Electric Service Requirements

Commercial Industrial

July 2007

ENGINEERING SPECIFICATION T004

SMUD
SACRAMENTO MUNICIPAL UTILITY DISTRICT
6201 S Street, P.O. Box 15830, Sacramento, CA 95852-1830
The Power To Do More.SM

COMMERCIAL/INDUSTRIAL ELECTRIC SERVICE REQUIREMENTS SECTION

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A. GENERAL REQUIREMENTS FOR SERVICE

1. This is a guide to the Sacramento Municipal Utility District's (SMUD) requirements for the establishment of electric service to new or re-wired commercial/industrial installations. The requirements presented here are necessary for SMUD to supply uniform, satisfactory, and safe service. It is necessary that all written material (this text, as well as all of the notes on the drawings) be carefully read.

2. It is important that early arrangements be made in advance of the installation of electric service lines and the location and setting of meters. Contact SMUD's Customer Services Department, 6301 S Street, 1-888-742-7683, for new or additional service. This must be accomplished as soon as initial planning is considered. Delays in supplying this required information could cause an unnecessary inconvenience for the customer. Electric service will **not** be established until the "service entrance facilities" and interior wiring are satisfactorily completed by the customer.

   NOTE: "Customer service entrance facilities" is the term used to designate all the electrical components required to be furnished and installed by the customer.

3. Where the operation of the customer's equipment will require unusually stable voltage regulation, beyond that supplied by SMUD in the normal operation of its system, the customer shall be responsible to protect their own equipment. Any special or auxiliary equipment required by the customer will be installed on the load side of the meter. The customer, at their own expense will install, own, operate and maintain this special or auxiliary equipment.

4. In addition to SMUD's own requirements, the customer is responsible for complying with applicable provisions of City and County ordinances, the "National Electric Code" and all applicable orders, rules and regulations of the State of California.

5. **No** service can be connected until approved by the appropriate inspection authority. Only authorized SMUD employees are permitted to make connections between District wiring and customer wiring.

6. A new District commitment will normally be required after one year unless a customer has requested and received written approval for a longer period of time from a SMUD Engineering Designer.

7. Building plans and definite load information for commercial and industrial installations must be furnished to SMUD Engineering Designer E201 at P.O. Box 15830, Sacramento, 95852-1830, as

soon as possible. Delays in supplying this required information could cause an unnecessary inconvenience for the customer.

8. Commercial and Industrical contracts and/or agreements with SMUD will be executed in accordance with the provisions of SMUD Rules and Regulation 16.

9. The customer's service voltage will be determined by SMUD's Engineering Designer. Multiple service voltages to one building or parcel of property will only be granted upon approval of SMUD's Engineering Designer and local inspection authorities.

10. Normally, only one service point will be granted to one building or one parcel of property. Multiple service points may be granted to one building or multiple buildings on one parcel, provided they meet the requirements of the "National Electric Code" as well as the requirements of SMUD and local inspection authorities.

11. All commercial meter installations with a service main disconnect or combined breaker ratings greater than 200 amps must be reviewed and approved by SMUD. These drawings shall show the customer’s name and job address. Submit two copies to: SMUD Meter Shop, P.O. Box 15830, Sacramento, CA 95852-1830 prior to fabrication. One copy will be returned to the sender with approvals or required corrections.

12. Meter locations for all outdoor installations will be designated by the SMUD Engineering Designer. The meter(s) shall be located within 3 feet of the corner of the building closest to the SMUD service point and shall be a minimum of 3 feet from all property lines. Meter locations other than described above will not be allowed without advance written permission from the Engineering Designer. Any deviations will be made only for special structural requirements and must be approved by the Engineering Designer. Meter locations other than those described above are subject to additional charges, payable prior to meter installation.

B. ABBREVIATIONS

The following abbreviations may be used throughout these Service Requirements:

A.	=	A Type Meter	L.P.	=	Lightning Protector
Amp or A	=	Amperes	Man.	=	Manual
Ag. Can	=	Agricultural Meter Can	M.B.	=	Meter Mounting Base
C.C.	=	Circuit Closing	M.D.	=	Mamimum Demand
Cl.	=	Class of Meter	O.H.	=	Overhead
Comb. Can	=	Combination Can	R.M.T.	=	Rigid Metallic Conduit
D.B.	=	Direct Burial	S.	=	S Type Meter
E.B.	=	Encased Burial	S.P.	=	Separate Potential
El.	=	Element	S.S.	=	Safety Socket
G.O.	=	General Order	U.G.	=	Underground
I.M.T.	=	Intermediate Metallic Conduit	U/L	=	Underwriters Lab
Int.	=	Interval	V.	=	Volts
KW.	=	Kilowatts	W.	=	Watts

USE CAUTION WHEN
DIGGING TO AVOID
BURIED ELECTRICAL CABLES.
BEFORE DIGGING, CALL
U.S.A. (Underground Service Alert),
800-642-2444

C. MINIMUM REQUIREMENTS FOR COMMERCIAL/INDUSTRIAL ELECTRIC SERVICE INSTALLATIONS

1. Underground Services, Commercial/Industrial

(a) City or County inspects all UG services and determines panel size, conductor size, and number of conductors required.

(b) Customer to provide all conduit and conductor to a location designated by the District.

2. Overhead Service Drops, Commercial/Industrial

(a) A "service drop" is the span of overhead conductors from SMUD's pole to the customer's building or structure and does **not** include the "drip loops". The drip loop is formed by connecting the ends of the customer's service entrance conductors to the service drop.

(b) Unless special permission is granted by SMUD's Engineering Designer, the length of the service drop is **not** to exceed 100 feet (distance measured from the nearest SMUD pole to the point of attachment). In addition, the point of attachment shall be located on that part of the building nearest to and facing SMUD's pole.

(c) The height of the point of support or attachment on the customer's building must be sufficient to provide the necessary ground clearances prescribed by all applicable orders, rules and regulations of the State of California, General Order 95 of the California Public Utilities Commission, the "National Electrical Code", and City and County ordinances.

(d) In the area accessible to pedestrians only, where the 12 foot minimum clearance applies, clearances shall be measured from either the lowest point of the drip loops or the lowest point of sag of the service drop conductors, whichever is lower. Where proper height cannot be maintained by going to the highest point on the face of the building, a periscope type service riser will be necessary. (See Page G-5).

(e) In addition to the required ground clearances, the service drop must have a "radial clearance" of 3 feet from any building exit, window, door or other opening at which human contact might be expected. In the case of a service drop located above the horizontal plane through the top extremity of such an opening, the 3 foot minimum clearance may be reduced to the maximum practical radial clearance. In **no** event, however, shall it be less than 1 foot. (See Page G-4).

(f) Because of the necessity of meeting these clearances and a variety of other problems, it is imperative that you contact SMUD before you decide on a point of attachment for the service drop. A SMUD Engineering Designer will help you select a point of attachment that will meet SMUD's requirements. Call 732-5700 to request a meter spot. SMUD will **not** connect to an unsuitable location selected by the customer or his representative.

(g) Eye bolts or securely bolted service racks are required for support of the service drop and must be installed by the customer through a minimum of 2 x 4 inch backing. Lag screws are **not** permissible.

(h) The point of attachment should be located at or near the corner of the building nearest and facing the pole

designated by the District as the pole from which the service drop will be installed. In all cases, the SMUD Engineering Designer must approve the service attachment location.

(i) The Engineering Designer must be consulted on all rewire jobs which involve proper service wire clearance over a swimming pool or metallic roof.

3. Service Head

(a) An approved, rain tight service head shall be installed at a point suitable for connecting the service entrance conductors to the service drop.

(b) The service head shall be located as close to the center point of the service attachment as practical, but in **no** case shall the distance exceed 24 inches. Unless it is impractical, the service head should be higher than the point of attachment. (See Page C-5 for illustrations of minimum clearances above the roofline.)

4. Service Riser Conductors

(a) The local inspection authorities must be consulted for size and type of wire.

(b) The service riser conductors must be continuous and without splices. Neutral line wire (white) shall be continuous and without a splice from the service head through the bonding lug to the neutral bar in the switch. Where special permission is granted, the neutral line may be broken if the socket is equipped with an approved connection device.

(c) A minimum of 24 inches of conductor must remain outside of the service head and allow for a proper drip loop at the service connection.

5. Service Conduit

(a) The local inspection authorities must be consulted for size and type of conduit.

(b) Conduit should be in one continuous length from the service head to the meter socket. A limited number of approved type condulets will be permitted when building construction makes a continuous run impractical. If gutters are used, they shall be equipped with sealing devices.

(c) RMT or IMT conduit of 1-1/2 inch inside diameter is the minimum service riser conduit acceptable for attaching SMUD's service cables.

(d) Fire protection, in accordance with local inspection authorities, is required where service risers are enclosed in flammable materials.

(e) Conduit may be concealed in building walls and/or attics on the Utility (line) side of the meter under the following conditions:

(1) A semi-flush, mounted, combination meter socket main breaker is used.

(2) A 1 1/2 inch minimum inside diameter conduit is used.

(3) Conduit is in one continuous vertical run from the meter service entrance to a minimum of 6 inches above where the conduit leaves the concealed wall and/or attic. **No** condulets or sleeves are allowed in the concealed area.

6. Meter Location

(a) A clear, unobstructed work space shall be left on all sides of the meter. (See Page G-1).

(b) The meter(s) shall be located on the exterior of the building and shall be at least 3 feet from a property line.

(c) When it is absolutely necessary to locate meters in locked rooms, cabinets or fenced enclosures, consult SMUD's Engineering Designer. District representatives shall have access to such areas by using a SMUD key. The customer is responsible for having the lock(s) keyed for a SMUD key.

(d) Carports, breezeways, covered or screened porches, or any other area that might be enclosed at some future date should **not** be selected as a meter location. These areas may only be utilized with prior approval of SMUD's Engineering Designer.

(e) Meters or metering equipment shall **not** be installed in elevator shafts, ventilator shafts, clothes closets, broom closets, lavatories, in or over stairways, over doorways, windows, sinks, washtrays, gas meters or other grounded objects, in driveways, or in any other hazardous location.

(f) The area on either side of a door or swinging window, equal to the width of that door or swinging window, is **not** acceptable as a meter location.

(g) A level, standing and working surface shall be provided in front of each meter to permit ready access to the meter. This space must be at least 30 x 36 inches and contain no working obstructions. (See Page G-1).

7. Meter Socket

(a) The meter socket must be installed in a true vertical plane.

(b) Any unused outlets in a meter socket must be sealed with internally removable plugs.

(c) Die-cast meter sockets shall **not** be used as a wiring gutter for more than two meters.

(d) Commercial, self-contained meter sockets shall be U/L approved and shall have a continuous duty current rating equal to or greater than the current rating of the associated load service equipment.

(e) Neutral taps shall be connected to the service neutral conductor and shall be located behind sealed panels. Wire nuts are **not** permitted.

(f) Meter sockets with extruded or cast aluminum jaws are **not** acceptable and will **not** be connected.

(g) Standard switchboard service sections can be used on all services having a main size of 201 amperes or over.

(h) SMUD's Meter Division is to be contacted for prior approval on jobs involving anything labeled "special".

(i) The customer's wiring for new service or rewiring shall include a grounded conductor or bus in the service entrance equipment. The grounded conductor or bus shall connect to the proper terminals in the service entrance meter compartment and service switch. Sizing of this conductor or bus shall be in accordance with the requirements of local inspection authorities.

8. Test Bypass Devices for Self-Contained Meter Installations

Approved test bypass devices are required on **all** SMUD designated commercial installations:

(a) **Exceptions:** Test bypass devices are **not** required for single phase services to signboards, temporary power poles, and accessory buildings located on residential properties that qualify for a separate service and conform to residential zoning restrictions.

(b) See Pages G-23 through G-25.

9. Service Main Disconnect

(a) The service main disconnect, or main breaker, must be installed on the load side of the SMUD meter.

(b) If the service main disconnect is installed outside, it shall be of an approved raintight type.

(c) If the meter socket and service main disconnect (main breaker) are in separate enclosures, the wiring between the two enclosures must be in R.M.T., I.M.T. electrical conduit or approved sealable raceway.

(d) The ampacity ratings for service main disconnects or main breakers are approved by the local electrical inspection authorities.

10. Grounding

(a) An approved, concrete encased electrode (uffer ground) must be used for all new construction.

(b) The local inspection authorities must be consulted for the required ground conductor type and size and for other types of grounding.

11. Metering Arrangement

(a) The metering arrangement approved as standard and required by SMUD provides for the line current to enter first the meter and then the disconnect (switch) and overload protective devices (fuses or circuit breakers).

(b) Unmetered service wires and metered load wires shall not be combined in the same conduit, raceway, or gutter.

12. Metering Emergency Alarm Systems

(a) District policy does **not** allow connections to a customer's service preceding the electric meter. In those cases when it is impractical to install an emergency alarm system on the load side of the service meter, a separate house meter for the emergency system will be required.

D. METER INSTALLATIONS ON LOW VOLTAGE SWITCHBOARDS, 0-600 VOLTS, 0-4000 AMPERES

1. Switchboards – General

(a) Use of a reactive, volt-ampere-hour meter to measure power factors may be necessary, depending upon the rate under which service is rendered and the amount of load. Some rate schedules call for measurement of the power factor if a certain demand is exceeded for 3 months consecutively. SMUD will provide specific information on these subjects upon request.

(b) All compartments containing unmetered conductors shall be sealable. When a raceway or conduit for "the wiring between the meter and the current transformers" is necessary, it shall be sealable and used exclusively for revenue metering.

2. Switchboard Service Section

(a) A service section is defined as the section of a customer's switchboard provided specifically for housing the metering current transformers (if required), the revenue meters and test facilities, and the service main disconnect or main breaker. SMUD will accept them only if the following requirements are met:

(1) Metered and unmetered wiring shall be separated (**not** cabled together) so that it is readily apparent that all of the load is being metered.

(2) Factory, "harness style" wiring (or equivalent) shall be used between the "hot gutter" and the line terminal of each meter socket and also between the load terminals of each meter socket and the line side of the corresponding circuit breaker.

(3) Connecting wires between the meter socket load terminals and the circuit breaker line terminals shall

be separately color coded for each position in the row.

(4) The relation of the individual meter socket, breaker and address served shall be permanently and clearly marked with the meter panels in place.

(5) When the installation is completed, all panels must be removable for inspection of wiring.

(6) Panel design shall permit convenient replacement of any individual meter socket or jaw assembly.

(b) When two or more switchboard service sections (standard or specially engineered) are supplied from one set of service conductors, the supply bus and any connections to it shall be located above the current transformer position in a separate sealable enclosure outside of the current transformer compartment. The supply bus it to be arranged so that it is readily accessible and may be worked upon without disturbing the current transformers and the associated secondary wiring.

3. Standard Switchboard Service Section

(a) The general arrangement of a standard switchboard service section is shown on Page G-12.

(b) The standard section now utilizes a hinged meter panel located in front of the current transformer compartment to minimize the overall space requirements. It should be noted that hinged meter panels must be sealable and easily removed with the hinges readily interchangeable from the right or left side on the job site. They must also have handles and open a minimum of 90° on the side that it is hinged with meters and test switches mounted to permit safe and ready access to the instrument transformer. (See Pages G-13 and G-14).

4. Specially Engineered Service Section

(a) Switchboard designs which do **not** conform to the standard switchboard arrangements are considered specially engineered. Specially engineered service sections include installations:

(1) Any service greater than 600V.

(2) Over 1000 amperes.

(3) Where more than one bus (multi-leaf) is used per phase.

(b) Various arrangements for specially engineered service sections are suggested in the illustrations on Pages G-15 through G-20.

(c) When a specially engineered service section is necessary, three drawings of the proposed section shall be submitted to SMUD metering for approval prior to manufacture. The drawings shall indicate the contractor's and the customer's name and address and the installation address.

(d) The general arrangement of a specially engineered switchboard service section should follow as nearly as practical that of the standard section. In designing a specially engineered service section, the following general requirements shall be observed:

(1) Socket meters, used with current transformers, shall be mounted on hinged panels. Self-contained meters shall be mounted on non-hinged panels.

(2) When a hinged meter panel is located behind a door, a clear space of at least 11 inches is required between the meter panel and the door, as well as a 90° opening with meters and test switches in place. The access door shall be provided with a single latching device. The access door(s) shall be equipped with devices to accommodate two padlocks.

(3) A clear space in back of the meter panel, at least 4 inches deep, shall be provided for secondary wiring and for the back of the phase shifting device required for determination of power factor. If recording or graphic demand metering is required, SMUD must be consulted to determine any additional space requirements.

(4) Sockets installed on switchboards shall be of a design acceptable to the District.

(5) Provision should be made for mounting a reactive, volt-ampere-hour meter, unless SMUD specifically indicates that it is not required. The opening for the

phase shifting device shall be covered with a flat plate fastened on the inside and painted to match the switchboard.

(6) A minimum of 4 inches of clear space is required directly below the bottom slot of the meter test switch to permit safe connection of test leads.

(7) **Not** more than two meters shall be mounted on any removable meter panel.

(8) Panels, which provide access to instrument transformers, shall **not** be larger than required for good accessibility. Removable panels shall be equipped with lifting handles mounted slightly above the panel center and shall **not** be heavier than can be conveniently lifted by one person.

(9) The front edges of the current transformer bus bars shall all be located in the same vertical plane.

(10) A removable bus section and suitable transformer support shall be provided to permit the installation of window type transformers for all installations over 1000 amperes.

(11) Busses shall be adequately supported in the current transformer compartment to withstand the mechanical stresses of short circuit. The bus supports shall **not** interfere with installation or removal of current transformers. Current transformers shall **not** be used to support the busses. The busses must be entirely self-supporting.

(12) The busses and current transformer mountings shall be designed so that each of the current transformers may be withdrawn from its mounting position directly through the access panel without disturbing any other current transformer.

(13) When multi-leaf busses and/or current transformers are used, the busses shall be oriented so that they appear "edgewise" when viewed from the access panel.

(14) The general arrangement and spacing of current transformers and the methods of mounting current transformers shall conform, in so far as practical, to

the illustrations on Pages G-15 through G-17 and G-19.

5. Service Entrance Location

(a) In the Standard and Specially Engineered Switchboard Service Sections, the direction of feed shall be vertical and **no** other conductors shall pass through this compartment.

(b) In addition, for underground services 801-4000 Amps or for multiple metering switchboards, bus bars shall be extended into the terminating pull section. For underground services 0-800 Amps, lug landings in the terminating pull section or pull box, connecting conductors between such landings and the current transformer compartment, shall be provided by the customer.

6. Sequence

The service switch shall be on the load side of the metering equipment in all cases. (Meter-switch-fuse sequence).

7. Current Transformer Compartments

(a) If either the capacity of the service switch exceeds 200 amperes or the capacity of the conductors supplying a breaker or group of breakers exceeds 200 amperes, transformer compartments will be required.

(b) Details of the size and arrangement of current transformer compartments for the Standard Switchboard Service Sections are shown on Pages G-15 thru G-20.

(c) The current transformers supplied by the serving agency for revenue metering shall not be utilized for any other purpose. Covers for current transformer compartments shall be made of code gauge metal. If non-hinged panels are used as covers, they shall be provided with lifting handles and be attached with sealable studs and wing nuts or by other approved means.

(d) The customer shall furnish lugs and connect the cable to the line and load sides of the bus stubs in the current transformer compartment. The ends of the bus bars shall be located so that the current transformers can be connected without removing adjacent panels. The bus supports in the current transformer compartment shall be sufficiently rigid to maintain alignment of the bus after the service conductors

are connected to the bus stubs and before the current transformer(s) is installed.

(e) When links and supports for through type current transformers are required, the bus and removable links must be of a compatible material and hardware.

8. Meter Panels

(a) The hinged meter panels shown on Pages G-13 and G-14 are designed to accommodate only transformer rated socket meters.

(b) The non-hinged meter panels shown on G-21 are designed to accommodate only self-contained socket meters.

9. Meter Sockets

(a) The following table shows the type of meter sockets to be furnished:

Self-Contained Meters

Service		**Meter Clips/ Terminals**
Single Phase	Two or three wire	4
Single Phase	Three wire, 120/208 volt wye	5

Three Phase	Four wire delta	7
Three phase	Four wire wye	7

Meters with Current Transformers

Service		Meter Clips/ Terminals
*Single phase	Three wire	6
Three phase	Four wire delta	13
Three phase	Four wire wye	13

* Any service over 200 amp, single phase, requires authorization of SMUD's Engineering Designer.

(b) When socket-type meters are used, sockets shall be furnished with approved sealing rings installed by the switchboard manufacturer.

10. Meter Height

(a) When meters are located in a meter room or when fully enclosed in a cabinet the minimum height of the meter shall be 36 inches and the maximum height shall not exceed 75 inches. These heights are measured from the standing surface to the center line of the meter. Cabinets shall not impair working space.

(b) When meters are wall or surface mounted, but not located in a meter room or enclosure, the minimum height of the meter shall be 48 inches and the maximum height shall not exceed 75 inches. These heights are measured from the standing surface to the center line of the meter.

11. Meter Marking

(a) Where more than one revenue meter is installed in a building, each meter position shall be clearly and permanently marked by the building owner to indicate the particular location supplied by it.

(b) Service will not be established until this identification has been completed.

12. Meters and Test Facilities

(a) Transformer rated meters and test equipment will be furnished and installed by SMUD.

(b) Secondary wiring from current transformers to meters (**not** to exceed 50 feet) will be installed by SMUD, using continuous runs of color coded wires in conduits or raceways (where necessary) which have been furnished and installed by the switchboard manufacturer.

13. Remote Metering

(a) When separation of the meter and current transformer is allowed, the customer shall provide clearances and working space for both the meter and current transformer installation (pg. G-8). the customer shall supply and install conduit for the wiring between the meter and the current transformer. The conduit, 1 1/4 inch min., shall be limited to a maximum of 50 ft. and a maximum of three 90° bends, unless sealable, accessible,exposed condulets are furnished. Secondary wiring from the current transformers to the meter will be installed by SMUD.

(b) Final meter and current transformer cabinet locations must be approved by SMUD's Engineering Designer.

(c) Remote Metering is only allowed on services with a main disconnect rated greater than 225 amps and must be pre-approved by Field Metering.

14. Self-Contained Meters

(a) Self-contained meters are those having current coils designed to carry the line current. They do **not** require current transformers.

(b) Sockets for self-contained meters and test facilities shall be wired by the switchboard manufacturer.

(c) Spacings for various combinations of self-contained meters are shown on Page G-21.

E. REQUIREMENTS FOR COMMERCIAL MULTIPLE METER INSTALLATIONS

1. Meter Cabinets and Enclosures

(a) The cabinet shall be designed so that no obstruction such as door jambs, vertical posts, etc., be allowed within the cabinet opening. With the cabinet door open, a clear working space of 36 inches is required directly in front of the socket for installing the meter.

(b) Shallow cabinets, with holes cut in the doors for meters to protrude through, will **not** be permitted.

(c) Clearances between the sealing flange of the meter socket and the inside of the closed cabinet door shall be a minimum of 11 inches, but not more than 15 inches for commercial and industrial meter installations. (See Page G-2)

(d) Hinged doors shall **not** exceed 4 x 4 feet and shall be provided with a device to hold them in the open position safely.

(e) All doors shall be fitted properly to insure positive opening and closing and shall be equipped with adequate pulls, hinges and latches.

(f) Cabinets shall be raintight and constructed of weather resistant materials. All top openings (conduits entering and leaving) shall be flashed and sealed.

(g) When cabinets are to be locked with the customer's lock, a double lock arrangement shall be provided to accommodate a SMUD padlock.

(h) If the socket is installed for future use, plastic meter covers will be used to cover energized sockets. Where extra meter sockets have been installed in multi-meter installations and have **no** probable future use, the internal bus must be removed from the socket and the socket opening closed.

(i) For multiple-meter installations in a multi-meter enclosure, the meter sockets shall have a minimum horizontal clearance of 7-1/2 inches, center to center, and a minimum vertical clearance of 8-1/2 inches, center to center.

2. Totalized Metering

(a) Totalized metering **may** be available for certain larger commercial/industrial services. Check with SMUD's Engineering Designer for information.

3. Non-Installation of Meters

The meter(s) will **not** be installed until:

(a) The customer has complied with all the requirements listed above.

(b) The work has been passed by the proper inspection authorities.

(c) Each service switch and meter position, in a multiple meter installation, has been clearly and prominently marked in a permanent manner with an oil base paint or an engraved plate has been fastened with screws to indicate the particular address supplied by it. Street address and suite, apartment number, etc., are permanently applied to the building.

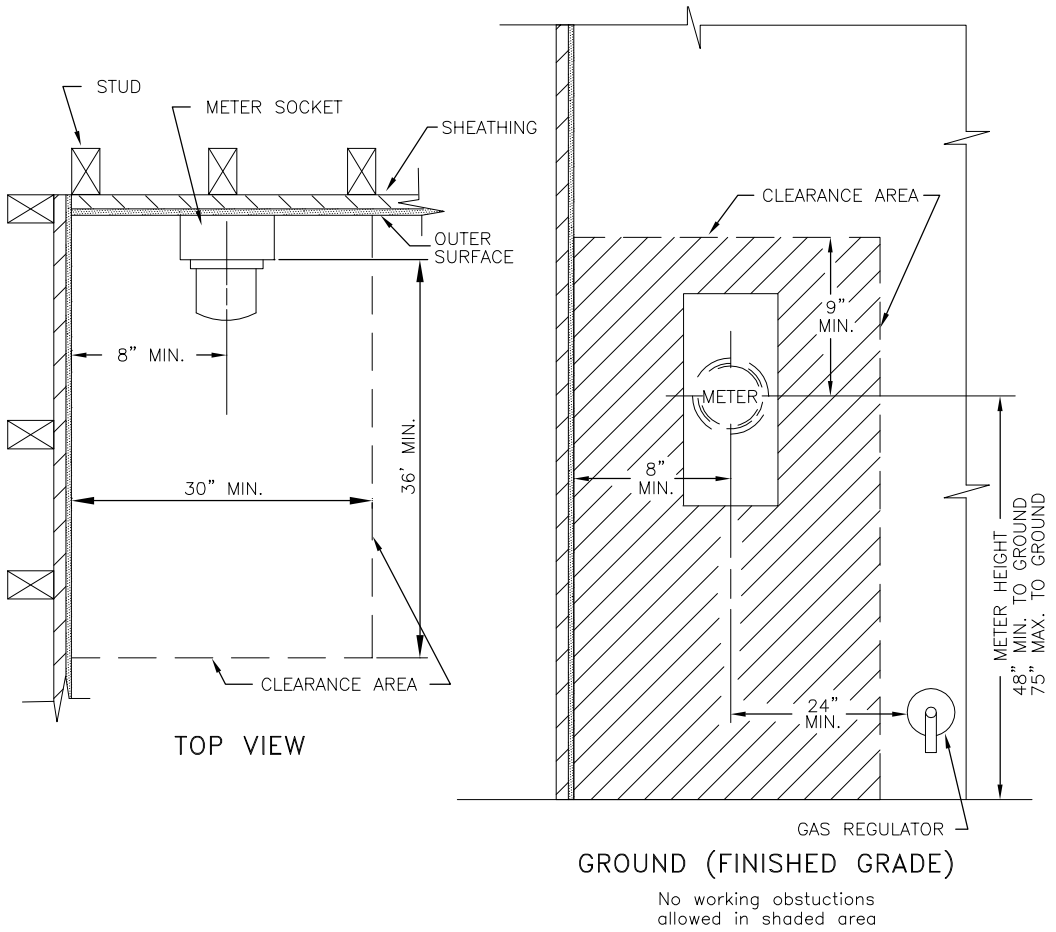
F. SWIMMING POOL CLEARANCES FOR SUPPLY SERVICE DROPS (INCLUDES HOT TUBS)

1. The installation and maintenance of service drops over swimming pools is to be avoided where practical.

2. The customer must contact a SMUD Engineering Designer to determine the District's service requirements before installing a new pool or rewiring an existing installation where a SMUD service drop is over or will cross within 10 feet of a pool.

3. The clearances shown on Page G-27 are required in SMUD's Service Area.

G. Drawings



— — — Indicates boundary of area which must be kept clear of obstructions.

NOTES:

1. A clearance area around the socket must be maintained as shown in the illustrations.

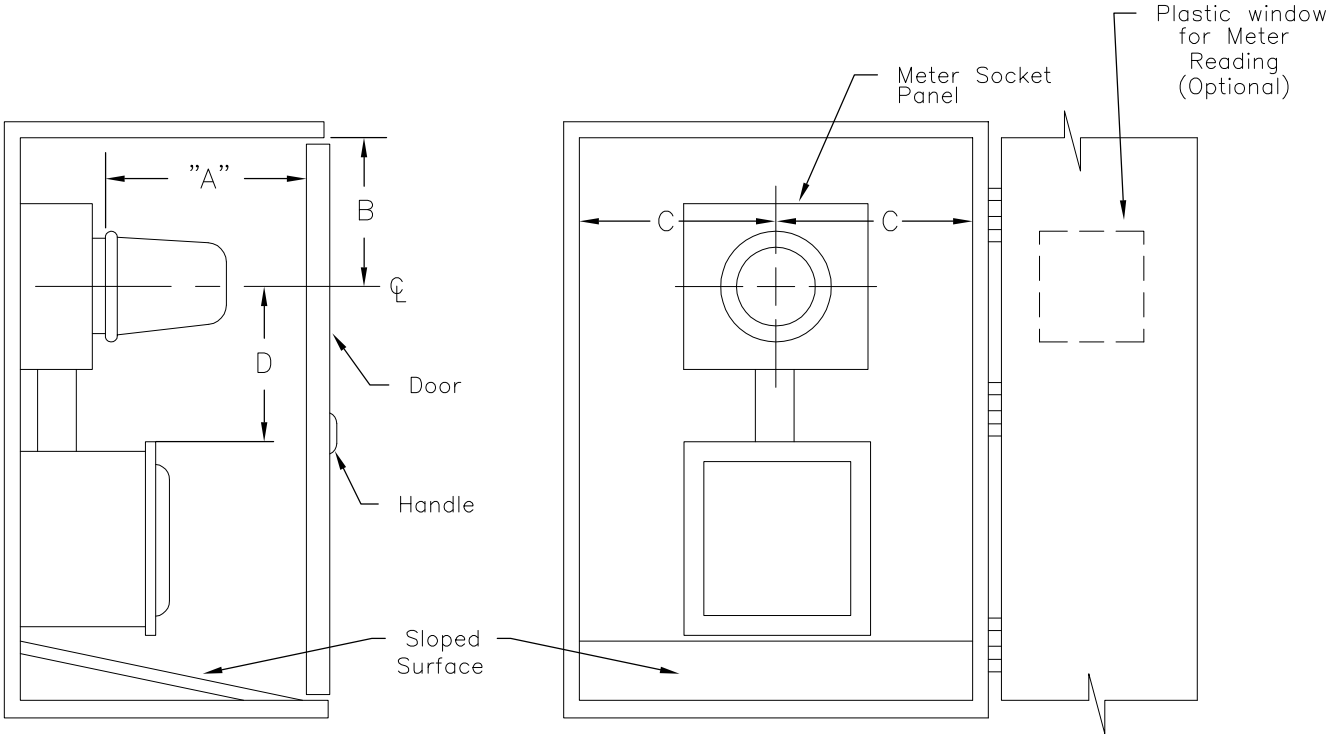
2. There must be an 8 inch minimum clearance between the center of the meter socket and any obstruction.

3. Suitable standing space, at least 30 x 36 inches, shall be maintained in front of the meter socket in order to allow for installation, testing and reading.

4. Meters shall be located so that they will not be damaged by a swinging window or door. for any door opening, the surface of the wall on either side of that door for a distance equal to the width of the door is unacceptable as a meter spot, or a suitable stop should be installed.

5. The 36 inch minimum clearance must be increased to 42 inches on all 277/480Y installations where a grounded object will be behind a workman in front of the meter.

ENGR. SPEC. T004	CONSTRUCTION STANDARDS	DRAWING REFERENCE# G356-C1	REV: 1	
			DATE: JAN 06	
SMUD SACRAMENTO MUNICIPAL UTILITY DISTRICT	Required Minimum Clearance of Meter Socket From Obstructions		G-1	



SIDE VIEW

FRONT VIEW

DIMENSION "A": 9" minimum to 15" maximum for Single–Phase.
11" minimum to 15" maximum for Poly–Phase.

DIMENSION "B": 7" minimum for Single–Phase.
9" minimum for Poly–Phase.

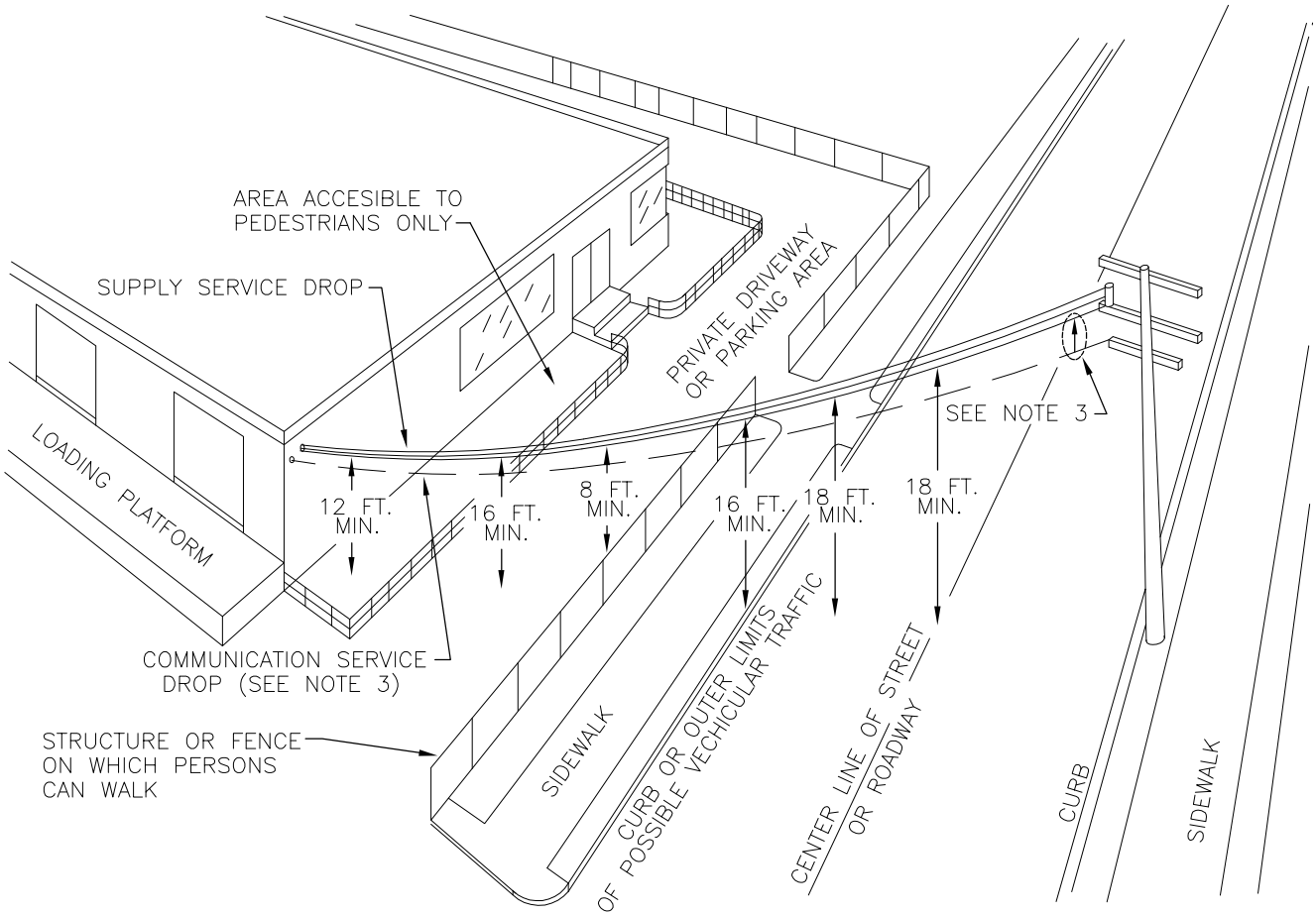
DIMENSION "C": 10" minimum.

DIMENSION "D": 8" minimum.

NOTES:

1. Meter sockets, having jaws which must be tightened with a wrench, shall have a minimum "C" dimension of 6 inches.
2. Neither roof nor door supports shall interfere with installation of the meter.
3. With the cabinet door open, a clear space of at least 15 inches is required directly in front of the meter is required.
4. When the cabinet door is lockable, a double lock arrangement is required.

ENGR. SPEC. T004	CONSTRUCTION STANDARDS	DRAWING REFERENCE# G356-C2	REV: 1 DATE: JAN 06
SMUD SACRAMENTO MUNICIPAL UTILITY DISTRICT	Clearance for Commercial Meter Cabinet Enclosures		G-2



NOTES:

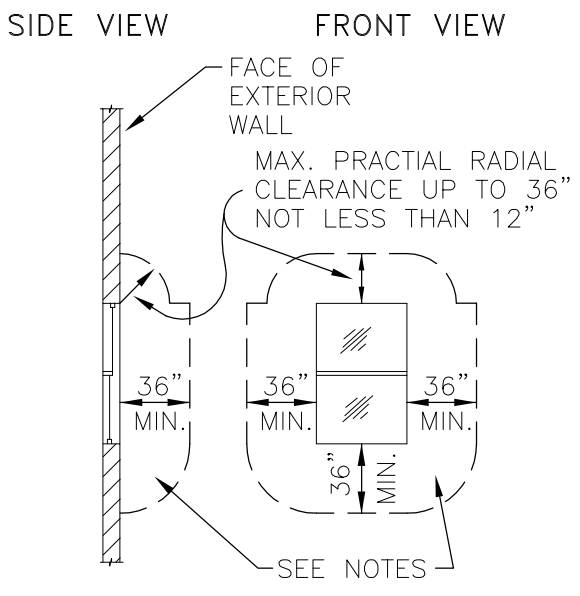
Vertical clearances above rails:

1. Crossing above RR tracks without overhead trolley wire . . . 25 feet minimum

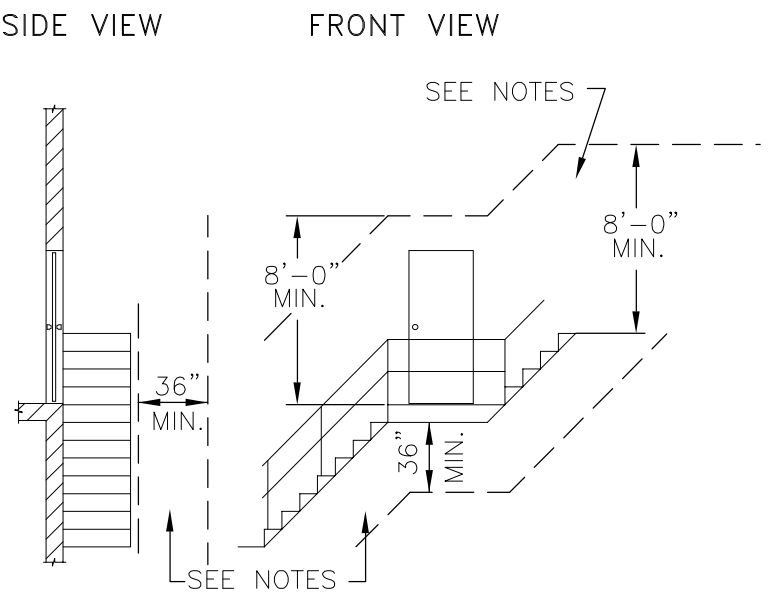
2. Crossing above RR tracks with overhead trolley wire:
   (a) Above rails where freight cars are transported . . . 26 feet minimum
   (b) Above rails where freight cars are not transported . . 23 feet minimum
   (c) In each case, the service drop must clear trolley wires by not less than . . . . . 4 feet minimum

3. Clearance between the supply service drop and the communication service drop shall be 24 inches minimum radially if more than 15 feet from the point of building attachment of either service. If less than 15 feet, the minimum clearance must be 12 inches.

ENGR. SPEC. T004	CONSTRUCTION STANDARDS	DRAWING REFERENCE# G356-C3	REV: 1	
			DATE: JAN 06	
SMUD SACRAMENTO MUNICIPAL UTILITY DISTRICT	Ground Clearance for Supply Drops, 0-750 Volts (Commercial and Industrial Premises)	G-3		



CLEARANCE FROM WINDOWS, DOORS, EXITS, ETC.



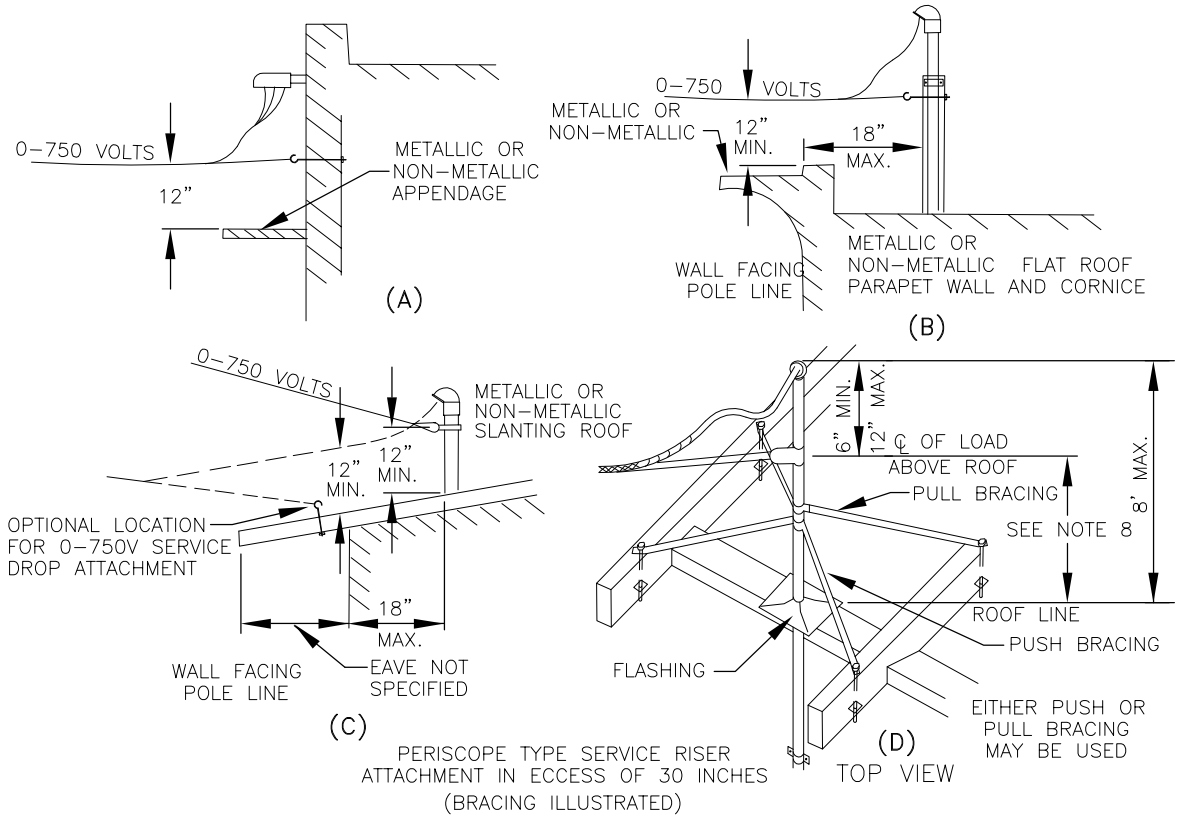
CLEARANCE FROM FIRE ESCAPES, STAIRWAYS, PORCHES, ETC.

— — — Indicates boundary of clearance area through which conductors must not pass.

NOTES:

1. Service wires should not be attached to the building wall within the above clearance areas and should not pass through clearance space illustrated in these sketches.
2. The rules for overhead line construction, issued by the California Public Utilities Commission, require that:
   a. All portions of the service drop shall have a horizontal clearance of 3 feet from any exit, window, door or other point at which human contact might be expected.
   b. Service drops shall be so arranged as to minimize hampering and endangering workmen and firemen in the performance of their duties. This is interpreted to mean that service drops shall be so arranged that a fireman can place a ladder against any window without interference or danger.
3. SMUD will not be responsible for any damage to the building caused by rain or structural failure.

ENGR. SPEC. T004	CONSTRUCTION STANDARDS	DRAWING REFERENCE# G356-C4	REV: 1 DATE: JAN 06
SMUD SACRAMENTO MUNICIPAL UTILITY DISTRICT	Service Drop Requirements for Windows, Doors, Fire Escapes, Stairways, Balconies, Etc.		G-4



NOTES:

1. SMUD will not be responsible for any damage to the building caused by rain or structural failure.
2. Where a SMUD Engineering Designer specifies that the service drop is to be 3 single wires, clearance between the service drop conductors must be a minimum of 6 inches. If an 8 inch minimum between points of attachment does not provide the necessary 6 inch clearance between wires, the separation between the points of attachment must be increased sufficiently to provide the 6 inch clearance.
3. On premises used for industrial or commercial purposes, service drops shall be maintained at a vertical clearance of not less that 8 feet over all or any portions of buildings and structures, except that service drops of 0–750 volts may be less than 8 feet, but not less than 12 inches, above the metallic or non–metallic cornice, decorative appendage, eave, roof or parapet wall of the building serviced provided:

   a. The current carrying conductors are insulated for the voltage being supplied.
   b. The point of attachment of the service drop is not more than 18 inches back of the front face of the building wall facing the pole line from which the service drops originate.

4. All service wires crossing over a roof must clear the roof by 8 feet.
5. The above methods of supporting service drops may be used where a roof overhang is exposed. Where the roof overhang is sealed, these methods may also be used if the service conduit is vertical through a sealed area. Horizontal conduit runs are not be made in a sealed portion.
6. Where a service riser projects through the roof, the service head must be a minimum of 12 inches above the roof line.
7. All service attachments shall be capable of withstanding a minimum service pull of 600 pounds without damage to the building structure.
8. Where a periscope type service riser is used for service attachment, the service riser must be braced if the center line of the load exceeds 30 inches above the roof. Bracing must be of rigid conduit with a brace kit as illustrated in Figure (D) above.
9. Couplings or sleeves will not be permitted in the periscope type service riser between the uppermost point of service attachment and the bottom support clamp.
10. Lag screws are not allowed in any portion of the service attachment.
11. Cable type guys are not allowed for service attachment support.
12. Consult SMUD's Engineering Designer for any other points of attachment.

ENGR. SPEC. T004	CONSTRUCTION STANDARDS	DRAWING REFERENCE# G356-C5	REV: 1 DATE: JAN 06
SMUD SACRAMENTO MUNICIPAL UTILITY DISTRICT	Clearance of 0-750 Volts Service Drops from Building on Commercial or Industrial Premises		G-5

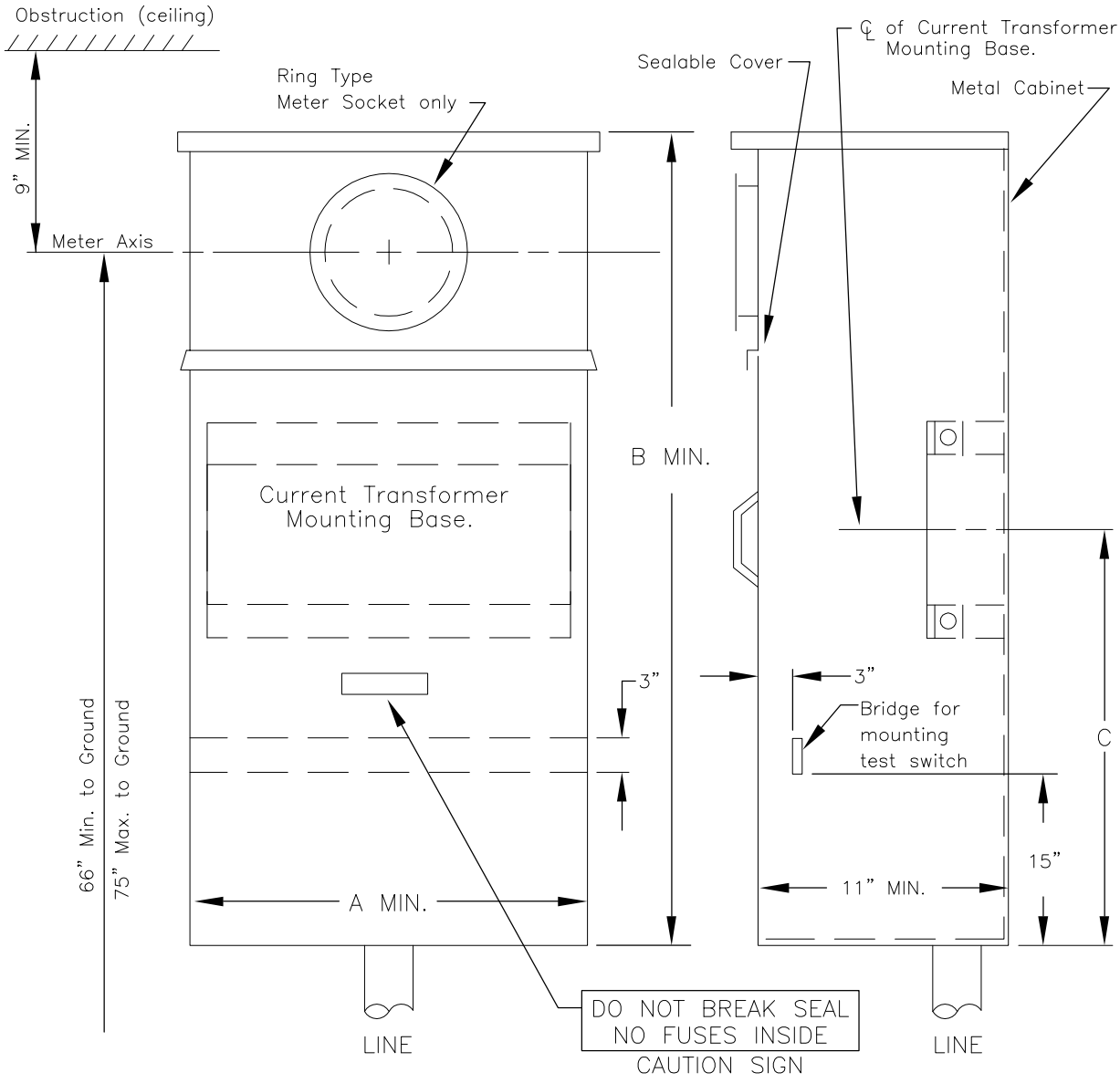


TABLE 1

MINIMUM DIMENSIONS				TRANSFORMER MOUNTING BASE	MAXIMUM WIRE SIZE	USE
CABINET	A	B	C			
24" x 52" x 11"	24"	52"	29"	Fig. B Pg. C-9	500,000 (1)	1ø (2)
36" x 52" x 11"	36"	52"	29"	Fig. D Pg. C-9	500,000 (1)	3ø (3)

1. *Conductors larger than 500MCM shall not be installed except when required by code or ordinance for 400 ampere capacity.
2. Any service over 200A, single phase, requires authoration of SMUD's Engineering Designer.
3. Check with SMUD's Engineering Designer for availability of 120/240V, 3ø, delta service.

ENGR. SPEC. T004	CONSTRUCTION STANDARDS	DRAWING REFERENCE# G356-C6	REV: 1 DATE: JAN 06
SMUD SACRAMENTO MUNICIPAL UTILITY DISTRICT	Combination Meter and Current Transformer Cabinet, Main Switch or Breaker Rated 201-400 Amperes (Underground Service)		G-6

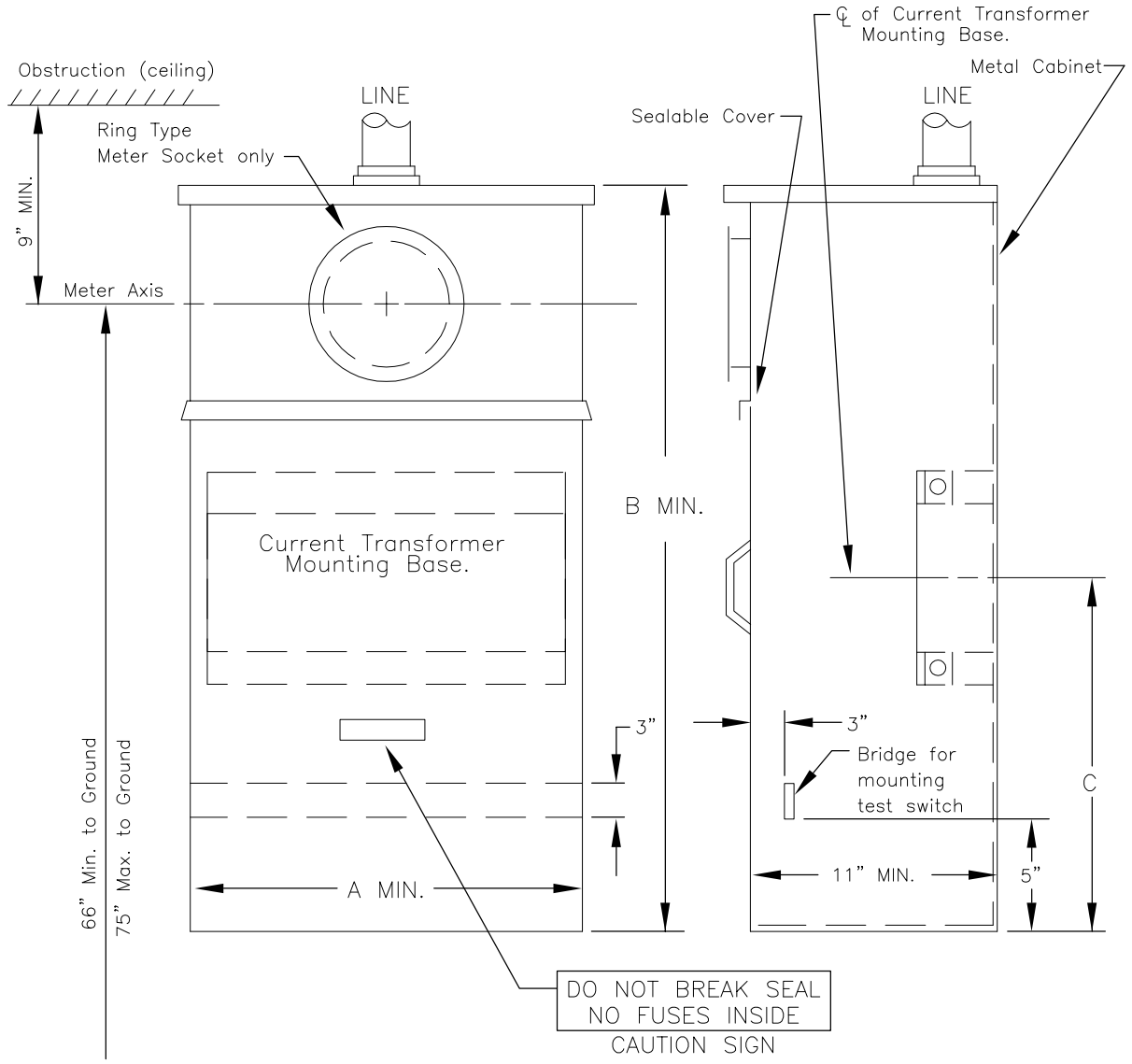


TABLE 1

MINIMUM DIMENSIONS				TRANSFORMER MOUNTING BASE	MAXIMUM WIRE SIZE	USE
CABINET	A	B	C			
36" x 42" x 11"	36"	42"	19"	Fig. D Pg. C–9	500,000 (1)	3ø (3)
24" x 42" x 11"	24"	52"	19"	Fig. B Pg. C–9	500,000 (1)	1ø (2)

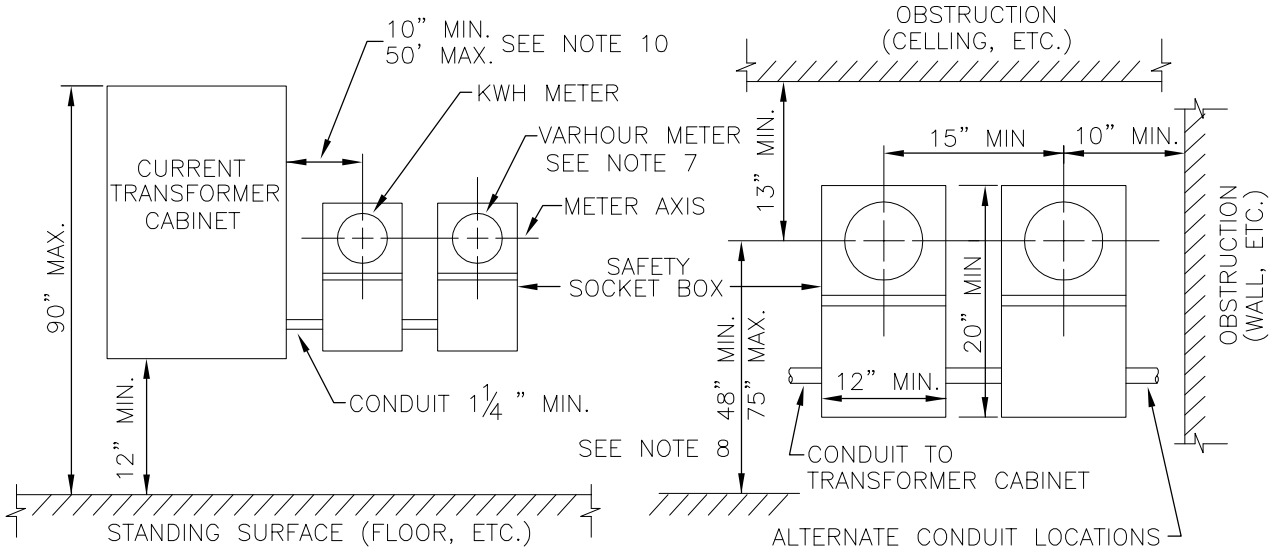
1. *Conductors larger than 500MCM shall not be installed except when required by code or ordinance for 400 ampere capacity.
2. Any service over 200A, single phase, requires authoration of SMUD's Engineering Designer.
3. Check with SMUD's Engineering Designer for availability of 120/240V, 3ø, delta service.

ENGR. SPEC. T004	CONSTRUCTION STANDARDS	DRAWING REFERENCE# G356-C7	REV: 1 DATE: JAN 06
SMUD SACRAMENTO MUNICIPAL UTILITY DISTRICT	Combination Meter and Current Transformer Cabinet, Main Switch or Breaker Rated 201-400 Amperes (Overhead Sevice)		G-7

Type of Service		No. of Jaws in Socket
*1ø	3 Wire, 120/240V.	6
*3ø	4 Wire delta	13
3ø	4 Wire wye	13

*Consult Engineering Designer as to the availability of Delta service.

SOCKET REQUIREMENTS FOR METERS USED WITH CURRENT TRANSFORMERS



(A)

GENERAL ARRANGEMENT
CURRENT TRANSFORMER INSTALLATION

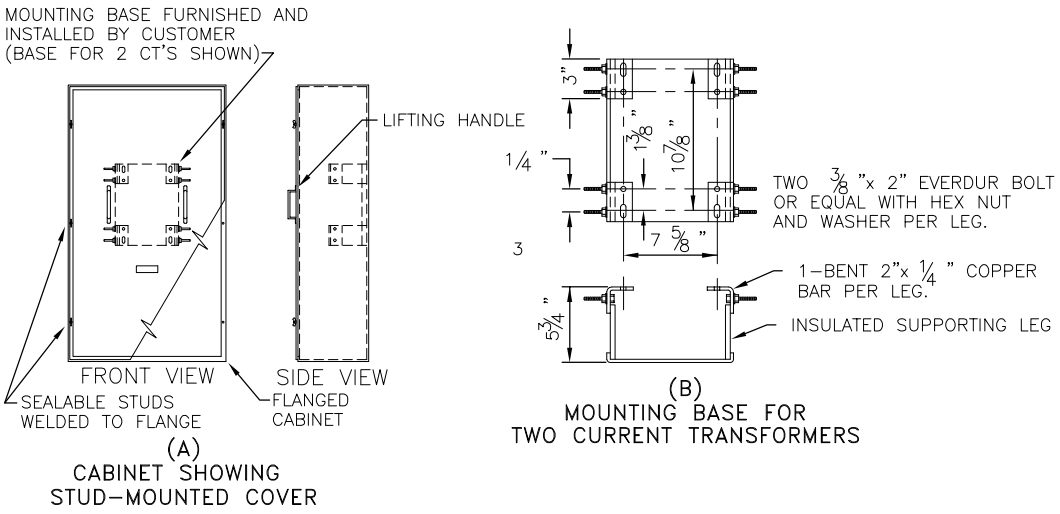
(B)

ONE OR MORE
SAFTEY SOCKET BOXES
INDOOR OR OUTDOOR

NOTES:

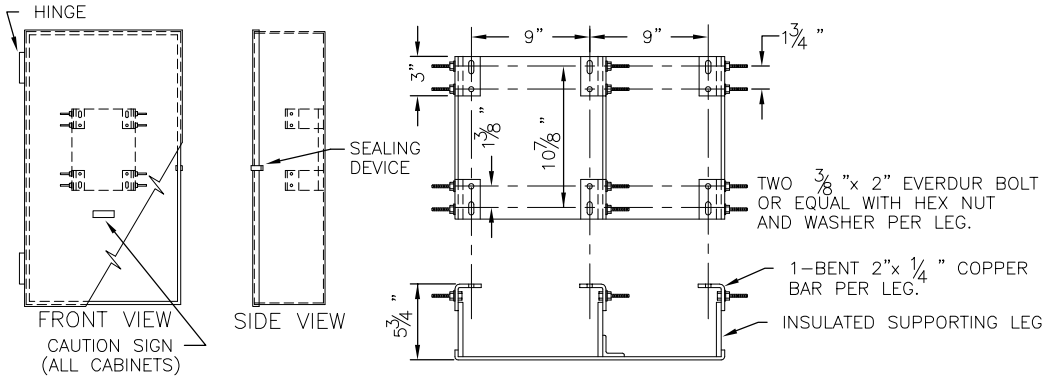
1. The neutral or unmetered leg shall be continuous.
2. The direction of feed through the current transformer cabinet shall be vertical.
3. All safety socket boxes are to be installed plumb.
4. For outdoor installments, a raintight transformer cabinet and a raintight meter inclosure are necessary.
5. For details of current transformer cabinet see pages (C9 thru C11)
6. A clear working space of at least 36 inches must extend from the surface on which the metering equipment is mounted.
7. A varhour meter is not always necessary. Consult SMUD for details.
8. The meter height may be reduced to 36 inches when in a meter room or an approved cabinet.
9. The customer shall furnish and install a meter socket(s) and a metal cabinet for housing the metering current tranformers in accordance with the specifications shown.
10. 50' Maximum for remote Meter.

ENGR. SPEC. T004	CONSTRUCTION STANDARDS	DRAWING REFERENCE# G356-C8	REV: 1 DATE: JAN 06
SMUD SACRAMENTO MUNICIPAL UTILITY DISTRICT	Current Transformer Cabinets 201-800 Amperes		G-8



(A)
CABINET SHOWING
STUD-MOUNTED COVER

(B)
MOUNTING BASE FOR
TWO CURRENT TRANSFORMERS



(C)
CABINET SHOWING
HINGED, FLANGED COVER

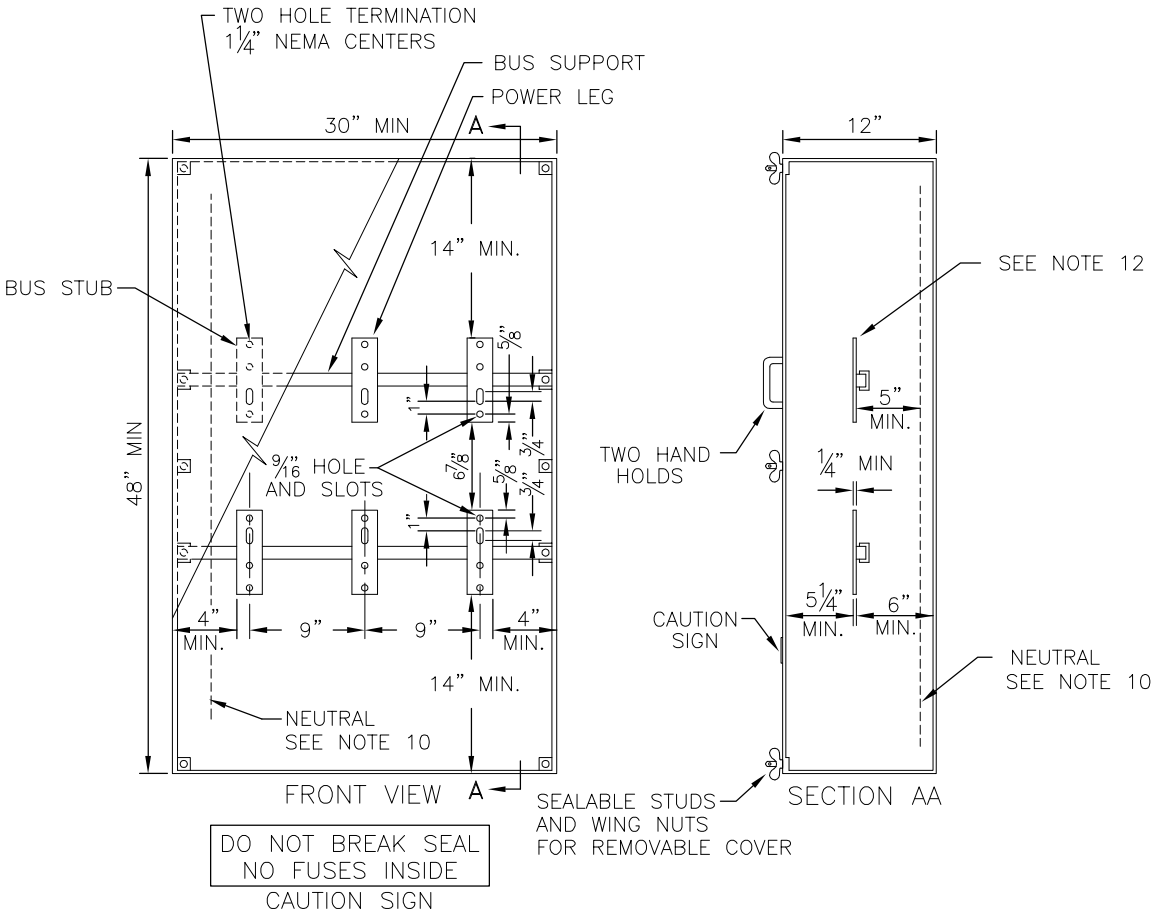
(D)
MOUNTING BASE FOR
THREE CURRENT TRANSFORMERS

TYPE OF SERVICE	MINIMUM CABINET SIZE	MOUNTING BASE
SINGLE PHASE	24" x 42" x 11"	TWO CURRENT TRANSFORMER BASE
THREE PHASE	36" x 42" x 11"	THREE CURRENT TRANSFORMER BASE

NOTES:

1. The cover shall be sealable.
2. The cover shall not be attached by means of screws.
3. A hinged cover may be used, provided there is proper clearance to open the cover when the cabinet is installed.
4. When exposed to weather, the cabinet shall be raintight.
5. The customer shall furnish lugs and connect cable to the current transformer mounting base.
6. When service is 4-wire delta, connect the power leg to the current transformer mounting base.
7. The grounding lug shall be provided by SMUD.
8. No connection shall be made in any instrument transformer cabinet to supply any other meter, and not more than one load circuit shall leave any such cabinet, except when required by SMUD.
9. Any service over 200 amperes, single phase, required authorization of SMUD's Engineering Designer.

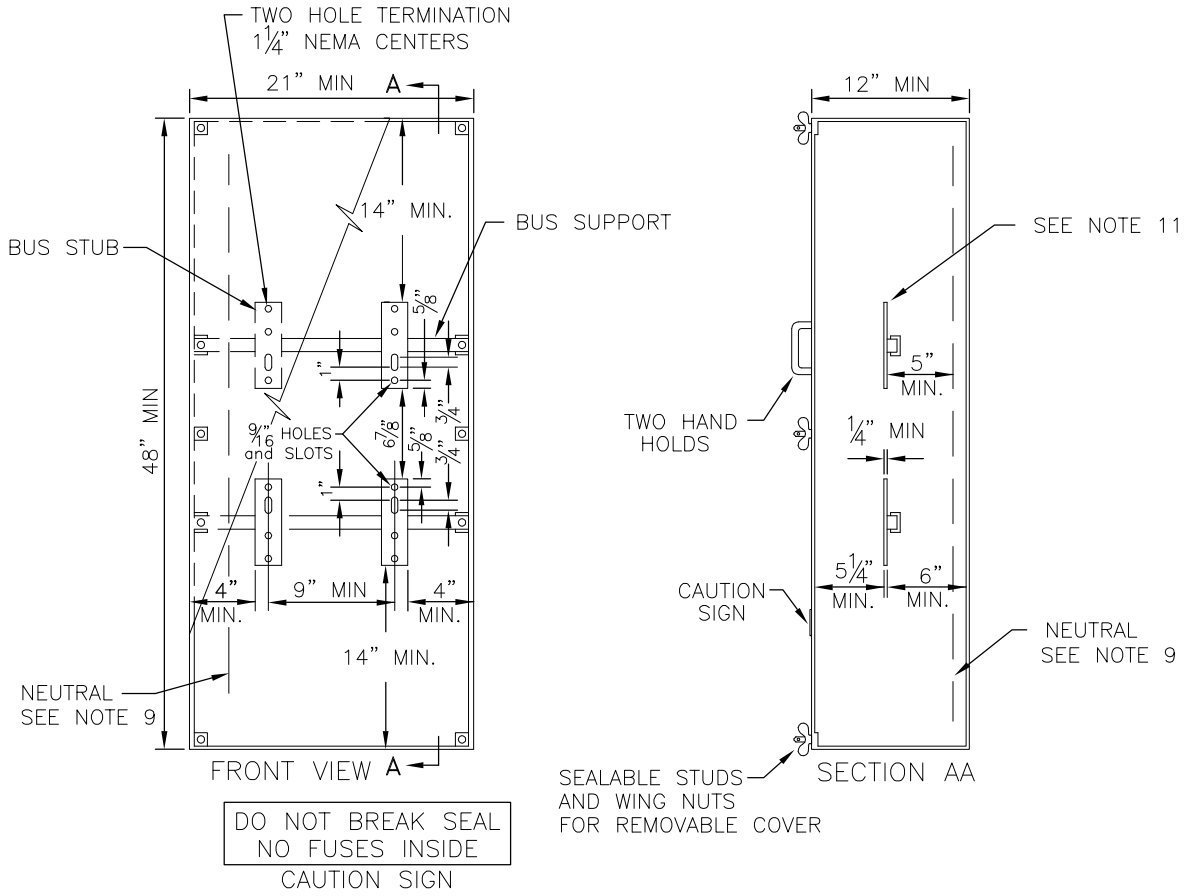
ENGR. SPEC.	T004	CONSTRUCTION STANDARDS	DRAWING REFERENCE# G356-C9	REV: 1 DATE: JAN 06
SMUD SACRAMENTO MUNICIPAL UTILITY DISTRICT		Current Transformer Cabinets, Main Switch or Breaker Rated 201-400 Amperes		G-9



NOTES:

1. Two current transformers are required for 1/ø service.
2. The use of a standard switchboard service section in lieu of metering arrangements using this cabinet may prove to be more economical for the customer and should be investigated.
3. A hinged cover may be used, provided there is proper clearance to open the cover when the cabinet is installed.
4. The cover shall not be attached by means of screws.
5. The cover shall be sealable.
6. When exposed to weather, the cabinet shall be raintight.
7. A grounding lug shall be provided by SMUD.
8. No bus bar may be more than 4 inches wide.
9. The neutral may be cable or bus bar and may be located on either side of the cabinet.
10. No connection shall be made in any instrument transformer cabinet to supply any other meter, and not more than one load circuit shall leave any such cabinet, except when required by SMUD.
11. The customer shall funish lugs and connect cable to the line and load sides of the bus stubs.
12. Any service over 200 amps, single phase, required authorization of SMUD's Engineering Designer.

ENGR. SPEC. T004	CONSTRUCTION STANDARDS	DRAWING REFERENCE# G356-C10	REV: 1
			DATE: JAN 06
SMUD SACRAMENTO MUNICIPAL UTILITY DISTRICT	Bused Current Transformer Cabinet (30" Min.) for Three Phase Service, Main Switch or Breaker Rated 201-800 Amperes		G-10

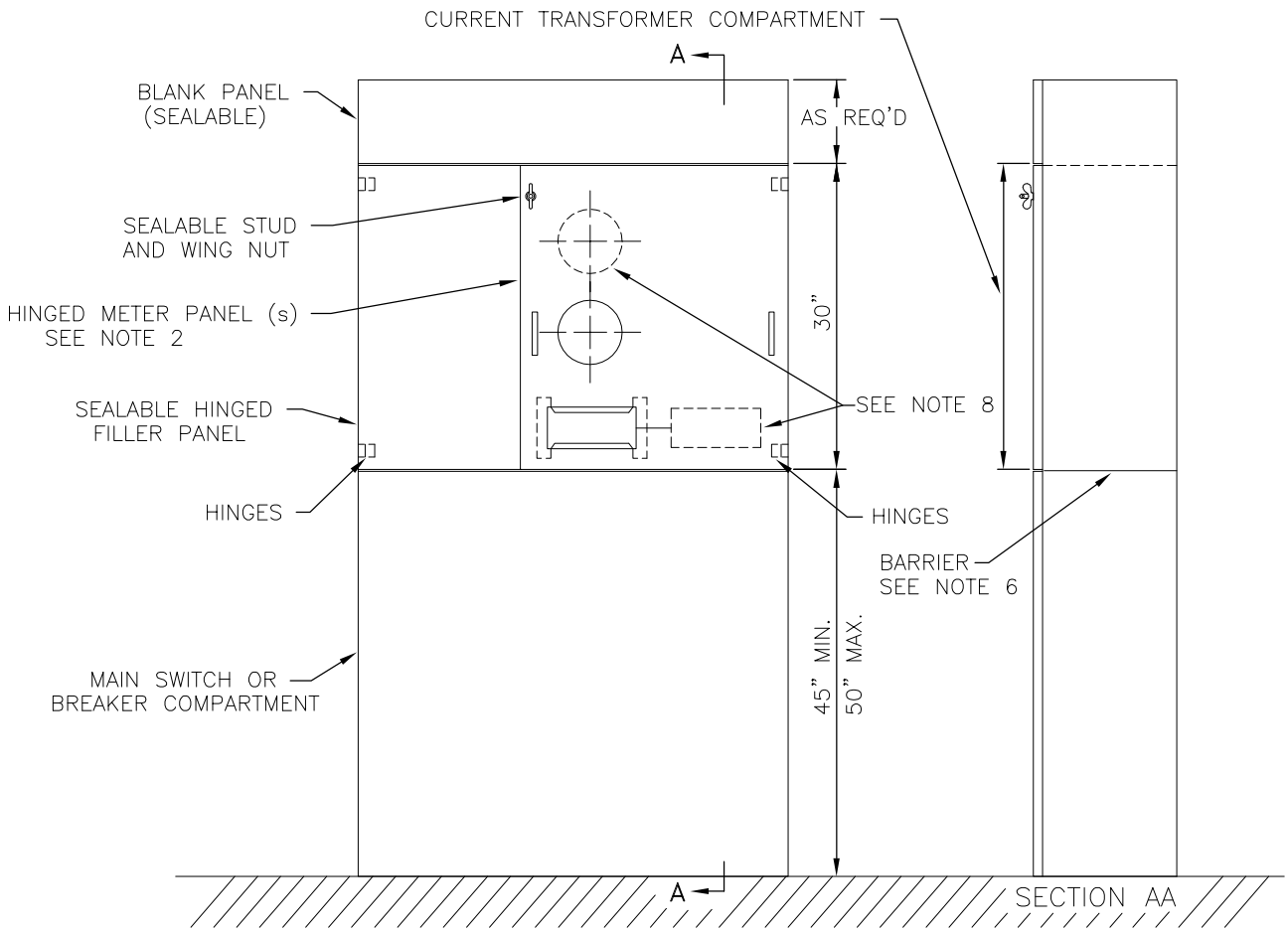


DO NOT BREAK SEAL
NO FUSES INSIDE
CAUTION SIGN

NOTES:

1. Two current transformers are required for 1/ø service.
2. The use of a standard switchboard service section in lieu of metering arrangements using this cabinet may prove to be more economical for the customer and should be investigated.
3. A hinged cover may be used, provided there is proper clearance to open the cover when the cabinet is installed.
4. The cover shall not be attached by means of screws.
5. The cover shall be sealable.
6. When exposed to weather, the cabinet shall be raintight.
7. A grounding lug shall be provided by SMUD.
8. No bus bar may be more than 4 inches wide.
9. The neutral may be cable or bus bar and may be located on either side of the cabinet.
10. No connection shall be made in any instrument transformer cabinet to supply any other meter, and not more than one load circuit shall leave any such cabinet, except when required by SMUD.
11. The customer shall funish lugs and connect cable to the line and load sides of the bus stubs.
12. Any service over 200 amps, single phase, required authorization of SMUD's Engineering Designer

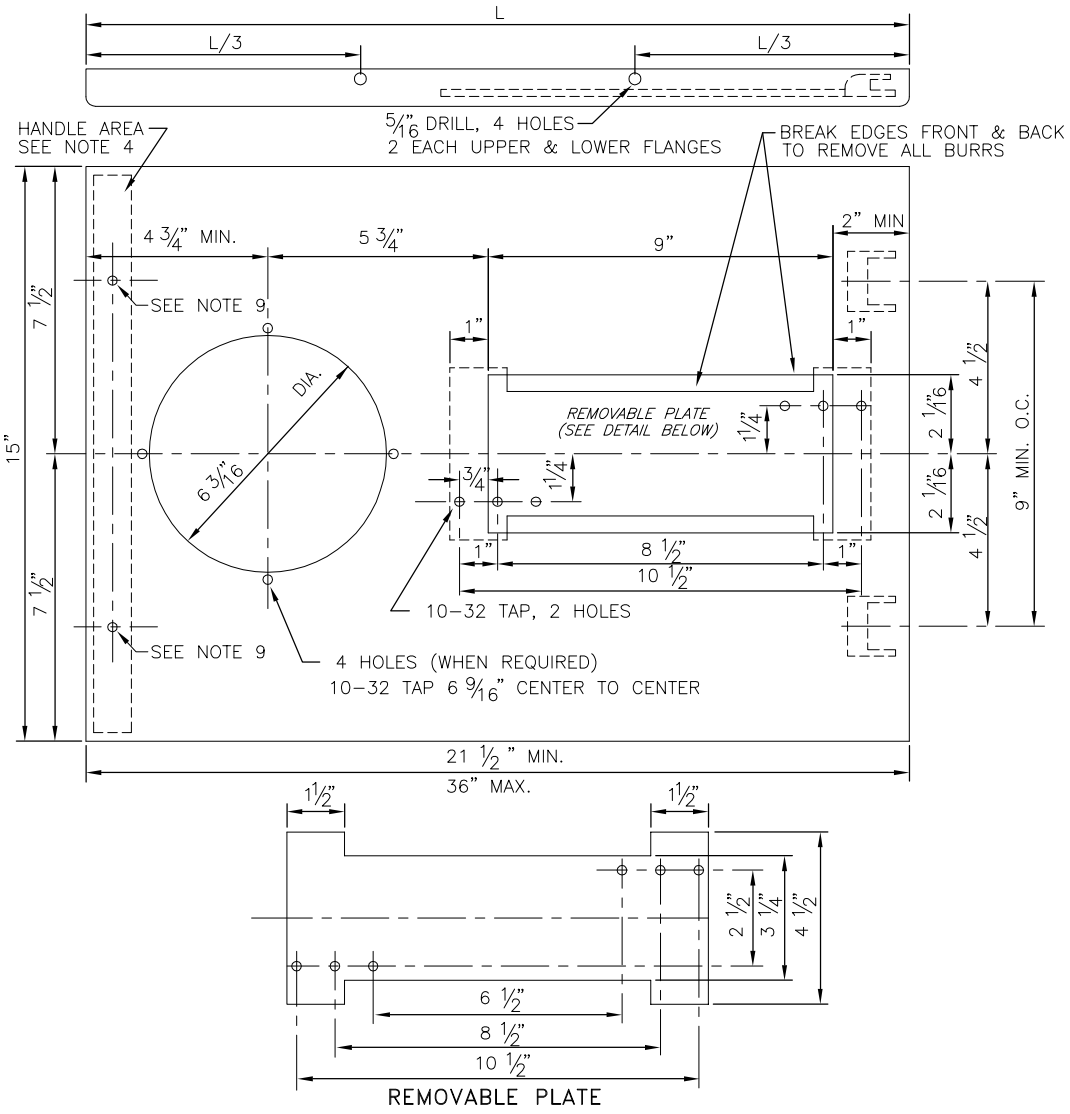
ENGR. SPEC. T004	CONSTRUCTION STANDARDS	DRAWING REFERENCE# G356-C11	REV: 1 DATE: JAN 06
SMUD SACRAMENTO MUNICIPAL UTILITY DISTRICT	Bused Current Transformer Cabinets (21" Min.) for Three Phase Service, Main Switch or Breaker Rated 201-800 Amperes		G-11



NOTES:

1. Filler panels shall be used where the switchboard width exceeds the meter panel width.
2. The filler panel and meter panel shall be hinged, reversible, interchangeable and sealable.
3. When only one meter panel is furnished, it shall be mounted in the lower position.
4. The meter panel shall have a handle(s) attached. See Pages C–13 and C–14.
5. Hinges shall be readily interchangeable, right or left, on the job site. When clevis type or removable pin type hinges are used, provision shall be made for removing the pin from the top without removing the adjacent panel.
6. The barrier shall be of insulating, nontracking material and have a minimum of 24 vent holes of 3/8 inch diameter.
7. The grounding connection shall be made in the main switch or breaker compartment.
8. Reactive volt–ampere–hour metering provisions may not be required. Consult SMUD's Meter Division for details.

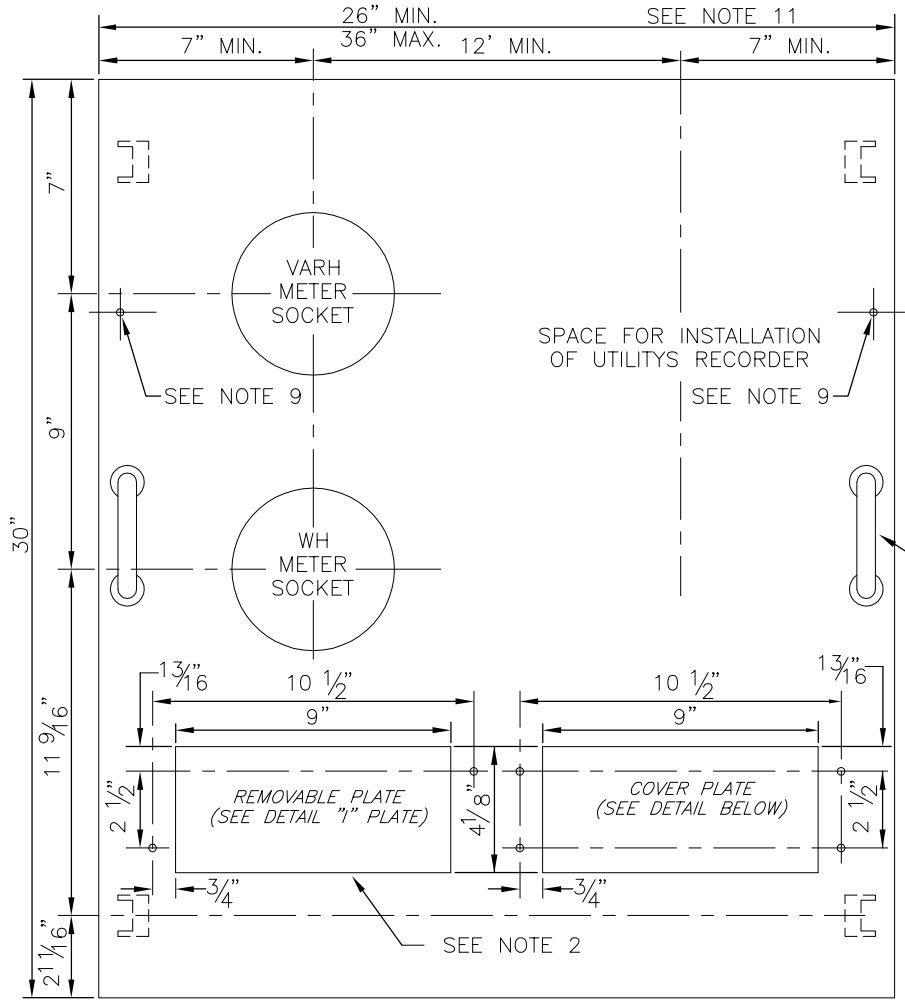
ENGR. SPEC. T004	CONSTRUCTION STANDARDS	DRAWING REFERENCE# G356-C12	REV: 1
			DATE: JAN 06
SMUD SACRAMENTO MUNICIPAL UTILITY DISTRICT	Switchboard Service Section with Filler Panel, 0-600 Volts		G-12

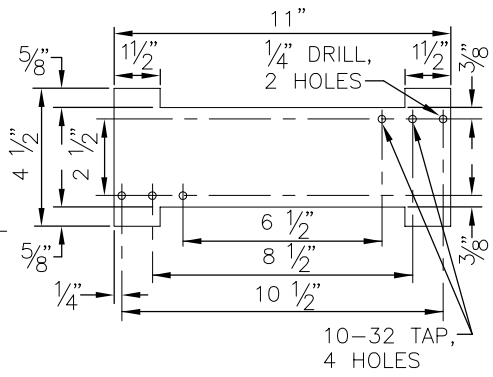


NOTES:

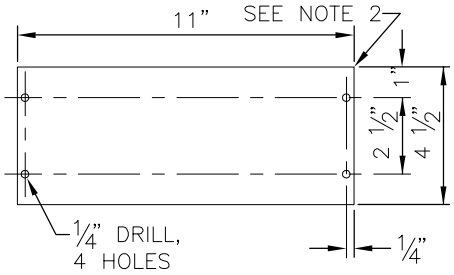
1. The switchboard manufacturer shall drill, tap and slot the panel as shown for secondary test switches and shall furnish and install sockets complete with sealing rings.
2. Meter sockets installed on hinged panels shall be designed for back connection.
3. Meter panels shall be constructed of 12 gauge steel (minimum) and shal lbe hinged, reversible, sealable and interchangeable.
4. A handle shall be attached at the unsupported end of the meter panel with a minimum radial clearance of 1 inch from the meter socket or removable plate section.
5. Hinges must support a 25 pound load applied at the unsupported end with 1/8 inchd maximum sag when open.
6. Hinges shall be readily interchangeable, right to left, on the job site.
7. A removable plate shall be secured to the rear of the panel by screws of such length that they do not protrude through the face of the panel.
8. Meter panels shall be capable of being opened 90 with meter and test facilities in place.
9. All securing screws and sealing screws on the panel shall be captive. When used, studs and wing nuts shall be sealable.

ENGR. SPEC. T004	CONSTRUCTION STANDARDS	DRAWING REFERENCE# G356-C13	REV: 1 DATE: JAN 06
SMUD SACRAMENTO MUNICIPAL UTILITY DISTRICT	Hinged Socket Meter Panel		G-13





DETAIL "I" PLATE

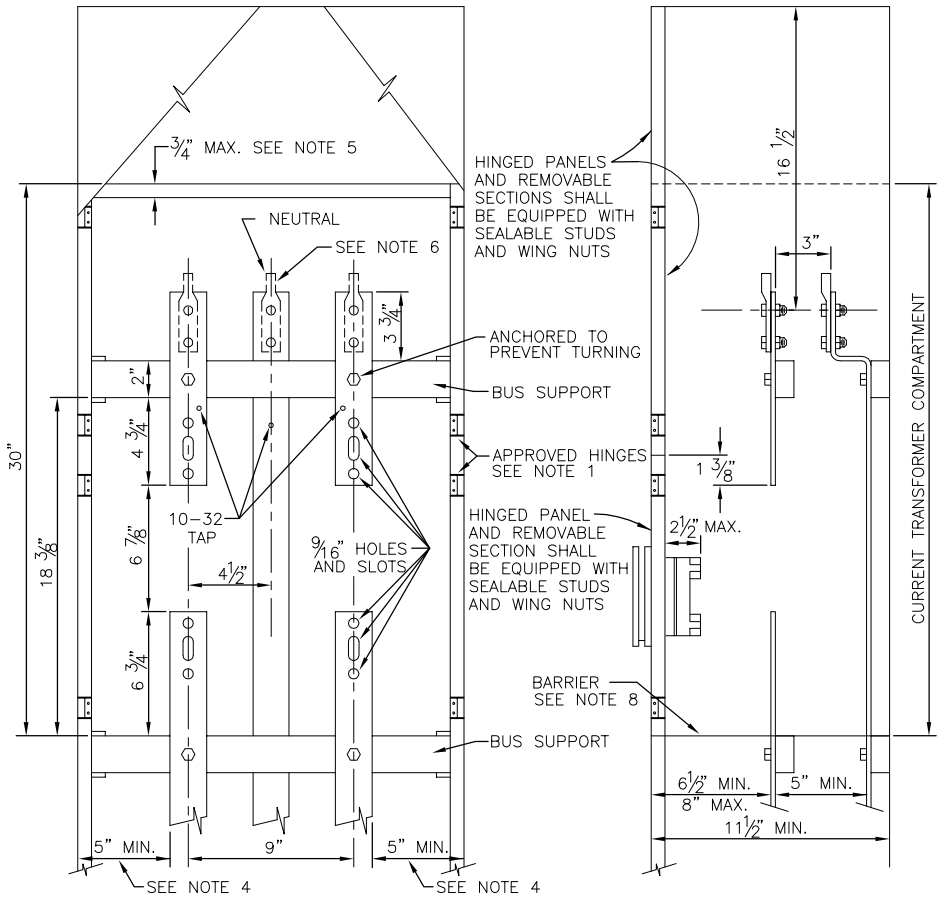


COVER PLATE

NOTES:

1. The switchboard manufacturer shall drill, tap and slot the panel as shown and shall furnish and install sockets complete with sealing rings. All holes are 10–32 tap, except as noted.
2. Removable plates shall be painted and attached to the panel.
3. Meter panels shall be constructed of 12 gauge steel (minimum) and shall be hinged and sealable.
4. Hinges shall be readily interchangeable, right or left, on the job site. When clevis type or removable pin type hinges are used, provision shall be made for removing the pin from the top.
5. Hinges must support a 25 pound load applied at the unsupported end with 1/8 inch maximum sag when open.
6. The hinged meter panel shall not be hinged to a filler panel.
7. The hinged meter panel shall be capable of being opened 90 with meter and test facilities in place.
8. The panel shall have a handle attached to both sides.
9. All securing screws and sealing screws on the panel shall be captive. When used, sutd and wing nuts shall be sealable.
10. Meter sockets installed on hinged panels shall be designed for back connection.
11. For panel width less than 26 inches, consult SMUD.

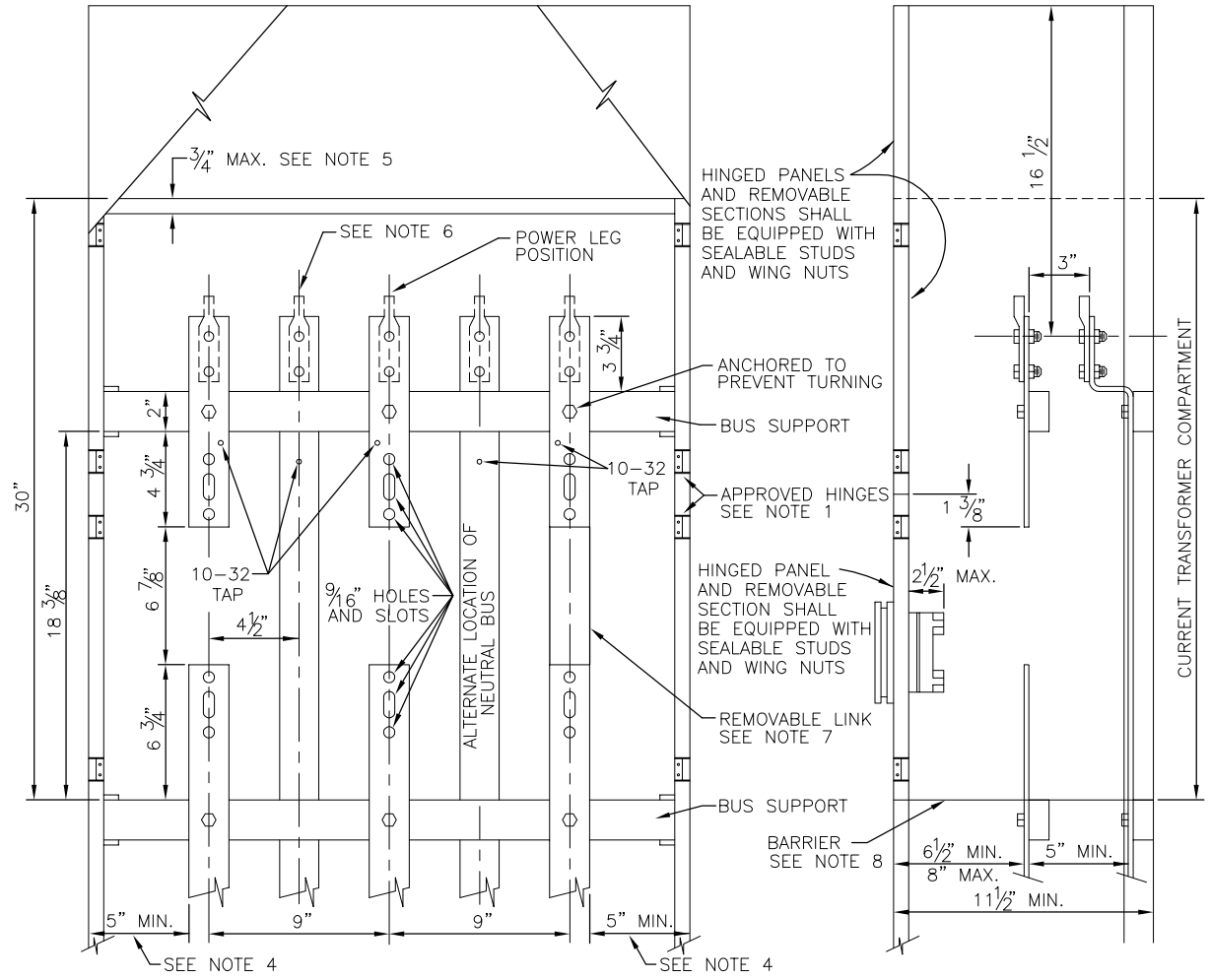
ENGR. SPEC. T004	CONSTRUCTION STANDARDS	DRAWING REFERENCE# G356-C14	REV: 1	
			DATE: JAN 06	
SMUD SACRAMENTO MUNICIPAL UTILITY DISTRICT	Hinged Socket Meter and Demand Recorder Panel		G-14	



NOTES:

1. The stationary portion of the hinges shall be attached to both sides of the switchboard in order to permit ready interchangeability of hinged panels to the right or left side.
2. The compartment shall be on the supply side of the main switch or breaker.
3. The direction of feed shall be vertical, and no other conductors shall pass through this compartment.
4. The clearance to the side of each compartment shall be increased by the amount by which the corner angle exceeds 1 inch.
5. Return flanges for the lower and upper metal panel support shall not project more than 3/4 inch up or down from the adjacent switchboard panels.
6. Each bus shall have a connector that will accept stranded conductors having the ampere capacity of the main switch or breaker.
7. The neutral may be located on the side wall or at either side.
8. The barrier shall be of insulating, nontracking material and have a minimum of 24 vent holes of 3/4 inch diameter.
9. The bus dimensions shall be a maximum of 3/4" x 2" and a minimum of 1/4" x 2" When a laminated bus is used, there shall be no space between laminiations in the current transformer compartment.
10. Any service over 200 amp, single phase, requires authorization of SMUD's Engineering Designer. In no case, will SMUD provide over 100 KVA to any single customer at single phase, 3–wire (417 amps).

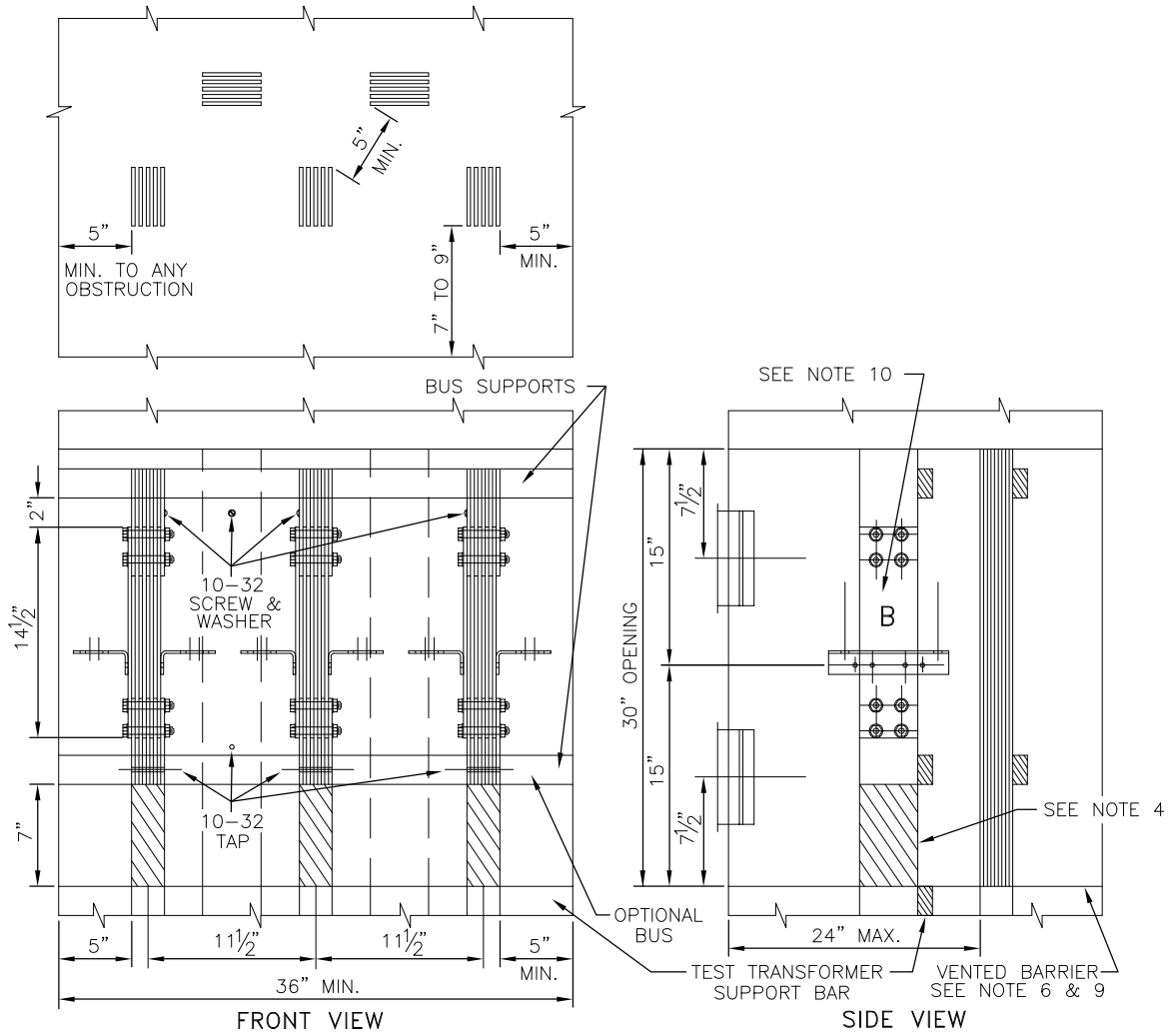
ENGR. SPEC. T004	CONSTRUCTION STANDARDS	DRAWING REFERENCE# G356-C15	REV: 1 DATE: JAN 06
SMUD SACRAMENTO MUNICIPAL UTILITY DISTRICT	Current Transformer Compartment, 0-600 Amperes (Single Phase, 3 Wire Services)		G-15



NOTES:

1. The stationary portion of the hinges shall be attached to both sides of the switchboard in order to permit ready interchangeability of hinged panels to the right or left side.
2. The compartment shall be on the supply side of the main switch or breaker.
3. The direction of feed shall be vertical, and no other conductors shall pass through this compartment.
4. The clearance to the side of each compartment shall be increased by the amount by which the corner angle exceeds 1".
5. Return flanges for the lower and upper metal panel support shall not project more than 3/4" up or down from the adjacent switchboard panels.
6. Each bus shall have a connector that will accept stranded conductors having the ampere capacity of the main switch or breaker.
7. A removable link shall be installed in the power leg when the switchboard is to be used for for three phase service.
8. The barrier shall be of insulating, nontracking material and have a minimum of 24 vent holes of 3/4 inch diameter.
9. The bus dimensions shall be a maximum of 3/4" x 2" and a minimum of 1/4 inch x 2" When a laminated bus is used, there shall be no space between laminiations in the current transformer compartment.

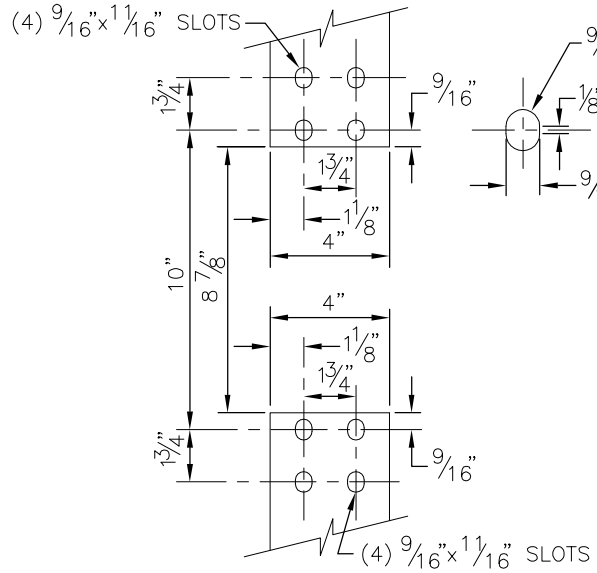
ENGR. SPEC. T004	CONSTRUCTION STANDARDS	DRAWING REFERENCE# G356-C16	REV: 1	
			DATE: JAN 06	
SMUD SACRAMENTO MUNICIPAL UTILITY DISTRICT	Current Transformer Compartment, 0-1000 Amperes (Three Phase, 4 Wire Services)	G-16		



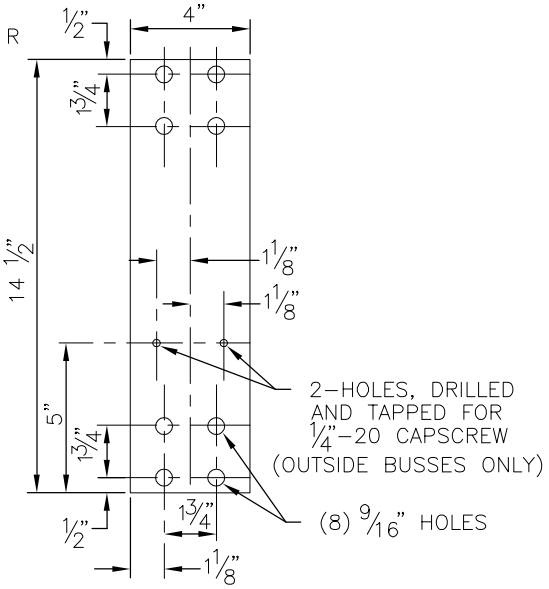
NOTES:

1. The bus anchorage shall be such that the busses will remain in position when removable section "B" is out.
2. The direction of feed shall be vertical, No other conductors shall pass through this compartment.
3. The transformer compartment shall be on the supply side of the main switch or breaker.
4. Bus corners should be rounded, as necessary. to prevent damage to insulation and to maintain an overall diagonal dimension of not more than 4.45 inches. Bus insulation must be adequate for the voltage involved.
5. The maximum permissible bus unit shall consist of four 1/4 inch x 4 inch bars spaced 1/4 inch.
6. The barrier should not be less than 45 inches and shall not be more than 50 inches above the standing surface.
7. Clearance to the side of the compartment shall be increased by the amount by which the corner angle exceeds 1 inch.
8. Return flanges for the lower and upper meter panel support shall not project more than 3/4 inch up or down from the adjacent switchboard panels.
9. The barrier shall be of insulating, nontracking material and have a minimum of 24 vent holes of 3/8 inch diameter.
10. For details of removable section "B" and C.T. support, see Page C–18.

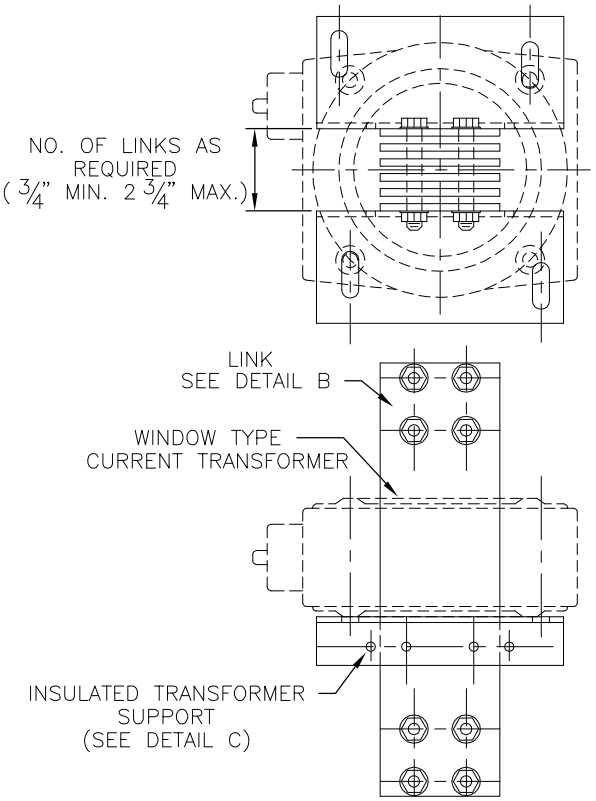
ENGR. SPEC. T004	CONSTRUCTION STANDARDS	DRAWING REFERENCE# G356-C17	REV: 1 DATE: JAN 06
SMUD SACRAMENTO MUNICIPAL UTILITY DISTRICT	Current Transformer Compartment, 0-600 Volts, 1001-3000 Amperes		G-17



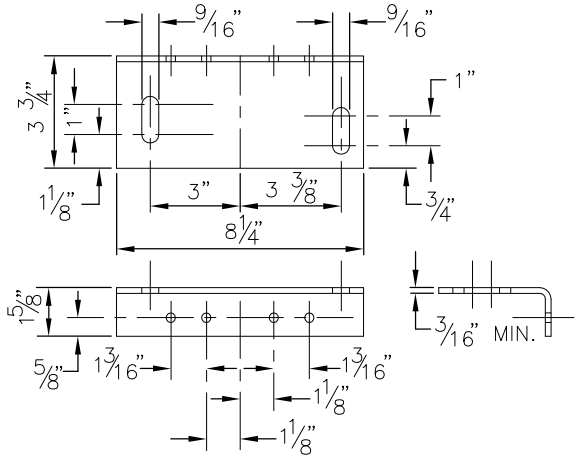
DETAIL A
DRILLING AND SPACING BUS



DETAIL B
1/4"x4" LINK
(SAME MATERIAL AS BUS)



REMOVABLE LINK ASSEMBLY
(FURNISHED BY MANUFACTURER)

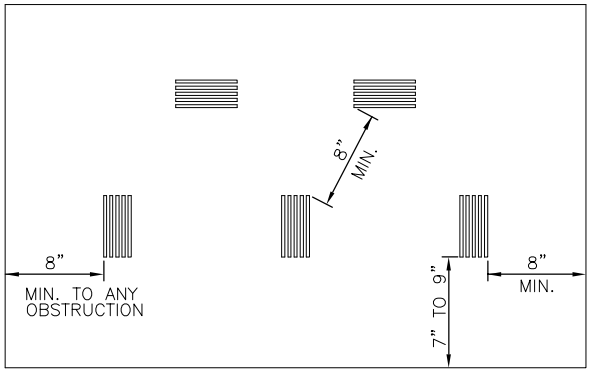


DETAIL C
INSULATED SUPPORT FOR
CURRENT TRANSFORMER
(MATERIAL: INSULATING, NON-TRACKING)

NOTES:

1. The manufacturer will provide 1/2 inch hex head bolts, nuts and lock washers.

ENGR. SPEC. T004	CONSTRUCTION STANDARDS	DRAWING REFERENCE# G356-C18	REV: 1	
			DATE: JAN 06	
SMUD SACRAMENTO MUNICIPAL UTILITY DISTRICT	Current Transformer Compartment, 0-600 Volts, 1001-3000 Amperes (Removable Link and Current Transformer Support)		G-18	



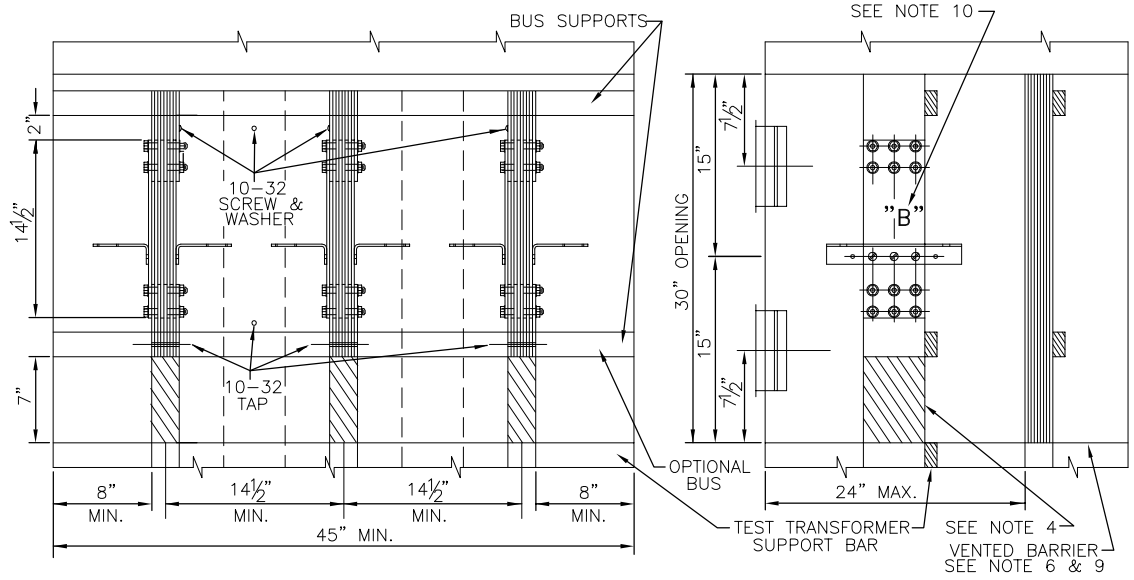
MAXIMUM NUMBER OF BARS:

4 – 1/4" x 4" SPACED 1/4"

6 – 1/4" x 5" SPACED 1/4"

4 – 3/8" x 5" SPACED 3/8"

5 – 3/8" x 5" SPACED 1/4"



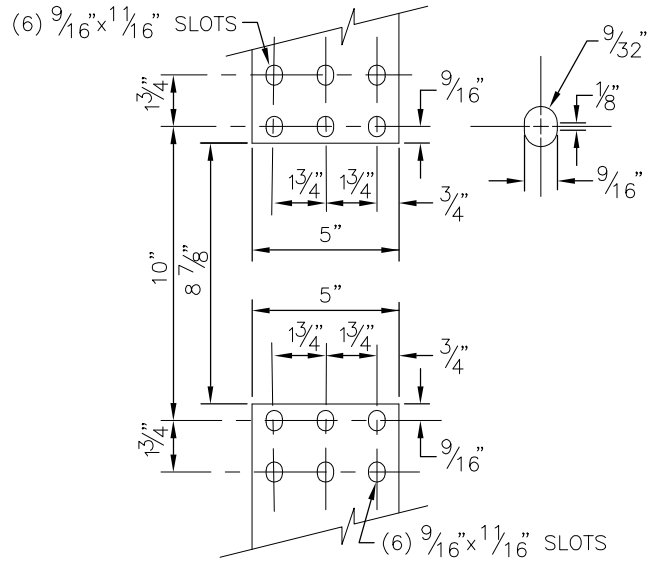
FRONT VIEW

SIDE VIEW

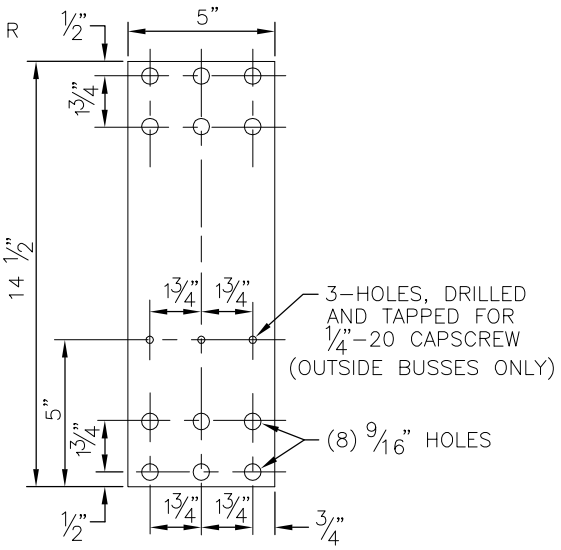
NOTES:

1. The bus anchorage shall be such that the busses will remain in position when removable section "B" is out.
2. The direction of feed shall be vertical. No other conductors shall pass through this compartment.
3. The transformer compartment shall be on the supply side of the main switch or breaker.
4. Bus corners should be rounded, as necessary, to prevent damage to insulation. Bus insulation must be adequate for the voltage involved.
5. The maximum permissible bus unit shall consist of six 1/4 inch x 5 inch bars space 1/4 inch.
6. The barrier should not be less than 45 inches and shall not be more than 50 inches above the standing surface.
7. Clearance to the side of the compartment shall be increased by the amount by which the corner angle exceeds 1 inch.
8. Return flanges for the lower and upper meter panel support shall not project more than 3/4 inch up or down from the adjacent switchboard panels.
9. The barrier shall be of insulating material and have a minimum of 24 vent holes of 3/8 inch diameter.
10. for details of removable section "B" and C.T. support for a 4 inch bus, see Page C–18 and for a 5 inch bus, see Page C–20. Consult SMUD for use of a bus larger than 5 inches.

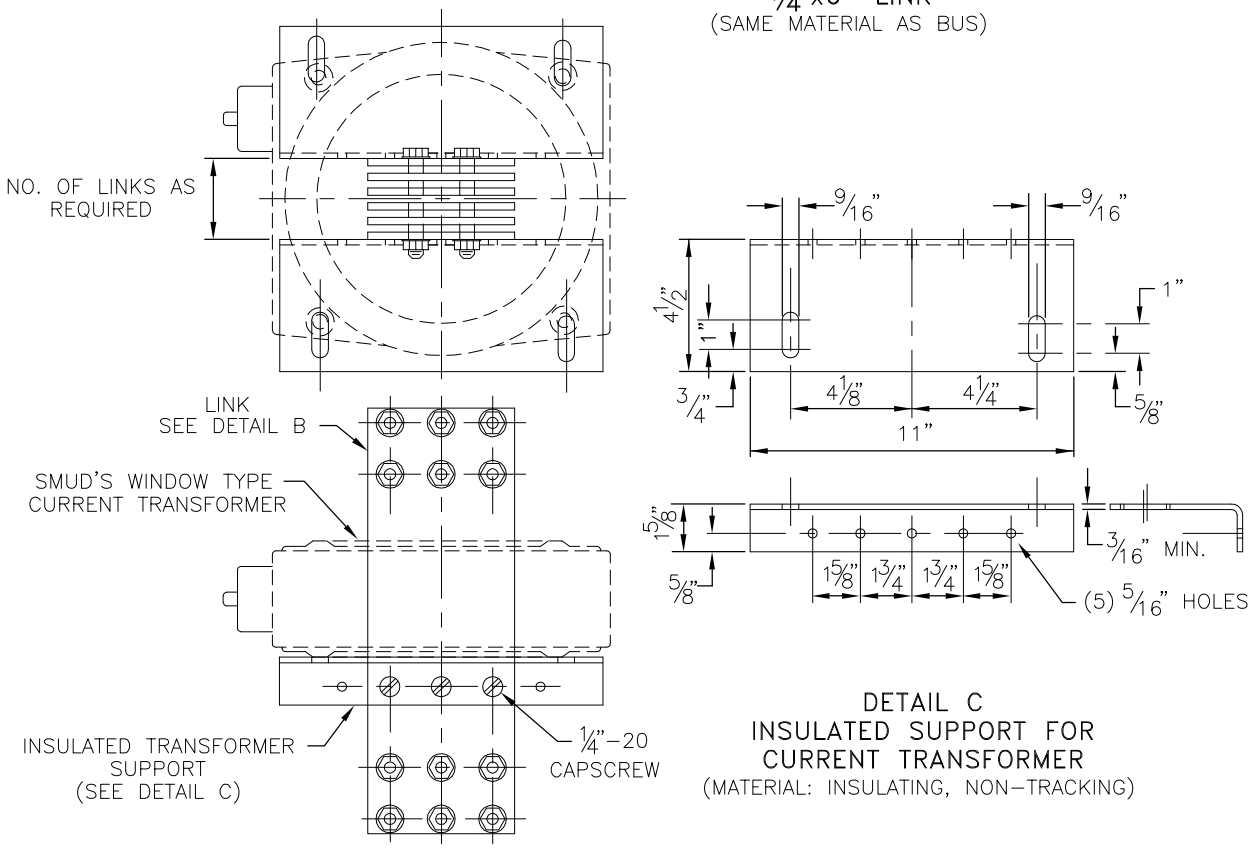
ENGR. SPEC. T004	CONSTRUCTION STANDARDS	DRAWING REFERENCE# G356-C19	REV: 1 DATE: JAN 06
SMUD SACRAMENTO MUNICIPAL UTILITY DISTRICT	Current Transformer Compartment, 0-600 Volts, 3001-4000 Amperes		G-19



DETAIL A
DRILLING AND SPACING BUS



DETAIL B
1/4"x6" LINK
(SAME MATERIAL AS BUS)



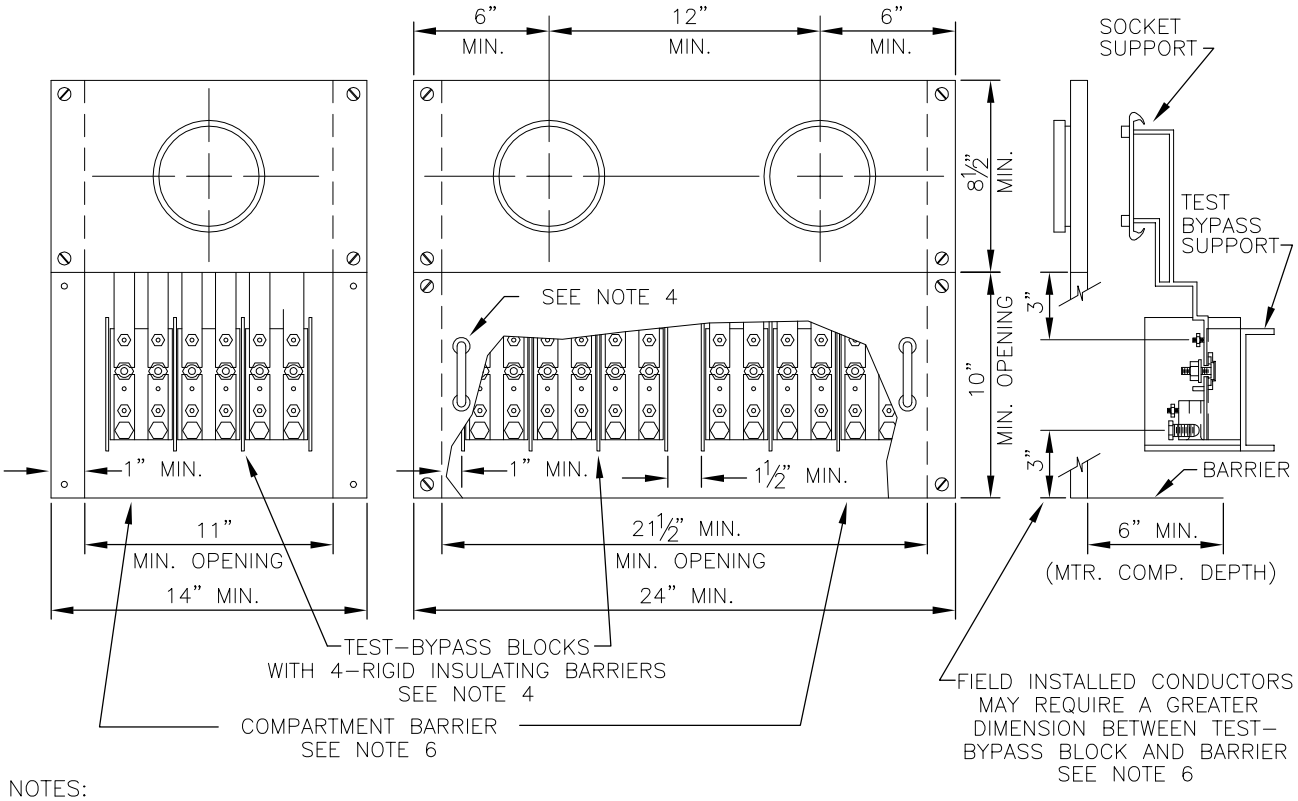
REMOVABLE LINK ASSEMBLY
(FURNISHED BY MANUFACTURER)

DETAIL C
INSULATED SUPPORT FOR CURRENT TRANSFORMER
(MATERIAL: INSULATING, NON-TRACKING)

NOTES:

1. The manufacturer will provide 1/2 inch hex head bolts, nuts and lock washers.
2. Consult SMUD for use of bus bars larger than 5 inches.

ENGR. SPEC. T004	CONSTRUCTION STANDARDS	DRAWING REFERENCE# G356-C20	REV: 1	
			DATE: JAN 06	
SMUD SACRAMENTO MUNICIPAL UTILITY DISTRICT	Current Transformer Compartment, 0-600 Volts, 3001-4000 Amperes (Removable Link and Current Transformer Support)		G-20	

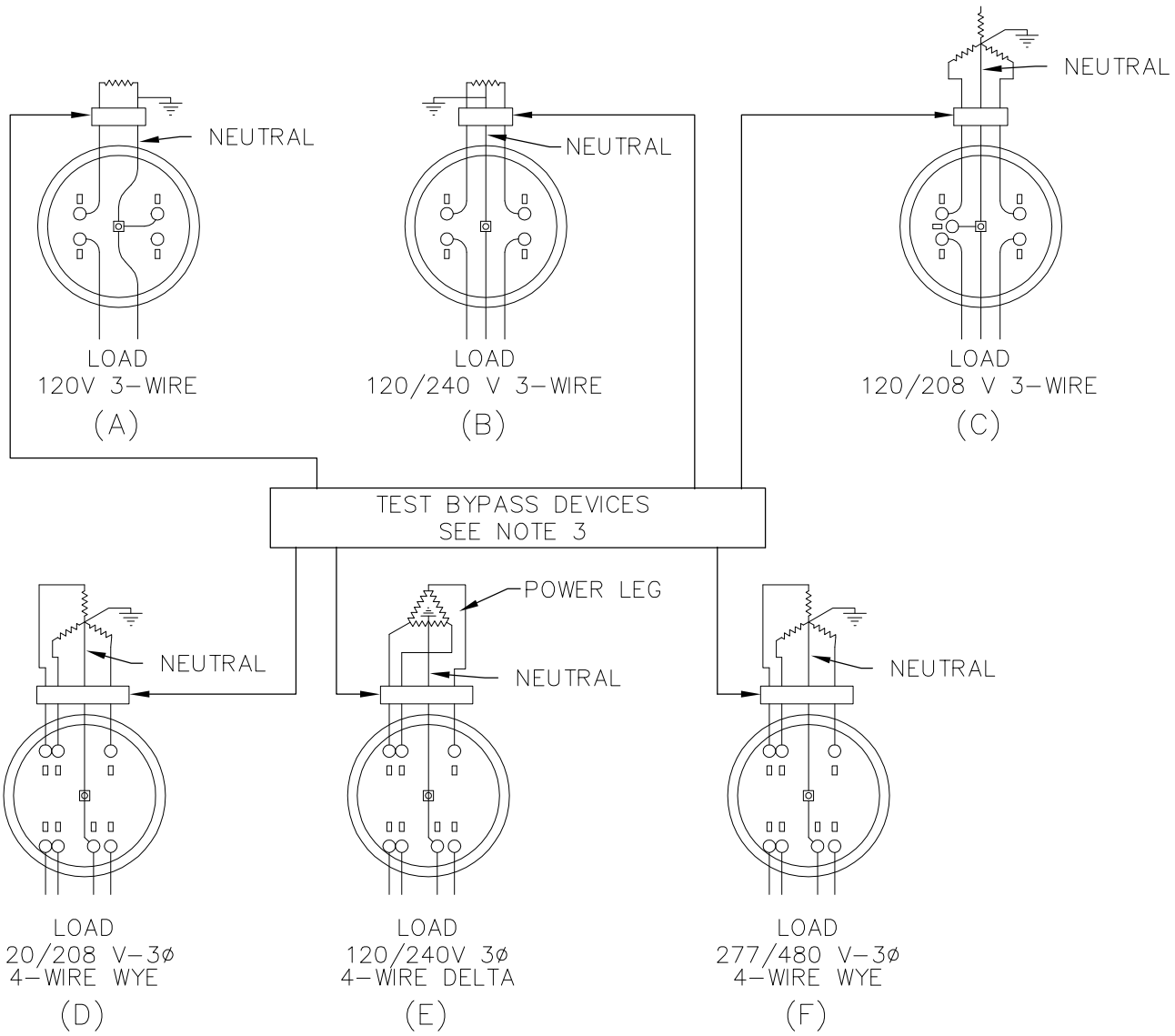


NOTES:

1. Test bypass blocks and barriers shall be furnished, installed and wired or bussed to the meter socket by the manufacturer. Blocks and barriers shall conform to the requirements shown on Page C–23 and C–24. Connection sequence is line–load, from left to right, for each phase.
2. Metered conductors shall not pass through adjacent metering compartments except in enclosed wireways.
3. Meter panels shall be removable with a maximum of two meters per panel.
4. Test bypass block cover panels shall be sealable and fitted with handles.
5. When a neutral is required for metering or testing, an insulated neutral terminal shall be provided behind each test bypass cover panel. The terminal shall be readily accessible when the cover panel is removed and shall be individually connected to the neutral bus with a minimum size No. 8 AWG copper wire.
6. A factory installed, full–width insulating barrier shall be located at the bottom of each test bypass compartment.
7. For 3/ø, 4 wire, connect the 7th jaw to the body of the neutral lug with No. 8 copper wire.
8. For 3/ø, 4 wire delta, identify the right–hand test bypass block (2 poles) as the power leg.
9. For 1/ø, 3 wire, omit the center test bypass block.
10. For 1/ø, 3 wire, 120/208 volt, omit the center test bypass block and connect the 5th jaw to the body of the neutral lug with No. 8 copper wire.
11. Meter panels shall be removable when the meter is in place. The meter socket is to be supported independent of and attached to the meter panel.
12. Separate line and load conductors shall be installed by the contractor or manufacturer for each meter socket.
13. Each line and load position shall be clearly identified by 3/4 inch minimum block letter labeling.
14. All securing screws shall be captive. All panels shall be sealable.

ENGR. SPEC. T004	CONSTRUCTION STANDARDS	DRAWING REFERENCE# G356-C21	REV: 1 DATE: JAN 06
SMUD SACRAMENTO MUNICIPAL UTILITY DISTRICT	Switchboard Service Section with Self-Contained Meter Panels		G-21

SINGLE PHASE SOCKETS

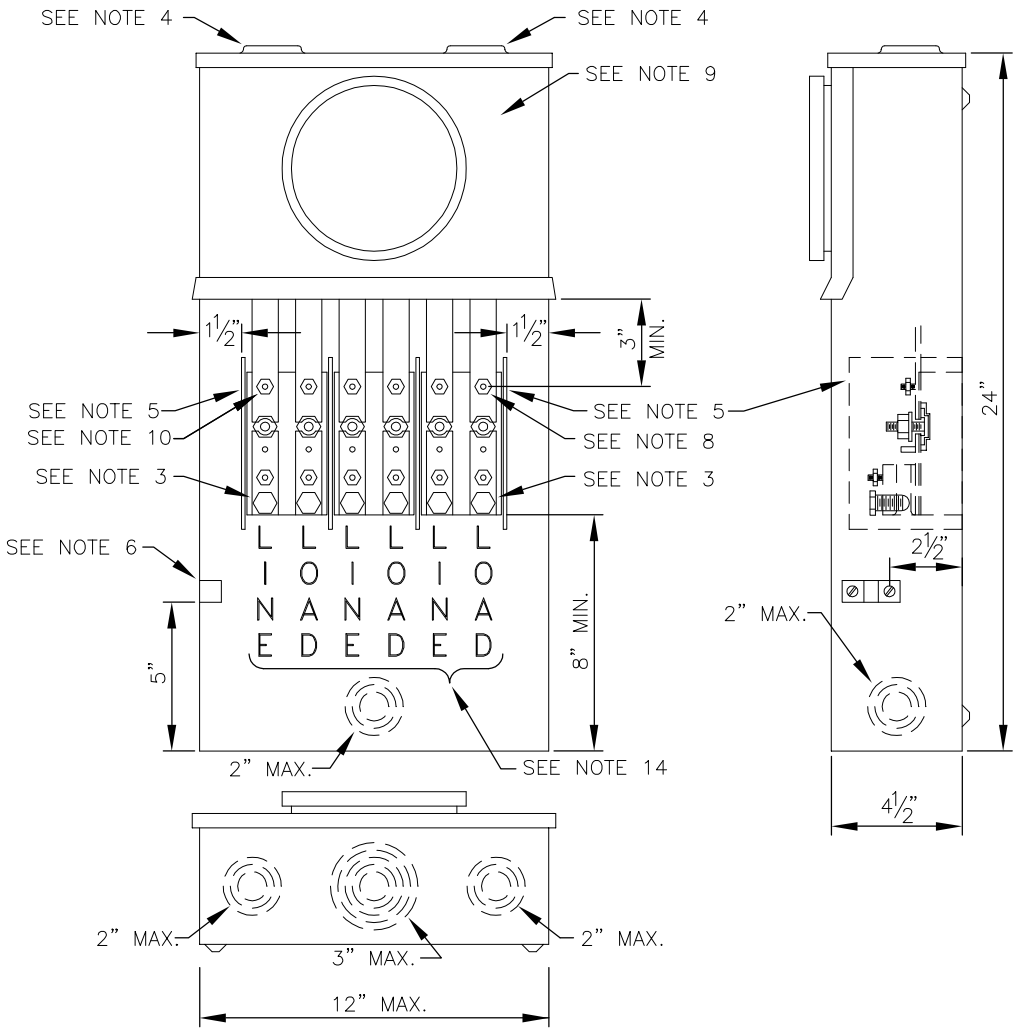


POLYPHASE SOCKETS

NOTES:

1. Commercial, self-contained meter sockets shall be U/L approved and shall have a continuous duty current rating load equal to or greater than the current rating of the associated load service equipment.
2. Neutral taps shall be connected to the service neutral conductor and located behind sealed panels. Wire nuts are not permitted.
3. For test bypass devices, see Pages C-23 through C-25.

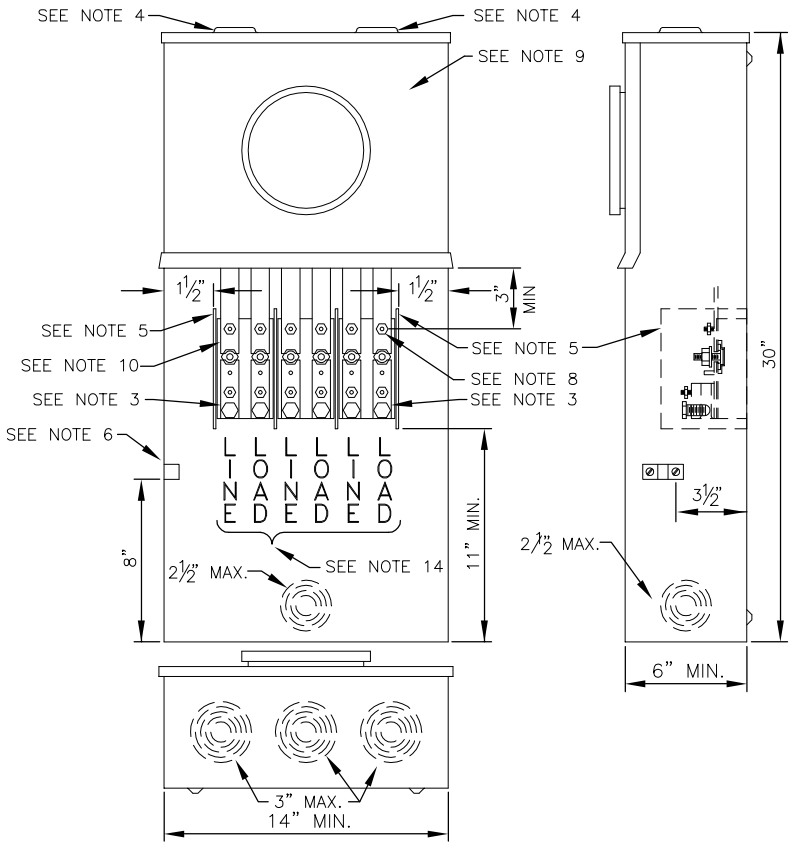
ENGR. SPEC. T004	CONSTRUCTION STANDARDS	DRAWING REFERENCE# G356-C22	REV: 1	
			DATE: JAN 06	
SMUD SACRAMENTO MUNICIPAL UTILITY DISTRICT	Diagram of Connections, Meter Sockets for Self-Contained Meters		G-22	



NOTES:

1. Self–contained meter sockets shall be U/L current rated for continuous duty.
2. This device may be used as a combination terminating pull and meter socket box for an underground service.
3. Aluminum bodied terminals shall be used for No.6 through No.1/0 wire.
4. Hubs must be capped off if used for an underground feed.
5. Rigid insulating barriers must be used.
6. Insulated, bondable vertical lay–in, double neutral lug with No.1/0 wire capacity.
7. Test blocks shall be bussed or wired to socket jaws or terminals.
8. Upper test connector studs.
9. All section covers shall be independently removable. The upper cover shall be nonremovable when the meter is in place. The lower cover shall be sealable and permanently labeled: "DO NOT BREAK SEALS, NO FUSES INSIDE."
10. For 3/ø, 4 wire, connect the 7th jaw to the body of the neutral lug with No. 8 copper wire.
11. For 3/ø, 4 wire delta, identify the right–hand test bypass block (2 poles) as the power leg.
12. For 1/ø, 3 wire, omit the center block and associated barriers.
13. For 1/ø, 3 wire, 120/208 volt, omit the center block and associated barriers and connect the 5th jaw to the body of the neutral lug with No.8 copper wire.
14. Decals on the inside back of the enclosure must be in 3/4 inch minimum high block letters.
15. On 480v installations, lightning protectors shall be mounted on the bottom or side of the enclosure by SMUD.
16. Test block details are on Page C–25.

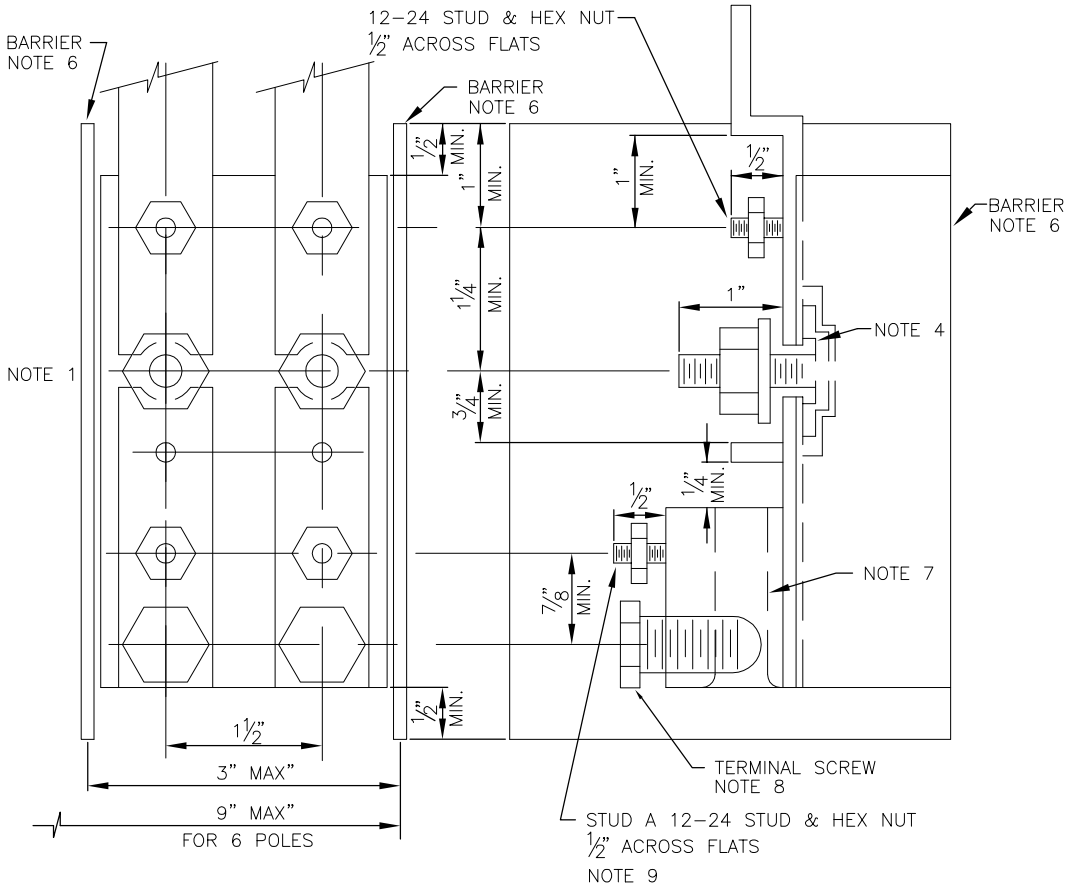
ENGR. SPEC. T004	CONSTRUCTION STANDARDS	DRAWING REFERENCE# G356-C23	REV: 1 DATE: JAN 06
SMUD SACRAMENTO MUNICIPAL UTILITY DISTRICT	Safety Socket Box with Factory Installed Test Bypass Devices, 100 Amperes Maximum		G-23



NOTES:

1. Self–contained meter sockets shall be U/L current rated for continuous duty.
2. This device may be used as a combination terminating pull and meter socket box for an underground service.
3. Aluminum bodied terminals shall be used for No. 1/0 through No. 250 MCM wire.
4. Hubs must be capped off if used for underground feed.
5. Rigid insulating barriers must be used.
6. Insulated, bondable vertical lay–in, double neutral lug with No. 250 MCM wire capacity.
7. Test blocks shall be bussed or wired to socket jaws or terminals.
8. Upper test connector studs.
9. All section covers shall be independently removable. The upper cover shall be nonremovable when the meter is in place. The lower cover shall be sealable and permanently labeled: "DO NOT BREAK SEALS, NO FUSES INSIDE."
10. For 3/ø, 4 wire, connect the 7th jaw to the body of the neutral lug with No. 8 copper wire.
11. For 3/ø, 4 wire delta, identify the right hand test bypass block (2 poles) as the power leg.
12. For 1/ø, 3 wire, omit the center block and associated barriers.
13. For 1/ø, 3 wire, 120/208v, omit the center block and associated barriers and connect the 5th jaw to the body of the neutral lug with No. 8 copper wire.
14. Decals on the inside back of the enclosure must be in 3/4 inch minimum high block letters.
15. On 480v installations, lightning protectors shall be mounted on the bottom or side of the enclosure by SMUD.
16. Test block details are on Page C–25.

ENGR. SPEC. T004	CONSTRUCTION STANDARDS	DRAWING REFERENCE# G-356-C24	REV: 1 DATE: JAN 06
SMUD SACRAMENTO MUNICIPAL UTILITY DISTRICT	Safety Socket Box with Factory Installed Test Bypass Devices, 200 Amperes Maximum		G-24



NOTES:

1. The strike distance between the upper and lower bus sections shall not be less than 1/4 inch when the shorting nut is backed off.

2. The circuit–closing nut shall be a hex nut 5/8 inch across flats with plated copper washer attached and have threads counter–bored at the bottom to facilitate reinstallation. The bolt head shall be secured in place to prevent turning and backout.

3. The circuit–closing nut and bolt assembly shall maintain the applied contact pressure between the plated copper washer and the bus members of the test bypass block.

4. The insulating washer shall be made from dimensionally stable, nontracking material and shall provide a minimum of 1/8 inch creep distance between the bolt and the bus sections. bus sections shall be plated.

5. Wire stops shall extend to the center of the terminal opening or beyond.

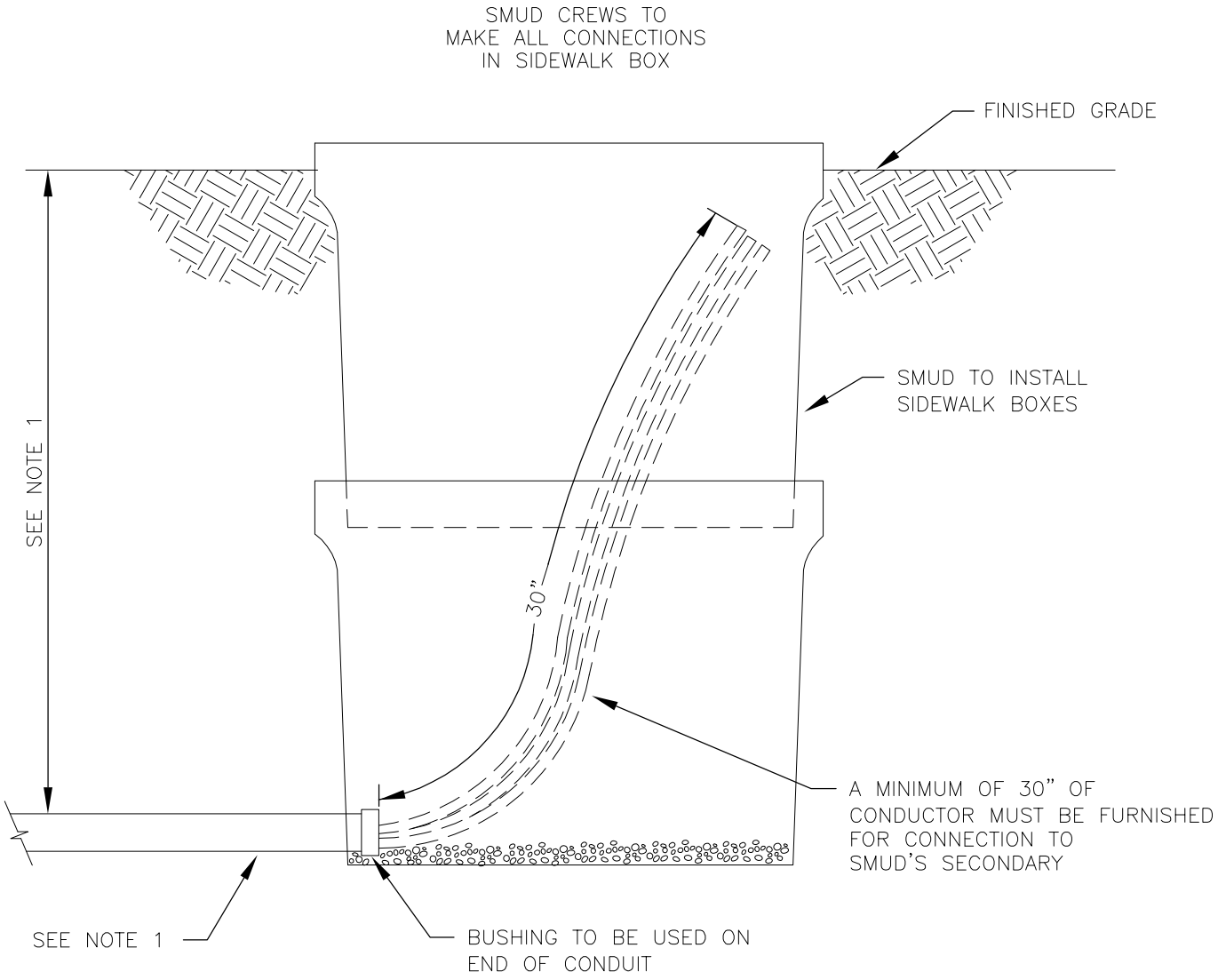
6. Rigid insulating barriers shall project at least 1/4 inch beyond any energized parts when the maximum wire size is installed.

7. Terminals shall be aluminum bodied. The opening shall extend through the terminal body and, if the wire hole is round, shall be chamferred as necessary to facilitate installation of the largest size wire.

8. The terminal screw may be of the Allen type (3/16 inch across flats for 100 amp or 5/16 across flats for 200 amp). If stud "A" is a part of the terminal screw, the terminal screw shall be 5/8 inch hex across flats.

9. Stud "A" shall be located in the clear area between the terminating lug and the circuit–closing nut and may be positioned on the terminal body, on the terminal screw, on the bus member, or incorporated as part of the wire stop.

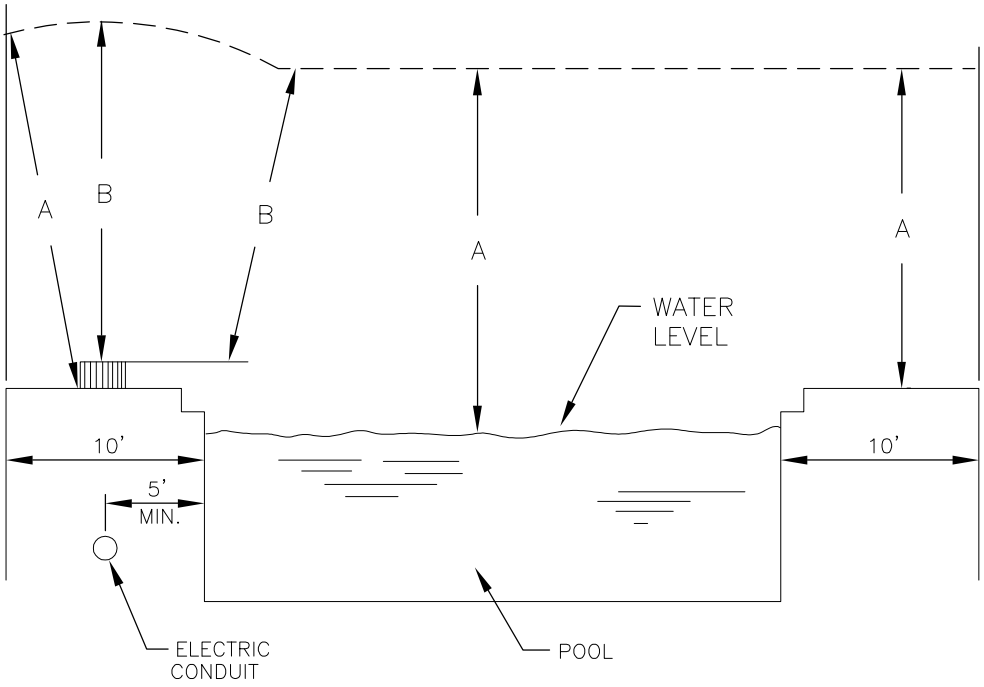
ENGR. SPEC. T004	CONSTRUCTION STANDARDS	DRAWING REFERENCE# G356-C25	REV: 1	
			DATE: JAN 06	
SMUD SACRAMENTO MUNICIPAL UTILITY DISTRICT	Test Bypass Blocks for Safety Socket, 0-200 Amperes		G-25	



NOTES:

1. Customer conductor and conduit size and type must be approved by the local inspection authorities. Conduit depth must also be approved by the local inspection authorities.

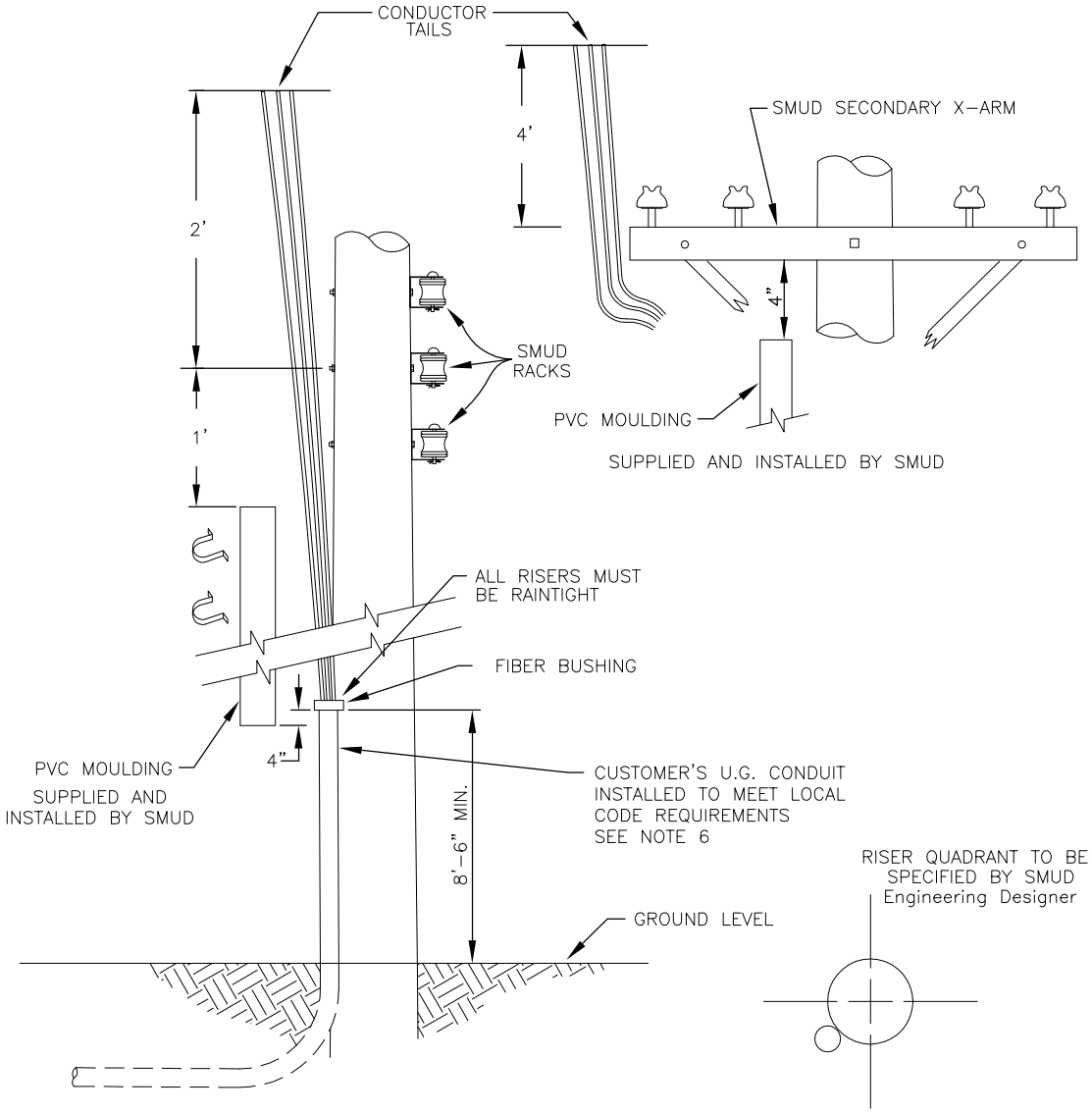
ENGR. SPEC. T004	CONSTRUCTION STANDARDS	DRAWING REFERENCE# G356-C26	REV: 1 DATE: JAN 06
SMUD SACRAMENTO MUNICIPAL UTILITY DISTRICT	Minumum Requirements for Customer's Underground Service Connection from SMUD Sidewalk Box		G-26



CLEARANCES

	Insulated supply or service drop cables, 0–750 volts to ground, supported on and cabled together with an effectively grounded bare messenger	All other supply or other service drop conductors	
		Voltage to Ground	
		0–15 kv	15–50 kv
A. Clearance in any direction to the water level, edge of water surface, base of diving platform or permanently–anchored raft.	22.5 feet	25 feet	27 feet
B. Clearance in any direction to the diving platform or tower.	14.5 feet	17 feet	18 feet

ENGR. SPEC. T004	CONSTRUCTION STANDARDS	DRAWING REFERENCE# G356-C27	REV: 1	
SMUD SACRAMENTO MUNICIPAL UTILITY DISTRICT	Service Clearance Over Swimming Pool		DATE: JAN 06	G-27



NOTES:

1. A customer owned service riser may only be used upon approval of a SMUD Engineering Designer.
2. Conductors must be cut to reach 2 feet above SMUD's middle secondary rack, or if crossarm construction, 4 feet above SMUD's secondary arm.
3. When part of the conduit run is nonmetallic, a grounded type bushing must be installed at the upper end of the metallic pole riser conduit and grounding conductor attached to the bushing, carried through the conduit run, and attached to the service ground.
4. Installation must be inspected and approved by the local inspection authorities.
5. In case the District is forced by other agencies to relocate a pole on which a customer has an underground riser, it will be the customer's responsibility to relocate that riser to a new location.
6. Use of PVC:
   a. Schedule 80 PVC – 2–1/2 inch minimum.
   b. Schedule 120 PVC – 2 inch minimum.

ENGR. SPEC. T004	CONSTRUCTION STANDARDS	DRAWING REFERENCE# G356-C28	REV: 1 DATE: JAN 06
SMUD SACRAMENTO MUNICIPAL UTILITY DISTRICT	Customer Owned Underground Service Riser, 0-750 Volts		G-28

Minimum Requirement for Customer's Underground Service

COMMERCIAL DELTA METER REQUIREMENTS

TYPE OF SERVICE	REF. PAGE NO.	MAIN SIZE AMPS.	METER	METER SOCKET	CURRENT COILS	TEST BYPASS	CURRENT COIL CAN SIZE
2W-1 Phase 120V	G-23	0-30	C1.100 120V 2W 1 Phase S	100A 4 Point Continuous Duty Rated		See Page G-23	
3W-1 Phase 120/240V	G-23	0-100	C1.200 240V 3W 1 Phase S	100A 4 Point Continuous Duty Rated		See Page G-23	
"	G-24	101-200 Under 30KW	C1.200 240V 3W 1 Phase S	200A 4 Point Continuous Duty Rated		See Page G-24	
"	G-24	101-200 Over 30KW	C1.200 240V 3W 1 Phase 15'Int M.D. S	200A 4 Point Continuous Duty Rated		See Page G-24	
3W-1 Phase 120/240V (1)	G-6 G-7 G-8 G-9	201-400	5A 240V 3W 1 Phase S.P. 15'Int M.D. S	Comb. Can S.S. Box 6 Point See G-7	2-2W 300A	7 Pole Test Switch	See G-9
"	G-8 G-11	401-800	5A 240V 3W 1 Phase S.P. 15'Int M.D. S	S.S. Box 6 Point See G-8	2-2W 600A	7 Pole Test Switch	See G-11
4W-3 Phase 120/240V (2)	G-23	0-100 Under 30KW	C1.200 240V 4W Delta 3 Phase S	100A 7 Point Continuous Duty Rated		See Page G-23	
"	G-23	0-100 Over 30KW	C1.200 240V 4W Delta 3 Phase 15'Int M.D. S	100A 7 Point Continuous Duty Rated		See Page G-23	
"	G-24	101-200	C1.200 240V 4W Delta 3 Phase 15'Int M.D. S	200A 7 Point Continuous Duty Rated		See Page G-24	
"	G-6 G-7 G-8 G-9	201-400	5A 240V 4W 3 Phase S.P. 15'Int M.D. S	Comb. Can 13 Point See G-6, G-7	3-2W 300A	10 Pole Test Switch	See G-9
"	G-8 G-10	401-800	5A 240V 4W Delta 3 Phase S.P. 15'Int M.D. S	S.S. Box 13 Point	3-2W 600A	10 Pole Test Switch	See G-10

(1) Any service over 200A, single phase, requires approval of SMUD's Engineering Designer.
(2) Check with SMUD's Engineering Designer for availability of 3 Phase Delta Service.

COMMERCIAL WYE METER REQUIREMENTS

TYPE OF SERVICE	REF. PAGE NO.	MAIN SIZE AMPS.	METER	METER SOCKET	CURRENT COILS	TEST BYPASS	CURRENT COIL CAN SIZE
2W-1 Phase 120V	G-23	0-30	C1.100 120V 2W 1 Phase S	100A 4 Point Continuous Duty Rated		See Page G-23	
3W-1 Phase 120/208V	G-24	0-200	C1.200 120V 3W 1 Phase S	100A-200A 5 Point Continuous Duty Rated		See Page G-24	
4W-3Phase 120/208V	G-23	0-100 Under 30KW	C1.200 120V 4W 3 Phase S	100A 7 Point Continuous Duty Rated		See Page G-23	
"	G-24	101-200 Under 30KW	C1.200 120V 4W 3 Phase S	200A 7 Point Continuous Duty Rated		See Page G-24	
"	G-23	0-100 Over 30KW	C1.200 120V 4W 3 Phase 15'Int M.D. S	100A 7 Point Continuous Duty Rated		See Page G-23	
"	G-24	101-200 Over 30KW	C1.200 120V 4W 3 Phase 15'Int M.D. S	200A 7 Point Continuous Duty Rated		See Page G-24	
	G-6 G-7 G-8 G-9	201-400	5A 120V 4W 3 Phase S.P. 15'Int M.D. S	Comb. Can 13 Point See G-7	3-2W 300A	10 Pole Test Switch	See G-9
"	G-8 G-10	401-800	5A 120V 4W 3 Phase S.P. 15'Int M.D. S	S.S. Box 13 Point	3-2W 600A	10 Pole Test Switch	See G-10
4W-3 Phase 277/480V	G-23	0-100 Under 30KW	C1.200 277V 4W 3 Phase S	100A 7 Point Continuous Duty Rated		See Page G-23	
"	G-23	0-100 Over 30KW	C1.200 277V 4W 3 Phase 15'Int M.D. S	100A 7 Point Continuous Duty Rated		See Page G-23	
"	G-24	101-200	C1.200 277V 4W 3 Phase 15'Int M.D. S	200A 7 Point Continuous Duty Rated		See Page G-24	
"	G-6 G-7 G-8 G-9	201-400	5A 277V 4W 3 Phase S.P. 15'Int M.D. S	Comb. Can 13 Point See Page G-6, G-7	3-2W 300A	10 Pole Test Switch	See G-9
"	G-8 G-10	401-800	5A 277V 4W 3 Phase S.P. 15'Int M.D. S	S.S. Box 13 Point	3-2W 600A	10 Pole Test Switch	See G-10