assigned address.**

10.0 PERMANENT U/G SERVICE FROM WOOD POST

Approved manufactured steel pedestals are preferred construction but a terminating facility limited to a maxmum of 200 amps self-contained meter panel attached to a 6" x 6" x 10' full length 'treated wood' or redwood post is acceptable.

Post/pedestal installations shall be in locations out of the way of any vehicular traffic.



11.0 TRENCHING

11.1 Commercial / Industrial services will typically be multiple 4" conduits up to and including 2000 Amps. **For 2001 Amp or larger panels**, cable trench is required, refer to GI0011U, substructure, Section 7, for details.

11.2 Trenching configurations are subject to change due to location and joint utility requirements. Check with local LU office if questions arise.

11.3 Trenching and backfill must conform to LU Standards TE0001U and SUB01X, substructure.

11.4 The electric underground service may be installed with joint utilities (gas, telephone, cable television). **The electric service will maintain a minimum 12" separation from other utilities.** See appropriate utility representative for joint trench details. (For LU joint trench details, see TE0001U.)

12.0 REFERENCES

Electric Metering - Commercial and Industrial, CM0001M, substructure, Section 8.
Electric Switchboards 0-600 Volts, SB00011M, substructure, Section 8.
600V Underground Cable and Conduit Selection Guide, CB0003U, substructure, Section 4.
Conduit Application Standard, CD0004U, substructure, Section 4.
Backfill Material Specifications, SUB01X, substructure, Section 3.
Trenching Excavation Standards, TE0001U, substructure, Section 3.

CABLE TRENCH INSTALLATION GUIDE

1.0 INDEX

2.0 PURPOSE

This standard provides information for construction of Cable Trench. This installation is for underground services from 2001 amps to 4000 amps.

3.0 GENERAL INFORMATION

3.1 **Cable Trench is suitable for the following conditions:**

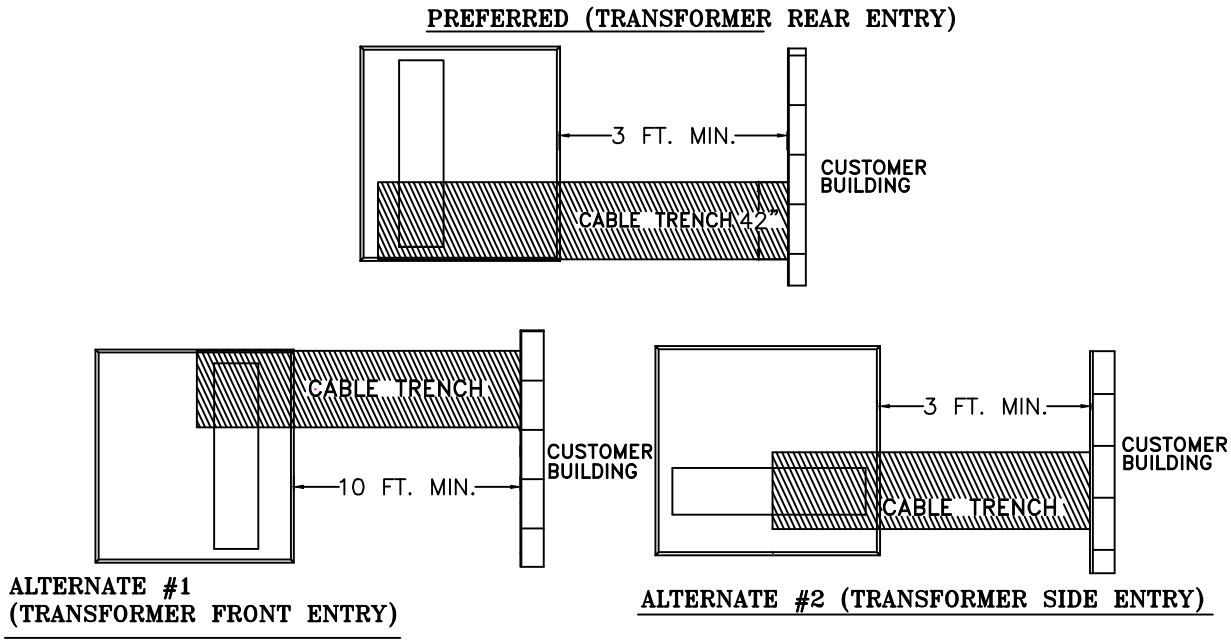
- 2001 Amp to 4000 amp services.
- Trench length should be limited to 20 feet, with the service cable length limited to less than 50' from transformer to customer panel.

4.0 PLANNING INFORMATION

4.1 Location And Orientation Of Service

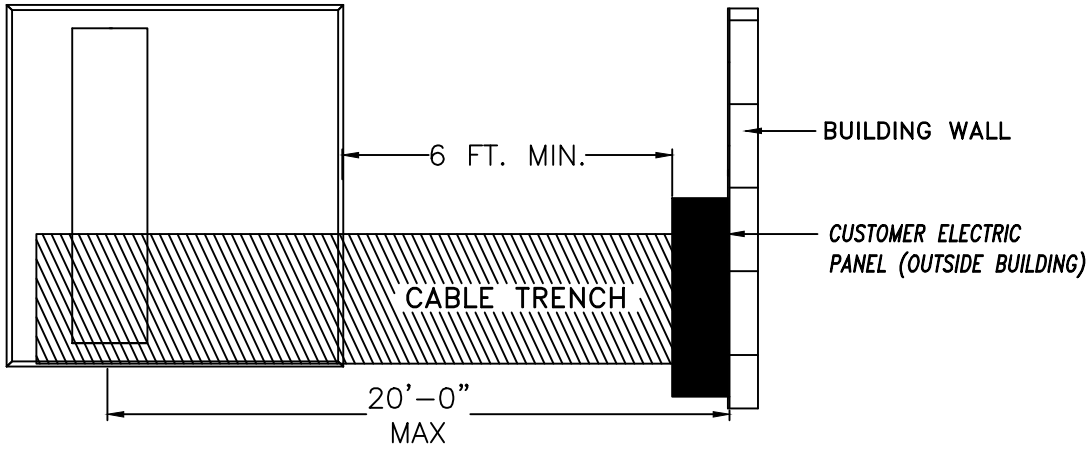
Pad placement and switch board pull section should maximize trench window space.

4.2 Service Entrances

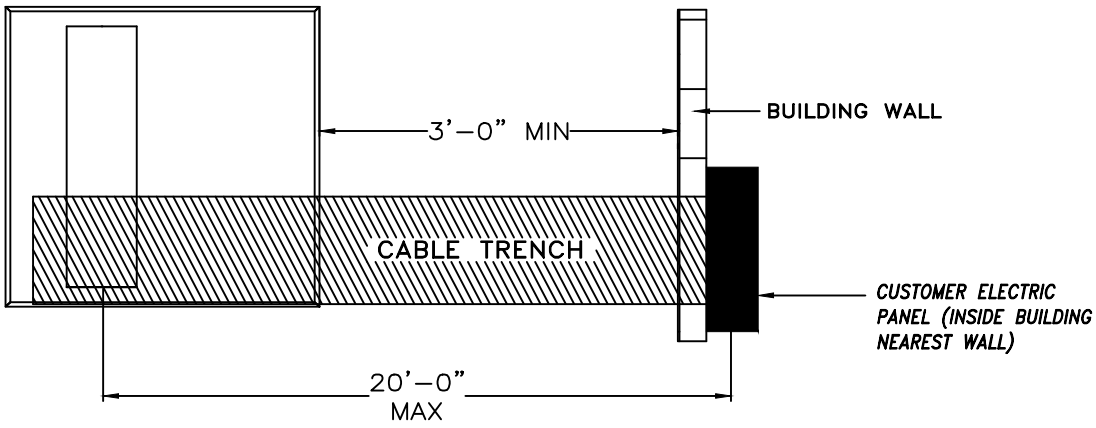


The trench length must be determined, (see Section 6.8 for details).
If the entrance is inside the building, then the wall must be cut or designed to allow the trough entry. **The customer must meet GO 128 RULE 12 requirements.**

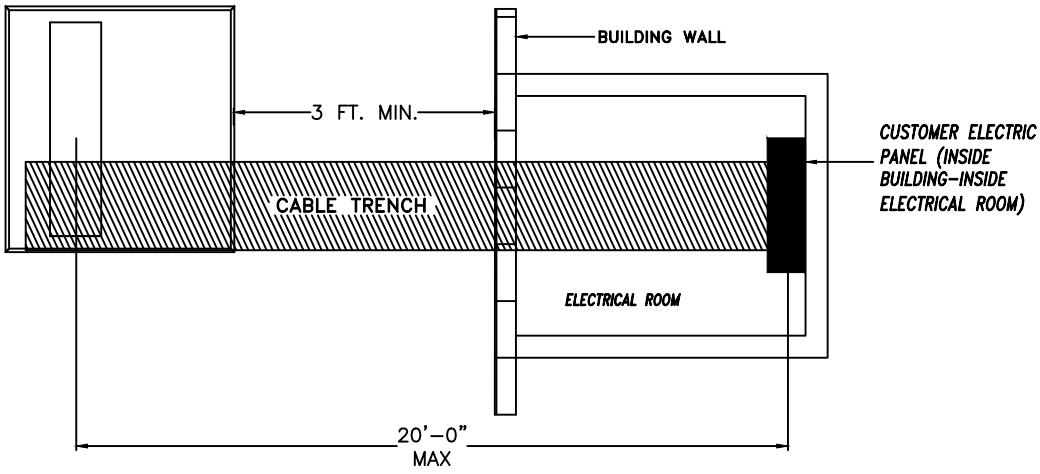
A. PREFERRED #1



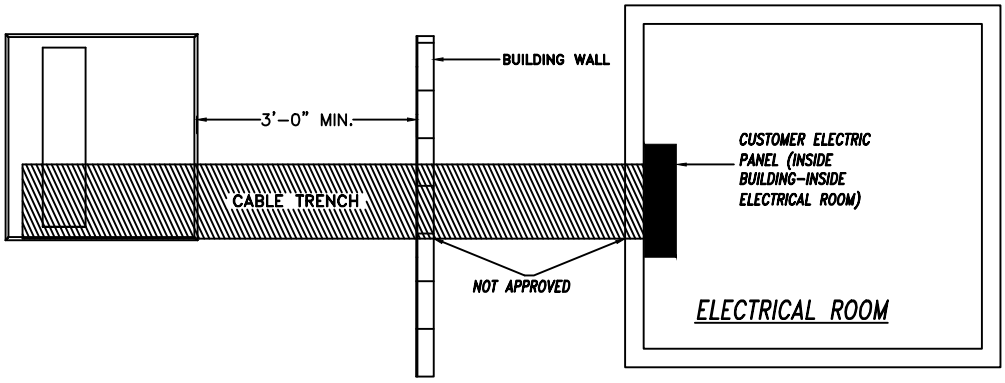
B. PREFERRED #2



C. PREFERRED #3



D. NOT APPROVED CONSTRUCTION



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LL	ET	JM	08/17	04

ENGINEERING AND CONSTRUCTION STANDARD

CABLE TRENCH INSTALLATION GUIDE

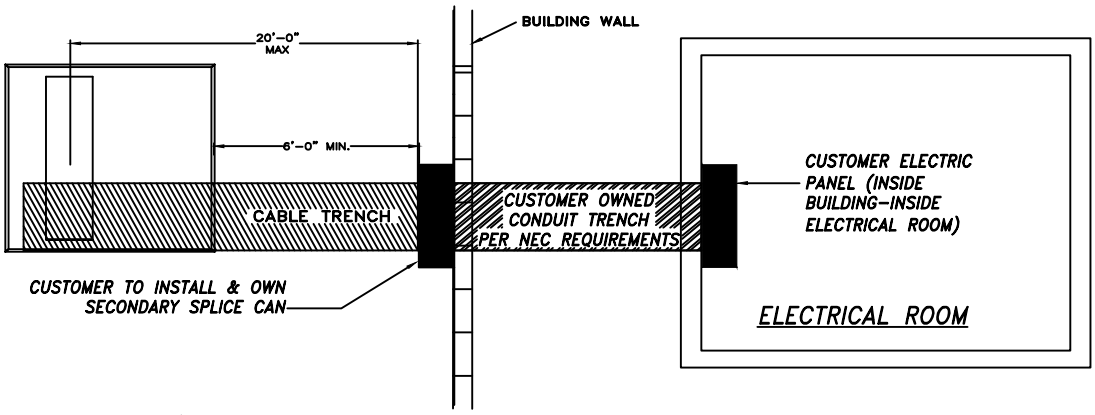
SUBSTRUCTURE

DRAWING NUMBER
GI0011U

NOTES:

1. LU cable trench **is not approved** for installation inside a building to serve an internal / isolated Electrical Room.
2. If an internal / isolated Electrical Room is required, the customer must install a secondary splice can at the outer wall nearest the transformer. Refer to drawing below.
3. Outside splice can, and all facilities inside the building, will be customer owned and installed. Facilities must meet GO 95/128 requirements.

D1. ACCEPTABLE CONSTRUCTION



4.3 Trench Covers

There are two types of trench covers available:

- H-20 Full Traffic Rated
- Non-Traffic / Pedestrian Only

4.4 Cable Selection

Multiple runs of cable will be required to serve the load. The number of runs depends upon the main panel rating. Number of cables per phase is based on 80% rated panels. Add extra set(s) if 100% panel, noted by ( ) in table.

MAIN PANEL RATING	NUMBER OF CABLES PER PHASE
2001-2500 AMPS	5 (6)
3000 AMPS	6 (7)
3500 AMPS	6 (8)
4000 AMPS	7 (9)

See Table 8 of CB0003U, substructure, Section 4, for cable ratings.

4.5 Required Service Materials **(to be supplied by LU)**

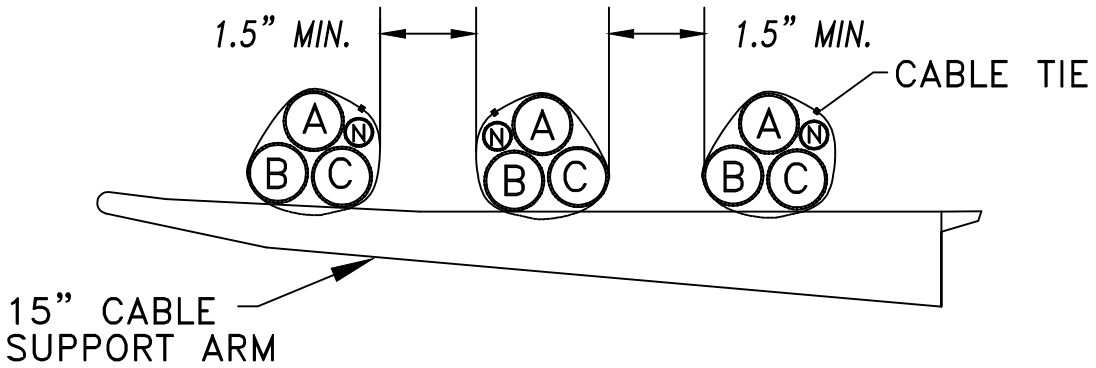
ITEM	STOCK NUMBER	QUANTITY
750 kcmil 1/C 600 Volt Cable (Phase)	8800-230895	See Section 4.4
350 kcmil 1/C 600 Volt Cable (Neutral)	8800-230781	See Section 4.4
750 kcmil Flat-to-Crimp Connections (bolt set). Stackable lug: 25-1315.	8800-251356 (8800-252693)	6 connectors per cable run *
350 kcmil Flat-to-Crimp Connectors (bolt set). Stackable lug: 25-1313	8800-251351 (8800-252697)	2 connectors per cable run *
Cable Ties	8800-958084	1 pkg. per 10' trench length

* Customer to furnish cable connectors at panel. LU to furnish bolts.

5.0 CREW INFORMATION

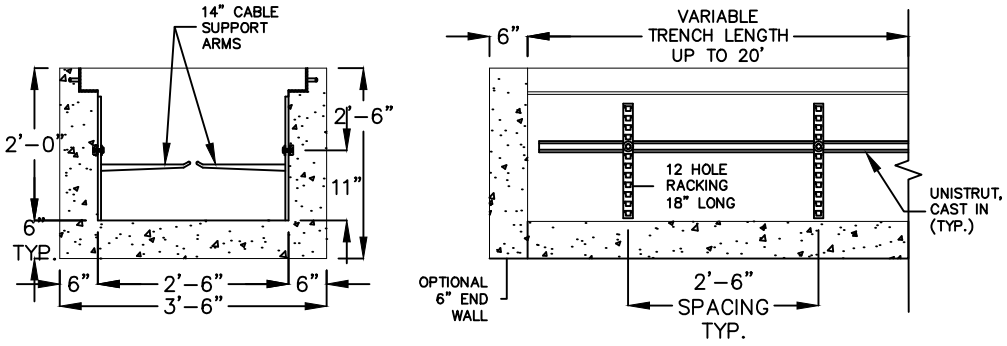
5.1 **Cable Orientation**

Cable Ties are to be set at +/- 15" intervals along the cable run. Each cable run contains 3 different phases and a neutral.



5.2 **Support Arm and Tie-Down Spacing**

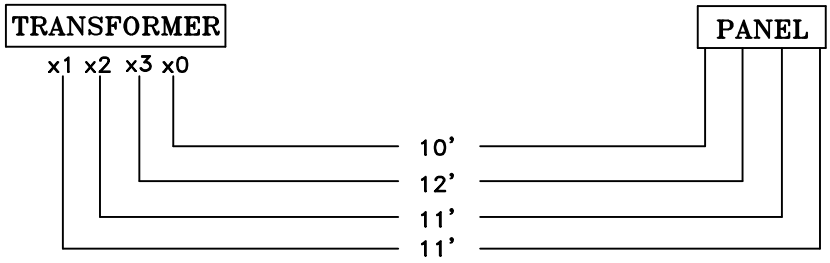
Support arms are to be set at 30 inch spacings. The cable is fastened to each arm.



5.3 **Cable Lengths**

All X1 phase cables must be the same length, all X2 phase cables must be the same length, etc. However the length of the X1cables ***does not*** have to equal the X2 lengths or the X3 lengths.

Example:



6.0 CONTRACTOR INFORMATION

6.1 **Contractor Responsibility**

The contractor will provide trench, furnish and install materials as listed in section 6.7. Contractor will be responsible to submit to Jensen Precast (precasted trench) and/or LU (poured in place trench) a preliminary drawing with the following items:

a. Information as shown in 6.8 with pad size.
b. Submit a preliminary design worksheet to Jensen Precast and/or LU Inspection group for verification of measurements and final approval. Jensen will fax final design to LU inspection group reno or district planner for final acceptance.

6.2 **Trench Construction**

The cable trench may be precast (Preferred) or poured in place (Non Preferrred).

a. Poured-in-place trench walls to be formed, **do not** cast against existing soil.
b. Exposed edges to be finished with edging tool.
c. No customer conductor, including bare ground/bonding conductors, is to be installed in the trench.

d. Unistrut or equivalent to be cast in wall. See details, Section 7.1.
e. Unistrut shall be hot dip galvanized and have an "A" corrosion rating.

6.3 **Backfill Composition**

Backfill material shall meet requirements of LU Standard SUB01X, Trench Bedding and Backfill (see substructure, Section 3).

6.4 **Service Entrance**

6.4.1 The contractor must check with local codes before running a service entrance.

6.4.2 *Service entrance into buildings must have 'fire proofing' per GO 128 RULE 12 requirements*.

6.4.3 Firestopping - Building codes and standards provide strict requirements for sealing, or firestopping, penetrations through fire-rated walls, floors, and ceilings. Approved methods and materials must be used to reduce the chance of spreading fire, smoke, and toxic gases throughout the building(s). See Section 7.0, note 11.

6.4.4 Firestop materials are available as:
Blankets,
Caulking compounds,
Cementitious compounds,
Collar devices and chokes,
Composite sheets,
Pillows,
Putty,
Wrap strips,
Sprays, and
Mechanical systems.

6.4.5 All firestopping solutions are generally a combination of firestop materials, holding devices, packing materials, and othe devices that make up a listed (approved) system. A ways use an approved and engineered system to firestop a penetratrion. Contact an appropriate firestop manufacturer with any questions.

6.5 **Trench Covers**

a. To be stamped as shown in Sections 7.0.
b. Will be coated with red oxide primer and finished with epoxy sand paint.
c. All covers will be constructed in 24" lengths. If additional length is needed at the start or end up to 6" may be added to the 24" section. Cover needing additional width above 6" will be made to fit.

6.6 **Drains/Sump hole**

Precast and Poured in place: Locate knockout for the drain hole and the sump hole as shown in sections 7.0 and 7.1.

6.7 **List of Materials**

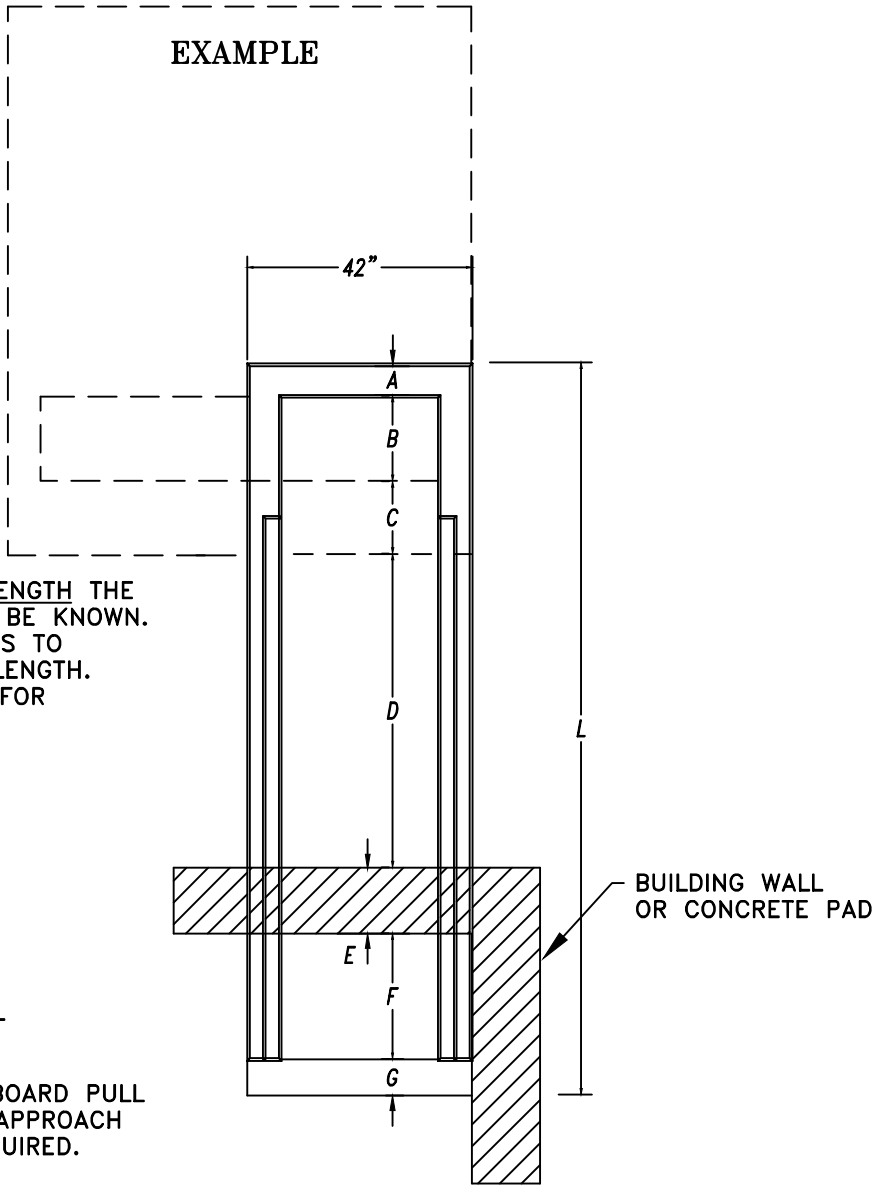
The materials listed below are for reference only, a detailed list of quantities should be generated by referenceing the final drawing and the specifications shown in this standard.

Materials to be Supplied by Contractor/Jensen Precast			
Poured-In-Place (Non-Traffic)		**Poured-In-Place (Traffic)**	
Concrete, 3000 psi strength @ 28 days	Diamond Plate Cover 1/4" Thickness	Concrete, 3000 psi strength @ 28 days	Diamond Plate Cover 1/2" Thickness
PVC, 6" Dia.	Structural Angle Iron 3-1/2" x 3-1/2" x 1/4"	PVC, 6" Dia.	Structural Tubing 3" x 3" x 1/4"
Nelson Studs, 2"	4" Long Unistruts For Holding Covers In Place	Nelson Studs, 2"	4" Long Unistruts For Holding Covers In Place
Rebar, #4 @ 11" OC.	Drain Rock, 3/4", 1 Cu. Ft.	Rebar, #4 @ 11" OC.	Drain Rock, 3/4", 1 Cu. Ft.
Rebar #3 @ 12" OC.	12" Sump	Rebar, #3 @12" OC.	12" Sump
Unistrut P4000 or Equivalent	Penta Head Bolts 1/2" x 3-1/2"	Unistrut P4000 or Equivalent	Penta Head Bolts 1/2" x 3-1/2"
Angle Iron, 3" x 4" x 1/4"	Cable Support Racks, Arms, & Hardware	Angle Iron, 3" x 4" x 1/4"	Cable Suport Racks, Arms, & Hardware

6.8 Determine Bus Trench Length

*BUS TRENCH ID MUST MATCH PAD AND SWITCHBOARD WINDOWS TO PREVENT CHAFING OF CABLE AND EASE THE CABLE INSTALLATION PROCESS.

NOTE:
CONTACT LU. ELECTRIC INSPECTOR TO VERIFY MEASUREMENT PRIOR TO ORDERING PRECAST CABLE TRENCH



TO DETERMINE BUS TRENCH LENGTH THE FOLLOWING DIMENSIONS MUST BE KNOWN. ONCE KNOWN, ADD DIMENSIONS TO DETERMINE OVERALL TRENCH LENGTH. THIS PROCESS CAN BE USED FOR REAR AND SIDE ENTRY ALSO.

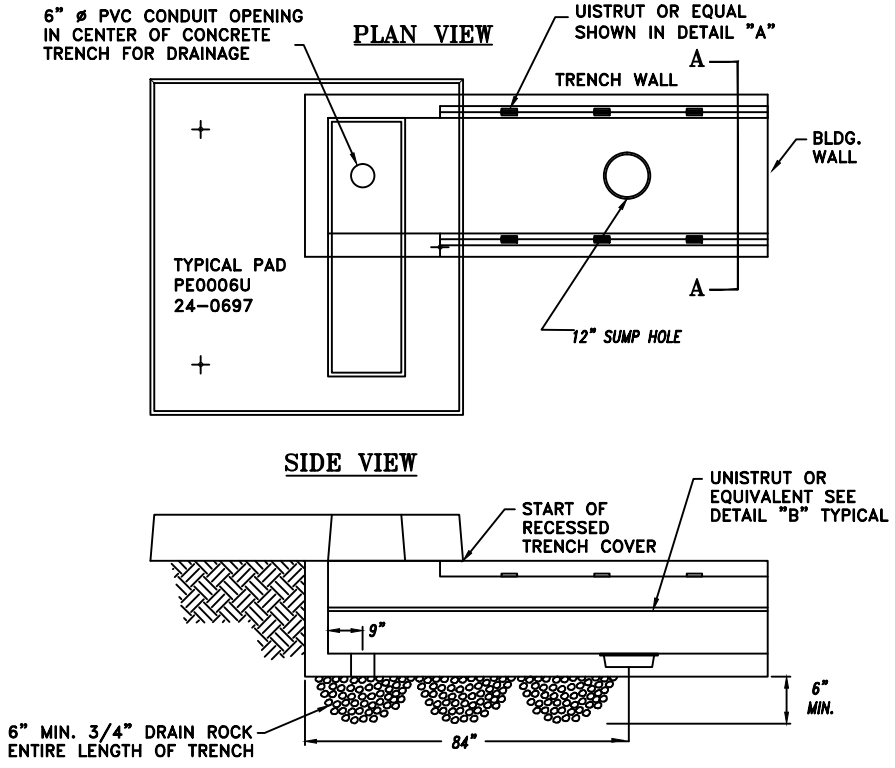
FORMULA:

L = A+B+C+D+E+F+G
L = OVERALL LENGTH (OD)
A = WIDTH OF END WALL
B = WIDTH OF PAD WINDOW
C = WIDTH OF PAD
D = LENGTH OF TRENCH FROM XFMR PAD TO BLDG. WALL
E = WIDTH OF BUILDING WALL SEE *NOTE BELOW
F = WIDTH/DEPTH OF SWITCHBOARD PULL SECTION NOTE: ON SIDE APPROACH A 30" MIN DEPTH IS REQUIRED.
G = WIDTH OF END WALL

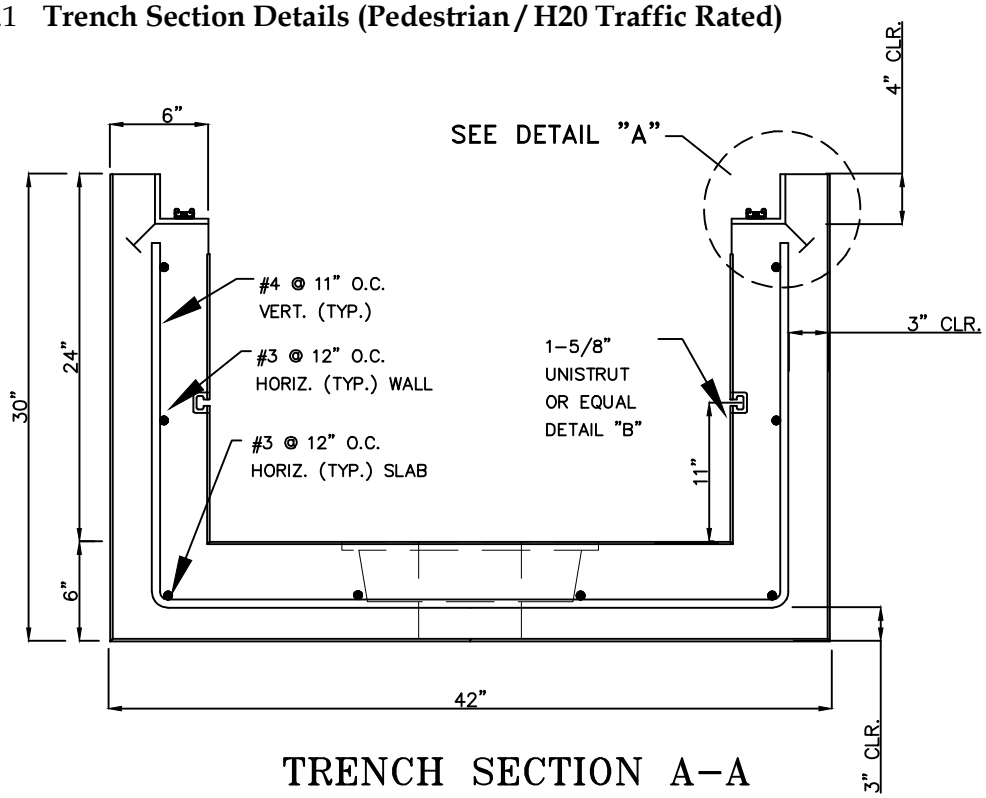
*NOTE: EXTRA TRENCH MAY BE REQUIRED INSIDE BUILDING

7.0 PRECASTED/POURED IN PLACE TRENCH DRAWINGS

1. Contractor is to furnish and install concrete trench (precasted is preferred installation).
2. Contractor to furnish and install unistruts as shown on plan view.
3. Contractor to provide LU and/or Jensen Precast with a preliminary layout to confirm transformer and trench layout. See section 6.8.
4. Trench walls to be formed, not cast against existing soil.
5. Concrete strength to be 3000 PSI at 28 days. Rebar yield strength shall be 60KSI.
6. Non traffic 1/4" diamond plate steel cover to be stamped "NON-TRAFFIC", "LU ELECTRIC" and painted with red oxide primer and sand epoxy painted.
7. H20 traffic rated 1/2" diamond plate steel cover to be stamped "H20 TRAFFIC", "LU ELECTRIC" and painted with red oxide primer and sand epoxy painted.
8. Finish exposed concrete trench edges with edging tool.
9. Backfill material shall be adjusted to ± 2% of optimum moisture content, placed and compacted in 8" lifts to 95% of maximum dry density per ASTM-0-1557.
10. Unistrut or equivalent (1-5/8"X 13/16"shall be cast into wall sections with spacing locations (vertical/horizontal) and a length to fit wall sections as specified on LU standard drawings. Unistrut shall be HDG unistrut P400 or equal and shall be "A" rated corrosion resistant.
11. The trench may not be extended into the building unless approved by local Inspection authority and adequate seal against water/fire is provided. (SEE NEC 300.21)

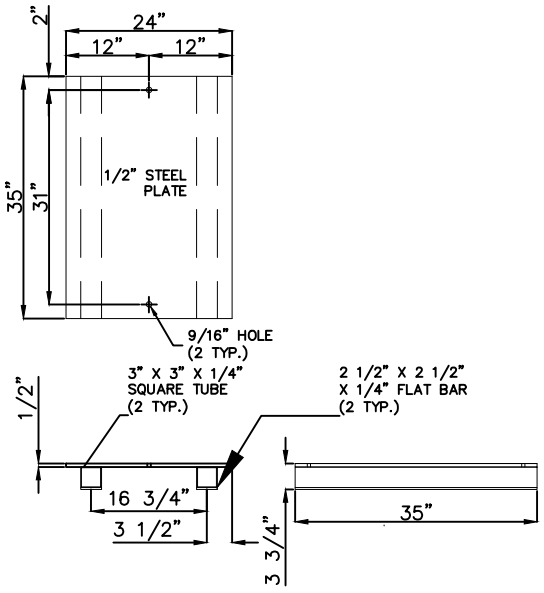


7.1 Trench Section Details (Pedestrian / H20 Traffic Rated)

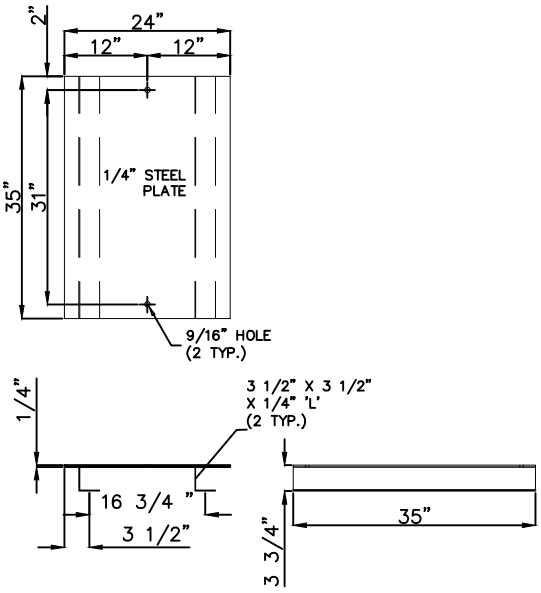


TRENCH SECTION A-A

H20 TRAFFIC RATED



PEDESTRIAN LID



Liberty Utilities®				ENGINEERING AND CONSTRUCTION STANDARD
				CABLE TRENCH INSTALLATION GUIDE
DRAWN	DESIGN	SUPR	DATE	REV
LL	ET	JM	08/17	04

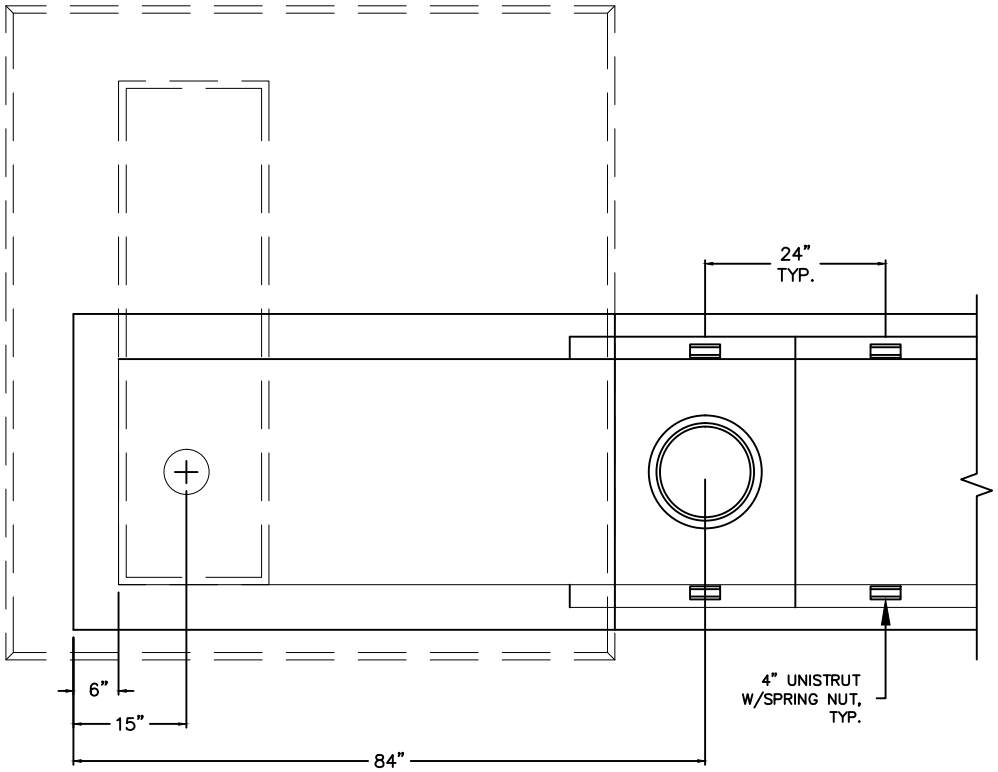
7.6.44 OF 86

SUBSTRUCTURE

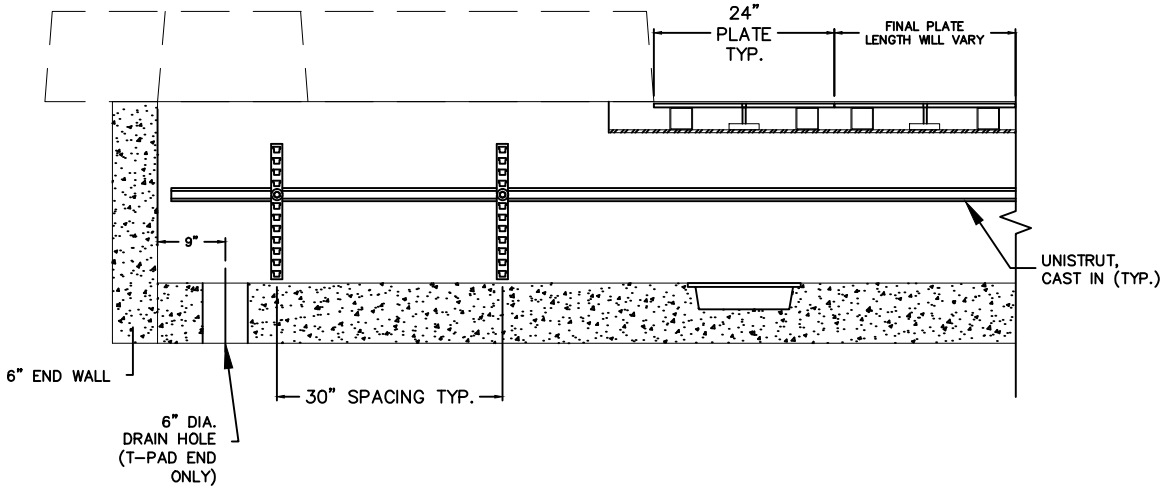
DRAWING NUMBER
GI0011U

7.2 Trench Section Details

TOP VIEW



SIDE VIEW



MOBILE HOME SERVICE REQUIREMENTS ELECTRIC

1.0 INDEX

2.0 PURPOSE

The purpose of this standard is to outline methods of providing underground utility service to mobile homes within the service territory of Liberty Utilities (LU).

3.0 GENERAL

3.1 In the application of this standard a mobile home development shall be considered either a mobile home subdivision or mobile home park.

A. A mobile home subdivision consists of lots for private ownership, where the lot is owned by an individual.

B. A mobile home park consists of spaces for rent, where the mobile home owner rents space for his mobile home.

3.2 The developer is responsible for the overall design and installation coordination of the various underground facilities of his project.

3.3 The developer shall be responsible to contact Liberty during the design phase of his project to ensure compliance with this standard.

3.4 The developer must follow local codes and ordinances for requirements applicable to customer facilities from the meter pedestal to the distribution panel board within the mobile home. *All GO 95 clearance requirements must be maintained. A 3' minimum space is required in front of any pedestal opening.*

3.5 Main and service layout of electric and other utilities shown in this standard are to illustrate overall design and installation coordination requirements.

3.6 The developer is responsible to establish finish grade on property prior to start of construction of Liberty's facilities.

3.7 Developer shall provide all main trenching, excavation, and backfill in accordance with Liberty's standards and specifications. The developer shall provide, install, and maintain service conduits, meter pads and meter pedestals in accordance with Liberty's specifications. In mobile home subdivisions, the owner shall provide, install, and maintain his service conduits, conductor, meter pad, and meter pedestal.

3.8 The developer shall provide a permanent and clearly marked identification mark showing address or space number on each meter pedestal and gas house line.

3.9 For feeder facilities, the developer will provide trenching, backfill, and provide and install other material required under applicable extension rules of California.

3.10 Liberty may furnish, install, and connect service cables and meters.

3.11 Meter pads in the immediate vicinity of driveways must be protected by steel posts as detailed on LU Dwg. PE0009U, "Padmounted Apparatus Barrier Posts".

3.12 Meter pad and utility island are defined as follows:

A. Meter Pad - The meter pad is where electric meter pedestals and gas meters are to be installed. It shall be located in accordance with this standard and at a location so as to prevent damage to meters resulting from placement of mobile homes.

1. The developer is responsible to stake locations of meter pads. ***Locations shall be approved by Liberty.***
2. Adjustments of meter pads and meters due to grade or staking errors shall be made by the developer or owner at his expense. Work required by Liberty to adjust our facilities will be charged to the developer.
3. In lot sale developments, the individual owner shall own and maintain the meter pad and pedestal and all the electrical and gas facilities from the meter pad to the mobile home.

B. Utility Island - The utility island is a central location for all customer facilities (electric, gas, water, sewer, telephone, TV, etc.) at the mobile home which allows the mobile home to be connected to those facilities.

1. Local city/county codes apply to the utility island and to the electric facilities from the load (customer) side of the meter pad to the utility island. The developer or owner should consult local city/county building departments for applicable requirements.

3.13 When certain conditions are met, a mobile home is no longer classified as mobile, but considered a modular or permanent building, and treated in accordance with Liberty's Residential Service Standards and this standard no longer applies. The following conditions make it a fixed, permanent residence:

A. It is built in accordance with the National Construction and Safety Standards.
B. It is placed on a permanent foundation, or
C. Its owner also owns the land on which it stands.

4.0 REFERENCES

4.1 **LU Standards:**

	Substructure, Standard Reference
Trench Excavation Standards	TE0001U, Section 3.
Typical Trench Details	TE0003U to TE0027U, Section 3.
Trench Bedding & Backfill	SUB01X, Section 3.
Conduit Installation Guide	CD0001U, Section 4.
Conduit Application Guide	CD0004U, Section 5.

4.2 **Other Codes & Rules:**

GO 95/128
Mobile Home Setup Guide, Washoe County
Occupational Safety & Health Administration (OSHA)
Uniform Plumbing Code (UPC)
Underwriters Laboratory (UL)

5.0 TYPICAL UNDERGROUND UTILITY LAYOUT

5.1 Electric primary and secondary cables will be installed in conduit in joint trench with telephone and cable TV. The facilities will be within the public utility easement (PUE) along the front of the lots, with street crossings as required.

5.2 Electric services shall be installed from the nearest electric box or transformer to the meter pad along side the property line within a 5 ft. PUE, see Detail #5A.

5.3 Mobile home parks can install either:

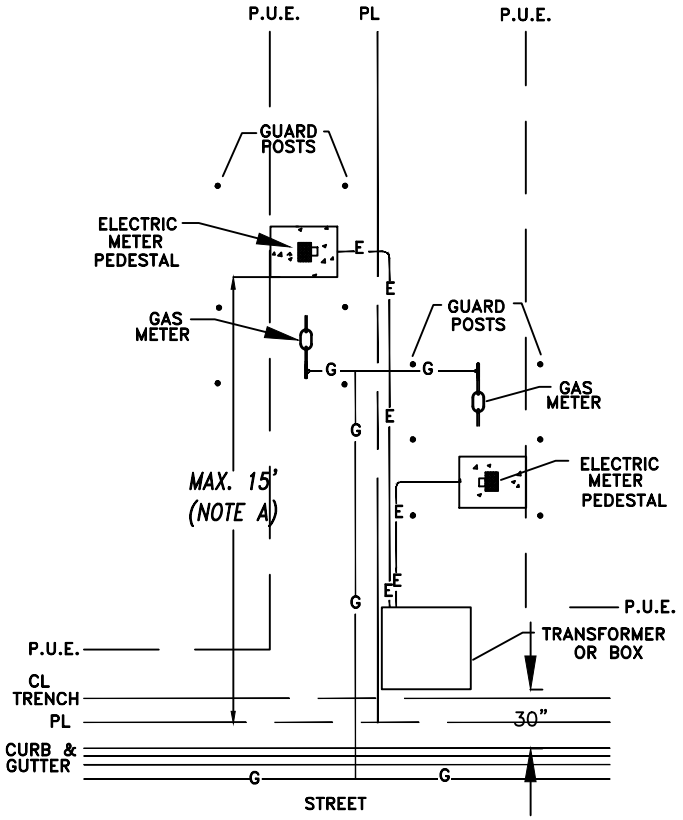
A. One electric meter pad with double meters, see Detail #5C. For gas meter location, refer to Detail #6C.

B. Two electric meter pads with single meters, see Detail #5B. For gas meter location, refer to Detail #6B.

5.4 Mobile home subdivisions shall install single electric meter pads for each lot. The pads may be on common lot lines, see Detail #5B. For gas meter location, refer to Detail #6B.

5.5 Quadruple electric meter pads may be used in mobile home parks. Approval must be received from LU prior to construction for correct wire sizing, see Detail #5D. For gas meter location, refer to Detail #6D.

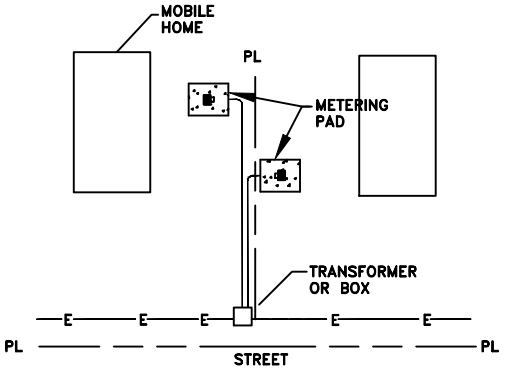
5.6 Any exceptions in the layout of electric facilities must be approved by LU prior to construction.



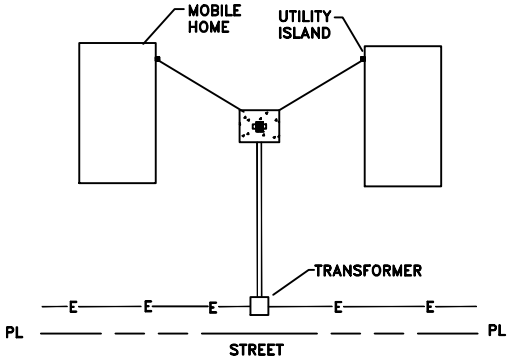
DETAIL #5A

NOTES:

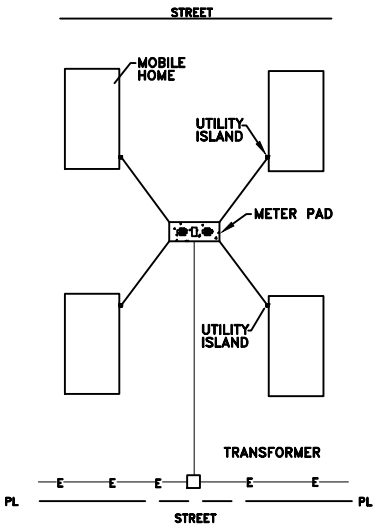
1. Maximum 15 ft. setback from property line for metering pads. Approval from LU must be received prior to construction for alternate meter pad locations.
2. Trench centerline to be 30" from back of curb for electric trenches, transformers, boxes or vaults. If sidewalk is present, trench centerline to be 24" behind sidewalk.
3. Service trench centerline to be 30" from side property line.
4. Meter pads to be 30" from side property line.
5. Guard posts to be 4" standard steel primed and painted yellow. Posts to be 5'- 0" long, buried 2' in concrete and filled with concrete.



DETAIL #5B



DETAIL #5C



DETAIL #5D

Liberty Utilities®			ENGINEERING AND CONSTRUCTION STANDARD	7.7.50 OF 86
			MOBILE HOME SERVICE REQUIREMENTS ELECTRIC & GAS	SUBSTRUCTURE
				DRAWING NUMBER ***UM0001M***

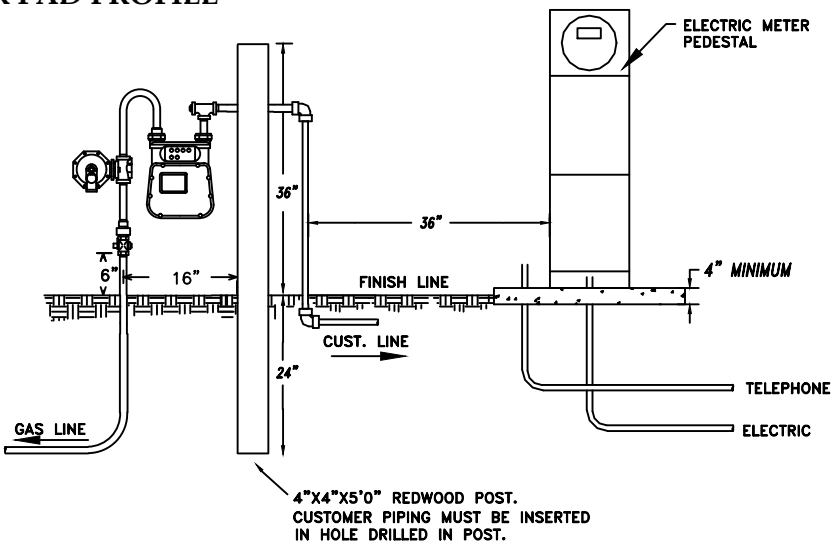
DRAWN	DESIGN	SUPR	DATE	REV
LL	ET	JM	08/17	04

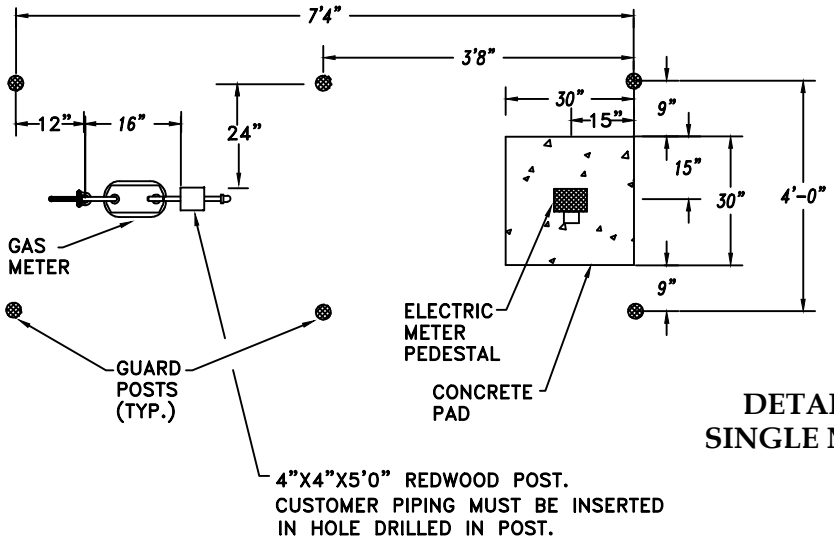
6.0 METER PAD DETAILS

6.1 See Details #6A, #6B, #6C, and #6D for pad layout and dimensions.

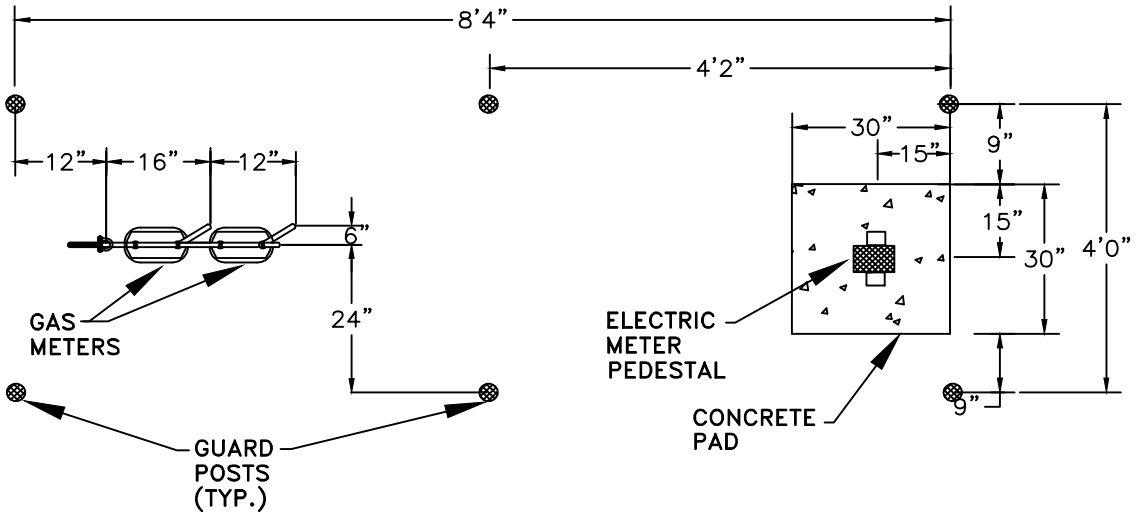
6.2 6" x 6" 10/10 steel mesh shall be used for reinforcing of all pads. Pads shall have a minimum thickness of 4".

DETAIL #6A
METER PAD PROFILE

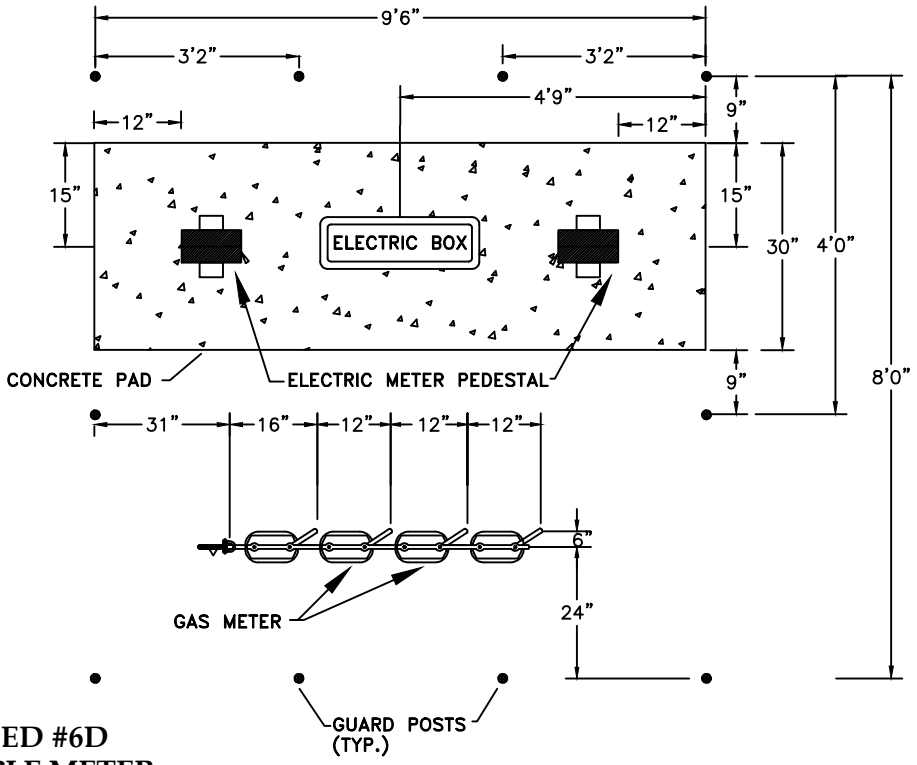




DETAIL #6B
SINGLE METERS



DETAIL #6C
DUAL METERS



DETAILED #6D
QUADRUPLE METER

DRAWN	DESIGN	SUPR	DATE	REV
LL	ET	JM	08/17	04

Liberty Utilities®

ENGINEERING AND CONSTRUCTION STANDARD

MOBILE HOME SERVICE REQUIREMENTS ELECTRIC & GAS

7.7.52 OF 86

SUBSTRUCTURE

DRAWING NUMBER
UM0001M

7.0 GENERAL INSTALLATION PROCEDURES

7.1 This section outlines the general procedures to follow in installing the electric service, meter pedestals and pads.

7.2 The developer/owner obtains LU's approval on utility layout prior to construction. ***LU will designate the service locations***.

7.3 The developer/owner provides all trenching, excavation and backfill in accordance with LU'S standards.

7.4 Any service conduit/pipe is provided and installed by developer/owner as specified by LU.

7.5 The developer/owner backfills trench to the level of joint utility before joint facilities are installed.

7.6 The developer/owner in the general sequence listed below, will then install the electrical grounding system at the meter pad, the meter pedestal and the electric line from the meter pad to the mobile home.

A. Install the electrical ground and bare copper grounding conductor. The grounding conductor shall not be connected to the gas pipe system.
B. Install the customer electric line (or conduit) from meter pad location to mobile home connection point (Utility island).
C. Install the gas service house line.
D. Remove the pull section panel of meter pedestal to allow service cable to extend through pedestal. Carefully place pedestal over LU'S electric conduit and customer's electric conduit. Position meter pedestal as required and plumb and level pedestal. See Details #6A, #6B, #6C, and #6D.
E. Backfill the installation and compact meter pad subgrade to 90%. Form and pour the concrete pad. The concrete pad should extend approximately two inches above finish grade.
F. Connect the grounding conductor to the accessible grounding lug inside the pedestal. Ground the pedestal by connecting the accessible grounding lug to the neutral service terminal landing lug.
G. Connect the customer's electric line.
H. Call for city/county inspection of electric and gas installation, as required.

7.7 Upon approval by inspecting authority, LU will connect the electric service conductors to the landing lugs in the meter pedestal, install and seal the pull section panel, and blank off and seal the meter socket ring.

7.8 LU will set the electric meter upon application for service.

8.0 METER PEDESTAL SPECIFICATIONS

8.1 The meter pedestal shall have a minimum rating of 100 amperes and ***shall face the street or point of access***. Construction, material, corrosive-resistant finish shall be approved by the Underwriters Laboratory (UL).

8.2 The meter socket base shall be UL recognized and provided with a sealing ring. The socket shall be factory-wired with the conductors in a separate or barriered raceway from the utility's terminating lugs to the meter socket. These conductors shall be inaccessible from the main disconnect and power outlet section. The conductors which extend to the meter socket shall be connected at the utility's terminating lugs independently of the connection for the customer's conductors. The minimum meter height is 36" above grade line when the meter is enclosed, or 48" minimum if exposed.

8.3 The customer's main disconnect and power outlet section shall have barriers installed to prevent access to the utility's cable pull and terminating section and to unmetered conductors which connect to the socket.

8.4 The utility's cable pull and terminating section shall be covered with a sealable and removable panel or panels, extending from 2" to 6" above grade, and when removed, give full access to the utility's terminating lugs. Access to the terminating lugs may be from either the front or the rear of the post. Access shall not be restricted by load conduits or raceways.

8.5 A minimum 12" opening shall be maintained from the terminating lugs to any fixed panel below the lugs. The minimum lug height is 18" above grade line; the maximum is 48". The terminating lugs shall be twin No. 2 to 350 kcm aluminum bodied pressure type for connection of the service lateral conductors. The space between terminating lugs, from lugs to sides of post, or from lugs to panel above shall be 1½" minimum. Rigid insulating barriers are required and shall project ¼" minimum beyond any energized parts if this space is less than 1½". Terminating lugs may be positioned either in-line or staggered. The neutral terminating lug shall be bondable to the post.

8.6 An accessible grounding lug shall be provided for a minimum #6 to 1/0 AWG grounding conductor.

8.7 The post shall have a minimum cross sectional dimension of 4" x 8" inside diameter. A fixed panel shall extend 2" minimum and 5" maximum above grade, and 18" minimum below grade.

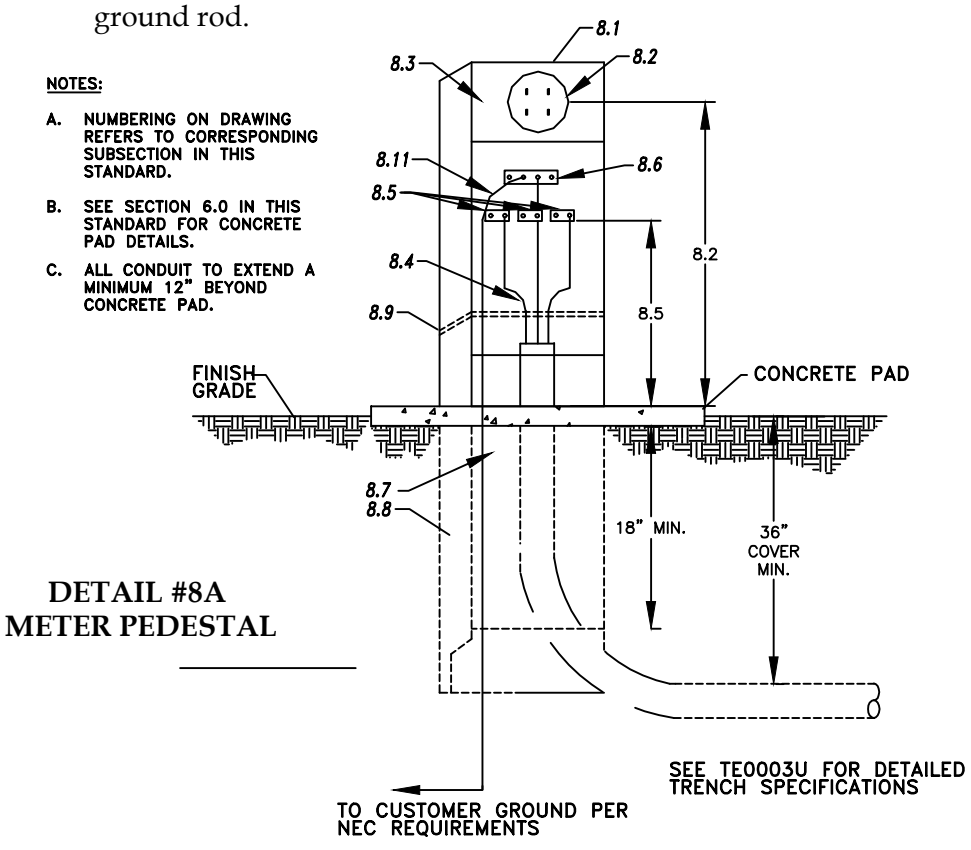
8.8 The minimum depth of the post in the ground shall be 24" with openings at the base to permit the service lateral conduit or conductors to sweep into the post.

8.9 A moisture barrier, located below all terminals and other live parts, or adequate ventilation, shall be provided to inhibit the condensation of moisture.

8.10 For authorization to attach telephone and cable TV termination facilities, consult LU.

8.11 Local codes must be followed for grounding requirements. Lugs for terminating the users ground wire (per A & B below), shall be located outside of the sealable termination section. This may be achieved by being located in a barriered raceway or installed on the outside of the meter pedestal. A minimum ground shall consist of a continuous bare copper grounding conductor extending from the neutral service terminal landing lug to a grounding electrode, which may be either:

A. UFER type ground as per NEC 250-66.
B. Metallic underground water piping system (not gas) with a minimum buried portion of 10'. If the buried portion of the metallic water piping system is less than 10' in length, it shall be supplemented with a 5/8" x 8' copper clad ground rod.



DETAIL #8A
METER PEDESTAL

ELECTRIC SERVICE REQUIREMENTS FOR IRRIGATION SERVICES

1.0 INDEX

2.0 PURPOSE

This standard provides specific information for the establishment of overhead or underground electric service for agricultural irrigation, stock watering and non-agricultural irrigation and drainage pumping installations.

3.0 LIMITS

LU will install a single span of overhead service drop or a single run of underground cable from its pole or service box to the customer's permanent approved support, provided the customer has made an application for service and LU's distribution pole line is located on the customer's premises or in an easement (public or private) adjoining said premises. If the length of the service is such that it would prove electrically prohibitive, a transformer and primary extension may be required, in which case, LU's line extension rules will be applied.

Service from a pole-mounted transformer bank is limited to (3 x 75 kVA) 225 kVA, three phase with a maximum 400 amp (480V) panel and an overhead service drop capacity of 2 - 4/0 QPLX. Underground service from a padmounted transformer is limited to 2500 kVA, three-phase. See Table, Sheet 7.8.65.

4.0 CUSTOMER'S RESPONSIBILITY

The customer shall furnish, install and maintain, at his expense, the service termination facilities necessary to accept overhead or underground service in accordance with state, local and national codes and the manufacturer's recommended single phase or three phase, overload protection which shall be provided by customer.

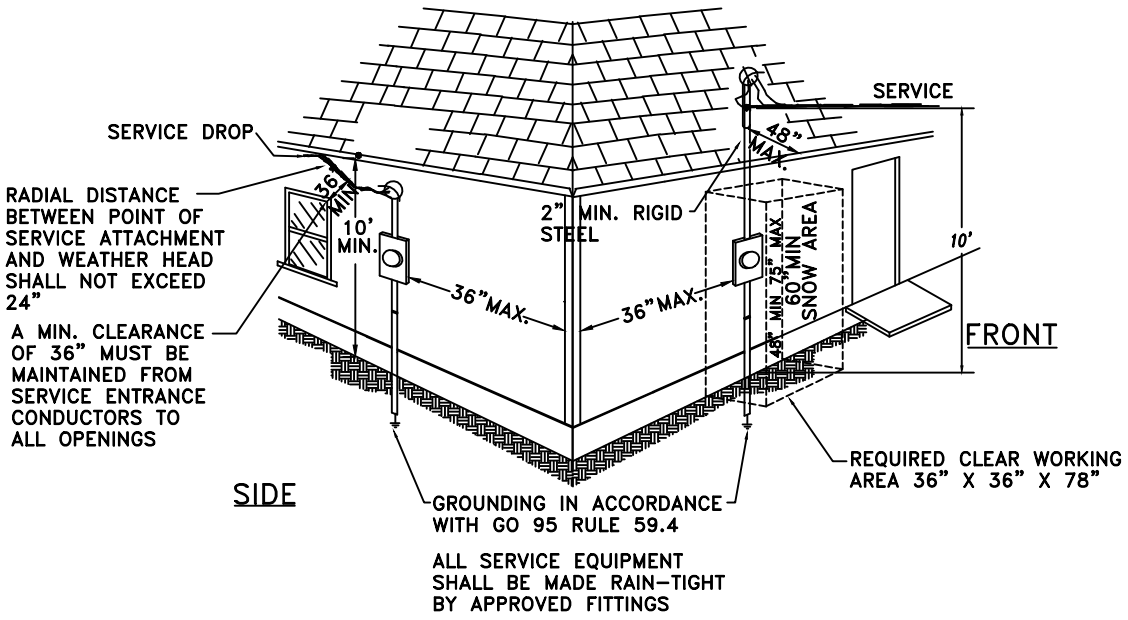
5.0 LU RESPONSIBILITY

LU may furnish, install and maintain the overhead service drop conductors, or the underground service cables, and any meters and instrument transformers required in accordance with the latest revision of our Rules and Regulations.

6.0 LOCATION OF TERMINATION FACILITIES

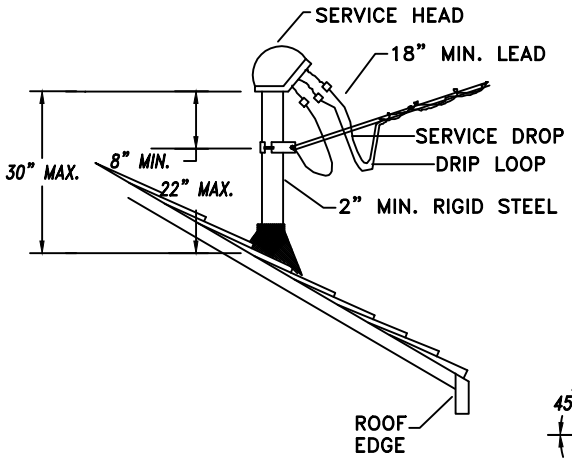
All service locations shall be approved by LU prior to construction of the service termination. The location of the point of attachment of the service drop shall be such that it can be reached with a single span, 75' #2 QPLX maximum with larger conductors, shorter. For underground services over 50' in length, additional pull boxes may be required. Service location must be a minimum distance of 10' from LU facilities. Location of the service termination on a building is preferred over use of a service pole. A clear, level working space (36" wide x 36" deep x 78" high) in front of all meters is required to permit meter installation and provide a safe working environment for LU personnel.

7.0 OVERHEAD SERVICE

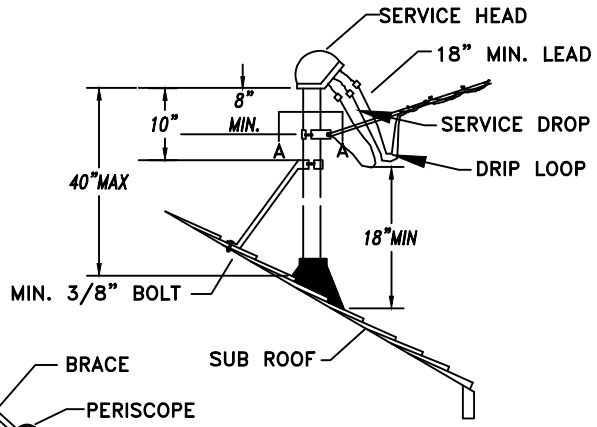


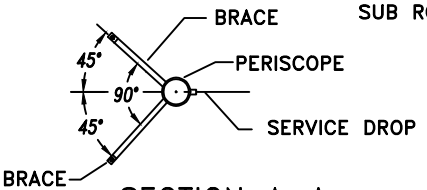
PERISCOPE DETAIL

UNBRACED PERISCOPE



(1) BRACED PERISCOPE





SECTION A–A

SERVICE POLE DETAIL

(See sheet 7.8.59 for notes)

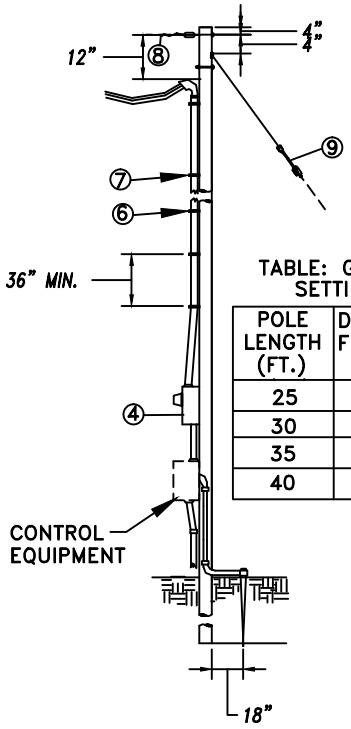
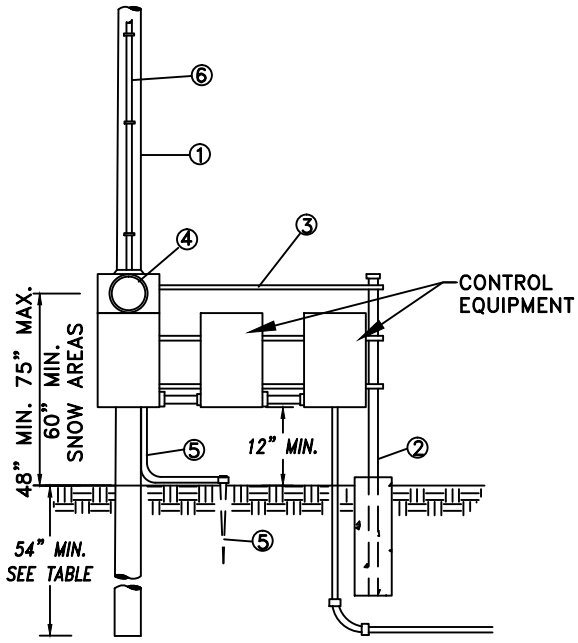


TABLE: GROUND SETTING

POLE LENGTH (FT.)	DEPTH IN FIRM SOIL (FT.)
25	4–1/2
30	5
35	5–1/2
40	6



TYPICAL SERVICE USING PANEL BOARDS

DRAWN	DESIGN	SUPR	DATE	REV
LL	ET	JM	08/17	04

Liberty Utilities®

ENGINEERING AND CONSTRUCTION STANDARD

ELECTRIC SERVICE REQUIREMENTS FOR IRRIGATION SERVICES

7.8.58 OF 86

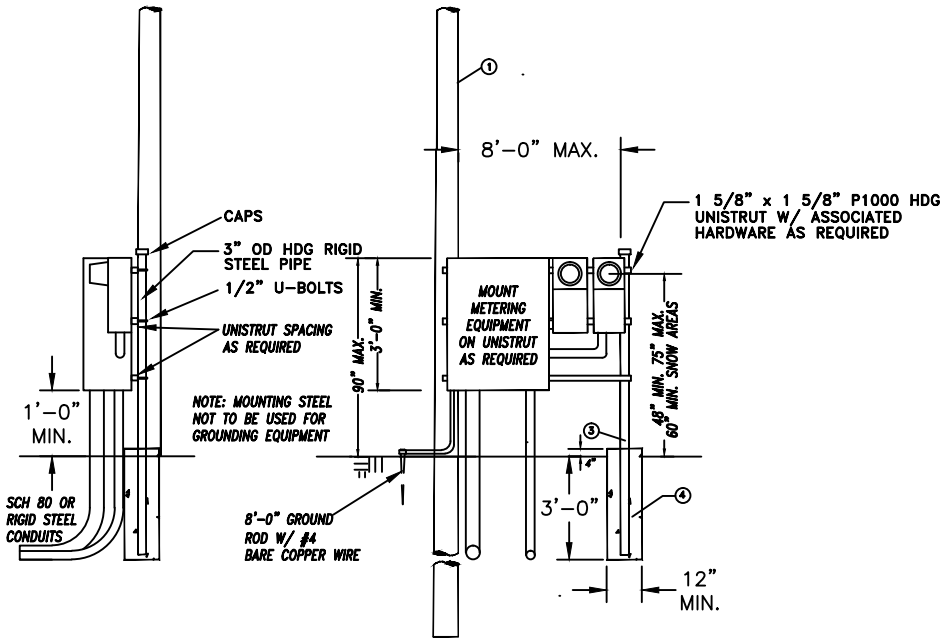
SUBSTRUCTURE

DRAWING NUMBER

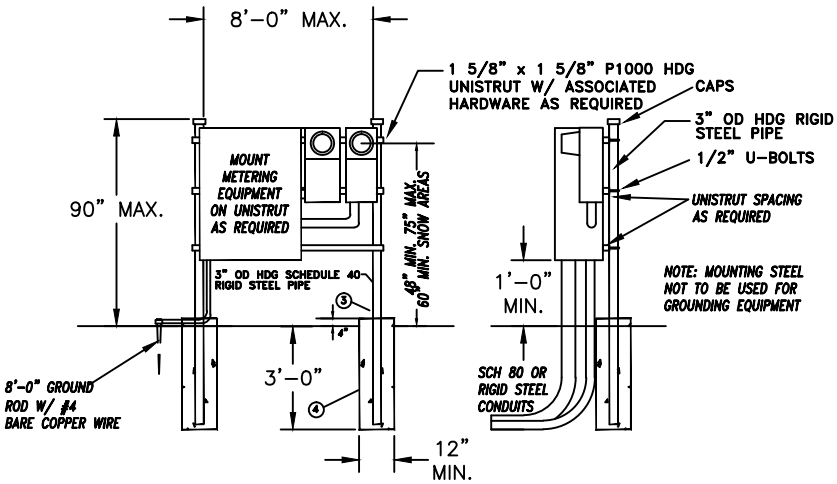
IS0001M

NOTES (FROM SHEET 7.8.58):

1. Pole, 25' minimum with split bolt.
2. Post. See Panel Board Detail for requirements.
3. Panel Boards. See Panel Board Detail for requirements.
4. Meter socket and/or current transformer enclosure per EUSERC Standards.
5. Conduit, ground wire, ground rod per GO 95/128 and local codes.
6. Service conduit, 2" minimum, Sch. 40 PVC, no steel allowed.
7. Pipe strap or plumber's tape, heavy duty galvanized.
8. Service drop by LU. Service insulator and attachment by customer.
9. Down guy and anchor. See Section 9.0 for requirements.



PREFERRED PANEL BOARDS USING UNISTRUT MOUNTING HARDWARE



Liberty Utilities®

DRAWN	DESIGN	SUPR	DATE	REV
LL	ET	JM	08/17	04

ENGINEERING AND CONSTRUCTION STANDARD

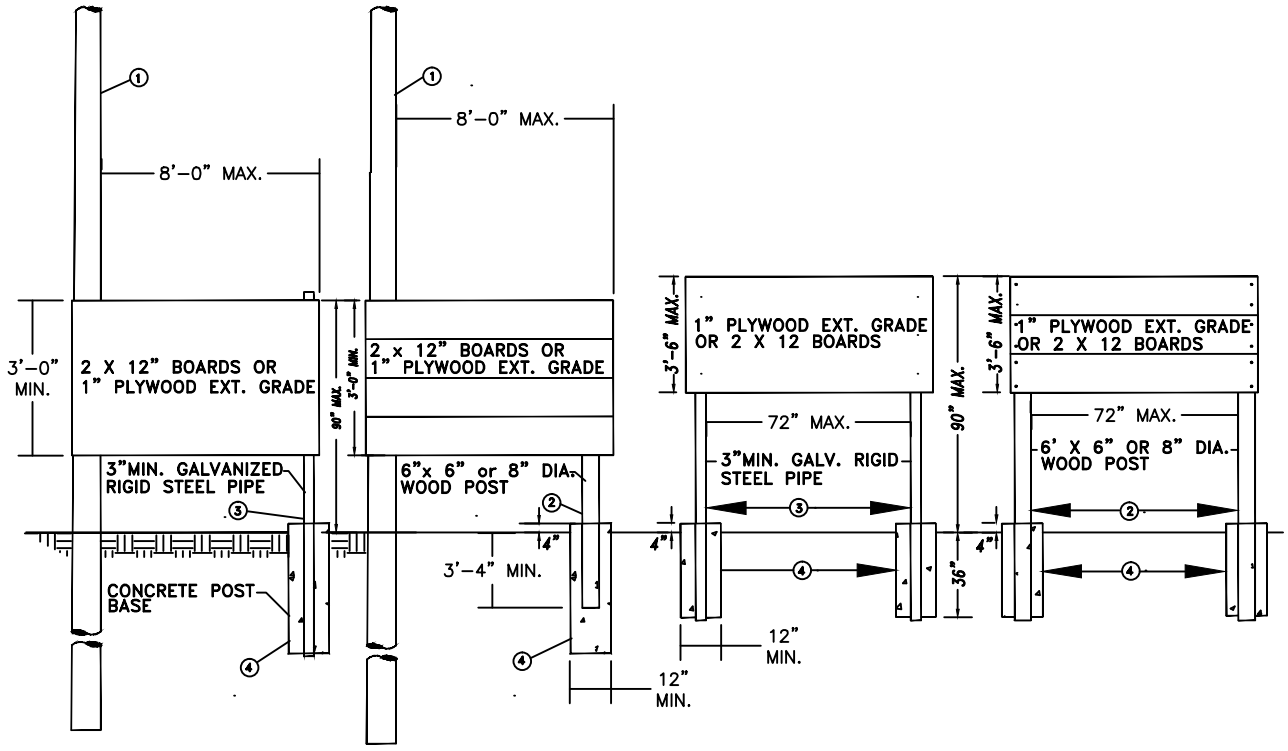
ELECTRIC SERVICE REQUIREMENTS FOR IRRIGATION SERVICES

7.8.59 OF 86

SUBSTRUCTURE

DRAWING NUMBER

IS0001M



ALTERNATE PANEL BOARD CONSTRUCTION USING WOOD

NOTES:

1. The service pole shall be round and shall be at least 25 feet in length (4-1/2 feet in ground) with a minimum top circumference of 16 ". The pole shall be machine shaved and full length treated by pressure or other process which will provide equivalent penetration and retention. See ANSI O5.1 for current pole specifications. ***Brush application of wood preservative is ineffective and, therefore, not acceptable.***

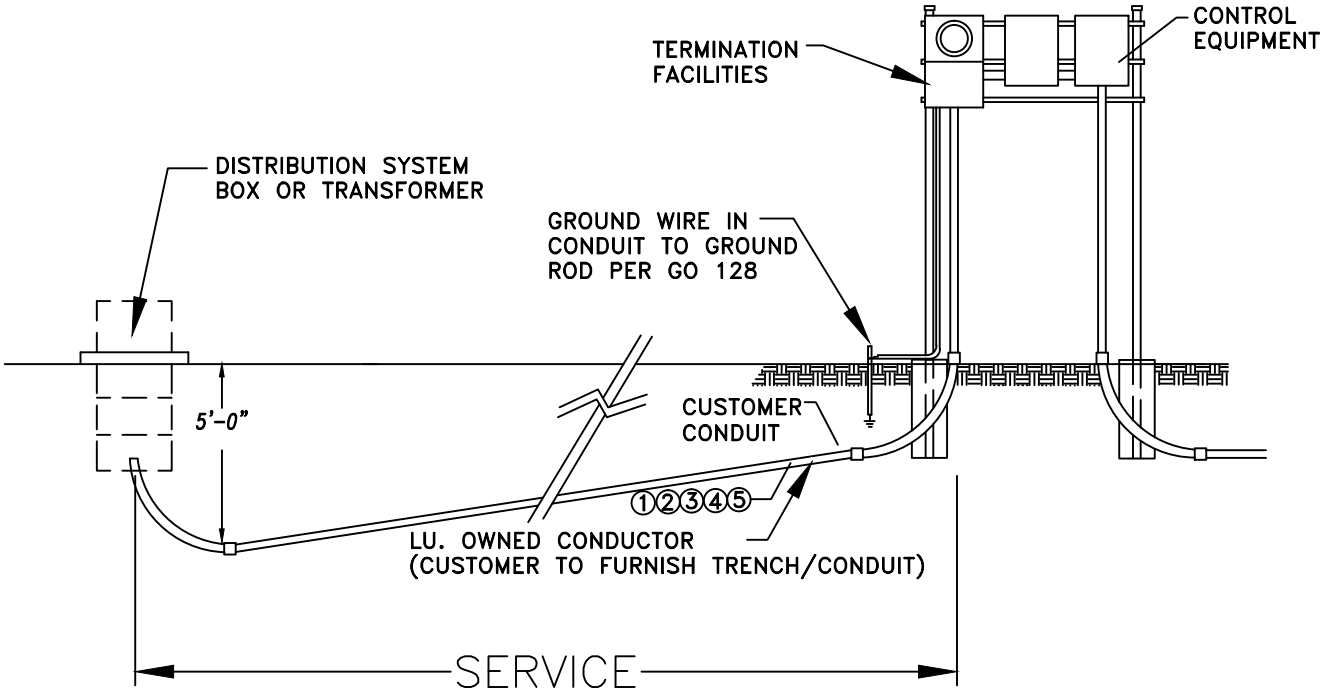
2. Wood posts shall be a minimum cross section of 6" x 6" or 8" in diameter and be treated per note 1 above.

3. Pipe posts shall be a minimum 3" in diameter and be galvanized rigid steel.

4. The concrete footing shall be a minimum of 12" in diameter and a minimum of 36" in the ground and extend a minimum of 4" above the ground.

8.0 U/G SERVICE FROM UNDERGROUND DISTRIBUTION

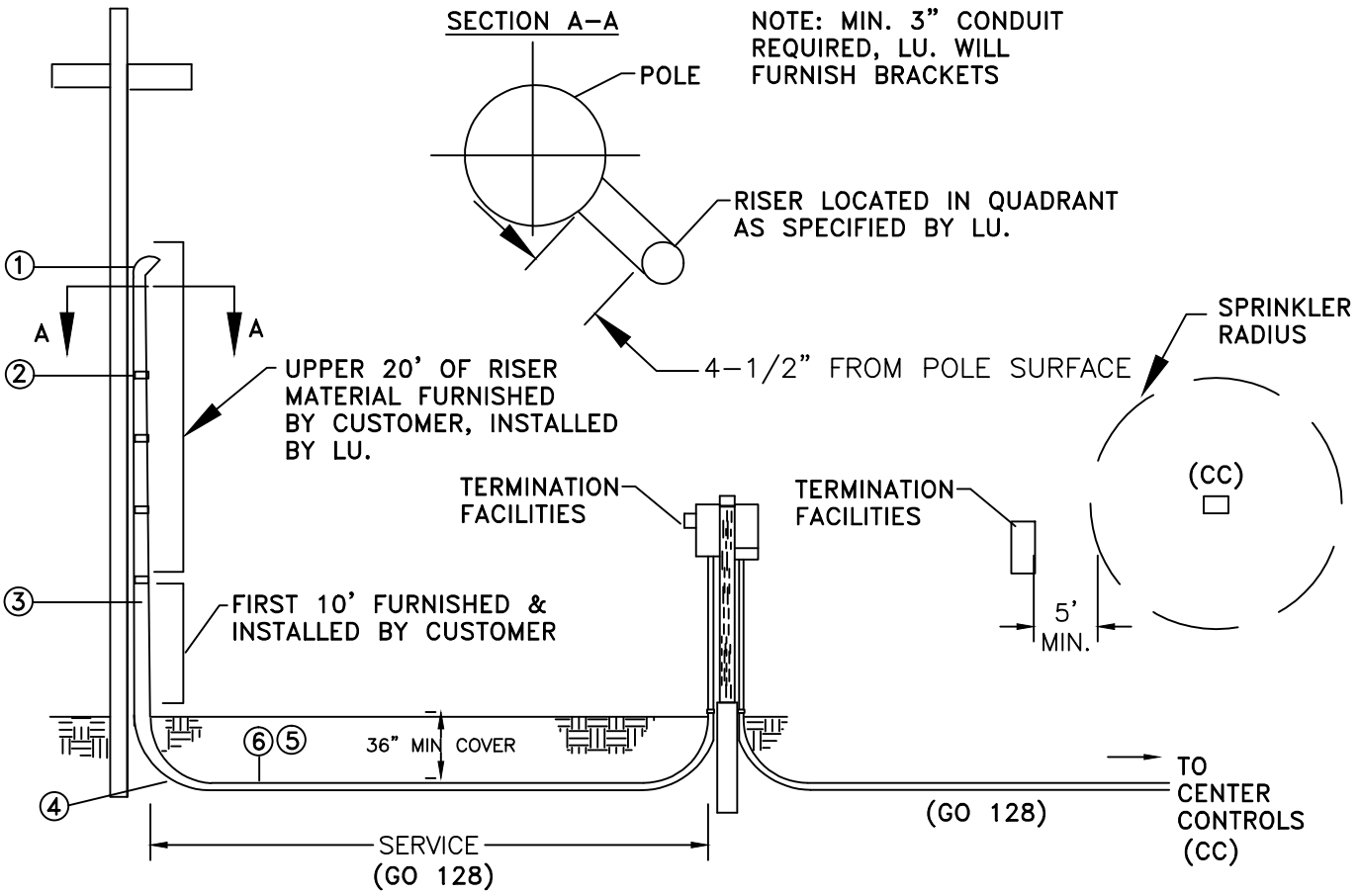
If the customer prefers to have the service installed underground, the service may be provided by means of a riser installed on a pole or from an underground distribution system. The local LU office should be contacted for assistance in layout of the underground service.



TYPICAL UNDERGROUND SERVICE USING PANEL

NOTES: (Customer to provide and install)

1. For conduit sizing details, see CB0003U, 600V Underground Cable and Conduit Selection Guide.
2. A ***maximum of 180°of accumulated bends is allowed***. Pull boxes will be required if more bends are necessary.
3. Underground conduit must be rigid steel, IMC, or electrical, gray, PVC (min. Sch. 40 or ANSI/ASTM F512, DB-120). ***DB-120 conduit cannot be exposed***. For more detail see CD0004U Conduit Application Guide.
4. **For services over 50' in length, additional pull boxes may be required.** Contact local LU office for acceptable layout.
5. A minimum 400# pull line with sequential footage markings to be installed in each conduit by customer at time of conduit installation.

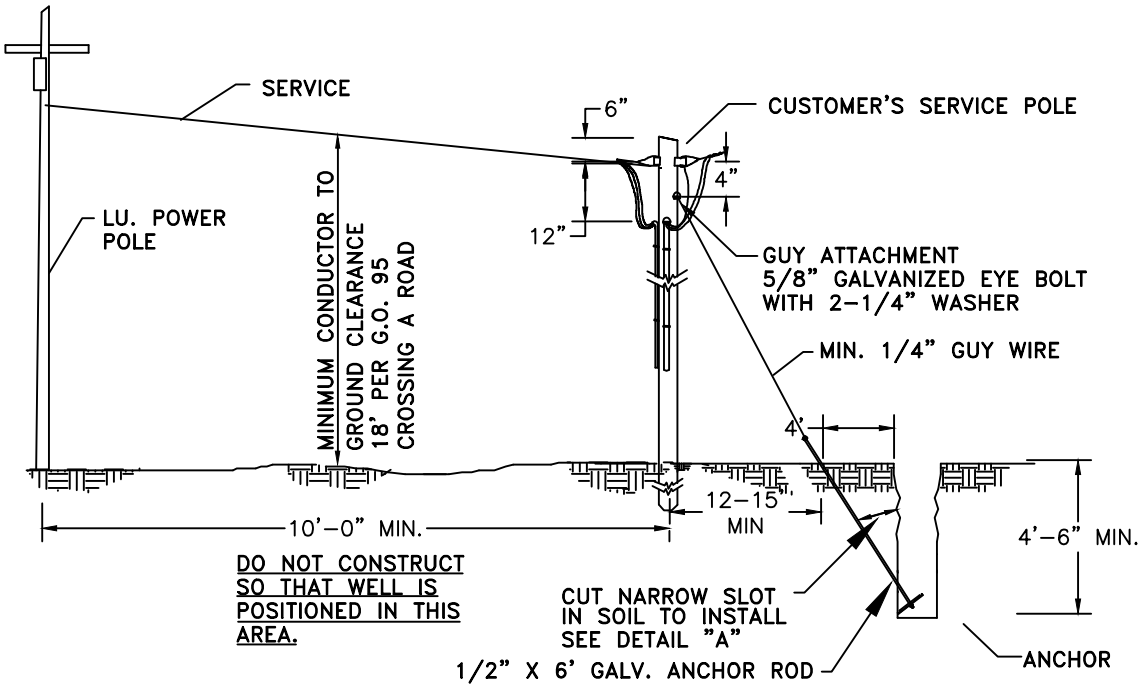


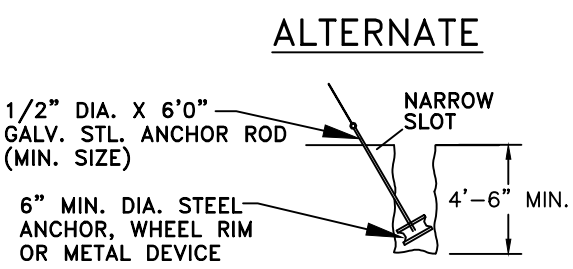
NOTE: (Customer to provide and install items)

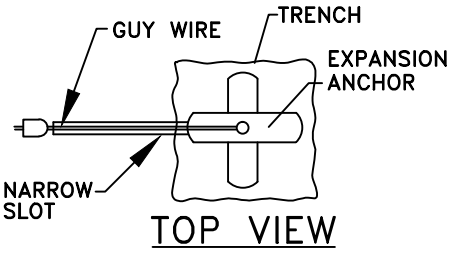
1. Weather head.
2. ***Steel not allowed in upper section***. Minimum 3" (for 200 amp panels) Sch. 40 PVC gray electrical conduit. *Brackets furnished and installed by LU.*
3. Rigid steel, IMC, or Sch. 80 PVC electrical, gray, conduit for first 10' above ground.
4. Minimum 36" radius sweep. Sweep material to match first section of riser material.
5. Minimum 3" ANSI/ASTM F512, DB-120 electrical, gray, conduit with pull line.
6. If service is over 75' in length from base of pole, a box may be required at base of pole.

NOTE: Notes from U/G Service from Underground Distribution also apply.

9.0 GUYING AND CLEARANCES







NOTES:

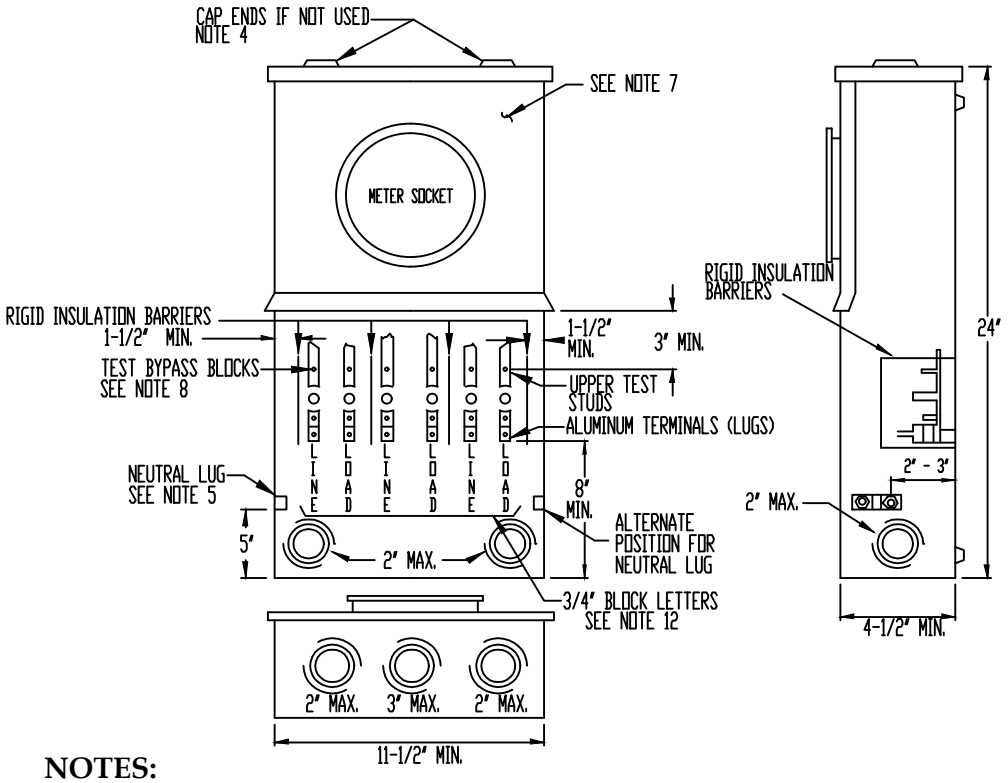
1. The service pole shall be located at least 10' from any well and in such a position the overhead conductors or guys will not cross through or over the area within a radius of 10' from the well. The service pole shall be located a minimum of 10' and a maximum of 75-100' from the LU pole. ***All service poles shall be anchored and guyed against the pull of the service drop.***

10.0 METERING

Refer to LU. Standard CM0001M, Metering Section 8.0, for details.

11.0 TERMINATION FACILITIES

0 - 200 AMPERES OVERHEAD OR UNDERGROUND SERVICE

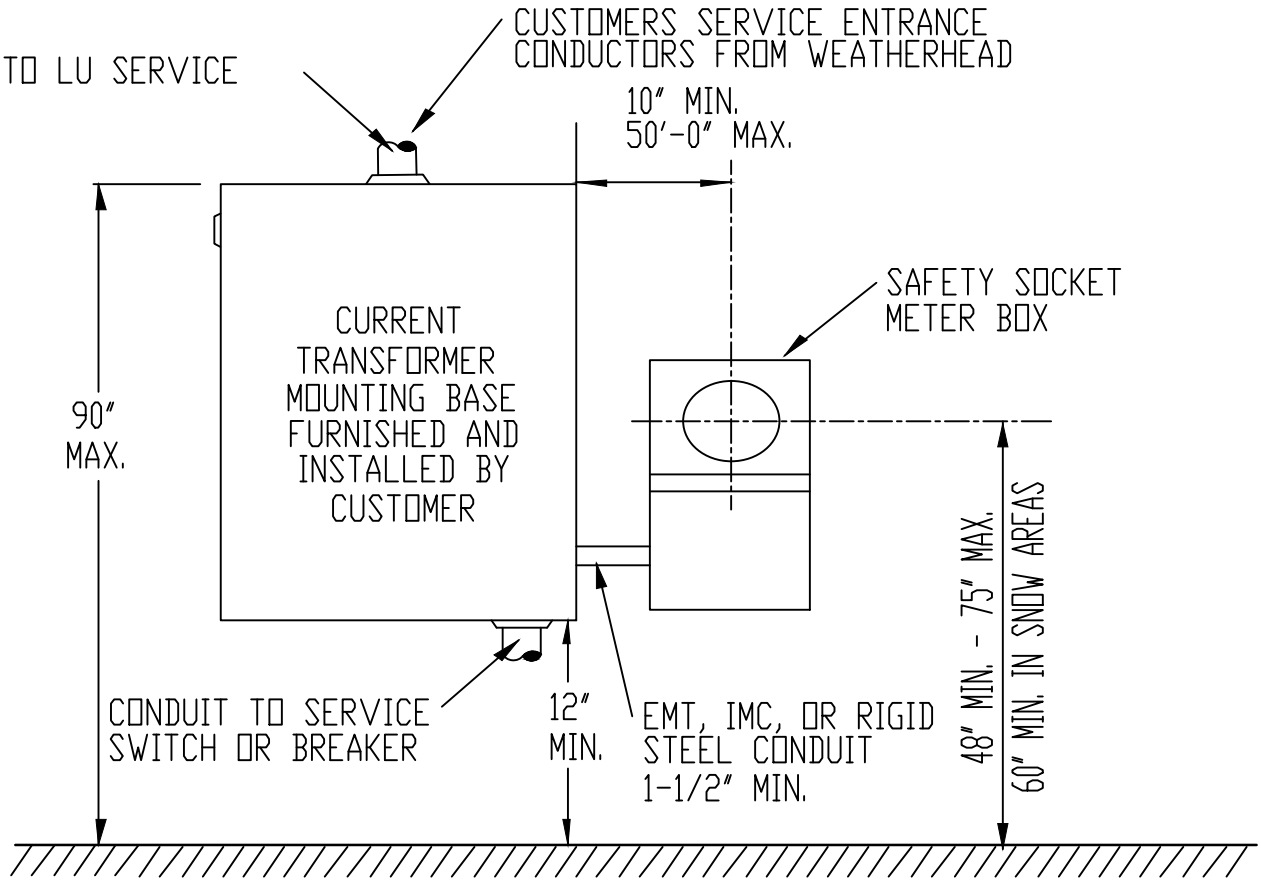


NOTES:

1. This device shall conform to EUSER Committee Standards and may be used for installations served by an overhead drop or underground cable run. Three phase device shown; single phase device is the same size.
2. 0-125 Amp panels shall have aluminum terminals (lugs) for #6 thru #1/0 wire.
3. 126-200 Amp panels shall have aluminum setscrew terminals (lugs) for #1/0 thru 250 kcm wire.
4. Hubs capped off if used for underground feed.
5. Rigid insulating barriers will be provided between phases.
6. Insulated bondable vertical lay-in, double neutral lug with 1/0 wire capacity for 0-125 amp panel, 250 kcm wire capacity for 126 - 200 Amp panels, mounted on either sidewall.
7. Test-bypass blocks shall be bussed or wired to socket jaws or terminals which permit LU to bypass customer's load and de-energize the socket.
8. All section panels shall be independently removable. Upper panel shall be non-removable when meter is in place. Meter socket shall be mounted on support and attached to upper panel. Lower panel shall be sealable and permanently labeled: **"DO NOT BREAK SEALS - NO FUSES INSIDE"**
9. Decals on inside back of enclosure in 3/4" minimum block lettering.

12.0 REFERENCES

201 - 400 AMPERES OVERHEAD



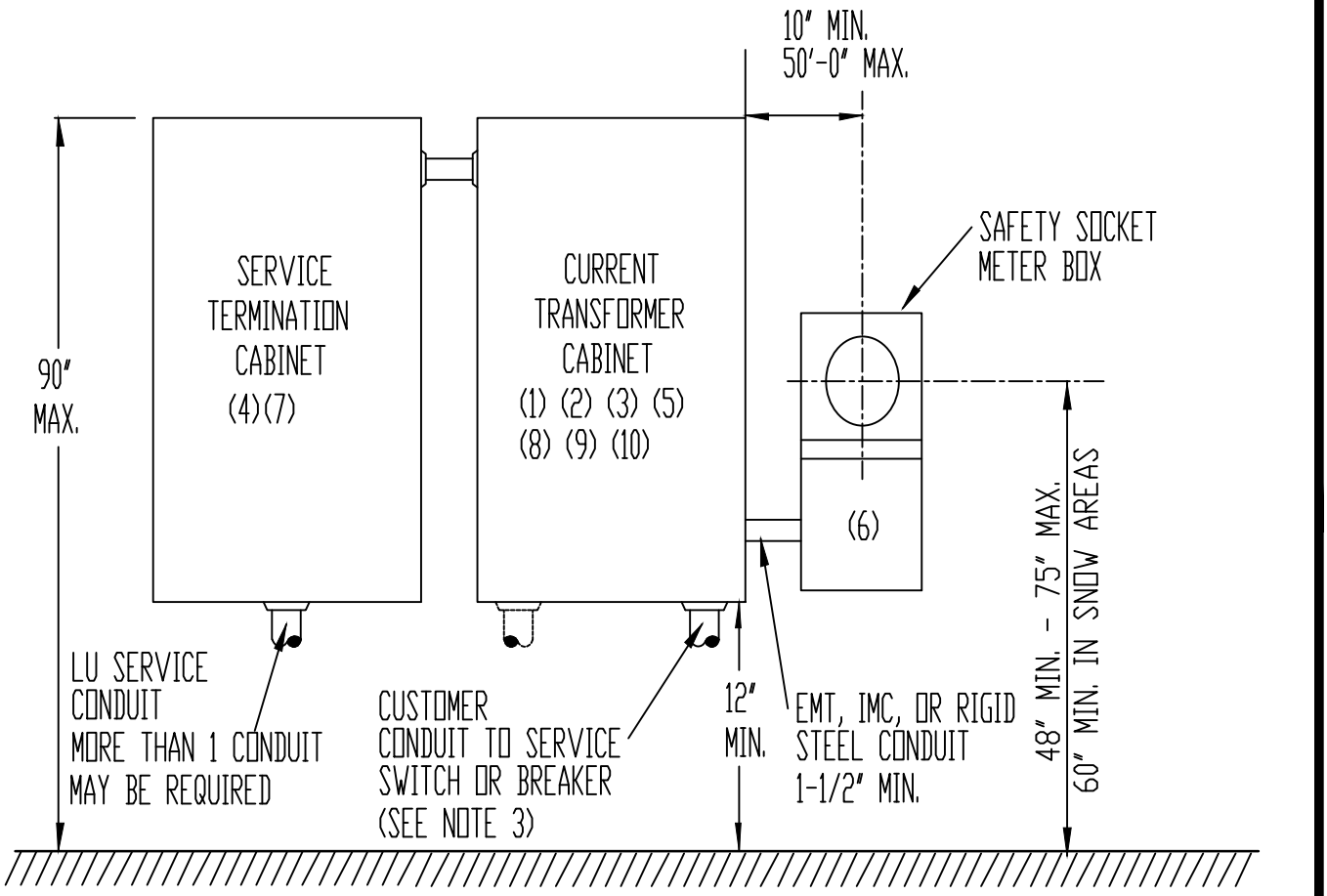
For single overhead irrigation service which is to be metered using current transformers, the customer shall furnish, install, own and maintain a separate current transformer cabinet and safety socket meter box and required service entrance conductors, conduit and weather head to the point of attachment of LU's overhead service. The bussed current transformer cabinet is also acceptable for this application. Equipment shall conform to EUSER Committee Standards.

The customer shall furnish lugs and connect his service entrance conductors to the line and load sides of the current transformer mounting base.

The customer's neutral conductor shall be continuous without splice through the current transformer cabinet.

For dimensions of **safety socket box, see Sheet 7.8.71.**
For dimensions of **current transformer cabinet, see Sheet 7.8.70.**
For three phase four wire service a mounting bracket for three CT's is required.
For three phase three wire service two CT's are required.

201 - 800 AMPERE UNDERGROUND



NOTES:

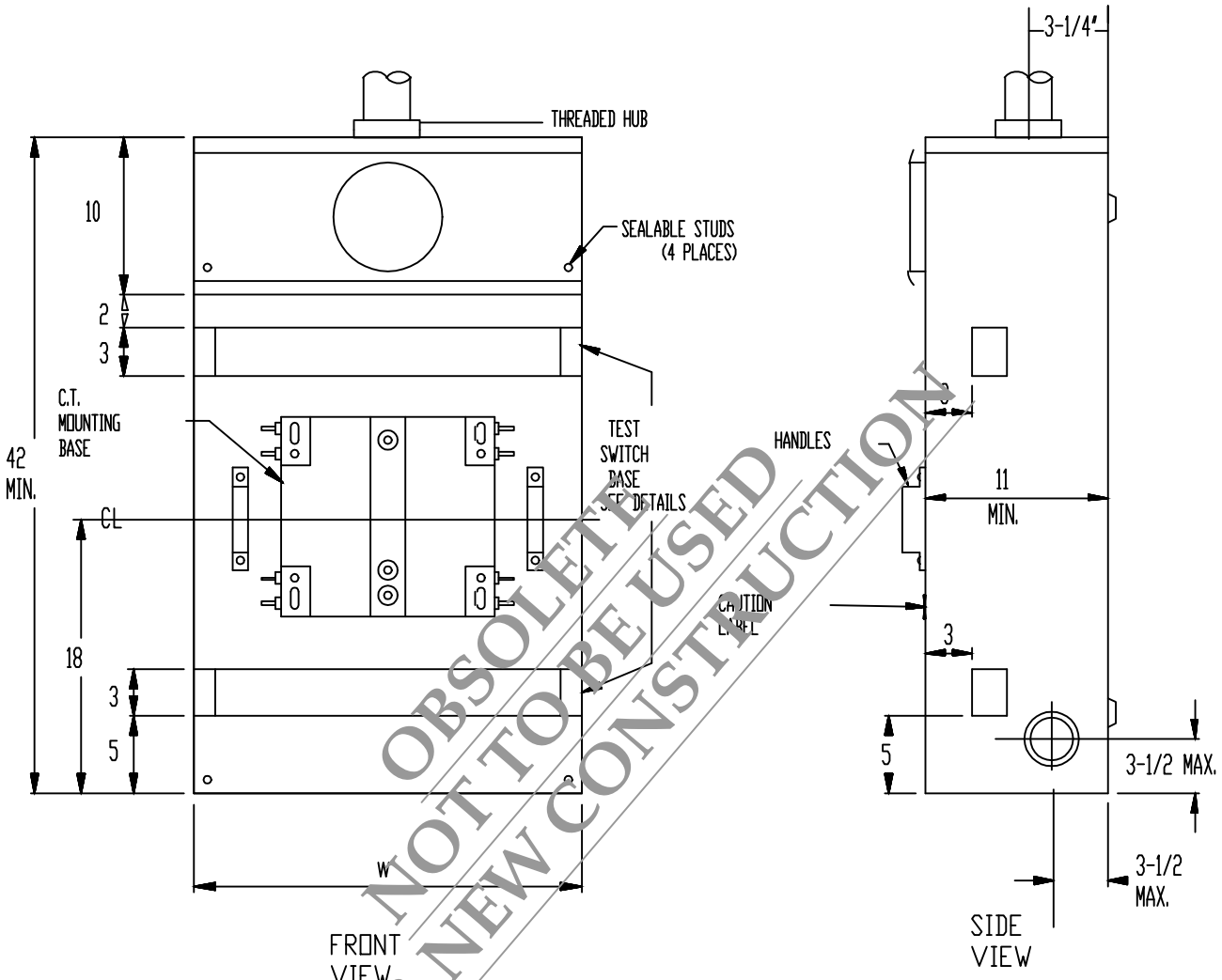
1. For service larger than 800 Amperes, consult local LU office.
2. For a single underground irrigation service, which is to be metered using current transformers, the customer will furnish, install and maintain a service termination cabinet, current transformer cabinet and safety socket meter box as shown above. Equipment shall conform to EUSER Committee Standards.
3. For compactness of equipment and aesthetics, it may be desirable to consider the installation of a switchboard service section.
4. LU will pull and terminate its service conductors directly to the service termination facilities in the service termination cabinet. It shall be the customers responsibility to provide the all wiring/terminations on the load side of the service termination cabinet.

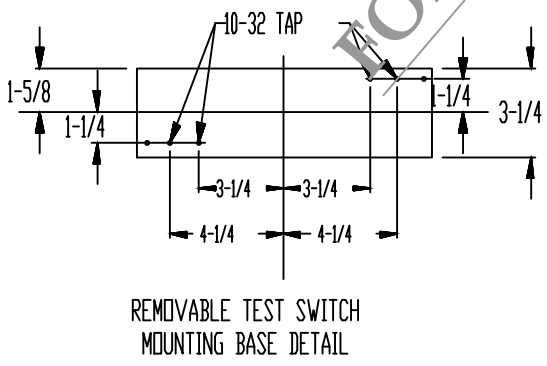
5. For dimensions of **current transformer cabinet, see Sheet 7.8.70.**
6. For dimensions of **safety socket box, see Sheet 7.8.71.**
7. For dimensions of **service termination cabinet, see Sheet 7.8.72.**
8. For three phase, four wire service, a mounting bracket for three CT's is required.
9. For three phase, three wire service, a mounting bracket for two CT's is required.
10. Customer is responsible for providing and installing service entrance conductors, periscope and grounding conductors. Service entrance conductor ampacity and insulation material must conform to the requirements of GO 95 RULE 49.4 Grounding conductors must conform to GO 95 RULE 59.4
12. The service entrance conductors shall be sized according to GO 95 requirements to meet the rating of the main service equipment, but, in no-case, shall be less than #8 AWG.
13. Maximum horsepower for single and grouped motors is based on the National Electrical Code for Motor Circuit Conductors, Article 430, Part M.(Table 1)

TABLE 1

SERVICE VOLTAGE	MAXIMUM HORSEPOWER (3) SINGLE OR GROUPED MOTORS	METERING EQUIPMENT MAXIMUM CONTINUOUS DUTY AMPACITY	TYPE METER EQUIPMENT (1) (2) REQUIRED
480 GrdY/277 Volts, 3 phase, 4 wire	**60 HP** SINGLE OR GROUPED	**100** AMPERES	7- JAW BUSED SAFETY-SOCKET METER BOX
	125 HP SINGLE OR GROUPED	**200** AMPERES	
	150 HP SINGLE OR GROUPED	**320** AMPERES	7-JAW BUSED SAFETY-SOCKET METER BOX
		400 AMPERES	COMBINATION METER, CURRENT TRANSFORMER AND SERVICE TERMINATION CABINET WITH 13-JAW SOCKET AND CT MOUNTING BASE

201 - 400 AMPERE COMBINATION METER AND CT CABINET FOR OVERHEAD SERVICE





REMOVABLE TEST SWITCH MOUNTING BASE DETAIL

MINIMUM BOX DEMENSIONS

WIDTH (MIN.)	
4 WIRE	3 WIRE
36 INCHES	24 INCHES

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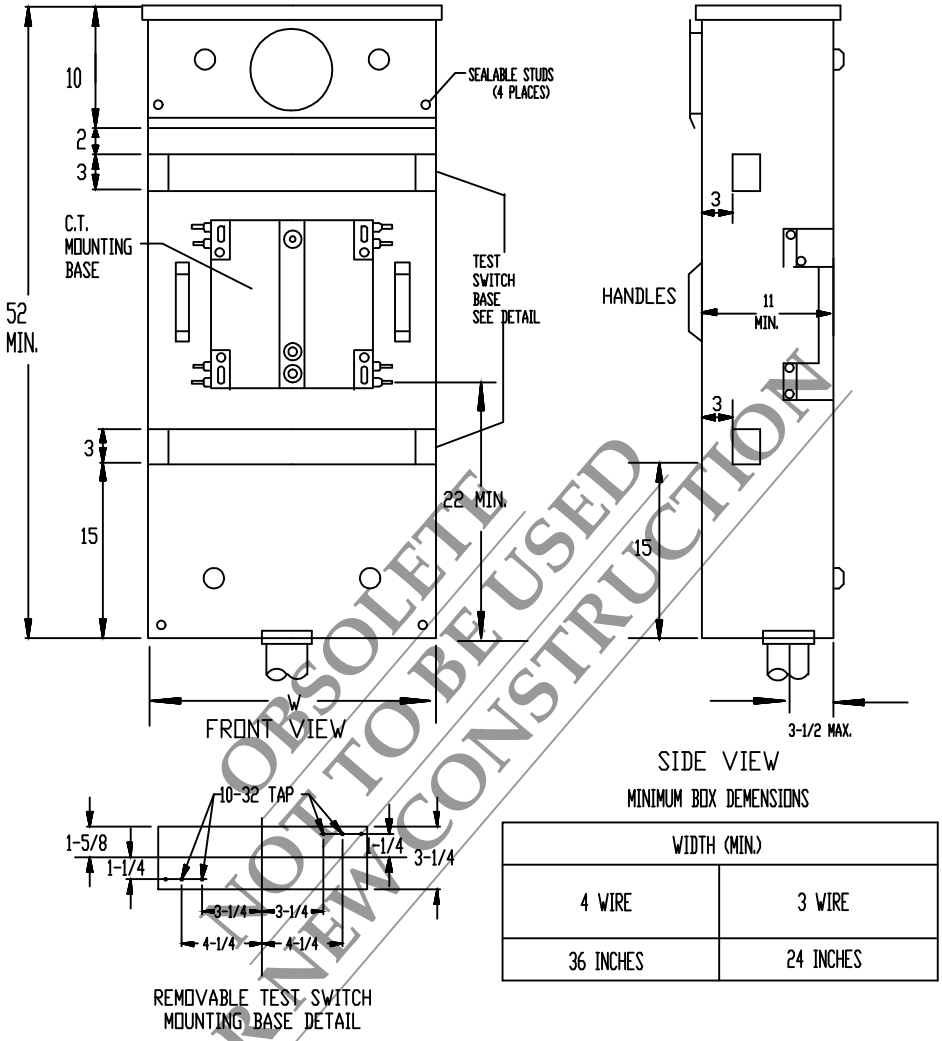
201 - 400 AMPERE COMBINATION METER AND CT CABINET FOR UNDERGROUND SERVICE



MINIMUM BOX DEMENSIONS

WIDTH (MIN.)	
4 WIRE	3 WIRE
36 INCHES	24 INCHES

NOTES:

1. Removable test switch perch shall be drilled and tapped the same as the removable plate on sheet 7.8.68.
2. All securing screws shall be captive. All panels and covers shall be sealable.
3. When exposed to weather, cabinet shall be raintight.
4. Provisions shall be made for bonding a neutral to the enclosure.
5. Provisions shall be made in the current transformer compartment for an insulated, bondable termination of LU's neutral when required, and for the third phase of a three-wire, three-phase service.
6. **Cabinet shall not be used as a splicing chamber.**

CURRENT TRANSFORMER CABINETS
(SEE TABLE BELOW)

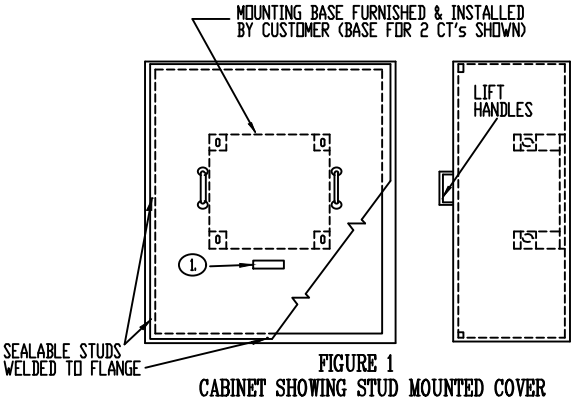


FIGURE 1
CABINET SHOWING STUD MOUNTED COVER

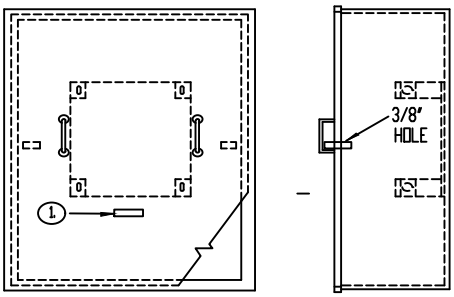


FIGURE 2
CABINET SHOWING FLANGED COVER FASTENED
BY SEALABLE RIVIT LATCHES

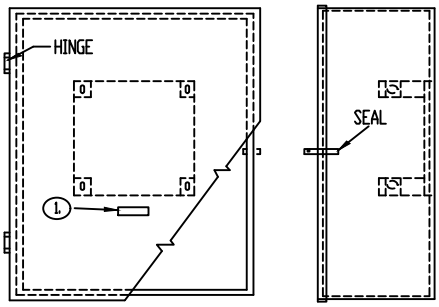


FIGURE 3 HINGED, FLANGED COVER

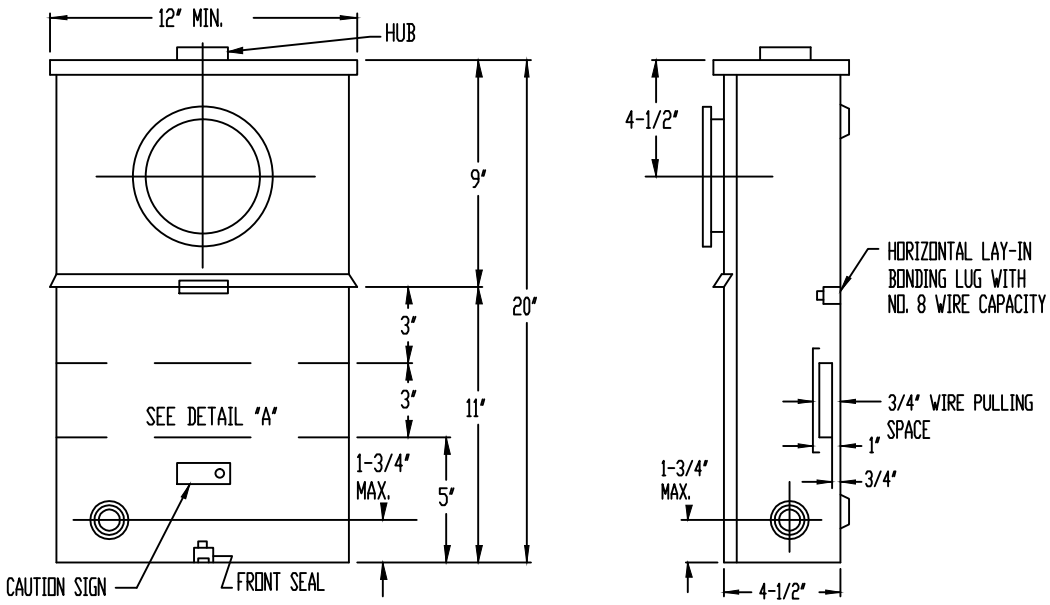
(L) CAUTION SIGN — DO NOT BREAK SEAL NO FUSES INSIDE

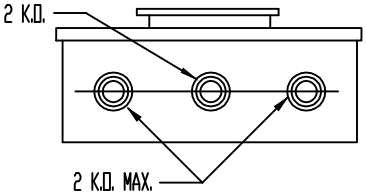
TABLE 2: (minimum cabinet size)			
TYPE OF SERVICE	**400 AMP CABINET SIZE**	**800 AMP CABINET SIZE**	**MOUNTING BASE**
3 WIRE	20" W x 36" H x 11" D	24" W x 48" H x 11" D	2 CT
3 WIRE	30" W x 36" H x 11" D	36" W x 48" H x 11" D	3 CT

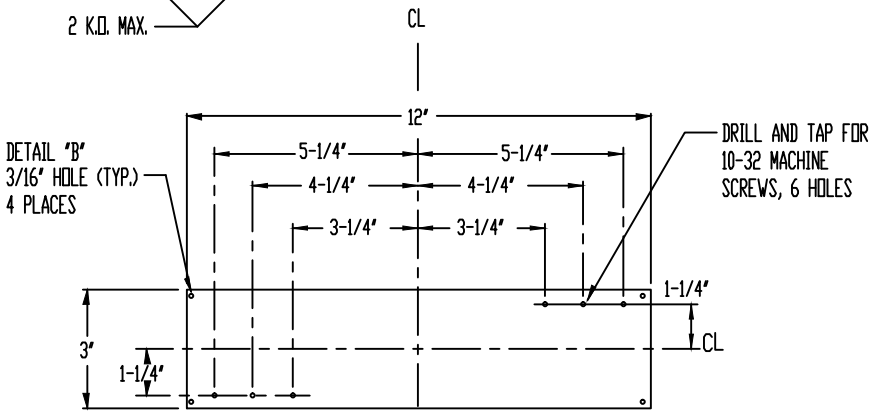
NOTES:

1. Cover shall be sealable
2. Customer shall furnish lugs and connect cable to current transformer mounting base for load side only.
3. ***Current transformer cabinet shall not be used as a splicing chamber.***
4. When exposed to weather, cabinet shall be raintight.
5. Grounding lug(s) shall be provided and secured to CT cabinet.
6. See CM0001M, Section 8.0, for CT base details.

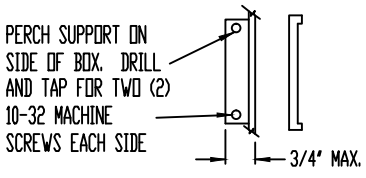
SAFETY SOCKET METER BOX







DETAIL "A"
REMOVABLE TEST
BLOCK PERCH



DETAIL "B"

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ELECTRIC SERVICE REQUIREMENTS FOR IRRIGATION SERVICES

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SUBSTRUCTURE

DRAWING NUMBER
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SERVICE TERMINATION CABINET

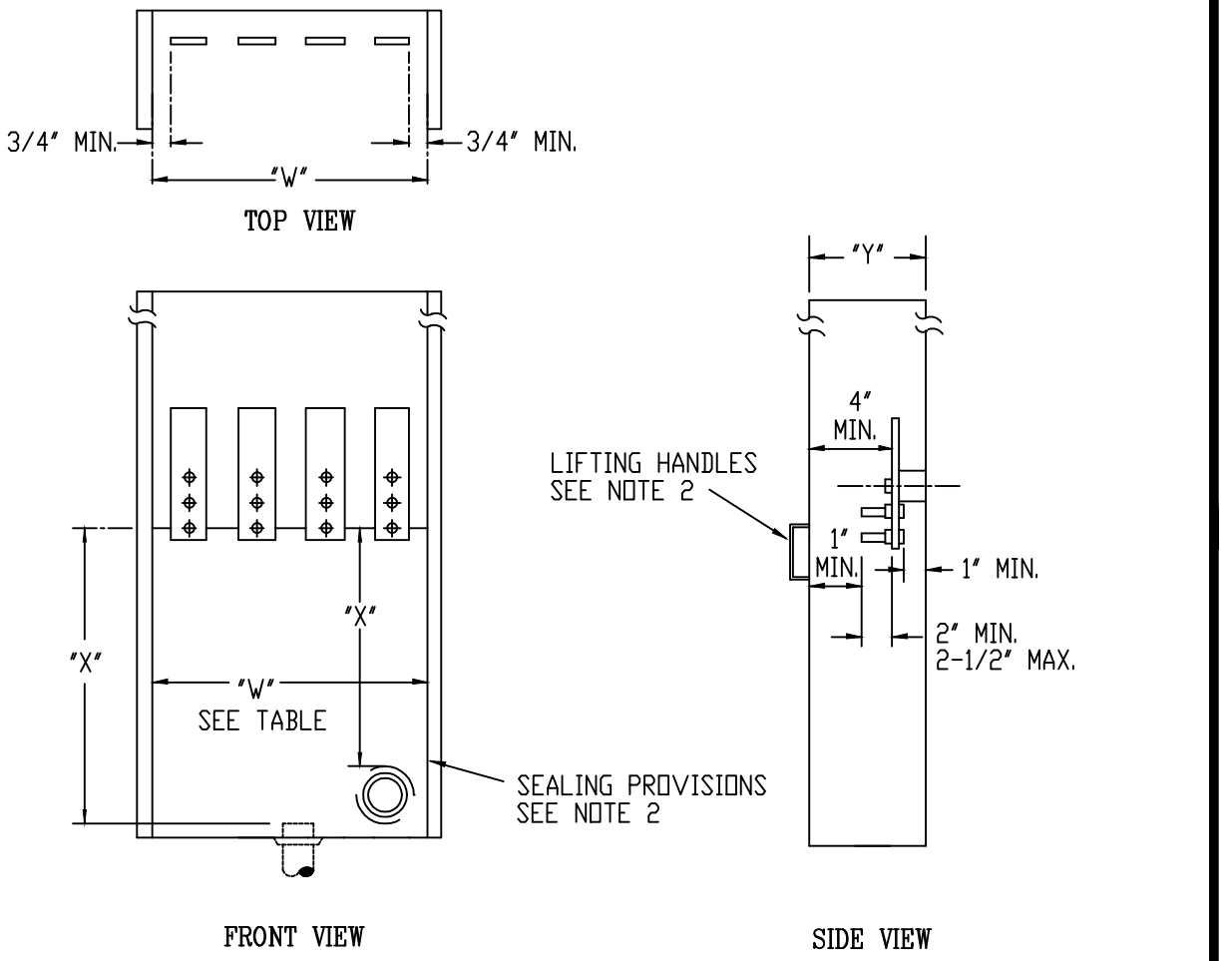


TABLE 3: (minimum pullbox dimensions)				
SERVICE AMPACITY	**"W"**		**"Y"**	**"X"**
	3-WIRE	**4-WIRE**		
0 - 200	10-½	14"	6"	11"
201 - 400	10-½	14"	6"	22"
401 - 800	16-½	22"	11"	26"
801 - 1200	22-½	30"	11"	26"

NOTES:

1. The above minimum dimensions are for the case where conduit enters the bottom of the pull box and all load conductors exit above the terminals. Where the service conduit enters from the side/back (bottom conduit entrance is preferred) of the pull box, the "X" dimension shall be taken from the closest portion of the conduit to the nearest termination bolt. The minimum pull box access opening (W), is measured between the left side and right side return flanges.

2. Pull box covers shall be removable, sealable, provided with two lifting handles, and limited to a maximum size of 9 square feet in area. Sealing provisions shall consist of two drilled stud and wingnut assemblies on opposite sides on the panel. All securing screws shall be captive.

3. Terminating facilities for service supply conductors shall be two 1/2" steel bolts (NEMA standard) as shown. One set shall be provided for terminations rated up to 400 amperes, two sets of bolts for terminations rated 401-800 amperes, and three sets of bolts for terminations rated 801-1200 amperes.

4. ***Terminating facilities shall be braced/secured to prevent turning or bus misalignment when the cables are installed.***

5. *The fault duty rating must match or exceed the panel rating*.

SERVICE ENTRANCE GROUNDING

1.0 INDEX

2.0 PURPOSE

This standard outlines the general requirements for service entrance grounding. All Local, State and National Electric Codes must be consulted for acceptable methods in specific areas.

3.0 GENERAL INFORMATION

3.1 The proper bonding and grounding:

A. Limits excessive voltages from lightning, line surges, or unintentional contact with higher voltage systems,

B. Stabilizes the voltage to earth (ground) during normal operations,

C. Limits voltage to ground on conductive materials enclosing electric conductors or equipment, and

D. Establishes an effective path for fault current to facilitate the operation of overcurrent devices in the event of insulation failure or ground faults.

3.2 All installations must be in compliance with all the Local, State and GO 95 (RULE 59.4) codes and ordinances.

4.0 BONDING

4.1 Application:
Bonding must be provided where necessary to assure electrical continuity and the capacity to *safely* conduct any fault current likely to be applied.

4.2 Requirements:
The following metallic equipment must be bonded and grounded together, by means of threaded fittings or bonding jumpers, to assure the electrical continuity required for a grounding circuit:

A. Service raceways or service cable armor,

B. All service equipment enclosures, including meter fittings of boxes, interposed in the service raceway, and

C. any conduit or armor which forms part of the grounding conductor.

The grounding conductor, bond or bonding jumper must be attached to circuits, conduits, enclosures and the like, which are to be grounded, by means of lugs, connectors or clamps, which are approved for the purpose.

5.0 GROUNDING ELECTRODE

5.1 A ***grounding electrode*** is a conductor, normally imbedded in the earth or in concrete (which is in direct contact with the earth), used for maintaining ground potential on conductors connected to it and for dissipating into the earth, current subjected to it.

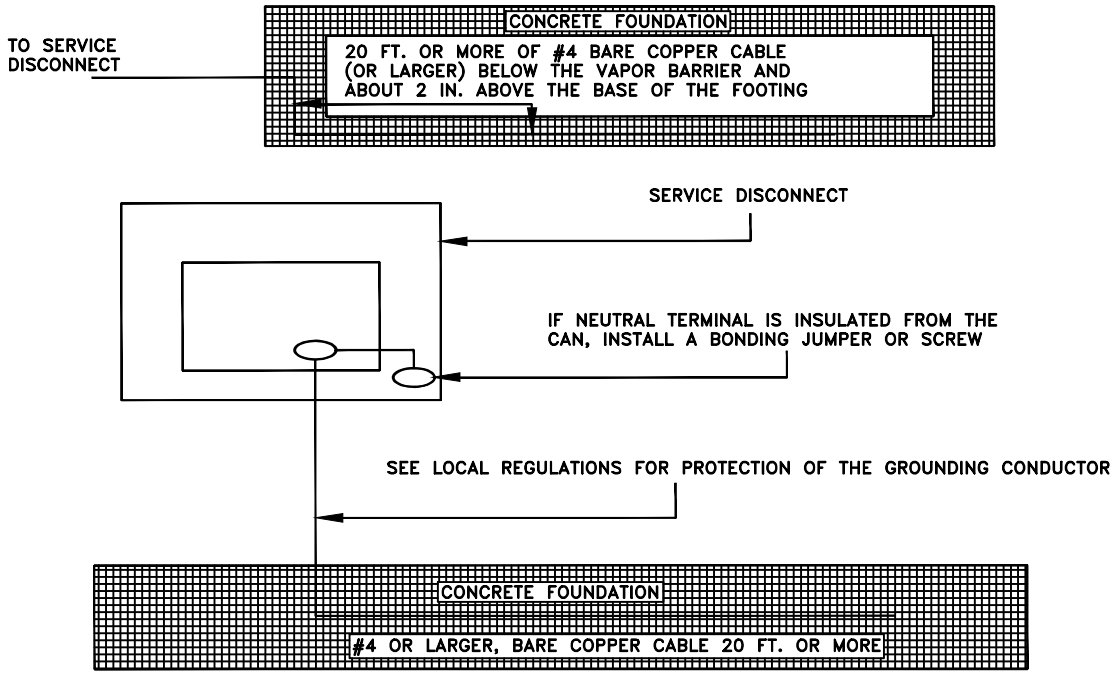
5.2 Types:

A. UFER:

Application:
The UFER type ground is the preferred grounding electrode in those areas where it is recognized by local authority having jurisdiction.

Requirements:
The minimum requirements for a UFER ground, as outlined in NEC 250, is a minimum of 20' of bare copper wire, not smaller than #4, encased by at least 2" of concrete and located near the bottom of a concrete foundation footing that is in direct contact with the earth, as illustrated in Figure 1 on the next page. Local codes should be consulted for additional requirements.

Figure 1
UFER Type Ground



B. Metallic Water Pipe:

Application:
In those areas where the UFER type ground is not recognized or where a concrete foundation is not being poured, such as reconstruction projects or mobile homes, a metallic underground piping system, either local or suppling a community, may be used as a grounding electrode. In any event, the interior piping system should be electrically continuous and bonded to the grounding electrode.

Requirements:
The buried metallic portion of the water pipe must be at least 10' in length including any metal well casing effectively bonded to the pipe. Where the metallic portion of the water pipe does not meet this requirement or where it is likely to be isolated by insulated joints/couplings, it must be supplemented by the use of an additional electrode of a type described in Section 5.2 C.

C. Electrodes, other:

Application:
Where electrodes described in A and B above are not available, or where a supplement to water piping is required, the grounding electrode shall consist of (a) driven pipe, (b) driven rod, or (c) buried plate.

Requirements:

(a). Driven Pipe: Galvanized pipe, ¾" trade size, minimum x 8', driven to a depth of 8'.

(b). Driven Rod: Steel or iron rods, 5/8" OD minimum x 8', or copper clad, steel rods, ½" OD minimum x 8', driven to a depth of 8'.

(c). Buried Plate: Iron or steel at least 0.25" thick or of copper at least 0.06" thick, which presents at least 2 square feet of surface area to exterior soil and buried a minimum of 2½' deep.

6.0 RESISTANCE

NEC 250 limits the resistance between electrodes and grounds to 25 ohms. It also states that where resistance exceeds this limit, two or more electrodes shall be connected in parallel. The additional rods should have a minimum of 6' separation.

7.0 GROUNDING ELECTRODE CONDUCTOR

7.1 The grounding electrode conductor is the conductor used to connect the grounding electrode to the equipment grounding conductor and to the neutral (grounded conductor) of the circuit at the service.

7.2 The grounding electrode conductor shall be installed and protected in accordance with the NEC 250 and applicable local codes and shall be continuous (without bolted splices) from the grounding electrode to the neutral connection. Aluminum or copper-clad aluminum grounding conductors shall not be used where in direct contact with masonry or the earth, or where subject to any corrosive conditions. Where used outside, aluminum or copper-clad aluminum grounding conductors shall be installed within 18" of the earth.

7.3 The grounding electrode conductors shall be sized in accordance with the minimum conductor sizes shown in the NEC 250-66 table.

7.4 Refer to the current issue of the NEC table 250-122 for the minimum size equipment grounding conductors for grounding raceways and equipment.

NEC TABLE 250-66
MINIMUM GROUNDING ELECTRODE CONDUCTOR SIZE FOR A/C SYSTEM

Size of Largest Service - Entrance Conductor		Size of Grounding Electrode Conductor	
Copper	**Aluminum or Copper-clad Aluminium**	**Copper**	**Aluminum or Copper-clad Aluminium**
#2 or smaller	1/0 or smaller	8	6
1 - 1/0	2/0 - 3/0	6	4
2/0 - 3/0	4/0 - 250KCM	4	2
Over 3/0 thru 350 kcm	Over 250 kcm thru 500 kcm	2	1/0
Over 350 kcm thru 600 kcm	Over 5000 kcm thru 900 kcm	1/0	3/0
Over 600 kcm thru 1100 kcm	Over 900 kcm thru 1750 kcm	2/0	4/0
OVER 1100 kcm	OVER 175 kcm	3/0	250 kcm
For any notes to this table, please check the current issue of the NEC.			

OVERHEAD TEMPORARY SERVICE POLE

1.0 PURPOSE

This standard outlines the minimum requirements for installation of a temporary overhead service pole by a customer, having a 100A to 200A, single phase service entrance. In some cases three phase service might be available, consult the local LU office for details. A service pole is considered temporary when the installation is expected to **remain in service for less than one year**. Building construction sites and temporary sales lots are examples. Inspection / approval by local authorities is required before service can be connected.

2.0 LOCATION

Temporary poles shall be placed in such a location that the service drop will not cross portions of adjacent property or any structures on customers' premises unless a radial clearance of 8 feet can be maintained from the structures. Service drop must be a minimum of 18' in California per GO-95, above the ground. Areas subject to heavy truck traffic; dump trucks, cement trucks, etc., may require additional ground clearance. (Contact LU for exceptions.) Temporary poles shall be a minimum of 10 feet and a maximum of 100 feet from LU's pole. When spans of #2 STR triplex exceed 75 feet (or larger conductor) or when crossing roads, temporary poles must be push-braced or back-guyed.

3.0 POLE

Poles may be rectangular or circular in cross section and shall be solid (not laminated). Rectangular poles shall be a minimum cross section of 6" x 6" nominal; circular poles shall be minimum top circumference of 16". The minimum acceptable length shall be 20 ft. and must be set a minimum of 4 ft. in the ground. A taller pole may be required to obtain the required clearances. Untreated redwood, butt-treated cedar and commercially full-treated Douglas Fir poles are acceptable.

NOTE:

Because this temporary pole must be safely climbed by LU linemen, a quality installation is critical.

4.0 SERVICE ENTRANCE EQUIPMENT

Service entrance conductors and grounding must meet applicable Local, State, and GO 95/128 Codes. Meter socket must meet LU requirements. Consult local LU office for detailed information.

5.0 IDENTIFICATION

Customer to provide an identification sign or tag securely attached to pole/panel with street address that matches the structure or building address.

6.0 RISER CONDUIT

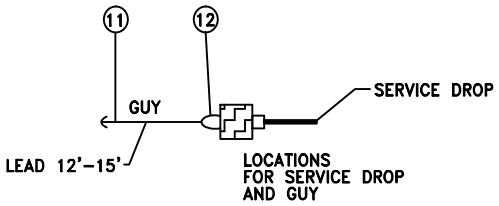
Conduit required to be non-conductive material with waterproof service head. Conduit size and type must meet GO 95/128 (min. schedule 40 PVC electrical conduit).

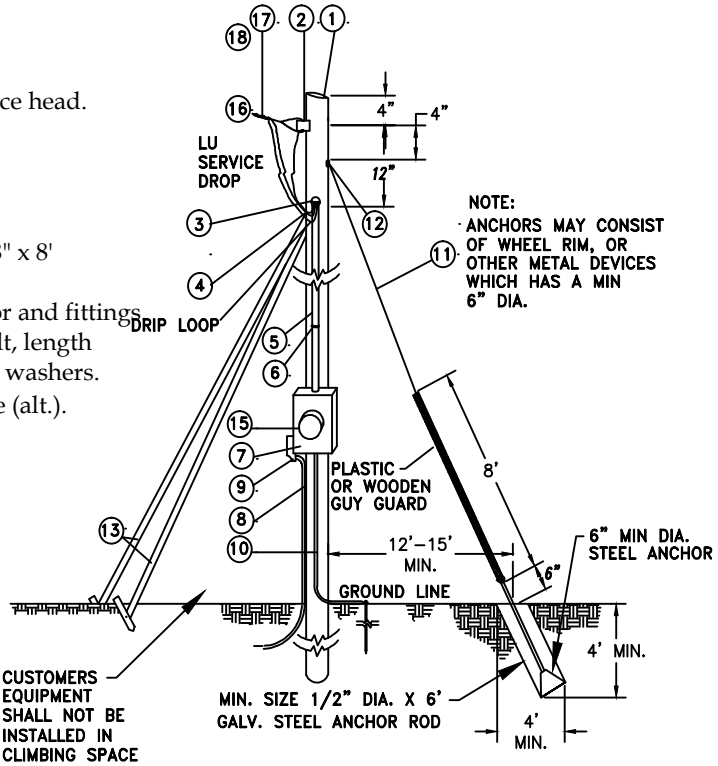
MATERIAL TO BE FURNISHED BY CUSTOMER

1. Pole or timber-min. 20', must meet requirements of Section 3.
2. Service insulator/bracket 4" from top of pole.
3. Service (weather) head.
4. Wire - insulated.
5. Conduit shall be min. Sch. 40 - PVC. electrical conduit & waterproof service head.
6. Conduit straps @ 30" spacings.
7. Meter socket, main service switch.
8. Conduit, load side.
9. Waterproof outlets.
10. Grounding (#4 copper wire with 5/8" x 8' copper clad ground rod).
11. Guy wire (1/4" galv. steel) w/ anchor and fittings.
12. Down guy requires 5/8" galv. eyebolt, length as required, with 2-1/4" square galv. washers.
13. Push brace min. 2" x 4" bolted to pole (alt.).

ITEMS FURNISHED BY LU

15. Meter
16. Service drop wire
17. Wedge clamp
18. Service drop connectors





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ENGINEERING AND CONSTRUCTION STANDARD

TEMPORARY OVERHEAD ELECTRIC SERVICE POLE

7.10.80 OF 86

SUBSTRUCTURE

DRAWING NUMBER

OT0001M

UNDERGROUND ELECTRIC TEMPORARY SERVICE PANELS

1.0 INDEX

2.0 PURPOSE

This standard outlines the minimum requirements for customer owned electric service panel from an underground source for installation of temporary service for building construction, or temporary sales location. This Standard also outlines the criteria for installing a temporary service where the permanent service panel and meter will be installed.

Local ordinances may include requirements in addition to those outlined in this standard. Consult local authorities for city and/or county requirements and permits. Inspection and approval by the city/county is required before service can be connected.

The local LU office *must* be consulted prior to construction if the service is larger than 200 amps or three phase service is desired. When temporary service is to be established at the permanent meter location, prior LU authorization is required.

Service is considered ***temporary*** when the installation is expected to remain in service for ***less than one year***.

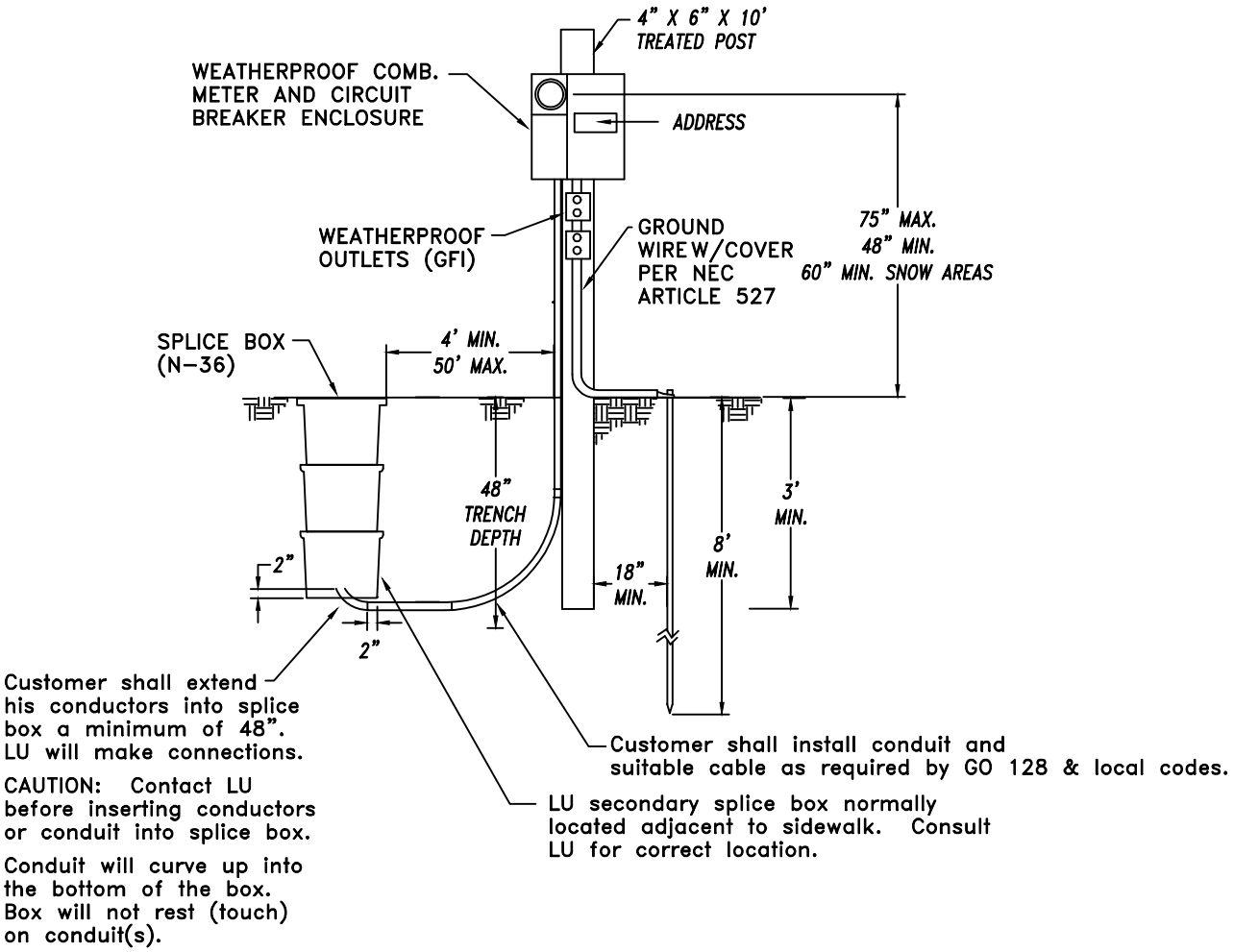
3.0 CUSTOMER RESPONSIBILITY FOR TOTAL TEMPORARY SERVICE

The customer, at his expense, shall furnish, install and maintain the service trench, backfill, conduit, service conductors, wood service post, grounding, weatherproof combination meter and circuit breaker enclosure, and any other materials required for this service beyond the point of attachment to LU's secondary bus.

The customer must install all the facilities per NEC, Article527 and as shown in Figure 1. *Post installations shall be located out of the way of any vehicular traffic.* An address must be provided for the structure. Customer must provide an identification sign or tag securely attached to the post/panel with street address.

LU will furnish and install the service cable connectors from the source to load cables, ***at the expense of the customer***. Arrangements for this service should be made, prior to construction, at the local LU office.

Figure 1



Total Temporary Service Detail

4.0 CUSTOMER RESPONSIBILITY FOR TEMPORARY SERVICE IN PERMANENT LOCATION

The customer, at his expense, shall furnish and install the service trench, backfill, conduit, panel mounting hardware, grounding, weatherproof combination meter and circuit breaker enclosure, and any other materials required for this service. The customer must install all the facilities per LU requirements and as shown in Figures 2 thru 6. An address must be provided for the structure. Customer must provide an identification sign or tag securely attached to the post or panel with street address, if not on structure or building.

SURFACE MOUNT PANELS-(Sheet 7.11.84) - Surface mount panels shall be equipped with swing out mounting brackets attached to the back side of the panel. Attach the panel to 2"x4" stud framing on each side of the panel using the mounting brackets as shown in Figure 2. Secure the brackets to the framing using four 3/4" (max.) screws. Wood studs are to be attached to the concrete foundation wall and rim joist with a minimum of six concrete nails. Studs shall extend below grade a minimum of 24" to provide stability to panel. Secure service conduit to rim joist using conduit U-Strap to match conduit size, Figure 3.

SEMIFLUSH PANELS- (Sheet 7.11.85) - Semiflush mounted panels are to be attached to the flanged edges on each side of the panel. Attach the panel to 2"x4" stud framing using a minimum of four 3/4" (max.) screws. Wood studs are to be attached to the concrete foundation wall and rim joist with a minimum of six concrete nails. Studs shall extend below grade a minimum of 24" to provide stability to panel. Refer to Figures 5 and 6, for details.

SURFACE MOUNT PANEL INSTALLATION REQUIREMENTS

Figure 2

Surface Mount Panel w/ 2"x4" Stud Framing
Figure 3

Panel Back Showing Swing Out Mounting Brackets Attached To 2"x4" Stud Framing
Figure 4

Extend bracing a minimum of 24" below grade to provide stability to panel during construction.

Conduit Support Strap Attached To Sill Plate

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ENGINEERING AND CONSTRUCTION STANDARD

UNDERGROUND ELECTRIC TEMPORARY SERVICE PANEL

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SEMIFLUSH MOUNT PANEL INSTALLATION REQUIREMENTS

Figure 5
Semiflush Panel Mounting Using 2"x4" Stud Framing

Figure 6
Foundation Wall Attachment Using Concrete Nails (Typical All Installations)

Extend bracing a minimum of 24" below grade to provide stability to panel during construction.

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5.0 LU RESPONSIBILITIES

LU, upon final inspection and approval of local authorities, will provide the service cable, if required, make the secondary cable connections and set the meter.

6.0 GROUNDING

The customer shall be responsible for bonding and grounding all exposed non-current carrying metal parts in accordance with applicable electric codes and local requirements. Refer to NEC 338 LU Standard US0002M, Service Entrance Grounding, for more details.