Table of Contents

1. PURPOSE .......................................................................................................................... 2
2. SCOPE .............................................................................................................................. 2
3. REFERENCES (LATEST EDITIONS) ................................................................................. 2
4. REQUIREMENTS FOR SERVICE ..................................................................................... 3
APPENDIX A - REFERENCED SPECIFICATIONS............................................................... 25
   SS4001 STRUCTURAL CONCRETE.................................................................................. 26
   SS0801 POLYVINYL CHLORIDE ELECTRICAL CONDUIT ......................................... 35
APPENDIX B- LIST OF MATERIAL SUPPLIERS............................................................. 40
APPENDIX C- DESIGN AND CONSTRUCTION DRAWINGS.............................................. 42
1. **PURPOSE**

Generally, all new residential, commercial and industrial developments will be designed and constructed as underground conduit systems. This Engineering Specification is used to set forth the Sacramento Municipal Utility District (SMUD) requirements pertaining to material and installation of the electric distribution underground structures for new electric service and for changes to existing facilities. The requirements are necessary for SMUD to supply uniform and safe service throughout SMUD’s service territory. It is important that the customer and their representatives, including contractors, read and understand this specification in its entirety because service will not be connected until all of the requirements are satisfied and approved by all of the appropriate inspection authorities including SMUD.

**USE CAUTION WHEN DIGGING.**

**TO AVOID BURIED ELECTRICAL CABLES,**

**CALL U.S.A. (Underground Service Alert) BEFORE DIGGING**

800-227-2600 or 811

2. **SCOPE**

This specification applies to the material, construction, and installation requirements for electric distribution underground structures throughout SMUD’s service area.

3. **REFERENCES (Latest Editions)**


3.3. ASTM D2855 Standard Practice for the Two-Step (Primer and Solvent Cement) Method of Joining Poly (Vinyl Chloride) (PVC) or Chlorinated Poly (Vinyl Chloride) (CPVC) Pipe and Piping Components with Tapered Sockets.


3.5. NEMA TC-3, Polyvinyl Chloride (PVC) Fittings for Use with Rigid PVC Conduit and Tubing.

3.6. NEMA TC-6 and TC-8, Polyvinyl Chloride (PVC) Plastic Utilities Duct for Underground Installations.

3.8. Underwriters Laboratories (UL) 651, Schedule 40 and 80 Rigid PVC Conduit and Fittings.

3.9. Western Underground Committee (WUC), Guide 3.6, Non-Concrete Enclosures.


3.11. Society of Cable Telecommunications Engineers (SCTE) 77, Specification for Underground Enclosure Integrity.


4. REQUIREMENTS FOR SERVICE

4.1. General

4.1.1. Go to [www.smud.org/projectapplication](http://www.smud.org/projectapplication) or 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 the required information could cause unnecessary inconvenience for the customer.

4.1.2. Commercial and industrial installations require building plans and definite load information to be furnished, in writing, to SMUD Customer New Services, MS EA105, at P.O. Box 15830, Sacramento, CA 95852-0830, as soon as possible. Delays in supplying the required information could cause unnecessary inconvenience for the customer.

4.1.3. The customer shall be required to conform to this specification and satisfy all of the requirements, including but not limited to, having the work inspected by a SMUD inspector, before SMUD personnel energize the customer's panel or other point of service. Electric service will not be established until the customer satisfactorily completes the “customer service entrance facilities” and interior wiring. It is important that early arrangements be made in advance of the installation of electric service lines and the location and setting of meters.

NOTE: “Customer service entrance facilities” is the term used to designate all of the electrical components that are required to be furnished and installed by the customer.
4.1.4. In addition to SMUD’s own requirements, the customer is responsible for complying with applicable provisions of City and County ordinances, the California Electric Code (CEC), the National Electric Code (NEC) and all applicable orders, rules and regulations of the State of California including, but not limited to, General Order 128.

4.1.5. The SMUD commitment letter will normally be valid for one year. A new SMUD commitment shall 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. The customer is required to install facilities (see 4.3.1) for underground systems including, but not limited to, conduits, boxes, and transformer pads, per the SMUD commitment.

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

4.1.7. No service shall be connected until approved by the local inspection authority. Only authorized SMUD employees are permitted to make connections between SMUD wiring and customer wiring.

4.1.8. All installations must be located within Public Utility Easements or formal SMUD rights-of-way, which parallel the street except as may be directed by SMUD’s Engineering Designer.

4.1.9. All conduit and pull boxes located in the Public Utility Easement are to be installed by the customer at the customer’s expense and will be deeded to SMUD. All pull boxes to be deeded to SMUD will have their concrete/steel covers engraved with the words “SMUD ELECTRIC”. This wording meets the requirements of CPUC, G.O. 128, Section 17.8, Identification of Manholes, Handholes and Subsurface and Self-contained Surface-mounted Equipment Enclosures.

4.1.10. The customer shall secure all permits and licenses necessary for the execution of the work, unless noted elsewhere and, at the customer’s own expense. The customer shall give all notices necessary and incidental to the due and lawful prosecution of the work.
4.1.11. Portions of the work may be near existing SMUD facilities. These facilities may remain energized throughout the course of the work. The customer and their personnel shall use extreme care while performing work near energized SMUD facilities. It shall be the responsibility of the customer to ascertain the location of both existing overhead and underground facilities and to be fully aware of the proximity of their work to the energized electrical facilities or other hazards. The customer shall be responsible for any damage to existing electrical facilities caused by the customer. The Underground Service Alert organization shall be used to help locate existing facilities: USA - 1-800-227-2600 or 811.

4.1.12. All Residential Development contracts and/or agreements with SMUD shall be executed in accordance with the provisions of SMUD Rule and Regulation 15, Extension of Facilities to Residential Premises.

4.1.13. Commercial and Industrial contracts and/or agreements with SMUD shall be executed in accordance with the provisions of SMUD Rule and Regulation 16, Extension of Facilities to Non-Residential Premises.

4.1.14. Normally, only one service point will be granted to one building or one parcel of property. Multiple service points may be granted to one parcel, provided they meet the latest requirements of the National Electric Code, the California Electrical Code, as well as the requirements of SMUD and local inspection authorities.

4.1.15. SMUD’s Engineering Designer will determine the customer’s service voltage. 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.

4.1.16. Joint Utility Trench

4.1.16.1. Joint utility trenches can only be used for power, communications, CATV, and gas facilities. No other facilities shall be allowed in the utility trench. Location and separation within the joint utility trench must be agreed upon by the utilities in advance and follow applicable provisions of City and County ordinances, the CEC, the NEC and all applicable orders, rules and regulations of the State of California including, but not limited to, General Order 128.

4.1.16.2. For commercial/industrial projects, the customer will consult with the other utilities in an attempt to coordinate trenching. However, the customer must recognize that each utility has its own design criteria. The customer must get written approval for any requested deviations from the power plan submitted by SMUD’s Engineering Designer before construction starts.
USE CAUTION WHEN DIGGING TO AVOID BURIED ELECTRICAL CABLES BEFORE DIGGING CALL U.S.A. (Underground Service Alert) 1-800-227-2600 or 811

4.1.17. Street Lights

4.1.17.1. The street lighting system design and construction of the infrastructure is the responsibility of the customer. SMUD will work with the local agency with jurisdiction (LAJ) to provide a designated street light service point. For information concerning street light systems call:

- City of Citrus Heights 916-727-4770
- City of Elk Grove 916-487-2256
- City of Folsom 916-355-7272
- City of Galt 209-366-7260
- City of Rancho Cordova 916-851-8710
- City of Sacramento 916-808-5961
- County of Sacramento 916-875-5544

4.1.17.2. The customer is responsible to arrange for the installation of any necessary temporary facilities required to energize the development street light system prior to permanent facilities being installed.

4.1.17.3. The customer shall install a standard “SMUD” 17” x 30” (reference section 4.8.8.6 for traffic areas and 4.8.8.7 for other areas) service box and the necessary conduit within the city or county right away or other location as determined by the SMUD Engineering Designer. A SMUD inspector will approve all box and conduit installations.

4.1.17.4. Depending on the installation, a metered service pedestal may be required on retrofits and is required on new installations.

4.1.18. Customer pull boxes and/or other openable devices are not allowed in the service run between the SMUD service box and customer’s panel.
4.1.19. The customer shall indemnify, defend, and hold harmless the Sacramento Municipal Utility District, its directors, officers, representatives, agents, and employees against all claims, loss, damage, expense and liability asserted or incurred by other parties, including, but not limited to, the Sacramento Municipal Utility District’s employees and customers’ employees, arising out of or in any way connected with the performance of work described by this specification and caused by the acts, omissions, intent or negligence, whether active or passive, of the customer, its agents, employees and suppliers, and excepting only loss, damage or liability as may be caused by the intentional acts or the active negligence of the Sacramento Municipal Utility District. It is the intent of parties hereto that, where negligence is determined to have been contributory, principles of comparative negligence will be followed and each party shall bear the proportionate cost of any loss, damage, expense and liability attributable to that party’s negligence.

4.2. **Material Furnished and Installed by SMUD**

4.2.1. SMUD will furnish and install electric facilities that include: transformers, switchgear, primary conductors, terminations, connectors, splices, and associated materials. SMUD’s charges for materials and installation labor will be in accordance with the latest provisions of SMUD’s Rule and Regulations 15 and 16.

4.2.1.1. The SMUD Engineering Designer shall determine the quantity, size, and type of facilities to be furnished and installed by SMUD.

4.2.1.2. SMUD will provide and install material required to make the connection between the customer supplied ground rod and the transformer or other device.

4.2.1.3. Secondary conductors and associated facilities shall be installed per SMUD Rule 15, Extension of Facilities to Residential Premises.

4.2.1.4. For commercial developments SMUD Rule 16, secondary conductors will be furnished and installed from the transformer to the secondary junction box, if a junction box is required by SMUD.
4.3. **Material Furnished and Installed by Customer**

4.3.1. The customer is required to furnish and install all materials, labor, equipment, and incidentals necessary to provide a complete conduit system. The complete conduit system also includes any future facility needs. The materials include but are not limited to the trench (excavation and appropriate backfill), conduit ducts, manholes, vaults, enclosures, switchgear boxes, transformer pads/wells, service boxes, and all measures required to protect these facilities (concrete encasements, retaining walls, barricades, etc.). The material and installation shall be per this specification, which includes the design and construction drawings located in Appendix C.

4.3.2. The customer shall comply with all applicable SMUD procedures and specifications. Customer installed facilities must be approved by the SMUD inspector prior to acceptance.

4.3.3. SMUD equipment and material are to be installed and maintained in or on facilities furnished by the customer. The customer will grant SMUD representatives a right of access to the site for construction inspection and maintenance purposes.

4.3.4. SMUD equipment shall be accessible to a 26,000-pound SMUD service vehicle in all weather. SMUD equipment shall be no further than 15 feet from a drivable surface. The drivable surface shall have a minimum width of 20 feet.

4.3.5. Only those electrical conduits intended for electric service shall be placed under a transformer pad. The placement of other conduits or structures foreign to the electric service must be approved by a SMUD’s Engineering Designer or a SMUD inspector.

4.3.6. **Secondary Conductors**

4.3.6.1. Secondary conductors and associated facilities shall be installed per SMUD Rule 15, Extension of Facilities to Residential Premises.

4.3.6.2. For commercial developments SMUD Rule 16, the customer shall install service conductors to terminate at a transformer, secondary junction box, or other SMUD designated point.

4.3.7. **Transformer Vaults**

4.3.7.1. Transformer vaults shall be installed by the customer and shall comply with SMUD Specification T-001, “Customer Built Vault Requirements.”

4.3.7.2. **Service Entrance Conductor or Bus Duct**

(a) Service entrance conductors or bus duct shall be furnished and installed by the customer.
(b) The service entrance conductors within a transformer vault shall be long enough to rack on the vault wall as determined by SMUD’s Engineering Designer, or by SMUD inspector.

(c) Service entrance bus duct, transformer tap can and connectors may be used with SMUD approval within vaults. Customer transformer tap can and bus duct shall terminate as close as practical to the SMUD transformer.

4.3.7.3. The customer and/or their representatives or contractors shall not enter any vault, manhole, or other SMUD facility that contains energized equipment except in the presence of a SMUD representative. SMUD personnel are available for this purpose upon a minimum of two full working days notice to SMUD’s Grid Assets Substation Maintenance, Downtown Network Work Group.

4.3.8. Manhole Structures

4.3.8.1. Manholes shall be specified per SMUD’s Engineering Designer. They shall be installed by the customer and comply with SMUD Specifications DS0604, DS0605 or DS0606.

4.3.9. Protective Barriers (Bollards)

4.3.9.1. The customer shall install bollards when the edge of SMUD equipment is less than five feet from vehicular traffic, or when SMUD’s Engineering Designer determines the equipment location may become exposed to vehicular traffic.

4.3.9.2. The bollards shall be in accordance with one of two methods outlined on Engineering Drawings UVD 2.4 and UVD 2.5.

4.4. Inspections

4.4.1. SMUD will provide an inspector. A minimum of two full working days are required to schedule an inspector. The hours of work for the inspector are from 8:00 AM to 3:00 PM, Monday through Friday. All work requiring the presence of the inspector shall be scheduled during these hours. For scheduling of inspector’s call (916) 732-5700.

4.4.2. Subdivisions – Before a pre-construction meeting can be scheduled, the customer/developer must establish a meeting date and coordinate with all utilities (a minimum of 2 working days’ notice is required).

4.4.3. Failure to contact the SMUD inspector may require excavation to inspect installed facilities and/or rejection of the work.
4.4.4. All material and work shall be subject to inspection, examination, and testing by SMUD, at any time during manufacture, installation, or construction. The customer shall provide and maintain proper facilities and safe access for such inspections or testing. The customer shall pay the cost of all tests required under this specification. SMUD will pay the costs of any additional testing required by its Inspector to ensure the adequacy of the work.

4.4.5. The customer shall, unless otherwise specified, give a minimum of two full working days' notice to the SMUD inspector prior to placing concrete, installing ground rods, backfilling trench, or mandrelling conduit.

4.4.6. SMUD shall have the right to reject defective material and work. Rejected work shall be corrected and rejected material shall be replaced with proper material. The customer shall promptly segregate and remove rejected material from the job site.

4.4.7. Failure of the customer to adhere to the above provisions may result in the customer being required, at their expense, to remove, uncover or otherwise enable inspection of such work by the SMUD inspector.

4.4.8. Rejected work will result in delaying electric service until the inadequacies are corrected. The customer shall pay the cost of correcting rejected work.

4.5. Excavation and Backfill

4.5.1. Backfilling shall not be done until the work to be covered has been approved by a SMUD inspector.

4.5.2. Excavation, backfill, and compaction shall be in accordance with this specification, which includes the latest revision of SMUD drawings, shown in Appendix C, unless otherwise specified in the plans and/or the requirements of the local jurisdiction.

4.5.3. For backfilling trenches, except for concrete encased conduit, fine earth, sandy loam, or sand shall be used for initial backfill unless specified or shown otherwise on the plans. Initial backfill shall extend to a minimum of 6" above the top conduit. SMUD inspector may require 6" layer of sand or pea gravel on the bottom of the trench depending on soil conditions. “Fine Earth” shall mean earth free of rocks or clods larger than 3/4" and deleterious matter. The method of compaction used shall be as approved by the inspector. Jetting shall not be allowed.

4.5.4. Concrete encasement shall be required on all elbows (see exceptions 1 & 2 below) and shall be a mix consisting of 3/8" maximum size, washed pea gravel aggregate, and 5 sacks of Type I, II, or III portland cement. The mix shall have a slump of six (6") to eight (8") inches. Forms shall be used, especially around the conduit entering and exiting the 48" x 72" and 74" x 98" boxes, to limit excess concrete. Excess concrete shall not be disposed of in open trenches on the job site.
**Exception 1:** Total encasement may not be required on elbows installed at the base of the pole (i.e. risers) or at the transformer pad; however, the concrete shall be placed on the inside radius of the elbow. The concrete shall be a minimum of 6" in depth. Plywood or drywall is typically placed on the sides of the elbow to create a form.

**Exception 2:** Concrete encasement may not be required on all elbows in new subdivisions. Refer to the substructure print for the requirements.

4.5.5. Where concrete encasement is required:

4.5.5.1. SMUD Standard U12P3X8 shall be used for typical distribution trenches in core downtown areas.

4.5.5.2. For all other locations, concrete shall be placed to form a conduit encasement of at least three inches (3") on all sides and three inches (3") to six inches (6") between the outer surfaces of the envelope and the surface of the nearest conduit.

4.5.6. When concrete is used, a ticket from concrete company shall be provided upon request.

4.5.7. Surfaces upon which concrete is to be placed shall be free of standing water, mud, and debris. All of the absorptive surfaces against which concrete is to be placed shall be moistened.

4.6. **Installation - Boxes**

4.6.1. The customer shall furnish and install all boxes as shown on the SMUD Commitment plan.

4.6.2. When required by SMUD’s Engineering Designer, the customer shall install primary pull boxes per the associated installation drawings shown in Appendix C.

4.6.3. The sub-grade for all sub-surface boxes and transformer pads shall be compacted to a relative density of at least 90 percent. A written compaction report shall be provided upon request.

4.6.4. All switchgear boxes, primary pull boxes and secondary pull boxes require an aggregate base of an eight-inch (8") layer of 3/4" crushed rock. The 3/4" crushed rock shall be tamped and consolidated. All boxes shall be placed level.

4.6.5. The 17" x 30", 24" x 36" and 30" x 48" pull boxes rated for full traffic shall be installed per U1S3X5.

4.6.6. Secondary service boxes shall be installed so that top of box follows the slope of the finished grade except as noted on the drawings.

4.6.7. Customer pull boxes and/or other openable devices are not allowed in the service run between the SMUD service box and customer's panel.
4.6.8. For all switchgear boxes, the Customer shall hold backfill two feet (2') from the surface and two feet (2') out from the box to allow for installation of perimeter grounding conductor. The customer shall install the ground grid wire (#4/0 Bare CU). The inspector shall coordinate inspection for installing and backfilling the grounding wire. See SMUD drawings UGA2.5 and U12H3X1.

4.6.9. The customer shall install all pull boxes and pads at final grade. The customer shall raise, lower or relocate installed facilities at the customer’s expense, as deemed necessary by SMUD’s Engineering Designer due to any customer development changes.

4.6.10. Where mounded landscaping is planned or added at a later date, the customer is responsible to provide permanent retaining walls or appropriate grade changes to insure pull boxes are not covered and proper operating clearances are maintained. Wood is not considered permanent and is not an acceptable material. Contact SMUD’s inspector for further information.

4.6.11. Flexible plastic gaskets, “paint on” Mastic, ConSeal or similar material approved by SMUD shall be used to seal all of the joints except full traffic covers. Portland expanding (Non-shrink) grout shall be used to seal the joint between the cover and the concrete boxes.

4.7. **Installation - Conduit**

4.7.1. All conduits and conduit systems shall be placed in accordance with the SMUD commitment and installed per the associated drawings that are a part of the specification. A conduit system shall consist of one or more conduits in the same trench.

4.7.2. Concrete encasement shall be required as outlined per section 4.5.

4.7.3. Conduit for service or secondary conductors shall not be placed under the primary cable well.

4.7.4. The radius for six-inch (6") conduit elbows for secondary conductors can be reduced to a 30" radius for installations between adjoining equipment (see UVD5.4), if shown that a 48" radius will not allow for required clearances.

4.7.5. All non-metallic conduit shall be cemented at all joints with a suitable cement recommended by the manufacturer of the conduit and per ASTM D2564 & ASTM D2855.

4.7.6. All conduits terminating at pull boxes shall have end bells (see section 4.8.2.6). The end bells shall either be flush with the inside wall and grouted in place or stubbed up as shown on the drawings.

4.7.7. Sweeps and elbows shall have a uniform curvature over their entire length. The customer shall use factory made sweeps and elbows whenever possible. The customer shall not kink or offset the joints in order to curve the line.
4.7.8. All conduit bends made by the customer shall be made with suitable equipment while maintaining a round cross-section of the conduit. The bending method shall be in accordance with the equipment manufacturer’s recommendations. Heating, kinking and flattening of the conduit will not be permitted.

4.7.9. The minimum cover of the conduit systems shall be as shown on the drawings in Appendix C. Cover shall be measured from finished grade to top of encasement for concrete encased system and top of uppermost conduits for direct buried system. Trench depth shall be measured from finished grade to bottom of trench for direct buried system. Conduits may need to be installed at a greater depth due to existing facilities or alignment changes.

4.7.10. The conduit shall be placed such that there is firm bearing for the full length. Conduit shall be laid on as uniform a slope as possible.

4.7.11. The conduits shall be thoroughly cleaned and tested after installation. The test shall involve drawing a mandrel through each conduit. The SMUD inspector will furnish mandrels. The mandrel test shall be pulled only in the presence of the inspector.

4.7.12. Conduits that do not pass the mandrel test shall be repaired and re-tested. A brush shall not be used in any plastic conduit.

4.7.13. A flat tape pull line shall be left in each conduit as a “sleeper” (See Section 4.8.4.).

4.8. **SMUD Approved Material**

4.8.1. Request for Material Approval

4.8.1.1. Materials to be incorporated in the work may be designated under a trade name or the name of the manufacturer, for convenience in designation on the plans or in the specifications. Where materials are specified by a particular designation, or equal, the customer may use an alternative material which is of equal quality and of the required characteristics for the purpose intended, subject to the following requirements:

The customer shall request approval of a proposed substitution in writing accompanied by complete data as to the quality of the material proposed. Such request shall be made in ample time to permit due consideration for approval without delaying the work. At least ten (10) working days are required to review submittal.
4.8.1.2. The burden of proof as to the equality or suitability of alternatives shall be upon the customer. Samples may be required to determine equality. SMUD shall be the sole judge as to the equality and suitability of alternative materials. Materials incorporated in the work prior to approval of their use by SMUD shall be at the customer's risk and subject to subsequent rejection.

4.8.1.3. Submittals shall be sent to:
Sacramento Municipal Utility District
Standards Principal Engineer, Mail Stop EA305
PO Box 15830
Sacramento, California 95852-0830

4.8.2. Conduit

4.8.2.1. Unless otherwise specified, all two-inch (2"), three-inch (3"), four-inch (4"), five-inch (5"), and six-inch (6") diameter conduit systems shall be entirely non-metallic.

4.8.2.2. The conduit for pole risers shall be Schedule 80 PVC.

4.8.2.3. DB 120 type conduit

All type DB 120: two-inch (2"), three-inch (3"), four-inch (4"), five-inch (5") and six-inch (6") conduit shall be polyvinyl chloride (PVC), gray color, 20' in length with an integral belled end, and in accordance with the latest revisions of ASTM F512 and NEMA TC-8. Conduit may be from any manufacturer meeting these specifications. Additional couplings required for installation shall be manufactured, rated, and designed for use with this conduit.

4.8.2.4. Schedule 40 and 80 type conduit

(a) All Schedule 40 and 80, two-inch (2"), three-inch (3"), four-inch (4"), five-inch (5") and six inch (6") conduit shall be polyvinyl chloride (PVC), gray color, 10' in length with an integral belled end and in accordance with the latest revisions of UL651 and NEMA TC-2. Conduit shall be from any manufacturer meeting these specifications. Additional couplings required for installation shall be manufactured, rated and designed for use with this conduit.

(b) Elbow (Rigid Non-metallic)

All two-inch (2"), three-inch (3"), four-inch (4"), five-inch (5") and six-inch (6") elbows shall be polyvinyl chloride (PVC), Schedule 40 except as noted on the drawings. Elbows shall conform to NEMA TC 3. Elbows shall be acceptable from any manufacturer meeting specification with a minimum radius as shown below unless noted on drawings:
4.8.2.5. Conduit for Boring
Conduit installed by boring shall be "Bore-Gard" manufactured by Prime Conduit, or SMUD approved. Contact the inspector for updated list of approved manufacturers.

4.8.2.6. End Bell
(a) The end bells shall be solid one-piece type, polyvinyl chloride (PVC), Schedule 40, gray color. End bells shall conform to NEMA Publication No. TC 3-2004 and ASTM Publication F-512-06.

(b) End bells shall be the following or SMUD approved equal:

<table>
<thead>
<tr>
<th>Prime Conduit No.</th>
<th>Condux No.</th>
</tr>
</thead>
<tbody>
<tr>
<td>2&quot; Conduit</td>
<td>EB200</td>
</tr>
<tr>
<td>3&quot; Conduit</td>
<td>EB300</td>
</tr>
<tr>
<td>4&quot; Conduit</td>
<td>EB400</td>
</tr>
<tr>
<td>5&quot; Conduit</td>
<td>EB500</td>
</tr>
<tr>
<td>6&quot; Conduit</td>
<td>EB600</td>
</tr>
</tbody>
</table>

4.8.2.7. Conduit Plug
The conduit plugs shall be plastic tapered for appropriate conduit size. Plugs shall be the following or SMUD approved equal:

<table>
<thead>
<tr>
<th>Prime Conduit</th>
<th>4&quot; Conduit</th>
<th>6&quot; Conduit</th>
</tr>
</thead>
<tbody>
<tr>
<td>Condux</td>
<td>PEPT400</td>
<td>PEPT600</td>
</tr>
<tr>
<td></td>
<td>80476-01</td>
<td>80478-00</td>
</tr>
</tbody>
</table>

- Two inch (2") 18" radius
- Three inch (3") 18" radius
- Four inch (4") 30" radius
- Five inch (5") 36" radius
- Six inch (6") 48" radius
4.8.3. Ground rods

4.8.3.1. Ground rods shall be 5/8" x 8'-0" copper clad steel. The copper cladding shall be a 13-mil thick minimum. The cladding shall be bonded to a carbon steel rod 0.562" to 0.565" in diameter (nominal 5/8") and eight feet (8') in length. The maximum tolerances of ground rod length are plus one inch (1") and minus zero inches (0"). The ground rod shall be a sectional type with one end having a true conical machined driving point and non-thread end. The opposite end shall be flat with a non-thread end. The quantity of ground rods shall be per the associated drawings and/or per SMUD’s Line Design Department.

Ground rod shall be the following or SMUD approved equal:

- Eritech 615883
- Thompson Lightning Protection TL588
- ATI Tectoniks GRC-10-15-8
- Galvan 6258G13

4.8.4. Pull Tape (Sleeper)

The tape shall be made from Polyester, be lubricated, printed with footage markings and have a minimum strength of 2500 lb. The tape shall be one continuous length with no splices. The tape shall be the following or SMUD approved equal:

- Arnco. DLWP25S-3000
- NEPTCO WP2500P
- Pacific Strapping FMT-P2500
- Fibertek WP2500
- Redback Industries PW2500
- Fiber Tech WPP2500PL
- Wellington Slick tape N303M10-9083
- Milliken MT2500-3000
4.8.5. Transformer Pads and Wells

4.8.5.1. Transformer Pad - Non-Concrete Single Phase

The transformer pad shall be made from reinforced plastic concrete or rotational molded polyethylene. The nominal dimensions are 44" wide by 51" long by 3-\( \frac{1}{2} \)" thick. The top surface of the pad must be level. Cable entrance opening and \( \frac{1}{2} \)" inserts, shall all be according to SMUD drawing UVD 2.1 and 2.1A, latest revision. The pad shall be the following or SMUD approved equal:

- **Armorcast Products**: A6001875
- **Replacon**: 44513-3TP
- **Hubbell**: PH44512416500
- **NewBasis**: PP1P-4451-00000
- **Martin Enterprises**: 4451 PC CABINET PAD
- **Concast**: FP-44-51-305-SMUD

4.8.5.2. Transformer Well for Single Phase Transformer

The well shall be plastic type, a one piece structurally solid round unit, with a 12" height. Nominal 32" diameter (includes flange diameter) top opening, and nominal 25" diameter bottom opening. All edges shall be smooth to prevent cable insulation abrasion. The well shall be the following or SMUD approved equal:

- **Armorcast Products**: 6001864-SMUD
- **Hubbell**: B002500501
- **Replacon**: RP322512CW
- **Martin Enterprises**: 320012 FRP
- **NewBasis**: CW320012T-0000

4.8.5.3. Transformer Pad – Pre-cast Concrete Three Phase (84" x 84" x 6")

Refer to drawings UVD 2.2 & UVD 2.2A. The pad shall be the following or SMUD approved equal:

- **Jensen Precast**: PD7750SM
- **Oldcastle**: 0270195

4.8.5.4. Transformer Pad – Pre-cast Concrete Three Phase (120" x 105" x 6")

Refer to drawings UVD 2.3A & UVD 2.3A1

- **Oldcastle**: 0270197
- **Jensen**: PD105120SM
4.8.5.5. Transformer Well for Three Phase Transformers
Manufactured from a non-concrete material, RPM or fiberglass. Assembled size (36" x 36" x 18"). The well shall be one of the following or SMUD approved equal:

- **Hubbell** B003636500
- **Armorcast Products** A6001790
- **Martin Enterprises** 363618 FRP SMUD
- **NewBasis** CW363618-00000

4.8.6. Padmount Secondary Junction Box

4.8.6.1. A secondary padmounted junction box, drawings U1S3D1, UAD1.6, and UVC 1.7 may be required whenever the customer installed source terminations exceed those allowed. See UAD1.5 to determine the number of secondary conductors that can terminate on a transformer, before a junction box is needed, given the transformer size and conductor size. See UAD1.6 if it’s determined that a secondary junction box is needed.

4.8.6.2. The customer is responsible for providing 12' tails per conductor per phase. The customer is also responsible for installing the handhole for the secondary junction box. The handhole shall be to the proper grade, as part of the customer’s secondary conduit installation. The maximum number of cables (customer’s and SMUD’s) that can be terminated in a padmount secondary junction box installation is 80. See Drawing UAD1.6, for number of SMUD cables.

4.8.6.3. Secondary conductors from the transformer to the secondary enclosure will be furnished and installed by SMUD in the customer’s conduit. SMUD will furnish connectors and make all connections in transformer and/or enclosure.

4.8.6.4. Service conductors from the secondary enclosure to the customer’s panel must be supplied by the customer. For any non-standard conductor approved by SMUD’s Line Design Department, customers must also furnish SMUD approved connectors, compression tooling and dies.

4.8.6.5. All ends of all customer service conductor(s) shall be sealed in such a manner that moisture will not enter the cable.
4.8.7. Subsurface Boxes for Switchgear and Secondary Junction Box

4.8.7.1. Cover, Temporary, for 12kV and 21kV RPM Handhole Boxes

The temporary covers for the 12 kV switchgear boxes shall be rated for pedestrian traffic only. **The nominal dimensions for the 12 kV** switchgear box covers are: 57" wide by 65" long by 2" thick, non-skid surface. **The nominal dimensions for the 21 kV** switchgear boxes are: 75" wide by 82" long by 1.5" thick, non-skid surface. The covers shall be marked “SMUD ELECTRIC” in 1" minimum high letters. The cover shall come with the necessary bolt-down hardware. The approved supplier is Replacon. The part numbers for the switchgear boxes are (12kV) 6557S and (21kV) 8275S.

4.8.7.2. RPM Handhole Box (88" x 67" x 48") 12kV Switchgear (See UVC1.4.)

(a) The box shall be permanently marked with correct weight, vendor’s name, and part number.

(b) The box and cover combination shall be from the following or SMUD approved equal:

Replacon RP886748S

4.8.7.3. RPM Handhole Box (102" x 82" x 48") 21kV Switchgear (See UVC1.5)

(a) The box shall be permanently marked with correct weight, vendor’s name, and part number.

(b) The box and cover combination shall be from the following or SMUD approved equal:

Replacon RP1028248S

4.8.7.4. Non-Concrete Secondary J-Box (48" x 96" x 48")

Secondary Junction Enclosure (See UVC 1.7)

(a) The box shall be permanently marked with correct weight, vendor’s name, and part number.

(b) The box and cover combination shall be from one of the following or SMUD approved or equal:

Replacon 4896 J-BOX-S
4.8.7.5. Primary Pull Box and T-Tap Assembly (30" x 48" x 18")
(See UVC 2.1 & UVC 2.2)

(a) The T-Tap assembly shall consist of a 30" x 48" x 18" deep box with a 16" extension and cover for attaching the T-Tap structure.

(b) The cover shall be from one of the following or SMUD approved equal.

- **Replacon** RP3048
- **Hubbell** C183048511
- **Martin Enterprises** 3048 PC COVER
- **Armorcast Products** A6001630-SMUD
- **NewBasis** PCC3048P1-90007

4.8.8. Subsurface Pull Boxes, Extensions and Covers

Clearances around all boxes and covers in section 4.8.8 shall be as shown in drawing UVC 1.2.8.

4.8.8.1. Open Bottom Concrete Boxes (48" x 72" & 74" x 98") (OD)

(a) The **48" x 72" box** shall be from one of the following or SMUD approved equal:

- **Jensen Precast** PB4266SM
- **Oldcastle** 0090010

(b) The **74" x 98" box** shall be from one of the following or SMUD approved equal:

- **Jensen Precast** PB6690SM
- **Oldcastle** 0130200

(c) The boxes shall be made from precast concrete.

(d) The nominal inside dimensions (ID) for the 48"x 72" box are 42" wide by 66" long by 42" high. Refer to SMUD drawing UVC1.2.

(e) The nominal inside dimensions (ID) for the 74"x 98" box are 66" wide by 90" long by 42" high. Refer to SMUD drawing UVC1.6.

(f) The boxes shall be rated for full deliberate H20-44 traffic loading.

4.8.8.2. 48" x 72" Extensions

(a) The 48" x 72" x 6" Extension shall be from the following or SMUD approved equal:

- **Jenson Precast** RS426606
- **Oldcastle** 0090015
4.8.8.3. 74" x 98" Extensions

(a) The 74" x 98" x 6" Extension shall be from the following or SMUD approved equal:

Jenson Precast  RS669006
Oldcastle      0130203

(b) The 74" x 98" x 12" Extension shall be from the following or SMUD approved equal:

Jenson Precast  RS669012
Oldcastle      0130205

4.8.8.4. Spring Assist Box Covers, Landscape and Sidewalk Only (48" x 72" & 74" x 98") (OD)

(a) The approved manufacturers and part numbers for the 48" x 72" Spring Assist Box Covers are:

Jensen Precast  CA4266ATISM
Oldcastle      2061330

(b) The approved manufacturers and part numbers for the 74" x 98" Spring Assist Box Covers are:

Jensen Precast  CA6690ATSM
Oldcastle      2025110

(c) The covers shall be designed for H-10 light traffic loading.

(d) The covers shall meet the anti-slip requirements shown below in Paragraph 4.8.8.8. “Aluminum and Steel Covers”.

(e) Covers shall be marked with an aluminum plate insert 7-1/2" x 2-1/2" on opposite corners. One plate shall be marked with “SMUD ELECTRIC”, and the manufacturer’s name or logo the other plate shall be blank. Plates to be secured with two 1/2" Allen-head stainless steel bolts.

(f) Covers shall have lifting provision for 1/2" hook consisting of a blind opening 4" x 9/16" x 1-1/8" deep (min.).

(g) Locking mechanism shall be captive 1/2" stainless steel penta-head swing gate on top cover only.

(h) For the Spring Assist cover 48"x 72", refer to drawing UVC 1.2.2.

(i) For the Spring Assist cover 74"x 98", refer to drawing UVC 1.6.1.
4.8.8.5. Full Traffic Box Covers (48" x 72" & 74" x 98") (OD)

(a) The covers shall be manufactured in accordance with SMUD drawing UVC1.2.9 for the 48" x 72" cover and UVC1.6.5 for the 74" x 98" cover.

(b) The covers shall be designed for full deliberate H20-44 traffic loading.

(c) The covers shall be marked with two aluminum plate inserts 7-1/2" x 2-1/2" on opposite corners. One plate shall be marked with "SMUD ELECTRIC" and the manufacturer's name or logo. The other plate shall be blank. Plates to be secured with 1/2" Allen-head stainless steel bolts.

(d) The approved manufacturers and part numbers for the 48" x 72" Full Traffic Covers are:

- **Jensen Precast**: CA4266HDSM
- **Oldcastle**: 0260122

(e) The approved manufacturers and part numbers for the 74" x 98" Full Traffic Covers are:

- **Jensen Precast**: CA6690HDSM
- **Oldcastle**: 0260125

4.8.8.6. Open Bottom Concrete Boxes, Extensions, and Steel Covers 

(17" x 30"), (24" x 36"), and (30" x 48") (See U1S3X)

These boxes, extensions, and covers shall be rated for full deliberate H20-44 heavy traffic loading. These boxes shall be installed in full traffic locations and incidental traffic locations such as parking lots, alleys, and industrial areas.

(a) The approved manufacturers and part numbers for the 17" x 30" Box, Extension, and Cover are:

- **Jensen Precast**: HT1730-B; with corresponding cover, HT1730-L01; with corresponding extension, HT1730-E12. "SMUD ELECTRIC" shall be marked on top of cover with 1" minimum height letters, and 3/8" or 1/2" large penta-head stainless steel bolts.

- **Concast**: CHR-17-30-12; with corresponding cover, 17-30-CHR-TP; with corresponding extension, CHREX-17-30-12. "SMUD ELECTRIC" shall be marked on top of cover with 1" minimum height letters, and 3/8" or 1/2" large penta-head stainless steel bolts.
(b) The approved manufacturers and part numbers for the 24" x 36" Box, Extension, and Cover are:

**Jensen Precast** HT2436-B; with corresponding cover, HT2436-L01; with corresponding extension, HT2436-E12. “SMUD ELECTRIC” shall be marked on top of cover with 1" minimum height letters, and 3/8" or 1/2" large penta-head stainless steel bolts.

**Concast** CHR-24-36-12; with corresponding cover, 24-36-CHR-TP; with corresponding extension, CHREX-24-36-12. “SMUD ELECTRIC” shall be marked on top of cover with 1" minimum height letters, and 3/8" or 1/2" large penta-head stainless steel bolts.

(c) The approved manufacturers and part numbers for the 30" x 48" Box, Extension, and Cover are:

**Jensen Precast** HT3048-B; with corresponding cover, HT3048-L01; with corresponding extension, HT3048-E12. “SMUD ELECTRIC” shall be marked on top of cover with 1-inch minimum height letters, and 3/8" or 1/2" large penta-head stainless steel bolts.

**Concast** CHR-30-48-12; with corresponding cover, 30-48-CHR-TP; with corresponding extension, CHREX-30-48-12. “SMUD ELECTRIC” shall be marked on top of cover with 1" minimum height letters, and 3/8" or 1/2" large penta-head stainless steel bolts.

4.8.8.7. Non-Concrete Underground Enclosures (17" x 30"), (24" x 36"), and (30" x 48") and extensions shall meet ANSI TIER 15 loading requirements.

(a) The approved manufacturers and part numbers for the 17" x 30" x 18" Enclosures are:

**Hubbell** A52173051305D

**Replacon** RP1730-18-IT

**Armorcast Products** A6001640TAX18

**NewBasis** FCA173018T-90015

**Martin Enterprises** 173018 FRP SMUD

(b) The approved manufacturers and part numbers for the 24" x 36" x 18" Enclosures are:

**Hubbell** A52243653205D

**Armorcast Products** A6001974TAX18

**NewBasis** FCA243618T-90004

**Martin Enterprises** 243618 FRP SMUD
(c) The approved manufacturers and part numbers for the 30" x 48" x 18" Enclosures are:
   Hubbell A52304852905D
   Armorcast Products A6001550TAX18
   NewBasis FCA304818T-90001
   Martin Enterprises 304818 FRP SMUD

(d) The approved manufacturers and part numbers for the 17" x 30" x 8" Extensions are:
   Armorcast Products A6001640TEX8
   Hubbell E02173008A
   NewBasis FCE073008T-00000
   Martin Enterprises 173008 FRP EXT SMUD

(e) The approved manufacturers and part numbers for the 24" x 36" x 8" Extensions are:
   Hubbell E02243608A
   NewBasis FCE243608T
   Armorcast Products A6001974TEX8
   Martin Enterprises 243608 FRP EXT SMUD

(f) The approved manufacturers and part numbers for the 30" x 48" x 16" Extensions are:
   Hubbell E02304816A
   Armorcast Products A6001550TEX16
   NewBasis FCE304816T-00000
   Martin Enterprises 304816 FRP EXT SMUD

4.8.8.8. Aluminum and Steel Covers

Aluminum and steel covers for pull boxes and J-Boxes shall be manufactured with ASTM tested non-slip material as currently used by SlipNOT or Jensen MetalTech. This material shall meet the following performance/manufacturing requirements:

(a) The coefficient of friction of the surface shall be no less than 0.60 as determined by ASTM C1028.

(b) Bond strength rating per ASTM C633 shall have average bond strength of at least 4000 psi.

(c) The surface shall be etched a minimum of 25 mils prior to application of the non-slip material.
Appendix A - Referenced Specifications

Engineering Specification SS4001 Structural Concrete .............................................. 26
Engineering Specification SS0801 Polyvinyl Chloride Electrical Conduit ............... 35
Engineering Specification SS4001 Structural Concrete

1 PURPOSE
To specify the construction material, standards and requirements for cast-in-place concrete furnished for SMUD.

2 SCOPE
2.1 This specification shall cover cast-in-place concrete for footings, slabs, vaults, manholes, buildings, and other structures, but not including duct encasement. This specification shall govern, excepting as modified by the Drawings and/or Technical Conditions. All construction work is subject to quality control, inspection, and testing under authority of the Inspector.

2.2 Where conflicts exist between this specification and the Drawings and/or Technical Conditions, the Drawings and Technical Conditions shall govern. Where conflicts exist between this specification and the below referenced specifications, this specification shall govern.

3 REFERENCES
Unless otherwise stated in the Technical Conditions, all references shown below shall be the latest edition in publication at the time bids are taken.

3.1 State of California, Department of Transportation, (CALTRANS), STANDARD SPECIFICATIONS, sections 51, 52, and 90.

3.2 American Society for Testing and Materials (ASTM) Designation A82, "Standard Specification for Steel Wire, Plain, for Concrete Reinforcement".


3.9 American Concrete Institute standard (ACI) 318, “Building Code Requirements for Reinforced Concrete”.

3.10 SMUD Engineering Drawing A-1043
4 SUBMITTALS

The following documents and records should be submitted to SMUD for review and approval:

4.1 Concrete reinforcement shop drawings, accessories, and material certifications.
4.2 Anchor rod assemblies, shop drawings, and material certifications.
4.3 Concrete material product data.
4.4 Concrete cure and finish products.
4.5 Concrete mix design data:
   4.5.1 Submit concrete mix design for each concrete strength.
   4.5.2 Identify mix ingredients, manufacturer, and proportions, including admixtures.
   4.5.3 Identify chlorine content of admixtures and whether or not chloride was added during manufacture.
   4.5.4 Provide copies of proposed concrete mix design laboratory test data for each mix with average compressive strength and standards deviation calculated demonstrating compliance with ACI 318. Test data shall include slump, air content, 7 and 28 day compressive strength. Testing and sampling collections shall be by an independent laboratory acceptable to SMUD.

5 FORMS AND SURFACES ON WHICH CONCRETE IS PLACED

5.1 Outside forms shall be used for vertical surfaces except where shown on the plans, and excepting upon approval of the Inspector to cast concrete directly against undisturbed existing material where excavation is cut to "neat lines" which shall be one inch minimum over-excavation of drawing dimensions. The allowable deviation from plan thickness for concrete walls against earth shall be +1" minimum to +6" maximum.

5.2 The bottom surface of excavations upon which concrete is to be placed shall be a smooth level plane, with the top 6 inches compacted to 95% relative density, and constructed to the elevation necessary to meet the requirements of the Drawings and the specifications. Unless dictated by clearance requirements over lower laying facilities, or specifically required by the Drawings and/or Technical Conditions, the level compacted plane may be from 0" to 2" lower than required by the Drawings, but the resulting concrete structure shall be of uniform thickness.

5.3 Forms shall be accurately constructed to produce structures of the shape, lines and dimensions required by the Drawings. Vertical forms shall extend a minimum of 2 inches into the subgrade. All exposed vertical edges shall be chamfered 3/4" x 3/4". All sharp edges inside manholes and vaults shall be chamfered 3/4" x 3/4".
5.4 All form material shall be new except where approved by the Inspector. Erected forms shall be adequately strong, rigid, and durable to withstand all loads imposed upon them, and to permit all operations of placing and consolidating the concrete without deflection or damage which would impair the quality of the finished work.

5.5 Forms shall be constructed so as to obtain exposed surfaces of concrete having a smooth, uniform texture, free from irregularities, offsets, fins, or other defects.

5.6 All surfaces upon which concrete is to be placed shall be clean free of loose material and standing water. The surfaces of dry, porous materials against which concrete is to be placed shall be moistened immediately prior to placement of the concrete to prevent water from being “drawn out” of the concrete.

6 STEEL REINFORCEMENT AND ANCHOR BOLTS

6.1 MATERIALS

6.1.1 Unless otherwise shown on the Drawings or required by the Technical Conditions, reinforcing steel shall be ASTM A615 Grade 60 deformed steel bars. All reinforcing bars shall be provided with material test reports.

6.1.2 Anchor bolts shall meet the requirements of the Drawings and/or the Technical Conditions. All anchor bolts/rods, nuts, washers, anchor plates, and anchor bolt templates shall meet the requirements of the Drawings and/or the Technical Conditions. All anchor bolts/rods, nuts, washers shall be provided with material test reports. Anchor materials without material test reports shall not be used.

6.1.3 Spacers and chairs shall be precast mortar blocks (dobies), metal chairs, or other manufactured products as best suited for the intended purpose and approved by the Inspector.

6.1.4 Welding of reinforcing steel shall not be allowed under any circumstances.

6.2 PLACING REINFORCING STEEL

Placing of reinforcing steel shall conform to the requirements of the CALTRANS Specification, the ACI 318 specifications, and these specifications.

6.2.1 Steel reinforcement bars shall be accurately placed where shown on the Drawings.

6.2.2 All reinforcement steel shall be clean and free of heavy flaky rust, loose mill scale, grease or other foreign substances.
6.2.3 Reinforcement and anchor bolts shall be secured firmly in position; supports shall have sufficient strength to carry the load of the bars, the wet concrete, and the workers, and shall be placed close enough together so that bars will not sag or displace under normal working conditions.

6.2.4 Bars shall be tied with wire at least 3 times in any bar length. Ties to be used more frequently to support safe rebar handling, secure bars during concrete placement, or other construction activities. All tie wire ends shall be bent back from the outside surfaces by wrapping around the bar.

6.2.5 Bar splices shall not be allowed unless approved by the Engineer. Bar splices shall meet the requirements of the latest edition of ACI 318.

6.2.6 All reinforcing steel shall have the following minimum cover unless otherwise shown on the Drawings or required by the Technical Conditions.

6.2.6.1 Concrete against earth, no forms; 3 inches.

6.2.6.2 Formed concrete against earth, and/or top surface screeded and backfilled; 2 inches.

6.2.6.3 Concrete formed or finished and open to the air; 1 ½ inches.

7 PORTLAND CEMENT CONCRETE

Portland Cement Concrete (PCC) shall be furnished and installed in accordance with Sections 90 and 51 of the CALTRANS Specification, and these specifications. The Contractor shall submit the proposed design mix and test data showing compliance with these specifications for District review.

7.1 Unless otherwise specified in the Drawings and/or Technical Conditions, all cement shall be ASTM C150 Type II "low alkali".

7.2 The design mix shall contain a minimum of 6-sacks (564 lbs) of Portland Cement and shall have a maximum coarse aggregate of 1-inch unless otherwise required by the Drawings, Technical Conditions, or Engineer. Concrete to be placed under water or drilling slurry shall have a minimum of 660 pounds of cement per cubic yard.

7.3 Admixtures shall not be used to replace cement and shall be reviewed and approved by the Engineer.

7.4 Water (and ice) shall be clean, domestic quality water, and shall meet the chemical requirements of Section 90 and ASTM C94.
7.5 All concrete to be placed under water or slurry/drilling fluid due to caving holes and/or high groundwater conditions (water or slurry displacement method of construction) shall require special mix design, placement procedures, and continuous inspection in accordance with the Drawings, Technical Conditions, or Engineer’s requirements. The slurry displacement method shall only be performed by a Contractor with extensive, demonstrated experience in the work using a detailed work procedure reviewed and approved by SMUD. The concrete mix design shall be provided by the Contractor and reviewed by SMUD. The slurry/drilling fluid shall not be used material or re-used on the jobsite unless previously approved by the Engineer.

7.6 The water/cement ratio shall be kept as low as possible and shall not exceed 0.5 unless otherwise required by the Drawings, Technical Conditions, or Engineer. The amount of water required for proper consistency of the concrete shall be determined by the slump test. Allowable slumps shall be as follows unless otherwise noted by the Drawings, Technical Conditions, or Engineer:

7.6.1 Slabs on grade: 4" (+/-1")
7.6.2 Drilled Piers (dry hole using standard concrete placement method): 6" (+/-1")
7.6.3 Drilled Piers (wet or caving hole using water or slurry displacement method): Refer to Section 7.5.

7.7 The concrete shall have a minimum 28 day compressive strength of 4000 pounds per square inch, unless otherwise required by the Drawings and/or Technical Conditions.

8 MIXING AND TRANSPORTING

8.1 Concrete shall be mixed and transported in accordance with the requirements of Section 90. The Contractor shall make adequate advance arrangements for preventing delays in delivery and placing of the concrete. An interval of more than forty-five (45) minutes between any two consecutive batches or loads, or a delivery and placing rate of less than eight (8) cubic yards of concrete per hour, shall constitute cause for shutting down the work for the remainder of the day, and if so ordered by the Inspector, the Contractor shall make at his own expense, a construction joint at the location and of the type directed by the Inspector, in the concrete already placed.

8.2 Concrete which has been in the mixer for more than 90 minutes, or for more than 250 revolutions of the drum or blades, or that reaches a temperature of 90°F, shall not be used in the work.

8.3 Each load of concrete delivered to the work site shall be accompanied by a batch plant mix ticket.
8.4 If the work site is at a remote location where the distance from the batch plant to the site is such that the transport truck is not able to travel the distance and discharge the concrete within the 90 minute time limit specified in section 8.2 above, the concrete may be “dry batched” and transported in accordance with the following requirements. Prior approval must be obtained from SMUD before this method can be used.

8.4.1 Trucks proposed for used shall be approved by SMUD prior to first use. The drum fins shall be clean, in good repair, and shall have a height of not less than 10 inches.

8.4.2 The drum shall be loaded with all aggregates prior to the loading of the Portland Cement. No free water shall be present in the aggregates.

8.4.3 The Portland Cement shall be loaded on top of the aggregate, and in such a manner as to prevent the Cement from “running down the sides of the drum” during transport. An additional 50 pounds of cement per cubic yard of mix shall be added to the required cement.

8.4.4 The drum opening shall be covered to prevent the cement from becoming airborne and blowing out of the drum during transit.

8.4.5 The drum shall not be turned after the addition of the cement and during the transit to the work site.

8.4.6 The Contractor shall have a method of accurately metering the water for the mix. The water shall be added such that all water is in the drum by the end of the first ¼ of the specified mixing period. Mixing shall be in accordance with the mixer manufacturer’s specifications for number of revolutions and speed of the drum.

8.5 No additional water shall be incorporated into the concrete during hauling or after arrival at the work site, unless authorized by the Inspector. If the Inspector authorizes additional water to be added to the concrete, the drum shall be revolved not less than 30 revolutions at mixing speed after the water is added and before discharge is commenced.

8.6 No concrete shall be used which has partially set, and no concrete shall be retempered or remixed.

9 PLACING

9.1 Concrete placement shall commence only in the presence of, and with the approval of the Inspector. Concrete shall not be placed on frozen or frost coated ground, forms, steel, or other frost coated surfaces.

9.2 Concrete shall not be placed if the air temperature is expected to drop below 40°F during placing, finishing, or prior to setting. The temperature of mixed concrete, immediately before placing, shall be not less than 50°F or more then 90°F.

9.3 Subgrade compaction, forms, reinforcing steel, embedded items, etc. will be inspected and approved prior to concrete placement. Embedment of aluminum is prohibited unless it is effectively coated or wrapped.
9.4 Concrete shall be placed as nearly as practicable in its final position to avoid segregation due to handling or flowing. Placing, once started, shall be carried on as a continuous operation. All concrete shall be thoroughly consolidated during placement and shall be worked around reinforcement and embedded fixtures and into the corners of the forms with the aid of mechanical vibrators and supplemented by hand spading and tamping. Vibrators shall not be used to move the concrete within the forms. The location, manner, and duration of the application of the vibrators shall be such that the concrete is free of rock pockets, closes against all surfaces of form and embedded material, and consolidated to the maximum density without segregation of the mortar and coarse aggregates.

9.5 Concrete shall not be permitted to fall from a height greater than 3 feet for slabs and shallow footings, and 6 feet for walls and small (less than 3'-6" in diameter) caisson footings without the use of adjustable length pipes ("elephant trunk") and funnel.

9.6 For large (greater than 3'-6" diameter) caisson footings, elephant trunks do not need to be used providing the concrete enters the footing through a funnel placed in the center of the hole, and that there are non-obstructions for the stream to hit as it falls to the bottom of the hole. The top 8 feet of the footing must be vibrated. The Inspector may require the Contractor to use elephant trunks if free dropping of the concrete appears to be causing caving of the sides of the hole, or displacement of the reinforcement.

10 CONSTRUCTION JOINTS

10.1 Construction joints shall be located where shown on the Drawings (See Drawing A-1043 for joint details). All joints shall be straight and plumb or level. Under no circumstances shall the concrete along a joint be allowed to assume a natural slope.

10.2 Joints not shown on the Drawings, including emergency joints needed as a result of problems with the receipt or placement of concrete, shall be located and constructed so as to not impair the strength of the structure and to be as inconspicuous as possible. Additional reinforcement of dowels may be required in the joint. The Engineer will approve all joint locations and additional reinforcement, and may require that some or all concrete already placed be removed if the joint location weakens the structure, at no additional cost to SMUD.

10.3 At all joints, the surface of the concrete shall be roughened and thoroughly cleaned of all laitance, loose or defective concrete, coatings, and foreign materials prior to placing the next lift of concrete.

11 FINISHING

11.1 All horizontal surfaces of concrete shall have a steel troweled, light broom finish, except surfaces that will be buried may be screeded off and broomed. All top horizontal edges shall be rounded with a steel edger.
11.2 All defects (e.g., rock pockets, porous, and fractured concrete) in the concrete shall be removed and refilled with concrete, dry packed, or repaired, as directed by the Inspector. If, in the opinion of the Engineer, the defects are such that repairs will not result in a structurally or aesthetically acceptable structure, the Contractor shall remove and replace the entire structure, at no additional cost to SMUD.

11.3 Surface variation for all troweled surfaces shall not exceed 1/8 inch in 8 feet, measured with a straight edge. The tolerance in elevation shall not exceed 1/8 inch plus or minus from a true plane at the elevation shown on the Drawings.

12 CURING

12.1 Curing compound shall be either clear or white pigmented, as approved by the Inspector. The compound shall be applied at the manufacturer’s specified rate, immediately after surface finishing is completed.

12.2 When the ambient temperature is above 75°F, the Contractor shall fog the surface with a fine spray of water, after the curing compound has set sufficiently to prevent displacement, and shall keep the surface moist until the temperature drops below 75°F or until 7 P.M. on the day the concrete is placed. On windy days where rapid wind drying is observed, the Contractor shall keep the surface moist for 3 hours after application of the curing compound. Curing compound shall be applied to formed surfaces within one hour after stripping if forms are removed within 7 days after placing concrete.

12.3 Tops of footings, and any surface which shall have additional concrete or grout placed on it, shall be thoroughly cleaned of all compound, laitance, and foreign materials not earlier than 7 days after placement of the concrete.

13 PROTECTING CONCRETE

The concrete shall be protected in accordance with section 90-8 of the State Specification. On very hot or windy days, the concrete shall be protected from surface drying that causes a flash or surface set.

14 FORM REMOVAL AND BACKFILL

14.1 Forms which do not support the dead load of concrete members shall not be removed until at least 24 hours after the concrete has been placed and until the concrete has sufficient strength to prevent damage to the surface. Backfill may be placed after the curing compound has dried.

14.2 Forms and falsework supporting forms in structures shall not be removed until approved by the Engineer, but in no case in less than seven days. Backfill shall not be placed around or on top of structures until the concrete reaches a strength of 3000 psi, but in no case in less than 14 days after the concrete has been placed.
15 **APPLICATION OF LOADS**

Loads shall not be allowed to be imposed upon concrete structures until laboratory test results indicate that the concrete has attained the specified design strength, and until approved by the Engineer.

16 **DRAWINGS**

SMUD Engineering Drawing A-1043
Engineering Specification SS0801 Polyvinyl Chloride Electrical Conduit

1 PURPOSE
To specify construction materials and standards for non-metallic electrical conduit.

2 SCOPE
This specification covers the requirements for furnishing and installing polyvinyl chloride (PVC) conduit and fittings to be used for the installation of electrical power cables. Installation of electrical cables is not part of this specification.

The contract specifications and drawings take precedent over any conflicting portions of this specification and may modify or replace portions of it.

3 REFERENCES
3.1 National Electric Manufacturers Association (NEMA) Standards Publications, latest edition:
3.1.1 TC-2 "Electrical Polyvinyl Chloride (PVC) Conduit"
3.1.2 TC-3 "Polyvinyl Chloride (PVC) Fittings for use with Rigid PVC Conduit and Tubing"
3.1.3 TC-6 & 8 "Polyvinyl Chloride (PVC) Plastic Utilities Duct for Underground Installation"
3.1.4 TC-9 "Fittings for Polyvinyl Chloride (PVC) Plastic Utilities Duct for Underground Installation"

4 DEFINITIONS
4.1 INSPECTOR - The authorized job site representative of SMUD’S Engineer.

5 MATERIALS
All materials shall be furnished by the Contractor unless specifically stated otherwise in the contract specifications.

5.1 CONDUIT
5.1.1 Conduit shall be manufactured from PVC plastic, shall be listed by Underwriters Laboratories and wire rated for 90° C conductor.

5.1.2 Conduit types, unless specifically stated otherwise in the contract specifications or shown otherwise on the drawings, shall be as follows:
   Type DB-120 For conduit to be encased with concrete. Type DB conduit shall conform to NEMA Standards Publication No. TC-6.
   Schedule 40 For conduit to be direct buried. Schedule 40 conduit shall conform to NEMA Standards Publication No. TC-2.
Schedule 80  For conduit to be installed on poles and for all other above ground installations. Schedule 80 conduit shall conform to NEMA Standards Publication No. TC-2.

5.1.3 All conduits shall be identified and marked in accordance with the NEMA Standards.

5.1.4 Conduit sizes shall be as shown on the contract drawings.

5.2 FITTINGS
Fittings shall be compatible with the conduit being used.

5.2.1 Fittings for Type DB conduit shall conform to NEMA Standard Publication No. TC-9.

5.2.2 Fittings for Schedules 40 and 80 conduits shall conform to NEMA Standards Publication No. TC-3.

5.3 SOLVENT CEMENT
5.3.1 Solvent cement for joining of conduit shall either meet the requirements of ASTM D2564 or shall be in accordance with the conduit manufacturer's recommendations.

5.4 CONDUIT SPACERS
5.4.1 Interlocking plastic base and intermediate spacers manufactured for use with conduit shall be used to support and separate all conduit to be encased with concrete. Spacer assemblies shall provide a minimum conduit separation of 1.5 inches and a 3-inch space above the trench floor. See Electric Service Requirement (ESR) T007 section 4.5.5 for further clarification.

5.5 CONCRETE
5.5.1 Concrete for conduit encasement shall be a mix consisting of 3/8-inch maximum size, washed pea gravel aggregate, and 5 sacks of Type I, II, or III portland cement. The mix shall have a slump of 6 to 8 inches.

6 INSTALLATION

6.1 GENERAL
6.1.1 Conduit shall be installed as shown on the plans. Conduit runs shall not have more bends than are shown on the plans.

6.1.2 Excavation and backfill for conduit installation shall be as specified in the contract specifications. Trenches shall be excavated and conduit placed to maintain 30" minimum cover. Additional cover may be needed depending on the size of conduit, application, elbow radius size, if specified per SMUD drawing, etc... Cover shall be measured from finish grade to top of uppermost conduit for direct buried conduit, and to the top of concrete for encased conduit.
6.1.3 Factory manufactured sweeps shall be used wherever possible for changes in alignment. Conduit bends shall be smooth and uniform with the round cross-section maintained throughout the curve. Kinked or flattened conduits will not be accepted. Unless specified per SMUD drawings, the minimum radius for elbows and sweeps shall be as follows:

<table>
<thead>
<tr>
<th>Conduit Size</th>
<th>Riser Elbow Minimum Radius</th>
<th>Horizontal Sweep Minimum radius</th>
</tr>
</thead>
<tbody>
<tr>
<td>1&quot; to 2&quot;</td>
<td>18&quot;</td>
<td>4'</td>
</tr>
<tr>
<td>3&quot;</td>
<td>18&quot;</td>
<td>12'</td>
</tr>
<tr>
<td>4&quot;</td>
<td>30&quot;</td>
<td>12'</td>
</tr>
<tr>
<td>5&quot;</td>
<td>36&quot;</td>
<td>12'</td>
</tr>
<tr>
<td>6&quot;</td>
<td>48&quot;</td>
<td>12'</td>
</tr>
</tbody>
</table>

Metallic elbows, when specified, shall be rigid steel.

6.1.4 Five degree angle couplings shall not be used unless called for in the contract specifications or on the drawings.

6.1.5 A cable pulling "flat" rope shall be left as a "sleeper" in each conduit. The open ends of the conduit shall be plugged and capped with a PVC plug and cap to prevent entrance of dirt and other materials.

6.2 JOINING CONDUIT

6.2.1 Joining of PVC conduit and fittings shall be with solvent cement in accordance with both the conduit manufacturer's and the solvent cement manufacturer's recommendations.

6.2.2 The ends of cut conduits shall be square with the longitudinal axis of the conduit and shall have all burrs removed.

6.2.3 The socket depth of the fitting shall be measured and the outside of the conduit to be joined marked to indicate when the conduit end will be bottomed.

6.3 DIRECT BURIAL CONDUIT INSTALLATION

6.3.1 Trenches for conduit installations shall be graded true with no rocks or soft spots in the bottom. Trench bottoms that have been disturbed shall be compacted to a relative density of at least 90 percent. Conduits shall have a firm bearing surface along the full length of the run.

6.3.2 Runs of multiple conduits shall have 3 inches minimum of horizontal and vertical clearance between conduits using fine earth as spacing material. Fine earth shall be finely divided and free of rocks and clods larger than 3/8 inch and deleterious matter. Fine earth shall also be used for initial backfill unless specified or shown otherwise on the plans. Initial backfill shall extend to a minimum of 6 inches above the top conduit. Initial backfill shall be carefully placed and compacted so as to fill all voids without disturbing or damaging the conduits. The method of compaction used shall be as approved by the Inspector. Jetting will not be allowed.
6.4 CONCRETE ENCASED CONDUIT INSTALLATION

6.4.1 As required concrete shall be used to encase all conduits and to form a 3-inch to 6-inch thick envelope around the duct bank.

6.4.2 Interlocking plastic spacers shall be used to provide a framework that supports and separates the conduits during placement of concrete. Spacer assemblies shall be placed at 4 foot maximum intervals, except assemblies for 2-inch and smaller conduits shall be at 2-foot maximum intervals.

6.4.3 Conduit and spacer assemblies shall be firmly secured and tied down to prevent displacement or floating of the conduits during placement of concrete. Metallic wire or banding material may be used to secure the conduits only if they completely surround the duct bank and form a closed loop. Partial wraps and open loops will not be allowed.

6.4.4 Trench walls may act as forms for the concrete encasement. Surfaces upon which concrete is to be placed shall be free of standing water, mud, and debris. Absorbent surfaces against which concrete is to be placed shall be moistened immediately prior to placing the concrete.

6.4.5 Placement of concrete shall be made so as to avoid dislodging soil from the trench walls. Concrete shall be hand worked to completely fill all voids between conduits and between conduits and trench walls.

6.4.6 The top of the concrete encasement shall be struck off or tamped to provide a semi-smooth, flat surface.

6.4.7 Cold joints, where necessary in concrete encasement, shall be made on a uniformly sloping plane at the angle of repose of the fresh concrete and shall be roughened. Before beginning the next pour the surface shall be thoroughly cleaned.

6.4.8 Concrete encasement shall extend a minimum of 1 foot beyond the connection to metallic or direct buried conduit.

6.4.9 Concrete which has been mixed 90 minutes after the addition of water shall not be used.

6.4.10 Concrete shall be placed only upon the approval of, and in the presence of, the Inspector.

6.5 TERMINATIONS AND RISERS

6.5.1 Conduits entering walls of buildings, manholes, cable troughs, pullboxes, and vaults shall terminate with end bells. All other below grade terminations shall be with a coupling and plug.

6.5.2 Conduit terminations in concrete slabs or floors of other concrete structures shall be with a coupling and plug installed flush with the top of concrete.
6.5.3 Pole risers shall be constructed as shown on SMUD Drawing U1N. The radius portion of the elbow for risers shall be below finish grade.

7 TESTING

7.1 After installation and backfilling, all conduits shall be cleaned of any debris, water, or other materials. Steel brushes shall not be used in the conduits.

7.2 After the conduits have been cleaned, the Contractor shall pull a SMUD furnished mandrel through each conduit. The mandrel tests must be witnessed by the Inspector.

7.3 Any conduit failing the mandrel test shall be repaired or replaced at the Contractor's expense.

7.4 A cable pulling “flat” rope shall be left as a sleeper in each conduit run. It shall be polyester fiber woven in a flat configuration, lubricated, tensile strength 2500 lbs., printed with manufacturer's name, strength rating, and footage markings.
Appendix B

List of Material Suppliers

The table below lists material suppliers with whom SMUD is familiar. It is not intended to be an exhaustive list of all possible suppliers in the area. There may be additional vendors that can provide the material required by this specification.

<table>
<thead>
<tr>
<th>ARMORCAST PRODUCTS CO.</th>
<th>HANSON CONCRETE</th>
</tr>
</thead>
<tbody>
<tr>
<td>13230 Saticoy Street.</td>
<td>7020 Tokay Ave</td>
</tr>
<tr>
<td>N. Hollywood, CA 91605</td>
<td>Sacramento, CA 65828-2418</td>
</tr>
<tr>
<td>(818) 982-3600</td>
<td>(916) 318-3910</td>
</tr>
<tr>
<td>Fax (818) 982-7742</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>AZCO SUPPLY, INC.</th>
<th>HUBBELL POWER SYSTEMS</th>
</tr>
</thead>
<tbody>
<tr>
<td>2250 Stewart St. #9</td>
<td>210 N Allen</td>
</tr>
<tr>
<td>Stockton, Ca 95205-3244</td>
<td>Centralia, MO 65240</td>
</tr>
<tr>
<td>(209) 943-2452</td>
<td>(573) 682-5521</td>
</tr>
<tr>
<td></td>
<td>Fax (573) 682-8475</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>CAPITAL WHOLESale ELECTRIC</th>
<th>INDEPENDENT UTILITY SUPPLY</th>
</tr>
</thead>
<tbody>
<tr>
<td>1811 12th St</td>
<td>4076 Channel Drive</td>
</tr>
<tr>
<td>Sacramento, CA 95811</td>
<td>West Sacramento, CA 95691</td>
</tr>
<tr>
<td>(916) 443-8051</td>
<td>(916) 376-8400</td>
</tr>
<tr>
<td>Fax (916) 446-2027</td>
<td>Fax (916) 376-8444</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>CONSOLIDATED ELECTRICAL DISTRIBUTORS</th>
<th>JENSEN PRECAST</th>
</tr>
</thead>
<tbody>
<tr>
<td>1800 24th Street</td>
<td>5400 Raley Boulevard</td>
</tr>
<tr>
<td>Sacramento, CA 95816</td>
<td>Sacramento, CA 95838</td>
</tr>
<tr>
<td>(916) 452-3111</td>
<td>(916) 991-8800</td>
</tr>
<tr>
<td>Fax (916) 452-3155</td>
<td>(800) 843-9569</td>
</tr>
<tr>
<td></td>
<td>Fax (916) 991-8810</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>ELECTROREP, INC.</th>
<th>MARTIN ENTERPRISES</th>
</tr>
</thead>
<tbody>
<tr>
<td>2015 Bridgeway, Suite 201</td>
<td>7231 Boulder Ave</td>
</tr>
<tr>
<td>Sausalito, CA 94965</td>
<td>Highland, CA 92346</td>
</tr>
<tr>
<td>(415) 332-4100</td>
<td>(951) 928-8713</td>
</tr>
<tr>
<td>Fax (415) 332-4150</td>
<td>Fax (951) 928-4623</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>ENERGY COMM</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>P.O. Box 488</td>
<td></td>
</tr>
<tr>
<td>Orinda, CA 94563</td>
<td></td>
</tr>
<tr>
<td>(925) 254-3736</td>
<td></td>
</tr>
<tr>
<td>Fax (925) 351-1905</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>GRAYBAR ELECTRIC COMPANY</th>
</tr>
</thead>
<tbody>
<tr>
<td>P. O. Box G</td>
</tr>
<tr>
<td>1211 Fee Drive</td>
</tr>
<tr>
<td>Sacramento, CA 95815</td>
</tr>
<tr>
<td>(916) 561-1900</td>
</tr>
</tbody>
</table>
Material Suppliers (cont.)

NEWBASIS
2626 Kansas Ave.
Riverside, CA
(951) 787-0600
Fax (951) 787-0632

OLDCASTLE PRECAST, INC.
3786 Valley Ave.
Pleasanton, CA 94566-8183
(925) 846-8183
Fax (925) 846-4904

REPLACON
P.O. Box 186
Sheridan, CA 95681
(530) 633-2050
Fax (530) 633-2028

WESCO DISTRIBUTION, INC.
1045 W National Drive, #19
Sacramento, CA 95834
(916) 928-1001
Appendix C

Design and Construction Drawings

The customer and/or their representatives or contractors shall adhere to the design and construction drawings listed in the table below, unless otherwise specified in writing by a SMUD inspector or designer. The Customer shall review all drawings. Any questions or comments shall be brought to Sacramento Municipal Utility District's (SMUD) attention for clarification or resolution.

Design and Construction Drawings

<table>
<thead>
<tr>
<th>Drawing Title</th>
<th>Drawing Identification Code</th>
<th>Page Number</th>
</tr>
</thead>
<tbody>
<tr>
<td>RESIDENTIAL CONDUIT SYSTEM TYPICAL INSTALLATION</td>
<td>U12P3X</td>
<td>C-1</td>
</tr>
<tr>
<td>DETAIL TYPICAL CONDUIT TERMINATION</td>
<td>U12P3X2</td>
<td>C-2</td>
</tr>
<tr>
<td>TYPICAL DISTRIBUTION TRENCH</td>
<td>U12P3X3</td>
<td>C-3</td>
</tr>
<tr>
<td>PRIMARY PULL BOX CORNER INSTALLATION 30&quot; X 48&quot; X 34&quot;</td>
<td>U12P3X5</td>
<td>C-4</td>
</tr>
<tr>
<td>PRIMARY PULL BOX INSTALLATION 48&quot; X 72&quot; X 42&quot;</td>
<td>U12P3X6</td>
<td>C-5</td>
</tr>
<tr>
<td>PRIMARY PULL BOX INSTALLATION 74&quot; X 98&quot; X 42&quot;</td>
<td>U12P3X7</td>
<td>C-6</td>
</tr>
<tr>
<td>SWITCHGEAR BOX TYPICAL INSTALLATION</td>
<td>U12H3X1</td>
<td>C-7</td>
</tr>
<tr>
<td>SINGLE PHASE TRANSFORMER PAD AND WELL INSTALLATION</td>
<td>U12K3X1</td>
<td>C-8</td>
</tr>
<tr>
<td>SECONDARY SERVICE BOX INSTALLATION 17&quot; X 30&quot; X 18&quot;</td>
<td>U1S3X1</td>
<td>C-9</td>
</tr>
<tr>
<td>RESIDENTIAL SECONDARY SERVICE BOX WIRE INSTALLATION</td>
<td>U1S3X2</td>
<td>C-10</td>
</tr>
<tr>
<td>SERVICE CONDUIT AT HOUSE FOUNDATION</td>
<td>U1S3X3</td>
<td>C-11</td>
</tr>
<tr>
<td>INSTALLATION FOR 17&quot; X 30&quot;, 24&quot; X 36&quot;, AND 30&quot; X 48&quot; FULL TRAFFIC BOXES</td>
<td>U1S3X4</td>
<td>C-12</td>
</tr>
<tr>
<td>BOX COVER CLEARANCE</td>
<td>UVC1.2.8</td>
<td>C-13</td>
</tr>
<tr>
<td>OPEN BOTTOM CONCRETE BOX 48&quot; X 72&quot; X 42&quot;</td>
<td>UVC1.2</td>
<td>C-14</td>
</tr>
<tr>
<td>Drawing Title</td>
<td>Drawing Identification Code</td>
<td>Page Number</td>
</tr>
<tr>
<td>--------------------------------------------------------</td>
<td>-----------------------------</td>
<td>-------------</td>
</tr>
<tr>
<td>SPRING ASSIST COVER FOR 48&quot; X 72&quot; BOX</td>
<td>UVC1.2.2</td>
<td>C-15</td>
</tr>
<tr>
<td>AT GRADE - FULL TRAFFIC BOX COVER FOR 48&quot; X 72&quot;</td>
<td>UVC1.2.9</td>
<td>C-16A/B</td>
</tr>
<tr>
<td>RIGGING CONFIGURATION OPEN BOTTOM CONCRETE BOX 48&quot; X 72&quot;X 42&quot;</td>
<td>RG1.0</td>
<td>C-17</td>
</tr>
<tr>
<td>T-TAP COVER 48&quot; X 72&quot;</td>
<td>UVC1.2.5</td>
<td>C-18</td>
</tr>
<tr>
<td>RPM HANOHOLE BOX 88&quot; X 67&quot; X 48&quot; FOR 12KV SWITCHGEAR</td>
<td>UVC1.4</td>
<td>C-19</td>
</tr>
<tr>
<td>RPM HANOHOLE BOX 102&quot; X 82&quot; X 48&quot; FOR 21KV SWITCHGEAR AND 12KV FEEDER TIE SWITCHES</td>
<td>UVC1.5</td>
<td>C-20</td>
</tr>
<tr>
<td>12KV &amp; 21KV PADMOUNTED SWITCHGEAR GROUNDING DETAIL</td>
<td>UGA2.5</td>
<td>C-21</td>
</tr>
<tr>
<td>OPEN BOTTOM CONCRETE BOX 74&quot; X 98&quot; X 42&quot;</td>
<td>UVC1.6</td>
<td>C-22</td>
</tr>
<tr>
<td>SPRING ASSIST COVER FOR 74&quot; X 98&quot; BOX</td>
<td>UVC1.6.1</td>
<td>C-23</td>
</tr>
<tr>
<td>AT GRADE - FULL TRAFFIC BOX COVER FOR 74&quot; X 98&quot;</td>
<td>UVC1.6.5</td>
<td>C-24A/B</td>
</tr>
<tr>
<td>RIGGING CONFIGURATION OPEN BOTTOM CONCRETE BOX 74&quot; X 98&quot;X 42&quot;</td>
<td>RG1.1</td>
<td>C-25</td>
</tr>
<tr>
<td>NON-CONCRETE SECONDARY J-BOX 48&quot; X 96&quot; X 48&quot;</td>
<td>UVC1.7</td>
<td>C-26</td>
</tr>
<tr>
<td>AT GRADE – COVER INSTALLATION DETAILS</td>
<td>UVC1.8.3</td>
<td>C-27</td>
</tr>
<tr>
<td>PRIMARY PULL BOX AND T-TAP INSTALLATION 30&quot; X 48&quot; X 34&quot;</td>
<td>UVC2.1</td>
<td>C-28</td>
</tr>
<tr>
<td>T-TAP COVERS FOR 30&quot; X 48&quot; BOX</td>
<td>UVC2.2</td>
<td>C-29</td>
</tr>
<tr>
<td>COMMERCIAL SECONDARY RUNS FROM TRANSFORMER TO PANEL</td>
<td>UAD1.5</td>
<td>C-30</td>
</tr>
<tr>
<td>COMMERCIAL SECONDARY RUNS FROM TRANSFORMER TO J-BOX</td>
<td>UAD1.6</td>
<td>C-31</td>
</tr>
<tr>
<td>SECONDARY J-BOX PADMOUNT</td>
<td>U1S3D1</td>
<td>C-32</td>
</tr>
<tr>
<td>Drawing Title</td>
<td>Drawing Identification Code</td>
<td>Page Number</td>
</tr>
<tr>
<td>------------------------------------------------------------------------------</td>
<td>-----------------------------</td>
<td>-------------</td>
</tr>
<tr>
<td>NON-CONCRETE SINGLE PHASE TRANSFORMER PAD 44&quot; X 51&quot;</td>
<td>UVD2.1</td>
<td>C-33</td>
</tr>
<tr>
<td>SINGLE PHASE TRANSFORMER PAD INSTALLATION 44&quot; X 51&quot;</td>
<td>UVD2.1A</td>
<td>C-34</td>
</tr>
<tr>
<td>THREE PHASE PRECAST TRANSFORMER PAD 84&quot; X 84&quot;</td>
<td>UVD2.2</td>
<td>C-35</td>
</tr>
<tr>
<td>THREE PHASE TRANSFORMER PAD INSTALLATION PRECAST 84&quot; X 84&quot;</td>
<td>UVD2.2A</td>
<td>C-36</td>
</tr>
<tr>
<td>THREE PHASE PRECAST TRANSFORMER PAD 105&quot; X 120&quot;</td>
<td>UVD2.3A</td>
<td>C-37</td>
</tr>
<tr>
<td>THREE PHASE TRANSFORMER PAD INSTALLATION PRECAST 105&quot; X 120&quot;</td>
<td>UVD2.3A1</td>
<td>C-38</td>
</tr>
<tr>
<td>PADMOUNTED TRANSFORMER GUARD CHAIN LINK FENCE TYPE</td>
<td>UVD2.4</td>
<td>C-39</td>
</tr>
<tr>
<td>PADMOUNTED TRANSFORMER GUARD PIPE BOLLARD TYPE WITH REMOVABLE BARRIER</td>
<td>UVD2.5</td>
<td>C-40</td>
</tr>
<tr>
<td>GENERAL ARRANGEMENTS FOR PADMOUNTED SECONDARY J-BOXES</td>
<td>UVD5.4</td>
<td>C-41</td>
</tr>
<tr>
<td>GENERAL ARRANGEMENT FOR DEAD-FRONT PADMOUNT 12KV SWITCHGEAR</td>
<td>UVD5.5A</td>
<td>C-42</td>
</tr>
<tr>
<td>GENERAL ARRANGEMENT FOR DEAD-FRONT PADMOUNT 21KV SWITCHGEAR</td>
<td>UVD5.5B</td>
<td>C-43</td>
</tr>
<tr>
<td>GENERAL ARRANGEMENT FOR SF6 VISTA PADMOUNT 21KV SWITCHGEAR</td>
<td>UVD5.5C</td>
<td>C-44</td>
</tr>
<tr>
<td>TYPICAL DISTRIBUTION RISER</td>
<td>U1N</td>
<td>C-45</td>
</tr>
<tr>
<td>DIFFICULT TRENCHING AREAS</td>
<td></td>
<td>C-46</td>
</tr>
<tr>
<td>TYPICAL DISTRIBUTION TRENCH IN CORE DOWNTOWN AREAS</td>
<td>U12P3X8</td>
<td>C-47A/B</td>
</tr>
</tbody>
</table>
RIGHT OF WAY
BACK OF SIDEWALK

NATIVE BACKFILL.
DEVELOPER IS RESPONSIBLE
FOR FINAL COMPACTION.

12" MIN. MACHINE COMPACTION.
(ALL LOCATIONS)

8'-0"

24"

SMUD AND OTHER UTILITIES

CUSTOMER OWNED
UTILITIES, (PRIVATE)
SEE NOTE 3.
FINISHED GRADE

(SEE NOTE 4.)

30" MIN.
COVER OVER GAS

59"

ROCK-FREE SANDY LOAM OR SAND.

SEE NOTE 2.
CLODS LESS THAN 3/4" OR SAND

NOTE: TRENCH BOTTOM
MUST BE SQUARE.

1. IF NUMBER OF CONDUITS WOULD
REQUIRE MORE ROOM TO MAINTAIN
CLEARANCE, CONTRACTOR MUST
USE WIDER TRENCH.

2. A = 12" MIN. RADIAL CLEARANCE
FROM ELECTRIC, GAS, AND COMM.
CONDUITS.

3. EXTRA TRENCH WIDTH NOT
ALLOWED IN SUBDIVISIONS.
CUSTOMER OWNED UTILITIES ARE
NOT ALLOWED IN P.U.E. EXTRA
TRENCH WIDTH FOR PRIVATE
UTILITIES IS TYPICALLY FOR
COMMERCIAL APPLICATIONS.

4. SMUD INSPECTOR MAY REQUIRE 6"
LAYER OF SAND OR PEA GRAVEL
BETWEEN THE BOTTOM OF THE
TRENCH AND THE ELECTRICAL
CONDUIT IF SOIL IS ROCKY.

TRENCH OPTION 1

TRENCH OPTION 2

HORTICULTURE, LAWN OR
CULTIVATED AREAS

NOTE:

5. MATCH EXISTING A.C. THICKNESS: 4" MINIMUM, 6" MAXIMUM.

6. SAW CUT 12" BEYOND THE WIDTH OF THE TRENCH.

7. T-GRIND REQUIRED FOR ALL PAVEMENTS (12" MINIMUM WIDTH), 1/2" DEEP GRIND AND PAVE TO THE LIP OF GUTTER, LANE LINE, OR CENTER OF TRAFFIC LANE (WHICHEVER IS APPLICABLE).

8. 3/4" AGGREGATE BASE @ 90% COMPACTION OR APPROVED SLURRY-CEMENT BACKFILL.

CITY OF FOLSOM

Sacramento Municipal Utility District

ESR: T007
PG #: C-3

REV. DATE: FEB 2015
REV. NO: 6

STANDARD NUMBER: U12P3X3

TYPICAL DISTRIBUTION TRENCH
NOTES:
1. SEE DRAWING U12P3X2 FOR CONDUIT TERMINATION DETAILS.
IF THE BOX IS LOCATED IN A LANDSCAPE AREA, THE TOP OF THE COVER SHALL BE BETWEEN 3" TO 6" ABOVE FINISHED GRADE. IF BOX IS LOCATED IN A WALKWAY, THE TOP OF THE COVER SHALL BE FLUSH WITH FINAL GRADE. SPRING ASSIST COVERS SHOULD BE USED IN LANDSCAPE AREAS ONLY. A FULL TRAFFIC COVER SHALL BE USED IN ALL OTHER AREAS.

CONDUIT SHALL BE PVC SCHEDULE 40.

ELBOW (TYP.) SHALL BE 22-1/2°, PVC SCHEDULE 40, AND, FOR 4" CONDUIT SHALL HAVE A 30" RADIUS. THE 6" CONDUIT SHALL HAVE A 48" RADIUS.

3/4" CRUSHED ROCK, CRUSHED ROCK SHALL BE TAMPERED AND CONSOLIDATED.

SECTION VIEW

FINISHED GRADE

PRE CAST CONCRETE BOX 48" X 72" X 42"

CONDUIT SHALL BE CONCRETE ENCASED AS SHOWN.

PLAN VIEW

CENTER LINE OF TRENCH

NOTES:
1. SEE DRAWING U12P3X2 FOR CONDUIT TERMINATION DETAILS
2. SEE DRAWING UGA2.5 FOR GROUNDING INSTALLATION

EDGE OF P.U.E.

EDGE OF ROAD R/W

SMUD®
Sacramento Municipal Utility District

PRIMARY PULL BOX INSTALLATION
48" X 72" X 42"

ESR: T007

PG #: C-5

REV. DATE: JAN 2018
REV. NO.: 7

STANDARD NUMBER: U12P3X6
IF THE BOX IS LOCATED IN A LANDSCAPE AREA, THE TOP OF THE COVER SHALL BE BETWEEN 3" TO 8" ABOVE FINISHED GRADE. IF BOX IS LOCATED IN A WALKWAY, THE TOP OF THE COVER SHALL BE FLUSH WITH FINAL GRADE. SPRING ASSIST COVERS SHOULD BE USED IN LANDSCAPE AREAS ONLY. A FULL TRAFFIC COVER SHALL BE USED IN ALL OTHER AREAS.

CONDUIT SHALL BE PVC SCHEDULE 40.

CONDUIT SHALL BE 4" OR 6" DB120 PVC.

ELBOW (TYP.) SHALL BE 22-1/2°, PVC SCHEDULE 40, AND, FOR 4" CONDUIT SHALL HAVE A 30" RADIUS. THE 6" CONDUIT SHALL HAVE A 48" RADIUS.

3/4" CRUSHED ROCK. CRUSHED ROCK SHALL BE TAMPERED AND CONSOLIDATED.

FINISHED GRADE

PRE CAST CONCRETE BOX 74" X 98" X 42"

CONDUIT SHALL BE CONCRETE ENCASED AS SHOWN.

SECTION VIEW

20'-0"
10'-0"
20'-0"

EDGE OF P.U.E.

12'-6"
5'-0"
4'-6"
9'-3"
6'-2"

CENTER LINE OF TRENCH

EDGE OF ROAD R/W

PLAN VIEW

NOTES:
1. SEE DRAWING U12P3X2 FOR CONDUIT TERMINATION DETAILS
2. SEE DRAWING UGA2.5 FOR GROUNDING INSTALLATION
THE TOP OF THE COVER SHALL
BE 3' - 6" ABOVE FINISHED GRADE.

CONDUIT SHALL BE
PVC SCHEDULE 40.

CONDUIT SHALL BE
4" OR 6", DS120 PVC.

ELBOW (TYP.)
SHALL BE 22-1/2"
PVC SCHEDULE 40,
AND, FOR 4" CONDUIT
SHALL HAVE A 30" RADIUS.
The 6" CONDUIT SHALL HAVE
A 48" RADIUS.

3/4" CRUSHED ROCK.

SECTION VIEW

15'-2"

11'-4" OR 12'-6"

15'-2"

EDGE OF P.U.E.

12'-6"

7'-6"

EDGE OF ROAD RW

GROUND WIRE
SEE NOTE 2.

2'-0" (TYP)

CENTER LINE
OF TRENCH

NOTES:
1. SEE DRAWING U12P3X2 FOR CONDUIT TERMINATION DETAILS
2. SEE DRAWING UGA2.5 FOR GROUNDING INSTALLATION.
44" x 51" Non Concrete Transformer Pad

Conduit shall be 4"
PVC Schedule 40

Elbow (TYP.) shall be 90°, PVC Schedule 40, and have a 30° radius.

Conduit shall be 4"PVC Schedule DB120

5/8 x 8' Ground Rod Installed by Customer

SEE U12P3X2 FOR CONDUIT TERMINATION

There shall be an 8" layer of 3/4" crushed rock under the transformer pad and well. The rock shall be tamped and consolidated.

Cable well shall be 32" in diameter.

Section View

Center Line of Trench

51" 24" 18" 30" 12'-6"

12'-6" 8'-0"

To Additional Service Wells/Boxes (See U12P3X)

Edge of P.U.E.

Edge of Road R/W

Plan View

Notes:
1. See Drawing U12P3X2 for conduit termination details.
2. See Drawing UGA2.5 for grounding details.
SECTION VIEW

ELBOW (TYP.) SHALL BE 90°, PVC SCHEDULE 40, AND HAVE A MIN. 18" RADIUS.

ELBOW (TYP.) SHALL BE 90°, 4" DIAMETER, PVC SCHEDULE 40, AND HAVE A MIN. 30" RADIUS.

PLAN VIEW

NOTES:
1. SEE DRAWING U12P3X3 FOR CONDUIT TERMINATION DETAILS.
2. SEE DRAWING U1S3X2 FOR MINIMUM DISTANCE ALLOWED BETWEEN THE SERVICE BOX AND THE POLE.

SIDEWALK

CURB AND GUTTER

SECONDARY SERVICE BOX INSTALLATION
17" X 30" X 18"
MIN CONDUIT COVER AT SERVICE BOX 35"

SEE NOTE 4
3/4 CRUSHED ROCK

SEE NOTE 1.

SERVICE WIRE SHALL HAVE 36" TAIL

MINIMUM ELBOW RADIUS FOR SERVICE CONDUIT

<table>
<thead>
<tr>
<th>CONDUIT SIZE</th>
<th>RADIUS</th>
</tr>
</thead>
<tbody>
<tr>
<td>2&quot; - 3&quot;</td>
<td>18&quot;</td>
</tr>
<tr>
<td>4&quot;</td>
<td>30&quot;</td>
</tr>
</tbody>
</table>

ELBOW (TYP.) SHALL BE 90°, PVC SCHEDULE 40, AND HAVE A MIN. 18" RADIUS.

MINIMUM ELBOW RADIUS FOR SERVICE CONDUIT

<table>
<thead>
<tr>
<th>CONDUIT SIZE</th>
<th>MINIMUM DISTANCE</th>
</tr>
</thead>
<tbody>
<tr>
<td>2&quot;</td>
<td>50&quot;</td>
</tr>
<tr>
<td>3&quot;</td>
<td>60&quot;</td>
</tr>
<tr>
<td>4&quot;</td>
<td>80&quot;</td>
</tr>
<tr>
<td>6&quot;</td>
<td>124&quot;</td>
</tr>
</tbody>
</table>

NOTES:
1. FULL TRAFFIC BOX IS 12" DEEP. (SEE U1S3X4)
2. CUSTOMER TO COORDINATE WITH SMUD FOR RISER QUADRANT ON POLE.
3. SEE U1N FOR CONDUIT RADIUS
4. CONDUIT COVER WILL VARY WITH CONDUIT SIZE. CONDUIT CLEARANCE IN SERVICE BOX IS 3" FROM FLOOR.

PROPERTY LINE
LOT 1
LOT 2

SECTION VIEW

CONDUIT ARRANGEMENT FOR 3" OR GREATER SERVICE CONDUIT

MINIMUM DISTANCE FROM RISER POLE

RESIDENTIAL SECONDARY SERVICE BOX WIRE INSTALLATION
CONVENTIONAL FOUNDATION (TYPICAL)

MIN COVER 30°

2" CONDUIT PVC SCHEDULE 40

2" ELBOW PVC SCHEDULE 40 18° RADIUS

CONDUIT PVC SCHEDULE 40

2" ELBOW PVC SCHEDULE 40 18° RADIUS

CONCRETE SLAB FOUNDATION (TYPICAL)

MIN COVER 30°

2" CONDUIT PVC SCHEDULE 40

2" ELBOW PVC SCHEDULE 40 18° RADIUS

CONDUIT PVC SCHEDULE 40

2" ELBOW PVC SCHEDULE 40 18° RADIUS

CONVENTIONAL FOUNDATION (TYPICAL)

MIN COVER 30°

2" CONDUIT PVC SCHEDULE 40

2" ELBOW PVC SCHEDULE 40 18° RADIUS

CONDUIT PVC SCHEDULE 40

2" ELBOW PVC SCHEDULE 40 18° RADIUS

CONCRETE SLAB FOUNDATION (TYPICAL)

MIN COVER 30°

2" CONDUIT PVC SCHEDULE 40

2" ELBOW PVC SCHEDULE 40 18° RADIUS

CONDUIT PVC SCHEDULE 40

2" ELBOW PVC SCHEDULE 40 18° RADIUS

NOTES:
1. 2" SERVICE CONDUIT TYPICAL FOR UP TO 200 AMP SERVICE PANEL SEE RESIDENTIAL UNDERGROUND SPECIFICATION T003.
EXTENSION(S) ARE REQUIRED AND SHALL BE 12" DEEP. MORE THAN ONE EXTENSION MAY BE REQUIRED.

3/4" CRUSHED ROCK

ELBOW (TYP.) SHALL BE 90°, PVC SCHEDULE 40, AND HAVE A MIN. 30" RADIUS.

TABLE 1

<table>
<thead>
<tr>
<th>MINIMUM ELBOW RADIUS FOR ALL SERVICE CONDUIT ELBOWS (11-1/4&quot;, 22-1/2&quot;, 43&quot; &amp; 90&quot;)</th>
<th>CONDUIT SIZE</th>
<th>RADIUS</th>
</tr>
</thead>
<tbody>
<tr>
<td>2&quot; - 3&quot;</td>
<td>18&quot;</td>
<td></td>
</tr>
<tr>
<td>4&quot;</td>
<td>30&quot;</td>
<td></td>
</tr>
</tbody>
</table>

NOTES:

1. FULL TRAFFIC BOXES SHALL BE INSTALLED IN FULL TRAFFIC LOCATIONS AND INCIDENTAL TRAFFIC LOCATIONS SUCH AS PARKING LOTS, ALLEYS, AND INDUSTRIAL AREAS.
2. TRAFFIC BOXES REQUIRE A BASE OF AN EIGHT (8) INCH LAYER OF 3/4 INCH CRUSHED ROCK. THE CRUSHED ROCK SHALL BE TAMMED AND CONSOLIDATED.
3. MAXIMUM DEPTH DEPENDS ON MANUFACTURER. THE MAX DEPTH FOR COMPONENTS PROVIDED BY JENSEN IS 3 FEET.
4. MINIMUM CONDUIT COVER WILL DEPEND ON CONDUIT SIZE.
SIDE VIEW

PLAN VIEW

<table>
<thead>
<tr>
<th>BOX SIZE</th>
<th>A</th>
</tr>
</thead>
<tbody>
<tr>
<td>30&quot; x 48&quot; *</td>
<td>18&quot;</td>
</tr>
<tr>
<td>48&quot; x 72&quot;</td>
<td>36&quot;</td>
</tr>
<tr>
<td>74&quot; x 96&quot;</td>
<td>48&quot;</td>
</tr>
</tbody>
</table>

* APPLIES TO SMALLER SIZES.
ADJUSTING CLIP, 4 TOTAL. THE CLIP SHALL BE 3" X 3" X 3" X 1/4" 90° ANGLE IRON PER ASTM A-36. THE CLIP SHALL BE PERMANENTLY AFFIXED TO THE CONCRETE BOX AND BE HOT DIPPED GALVANIZED PER ASTM A-123.

LIFT ANCHOR, 4 TOTAL TYP. SEE DETAIL 1, SEE NOTES 4, 5 AND 6.

NOTES:

1. FOR PROPER RIGGING, SEE RG10.

2. OPEN BOTTOM CONCRETE BOX SHALL BE DESIGNED AND CONSTRUCTED FOR FULL DELIBERATE (H20-44) TRAFFIC LOADING.


4. THE LIFTING ANCHOR SHALL BE A STARCON SC-62 ANCHOR FROM MEADOW BURKE PRODUCTS WITH AN ANCHOR HEAD MARK OF 2.5S OR APPROVED EQUAL. THE ANCHOR SHALL BE RATED TO MEET OR EXCEED ALL REGULATIONS PERTAINING TO THE RIGGING OR LIFTING OF PRECAST CONCRETE ITEMS.

5. LIFT ANCHORS SHALL BE POSITIONED IN THE CENTERLINE OF THE WALL. MISALIGNMENT (OFF CENTERLINE) OF THE ANCHOR FOOT MAY RESULT IN A DRAMATIC REDUCTION OF THE SAFE WORKING LOAD. USE SPACERS AND/OR TIE THE ANCHOR TO REBAR TO ASSURE PROPER POSITIONING.

6. RECESS HOLE SHALL BE CREATED BY USING THE ST-39 RECESSION FORMER FOR A TWO TON ANCHOR FROM MEADOW BURKE PRODUCTS, OR APPROVED EQUAL.

7. BOX SHALL INCLUDE ONE STEP (BOWCO INDUSTRIES NO. 93813R, OR APPROVED EQUIVALENT) ON ONE SHORT WALL.

8. FOR BOX COVERS, SEE UVC1.2.2 OR UVC1.2.9.

9. MANUFACTURER SHALL PAINT/STENCIL CORRECT WEIGHT AND CATALOG NUMBER INSIDE AND OUTSIDE OF THE BOX.

10. SMUD STOCK CODE NUMBER: 10078777.

OPEN BOTTOM CONCRETE BOX
48" X 72" X 42"

SMUD®
Sacramento Municipal Utility District

ESR: T007
PG #: C-14
REV. DATE: FEB 2015
REV. NO.: 11
STANDARD NUMBER: UVC1.2
PAGE 1 OF 1
1. ADJUSTING CLIPS SHALL BE USED WHEN MAKING GRADE ADJUSTMENTS.
2. SLIPNOT "GRADE 2" MATERIAL OR APPROVED EQUAL SHALL BE APPLIED TO THE SURFACE OF THE COVER AND BE TESTED TO A MINIMUM OF .60 COF PER ASTM C-1028. TEST REPORTS TO BE SUBMITTED AT TIME OF BID.
3. A MINIMUM OF 25 MIL OF THE SURFACE SHALL BE ETCHED PRIOR TO ADDING SLIPNOT MATERIAL.
4. THE BOND STRENGTH OF THE SLIPNOT MATERIAL SHALL BE AT LEAST 4000 PSI PER ASTM C-633. TEST REPORTS TO BE SUBMITTED AT TIME OF BID.
5. STRUCTURAL GROUT OR FOAM SEALANT MUST BE USED AS DIRECTED BY THE SMUD INSPECTOR.
6. SHOULD BE USED IN LANDSCAPE AREAS ONLY.
7. SMUD STOCK CODE # 10012135
8. MANUFACTURER SHALL STENCIL NAME AND WEIGHT ON COVER.
3/4" COIL NUT WITH 3" X 3" X 1/4" PLATE WASHER AT BOTTOM OF SLAB AND 1/4" SCHEDULE 40 PIPE TO TOP SURFACE FOR LIFTING 4 TOTAL (TYP.)

LIFTING EYE CUT FROM 1/2" THICK ASTM A36 PLATE SEE DETAIL 1

ISOMETRIC 3-D VIEW

NOTES:

1. ADJUSTING CLIPS SHALL BE USED WHEN MAKING GRADE ADJUSTMENTS.
2. WHEN MAKING GRADE ADJUSTMENTS STRUCTURAL GROUT MUST BE USED FOR MAINTAINING STRUCTURAL INTEGRITY.
3. CONCRETE ENCASE COVER WITH 3,000 PSI CONCRETE ONE FOOT BY ONE FOOT DEPTH (MIN.) OR TO DEPTH OF PAVEMENT.
4. ALL WELDING SHALL BE PER ANSI D1.1, LATEST EDITION, USING E70XX ELECTRODES. ALL WELDERS SHALL HAVE CURRENT WELDING CERTIFICATION PER ANSI/WAWS FOR THE EQUIPMENT AND PROCESS USED. ALL FILLET AND PENETRATION WELDS SHALL BE 100% VISUAL INSPECTED IN ACCORDANCE WITH ANSI/WAWS D1.1 BY A CERTIFIED WELDING INSPECTOR.
5. THE LIFTING EYE SHALL BE RATED TO MEET OR EXCEED ALL REGULATIONS PERTAINING TO THE RIGGING OF LIFTING OF PRECAST CONCRETE ITEMS.
6. SMUD STOCK CODE 10012148
7. MANUFACTURE SHALL STENCIL NAME AND WEIGHT ON COVER.

FULL TRAFFIC BOX COVER FOR 48" X 72"
NOTES:

1. "NO EMPLOYEE SHALL BE PERMITTED UNDER PRECAST CONCRETE MEMBERS BEING LIFTED OR TILTED INTO POSITION EXCEPT THOSE EMPLOYEES REQUIRED FOR THE ERECTION OF THOSE MEMBERS." CODE OF FEDERAL REGULATIONS (CFR) TITLE 29 (1990 REVISION) SECTION 1926.704 E.

2. "LIFTING HARDWARE SHALL BE CAPABLE OF SUPPORTING AT LEAST FIVE TIMES THE MAXIMUM INTENDED LOAD APPLIED OR TRANSMITTED TO THE LIFTING HARDWARE." CODE OF FEDERAL REGULATIONS (CFR) TITLE 29 (1990 REVISION) SECTION 1926.704 D.

3. A SPREADER BAR SHALL BE USED. THE SPREAD SHALL BE 72 INCHES. ANY DEVIATION OF SPREAD DIMENSION SHALL BE APPROVED BY A LICENSED CIVIL ENGINEER PRIOR TO USE.

4. TWO TON SC-3 STARCON LIFTING BODY WITH CHAIN LINK FROM MEADOW BURKE PRODUCTS, OR EQUAL. FOUR PER BOX LIFT. (TYPICAL) (LIFTING-EYE-2T FROM CONAC, CONCRETE ACCESSORIES INC., IS AN APPROVED EQUAL.)

5. NOT ALL APPLICABLE REGULATIONS ARE NOTED.
T-TAP COVER
48" X 72"

NOTES:
1. THE CONCRETE COMPRRESSIVE STRENGTH SHALL BE 3000 PSI IN 28 DAYS.
2. THE DEFORMED REINFORCING STEEL SHALL BE PER ASTM A615 GR. 60.
3. THE PADS SHALL HAVE FOUR (4) 3/4" THREADED INSERTS FOR LIFTING EYES LOCATED ONE IN EACH CORNER APPROXIMATELY 6" FROM EACH SIDE.
   THE INSERTS SHALL BE FILLED WITH CORROSION INHIBITOR AND A STEEL ALLEN HEAD SET SCREW.
4. THE MANUFACTURERS NAME OR LOGO AND WEIGHT SHALL BE PERMANENTLY MARKED ON AN OUTSIDE EDGE.
5. MUST BE DESIGNED TO SUPPORT UNIFORM LOAD OF 2,500 lbs.
6. SMUD STOCK CODE # 10021715
NOTES:

1. THE ACCESS COVER SHALL BE RATED FOR PEDESTRIAN TRAFFIC LOADING.
2. THE TOP OF THE ACCESS COVER SHALL HAVE A MINIMUM COEFFICIENT OF FRICTION OF 0.80 WHEN TESTED PER ASTM C1028.
3. THE HANDHOLE SHALL BE PERMANENTLY MARKED WITH CORRECT WEIGHT, VENDOR'S NAME, AND PART NUMBER.
4. THE HANDHOLE SHALL BE CONSTRUCTED OF FIBERGLASS REINFORCED POLYMER CONCRETE. THE ASSEMBLED COMPONENTS MUST BE SECURELY FASTENED TOGETHER FOR SHIPPING AND INSTALLATION BY USE OF CORROSION RESISTANT BOLTS OR METAL BANDS.
5. THERE SHALL BE TWO LIFTING HOLES LOCATED AT THE BALANCE POSITION WITH THE ACCESS COVER INSTALLED.
6. THE ACCESS COVER SHALL BE SECURED BY 1/2" x 6 COIL THREAD STAINLESS STEEL PENTA HEAD BOLTS WITH A FLOATING REPLACEABLE NUT.
7. THE HANDHOLE SHALL BE PRE-ASSEMBLED AND SHIPPED AS A COMPLETE UNIT, PALLETIZED ON A FLAT BED TRUCK FOR EASE OF UNLOADING.
8. THE CENTERLINE OF THE HOLES AND SLOTS SHALL BE LOCATED 2-1/4" FROM THE OUTSIDE EDGE OF THE BOX.
NOTES:

1. THE ACCESS COVER SHALL BE RATED FOR PEDESTRIAN TRAFFIC LOADING.
2. THE TOP OF THE ACCESS COVER SHALL HAVE A MINIMUM COEFFICIENT OF FRICTION OF 0.60 WHEN TESTED PER ASTM C1028.
3. THE HANDHOLE SHALL BE PERMANENTLY MARKED WITH CORRECT WEIGHT, VENDOR'S NAME, AND PART NUMBER.
4. THE HANDHOLE SHALL BE CONSTRUCTED OF FIBERGLASS REINFORCED POLYMER CONCRETE. THE ASSEMBLED COMPONENTS MUST BE SECURELY FASTENED TOGETHER FOR SHIPPING AND INSTALLATION BY USE OF CORROSION RESISTANT BOLTS OR METAL BANDS.
5. THERE SHALL BE TWO LIFTING HOLES LOCATED AT THE BALANCE POSITION WITH THE ACCESS COVER INSTALLED.
6. THE ACCESS COVER SHALL BE SECURED BY 1/2" - 8 COIL THREAD STAINLESS STEEL PENTA HEAD BOLTS WITH A FLOATING REPLACEABLE NUT.
7. THE HANDHOLE SHALL BE PRE-ASSEMBLED AND SHIPPED AS A COMPLETE UNIT, PALLETIZED ON A FLAT BED TRUCK FOR EASE OF UNLOADING.
8. THE CENTERLINE OF THE HOLES AND SLOTS SHALL BE LOCATED 2-7/8" FROM THE OUTSIDE EDGE OF THE BOX.
5/8" COPPER CLAD GROUND RODS ARE PART OF SWITCHGEAR PAD.

24"

24"

NOTES:

1. THE CONTRACTOR SHALL INSTALL 4/0 AWG 19 STRAND CU GROUND WIRE AROUND THE PERIMETER 24" DEEP AND 24" OUT FROM BOX WALL AND BRING 30 INCH LONG TAILS THROUGH THE KNOCKOUTS ON THE SIDES OF BOX.

2. THE CONTRACTOR SHALL INSTALL THE GROUND RODS, 2/0 CU CABLE, AND CONNECTORS.

3. IF THE HANDHOLES ARE INSTALLED INSIDE A SUBSTATION, THE 4/0 AWG 19 STRAND CU GROUND WIRE DOES NOT NEED TO BE INSTALLED AROUND THE PERIMETER OF THE HANDHOLE. HOWEVER, 4/0 AWG 19 STRAND CU GROUND WIRE SHALL BE USED TO TIE TO THE SUBSTATION GROUND GRID.

GROUND RODS INSTALLED BY THE CONTRACTOR 10000573

GROUND RODS SHALL BE INSTALLED NEAR WELL WINDOW, 4'-6" FROM EACH SIDE AND 6" ABOVE GRADE OF INSIDE PAD. SEE DETAIL 1.

CONTRACTOR TO INSTALL 4/0 CU CABLE 24" ALL AROUND. SEE NOTES 1 AND 3.

COMPRESSION CONNECTORS NOT SUPPLIED WITH THIS STANDARD, SEE SWITCHGEAR STANDARD. SEE NOTE 2.

2/0 CU CABLE BY SMUD 10000203

NON-CONCRETE SWITCHGEAR PAD SHALL BE INSTALLED BY CONTRACTOR

<table>
<thead>
<tr>
<th>QTY</th>
<th>MATERIAL DESCRIPTION</th>
<th>SAP</th>
</tr>
</thead>
<tbody>
<tr>
<td>50 Ft</td>
<td>CABLE BARE CU SD 2/0 AWG 7 STRAND</td>
<td>10000203</td>
</tr>
<tr>
<td>2 EA</td>
<td>ROD GROUND COPPER CLAD 5/8 DIA 8 FT</td>
<td>10000573</td>
</tr>
<tr>
<td>70 Ft</td>
<td>CABLE BARE CU SD 4/0 AWG 19 STRAND</td>
<td>10000204</td>
</tr>
<tr>
<td>9 EA</td>
<td>CONN U BOLT GRND CU 2/0-4/0 CBL-5/8 ROD</td>
<td>10008464</td>
</tr>
</tbody>
</table>

THIS MATERIAL IS NOT PROVIDED AS PART OF THIS STANDARD.

SMUD
Sacramento Municipal Utility District

12KV & 21KV PADMOUNT SWITCHGEAR GROUNDING DETAIL

SAP: UGA2.5

PAGE 1 OF 1
NOTES:
1. FOR PROPER RIGGING, SEE RG1.1.
2. OPEN BOTTOM CONCRETE BOX SHALL BE DESIGNED AND CONSTRUCTED FOR FULL DELIBERATE (H20-44) TRAFFIC LOADING.
4. THE LIFTING ANCHOR SHALL BE A STARCON SC-52 ANCHOR FROM MEADOW BURKE PRODUCTS, OR APPROVED EQUAL, WITH AN ANCHOR HEAD MARK OF 2.5S. THE ANCHOR SHALL BE RATED TO MEET OR EXCEED ALL REGULATIONS PERTAINING TO THE RIGGING OF LIFTING OF PRECAST CONCRETE ITEMS.
5. LIFT ANCHORS SHALL BE POSITIONED IN THE CENTERLINE OF THE WALL OR CHAMFER. MISALIGNMENT (OFF CENTERLINE) OF THE ANCHOR FOOT MAY RESULT IN A DRAMATIC REDUCTION OF THE SAFE WORKING LOAD. USE SPACERS AND/OR TIE THE ANCHOR TO REBAR TO ASSURE PROPER POSITIONING.
6. RECESS HOLE SHALL BE CREATED BY USING THE SC-12 RECESS FORMER FOR A TWO TON ANCHOR FROM MEADOW BURKE PRODUCTS, OR APPROVED EQUAL.
7. BOX SHALL INCLUDE TWO STEPS (BOWCO INDUSTRIES NO. 93813R, OR APPROVED EQUAL) ON ONE SHORT WALL.
8. FOR BOX COVERS, SEE UVC1.6.1 OR UVC1.6.5.
9. MANUFACTURER SHALL PAINT/STENCIL CORRECT WEIGHT AND CATALOG NUMBER INSIDE AND OUTSIDE OF THE BOX.
10. SMUD STOCK CODE # 10009740.
1. Adjusting clips shall be used when making grade adjustments.

2. Slipnot "Grade 2" material or approved equal shall be applied to the surface of the cover and be tested to a minimum of .050 COF per ASTM C-1028. Test reports to be submitted at time of bid.

3. A minimum of 25 mil of the surface shall be etched prior to adding Slipnot material.

4. The bond strength of the Slipnot material shall be at least 4000 psi per ASTM C-633. Test reports to be submitted at time of bid.

5. Structural grout or foam sealant must be used as directed by the SMUD inspector.

6. Should be used in landscape areas only.

7. SMUD stock code # 10012132

8. Manufacturer shall stencil name and weight on cover.

**NOTES:**

**SECTION A-A**

**LEVELING BOLT**

**CONCRETE BOX**

**ADJUSTING CLIP**

**LIFTING ATTACHMENT**

**GROUT/FOAM (NOTE 5)**

**SECTION VIEW**

**SIDE VIEW**

**PLAN VIEW**

**SEE DETAIL B.**

**COTTER KEY KEEPER**

**LEVELING BOLT**

**TYPICAL, 4 TOTAL.**

**39°**

**TYPICAL.**

**A**

**100°**

**71°**

**65.25°**

**SMUD**

Sacramento Municipal Utility District

ESR: T007

PG #: C-23

REV. DATE: MAR 2018

REV. NO: 6

STANDARD NUMBER: UVC1.6.1

PAGE 1 OF 1

SPRING ASSIST COVER
FOR 74" X 98" BOX
3/4" COIL NUT WITH 3" X 3" X 1/4" PLATE WASHER AT BOTTOM OF SLAB AND 3/4" SCHEDULE 40 PIPE TO TOP SURFACE FOR LIFTING 4 TOTAL (TYP.)

30" ACCESS COVER/FRAME
SEE UVC1.8.1

72"

54 3/4" 94"

96"

86 1/2" FRAME OPENING

64 1/2" FRAME OPENING

1/2" DIAMETER X 3 HEADED STUDS
TYPICAL 20 PLACES
AT 18" ON CENTER

ISOMETRIC VIEW

NOTES:

1. ADJUSTING CLIPS SHALL BE USED WHEN MAKING GRADE ADJUSTMENTS.
2. WHEN MAKING GRADE ADJUSTMENTS STRUCTURAL GROUT MUST BE USED FOR MAINTAINING STRUCTURAL INTEGRITY.
3. CONCRETE ENCASE COVER WITH 3,000 PSI CONCRETE ONE FOOT BY ONE FOOT DEPTH (MIN.) OR TO DEPTH OF PAVEMENT.
4. ALL WELDING SHALL BE PER ANSI D1.1, LATEST EDITION, USING E70XX ELECTRODES. ALL WELDERS SHALL HAVE CURRENT WELDING CERTIFICATION PER ANSI/AWS FOR THE EQUIPMENT AND PROCESS USED. ALL FILLET AND PENETRATION WELDS SHALL BE 100% VISUAL INSPECTED IN ACCORDANCE WITH ANSI/AWS D1.1 BY A CERTIFIED WELDING INSPECTOR.
5. THE LIFTING EYE SHALL BE RATED TO MEET OR EXCEED ALL REGULATIONS PERTAINING TO THE RIGGING OF LIFTING OF PRECAST CONCRETE ITEMS.
6. SMUD STOCK CODE 10012149
7. MANUFACTURE SHALL STENCIL NAME AND WEIGHT ON COVER.
1. "NO EMPLOYEE SHALL BE PERMITTED UNDER PRECAST CONCRETE MEMBERS BEING LIFTED OR TILTED INTO POSITION EXCEPT THOSE EMPLOYEES REQUIRED FOR THE ERECTION OF THOSE MEMBERS." CODE OF FEDERAL REGULATIONS (CFR) TITLE 29 (1990 REVISION) SECTION 1926.704 E.

2. "LIFTING HARDWARE SHALL BE CAPABLE OF SUPPORTING AT LEAST FIVE TIMES THE MAXIMUM INTENDED LOAD APPLIED OR TRANSMITTED TO THE LIFTING HARDWARE." CODE OF FEDERAL REGULATIONS (CFR) TITLE 29 (1990 REVISION) SECTION 1926.704 D.

3. A SPREADER BAR SHALL BE USED, THE SPREAD SHALL BE 72 INCHES. ANY DEVIATION OF SPREAD DIMENSION SHALL BE APPROVED BY A LICENSED CIVIL ENGINEER PRIOR TO USE.

4. TWO TON SC-3 STARCON LIFTING BODY WITH CHAIN LINK FROM MEADOW BURKE PRODUCTS, OR EQUAL. FOUR PER BOX LIFT. (TYPICAL) (LIFTING-EYE-2T FROM CONAC. CONCRETE ACCESSORIES INC., IS AN APPROVED EQUAL)

5. NOT ALL APPLICABLE REGULATIONS ARE NOTED.
NOTES:

1. DESIGNED FOR PEDESTRIAN TRAFFIC LOADING.

2. MANUFACTURER SHALL PAINT/STENCIL CORRECT WEIGHT AND CATALOG NUMBER ON EACH BOX.

3. REPLACON CATALOG NO. 4896-J-BOX-S OR SMUD ENGINEERING APPROVED EQUAL.

4. ASSEMBLED COMPONENTS MUST BE SECURELY FASTENED TOGETHER FOR SHIPPING AND INSTALLATION BY USE OF CORROSION RESISTANT BOLTS OR METAL BANDS.

5. SMUD STOCK CODE # 10011318 USED WITH ENCLOSURE SECONDARY BUS P.M. SMUD STOCK CODE # 10010041.

6. BOX SHALL INCLUDE (2) ONE STEP (BOWCO INDUSTRIES NO. 93813R), ONE ON EACH SHORT WALL.
NOTES:
1. USE PORTLAND EXPANDING (NON-SHRINK), NON-METALIC GROUT.
2. CONCRETE ENCASEMENT TO BE 3000 PSI (5 SACK) MINIMUM.
3. FLEXIBLE PLASTIC GASKETS, "PAINT ON" MASTIC, CONSEAL OR SIMILAR MATERIAL
   APPROVED BY SMUD SHALL BE USED TO SEAL ALL OF THE JOINTS EXCEPT FULL TRAFFIC
   COVERS.
NOTES:

1. SEE DRAWING U12P3X2 FOR CONDUIT TERMINATION DETAILS.
2. SEE DRAWING UGA2.5 FOR GROUNDING INSTALLATION.
COVER FOR 3-WAY T-TAP

NOTES:
1. COVER SHALL BE POLYMER CONCRETE.
2. SMUD STOCK CODE 10012220.

COVER FOR 4-WAY T-TAP

NOTES:
1. COVER SHALL BE GALVANIZED STEEL.
2. SMUD STOCK CODE 10020563.
3. ½" MOUNTING HOLE, DRILLED AND TAPPED, LOCATED AS SHOWN (TYP.)
THE SMUD PREFERRED METHOD OF CONSTRUCTION IS TO HAVE THE SECONDARY SERVICE CONDUCTORS TERMINATE AT THE SMUD TRANSFORMER(S) AND THE CUSTOMER’S PANEL(S). THIS PREFERRED METHOD ALSO INCLUDES PARALLEL TRANSFORMERS, I.E. TWO TRANSFORMERS SERVING THE SAME CUSTOMER. FOR EXAMPLE, TWO 500 KVA (208Y/120) TRANSFORMERS SERVING THE SAME CUSTOMER CAN HAVE UP TO 20 SERVICE RUNS, 10 FROM EACH TRANSFORMER. IF THE CRITERIA BELOW IS EXCEEDED, A SECONDARY JUNCTION BOX SHALL BE REQUIRED.

MAXIMUM NUMBER OF COMMERCIAL SERVICE RUNS FROM SMUD’S PADMOUNT TRANSFORMERS

SMUD SPECIFIES A MAXIMUM NUMBER OF SERVICE RUNS THAT CAN BE SERVED DIRECTLY FROM ONE PADMOUNT TRANSFORMER DUE TO:
1) THE NUMBER AND SIZE OF CONDUCTORS THAT CAN BE TERMINATED ON THE TRANSFORMER SECONDARY CONNECTORS, AND
2) THE NUMBER AND SIZE OF CONDUITS THAT CAN BE ACCOMMODATED BY THE OPENING IN THE TRANSFORMER PAD.
(SEE FIGURE 1.) THE MAXIMUM NUMBER OF CONDUITS MAY ALSO BE FURTHER REDUCED BY EXISTING CONDUIT INSTALLATION.

A SECONDARY JUNCTION BOX SHALL BE INSTALLED ADJACENT TO THE TRANSFORMER WHEN THE CUSTOMER’S SECONDARY DESIGN EXCEEDS THE REQUIREMENTS OF TABLE 1, OR THE COMBINED NUMBER AND SIZE OF THE CONDUITS EXCEEDS THE CAPACITY THE OF THE 18" BY 18" OR THE 20" BY 30" OPENINGS IN THE TRANSFORMER PADS, AS ILLUSTRATED IN FIGURE 1.(REFER TO UAD1.6).
7-4" CONDUITS OR 4-6" CONDUITS ARE MAX NUMBER OF CONDUITS ALLOWED WHEN USING THE 84" BY 84" TRANSFORMER PAD.

### TABLE 1. - MAXIMUM CONDUCTORS INSTALLED PER PHASE ON THREE PHASE PAD MOUNT TRANSFORMERS

<table>
<thead>
<tr>
<th>THREE PHASE PAD MOUNT TRANSFORMER DESCRIPTION</th>
<th>MAXIMUM NUMBER OF CONDUCTORS PER PHASE</th>
<th>ACCEPTABLE CONDUCTOR SIZES</th>
</tr>
</thead>
<tbody>
<tr>
<td>75 KVA OR SMALLER FOR ALL SECONDARY VOLTAGES</td>
<td>6</td>
<td>6 AWG THROUGH 500 KCMIL</td>
</tr>
<tr>
<td>150 KVA AND 300 KVA FOR ALL SECONDARY VOLTAGES</td>
<td>8</td>
<td>1/0 AWG THROUGH 750 KCMIL</td>
</tr>
<tr>
<td>500 KVA SECONDARY 480Y/277</td>
<td>8</td>
<td>1/0 AWG THROUGH 750 KCMIL</td>
</tr>
<tr>
<td>500 KVA SECONDARY 208Y/120</td>
<td>10</td>
<td>1/0 AWG THROUGH 750 KCMIL</td>
</tr>
<tr>
<td>750 KVA OR LARGER FOR ALL SECONDARY VOLTAGES</td>
<td>10</td>
<td>1/0 AWG THROUGH 750 KCMIL</td>
</tr>
</tbody>
</table>

### FIGURE 1

84" X 84" TRANSFORMER PAD SEE UVD2.2A FOR FULL DETAILS.

135" X 120" TRANSFORMER PAD SEE UVD2.3A1 FOR FULL DETAILS.

MAX NUMBER OF CONDUIT ALLOWED

- 4" - 7
- 5" - 5
- 6" - 4

RPM BOX, 36" X 36" X 18".

SMUD
Sacramento Municipal Utility District

COMMERCIAL SECONDARY RUNS FROM TRANSFORMER TO PANEL

ESR: T007
PG #: C-30
REV. DATE: MAY 2018
REV. NO.: 6
STANDARD NUMBER: UAD1.5
PAGE 1 OF 1
SMUD SECONDARY RUNS FROM TRANSFORMER TO JUNCTION BOX

THE NUMBER AND SIZE OF SECONDARY CABLES TO BE INSTALLED BY SMUD, AS WELL AS THE NUMBER AND SIZE OF SECONDARY CONDUITS, TO BE INSTALLED BY THE CUSTOMER, FROM THE TRANSFORMER TO THE SECONDARY JUNCTION BOX ARE SPECIFIED IN THE FOLLOWING TABLES. (SEE NOTE 1.)

### I. 208Y/120 VOLT INSTALLATION

<table>
<thead>
<tr>
<th>3 PHASE TRANSFORMER SIZE</th>
<th>NUMBER OF SECONDARY CIRCUITS</th>
<th>QUANTITY AND SIZE OF SECONDARY CONDUCTORS PER 3-PHASE CIRCUIT (SEE NOTE 2)</th>
<th>NUMBER &amp; SIZE OF CONDUITS REQUIRED</th>
<th>TOTAL NUMBER OF CONDUCTORS</th>
<th>TYPICAL PAD SIZE NOTE 5</th>
</tr>
</thead>
<tbody>
<tr>
<td>45 KVA</td>
<td>1</td>
<td>3-4/0 CU &amp; 1-4/0 CU NEUTRAL</td>
<td>2-4&quot;</td>
<td>4</td>
<td>84&quot; X 84&quot;</td>
</tr>
<tr>
<td>75 KVA</td>
<td>1</td>
<td>3-500 KC/MIL CU &amp; 1-4/0 CU NEUTRAL</td>
<td>2-4&quot;</td>
<td>4</td>
<td>84&quot; X 84&quot;</td>
</tr>
<tr>
<td>150 KVA</td>
<td>2</td>
<td>3-500 KC/MIL CU &amp; 1-4/0 CU NEUTRAL</td>
<td>3-4&quot;</td>
<td>8</td>
<td>84&quot; X 84&quot;</td>
</tr>
<tr>
<td>300 KVA</td>
<td>3</td>
<td>3-500 KC/MIL CU &amp; 1-4/0 CU NEUTRAL</td>
<td>4-4&quot;</td>
<td>12</td>
<td>84&quot; X 84&quot;</td>
</tr>
<tr>
<td>500 KVA</td>
<td>6</td>
<td>6-500 KC/MIL CU &amp; 1-500 KC/MIL CU NEUTRAL</td>
<td>7-4&quot;</td>
<td>24</td>
<td>84&quot; X 84&quot;</td>
</tr>
<tr>
<td>750 KVA</td>
<td>5</td>
<td>6-500 KC/MIL CU &amp; 1-500 KC/MIL CU NEUTRAL</td>
<td>5-5&quot;</td>
<td>35</td>
<td>84&quot; X 84&quot;</td>
</tr>
<tr>
<td>1000 KVA</td>
<td>6</td>
<td>6-500 KC/MIL CU &amp; 1-500 KC/MIL CU NEUTRAL</td>
<td>6-6&quot;</td>
<td>42</td>
<td>105&quot; X 120&quot;</td>
</tr>
</tbody>
</table>

### II. 480Y/277 VOLT INSTALLATION

<table>
<thead>
<tr>
<th>3 PHASE TRANSFORMER SIZE</th>
<th>NUMBER OF SECONDARY CIRCUITS</th>
<th>QUANTITY AND SIZE OF SECONDARY CONDUCTORS PER 3-PHASE CIRCUIT (SEE NOTE 2)</th>
<th>NUMBER &amp; SIZE OF CONDUITS REQUIRED</th>
<th>TOTAL NUMBER OF CONDUCTORS</th>
<th>TYPICAL PAD SIZE NOTE 5</th>
</tr>
</thead>
<tbody>
<tr>
<td>45 KVA</td>
<td>1</td>
<td>3-4/0 CU &amp; 1-4/0 CU NEUTRAL</td>
<td>2-4&quot;</td>
<td>4</td>
<td>84&quot; X 84&quot;</td>
</tr>
<tr>
<td>75 KVA</td>
<td>1</td>
<td>3-4/0 CU &amp; 1-4/0 CU NEUTRAL</td>
<td>2-4&quot;</td>
<td>4</td>
<td>84&quot; X 84&quot;</td>
</tr>
<tr>
<td>150 KVA</td>
<td>1</td>
<td>3-500 KC/MIL CU &amp; 1-4/0 CU NEUTRAL</td>
<td>2-4&quot;</td>
<td>4</td>
<td>84&quot; X 84&quot;</td>
</tr>
<tr>
<td>300 KVA</td>
<td>2</td>
<td>3-500 KC/MIL CU &amp; 1-4/0 CU NEUTRAL</td>
<td>3-4&quot;</td>
<td>8</td>
<td>84&quot; X 84&quot;</td>
</tr>
<tr>
<td>500 KVA</td>
<td>3</td>
<td>3-500 KC/MIL CU &amp; 1-4/0 CU NEUTRAL</td>
<td>4-4&quot;</td>
<td>12</td>
<td>84&quot; X 84&quot;</td>
</tr>
<tr>
<td>750 KVA</td>
<td>4</td>
<td>3-500 KC/MIL CU &amp; 1-4/0 CU NEUTRAL</td>
<td>5-4&quot;</td>
<td>16</td>
<td>84&quot; X 84&quot;</td>
</tr>
<tr>
<td>1000 KVA</td>
<td>5</td>
<td>3-500 KC/MIL CU &amp; 1-4/0 CU NEUTRAL</td>
<td>6-4&quot;</td>
<td>20</td>
<td>84&quot; X 84&quot;</td>
</tr>
<tr>
<td>1500 KVA</td>
<td>5</td>
<td>6-500 KC/MIL CU &amp; 1-500 KC/MIL CU NEUTRAL</td>
<td>5-5&quot;</td>
<td>28</td>
<td>84&quot; X 84&quot;</td>
</tr>
<tr>
<td>2000 KVA</td>
<td>5</td>
<td>6-500 KC/MIL CU &amp; 1-500 KC/MIL CU NEUTRAL</td>
<td>6-6&quot;</td>
<td>35</td>
<td>105&quot; X 120&quot;</td>
</tr>
<tr>
<td>2500 KVA</td>
<td>6</td>
<td>6-500 KC/MIL CU &amp; 1-500 KC/MIL CU NEUTRAL</td>
<td>6-6&quot;</td>
<td>42</td>
<td>105&quot; X 120&quot;</td>
</tr>
</tbody>
</table>

**NOTES:**
1. NUMBER AND SIZE OF SECONDARY CABLES ALLOWED FROM THE TRANSFORMER TO THE SECONDARY JUNCTION BOX IS BASED ON NEC 2017, TABLE B.310.15(B)(2)(7). CALCULATIONS HAVE BEEN ADJUSTED BASED ON CONDUCTOR TEMPERATURE RATING OF 90°C WITH 30°C TEMPERATURE AMBIENT, 75% LOAD FACTOR, AND TRANSFORMER LOADING OF 130%.
2. EACH THREE PHASE CIRCUIT AS DEFINED BY THE COLUMN TITLED "QUANTITY AND SIZE OF SECONDARY CONDUCTORS PER 3-PHASE CIRCUIT" SHALL BE INSTALLED IN ONE CONDUIT.
3. BUS EXTENSION BAR OR STACKING LUGS MAY BE NEEDED FOR INSTALLATION. STACKING LUGS ARE NOT STOCKED DUE TO VERY LIMITED USAGE. THE USE OF EXTENSION BARS OR STACKING LUGS ARE NOT THE PREFERRED METHODS OF CONSTRUCTION.
4. FINAL PAD SIZE TO BE DETERMINED BY SMUD LINE DESIGNER BASED ON NUMBER AND SIZE OF CONDUITS REQUIRED.
NOTES:

A. CUSTOMERS SERVICE CONDUCTOR TAILS TO BE 12 FT. LONG, COILED IN BOX.
B. SEE U12P3X2 IN ESR T007 FOR CONDUIT TERMINATION.
D. BOXES USED IN BUILDING ALCOVE APPLICATIONS SHALL HAVE A BOTTOM.
E. SEE UAD 1.6 FOR NUMBER AND SIZE OF TRANSFORMER CONDUITS & CONDUCTORS.
F. CONNECTORS AND TRANSFORMER SECONDARY CONDUCTOR MUST BE ORDERED SEPARATELY.
G. THE CONTRACTOR OR CUSTOMER SHALL INSTALL THE GROUND RODS ON CUSTOMER INSTALLED JOBS.

<table>
<thead>
<tr>
<th>PART</th>
<th>DESCRIPTION</th>
<th>QTY</th>
<th>SAP NO.</th>
</tr>
</thead>
<tbody>
<tr>
<td>U1S3D1</td>
<td>ENCLOSURE SECONDARY BUS PADMOUNTED</td>
<td>1</td>
<td>10010041</td>
</tr>
<tr>
<td></td>
<td>CABLE BARE CU MHD 4 AWG 7 STRAND COILS</td>
<td>30</td>
<td>10021430</td>
</tr>
<tr>
<td></td>
<td>CONN EYEBOLT TRANSF GRND CU 8 SOL TO 2STR</td>
<td>1</td>
<td>10003302</td>
</tr>
<tr>
<td></td>
<td>BOX RPM HANDBOKE 48X96X48 J BOX</td>
<td>1</td>
<td>10011318</td>
</tr>
<tr>
<td></td>
<td>ROD GROUND COPPER CLAD 5/8 DIA 8 FT</td>
<td>1</td>
<td>10005573</td>
</tr>
<tr>
<td></td>
<td>CLAMP GROUND ROD COPPER 5/8 ROD</td>
<td>6</td>
<td>10002235</td>
</tr>
</tbody>
</table>
**NOTES:**

1. ALL INSERTS MUST BE CORROSION RESISTANT.
2. TOP SURFACE OF PAD MUST BE LEVEL.
3. FOR INSTALLATION SEE DWG.U12K3X1 IN ESR T007 "SINGLE PHASE TRANSFORMER PAD AND WELL INSTALLATION".
4. SAP MATERIAL NO. 10000530.
NOTES:
1. TOP SURFACE OF PAD MUST BE LEVEL.
2. FOR P.U.E AND TRENCH INFORMATION SEE DWG.U12K3X1, "SINGLE PHASE TRANSFORMER PAD AND WELL INSTALLATION".
3. THE PAD FRONT SHALL HAVE A CLEARANCE OF NOT LESS THAN 8 FEET FROM OBJECTS OR STRUCTURES.
4. THE TRANSFORMER PAD SHALL BE SO LOCATED THAT THE PAD SIDE OR SIDES ADJACENT TO THE SURFACE OF A BUILDING SHALL HAVE A CLEARANCE OF NOT LESS THAN 3 FEET. THIS CLEARANCE MAY BE REDUCED TO 2 FEET IF THE BUILDING SURFACE IS NONCOMBUSTIBLE.
5. WHERE THE TRANSFORMER MAY BE LESS THAN 5 FROM VEHICULAR TRAFFIC, PROTECTIVE CHAIN LINK FENCE OR BOLLARDS SHALL BE INSTALLED PER SMUD ENGINEERING DRAWINGS UVD2.4 AND UVD2.5. ALL CLEARANCES ARE TO BE APPROVED BY SMUD’S DISTRIBUTION LINE DESIGN DEPARTMENT.
6. ANY EXISTING OR PROPOSED SWITCHGEAR OR ELECTRICAL EQUIPMENT MUST PROVIDE NATIONAL ELECTRICAL CODE CLEARANCES FROM THE TRANSFORMER AND PAD.
7. EXPANSION JOINTS SHALL BE INSTALLED BETWEEN THE CONCRETE TRANSFORMER PAD AND ADJACENT CONCRETE WALKWAYS, DRIVEWAYS, ETC.

PLAN VIEW

SECTION VIEW

CONDUIT SHALL BE 4" PVC SCHEDULE 40
ELBOW (TYP.) SHALL BE 90°, PVC SCHEDULE 40, AND HAVE A 30° RADIUS.
CONDUIT SHALL BE 4" PVC SCHEDULE DB120

SEE U12PSX2 FOR CONDUIT TERMINATION

THERE SHALL BE AN 8" LAYER OF 3/4" CRUSHED ROCK UNDER THE TRANSFORMER PAD. THE ROCK SHALL BE TAMPERED AND CONSOLIDATED.

CABLE WELL SHALL BE 32" IN DIAMETER, SAP 10001231
8" OF 3/4 CRUSHED ROCK BELOW CABLE WELL.

5/8" X 8" GROUND ROD INSTALLED BY CUSTOMER SAP10000573

SINGLE PHASE TRANSFORMER PAD INSTALLATION 44" X 51"
NOTES:

1. THE CONCRETE COMPRESSIVE STRENGTH SHALL BE 3000 PSI IN 28 DAYS.
2. THE PREFORMED REINFORCING STEEL SHALL BE PER ASTM A615 GR. 60.
3. THE PAD SHALL HAVE FOUR (4) 3/4" THREADED INSERTS FOR LIFTING EYES LOCATED ONE IN EACH CORNER APPROXIMATELY 6" FROM EACH SIDE. THE INSERTS SHALL BE FILLED WITH CORROSION INHIBITOR AND A STEEL ALLEN HEAD SET SCREW.
4. THE MANUFACTURER'S NAME OR LOGO AND WEIGHT SHALL BE PERMANENTLY MARKED ON AN OUTSIDE EDGE.
5. FOR CONDUIT ARRANGEMENT AND INSTALLATION REQUIREMENTS, SEE DRAWING UVD2.2A.
6. APPROXIMATE WEIGHT IS 3300 lbs.
7. SMUD STOCK CODE NUMBER: 10011684.
8. MUST BE DESIGNED TO SUPPORT UNIFORM LOAD OF 12,500 lbs.
1. The transformer pad shall be so located that the pad side or sides adjacent to the surface A of a building shall have a clearance of not less than 3 feet. This clearance may be reduced to 2 feet if the building surface is noncombustible. For transformers 750kVA and above contact SMUD's distribution line design department for special clearance requirements.

2. Any existing or proposed switchgear or electrical equipment must provide national electrical code clearances from the transformer and pad.

3. Where the transformer may be less than 5' from vehicular traffic, protective chain link fence or bollards shall be installed per SMUD engineering drawings UVD2.4 and UVD2.5. All clearances are to be approved by SMUD's distribution line design department.

4. Customer installed secondary cable shall extend a minimum of six feet out of the conduit.

5. Expansion joints shall be installed between the concrete transformer pad and adjacent concrete walkways, driveways, etc.

6. Secondary conduit shall not be installed under the primary well.

---

**NOTES:**

**Plan View**

- Reinforced plastic mortar box, 36" x 36" x 18", SAP 10011612
- Primary conduits, 4" PVC
- Secondary conduits
- 1/2" concrete insert type 2 total
- 8'-0" minimum working clearance required
- SEE DRAWING UVD2.2.
- See notes 1, 2, and 3.
- To the customer's panel or secondary junction box. See drawing U1S1D1. Max (4)6" conduits or (7)4" conduits.

---

**Conduit shall be 2" above rocks**

- 3" minimum above final grade
- 8" of 3/4" crushed rock
- 4" 90° Schedule 40 Elbow, 30° radius
- 5/8" x 8'-0" Copper clad ground rod, SAP 10000573
- 4" 90° Schedule 40 Elbow, 30° radius. Primary elbows shall be concrete encased with 5 SAC with rock, 1 foot past couplings. Soil 90% compaction or 3/4" AB CL2 6" lifts or 2 SAC sand slurry.
NOTES:

1. CONCRETE COMpressive strength in 28 days shall be 3000 psi minimum.

2. PRECAST PAD shall be designed in accordance with the latest edition of ACI 318 to support a 20,000 lb transformer and any loads imposed during lifting, handling, and transportation.

3. FOR PRIMARY CONDUIT ARRANGEMENT AND TRANSFORMER WELL LOCATION, SEE DRAWING UVD2.3A1.

4. PRECAST PAD shall have lifting anchors located one in each corner approximately 6 in. from each side. The lifting anchor shall be hot tip galvanized 'Swift Lift PS2 Anchor' from Dayton-Richmond Products, or approved equivalent. The anchor shall be at least 4 1/2 long, and shall not protrude from the pad. (See Detail 1.)

5. PAD shall have an alignment mark as shown. This mark is used to align transformer well during installation.

6. MANUFACTURER'S NAME OR LOGO and weight shall be permanently marked on an outside edge.

7. MANUFACTURER shall submit wet stamped structural calculations and drawings for approval at the time of bid.

![Diagram of PRECAST TRANSFORMER PAD 105" X 120"

**DETAIl 1**

**ISOMETRIC VIEW**

**A-A SECTION VIEW**

1/2" - 13 UNC X 1" DEEP THREADED INSERT (TYP. OF 2)

ALIGNMENT MARK, SEE NOTE 5

RECESS HOLE

LIFT ANCHOR, SEE NOTE 4

SEE NOTE 4 AND DETAIL 1.
NOTES:

1. THE TRANSFORMER PAD SHALL BE SO LOCATED THAT THE PAD SIDE OR SIDES ADJACENT TO THE SURFACE OF A BUILDING SHALL HAVE A CLEARANCE OF NOT LESS THAN 3 FEET. THIS CLEARANCE MAY BE REDUCED TO 2 FEET IF THE BUILDING SURFACE IS NONCOMBUSTIBLE. CONTACT SMUD'S DISTRIBUTION LINE DESIGN DEPARTMENT TO CONFIRM CLEARANCE REQUIREMENTS.

2. ANY EXISTING OR PROPOSED SWITCHGEAR OR ELECTRICAL EQUIPMENT MUST PROVIDE CLEARANCES, FROM THE TRANSFORMER AND PAD, LISTED BY NATIONAL ELECTRICAL CODE.

3. PROTECTIVE GUARDS SHALL BE INSTALLED PER SMUD ENGINEERING DRAWINGS UVD2.4 AND UVD2.5, WHERE THE TRANSFORMER MAY BE LESS THAN 5 FT FROM VEHICULAR TRAFFIC. ALL CLEARANCES ARE TO BE APPROVED BY SMUD'S DISTRIBUTION LINE DESIGN DEPARTMENT.

4. CUSTOMER INSTALLED SECONDARY CABLE MUST EXTEND A MINIMUM OF SIX FEET OUT OF CONDUIT.

5. THE MAXIMUM NUMBER OF SERVICE OR SECONDARY CONDUCTORS PER PHASE TO BE CONNECTED TO THE TRANSFORMER IS 10, AND THE MAXIMUM SIZE OF CONDUCTOR ALLOWED IS 750 KCMIL.

6. SEE UAD1.5 TO VERIFY IF A SECONDARY JUNCTION BOX IS REQUIRED FOR THE 120" X 105" TRANSFORMER PAD, A 36" X 36" X 18" D WELL MAY BE INSTALLED ON THE SECONDARY SIDE IN ORDER TO ACCOMMODATE MORE CONDUCTORS.

7. PRIMARY CONDUIT ELBOWS SHALL BE 90° SCHEDULE 40 WITH A THIRTY INCH RADIUS AND CONCRETE ENCASED.

8. EXPANSION JOINTS SHALL BE INSTALLED BETWEEN THE CONCRETE TRANSFORMER PAD AND ADJACENT CONCRETE WALKWAYS, DRIVEWAYS, ETC.

9. DRILL HOLES AT BASE OF TRANSFORMER, ATTACH PLATE WITH 3/8" NUT AND BOLT.
PLAN VIEW

84" GATE (GATE TO BE CENTERED WITH TRANSFORMER PAD OPENING). UNLESS OTHERWISE DETERMINED BY SMUD’S DISTRIBUTION LINE DESIGN DEPARTMENT.

MAX. SPAN 10'-0" OR EQUALLY SPACED
1-5/8" O.D. TOP RAIL

NOTES:

1. IF A BUILDING IS USED AS ANY PORTION OF THIS GUARD, THE TRANSFORMER PAD SHALL BE SO LOCATED THAT THE PAD SIDE OR SIDES ADJACENT TO THE SURFACE OF THE BUILDING SHALL HAVE A CLEARANCE OF NOT LESS THAN 3 FEET. THIS CLEARANCE MAY BE REDUCED TO 2 FEET IF THE BUILDING SURFACE IS NON-COMBUSTIBLE. TRANSFORMERS 750 KVA AND ABOVE CONTACT SMUD’S DISTRIBUTION LINE DESIGN DEPARTMENT FOR SPECIAL CLEARANCE REQUIREMENTS.

2. 6'-0" CLEARANCE SHALL BE PROVIDED IN FRONT OF TRANSFORMER TO PERMIT HOT STICK OPERATION.

3. ADDITIONAL FENCE HEIGHT MAY BE REQUIRED BY SMUD’S DISTRIBUTION LINE DESIGN DEPARTMENT.
NOTES:

1. IF A BUILDING IS USED AS ANY PORTION OF THIS GUARD, THE TRANSFORMER PAD SHALL BE SO LOCATED THAT THE PAD SIDE OR SIDES ADJACENT TO THE SURFACE OF THE BUILDING SHALL HAVE A CLEARANCE OF NOT LESS THAN 3 FEET. THIS CLEARANCE MAY BE REDUCED TO 2 FEET IF THE BUILDING SURFACE IS NONCOMBUSTIBLE, TRANSFORMERS 750 KVA AND ABOVE CONTACT SMUD'S DISTRIBUTION LINE DESIGN DEPARTMENT FOR SPECIAL CLEARANCE REQUIREMENTS.

2. 5'-0" CLEARANCE SHALL BE PROVIDED IN FRONT OF UNIT TO PERMIT HOT STICK OPERATION.

3. BOLLARDS SHALL BE LOCATED BEHIND THE PAD AND ON BOTH SIDES OF THE PAD. BOLLARDS SHALL BE LOCATED AS SHOWN AND EQUALLY SPACED. THE MAXIMUM DISTANCE BETWEEN BOLLARDS SHALL BE FIVE FEET. THE MINIMUM QUANTITY OF BOLLARDS SHALL BE AS FOLLOWS: 5 FOR 10 PAD (44" X 51"), 6 FOR THE 30 PAD (84" X 84"), AND 8 FOR THE LARGER 30 PAD (105" X 120'). THESE QUANTITIES MAY BE REDUCED IF A BUILDING IS USED AS A PORTION OF THE GUARD: THERE SHALL ALSO BE A REMOVABLE BARRIER, LOCATED AS SHOWN, THAT CONSISTS OF TWO VERTICAL PIPES OR TUBES AND A HORIZONTAL CHANNEL AS SHOWN IN THE SIDE VIEW.

4. BOLLARDS SHALL BE INSTALLED AROUND PAD MOUNT SMUD EQUIPMENT WHEN THE EDGE OF THE EQUIPMENT IS LESS THAN FIVE FEET FROM VEHICULAR TRAFFIC, OR WHEN SMUD'S DISTRIBUTION LINE DESIGN DEPARTMENT DETERMINES THE EQUIPMENT MAY BECOME EXPOSED TO TRAFFIC.

5. ALL PIPE AND REMOVABLE BARRIER SHALL BE PAINTED BRIGHT YELLOW WITH A RUST RESISTIVE PAINT.
**A. ONE TRANSFORMER**

**B. TWO TRANSFORMERS**

Outline showing the required working clearances. See note 1.

Outline showing the required working clearances. See note 1.

Subsurface enclosure for secondary junction cabinet. (Typ.)

**C. TWO TRANSFORMERS AND TWO SECONDARY JUNCTION CABINETS**

Notes:

1. A minimum clearance of 8 feet shall be maintained, without obstructions, in front of the transformers. A minimum clearance of 3 feet shall be maintained from all combustible structures or walls. A minimum clearance of 2 feet shall be maintained from all noncombustible structures or walls.

2. Transformer pad dimensions vary, refer to the SMUD commitment pertaining to your specific project for the required size of the transformer pad.

3. Refer to drawings UVD2.2, UVD2.2A, UVD2.3A and UVD2.3A1 for the transformer pad details.

4. Refer to drawing U183D1 in Book 1 for secondary junction box details.

5. For chain link fence refer to UVD2.4.

6. For bollards refer to UVD2.5.
Plan View

Access Lid

WELL
88" x 67" x 48"

3'-4"

3'-4"

1'-3"

8'-6"

Bollard (Typ.)
See Note 3.

Required clearance
See Notes 1 and 2.

Section View

4" Dia. std. pipe or 4" round or square tube with 0.120" min. wall thickness concrete filled. (Typ.)

5/8" Dia. x 1-1/2" clevis pins with holes for SMUD locks

C4x5.4x106"

C3x4.1x0.3" Typ.

1/4"

Finish Grade

0'-4" Min. around

Concrete filled (Typ.)

Notes:

1. A minimum working clearance as shown in plan view shall be maintained at all times. Other means may be required to prevent vehicles from parking within the required clearance zone.

2. One (1) bollard shall be located on each side of the switchgear as shown and shall be equal distance between the removable barriers.

3. All pipes and removable barrier shall be painted bright yellow with rust resistive paint.

4. Bollards shall be installed around pad mount SMUD equipment when the edge of the equipment is less than five feet from vehicular traffic, or when SMUD's distribution line design department determines the equipment may become exposed to traffic.

General Arrangements for Dead-Front Padmount 12kV Switchgear
NOTES:

1. A MINIMUM WORKING CLEARANCE AS SHOWN IN PLAN VIEW SHALL BE MAINTAINED AT ALL TIMES. OTHER MEANS MAY BE REQUIRED TO PREVENT VEHICLES FROM PARKING WITHIN THE REQUIRED CLEARANCE ZONE.

2. ONE (1) BOLLARD SHALL BE LOCATED ON EACH SIDE OF THE SWITCHGEAR AS SHOWN AND SHALL BE EQUAL DISTANCE BETWEEN THE REMOVABLE BARRIERS.

3. ALL PIPES AND REMOVABLE BARRIER SHALL BE PAINTED BRIGHT YELLOW WITH RUST RESISTIVE PAINT.

4. BOLLARDS SHALL BE INSTALLED AROUND PAD MOUNT SMUD EQUIPMENT WHEN THE EDGE OF THE EQUIPMENT IS LESS THAN FIVE FEET FROM VEHICULAR TRAFFIC, OR WHEN SMUD'S DISTRIBUTION LINE DESIGN DEPARTMENT DETERMINES THE EQUIPMENT MAY BECOME EXPOSED TO TRAFFIC.
NOTES:

1. A MINIMUM WORKING CLEARANCE AS SHOWN IN PLAN VIEW SHALL BE MAINTAINED AT ALL TIMES. OTHER MEANS MAY BE REQUIRED TO PREVENT VEHICLES FROM PARKING WITHIN THE REQUIRED CLEARANCE ZONE.
2. ONE (1) BOLLARD SHALL BE LOCATED ON EACH SIDE OF THE SWITCHGEAR AS SHOWN AND SHALL BE EQUAL DISTANCE BETWEEN THE REMOVABLE BARRIERS.
3. ALL PIPES AND REMOVABLE BARRIER SHALL BE PAINTED BRIGHT YELLOW WITH RUST RESISTIVE PAINT.
4. BOLLARDS SHALL BE INSTALLED AROUND PAD MOUNT SMUD EQUIPMENT WHEN THE EDGE OF THE EQUIPMENT IS LESS THAN FIVE FEET FROM VEHICULAR TRAFFIC, OR WHEN SMUD’S DISTRIBUTION LINE DESIGN DEPARTMENT DETERMINES THE EQUIPMENT MAY BECOME EXPOSED TO TRAFFIC.
NOTES:

1. CONCRETE ENCASEMENT MAY BE REQUIRED ON ELBOWS.
2. CONDUIT COVER FROM FINAL GRADE WILL BE DEPENDENT ON CONDUIT SIZE.
3. IF POLE IS NOT INSTALLED, STOP CONDUIT APPROXIMATELY 5' FROM PROPOSED POLE LOCATION.
NOTES:

1. WHEN TRENCHING IN THE "DIFFICULT TRENCHING AREA", INDICATED ABOVE, SAND BACKFILLING WILL BE REQUIRED.

2. FOR WORK IN THE NETWORK AREA, SEE ELECTRICAL SERVICE REQUIREMENT T-001 CUSTOMER-builtin VAULTS.
NOTES:

1. CONCRETE ENCASEMENT IS REQUIRED WITHIN THE DESIGNATED AREA AS NOTED ON PAGE 2 OF U12P3X8 FOR INSTALLATIONS THAT HOUSE OR WILL HOUSE 21kV PRIMARY FEEDER CABLES WITHIN THE PUBLIC ROAD RIGHT-OF-WAY. HOWEVER, THESE REQUIREMENTS MAY EXTEND TO AREAS OUTSIDE OF THE INDICATED MAP AREA AS NEEDED PER PLAN REQUIREMENTS.

2. CONCRETE ENCASEMENT MAY NOT BE REQUIRED FOR NON-FEEDER CABLE INSTALLATIONS AT ANY LOCATION IF THE TRENCH DOES NOT HOUSE OR PLAN TO HOUSE 21kV PRIMARY FEEDER CABLES UNLESS SPECIFICALLY NOTED ON THE PLANS.

3. 12kV NETWORK FEEDER CONSTRUCTION WILL REQUIRE CONCRETE ENCASEMENT AT ALL LOCATIONS.

4. CONCRETE ENCASEMENT MAY NOT BE REQUIRED IF CONSTRUCTION WILL OCCUR WITHIN A DEDICATED PUBLIC UTILITY EASEMENT (PUE) "BACK OF WALK" AND NOT WITHIN THE PUBLIC ROAD RIGHT-OF-WAY UNLESS SPECIFICALLY NOTED ON THE PLANS.

5. 24 INCHES OF MINIMUM COVER TO THE TOP OF THE HIGHEST CONDUIT (FOR CONCRETE ENCASED) UNLESS NOTED OTHERWISE.

6. MAXIMUM DEPTH TO THE BOTTOM OF THE ENCASEMENT SHALL NOT EXCEED 59 INCHES. TEMPORARY EXCURSIONS OR DIPS GREATER THAN 59 INCHES TO AVOID CONFLICTS MAY BE PERMITTED IF NECESSARY. HOWEVER, EXTENDED LENGTHS (TYPICALLY ON THE ORDER OF 100 FEET OR MORE) GREATER THAN 72 INCHES WILL REQUIRE SMUD ENGINEERING APPROVAL DUE TO POTENTIAL CABLE AMPACITY CONSTRAINTS.

7. MATCH EXISTING ASPHALT/CONCRETE (AC) THICKNESS UNLESS NOTED OTHERWISE OR AS REQUIRED BY THE APPROPRIATE CITY OR COUNTY AGENCY. SEE CITY OR COUNTY ROAD RESURFACING REQUIREMENTS FOR FURTHER DETAILS (E.G., CITY OF SACRAMENTO DRAWING T-80, ETC.).

8. CLASS 2 AGGREGATE BASE (TYPICAL) OR AS REQUIRED BY THE APPROPRIATE CITY OR COUNTY AGENCY.

9. TRENCH BACKFILL MAY BE NATIVE, CONTROLLED DENSITY FILL (CDF), 2-SACK SLURRY CEMENT, OR A SMUD-SPECIFIED LOW-STRENGTH FLUIDIZED THERMAL BACKFILL (FTB) IF REQUIRED PER PLANS (SEE SMUD ENGINEERING SPECIFICATION SS0803 FOR FTB IF REQUIRED). BACKFILL SHALL BE COMPACTED PER THE APPROPRIATE CITY OR COUNTY AGENCY REQUIREMENTS.

10. BACKFILL SHALL NOT BE CONCRETE OR CEMENT MIX OTHER THAN WHAT IS LISTED IN NOTE 9.

11. THE CITY OR COUNTY MAY ALLOW CDF AND/OR SLURRY CEMENT TO THE AC LAYER.

12. CONCRETE ENCASEMENT SHALL BE 5-SACK 3/8" PEA GRAVEL CONCRETE ENCASEMENT MIX, DYED RED, UNLESS NOTED OTHERWISE PER PLANS. SMUD MAY REQUIRE A SMUD-SPECIFIED HIGH-STRENGTH FTB AS NOTED. SEE SMUD ENGINEERING SPECIFICATION C911 FOR FURTHER DETAILS REGARDING THE CONCRETE ENCASEMENT OR SS0803 FOR FTB IF REQUIRED.

13. A MINIMUM OF THREE (3) INCHES OF CONCRETE COVER IS REQUIRED FOR THE CONCRETE ENCASEMENT. CONDUIT-TO-CONDUIT SPACING BETWEEN SMUD CONDUITS ONLY TO BE AT LEAST 1.5 INCHES.

14. SEE SMUD ENGINEERING SPECIFICATION SS0801 FOR FURTHER DETAILS REGARDING THE CONDUIT REQUIREMENTS.
NOTES:
1. AREA REQUIREMENTS FOR CONCRETE ENCASEMENT COVERS THE "DOWNTOWN" CORE AREA AS SHOWN ABOVE IN THE BOUNDARY AREA.
2. THE AREA INCLUDES: SACRAMENTO RIVER TO THE WEST, BROADWAY TO THE SOUTH, ALHAMBRA TO THE EAST AND THE AMERICAN RIVER TO THE NORTH.
3. CONCRETE ENCASEMENT MAY NOT BE REQUIRED FOR NON-FEEDER CABLE INSTALLATIONS WITHIN THE BOUNDARY AREA IF THE TRENCH DOES NOT HOUSE OR PLAN TO HOUSE 21KV PRIMARY FEEDER CABLES UNLESS SPECIFICALLY NOTED ON THE PLANS.
4. CONCRETE ENCASEMENT REQUIREMENTS MAY EXTEND BEYOND THE ABOVE BOUNDARY AREA IF SPECIFICALLY NOTED ON THE PLANS.