



## Electric Service Requirements


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# Distribution Underground Structure Engineering Specification T007

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November 2022



 <b>SMUD<sup>®</sup></b>	<b>ENGINEERING SPECIFICATION</b>	<b>No. T007</b>	
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		<b>REV. 11</b>	<b>DATE: 11/22</b>
<b>CATEGORY</b> <b>ELECTRIC SERVICE REQUIREMENT</b>			
<b>SUBJECT</b> <b>DISTRIBUTION UNDERGROUND STRUCTURE</b>			

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## 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)

- 3.1. American Society for Testing and Materials (ASTM) F512, Specification for Smooth-Wall Poly (Vinyl Chloride) (PVC) Conduit and Fittings for Underground Installation.
- 3.2. ASTM D2564, Standard Specification for Solvent Cements for PVC Plastic Piping Systems.
- 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.
- 3.4. National Electric Manufacturers Association (NEMA) TC-2, Electrical Polyvinyl Chloride (PVC) Conduit.
- 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.

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- 3.7. California Public Utilities Commission (CPUC), General Order 128, Rules for Construction of Underground Electrical Supply and Communication Systems.
- 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.
- 3.10. ASTM C857, Standard Practice for Minimum Structural Design Loading for Underground Precast Concrete Utility Structures.
- 3.11. Society of Cable Telecommunications Engineers (SCTE) 77, Specification for Underground Enclosure Integrity.
- 3.12. SMUD Rates, Rules and Regulations:  
<https://www.smud.org/en/residential/customer-service/rate-information/rates-rules-regulations.htm>
- 3.13. The National Electrical Code®, National Fire Protection Association Code 70.
- 3.14. The California Electrical Code, California Code of regulations Title 24, Building Codes, Part 3.
- 3.15. National Electrical Safety Code® (NESC).

#### **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.

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- 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.

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- 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.

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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 4.10.8.6 for traffic areas and 4.10.8.7 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.

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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.



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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**  
Service entrance conductors or bus duct shall be furnished and installed by the customer.

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- (a) 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.
- (b) 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) 732-5990.

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.

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- 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, Encasement 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.

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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.
  - 4.5.5.3. See SS0801 Section 5.5.1 for encasement concrete requirements and SS0801 Sec. 6.4 for concrete encased conduit installation requirements.
- 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 3/4" crushed rock shall meet one of the following requirements:
    - 4.6.5.1. The rock shall be crushed and graded so that 100 percent passes a 1" sieve, no more than 15 percent passes a 1/2" sieve, and no more that 3 percent passes a No. 4 sieve.

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- 4.6.5.2. Meets the gradation requirements of the County of Sacramento 3/4" clean crushed rock specification, section 50-16, with 100 percent passing a 1" sieve, 70-100 percent passing a 3/4" sieve, 5-55 percent passing a 1/2" sieve, 0-15 percent percent passing a 3/8" sieve, 0-5 percent passing the No 4 sieve, and 0-2 percent passing the No 8 sieve.
- 4.6.6. The 17" x 30", 24" x 36" and 30" x 48" pull boxes rated for full traffic shall be installed per U1S3X4.
- 4.6.7. Secondary service boxes shall be installed so that top of box follows the slope of the finished grade except as noted on the drawings.
- 4.6.8. Customer pull boxes and/or other openable devices are not allowed in the service run between the SMUD service box and customer's panel.
- 4.6.9. 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.
- 4.6.10. 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.
- 4.6.11. 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.
- 4.6.12. 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 - Ground Rods**
  - 4.7.1. All padmount equipment shall be installed with two (2) ground rods. Second ground rod must be installed in the Public Utility Easement (PUE) or dedicated right-of-way.
- 4.8. **Installation - Conduit**
  - 4.8.1. 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.
  - 4.8.2. Concrete encasement shall be required as outlined per section 4.5.

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- 4.8.3. Conduit for service or secondary conductors shall not be placed under the primary cable well.
- 4.8.4. 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.
- 4.8.5. All non-metallic conduits shall be cemented at all joints with a suitable cement recommended by the manufacturer of the conduit and per ASTM D2564 & ASTM D2855.
- 4.8.6. All conduits terminating at pull boxes shall have end bells (see section [4.9.2.7](#)). The end bells shall either be flush with the inside wall and grouted in place or stubbed up as shown on the drawings.
- 4.8.7. 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 to curve the line.
- 4.8.8. When following the curvature of the road and/or right-of-way sweeps/curves of straight conduit shall maintain a minimum radius of 4ft. for 1"-2" conduit and 12ft for 3"-6" conduit.
- 4.8.9. 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.
- 4.8.10. 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 upper most 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.
- 4.8.11. 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.
- 4.8.12. 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.
- 4.8.13. Conduits that do not pass the mandrel test shall be repaired and re-tested. A brush shall not be used in any plastic conduit.
- 4.8.14. A flat tape pull line shall be left in each conduit as a "sleeper" (See Section [4.9.4](#)).

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4.8.15. Requirements for underground bore with casing

- 4.8.15.1. Required Downtown and as required by applicable jurisdictions (i.e., Light Rail).
- 4.8.15.2. Casing shall be HDPE or steel.
- 4.8.15.3. HDPE casing to be filled with pumpable sand slurry.
- 4.8.15.4. All conduits inside casing shall use conduit spacers, shall be pressure grouted and have link seals on each end of the casing.
- 4.8.15.5. Provide link seals on each end of the casing.
- 4.8.15.6. Follow additional jurisdictional requirements as applicable.
- 4.8.15.7. Customer to submit proposed bore profile, bore method, and material submittal for SMUD review and approval.

4.9. **Installation – Pedestals**

- 4.9.1. A phenolic label with the pedestal address shall be used, with the label permanently affixed to the pedestal facing the street.
- 4.9.1. At the base of the pedestal no wires shall be accessible from the exterior. The exposed area between the pedestal and the pad shall be filled with concrete or mortar.

4.10. **SMUD Approved Material**

4.10.1. Request for Material Approval

- 4.10.1.1. 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.

- 4.10.1.2. 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.

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

4.10.2. Conduit

4.10.2.1. 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.

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

4.10.2.3. 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.

4.10.2.4. Schedule 40 and 80 type conduits

(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:

- |                   |            |
|-------------------|------------|
| - 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 |



4.10.2.5. Conduit Couplings

Couplings shall conform to NEMA TC3. Molded or swedge type couplings are acceptable.

4.10.2.6. 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.

4.10.2.7. 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:

	<b>Prime Conduit No.</b>	<b>JM Eagle</b>
<b>2" Conduit</b>	EB200	61500200
<b>3" Conduit</b>	EB300	61500300
<b>4" Conduit</b>	EB400	61500400
<b>5" Conduit</b>	EB500	61500500
<b>6" CONDUIT</b>	EB600	61500600

4.10.2.8. Conduit Plug

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

	<b>4" Conduit</b>	<b>6" Conduit</b>
<b>Prime Conduit</b>	PEPT400	PEPT600
<b>JM Eagle</b>	60020400	60020600

4.10.3. Ground rods

4.10.3.1. 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:

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

#### 4.10.4. 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:

<b>Arnco.</b>	DLWP25S-3000
<b>NEPTCO</b>	WP2500P
<b>Pacific Strapping</b>	FMT-P2500
<b>Fibertek</b>	WP2500
<b>Redback Industries</b>	PW2500
<b>Fiber Tech</b>	WPP2500PL
<b>Wellington Slick tape</b>	N303M10-9083
<b>Milliken</b>	MT2500-3000

#### 4.10.5. Transformer Pads and Wells

##### 4.10.5.1. 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 3-1/2" thick. The top surface of the pad must be level. Cable entrance opening and 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:

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

4.10.5.2. 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.

<b>Armorcast Products</b>	6001864-SMUD
<b>Hubbell</b>	B002500501
<b>Replacon</b>	RP322512CW
<b>Martin Enterprises</b>	320012 FRP
<b>NewBasis</b>	CW320012T-0000

4.10.5.3. 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:

<b>Jensen Precast</b>	PD7750SM
<b>Oldcastle</b>	0270195

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

Refer to drawings UVD 2.3A & UVD 2.3A1

<b>Oldcastle</b>	0270197
<b>Jensen</b>	PD105120SM

4.10.5.5. 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:

<b>Hubbell</b>	B003636500
<b>Armorcast Products</b>	A6001790
<b>Martin Enterprises</b>	363618 FRP SMUD
<b>NewBasis</b>	CW363618-00000
<b>Replacon</b>	RP363618S-1

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#### 4.10.6. Padmount Secondary Junction Box

- 4.10.6.1. 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.
- 4.10.6.2. 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.
- 4.10.6.3. 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.
- 4.10.6.4. 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.
- 4.10.6.5. All ends of all customer service conductor(s) shall be sealed in such a manner that moisture will not enter the cable.

#### 4.10.7. Subsurface Boxes for Switchgear and Secondary Junction Box

- 4.10.7.1. 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.

4.10.7.2. 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

4.10.7.3. 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

4.10.7.4. RPM Handhole Box (102" x 82" x 48") 21kV SF6 Padmount  
Switchgear (See UVC1.5.2):

(a) The box and frame combination shall be from the following:

Replacon 1028248VF

4.10.7.5. 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

4.10.7.6. 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-IT

**Hubbell** C183048511

**Martin Enterprises** 3048 PC COVER

**Armorcast Products** A6001630-SMUD

**NewBasis** PCC3048P1-90007

4.10.8. 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.

4.10.8.1. 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:

<b>Jensen Precast</b>	PB4266SM
<b>Oldcastle</b>	0090010

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

<b>Jensen Precast</b>	PB6690SM
<b>Oldcastle</b>	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.

4.10.8.2. 48" x 72" Extensions

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

<b>Jenson Precast</b>	RS426606
<b>Oldcastle</b>	0090015

4.10.8.3. 74" x 98" Extensions

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

<b>Jenson Precast</b>	RS669006
<b>Oldcastle</b>	0130203

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

<b>Jenson Precast</b>	RS669012
<b>Oldcastle</b>	0130205

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4.10.8.4. Spring Assist Box Covers, Landscape 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:

<b>Jensen Precast</b>	CAS2-4266-AHI-TRX-G-SM
<b>Oldcastle</b>	2061330

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

<b>Jensen Precast</b>	CAA2-6690-AHP-TRX-SM
<b>Oldcastle</b>	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 7-½" x 2-½" 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.

4.10.8.5. Full Traffic Box Covers (48" x72" & 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 7-½" x 2-½" 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.

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

<b>Jensen Precast</b>	CA4266HDSM
<b>Oldcastle</b>	0260122

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

<b>Jensen Precast</b>	CA6690HDSM
<b>Oldcastle</b>	0260125

4.10.8.6. Open Bottom Concrete Boxes, Extensions, and Steel Covers (17" x 30"), (24" x 36"), and (30" x 48") (See U1S3X5)

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.

4.10.8.7. 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:

<b>Hubbell</b>	A52173051305D
<b>Replacon</b>	RP1730-18-IT
<b>Armorcast Products</b>	A6001640TAX18
<b>NewBasis</b>	FCA173018T-90015
<b>Martin Enterprises</b>	173018 FRP SMUD

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

<b>Hubbell</b>	A52243653205D
<b>Replacon</b>	RP2436-IT
<b>Armorcast Products</b>	A6001974TAX18
<b>NewBasis</b>	FCA243618T-90004
<b>Martin Enterprises</b>	243618 FRP SMUD

(c) The approved manufacturers and part numbers for the 30" x 48" x 18" Enclosures are:

<b>Hubbell</b>	A52304852905D
<b>Replacon</b>	R3048-IT
<b>Armorcast Products</b>	A6001550TAX18
<b>NewBasis</b>	FCA304818T-90001
<b>Martin Enterprises</b>	304818 FRP SMUD

(d) The approved manufacturers and part numbers for the **17" x 30" x 8" Extensions** are:

<b>Armorcast Products</b>	A6001640TEX8
<b>Replacon</b>	RP1730-ITB
<b>Hubbell</b>	E02173008A
<b>NewBasis</b>	FCE073008T-00000
<b>Martin Enterprises</b>	173008 FRP EXT SMUD

(e) The approved manufacturers and part numbers for the **24" x 36" x 8" Extensions** are:

<b>Hubbell</b>	E02243608A
<b>Replacon</b>	RP2436X8
<b>NewBasis</b>	FCE243608T
<b>Armorcast Products</b>	A6001974TEX8
<b>Martin Enterprises</b>	243608 FRP EXT SMUD

(f) The approved manufacturers and part numbers for the **30" x 48" x 16" Extensions** are:

<b>Hubbell</b>	E02304816A
<b>Replacon</b>	RP3048X16
<b>Armorcast Products</b>	A6001550TEX16
<b>NewBasis</b>	FCE304816T-00000
<b>Martin Enterprises</b>	304816 FRP EXT SMUD

#### 4.10.8.8. 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.

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## Appendix A - Referenced Specifications

Engineering Specification SS4001 Structural Concrete.....	27
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## Engineering Specification SS4001 Structural Concrete

### 1 PURPOSE

To specify the construction material, standards and requirements for cast-in-place concrete provided and constructed for SMUD.

### 2 SCOPE

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

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

- 3.1 Unless otherwise stated in the Technical Conditions, all references shown below shall be the latest edition in publication at the time bids are taken.
- 3.2 State of California, Department of Transportation, (CALTRANS), STANDARD SPECIFICATIONS, sections 49, 51, 52, and 90.
- 3.3 American Society for Testing and Materials (ASTM) Designation A82, "Standard Specification for Steel Wire, Plain, for Concrete Reinforcement".
- 3.4 American Society for Testing and Materials (ASTM) Designation A185, "Standard Specification for Steel Welded Wire Fabric, Plain, for Concrete Reinforcement".
- 3.5 American Society for Testing and Materials (ASTM) Designation A615, "Standard Specification for Deformed and Plain Billet-Steel Bar for Concrete Reinforcement".
- 3.6 American Society for Testing and Materials (ASTM) Designation C31, "Standard Practice for Making and Curing Concrete Test Specimens in the Field".
- 3.7 American Society for Testing and Materials (ASTM) Designation C33, "Standard Specification for Concrete Aggregates".
- 3.8 American Society for Testing and Materials (ASTM) Designation C94, "Standard Specification for Ready-Mixed Concrete".
- 3.9 American Society for Testing and Materials (ASTM) Designation C143, "Standard Test Method for Slump of Hydraulic Cement Concrete".
- 3.10 American Society for Testing and Materials (ASTM) Designation C150, "Standard Specification for Portland Cement".
- 3.11 American Society for Testing and Materials (ASTM) Designation C175, "Specification for Air Entraining Portland Cement".

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- 3.12 American Society for Testing and Materials (ASTM) Designation D7949, "Standard Test Methods for Thermal Integrity Profiling of Concrete Deep Foundations".
- 3.13 American Concrete Institute standard (ACI) 318, "Building Code Requirements for Reinforced Concrete".
- 3.14 American Concrete Institute (ACI) Standard 305, "Guide to Hot Weather Concreting".
- 3.15 American Concrete Institute (ACI) Standard 301, "Specifications for Structural Concrete".
- 3.16 American Concrete Institute (ACI) Standard 336, "Specifications for The Construction of Drilled Piers".
- 3.17 American Concrete Institute (ACI) Standard 304, "Guide for Placing Concrete by Pumping Method".
- 3.18 American Concrete Institute (ACI) Standard 347, "Guide to Formwork for Concrete".

#### **4 SUBMITTALS**

- 4.1 Concrete reinforcement shop drawings, accessories, and material certifications.
  - 4.1.1 Concrete reinforcement shop drawings, accessories, and material certifications.
  - 4.1.2 Anchor bolt assemblies, shop drawings, and material certifications.
  - 4.1.3 Concrete material product data.
  - 4.1.4 Concrete cure and finish products.
  - 4.1.5 Concrete mix design data:
    - 4.1.5.1 Submit concrete mix design for each concrete mix to be used.
    - 4.1.5.2 Identify all mix ingredients, manufacturer's, sources, and proportions, including admixtures.
    - 4.1.5.3 Identify chlorine content of admixtures and whether or not chloride was added during manufacture.
    - 4.1.5.4 Provide copies of proposed concrete mix design, including historical test data. Provide 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.

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4.1.6 Additional drilled pier submittals:

- 4.1.6.1 When required by the Engineer or when drilled piers exceed 5 feet in diameter or greater than 20 feet in depth an engineered construction plan shall be provided for SMUD review. The plan shall include the design and detailed drawings for lifting/rigging and suspending the anchor bolt assembly and reinforcing cage. The plan shall be reviewed, stamped, and signed by a currently licensed California Professional Civil Engineer (PE).
- 4.1.6.2 When required by the Engineer or when drilled piers are constructed using wet methods (removable casing, water / slurry displacement, or similar) due to groundwater or caving, detailed plans and procedures for the drilled pier construction shall be provided for SMUD review. The plans and procedures shall meet or exceed the requirements of Caltrans Standard Specifications Section 49 and ACI 336. In addition to all pier construction planning, the plan shall include both on-site concrete mix testing and mitigation plans for loss of tremie and late concrete deliveries. The plan shall include drilled pier integrity testing using a method and plan such as Thermal Integrity Profiling (TIP). The thermal integrity test plan shall be stamped by a currently licensed California Professional Civil Engineer or Geotechnical Engineer (PE). The thermal integrity test Engineer shall be onsite during all pier construction activities. A drilled pier construction monitoring, inspection and logging plan shall also be provided. The plan shall be stamped by a currently licensed California Professional Geotechnical Engineer (PE). The Geotechnical Engineer shall be onsite during all pier construction activities.
- 4.1.6.3 Post construction submittal: When required by the Engineer or when drilled piers are constructed using wet methods (removable casing, water / slurry displacement, or similar) the Contractor shall provide a detailed pier testing and construction report following the field work. The report shall meet all the requirements of Section 49 of the Caltrans Standard Specifications and ACI 336. The information shall include both a drilled pier integrity test report and geotechnical report in accordance with Section 4.1.6.2.

## **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 +4" maximum.

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- 5.2 Unless otherwise noted on the Drawings, Specifications, or approved by the Engineer, 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 6 inches into the subgrade. All exposed vertical edges and horizontal edges shall be chamfered 3/4" x 3/4" unless otherwise noted on the Drawings. All sharp edges inside manholes and vaults shall be chamfered 3/4" x 3/4". Where expansion joints and/or void caps are utilized between adjacent concrete placements, verify with the Engineer whether a chamfer is required.
- 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 and free of loose material and standing water. The surfaces shall be dry if required for the sealing and/or the form release product utilized. The surfaces of dry, porous materials against which concrete is to be placed shall be treated and sealed with a protective coating intended for concrete placement in accordance with the manufacturer's directions to prevent water from being "drawn out" of the concrete. All surfaces shall utilize form release in accordance with the manufacturer's directions prior to placement of the concrete to facilitate form removal.
- 5.7 Form removal shall be in accordance with section 14.

## **6 STEEL REINFORCEMENT AND ANCHOR BOLTS**

Reinforcing steel and method of placing shall conform to ACI 318, Section 52 of the CALTRANS Specification and these specifications.

### **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 All anchor bolts/rods, nuts, washers, anchor plates, and anchor bolt templates shall meet the requirements of the Drawings and/or the Technical

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Conditions. All anchor bolts/rods, nuts, and washers shall be provided with material test reports. Anchor materials without material test reports shall not be used.

- 6.1.3 When the Drawings, Specifications and/or the Technical Conditions require hot-dip galvanized anchor bolts or embedded steel in concrete, all hardware shall be provided from the supplier in a hot dip galvanized condition. Field modification of materials and field galvanizing repair is not permitted.
- 6.1.4 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.
- 6.1.5 Welding of reinforcing steel shall not be allowed under any circumstances.
- 6.1.6 Epoxy coated reinforcing steel and ties shall conform to ASTM A775. All damaged or cut epoxy coated reinforcing steel shall be repaired in accordance with ASTM A775. Any repair coatings used shall be allowed to cure in accordance with all manufacturer's requirements.
- 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, concrete placement, and workers, and shall be placed close enough together so that bars will not sag or displace during construction.
  - 6.2.4 Reinforcement shall be tied at all intersections or a minimum of 3 times in any bar length, whichever is greater. Ties shall be used more frequently to support safe rebar handling, secure bars during concrete placement, support workers, or other construction activities. All tie wire ends shall be bent back from the outside surfaces by wrapping around the bar.
  - 6.2.5 All drilled pier cages shall have wire ties at all reinforcing bar intersections (100% tied).
  - 6.2.6 For large diameter piers, deep piers, and heavy cages to be rigged and lifted by the contractor additional ties and/or supplemental reinforcement or other means shall be used. All rigging points shall be properly tied and reinforced by the Contractor for safe lifting. When required by this Specification, the Engineer, or the Drawings the cage reinforcement and rigging shall be engineered, reviewed, and stamped by a currently licensed California Professional Engineer (PE).
  - 6.2.7 Bar splices shall not be allowed unless approved by the Engineer. Bar splices shall meet the requirements of ACI 318 unless otherwise shown on the Drawings or required by the Technical Conditions.



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6.2.8 All reinforcing steel shall have a minimum concrete cover as specified according to ACI 318 unless otherwise shown on the Drawings or required by the Technical Conditions.

### 6.3 TOLERANCES

Anchor bolts for all foundations shall not vary from the dimensions shown on the drawings by more than the following unless otherwise noted on the drawings:

6.3.1 1/8" (0.125") center-to-center of any two rods within an anchor group or individually from the dimension line.

6.3.2 3/16" (0.250") center-to-center of adjacent anchor rod groups.

6.3.3 1/4" (0.250") elevation of the top of the anchor rods relative to the top of concrete (anchor projection).

6.3.4 1/4" (0.250") maximum accumulation of error per hundred feet along established line.

## 7 PORTLAND CEMENT CONCRETE

Portland Cement Concrete (PCC) shall be furnished and installed in accordance with Sections 90 and 51 of the Caltrans Standard Specifications, 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 (564lbs.) 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 slurry shall meet the requirements of section 7.5.

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

7.4 When concrete is placed at project site elevations exceeding 500 feet above MSL the mix design shall be reviewed for freeze-thaw resistance. A concrete air entrainment admixture shall be added if required by the Drawings or Engineer.

7.5 Water (and ice) shall be clean, domestic quality water, and shall meet the chemical requirements of Section 90 and ASTM C94.

7.6 The following additional requirements apply to concrete to be placed under water or slurry (/drilling fluid) due to caving holes and/or high groundwater conditions unless otherwise noted by the Drawings or the Engineer.

7.6.1 Submittals shall be provided in accordance with Section 4.

7.6.2 Concrete shall require special mix design, placement procedures, continuous inspection, and testing in accordance with this Specification, the Drawings, Technical Conditions, or Engineer's requirements.

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- 7.6.3 The construction of drilled piers utilizing water, slurry displacement, or other specialty methods shall only be performed by a Contractor with extensive, demonstrated experience in the work and performed using a detailed work procedure reviewed by SMUD.
- 7.6.4 The concrete mix for water or slurry displacement methods shall contain a minimum of 675 pounds of cementitious material per cubic yard and shall be proportioned to prevent excessive bleed water and segregation.
- 7.6.5 The concrete mix design shall be provided by the Contractor and reviewed by SMUD. The concrete shall have a maximum nominal aggregate size of 3/4-in. (ACI 336 Section 2.4.2). The concrete aggregate size may be 1/2-in. or 3/8-in. maximum gradation in accordance with Cal Trans Section 49-3.02B if required by the Drawings, Engineer, or recommended by the Contractor for the construction means and methods utilized and approved by the Engineer.
- 7.6.6 The Contractor shall provide a concrete mix test plan in accordance with Caltrans Section 49-3.02A(4)(c). A concrete test batch shall be transported to the jobsite under the same conditions and in the same timeframe anticipated during the placement of concrete in the piers.
- 7.6.7 The concrete slump for slurry displacement shall be 7 to 9 inches. The concrete slump for temporary casing shall be 6 to 8 inches. Slump tests shall be taken for every truck.
- 7.6.8 A retarding admixture may be used if deemed necessary based upon the foundation design, site location, temperature, or other conditions. The admixture should be reviewed and approved by the Contractor, Ready-Mix Plant, and SMUD.
- 7.6.9 The slurry/drilling fluid shall not be used material or re-used on the jobsite unless previously approved by the Engineer.
- 7.7 The water/cement ratio shall be kept as low as possible and shall not exceed 0.5. 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.
  - 7.7.1 Slabs on grade: 5" (+/-1")
  - 7.7.2 Drilled piers (dry hole using tremie concrete placement method): 6" (+/-1")
  - 7.7.3 Drilled piers (wet or casing hole using alternate construction methods): Refer to Section 7.5
- 7.8 The concrete shall have a minimum 28-day compressive strength of 4000 psi (pounds per square inch), unless otherwise required by the Drawings and/or Technical Conditions.

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## 8 MIXING AND TRANSPORTING

- 8.1 Concrete shall be mixed and transported in accordance with the requirements of Section 90 of the Caltrans Standard Specifications. 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/her 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.

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- 8.5 No additional water shall be incorporated into the concrete during hauling or after arrival at the work site, unless specifically noted in writing on the delivery ticket and authorized by the Inspector. All trucks should arrive on site with a full tank of water so that the Inspector can verify that no water has been added. 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. The added water shall never exceed the amount allowed on the batch ticket.
- 8.6 No concrete shall be used which has partially set, and no concrete shall be re-tempered 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 greater than 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 placement shall not allow a fall from a height greater than 3 feet for slabs and shallow footings, and 6 feet for walls unless otherwise noted on the Plans or by the Engineer.
- 9.6 Where site conditions do not allow sufficient access to control placement by direct discharge from the concrete truck or the concrete fall exceeds section 9.5, concrete pumping methods shall be used unless otherwise approved by the Engineer.

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- 9.7 Concrete placement construction methods shall be such that concrete placement is fully controlled during drilled pier construction. Concrete shall not be allowed to impact reinforcing, the sides of the hole, or displace materials in the base of the hole. All drilled pier foundations exceeding 6 feet in depth shall be placed using a concrete pump truck and tremie unless otherwise noted on the Drawings, or pre-approved by both the Inspector and the Engineer. Any proposed alternate methods, such as elephant trunk placement shall be pre-approved by both the Inspector and Engineer and shall utilize industry proven methods acceptable by Caltrans and ACI.
- 9.8 The top 15 feet of the pier shall be vibrated (ref. Caltrans Section 49).
- 9.9 The following additional requirements apply to concrete to be placed under water or slurry/drilling fluid due to caving holes and/or high groundwater conditions (water, slurry displacement, or temporary casing methods of construction) unless otherwise noted by the Drawings or the Engineer.
- 9.9.1 Submittals shall be provided in accordance with Section 4.
- 9.9.2 Concrete shall require special mix design, placement procedures, and continuous inspection, and testing in accordance with this Specification, the Drawings, Technical Conditions, or Engineer's requirements.
- 9.9.3 All concrete placement and water or slurry/drilling fluid displacement shall be monitored and logged by the Contractor in accordance with Section 49 of the Caltrans Specification.
- 9.9.4 Unless otherwise noted on the Drawings or by the Engineer, all work shall be continuously monitored by SMUD via a qualified Inspector or qualified California Geotechnical Engineer.
- 9.9.5 The concrete tremie type, size, and placement shall meet the most stringent requirements outlined in Section 49 of the Caltrans Standard Specifications and ACI 336.
- 9.9.6 The tremie pipe shall be embedded in fresh concrete a minimum of 10 ft and maintained at that depth. The concrete tremie shall not be rapidly raised or lowered during tremie operations. SMUD may reject the pier if the tremie is not maintained in fresh concrete.
- 9.9.7 The tremie tip shall remain embedded in the concrete a minimum of 10 ft when the concrete approaches the top of the pier. The upper portion of concrete flow shall be wasted by overflow at the top of the pier as required until all water, slurry/drilling fluid, and mud is removed.
- 9.9.8 If the tremie seal is lost or the delivery tube becomes plugged and must be removed the more stringent procedures in both Caltrans and ACI shall be followed. SMUD may reject the pier if the tremie is lost and it cannot be verified that it was re-established in accordance with the required procedure.

## **10 CONSTRUCTION JOINTS**

- 10.1 Construction joints shall be located where shown on the Drawings. 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.

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- 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. All joint locations and additional reinforcement shall be subject to the Engineer's approval. If the Engineer determines the joint location weakens the structure, some or all placed concrete shall be removed 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.
- 11.2 All horizontal edges of concrete shall be chamfered 3/4" x 3/4". Top horizontal edges may be rounded with a steel edger if approved by the Engineer. Where expansion joints and/or void caps are utilized between adjacent concrete placements, verify with the Engineer whether a chamfer is required.
- 11.3 All defects (eg. 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. Where concrete defects result in reinforcing bar concrete cover being less than the minimum required on the design drawings the area shall be reviewed by the Engineer. If the Engineer determines the repairs to be aesthetically or structurally unacceptable, the Contractor shall repair the structure to meet SMUD's requirements at no additional cost to SMUD.
- 11.4 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 7P.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.

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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.

12.4 Form removal shall be in accordance with section 14.

### **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 and the concrete has sufficient strength to prevent damage during backfilling.

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 4000 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 TESTING**

#### **16.1 SLUMP**

Slump testing shall be performed for all concrete in accordance with ACI C143 by an ACI certified Inspector or Testing Lab Field Representative. The frequency of testing shall be in accordance with ACI unless otherwise required by the Drawings or Engineer.

Where concrete is placed under water or slurry/drilling fluid, all concrete deliveries shall be tested.

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## 16.2 COMPRESSION TESTING

All structural concrete shall be tested. The frequency of testing shall be in accordance with the recommendations of the ACI unless otherwise required by the Drawings or Engineer. Field test cylinders shall be taken in accordance with ACI C31 by an ACI certified Inspector or Testing Lab Field Representative. The cylinders shall be stored, transported, and tested in accordance with ACI. Unless otherwise required by the Drawings, Engineer, or Inspector a minimum of 7 cylinders is recommended. The following minimum cylinder testing is recommended:

(1)—3 day

(1)—7 day

(1)—14 day

(3)—28 day

## 16.3 DRILLED PIER INTEGRITY TESTING

Drilled pier testing, such as Thermal Integrity Profiling (TIP) or another approved non-destructive method, shall be used when required by the Drawings, Specifications, or Engineer. All drilled piers constructed under water or slurry shall include integrity testing



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## 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"
  - 3.1.5 California General Order 128, latest edition

### 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.

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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 The installation, at a minimum, meet or exceed California General Order 128 requirements unless specifically noted or directed otherwise.

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

6.1.3 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.

6.1.4 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 and approved by SMUD Engineering, the minimum radius for elbows and sweeps shall be as follows:

<u>Conduit Size</u>	<u>Elbow/Sweep Minimum Radius</u>
1" to 2"	18"
3"	18"
4"	30"
5"	36"
6"	48"

Metallic elbows, when specified, shall be rigid steel.

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

6.1.6 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 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.

 <b>SMUD</b> ENG. SPEC. <b>T007</b>	<b>REV.</b> 11	<b>ELECTRIC SERVICE REQUIREMENTS  DISTRIBUTION UNDERGROUND STRUCTURE</b>	<b>Page  43 of  48</b>
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#### 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 2 feet 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.

 <b>SMUD</b> ENG. SPEC. <b>T007</b>	<b>REV.</b>  11	<b>ELECTRIC SERVICE REQUIREMENTS DISTRIBUTION UNDERGROUND STRUCTURE</b>	<b>Page</b> <b>44 of</b> <b>48</b>
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## **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 District 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, nor is this to be considered an endorsement. There may be additional vendors that can provide the material required by this specification.

**ARMORCAST PRODUCTS CO.**

13230 Saticoy Street.  
N. Hollywood, CA 91605  
(818) 982-3600  
Fax (818) 982-7742

**AZCO SUPPLY, INC.**

2250 Stewart St. #9  
Stockton, Ca 95205-3244  
(209) 943-2452

**CONSOLIDATED ELECTRICAL  
DISTRIBUTORS**

1800 24th Street  
Sacramento, CA 95816  
(916) 452-3111  
Fax (916) 452-3155

**ELECTROREP, INC.**

2015 Bridgeway, Suite 201  
Sausalito, CA 94965  
(415) 332-4100  
Fax (415) 332-4150

**ENERGY COMM**

P.O. Box 488  
Orinda, CA 94563  
(925) 254-3736  
Fax (925) 351-1905

**GRAYBAR ELECTRIC COMPANY**

P. O. Box G  
1211 Fee Drive  
Sacramento, CA 95815  
(916) 561-1900

**HUBBELL POWER SYSTEMS**

210 N Allen  
Centralia, MO 65240  
(573) 682-5521  
Fax (573) 682-8475

**INDEPENDENT UTILITY SUPPLY**

4076 Channel Drive  
West Sacramento, CA 95691  
(916) 376-8400  
Fax (916) 376-8444

**JENSEN PRECAST**

5400 Raley Boulevard  
Sacramento, CA 95838  
(916) 991-8800  
(800) 843-9569  
Fax (916) 991-8810

**MARTIN ENTERPRISES**

7231 Boulder Ave  
Highland, CA 92346  
(951) 928-8713  
Fax (951) 928-4623

**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.

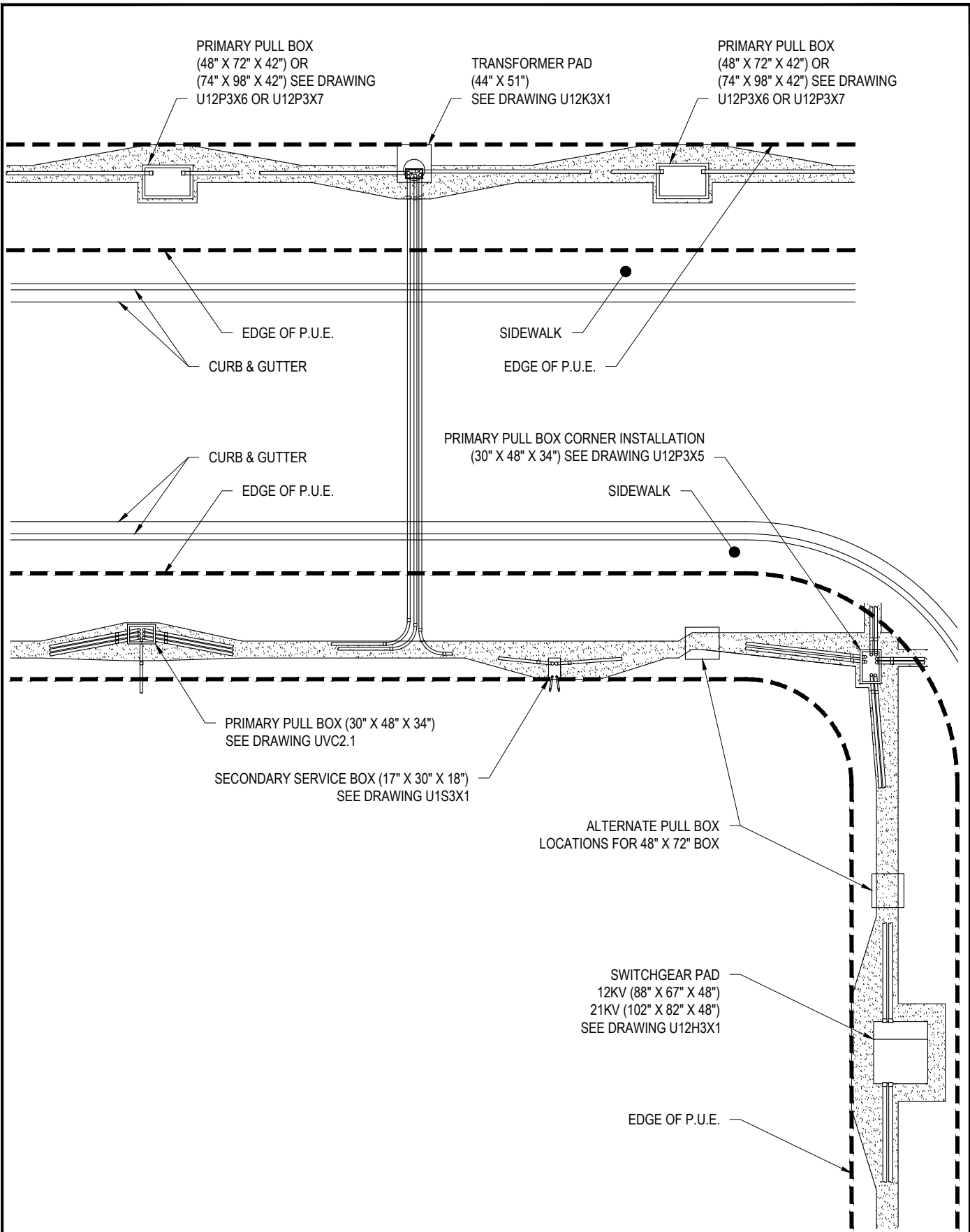
#### Design and Construction Drawings

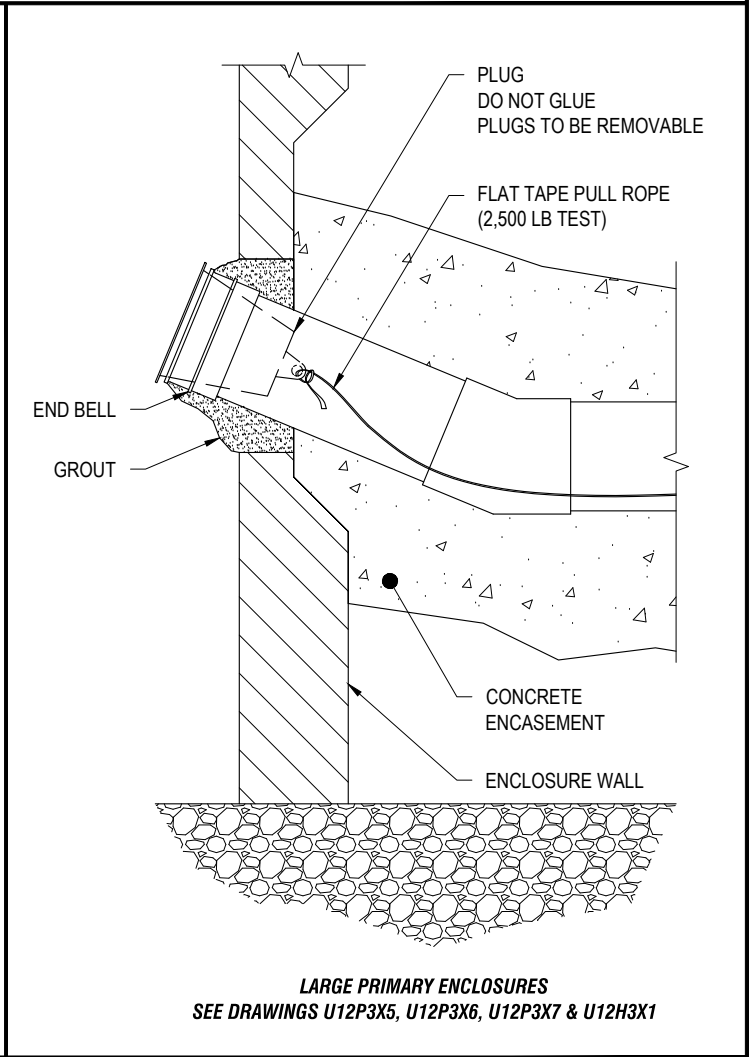
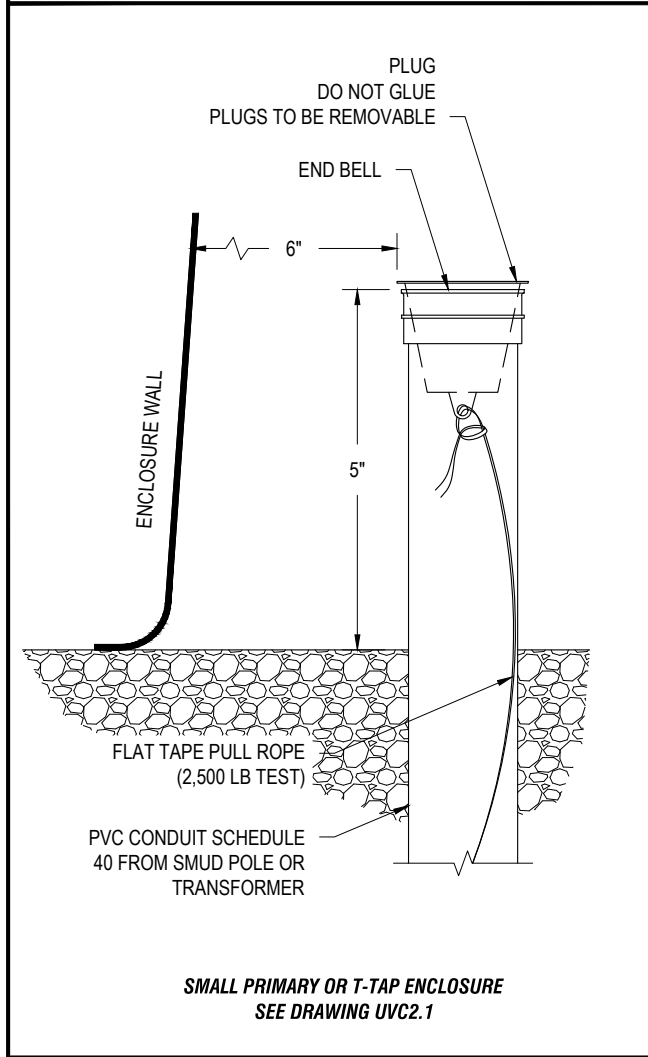
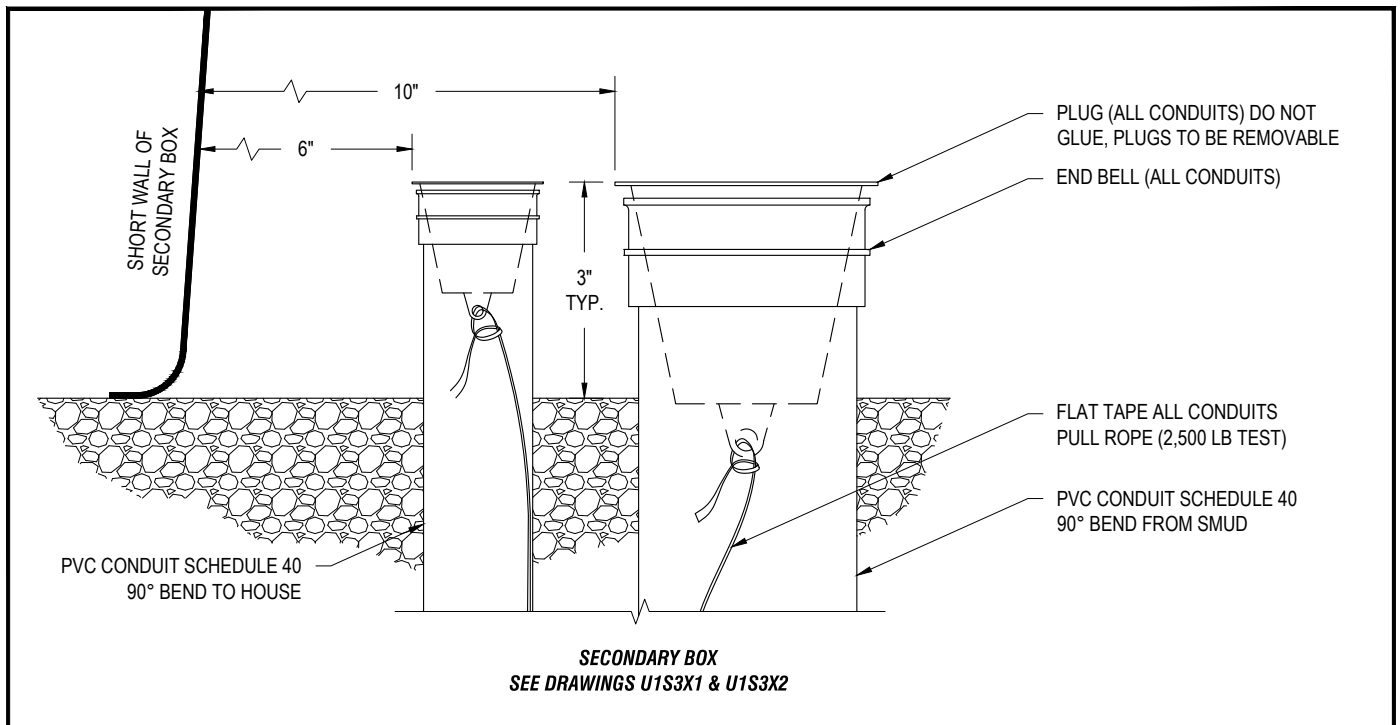
Drawing Title	Drawing Identification Code	Page Number
RESIDENTIAL CONDUIT SYSTEM TYPICAL INSTALLATION	U12P3X	C-1
DETAIL TYPICAL CONDUIT TERMINATION	U12P3X2	C-2
TYPICAL DISTRIBUTION TRENCH	U12P3X3	C-3
PRIMARY PULL BOX CORNER INSTALLATION 30" X 48" X 34"	U12P3X5	C-4
PRIMARY PULL BOX INSTALLATION 48" X 72" X 42"	U12P3X6	C-5
PRIMARY PULL BOX INSTALLATION 74" X 98" X 42"	U12P3X7	C-6
SWITCHGEAR BOX TYPICAL INSTALLATION	U12H3X1	C-7
SINGLE PHASE TRANSFORMER PAD AND WELL INSTALLATION	U12K3X1	C-8
SECONDARY SERVICE BOX INSTALLATION 17" X 30" X 18"	U1S3X1	C-9
INSTALLATION FOR 17" X 30" AND 24" X 36" SECONDARY BOXES	U1S3X2	C-10
SERVICE CONDUIT AT HOUSE FOUNDATION	U1S3X3	C-11
INSTALLATION FOR 17" X 30", 24" X 36", AND 30" X 48" FULL TRAFFIC BOXES	U1S3X4	C-12
BOX COVER CLEARANCE	UVC1.2.8	C-13
OPEN BOTTOM CONCRETE BOX 48" X 72" X 42"	UVC1.2	C-14


<b>Drawing Title</b>	<b>Drawing Identification Code</b>	<b>Page Number</b>
SPRING ASSIST COVER FOR 48" X 72" BOX	UVC1.2.2	C-15
AT GRADE - FULL TRAFFIC BOX COVER FOR 48" X 72"	UVC1.2.9	C-16A/B
RIGGING CONFIGURATION OPEN BOTTOM CONCRETE BOX 48" X 72"	RG1.0	C-17
T-TAP COVER 48" X 72"	UVC1.2.5	C-18
RPM HANDHOLE BOX 88" X 67" X 48" FOR 12KV SWITCHGEAR	UVC1.4	C-19
RPM HANDHOLE BOX 102" X 82" X 48" FOR 21KV SWITCHGEAR AND 12KV FEEDER TIE SWITCHES	UVC1.5	C-20
12KV & 21KV PADMOUNTED SWITCHGEAR GROUNDING DETAIL	UGA2.5	C-21
OPEN BOTTOM CONCRETE BOX 74" X 98" X 42"	UVC1.6	C-22
SPRING ASSIST COVER FOR 74" X 98" BOX	UVC1.6.1	C-23
AT GRADE - FULL TRAFFIC BOX COVER FOR 74" X 98"	UVC1.6.5	C-24A/B
RIGGING CONFIGURATION OPEN BOTTOM CONCRETE BOX 74" X 98"	RG1.1	C-25
NON-CONCRETE SECONDARY J-BOX 48" X 96" X 48"	UVC1.7	C-26
AT GRADE – COVER INSTALLATION DETAILS	UVC1.8.3	C-27
PRIMARY PULL BOX AND T-TAP INSTALLATION 30" X 48" X 34"	UVC2.1	C-28
T-TAP COVERS FOR 30" X 48" BOX	UVC2.2	C-29
COMMERCIAL SECONDARY RUNS FROM TRANSFORMER TO PANEL	UAD1.5	C-30
COMMERCIAL SECONDARY RUNS FROM TRANSFORMER TO J-BOX	UAD1.6	C-31
SECONDARY J-BOX PADMOUNT	U1S3D1	C-32

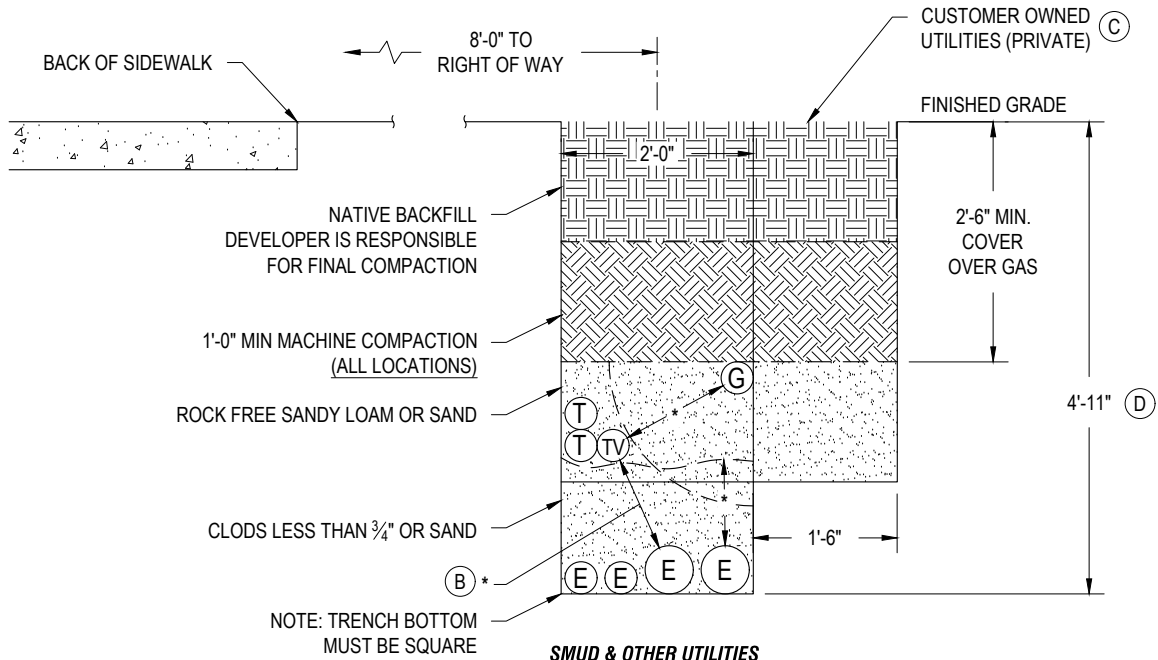


<b>Drawing Title</b>	<b>Drawing Identification Code</b>	<b>Page Number</b>
NON-CONCRETE SINGLE PHASE TRANSFORMER PAD 44" X 51"	UVD2.1	C-33
SINGLE PHASE TRANSFORMER PAD INSTALLATION 44" X 51"	UVD2.1A	C-34
THREE PHASE PRECAST TRANSFORMER PAD 84" X 84"	UVD2.2	C-35
THREE PHASE TRANSFORMER PAD INSTALLATION PRECAST 84" X 84"	UVD2.2A	C-36
THREE PHASE PRECAST TRANSFORMER PAD 120" X 105"	UVD2.3A	C-37
THREE PHASE TRANSFORMER PAD INSTALLATION PRECAST 120" X 105"	UVD2.3A1	C-38
PADMOUNTED TRANSFORMER GUARD CHAIN LINK FENCE TYPE	UVD2.4	C-39
PADMOUNTED TRANSFORMER GUARD PIPE BOLLARD TYPE WITH REMOVABLE BARRIER	UVD2.5	C-40
GENERAL ARRANGEMENTS FOR PADMOUNTED SECONDARY J-BOXES	UVD5.4	C-41
GENERAL ARRANGEMENT FOR DEAD-FRONT PADMOUNT 12KV SWITCHGEAR	UVD5.5A	C-42
GENERAL ARRANGEMENT FOR DEAD-FRONT PADMOUNT 21KV SWITCHGEAR	UVD5.5B	C-43
GENERAL ARRANGEMENT FOR SF6 VISTA PADMOUNT 21KV SWITCHGEAR	UVD5.5C	C-44
TYPICAL DISTRIBUTION RISER	U1N	C-45
DIFFICULT TRENCHING AREAS		C-46
TYPICAL DISTRIBUTION TRENCH IN CORE DOWNTOWN AREAS	U12P3X8	C-47A/B
21KV SF6 PADMOUNT SWITCHGEAR	UVC1.5.2	C-48



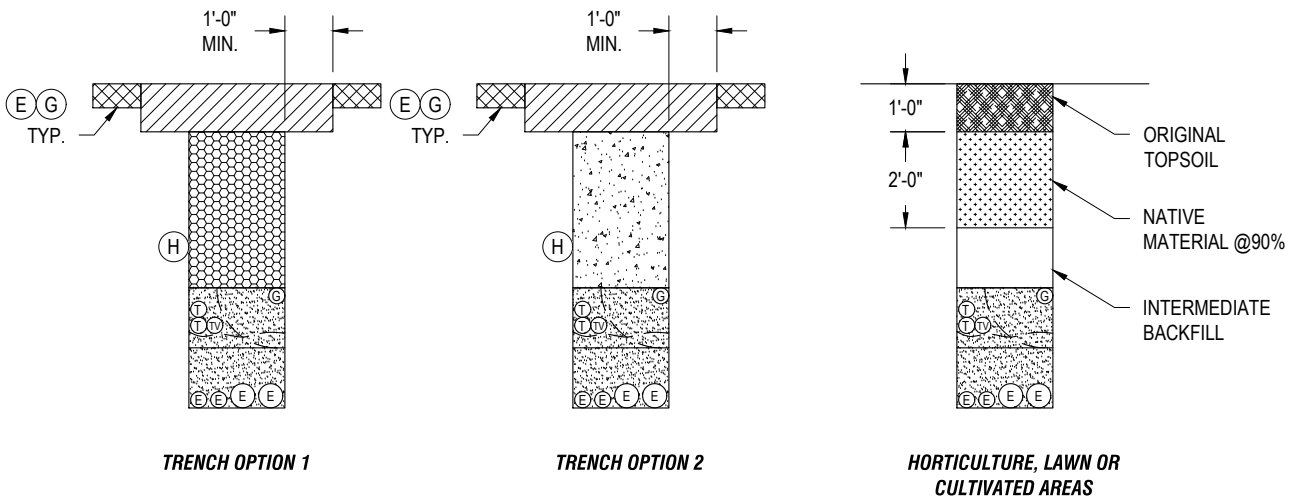


 <p>Sacramento Municipal Utility District</p>	ESR: T007	ESR PG. NO.: C-2	REV. DATE: MARCH 2023 REV. NO.: 8
	<b>DETAIL</b> <b>TYPICAL CONDUIT TERMINATION</b>		STANDARD NO.: <b>U12P3X2</b> PAGE 1 OF 1



**NOTES:**

- A. IF NUMBER OF CONDUITS WOULD REQUIRE MORE ROOM TO MAINTAIN CLEARANCE, CONTRACTOR MUST USE WIDER TRENCH.
- B. \* = 1'-0" MIN. RADIAL CLEARANCE FROM ELECTRIC, GAS, AND COMM. CONDUITS.
- C. 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.
- D. 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.



**CITY OF FOLSOM**

**NOTES:**

- E. MATCH EXISTING A.C. THICKNESS: 4" MINIMUM, 6" MAXIMUM.
- F. SAW CUT 1'-0" BEYOND THE WIDTH OF THE TRENCH.
- G. T-GRIND REQUIRED FOR ALL PAVEMENTS (1'-0" MINIMUM WIDTH), 1/2" DEEP GRIND AND PAVE TO THE LIP OF GUTTER, LANE LINE, OR CENTER OF TRAFFIC LANE (WHICHEVER IS APPLICABLE).
- H. 3/4" AGGREGATE BASE @ 90% COMPACTION OR APPROVED SLURRY-CEMENT BACKFILL.



ESR: T007

ESR PG. NO.: C-3

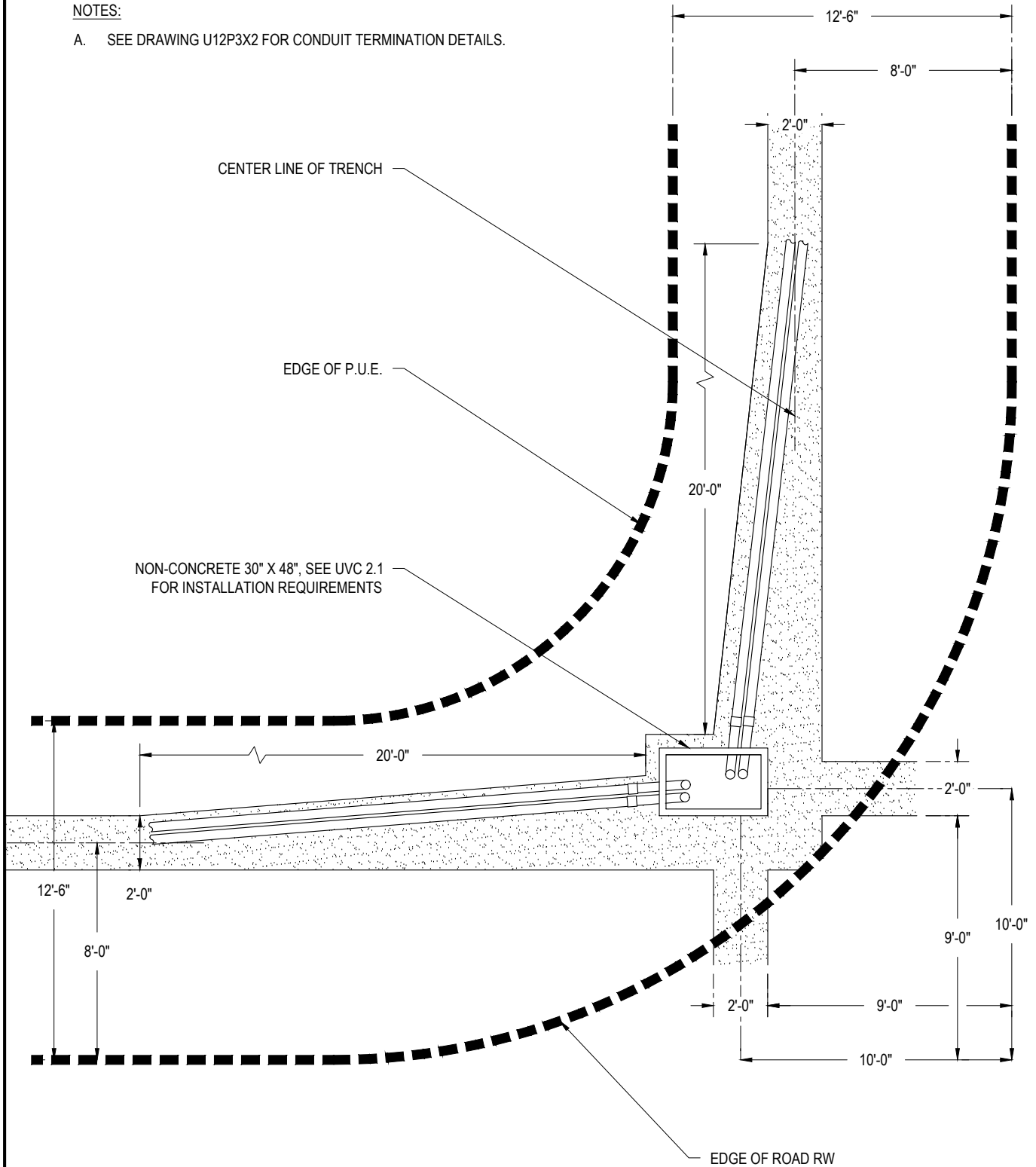
REV. DATE: MARCH 2023  
REV. NO.: 7

**TYPICAL DISTRIBUTION TRENCH**

STANDARD NO.:  
**U12P3X3**

**NOTES:**

A. SEE DRAWING U12P3X2 FOR CONDUIT TERMINATION DETAILS.



ESR: T007

ESR PG. NO.: C-4

**PRIMARY PULL BOX  
CORNER INSTALLATION  
30" X 48" X 34"**

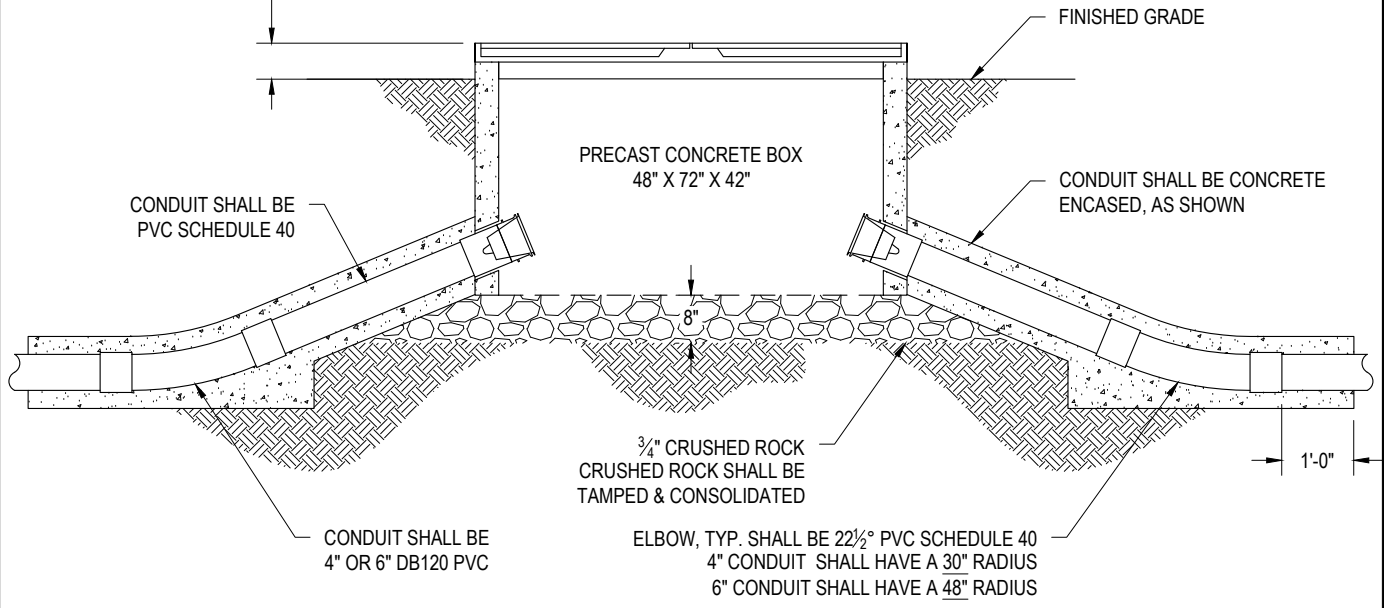
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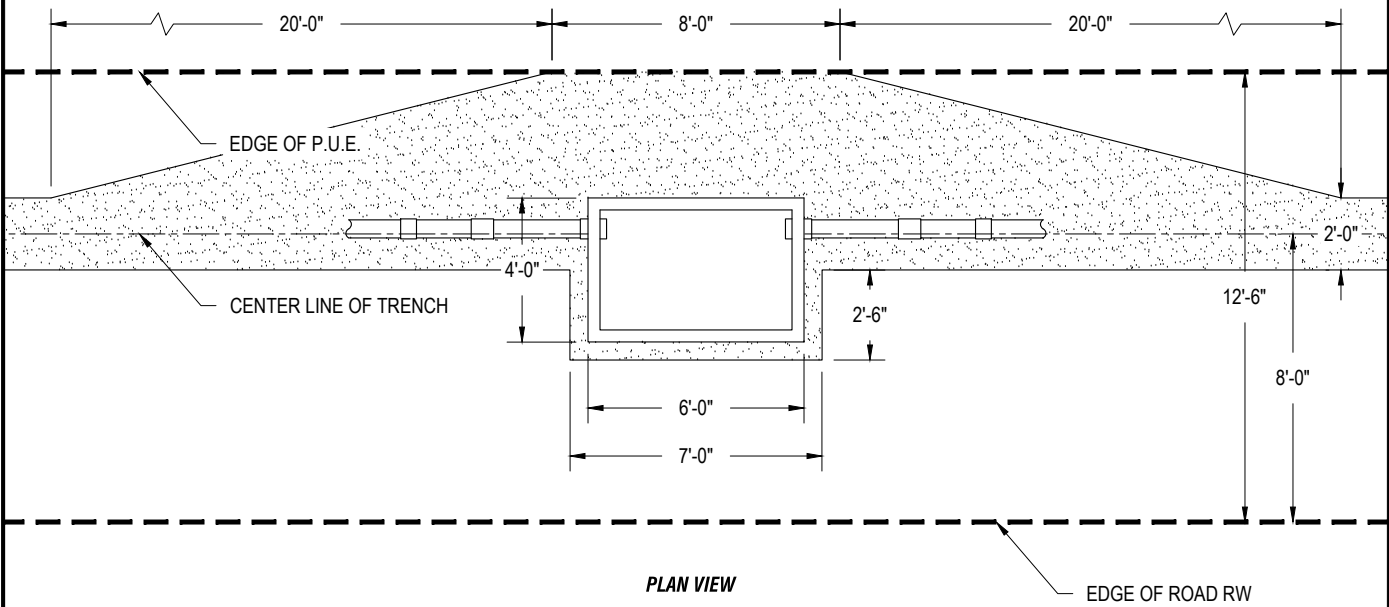
STANDARD NO.:  
**U12P3X5**

PAGE 1 OF 1

IF THE BOX IS LOCATED IN A LANDSCAPE AREA, THE TOP OF THE COVER SHALL BE BETWEEN 3" TO 6" ABOVE FINISHED GRADE. IF THE BOX IS LOCATED IN A WALKWAY, THE TOP OF THE COVER SHALL BE FLUSH W/ FINAL GRADE. SPRING ASSIST COVERS SHOULD BE USED IN LANDSCAPE AREAS ONLY. A FULL TRAFFIC COVER SHALL BE USED IN ALL OTHER AREAS.




**SECTION VIEW**



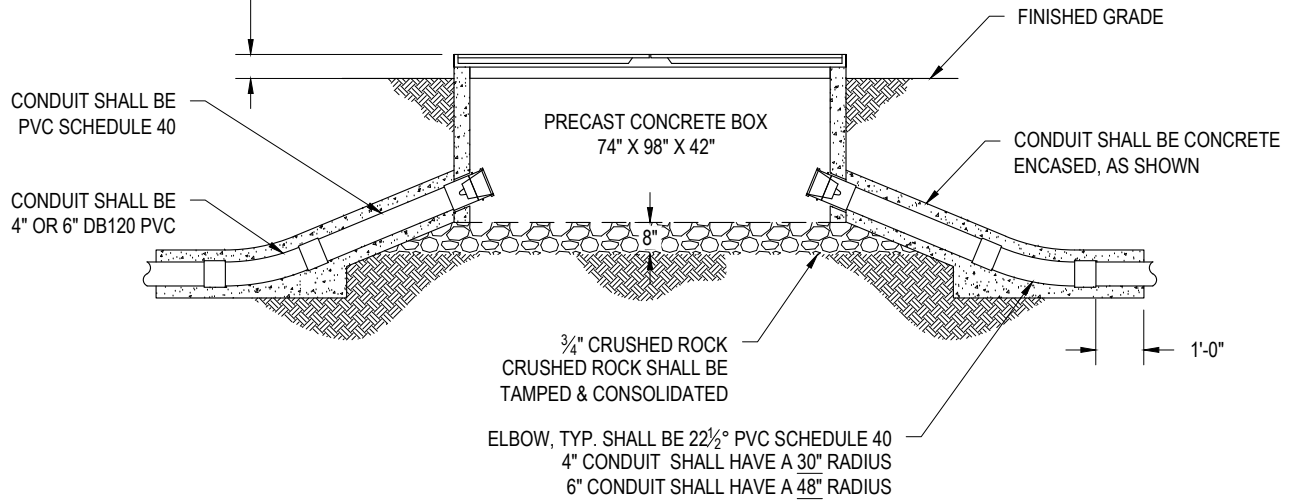
**PLAN VIEW**

**NOTES:**

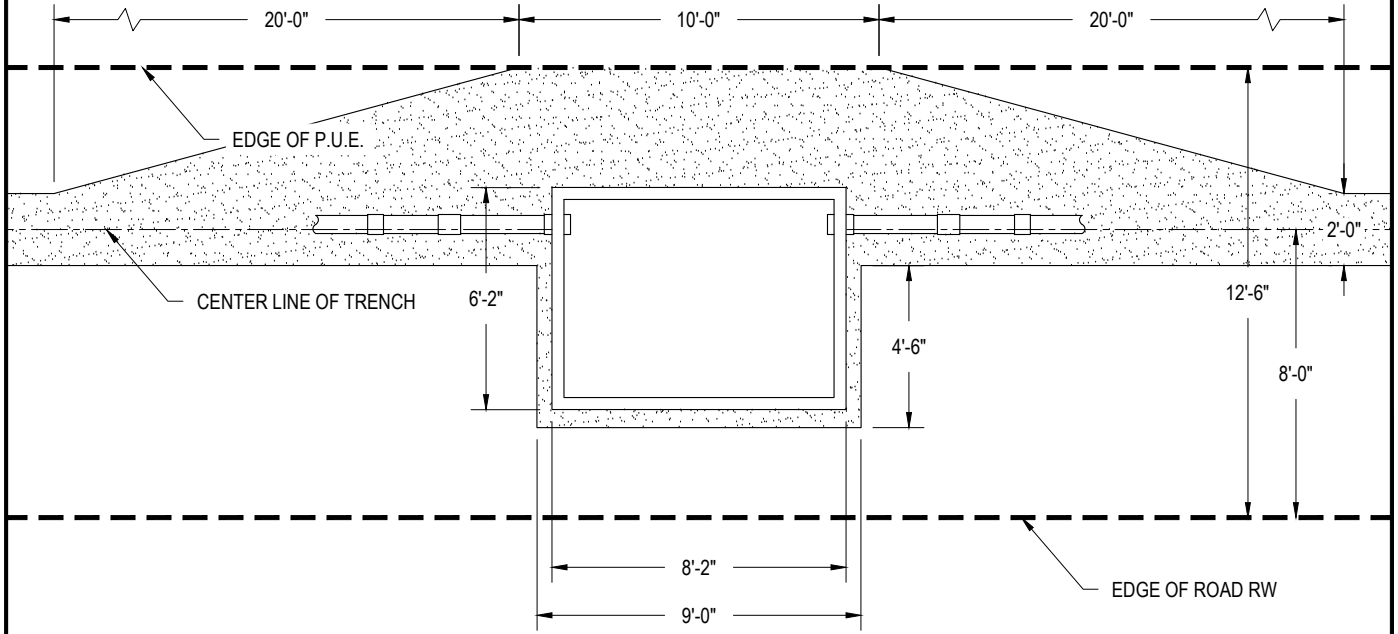
- A. SEE DRAWING U12P3X2 FOR CONDUIT TERMINATION DETAILS.
- B. SEE DRAWING UGA2.5 FOR GROUNDING INSTALLATION.

 Sacramento Municipal Utility District	ESR: T007	ESR PG. NO.: C-5	REV. DATE: MARCH 2023	REV. NO.: 8
	<b>PRIMARY PULL BOX INSTALLATION</b> <b>48" X 72" X 42"</b>			STANDARD NO.: <b>U12P3X6</b> PAGE 1 OF 1

IF THE BOX IS LOCATED IN A LANDSCAPE AREA, THE TOP OF THE COVER SHALL BE BETWEEN 3" TO 6" ABOVE FINISHED GRADE. IF THE BOX IS LOCATED IN A WALKWAY, THE TOP OF THE COVER SHALL BE FLUSH W/ FINAL GRADE. SPRING ASSIST COVERS SHOULD BE USED IN LANDSCAPE AREAS ONLY. A FULL TRAFFIC COVER SHALL BE USED IN ALL OTHER AREAS.



SECTION VIEW



PLAN VIEW

NOTES:

- A. SEE DRAWING U12P3X2 FOR CONDUIT TERMINATION DETAILS.
- B. SEE DRAWING UGA2.5 FOR GROUNDING INSTALLATION.



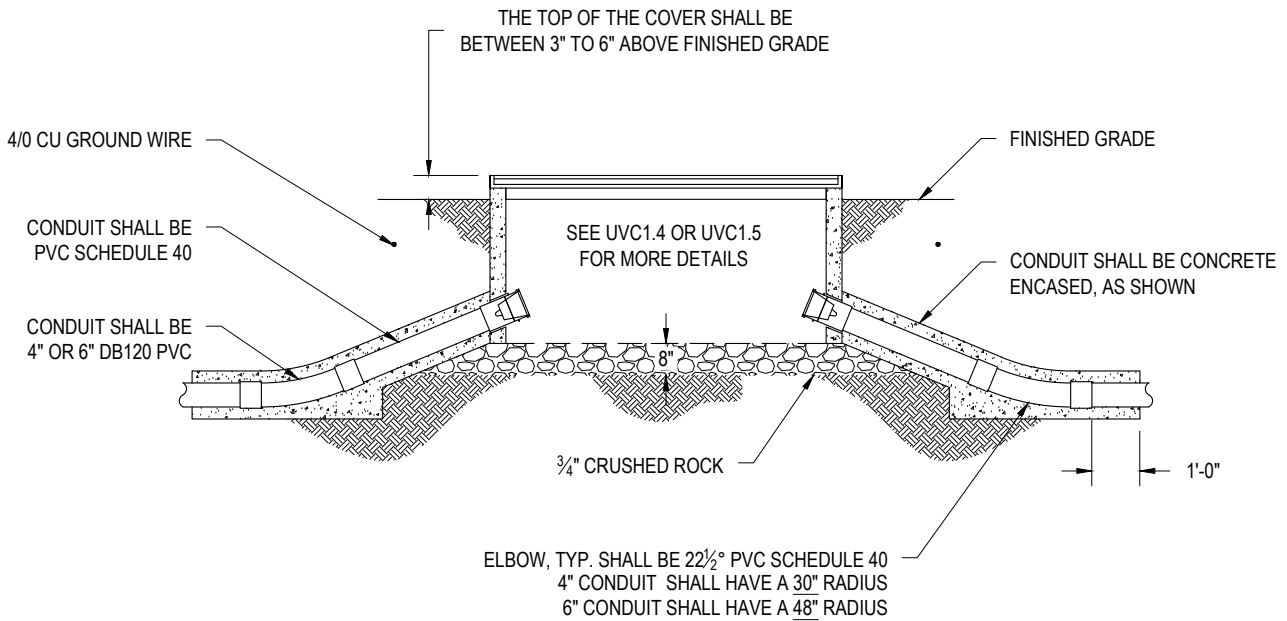
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ESR PG. NO.: C-6

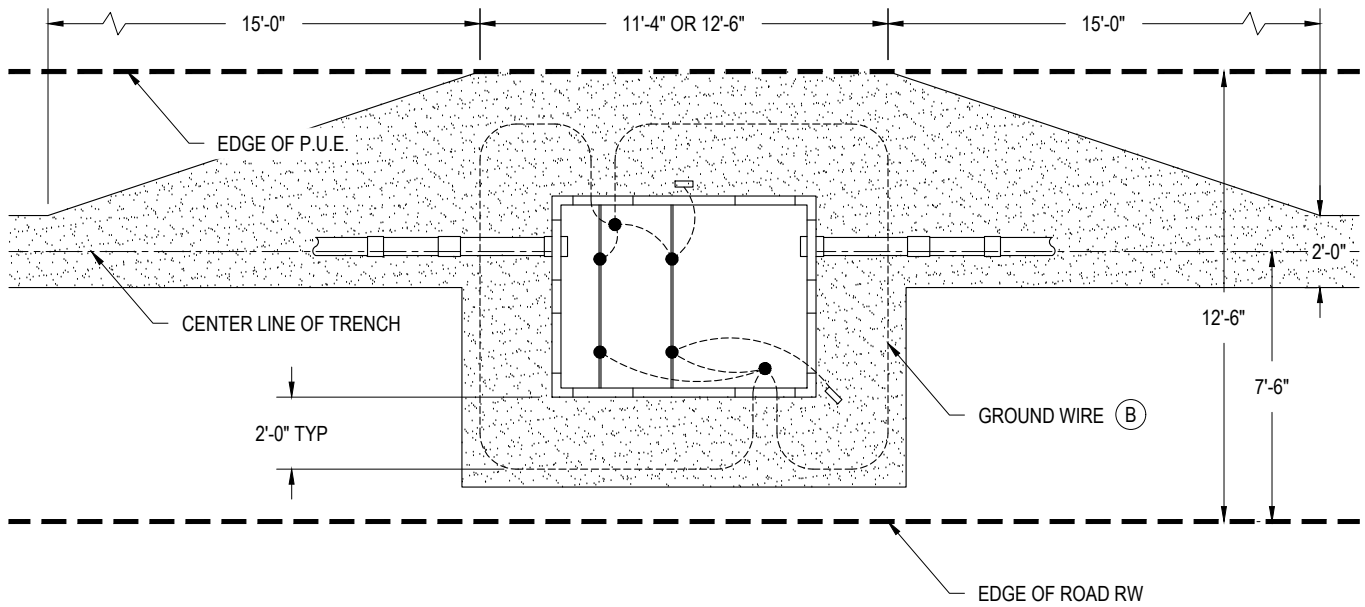
REV. DATE: MARCH 2023  
REV. NO.: 8

PRIMARY PULL BOX INSTALLATION  
74" X 98" X 42"

STANDARD NO.:  
U12P3X7



SECTION VIEW



PLAN VIEW

NOTES:

- A. SEE DRAWING U12P3X2 FOR CONDUIT TERMINATION DETAILS.
- B. SEE DRAWING UGA2.5 FOR GROUNDING INSTALLATION.



ESR: T007

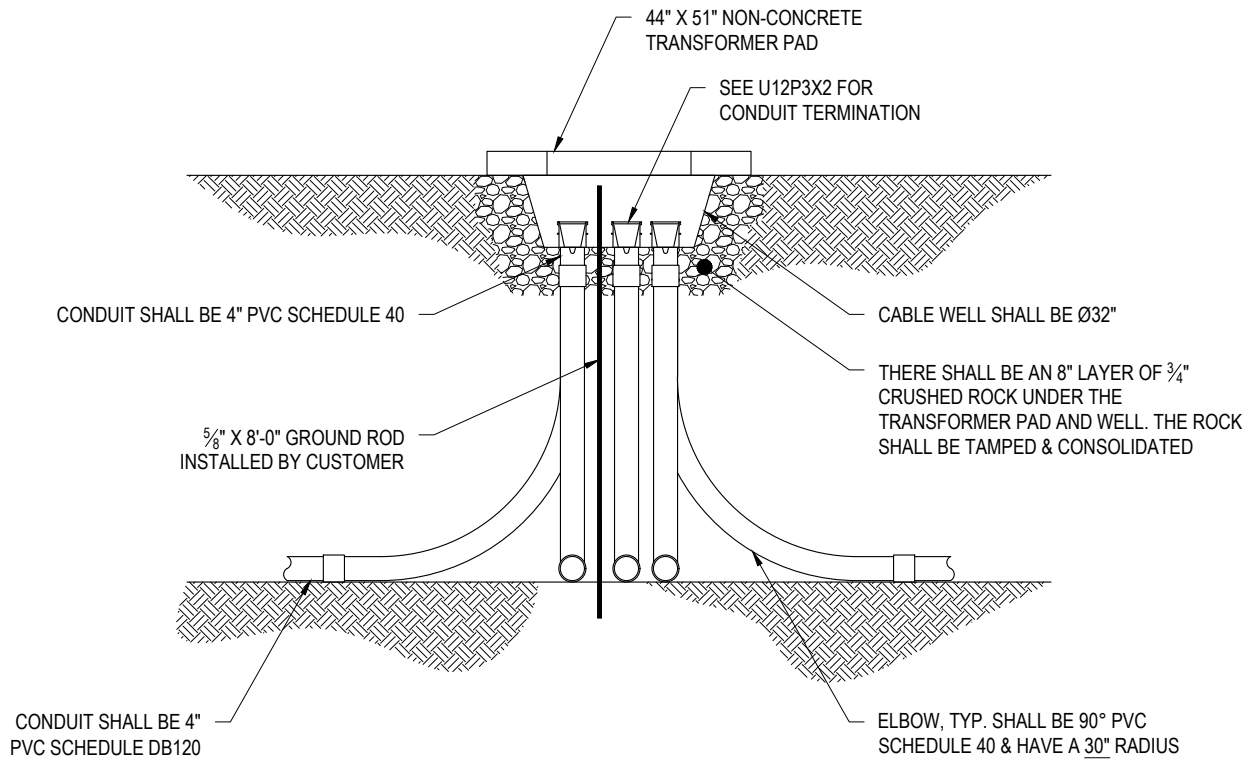
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REV. DATE: MARCH 2023  
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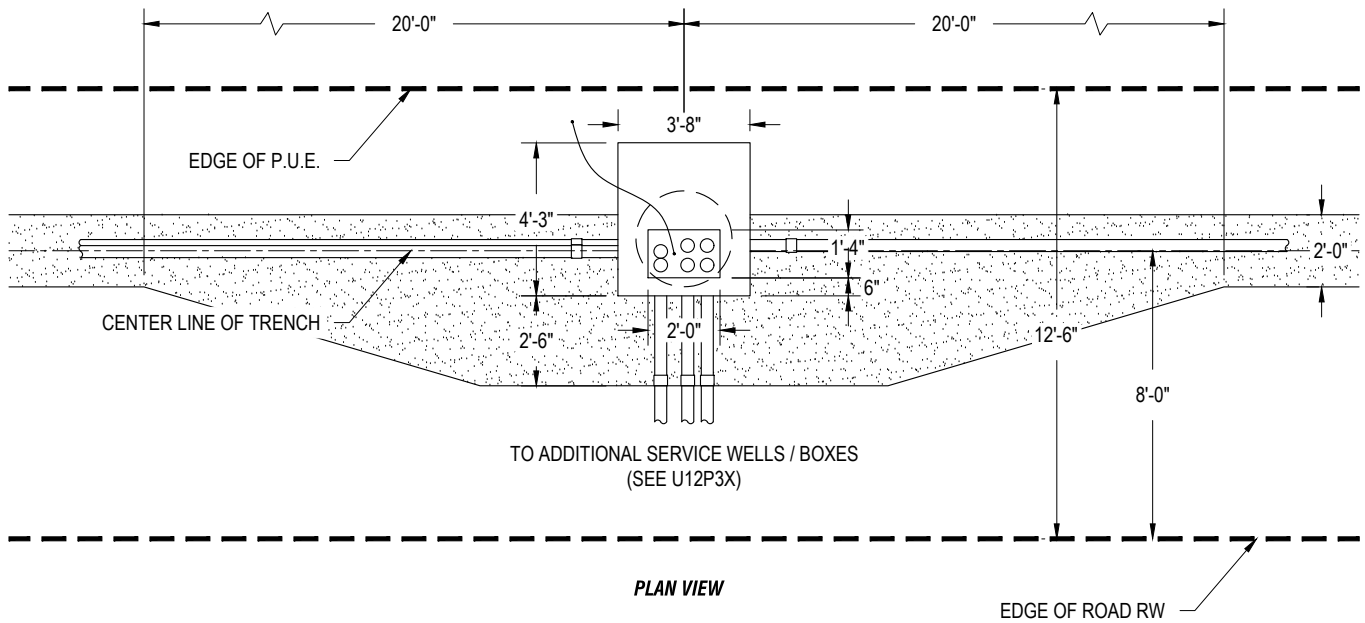
SWITCHGEAR BOX TYPICAL INSTALLATION

STANDARD NO.:  
 U12H3X1





**SECTION VIEW**



**PLAN VIEW**

**NOTES:**

- A. SEE DRAWING U12P3X2 FOR CONDUIT TERMINATION DETAILS.
- B. SEE DRAWING UGA2.5 FOR GROUNDING INSTALLATION.



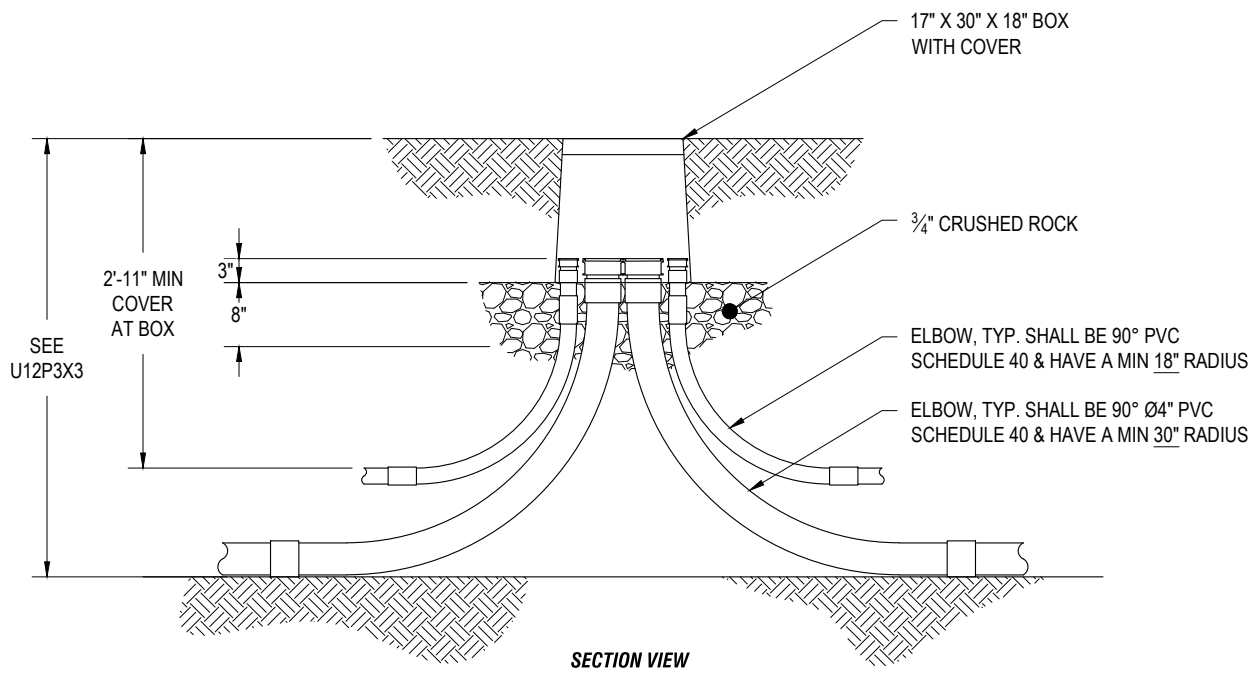
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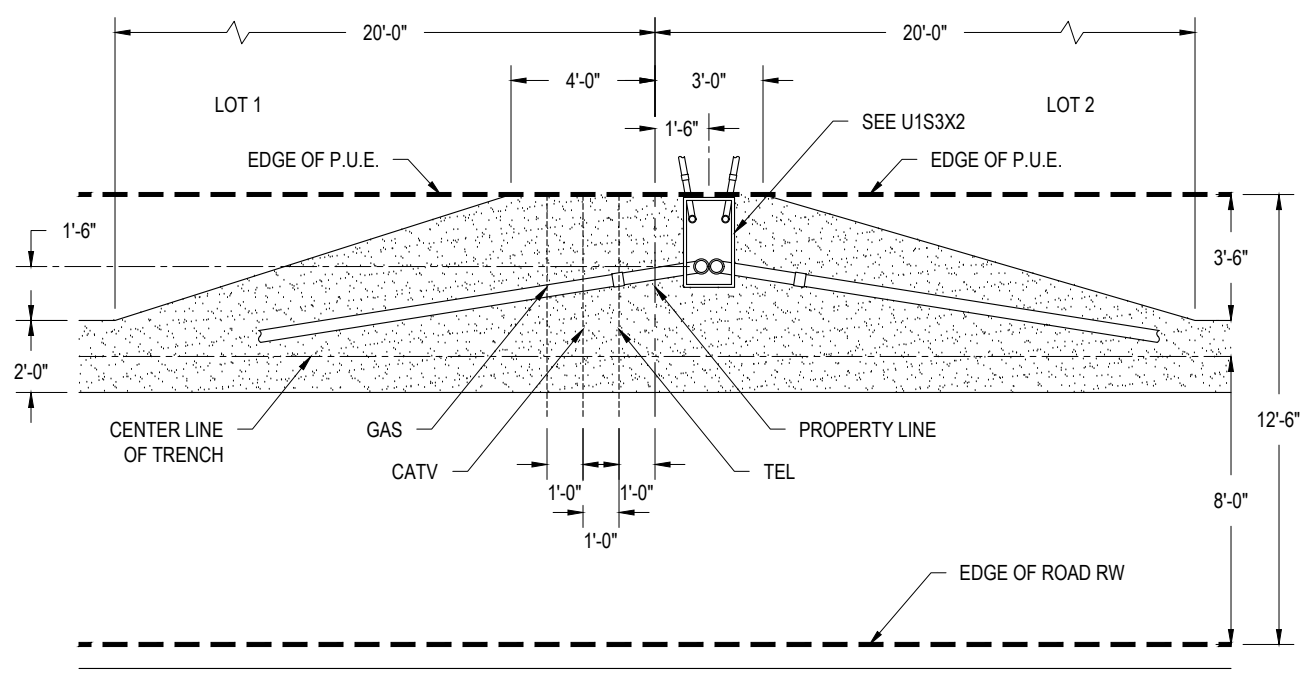
REV. DATE: MARCH 2022  
REV. NO.: 8

**SINGLE PHASE TRANSFORMER  
PAD & WELL INSTALLATION**

STANDARD NO.:  
**U12K3X1**



SECTION VIEW



PLAN VIEW

NOTES:

- A. SEE DRAWING U12P3X2 FOR CONDUIT TERMINATION DETAILS.
- B. SEE DRAWING U1S3X2 FOR MINIMUM DISTANCE ALLOWED BETWEEN THE SERVICE BOX AND THE POLE.

SIDEWALK

CURB & GUTTER



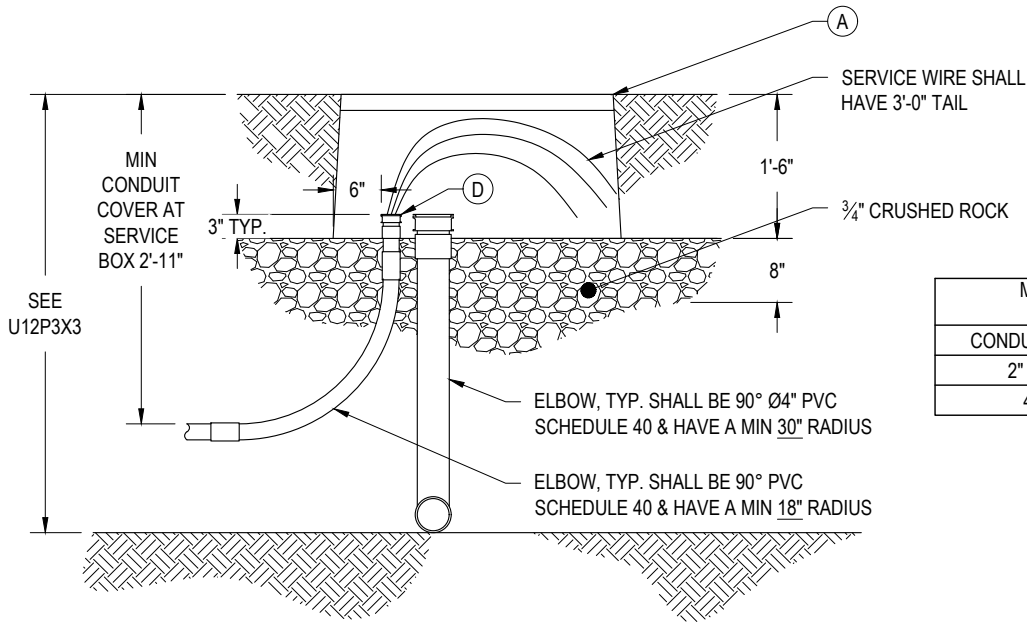
ESR: T007      ESR PG. NO.: C-9

**SECONDARY SERVICE BOX  
INSTALLATION 17" X 30" X 18"**

REV. DATE:    REV. NO.:  
MARCH 2023    10

STANDARD NO.:  
**U1S3X1**

PAGE 1 OF 1

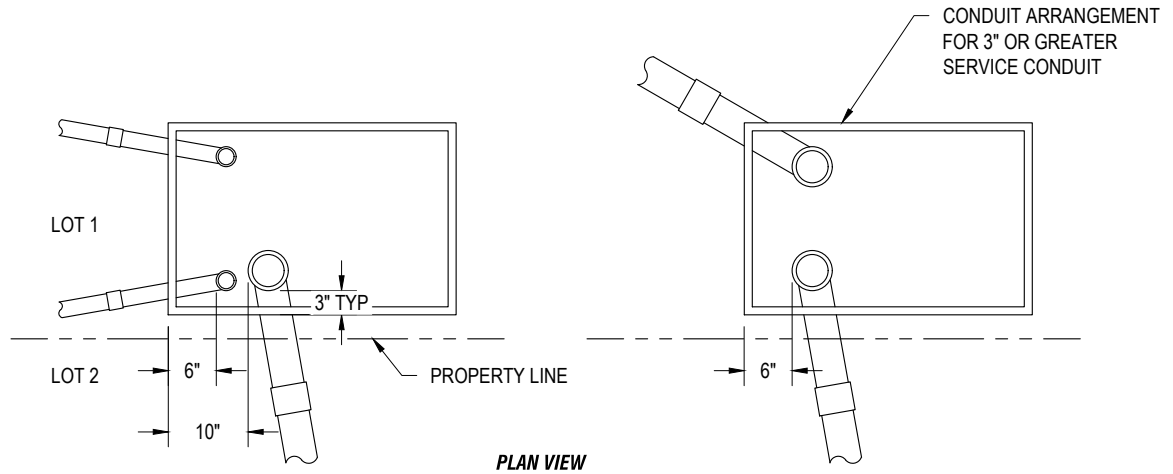


**TABLE - 1**

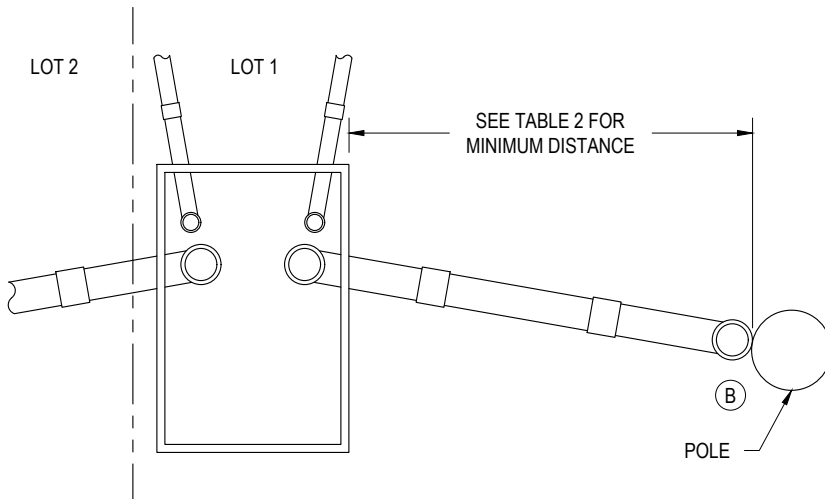
MINIMUM ELBOW RADIUS FOR SERVICE CONDUIT

CONDUIT SIZE	RADIUS
2" - 3"	18"
4"	30"

**SECTION VIEW**



**PLAN VIEW**



**MINIMUM DISTANCE FROM RISER TO POLE**

**TABLE - 2**

CONDUIT SIZE	MINIMUM DISTANCE
2"	4'-8"
3"	6'-8"
4"	6'-8"
6"	10'-4"

**NOTES:**

- A. FULL TRAFFIC BOX IS 1'-0" DEEP. (SEE U1S3X4)
- B. CUSTOMER TO COORDINATE WITH SMUD FOR RISER QUADRANT ON POLE.
- C. SEE U1N FOR CONDUIT RADIUS.
- D. CONDUIT COVER WILL VARY WITH CONDUIT SIZE. CONDUIT CLEARANCE IN SERVICE BOX IS 3" FROM FLOOR.
- E. APPROVED SUPPLIERS SEE PAGE 24, SECTION 4.9.8.7.



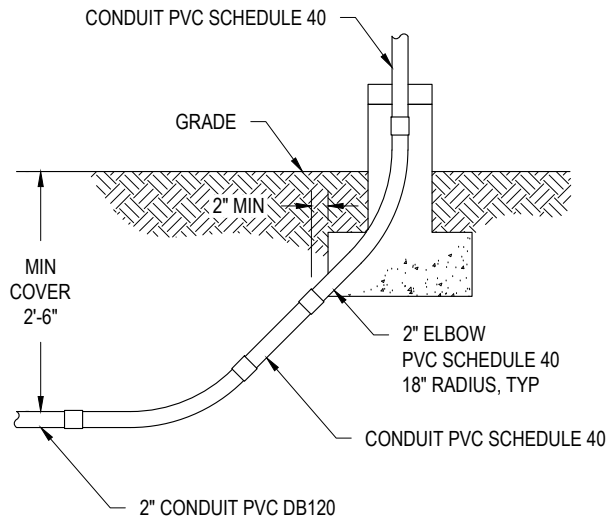
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ESR PG. NO.: C-10

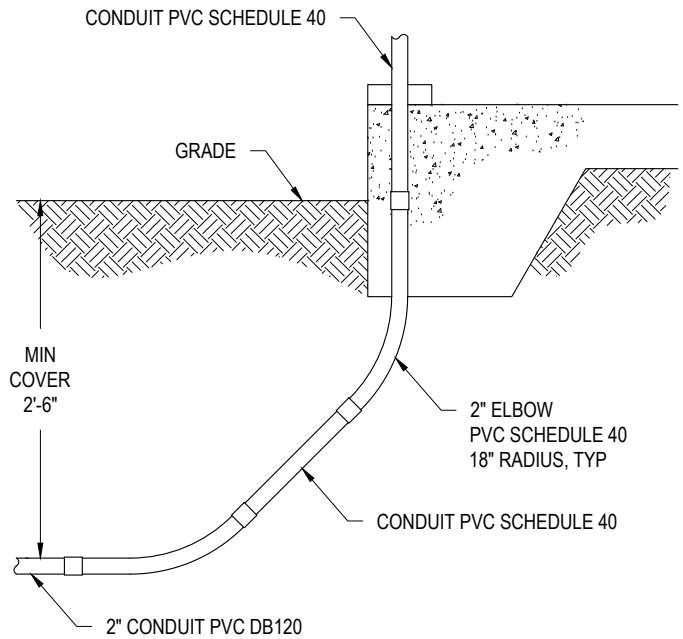
REV. DATE: MARCH 2023  
REV. NO.: 10

**INSTALLATION FOR 17X30, 24X36  
SECONDARY BOXES**

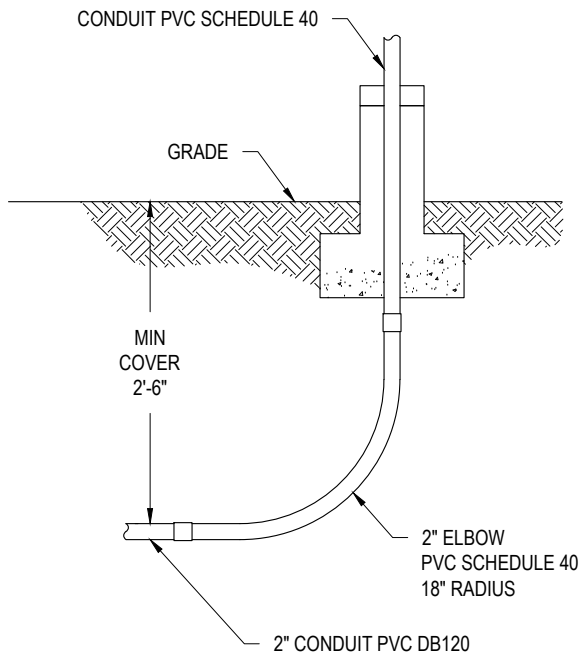
STANDARD NO.:  
**U1S3X2**



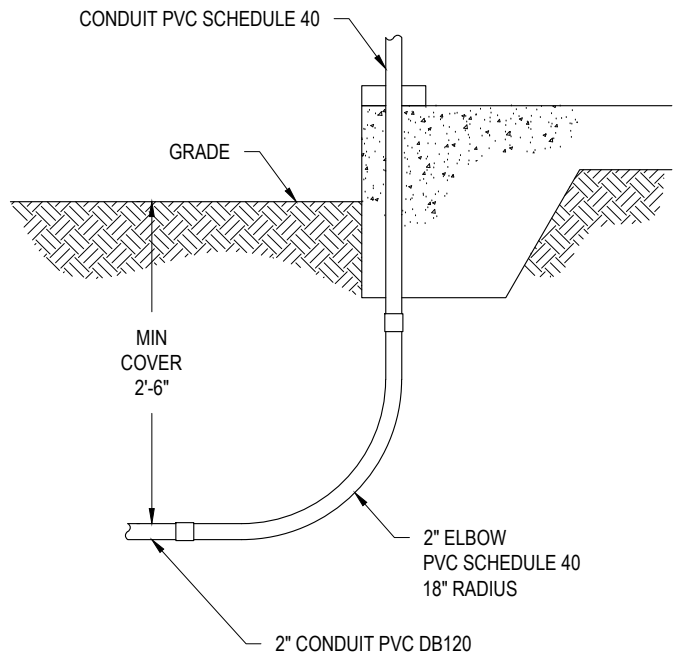
**CONVENTIONAL FOUNDATION  
(TYPICAL)**



**CONCRETE SLAB FOUNDATION  
(TYPICAL)**



**CONVENTIONAL FOUNDATION  
(TYPICAL)**



**CONCRETE SLAB FOUNDATION  
(TYPICAL)**

**NOTES:**

- A. 2" SERVICE CONDUIT TYPICAL FOR UP TO 200 AMP SERVICE PANEL  
SEE RESIDENTIAL UNDERGROUND SPECIFICATION T003.



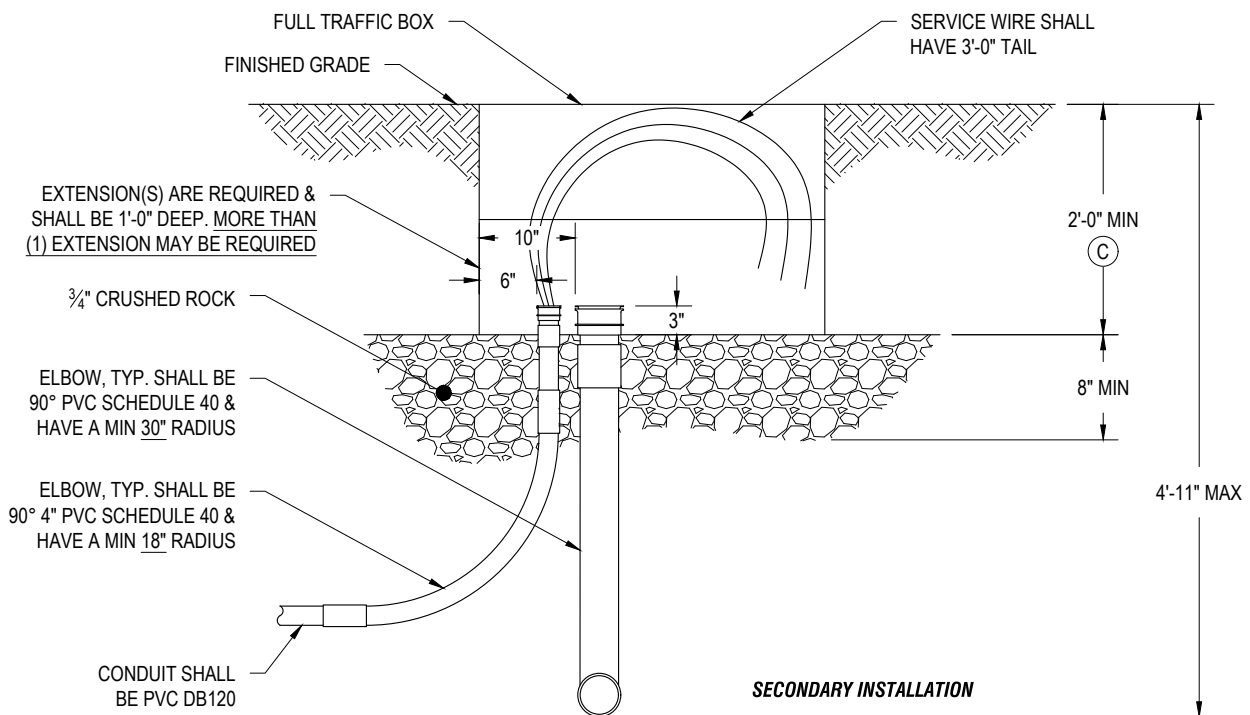
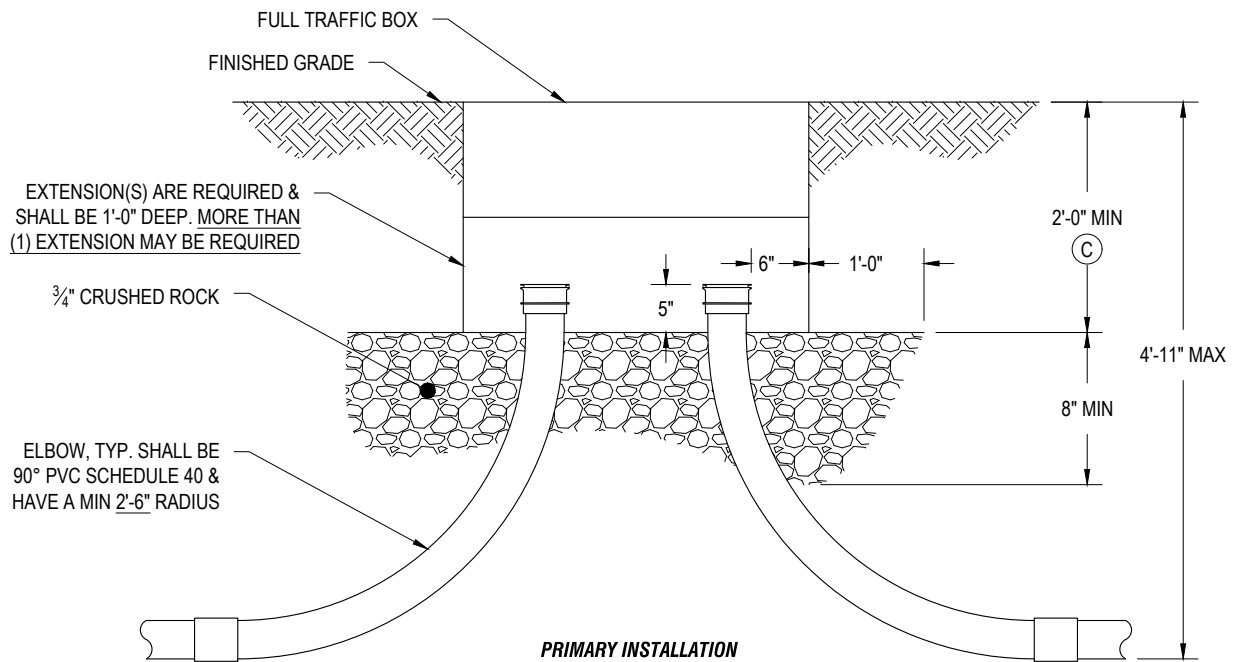
ESR: T007

ESR PG. NO.: C-11

REV. DATE: MARCH 2023  
REV. NO.: 5

**SERVICE CONDUIT  
AT HOUSE FOUNDATION**

STANDARD NO.:  
**U1S3X3**



**NOTES:**

- A. FULL TRAFFIC BOXES SHALL BE INSTALLED IN FULL TRAFFIC LOCATIONS AND INCIDENTAL TRAFFIC LOCATIONS SUCH AS PARKING LOTS, ALLEYS, AND INDUSTRIAL AREAS.
- B. TRAFFIC BOXES REQUIRE A BASE OF AN EIGHT (8) INCH LAYER OF 3/4" CRUSHED ROCK. THE CRUSHED ROCK SHALL BE TAMPED AND CONSOLIDATED.
- C. MAXIMUM DEPTH DEPENDS ON MANUFACTURER. THE MAX DEPTH FOR COMPONENTS PROVIDED BY JENSEN IS 3'-0".
- D. MINIMUM CONDUIT COVER WILL DEPEND ON CONDUIT SIZE.

**TABLE - 1**

MINIMUM ELBOW RADIUS FOR ALL SERVICE CONDUIT ELBOWS (1 1/4", 2 1/2", 45° & 90°)	
CONDUIT SIZE	RADIUS
2" - 3"	18"
4"	30"



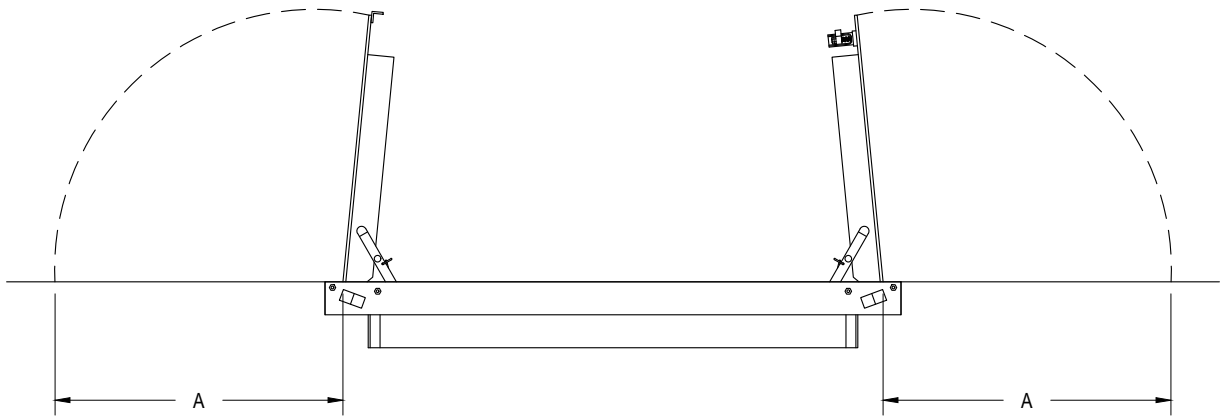
ESR: T007

ESR PG. NO.: C-12

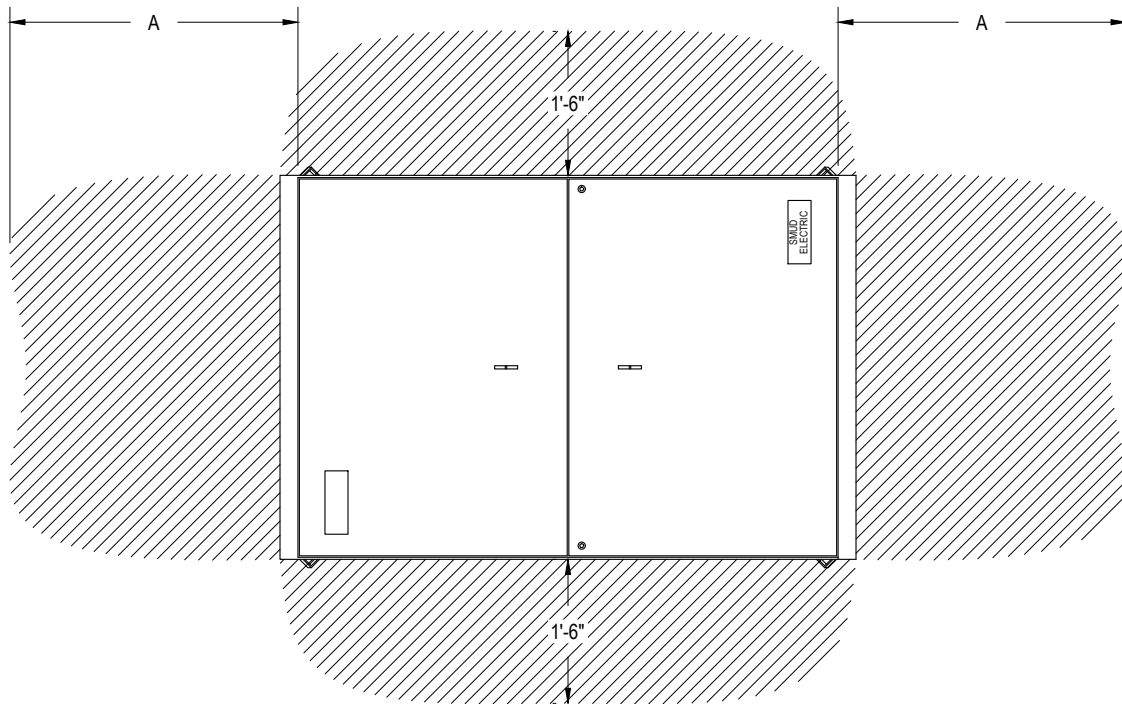
REV. DATE: MARCH 2023  
REV. NO.: 10

INSTALLATION FOR  
17" X 30", 24" X 36" & 30" X 48"  
FULL TRAFFIC BOXES

STANDARD NO.:  
**U1S3X4**



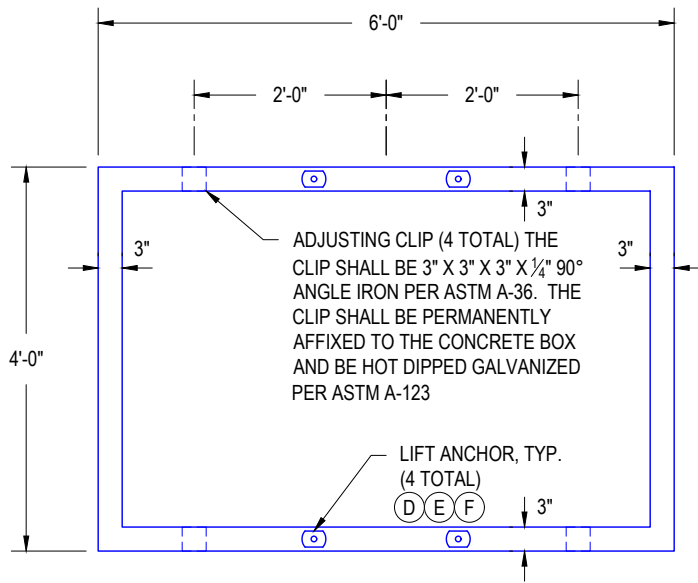
**SIDE VIEW**



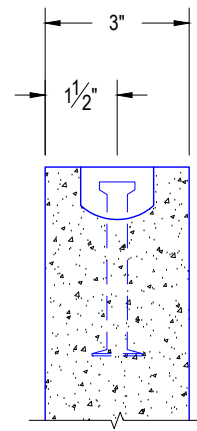
**PLAN VIEW**

BOX SIZE	A
30" X 48" *	1'-6"
48" X 72"	3'-0"
74" X 98"	4'-0"

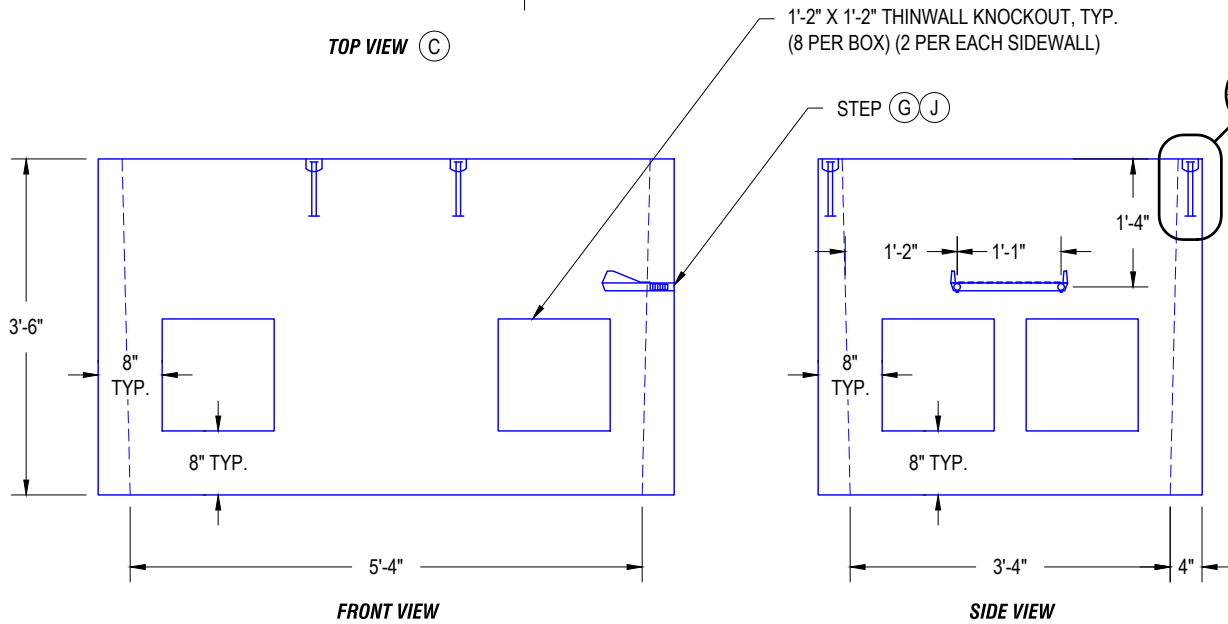
\* APPLIES TO SMALLER SIZES



TOP VIEW (C)

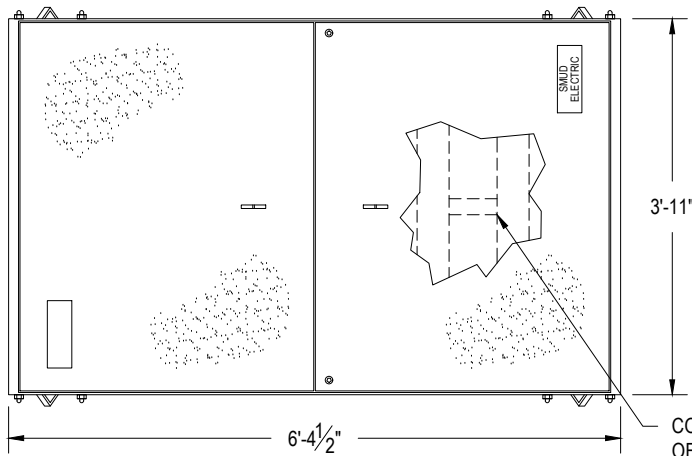


DETAIL - 1

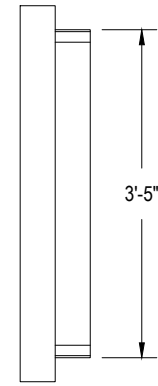


NOTES:

- A. FOR PROPER RIGGING, SEE RG1.0.
- B. OPEN BOTTOM CONCRETE BOX SHALL BE DESIGNED AND CONSTRUCTED FOR FULL DELIBERATE (H20-44) TRAFFIC LOADING.
- (C). THE INSIDE DIMENSIONS AND THE TOP DIMENSIONS OF THE BOX SHALL BE PER THIS DRAWING. THE WALLS MAY TAPER SUCH THAT THE INSIDE OPENING AT THE BOTTOM IS SMALLER THAN THE INSIDE OPENING AT THE TOP.
- (D). THE LIFTING ANCHOR SHALL BE A STARCON SC-52 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.
- (E). LIFT ANCHORS SHALL BE POSITIONED IN THE CENTERLINE OF THE WALL. MISALIGNMENT (OFF CENTERLINE) OF THE ANCHOR FOOT MAY RESULT IN A DRASTIC REDUCTION OF THE SAFE WORKING LOAD. USE SPACERS AND/OR TIE THE ANCHOR TO REBAR TO ASSURE PROPER POSITIONING.
- (F). RECESS HOLE SHALL BE CREATED BY USING THE ST-39 RECESS FORMER FOR A TWO TON ANCHOR FROM MEADOW BURKE PRODUCTS, OR APPROVED EQUAL.
- (G). BOX SHALL INCLUDE ONE STEP (BOWCO INDUSTRIES NO. 93813R, OR APPROVED EQUAL) ON ONE SHORT WALL.
- H. FOR BOX COVERS, SEE UVC1.2.2 OR UVC1.2.9.
- I. MANUFACTURER SHALL PAINT/STENCIL CORRECT WEIGHT AND CATALOG NUMBER INSIDE AND OUTSIDE OF THE BOX.
- (J). SMUD STOCK CODE NUMBER 10007677.

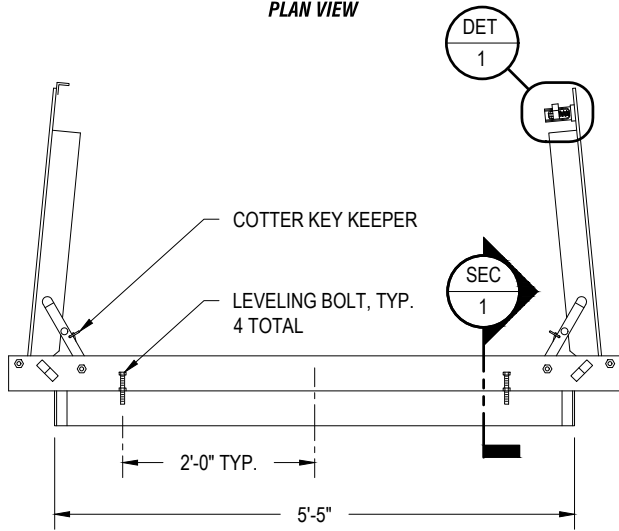


PLAN VIEW



SIDE VIEW

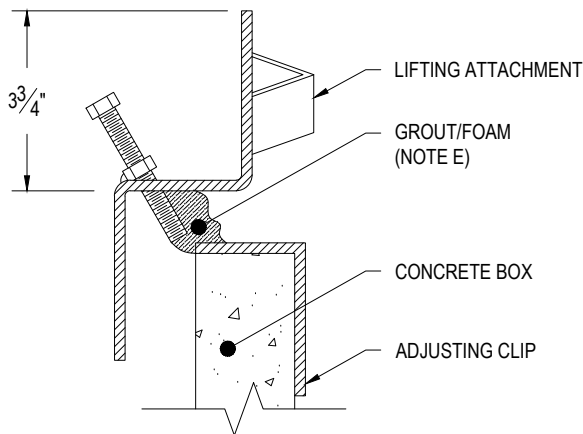
COVER DOOR HANDLE ON UNDERSIDE OF DOOR, TYP. PER DOOR



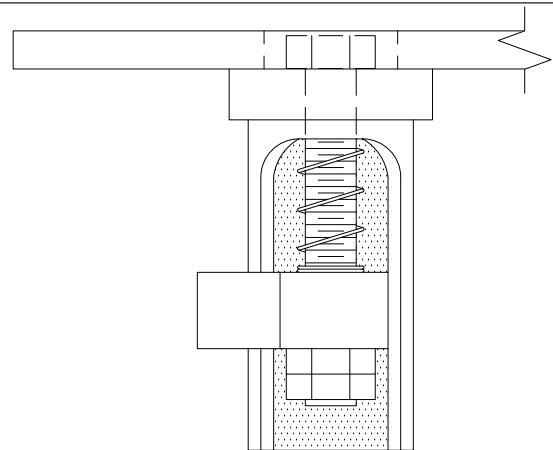
FRONT VIEW

NOTES:

- A. ADJUSTING CLIPS SHALL BE USED WHEN MAKING GRADE ADJUSTMENTS.
- B. 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.
- C. A MINIMUM OF 25 MIL OF THE SURFACE SHALL BE ETCHED PRIOR TO ADDING SLIPNOT MATERIAL.
- D. 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.
- E. STRUCTURAL GROUT OR FOAM SEALANT MUST BE USED AS DIRECTED BY THE SMUD INSPECTOR.
- F. SHOULD BE USED IN LANDSCAPE AREAS ONLY.
- G. SMUD STOCK CODE #10012135.
- H. MANUFACTURER SHALL STENCIL NAME AND WEIGHT ON COVER.



SECTION - 1  
LEVELING BOLT



DETAIL - 1  
LOCKING ASSEMBLY



ESR: T007

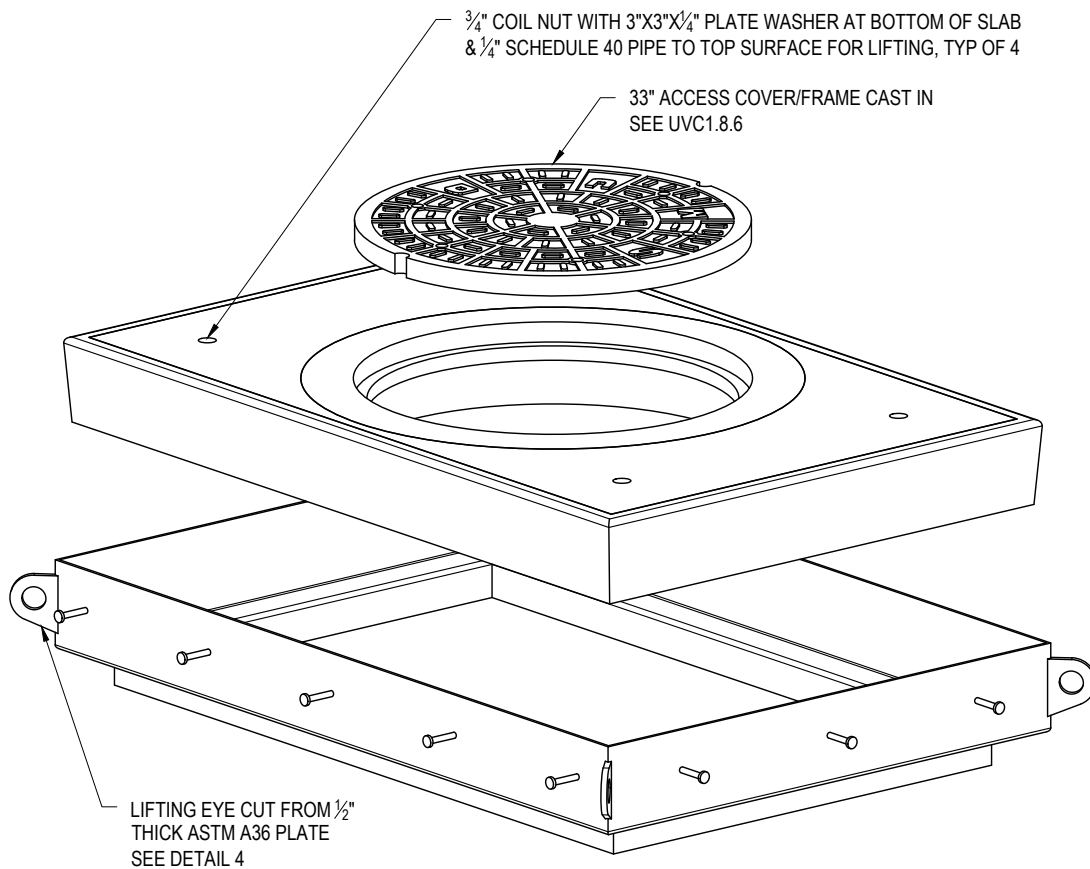
ESR PG. NO.: C-15

REV. DATE: REV. NO.:  
JAN 2020 7

SPRING ASSIST COVER  
FOR 4'-0" X 6'-0" BOX

STANDARD NO.:  
UVC1.2.2

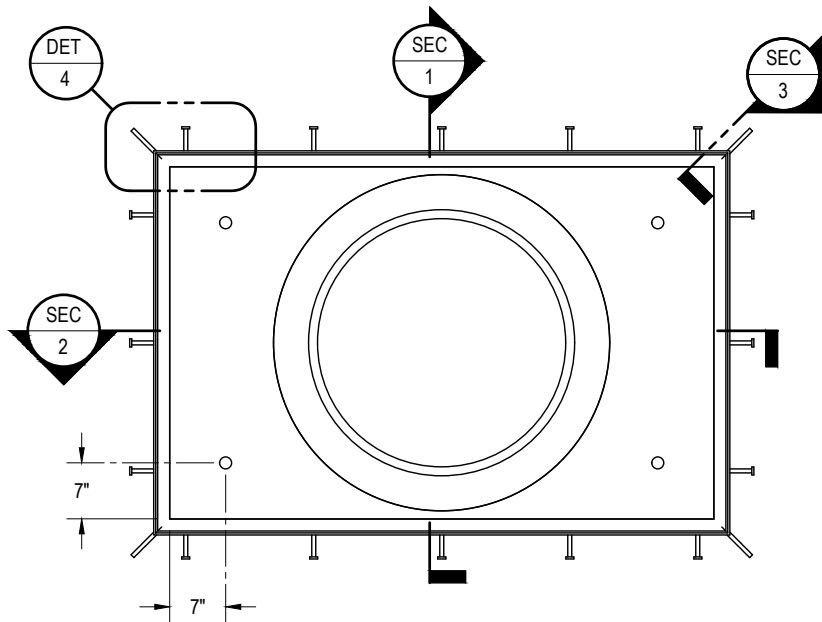




ISOMETRIC VIEW

NOTES:

- A. ADJUSTING CLIPS SHALL BE USED WHEN MAKING GRADE ADJUSTMENTS.
- B. WHEN MAKING GRADE ADJUSTMENTS STRUCTURAL GROUT MUST BE USED FOR MAINTAINING STRUCTURAL INTEGRITY.
- C. CONCRETE ENCASE COVER WITH 3,000 PSI CONCRETE 1'-0" x 1'-0" DEPTH (MIN.) OR TO DEPTH OF PAVEMENT.
- D. 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 & PROCESS USED. ALL FILLET & PENETRATION WELDS SHALL BE 100% VISUAL INSPECTED IN ACCORDANCE WITH ANSI/AWS D1.1 BY A CERTIFIED WELDING INSPECTOR.
- E. THE LIFTING EYE SHALL BE RATED TO MEET OR EXCEED ALL REGULATIONS PERTAINING TO THE RIGGING OF LIFTING OF PRECAST CONCRETE ITEMS.
- F. SMUD STOCK CODE 10012148.
- G. MANUFACTURE SHALL STENCIL NAME & WEIGHT ON COVER.



PLAN VIEW



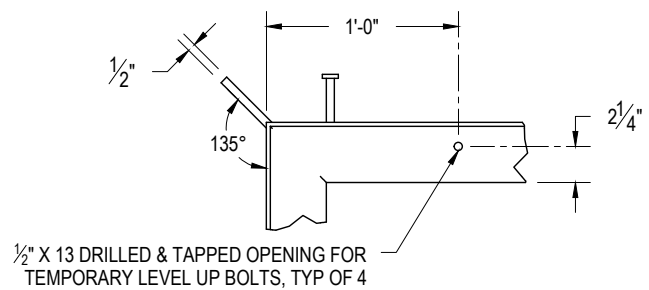
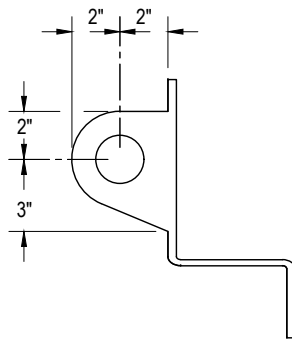
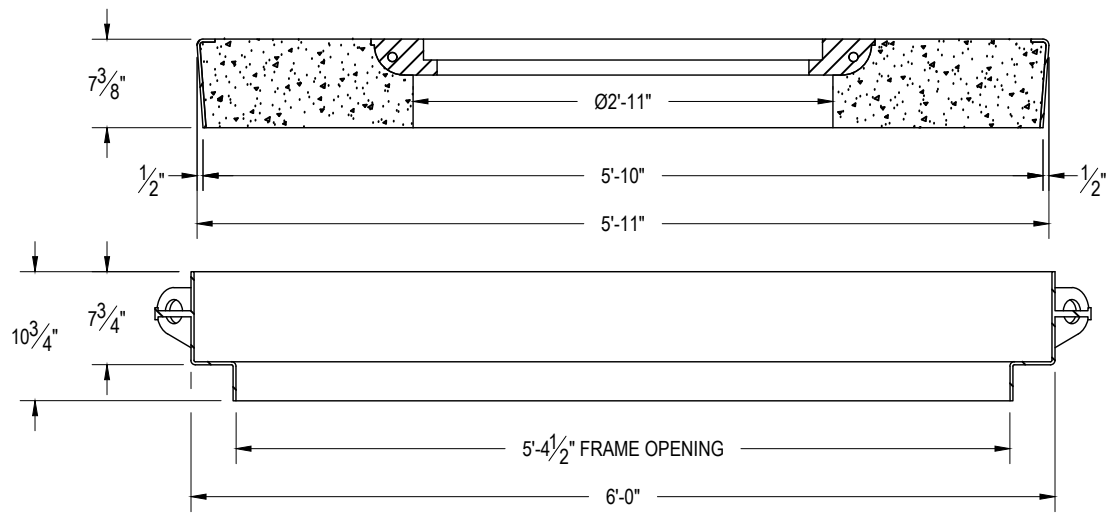
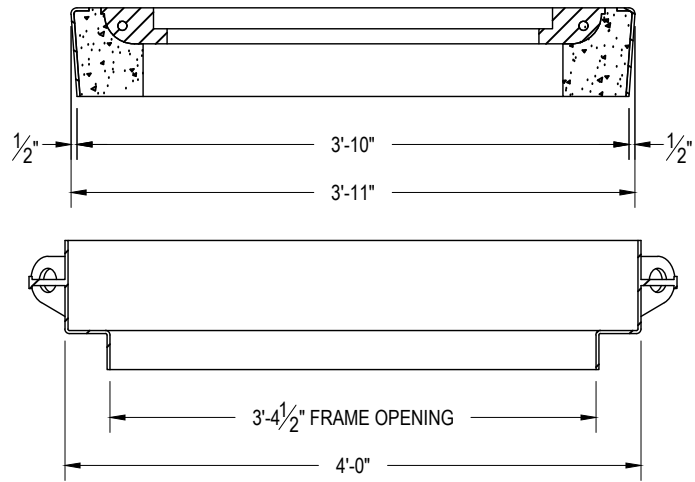
ESR: T007

ESR PG. NO.: C-16A/B

REV. DATE: MARCH 2023  
REV. NO.: 2

FULL TRAFFIC BOX COVER  
FOR 48" X 72"

STANDARD NO.:  
UVC1.2.9



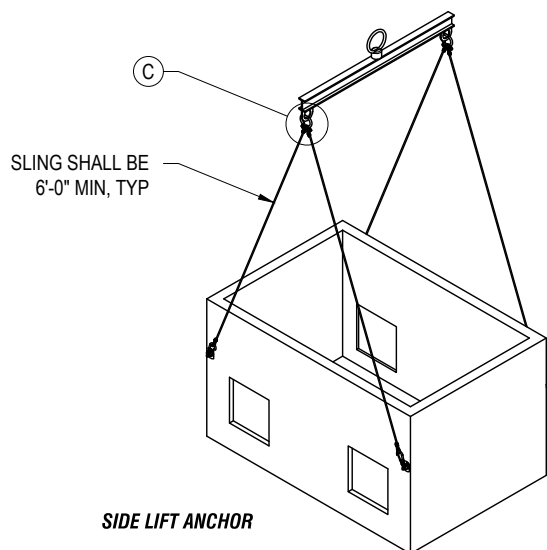
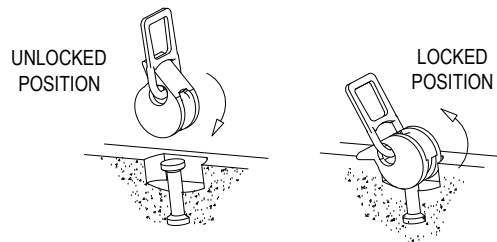
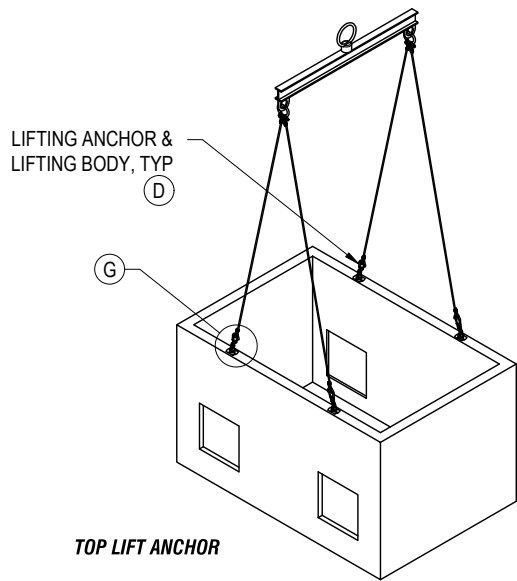
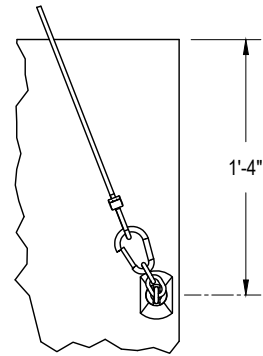
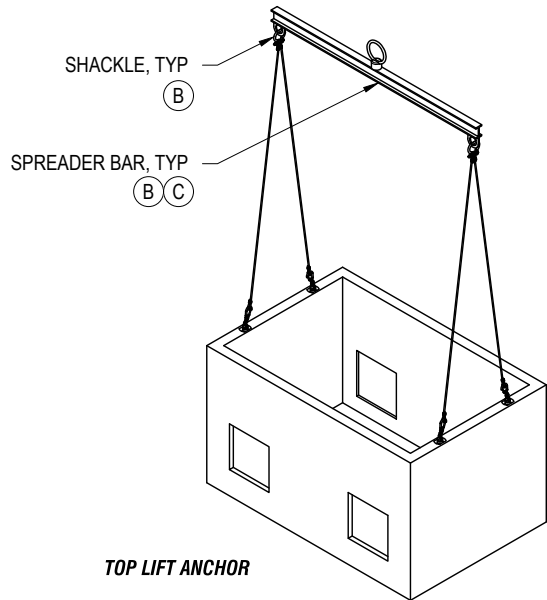
ESR: T007

ESR PG. NO.:C-16A/B

REV. DATE: MARCH 2023  
REV. NO.: 2

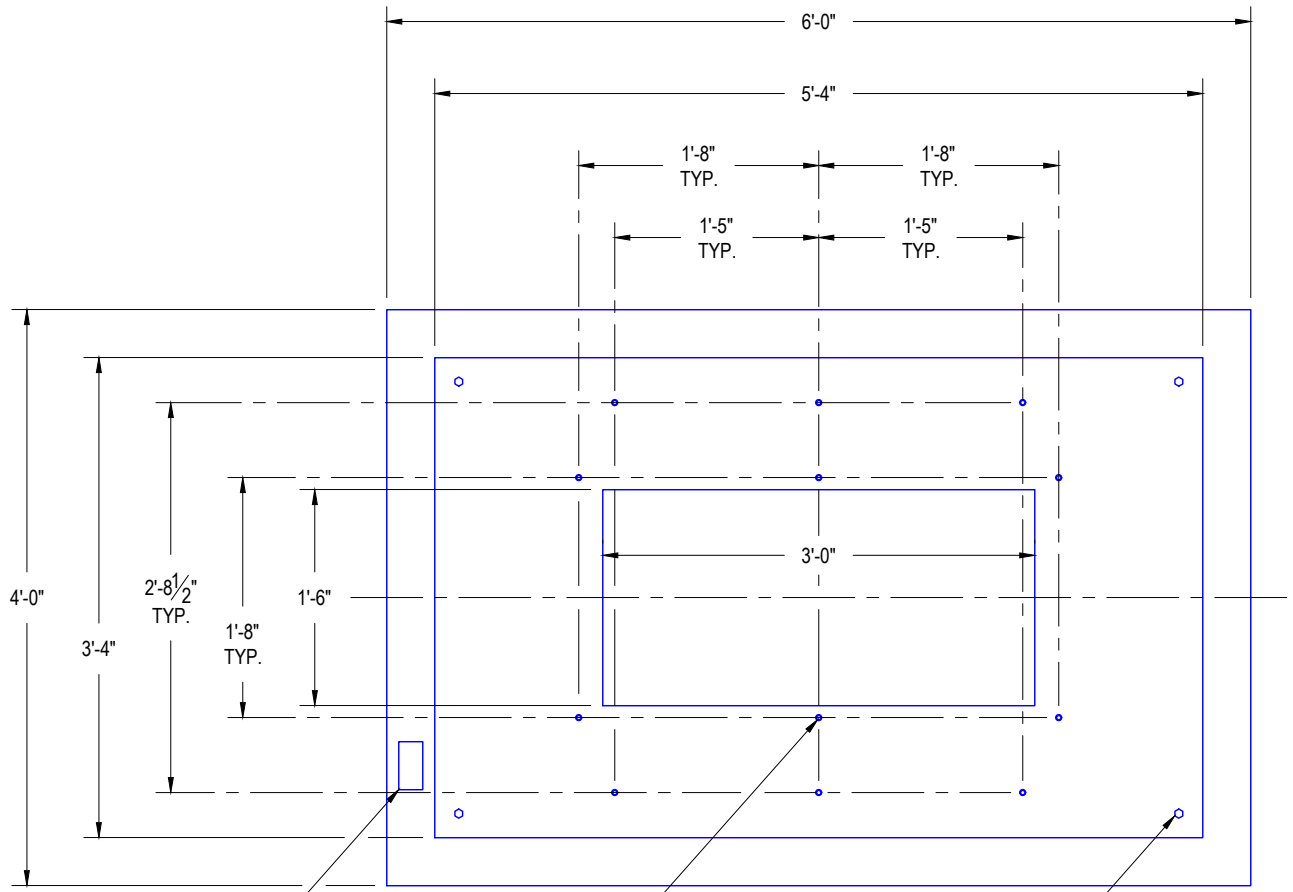
FULL TRAFFIC BOX COVER  
FOR 48" X 72"

STANDARD NO.:  
UVC1.2.9



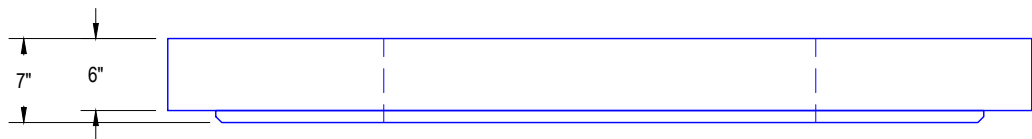
**NOTES:**

- A. "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.
- (B) "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.
- (C) A SPREADER BAR SHALL BE USED. THE SPREAD SHALL BE EQUAL TO THE DISTANCE BETWEEN LIFT POINTS TO MAINTAIN A 90° ANGLE. ANY DEVIATION OF SPREAD DIMENSION SHALL BE APPROVED BY A LICENSED CIVIL ENGINEER PRIOR TO USE. THE RIGGING MUST BE DESIGNED TO EQUALIZE THE LOAD ON ALL FOUR LEGS AND LIFT PERPENDICULAR TO WALLS.
- (D) 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.)
- E. NOT ALL APPLICABLE REGULATIONS ARE NOTED.
- F. CONCRETE BOXES ARE 6'-0" LONG X 4'-0" WIDE BY 3'-6" DEEP.
- (G) MINIMUM LIFTING ANGLE BETWEEN THE SLING AND EQUIPMENT SURFACE SHALL BE APPROXIMATELY 60°.



NAMEPLATE      1/2" INSERT, TYP. (12 TOTAL)      3/4" LIFTING INSERT W/ ALLEN HEAD BOLTS

**PLAN VIEW**



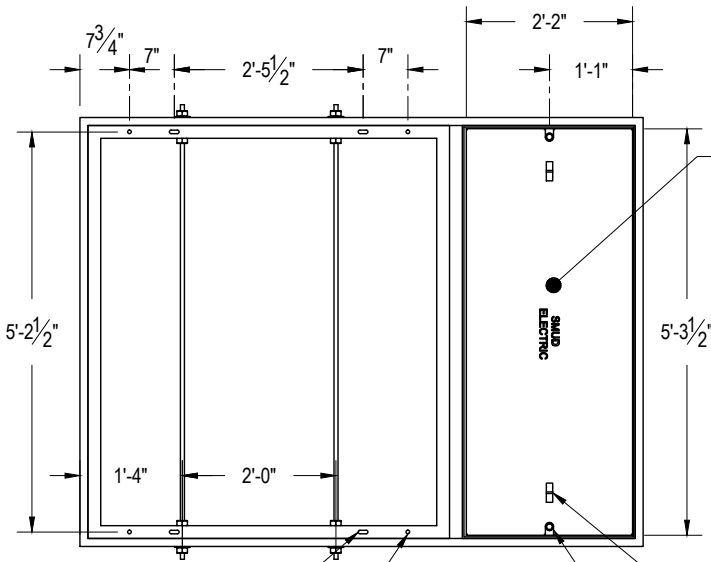
**SIDE VIEW**

**NOTES:**

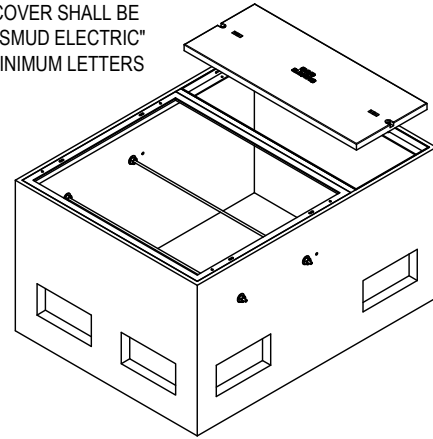
- A. THE CONCRETE COMPRESSIVE STRENGTH SHALL BE 3000 PSI IN 28 DAYS.
- B. THE DEFORMED REINFORCING STEEL SHALL BE PER ASTM A615 GR. 60.
- C. THE PAD SHALL HAVE FOUR (4) 3/4" THREADED INSERTS FOR LIFTING EYES LOCATED ONE IN EACH CORNER APPROXIMATELY 6" FROM EACH SIDE. THE INSERTS SHALL BE FILLED WITH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

	ESR: T007	ESR PG. NO.: C-18	REV. DATE: MARCH 2023	REV. NO.: 4
	<b>T-TAP COVER</b> <b>48" X 72"</b>		<b>STANDARD NO.:</b> <b>UVC1.2.5</b> PAGE 1 OF 1	

SMUD STOCK CODE:10003736



ACCESS COVER SHALL BE MARKED "SMUD ELECTRIC" WITH 1" MINIMUM LETTERS  
 (A) (B)



ISOMETRIC VIEW

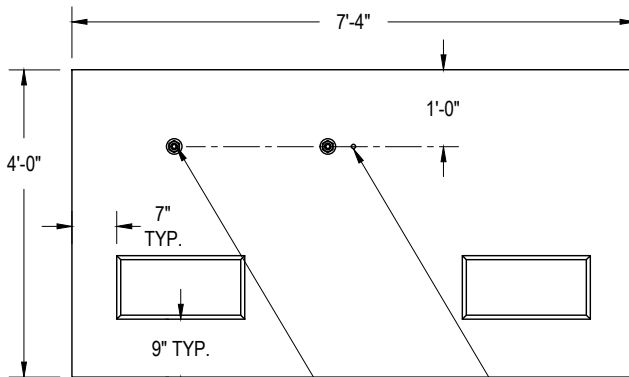
(H) Ø<sup>9</sup>/<sub>16</sub>" X 1 1/2" SLOT, TYP (4 TOTAL)

(H) Ø<sup>9</sup>/<sub>16</sub>" HOLE, TYP

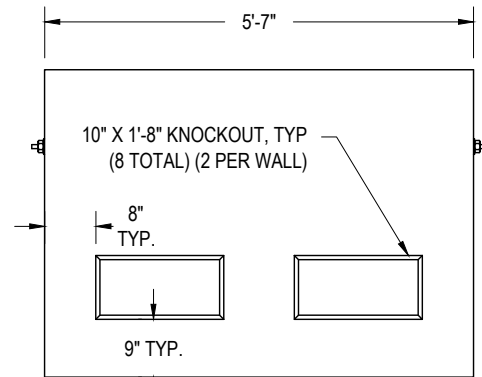
LIFTING PIN, TYP (2 TOTAL)

PENTA HEAD BOLT (F)

PLAN VIEW



FRONT VIEW



SIDE VIEW

Ø<sup>1</sup>/<sub>16</sub>" LIFTING HOLE, TYP (2 TOTAL) (E)

Ø<sup>5</sup>/<sub>8</sub>" COPPER CLAD GROUND ROD, TYP (2 TOTAL)  
 RODS TO BE EXTENDED 2" FROM BOX WALL FOR GROUNDING

NOTES:

- (A) THE ACCESS COVER SHALL BE RATED FOR PEDESTRIAN TRAFFIC LOADING.
- (B) THE TOP OF THE ACCESS COVER SHALL HAVE A MINIMUM COEFFICIENT OF FRICTION OF 0.60 WHEN TESTED PER ASTM C1028.
- (C) THE HANDHOLE SHALL BE PERMANENTLY MARKED WITH CORRECT WEIGHT, VENDOR'S NAME, AND PART NUMBER.
- (D) 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.
- (E) THERE SHALL BE TWO LIFTING HOLES LOCATED AT THE BALANCE POSITION WITH THE ACCESS COVER INSTALLED.
- (F) THE ACCESS COVER SHALL BE SECURED BY 1/2" - 6 COIL THREAD STAINLESS STEEL PENTA HEAD BOLTS WITH A FLOATING REPLACEABLE NUT.
- (G) THE HANDHOLE SHALL BE PRE-ASSEMBLED AND SHIPPED AS A COMPLETE UNIT, PALLETIZED ON A FLAT BED TRUCK FOR EASE OF UNLOADING.
- (H) THE CENTERLINE OF THE HOLES AND SLOTS SHALL BE LOCATED 2 1/4" FROM THE OUTSIDE EDGE OF THE BOX.



ESR: T007

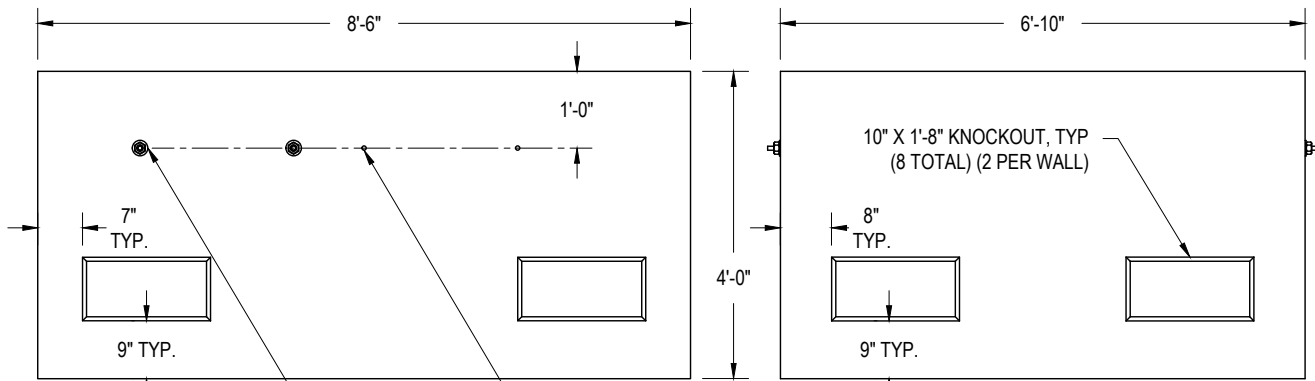
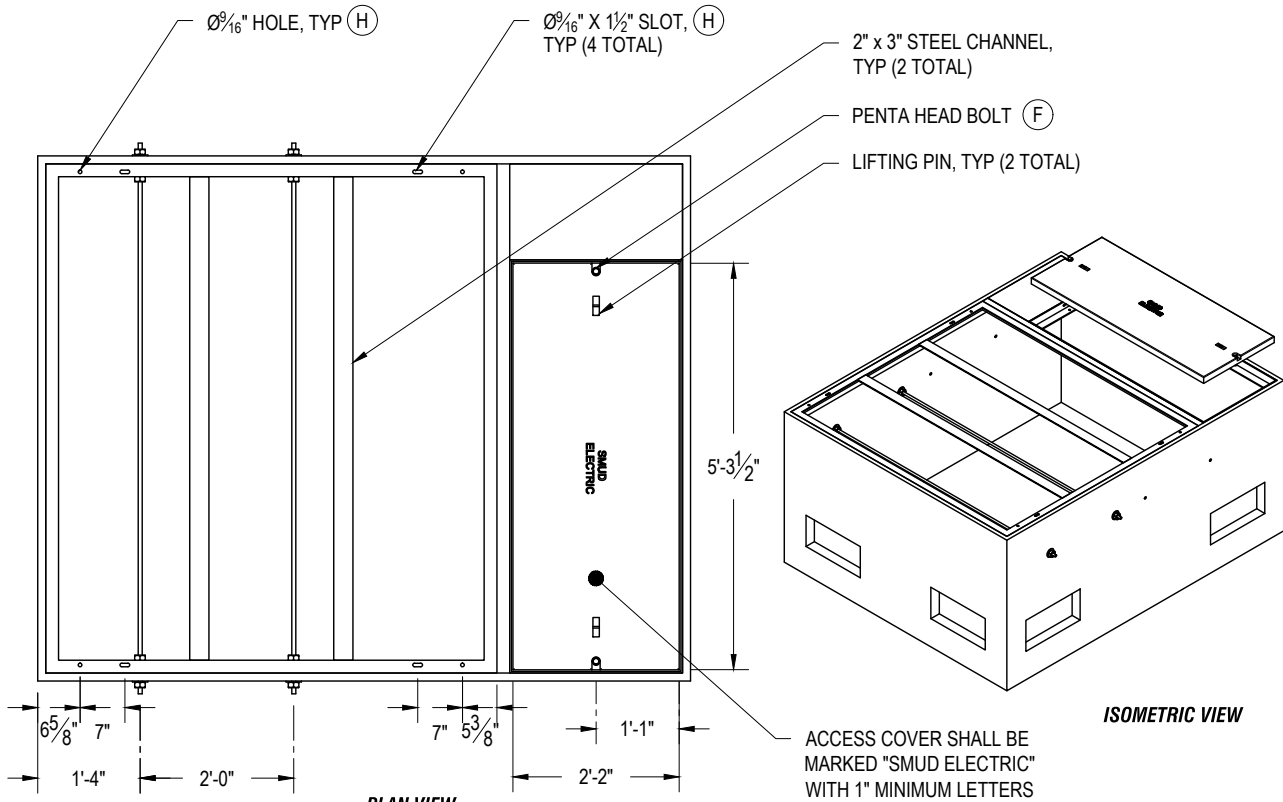
ESR PG. NO.: C-19

REV. DATE: MARCH 2023  
 REV. NO.: 5

RPM HANDHOLE BOX  
 88" X 67" X 48"  
 FOR 12KV SWITCHGEAR

STANDARD NO.:  
 UVC1.4

PAGE 1 OF 1



SMUD STOCK CODE:10008774

**NOTES:**

- (A) THE ACCESS COVER SHALL BE RATED FOR PEDESTRIAN TRAFFIC LOADING.
- (B) THE TOP OF THE ACCESS COVER SHALL HAVE A MINIMUM COEFFICIENT OF FRICTION OF 0.60 WHEN TESTED PER ASTM C1028.
- (C) THE HANDHOLE SHALL BE PERMANENTLY MARKED WITH CORRECT WEIGHT, VENDOR'S NAME, AND PART NUMBER.
- (D) 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.
- (E) THERE SHALL BE TWO LIFTING HOLES LOCATED AT THE BALANCE POSITION WITH THE ACCESS COVER INSTALLED.
- (F) THE ACCESS COVER SHALL BE SECURED BY 1/2" - 6 COIL THREAD STAINLESS STEEL PENTA HEAD BOLTS WITH A FLOATING REPLACEABLE NUT.
- (G) THE HANDHOLE SHALL BE PRE-ASSEMBLED AND SHIPPED AS A COMPLETE UNIT, PALLETIZED ON A FLAT BED TRUCK FOR EASE OF UNLOADING.
- (H) THE CENTERLINE OF THE HOLES AND SLOTS SHALL BE LOCATED 2 1/2" FROM THE OUTSIDE EDGE OF THE BOX.

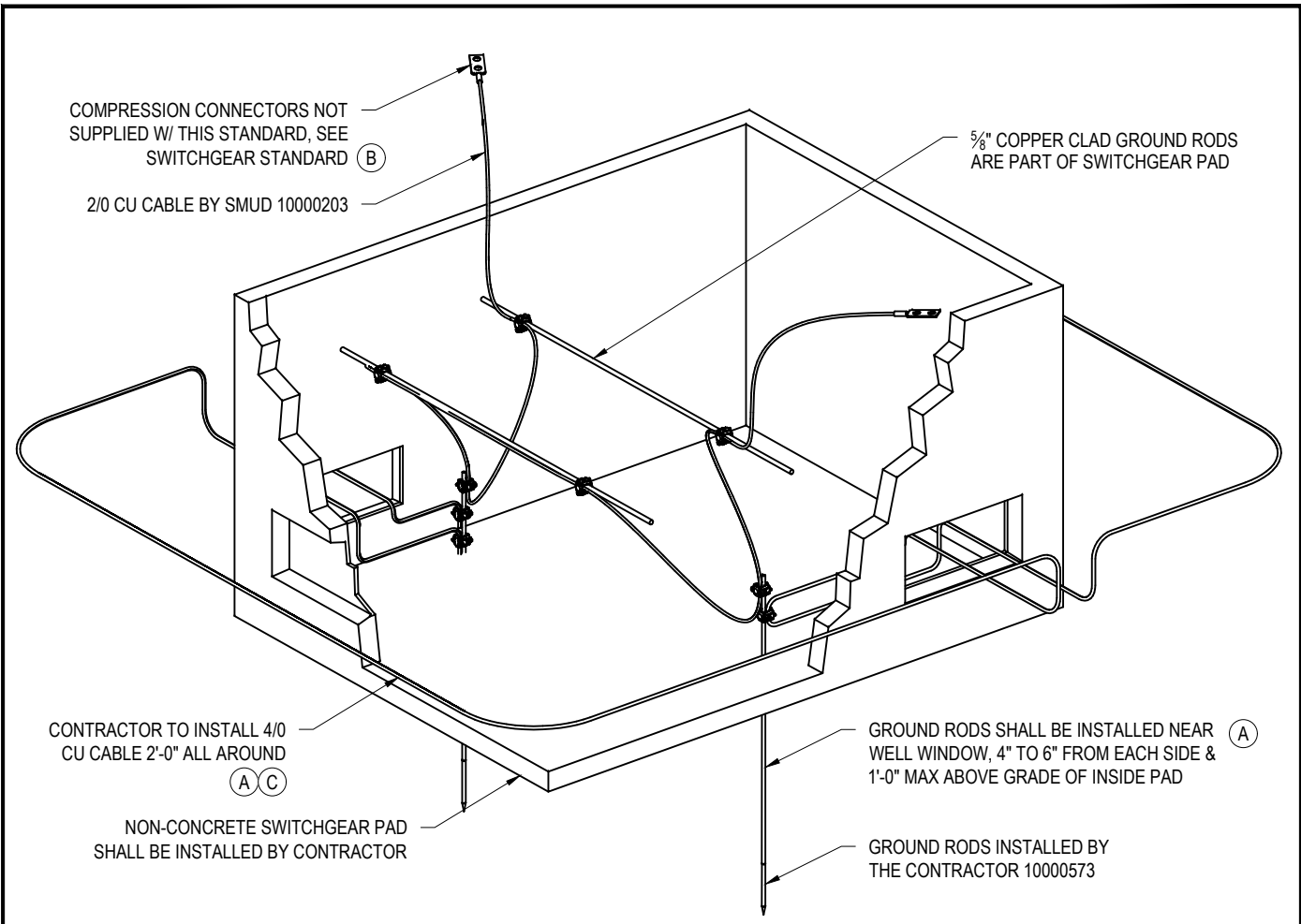


ESR: T007 ESR PG. NO.: C-20

**RPM HANDHOLE BOX 102" X 82" X 48"**  
**FOR 21KV SWITCHGEAR & 12KV FEEDER TIE SWITCHES**

REV. DATE: REV. NO.:  
 MARCH 2023 6

STANDARD NO.:  
**UVC1.5**  
 PAGE 1 OF 1



CONTRACTOR TO INSTALL 4/0 CU CABLE 2'-0" ALL AROUND (A)(C)

NON-CONCRETE SWITCHGEAR PAD SHALL BE INSTALLED BY CONTRACTOR

GROUND RODS SHALL BE INSTALLED NEAR WELL WINDOW, 4" TO 6" FROM EACH SIDE & 1'-0" MAX ABOVE GRADE OF INSIDE PAD (A)

GROUND RODS INSTALLED BY THE CONTRACTOR 10000573

SWITCHGEAR PAD OUTLINE

GROUND ROD

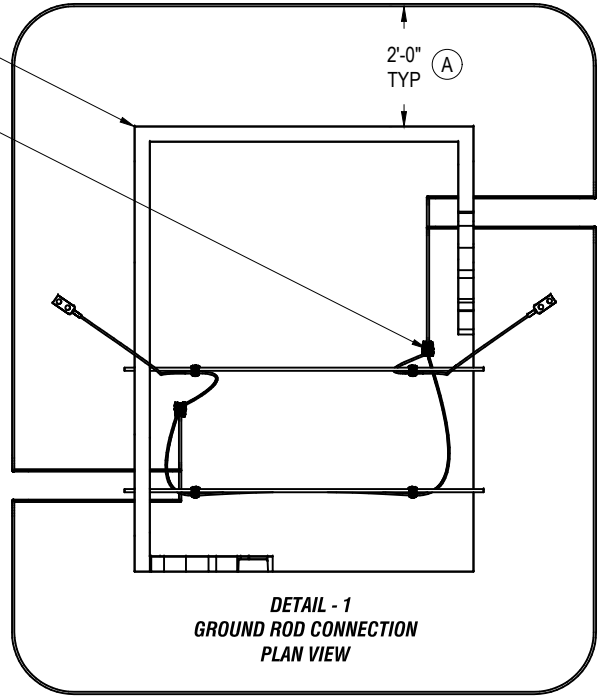
2'-0" TYP (A)

**NOTES:**

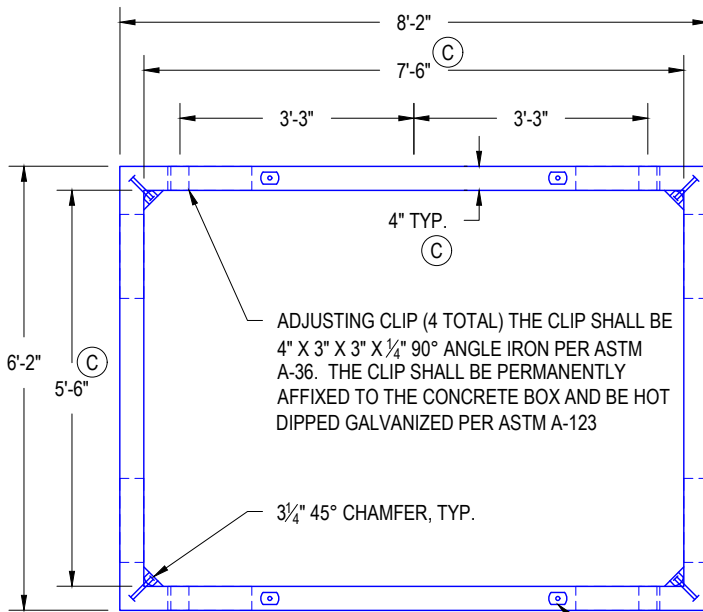
- (A) THE CONTRACTOR SHALL INSTALL 4/0 AWG 19 STRAND CU GROUND WIRE AROUND THE PERIMETER 2'-0" DEEP & 2'-0" OUT FROM BOX WALL & BRING 2'-6" LONG TAILS THROUGH THE KNOCKOUTS ON THE SIDES OF BOX.
- (B) THE CONTRACTOR SHALL INSTALL THE GROUND RODS, 2/0 CU CABLE, & CONNECTORS.
- (C) IF THE HANDHOLES ARE 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.

QTY	MATERIAL DESCRIPTION	SAP
50'-0"	CABLE BARE CU SD 2/0 AWG 7 STRAND	10000203
2 EA	ROD GROUND COPPER CLAD Ø5/8 8'-0"	10000573
70'-0"	CABLE BARE CU SD 4/0 AWG 19 STRAND	10000204
9 EA	CONN U BOLT GRND CU 2/0 - 4/0 CBL Ø5/8 ROD	10009464

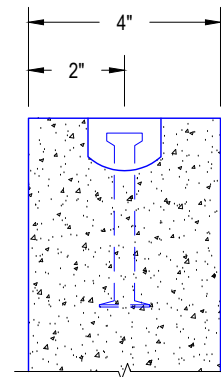
THIS MATERIAL IS NOT PROVIDED AS PART OF THIS STANDARD



**DETAIL - 1  
GROUND ROD CONNECTION  
PLAN VIEW**

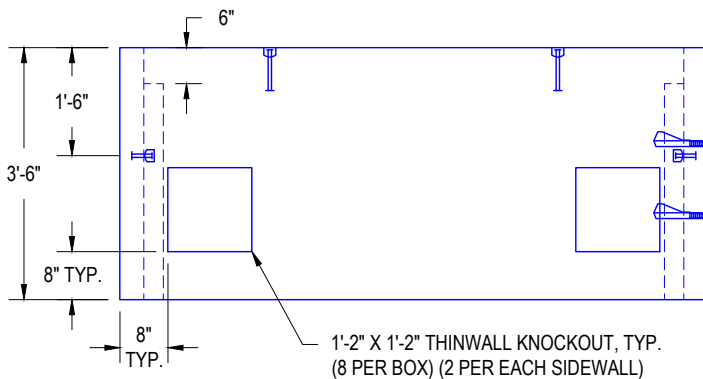


TOP VIEW

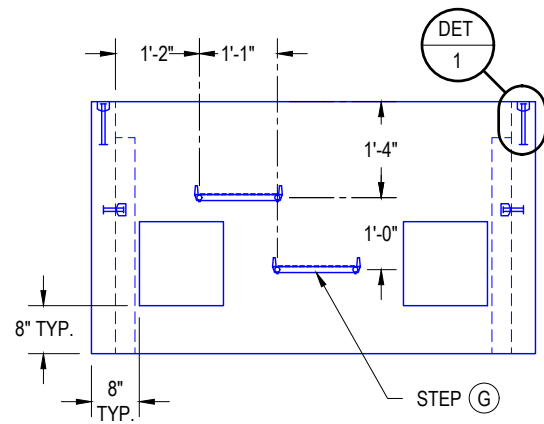


DETAIL - 1

LIFT ANCHOR, TYP.  
(4 TOTAL)  
(D) (E) (F)



FRONT VIEW



SIDE VIEW

NOTES:

- A. FOR PROPER RIGGING, SEE RG1.1.
- B. OPEN BOTTOM CONCRETE BOX SHALL BE DESIGNED AND CONSTRUCTED FOR FULL DELIBERATE (H20-44) TRAFFIC LOADING.
- (C) THE OUTSIDE DIMENSIONS AND THE TOP DIMENSIONS OF THE BOX SHALL BE PER THIS DRAWING. THE WALLS MAY TAPER SUCH THAT THE INSIDE OPENING AT THE BOTTOM IS SMALLER THAN THE INSIDE OPENING AT THE TOP.
- (D) 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.
- (E) LIFT ANCHORS SHALL BE POSITIONED IN THE CENTERLINE OF THE WALL OR CHAMFER. MISALIGNMENT (OFF CENTERLINE) OF THE ANCHOR FOOT MAY RESULT IN A DRASTIC REDUCTION OF THE SAFE WORKING LOAD. USE SPACERS AND/OR TIE THE ANCHOR TO REBAR TO ASSURE PROPER POSITIONING.
- (F) RECESS HOLE SHALL BE CREATED BY USING THE SC-12 RECESS FORMER FOR A TWO TON ANCHOR FROM MEADOW BURKE PRODUCTS, OR APPROVED EQUAL.
- (G) BOX SHALL INCLUDE TWO STEPS (BOWCO INDUSTRIES NO. 93813R, OR APPROVED EQUAL) ON ONE SHORT WALL.
- H. FOR BOX COVERS, SEE UVC1.6.1 OR UVC1.6.5.
- I. MANUFACTURER SHALL PAINT/STENCIL CORRECT WEIGHT AND CATALOG NUMBER INSIDE AND OUTSIDE OF THE BOX.
- J. SMUD STOCK CODE # 10009740.



ESR: T007

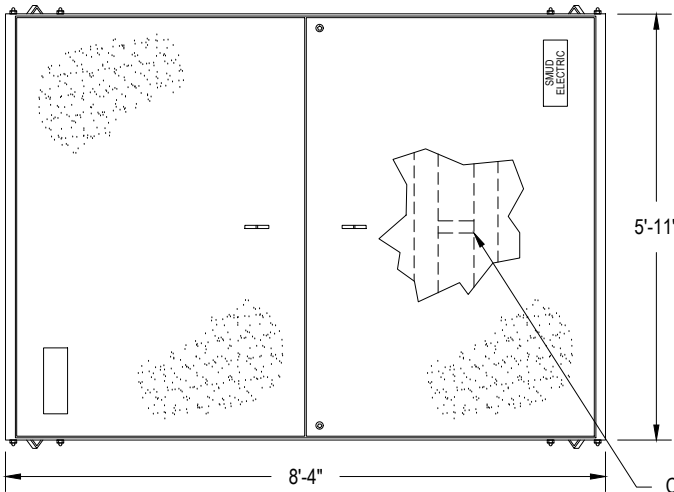
ESR PG. NO.: C-22

REV. DATE: MARCH 2023  
REV. NO.: 12

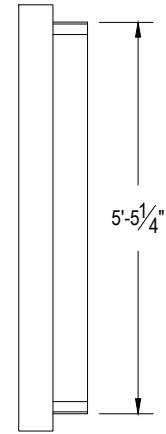
OPEN BOTTOM CONCRETE BOX  
74" X 98" X 42"

STANDARD NO.:  
UVC1.6



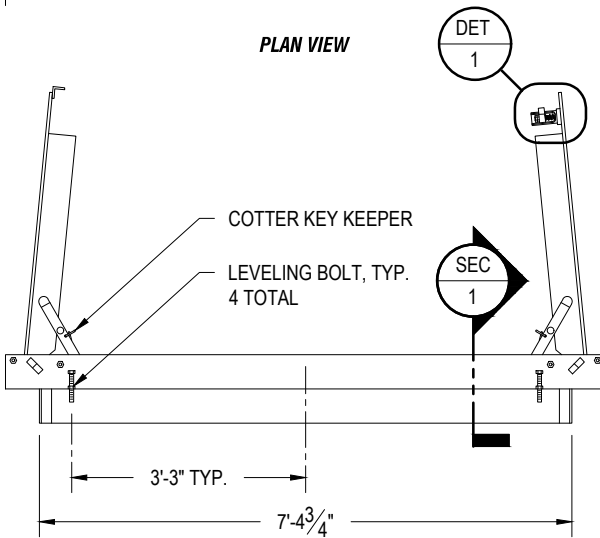


PLAN VIEW



SIDE VIEW

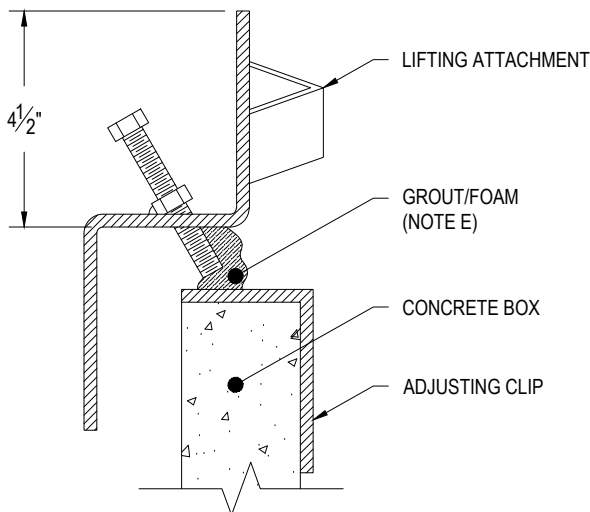
COVER DOOR HANDLE ON UNDERSIDE OF DOOR, TYP. PER DOOR



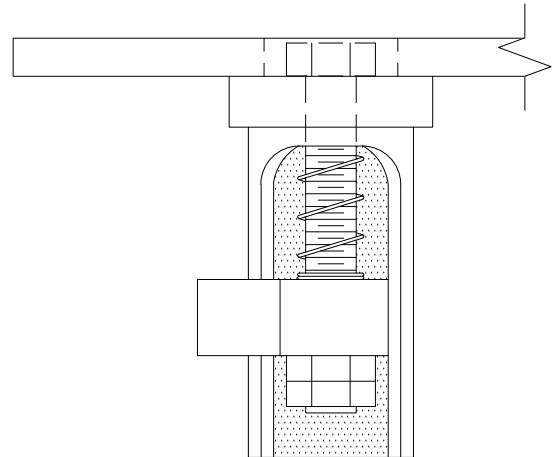
FRONT VIEW

NOTES:

- A. ADJUSTING CLIPS SHALL BE USED WHEN MAKING GRADE ADJUSTMENTS.
- B. 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.
- C. A MINIMUM OF 25 MIL OF THE SURFACE SHALL BE ETCHED PRIOR TO ADDING SLIPNOT MATERIAL.
- D. 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.
- E. STRUCTURAL GROUT OR FOAM SEALANT MUST BE USED AS DIRECTED BY THE SMUD INSPECTOR.
- F. SHOULD BE USED IN LANDSCAPE AREAS ONLY.
- G. SMUD STOCK CODE #10012132.
- H. MANUFACTURER SHALL STENCIL NAME AND WEIGHT ON COVER.



SECTION - 1  
LEVELING BOLT



DETAIL - 1  
LOCKING ASSEMBLY



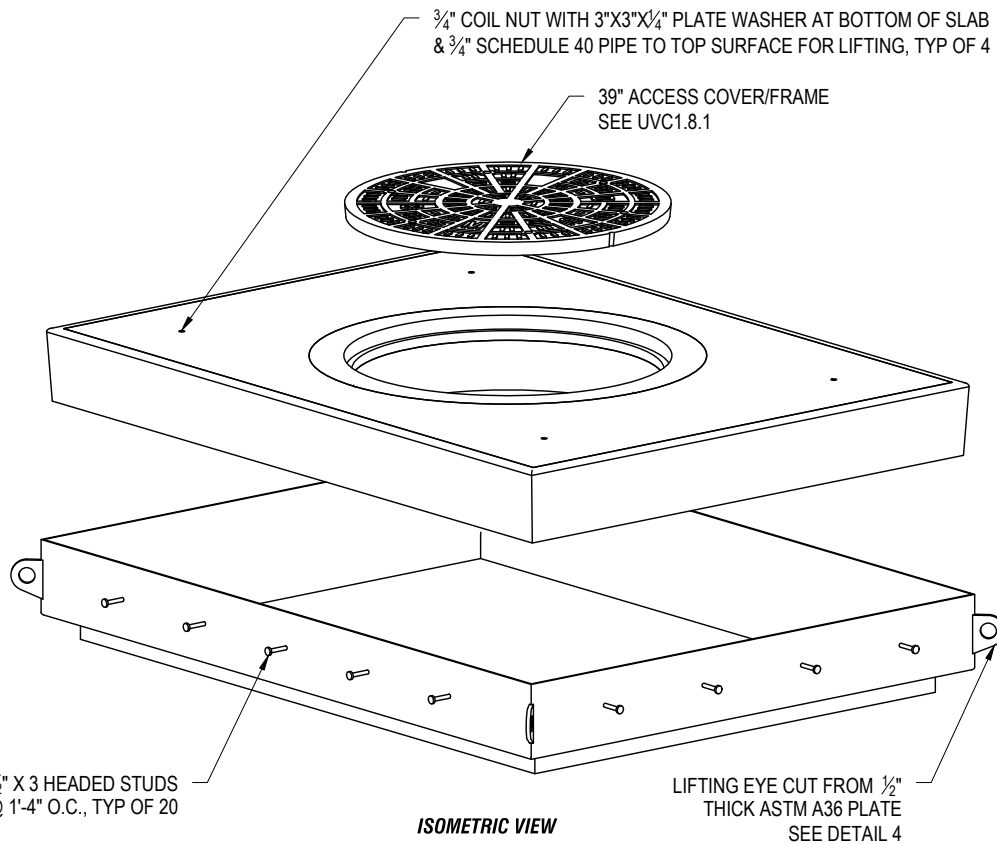
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REV. DATE: REV. NO.:  
JAN 2020 7

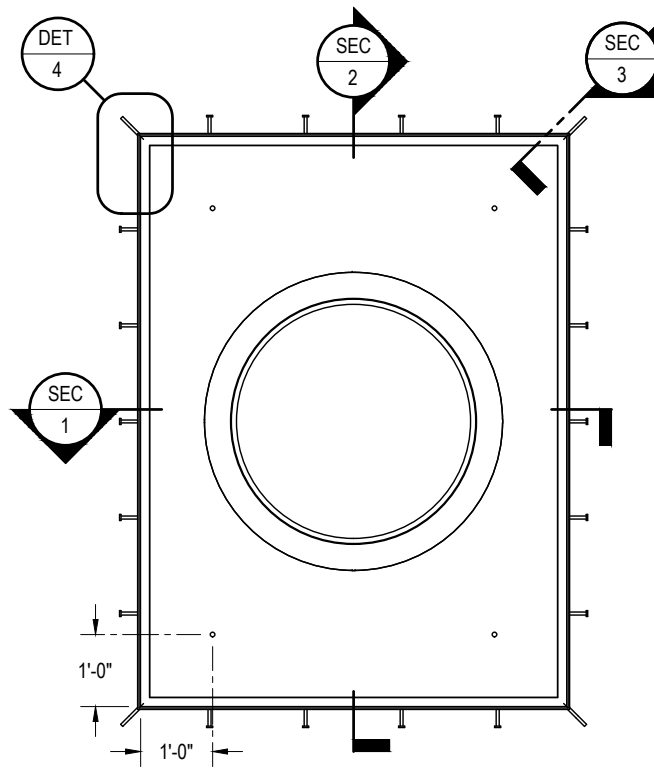
SPRING ASSIST COVER  
FOR 6'-2" X 8'-2" BOX

STANDARD NO.:  
UVC1.6.1



**NOTES:**

- A. ADJUSTING CLIPS SHALL BE USED WHEN MAKING GRADE ADJUSTMENTS.
- B. WHEN MAKING GRADE ADJUSTMENTS STRUCTURAL GROUT MUST BE USED FOR MAINTAINING STRUCTURAL INTEGRITY.
- C. CONCRETE ENCASE COVER WITH 3,000 PSI CONCRETE 1'-0"x1'-0" DEPTH (MIN.) OR TO DEPTH OF PAVEMENT.
- D. 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 & PROCESS USED. ALL FILLET & PENETRATION WELDS SHALL BE 100% VISUAL INSPECTED IN ACCORDANCE WITH ANSI/AWS D1.1 BY A CERTIFIED WELDING INSPECTOR.
- E. THE LIFTING EYE SHALL BE RATED TO MEET OR EXCEED ALL REGULATIONS PERTAINING TO THE RIGGING OF LIFTING OF PRECAST CONCRETE ITEMS.
- F. SMUD STOCK CODE 10012149.
- G. MANUFACTURE SHALL STENCIL NAME & WEIGHT ON COVER.



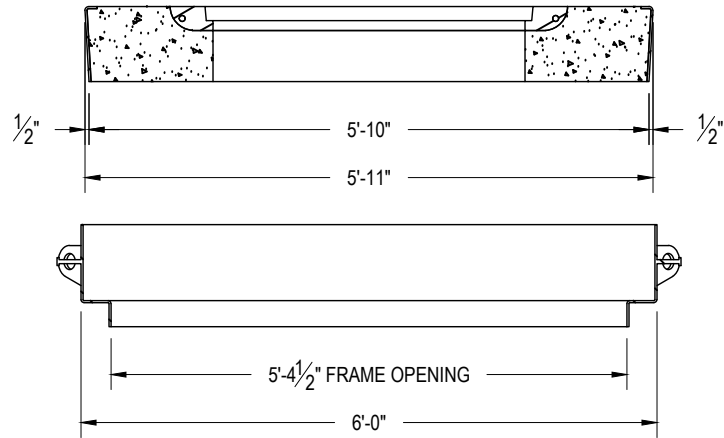
ESR: T007

ESR PG. NO.: C-24A/B

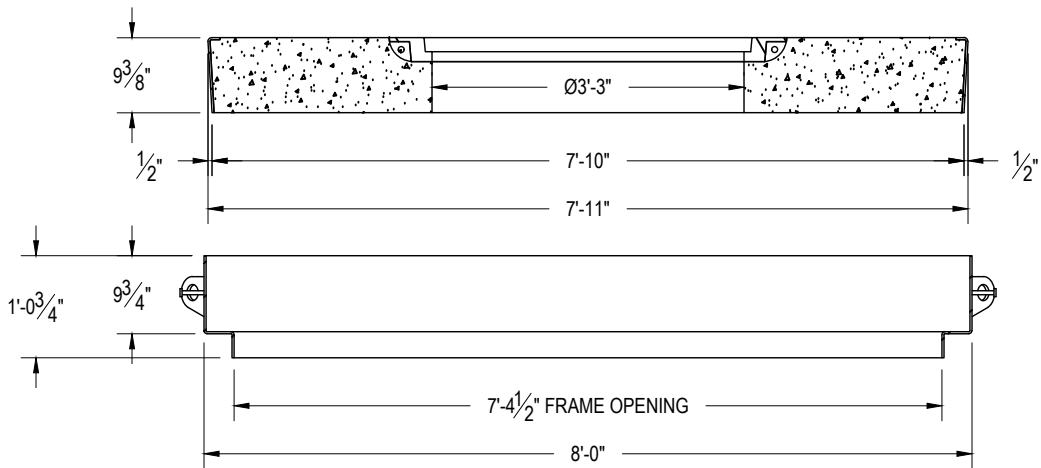
REV. DATE: MARCH 2023  
REV. NO.: 3

**FULL TRAFFIC BOX COVER  
FOR 74" X 98"**

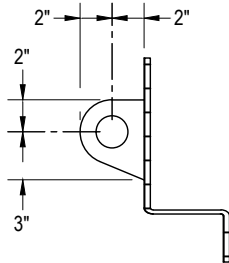
STANDARD NO.:  
**UVC1.6.5**



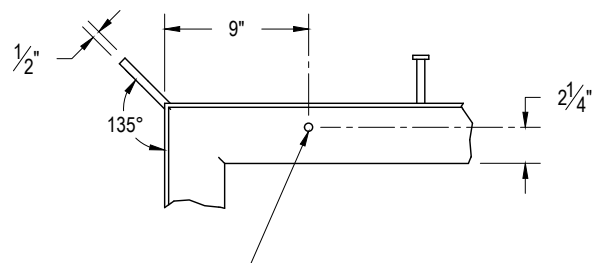
SECTION - 1



SECTION - 2



SECTION - 3



1/2" X 13 DRILLED & TAPPED OPENING FOR TEMPORARY LEVEL UP BOLTS, TYP OF 4

DETAIL - 4



ESR: T007

ESR PG. NO.: C-24A/B

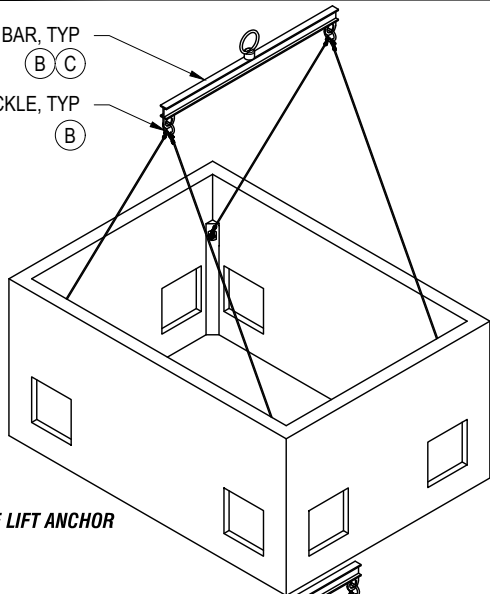
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REV. NO.: 3

FULL TRAFFIC BOX COVER  
FOR 74" X 98"

STANDARD NO.:  
UVC1.6.5

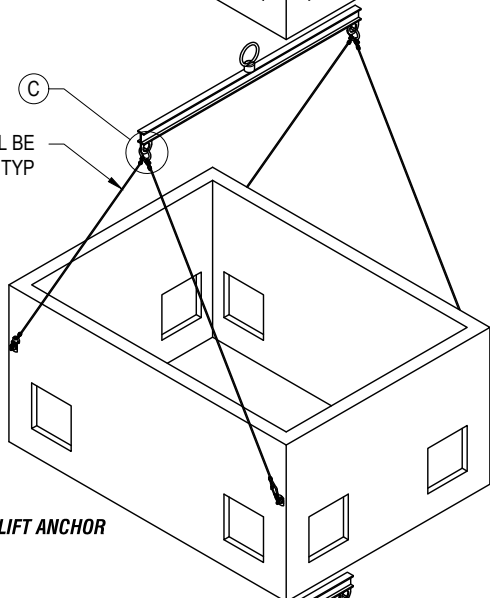
PAGE 2 OF 2

SPREADER BAR, TYP  
 (B) (C)  
 SHACKLE, TYP  
 (B)



**INSIDE LIFT ANCHOR**

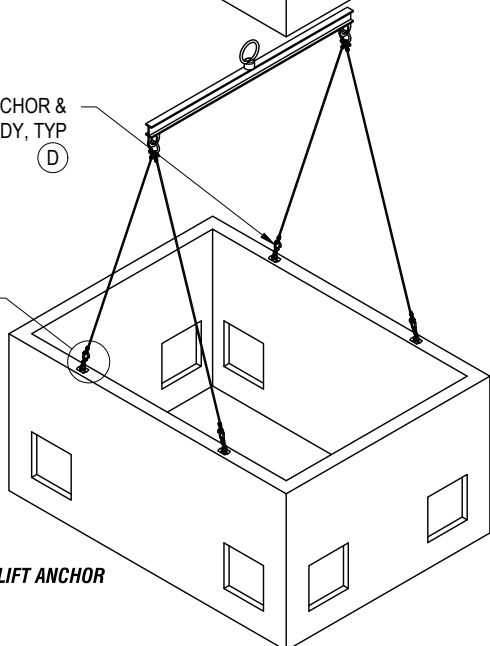
(C)  
 SLING SHALL BE  
 6'-0" MIN, TYP



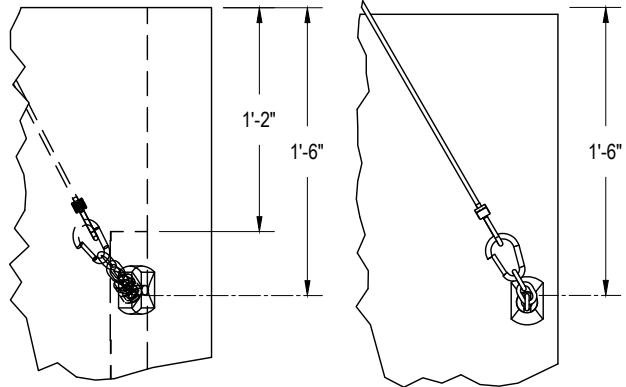
**SIDE LIFT ANCHOR**

LIFTING ANCHOR &  
 LIFTING BODY, TYP  
 (D)

(G)

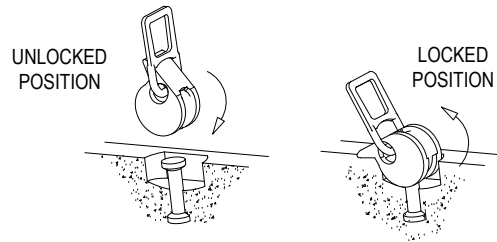


**TOP LIFT ANCHOR**



**DETAIL - 1  
 INSIDE ANCHOR POSITION**

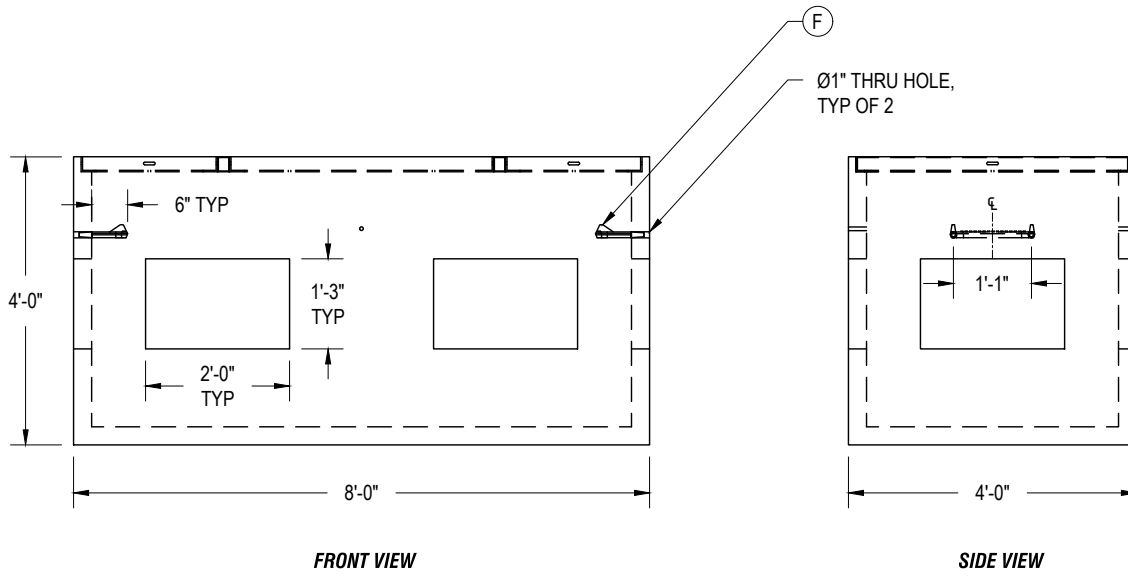
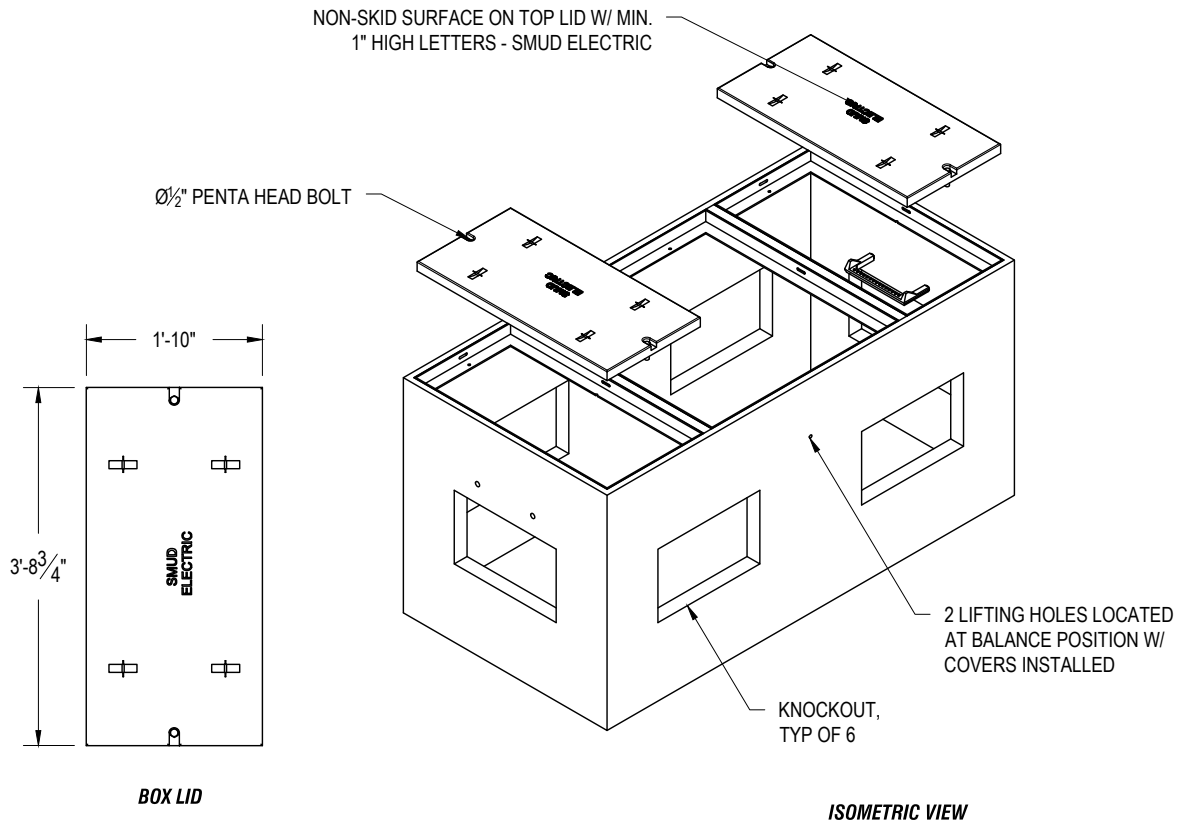
**DETAIL - 2  
 SIDE ANCHOR POSITION**



**DETAIL - 3  
 LIFT ANCHOR & LIFT BODY**

**NOTES:**

- A. "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.
- (B) "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.
- (C) A SPREADER BAR SHALL BE USED. THE SPREAD SHALL BE EQUAL TO THE DISTANCE BETWEEN LIFT POINTS TO MAINTAIN A 90° ANGLE. ANY DEVIATION OF SPREAD DIMENSION SHALL BE APPROVED BY A LICENSED CIVIL ENGINEER PRIOR TO USE. THE RIGGING MUST BE DESIGNED TO EQUALIZE THE LOAD ON ALL FOUR LEGS AND LIFT PERPENDICULAR TO WALLS.
- (D) 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.)
- E. NOT ALL APPLICABLE REGULATIONS ARE NOTED.
- F. CONCRETE BOXES ARE 8'-2" LONG X 6'-0" WIDE BY 4'-0" DEEP.
- (G) MINIMUM LIFTING ANGLE BETWEEN THE SLING AND EQUIPMENT SURFACE SHALL BE APPROXIMATELY 60°.



**NOTES:**

- A. DESIGNED FOR PEDESTRIAN TRAFFIC LOADING.
- B. MANUFACTURER SHALL PAINT/STENCIL CORRECT WEIGHT & CATALOG NUMBER ON EACH BOX.
- C. REPLACON CATALOG NO. 4896 J-BOX-S OR SMUD ENGINEERING APPROVED EQUAL.
- D. ASSEMBLED COMPONENTS MUST BE SECURELY FASTENED TOGETHER FOR SHIPPING & INSTALLATION BY USE OF CORROSION RESISTANT BOLTS OR METAL BANDS.
- E. SMUD STOCK CODE # 10011318 USED WITH ENCLOSURE SECONDARY BUS P.M. SMUD STOCK CODE # 10010041.
- (F). BOX SHALL INCLUDE (2) ONE STEP (MEADOW BURKE NO. 93813R). ONE ON EACH SHORT WALL.



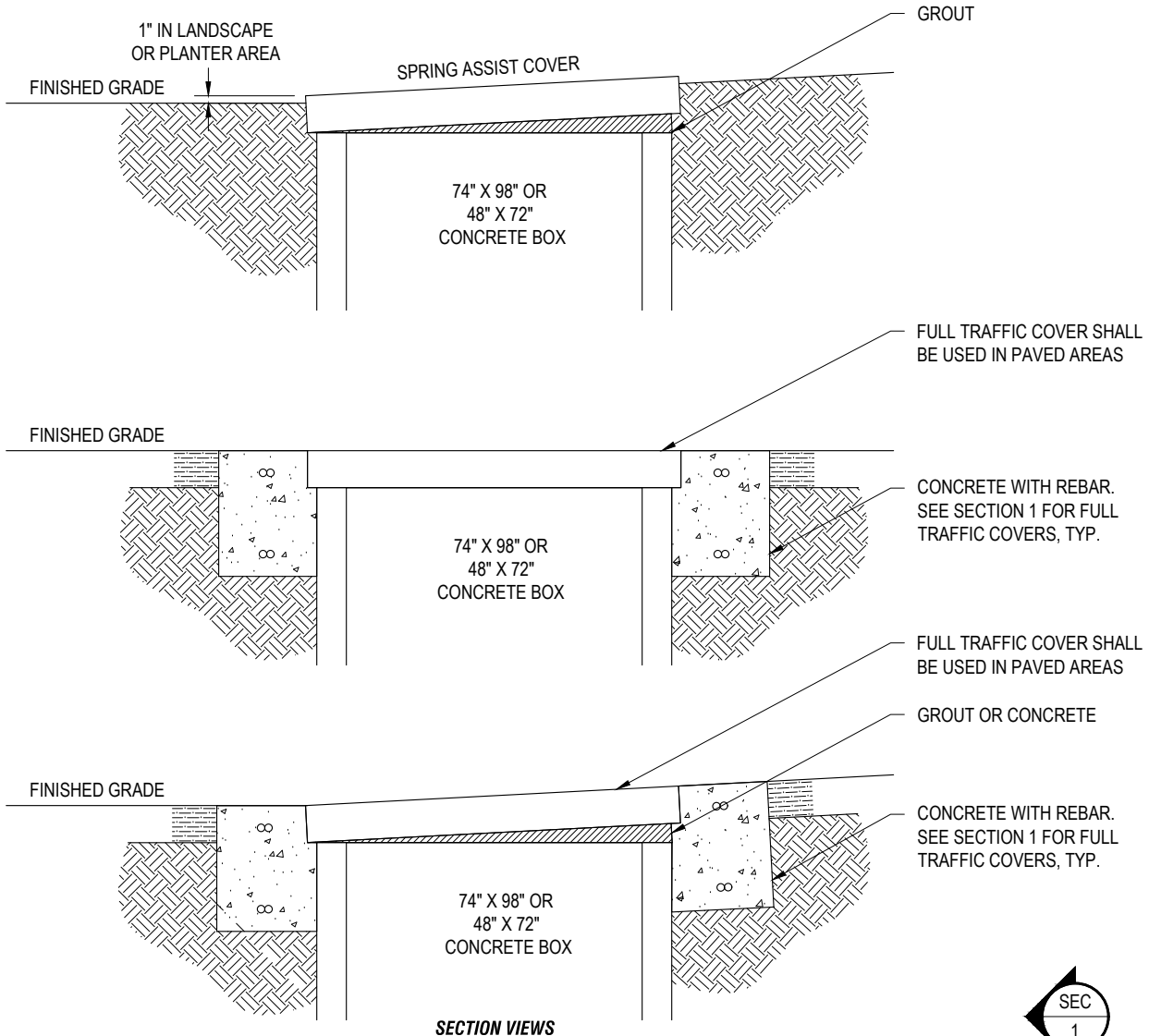
ESR: T007

ESR PG. NO.: C-26

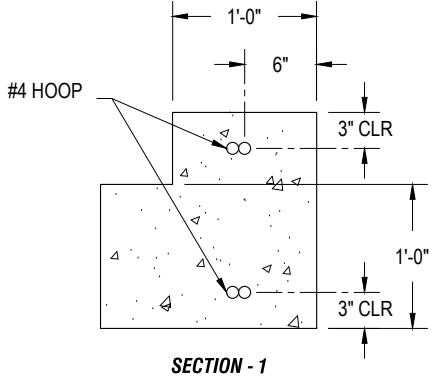
REV. DATE: MARCH 2023  
REV. NO.: 4

**NON-CONCRETE SECONDARY J-BOX  
48" X 96" X 48"**

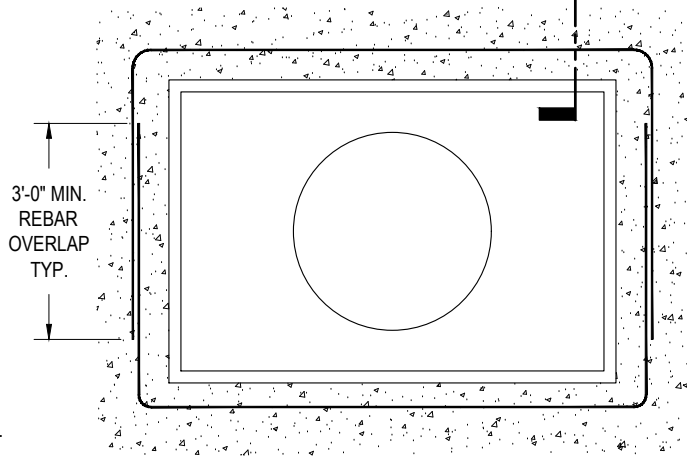
STANDARD NO.:  
**UVC1.7**



**SECTION VIEWS**




**SECTION - 1**

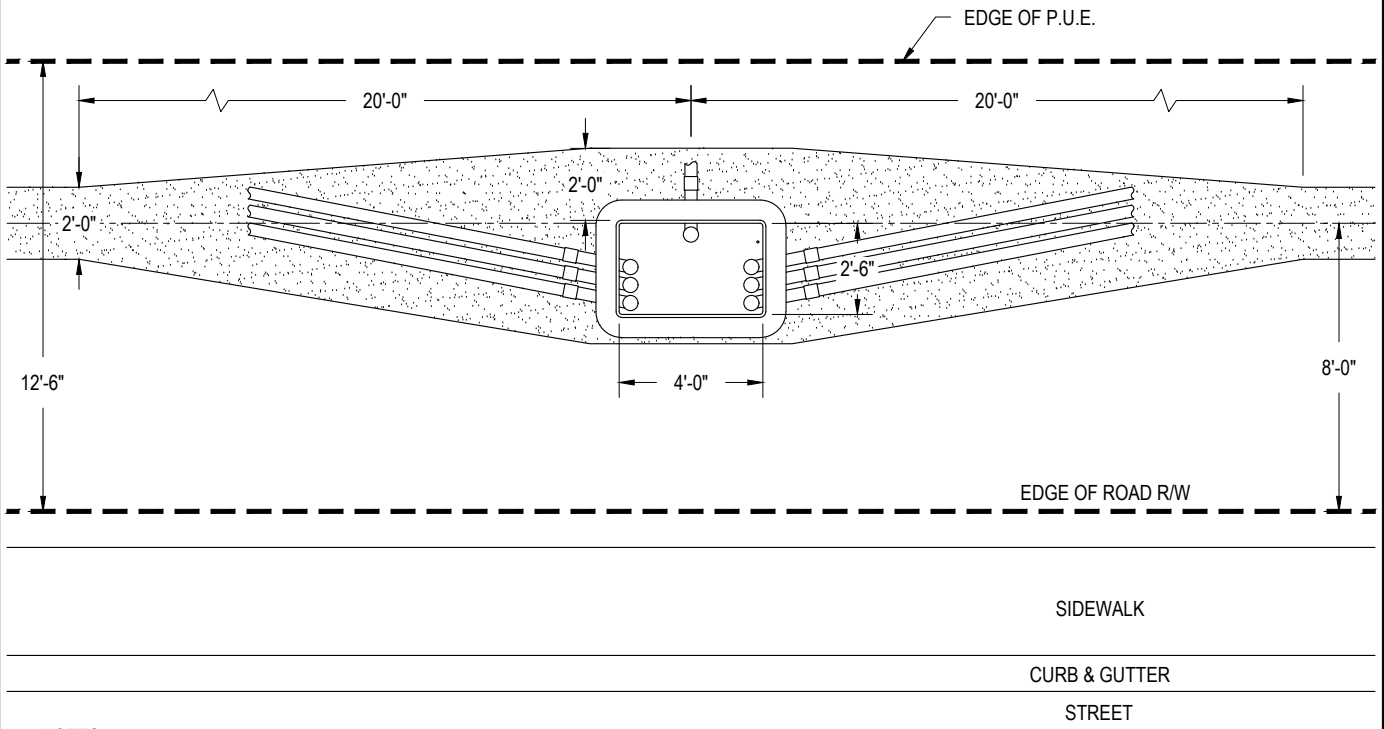
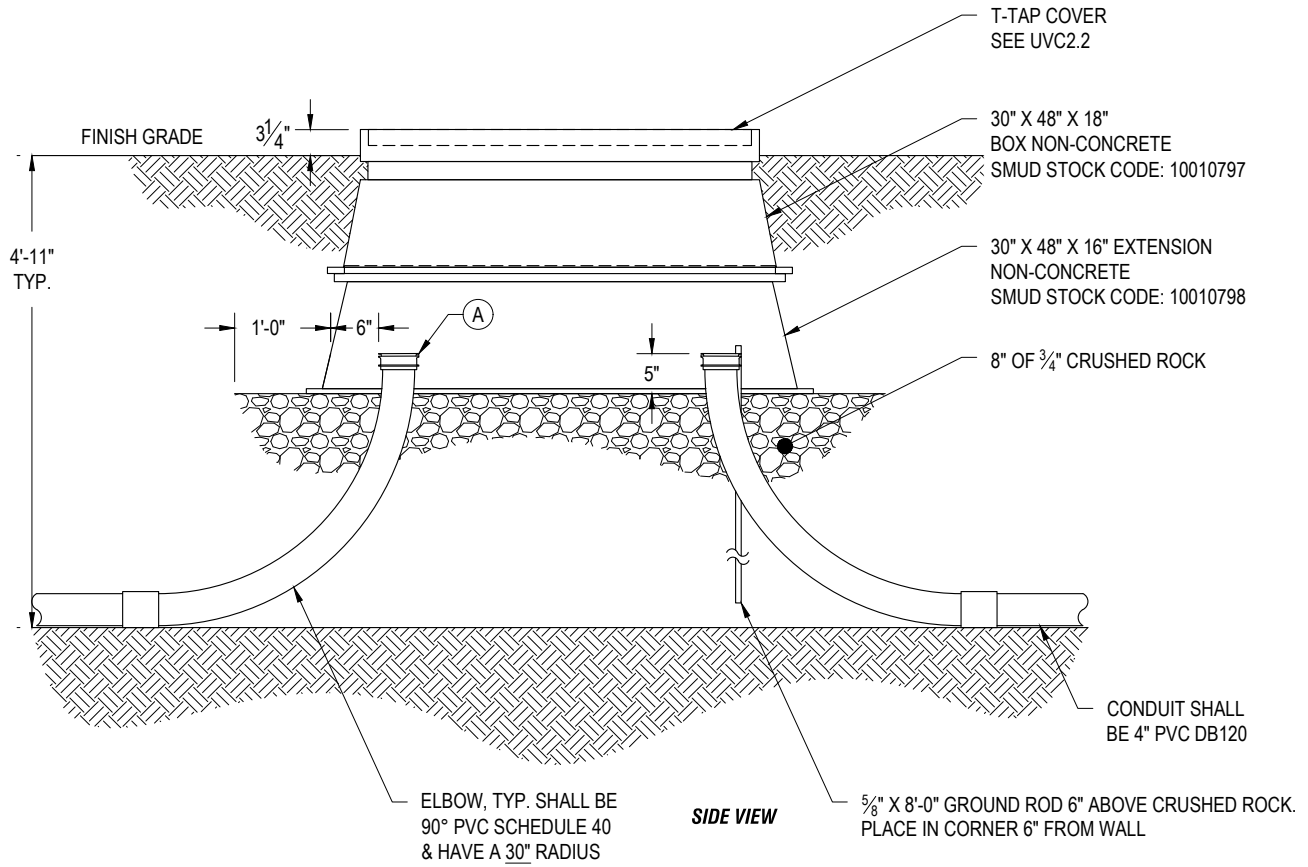


**TOP VIEW**

**NOTES:**


- A. USE PORTLAND EXPANDING (NON-SHRINK), NON-METALLIC GROUT.
- B. CONCRETE ENCASUREMENT TO BE 3000 PSI (5 SACK) MINIMUM.
- C. 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.

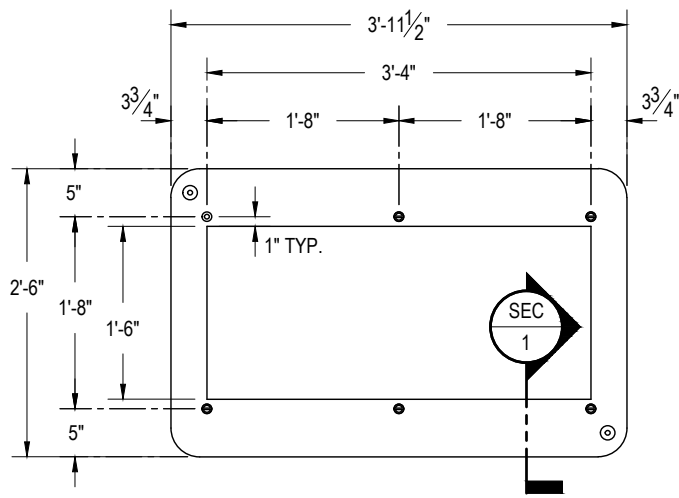
 <p>Sacramento Municipal Utility District</p>	<p>ESR: T007</p>	<p>ESR PG. NO.: C-27</p>	<p>REV. DATE: MARCH 2023</p>	<p>REV. NO.: 6</p>
	<p><b>AT GRADE - COVER INSTALLATION DETAILS</b></p>		<p><b>STANDARD NO.: UVC1.8.3</b></p> <p>PAGE 1 OF 1</p>	



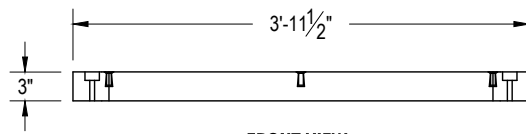
**NOTES:**

- (A) SEE DRAWING U12P3X2 FOR CONDUIT TERMINATION DETAILS.
- B. SEE DRAWING UGA2.5 FOR GROUNDING INSTALLATION.

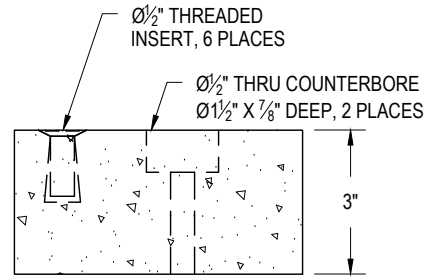
 <p>Sacramento Municipal Utility District</p>	<p>ESR: T007</p>	<p>ESR PG. NO.: C-28</p>	<p>REV. DATE: MARCH 2023</p>	<p>REV. NO.: 11</p>
	<p><b>PRIMARY PULL BOX &amp; T-TAP INSTALLATION</b></p> <p>30" X 48" X 34"</p>		<p>STANDARD NO.:</p> <p><b>UVC2.1</b></p> <p>PAGE 1 OF 1</p>	



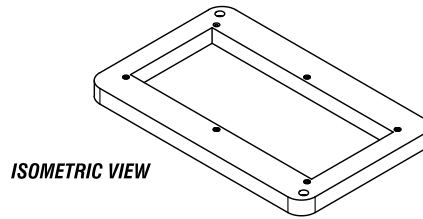
TOP VIEW



FRONT VIEW



SECTION - 1

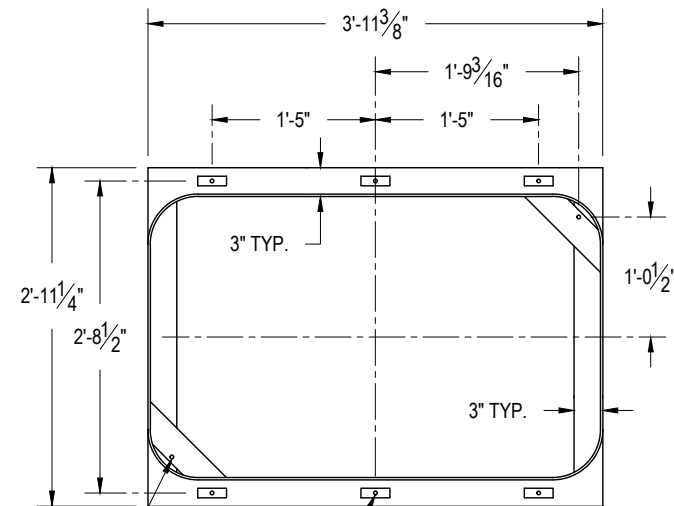


ISOMETRIC VIEW

NOTES:

- A. COVER SHALL BE POLYMER CONCRETE.
- B. SMUD STOCK CODE 10012220.

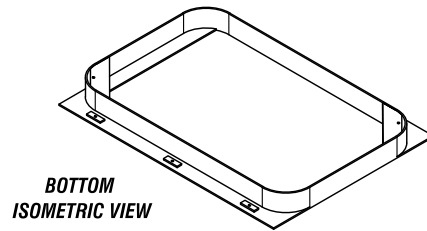
COVER FOR 3-WAY T-TAP



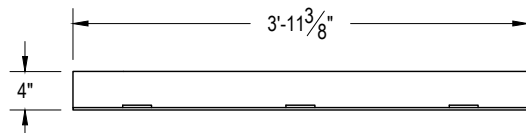
BOTTOM VIEW

Ø 1/2" THRU,  
2 PLACES

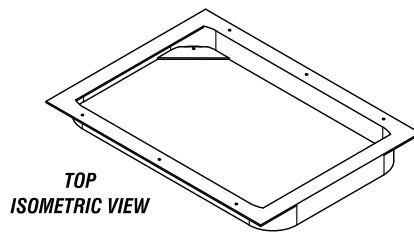
SEE NOTE C



BOTTOM  
ISOMETRIC VIEW



FRONT VIEW



TOP  
ISOMETRIC VIEW

NOTES:

- A. COVER SHALL BE GALVANIZED STEEL.
- B. SMUD STOCK CODE 10020563.
- C. Ø 3/8" MOUNTING HOLE, DRILLED & TAPPED. LOCATED AS SHOWN, TYP.

COVER FOR 4-WAY T-TAP



ESR: T007

ESR PG. NO.: C-29

REV. DATE: REV. NO.:  
MARCH 2023 4

T-TAP COVER FOR  
30" X 48" BOX

STANDARD NO.:  
**UVC2.2**

PAGE 1 OF 1



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.

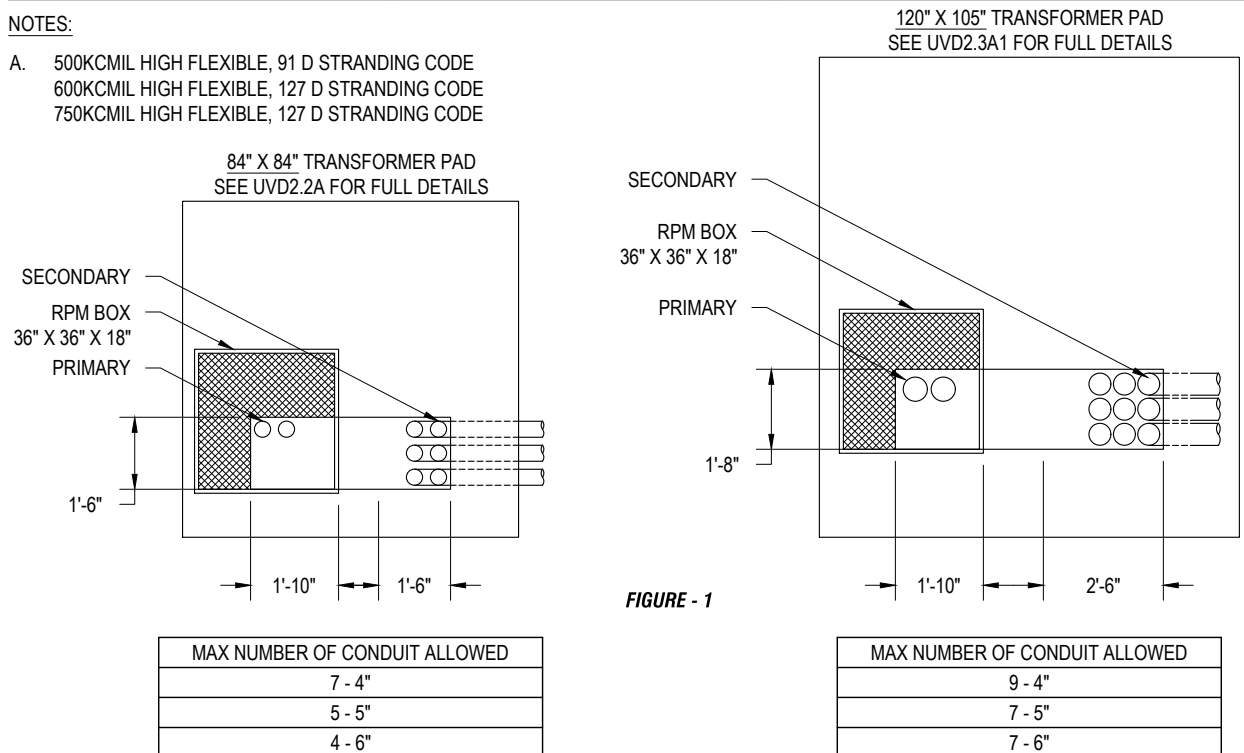
A SECONDARY JUNCTION BOX SHALL BE INSTALLED ADJACENT TO THE TRANSFORMER WHEN THE CUSTOMER'S SECONDARY DESIGN EXCEEDS THE REQUIREMENTS OF TABLE 1, OR THE COMBINED NUMBER AND SIZE OF THE CONDUITS EXCEEDS THE CAPACITY THE OF THE 1'-6" BY 1'-6" OR THE 1'-8" BY 2'-6" OPENINGS IN THE TRANSFORMER PADS, AS ILLUSTRATED IN FIGURE 1.(REFER TO UAD1.6).

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

THREE PHASE PAD MOUNT TRANSFORMER DESCRIPTION	MAXIMUM NUMBER OF CONDUCTORS PER PHASE	ACCEPTABLE CONDUCTOR SIZES
75 KVA OR SMALLER FOR ALL SECONDARY VOLTAGES	6	6 AWG THROUGH 500 KCMIL
150 KVA AND 300 KVA FOR ALL SECONDARY VOLTAGES	8	1/0 AWG THROUGH 750 KCMIL
500 KVA SECONDARY 480Y/277	8	1/0 AWG THROUGH 750 KCMIL
500 KVA TO 1000 KVA 208Y/120	8	1/0 THROUGH 750 KCMIL
	12	(A) HIGH FLEXIBLE 500 THROUGH 750 KCMIL
750 KVA TO 2500 KVA 480Y/277	8	1/0 THROUGH 750 KCMIL
	12	(A) HIGH FLEXIBLE 500 THROUGH 750 KCMIL
21kV 3325kVA 480Y/277 21kV 1500kVA 208Y/120	13	(A) HIGH FLEXIBLE 500 THROUGH 750 KCMIL

**NOTES:**

- A. 500KCMIL HIGH FLEXIBLE, 91 D STRANDING CODE  
600KCMIL HIGH FLEXIBLE, 127 D STRANDING CODE  
750KCMIL HIGH FLEXIBLE, 127 D STRANDING CODE



**FIGURE - 1**



ESR: T007

ESR PG. NO.: C-30

REV. DATE: MARCH 2023  
REV. NO.: 7

**COMMERCIAL SECONDARY RUNS  
FROM TRANSFORMER TO PANEL**

STANDARD NO.:

**UAD1.5**

PAGE 1 OF 1

**SMUD SECONDARY RUNS FROM TRANSFORMER TO JUNCTION BOX (A)**

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.

**I. 208Y/120 VOLT INSTALLATION**


3 PHASE TRANSFORMER SIZE	NUMBER OF SECONDARY CIRCUITS	QUANTITY AND SIZE OF SECONDARY CONDUCTORS PER 3-PHASE CIRCUIT (B)	NUMBER & SIZE OF CONDUITS REQUIRED	TOTAL NUMBER OF CONDUCTORS	TYPICAL PAD SIZE (D)
45 KVA	1	3-4/0 CU & 1-4/0 CU NEUTRAL	2-4"	4	84" X 84"
75 KVA	1	3-500 KCMIL CU & 1-4/0 CU NEUTRAL	2-4"	4	84" X 84"
150 KVA	2	3-500 KCMIL CU & 1-4/0 CU NEUTRAL	3-4"	8	84" X 84"
300 KVA	3	3-500 KCMIL CU & 1-4/0 CU NEUTRAL	4-4"	12	84" X 84"
500 KVA	6	3-500 KCMIL CU & 1-4/0 CU NEUTRAL	7-4"	24	84" X 84"
750 KVA	5 (C)	6-500 KCMIL CU & 1-500 KCMIL CU NEUTRAL	5-5"	35	84" X 84"
1000 KVA	5 (C)	6-750 KCMIL CU & 1-500 KCMIL CU NEUTRAL	6-6"	35	120" X 105"

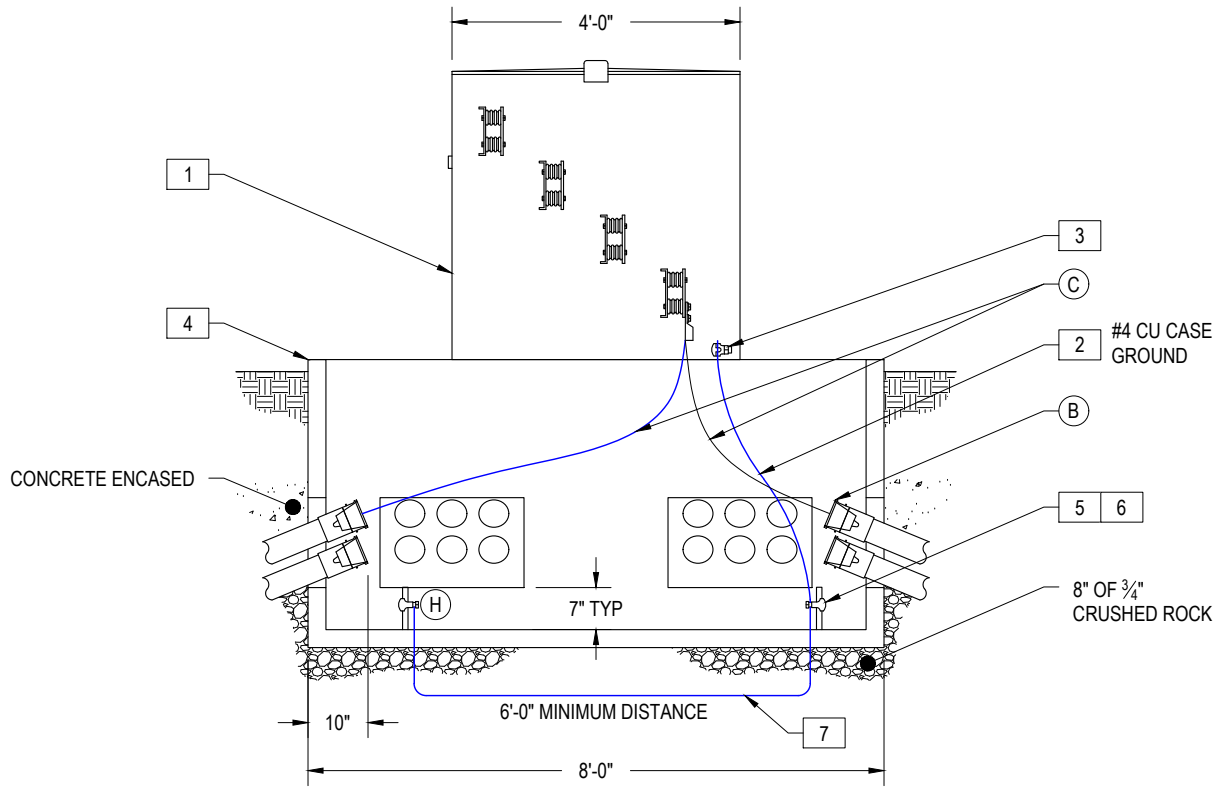
**II. 480Y/277 VOLT INSTALLATION**

3 PHASE TRANSFORMER SIZE	NUMBER OF SECONDARY CIRCUITS	QUANTITY AND SIZE OF SECONDARY CONDUCTORS PER 3-PHASE CIRCUIT (B)	NUMBER & SIZE OF CONDUITS REQUIRED	TOTAL NUMBER OF CONDUCTORS	TYPICAL PAD SIZE (D)
45 KVA	1	3-4/0 CU & 1-4/0 CU NEUTRAL	2-4"	4	84" X 84"
75 KVA	1	3-4/0 CU & 1-4/0 CU NEUTRAL	2-4"	4	84" X 84"
150 KVA	1	3-500 KCMIL CU & 1-4/0 CU NEUTRAL	2-4"	4	84" X 84"
300 KVA	2	3-500 KCMIL CU & 1-4/0 CU NEUTRAL	3-4"	8	84" X 84"
500 KVA	3	3-500 KCMIL CU & 1-4/0 CU NEUTRAL	4-4"	12	84" X 84"
750 KVA	4	3-500 KCMIL CU & 1-4/0 CU NEUTRAL	5-4"	16	84" X 84"
1000 KVA	5	3-500 KCMIL CU & 1-4/0 CU NEUTRAL	6-4"	20	84" X 84"
1500 KVA	4	6-500 KCMIL CU & 1-500 KCMIL CU NEUTRAL	5-5"	28	84" X 84"
2000 KVA	6 (C)	6-500 KCMIL CU & 1-500 KCMIL CU NEUTRAL	6-6"	42	120" X 105"
2500 KVA (E)	6 (C)	6-500 KCMIL CU & 1-500 KCMIL CU NEUTRAL	6-6"	42	120" X 105"

**NOTES:**

- (A) NUMBER & SIZE OF SECONDARY CABLES ALLOWED FROM THE TRANSFORMER TO THE SECONDARY JUNCTION BOX IS BASED ON IEEE 835 TABLE 5. CALCULATIONS HAVE BEEN ADJUSTED BASED ON CONDUCTOR TEMPERATURE RATING OF 90°C WITH 30°C TEMPERATURE AMBIENT, 75% LOAD FACTOR, & TRANSFORMER LOADING OF 115%.
- (B) EACH THREE PHASE CIRCUIT AS DEFINED BY THE COLUMN TITLED "QUANTITY & SIZE OF SECONDARY CONDUCTORS PER 3-PHASE CIRCUIT" SHALL BE INSTALLED IN ONE CONDUIT.
- (C) WHEN TERMINATING MORE THAN 8 RUNS PER PHASE USE 600V CLASS D FLEXIBLE CABLE.
- (D) FINAL PAD SIZE TO BE DETERMINED BY SMUD LINE DESIGNER BASED ON NUMBER & SIZE OF CONDUITS REQUIRED.
- (E) 2500KVA TRANSFORMER LOADING AT 100%.
- F. CUSTOMER TERMINATION PADS SHALL NOT EXCEED 1 $\frac{3}{4}$ " WIDTH. COMBINATION OF SMUD/CUSTOMER TERMINATIONS NOT TO EXCEED 20 WITHOUT SMUD APPROVAL.
- G. CUSTOMER MAY INSTALL UP TO 12 CONDUCTORS PER PHASE.

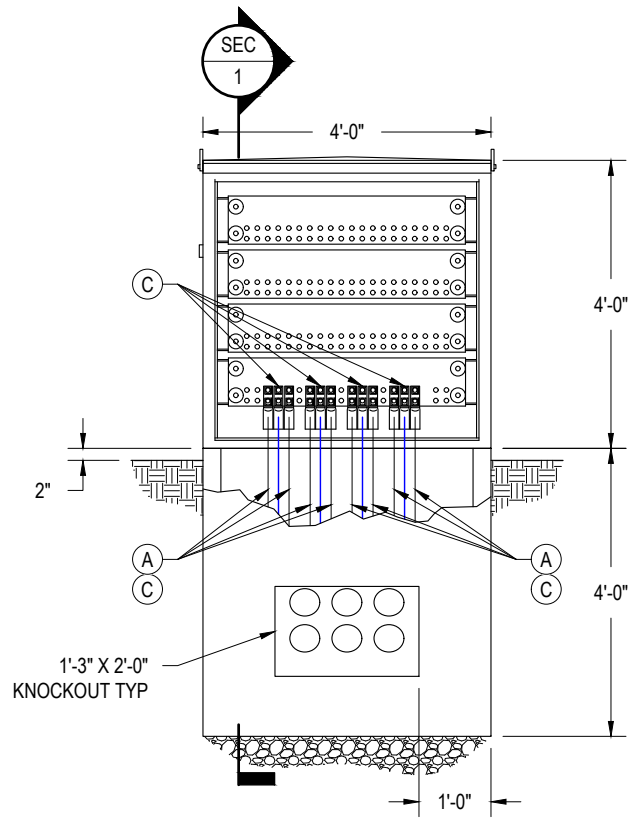
 <p>Sacramento Municipal Utility District</p>	ESR: T007	ESR PG. NO.: C-31	REV. DATE: REV. NO.: MARCH 2023 8
	<p><b>COMMERCIAL SECONDARY RUNS FROM TRANSFORMER TO J-BOX</b></p>		



SECTION - 1


NOTES:

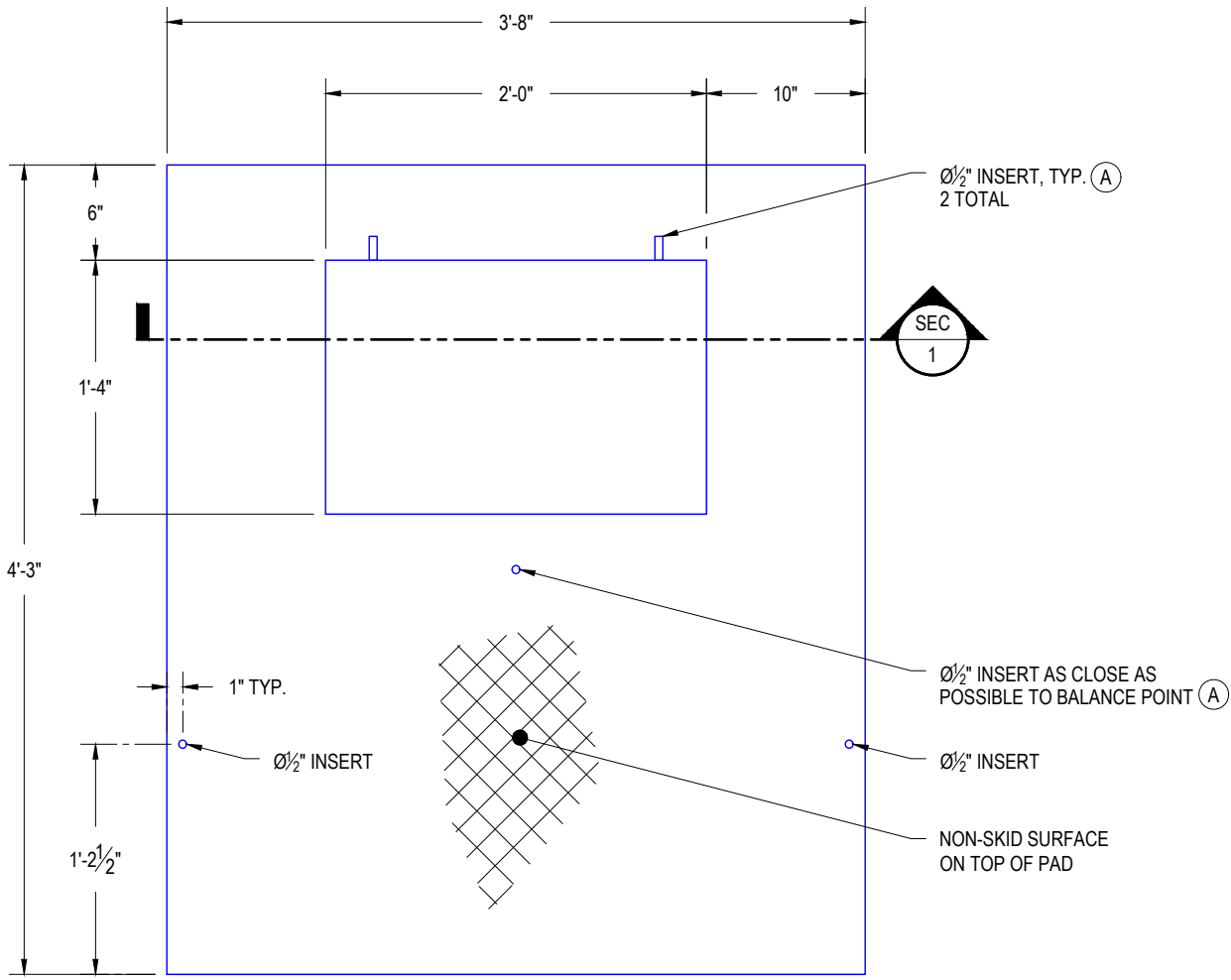
- (A) CUSTOMER'S SERVICE CONDUCTOR TAILS TO BE 12'-0" LONG, COILED IN BOX.
- (B) SEE U12P3X2 IN ESR T007 FOR CONDUIT TERMINATION.
- (C) FOR INSTALLATIONS THAT WILL HAVE MORE THAN 3,000 SECONDARY AMPS, THE CONDUCTORS FROM THE TRANSFORMER SHALL BE LOCATED IN THE CENTER OF THE BUS & THE CUSTOMER'S SERVICE CONDUCTORS SHALL BE DIVIDED & SPACED EQUALLY ON OPPOSITE SIDES OF THE SMUD CONDUCTORS, AS SHOWN.
- D. BOXES USED IN BUILDING ALCOVE APPLICATIONS SHALL HAVE A BOTTOM.
- E. SEE UAD1.6 FOR NUMBER AND SIZE OF TRANSFORMER CONDUITS & CONDUCTORS.
- F. CONNECTORS & TRANSFORMER SECONDARY CONDUCTOR MUST BE ORDERED SEPARATELY.
- G. THE CONTRACTOR OR CUSTOMER SHALL INSTALL THE GROUND ROD(S) ON CUSTOMER INSTALLED JOBS.
- (H) SECOND GROUND ROD SHALL BE INSTALLED PER T007 REQUIREMENTS.



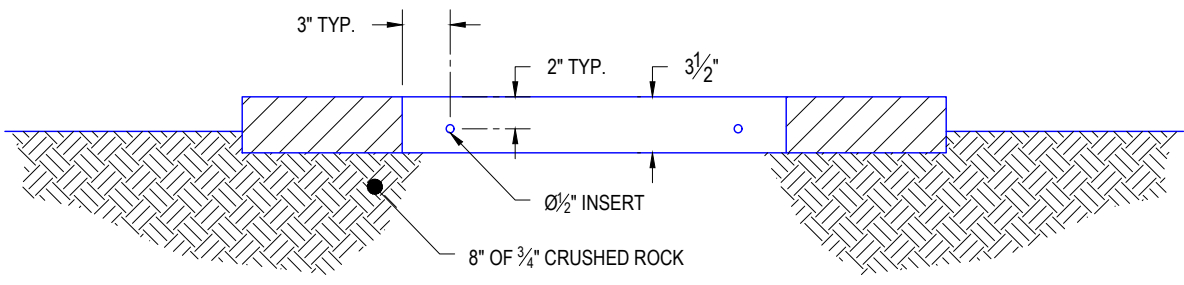
SIDE VIEW W/ BREAKAWAY

PART#	QTY	MATERIALS	
		DESCRIPTION	SAP NO.
1	1	ENCLOSURE SECONDARY BUS PADMOUNTED	10010041
2	30	CABLE BARE CU MHD 4 AWG 7 STRAND COILS	10021430
3	1	CONN EYEBOLT TRNSF GRND CU 8 SOL TO 2STR	10000302
4	1	BOX RPM HANDHOLE 48X96X48 J BOX	10011318
5	2	ROD GROUND COPPER CLAD 5/8 DIA 8 FT	10000573
6	3	CLAMP GROUND ROD COPPER 5/8 ROD	10000235
7	8	CABLE BARE CU MHD 1/0 AWG 7 STRAND	10000196

 Sacramento Municipal Utility District	ESR: T007	ESR PG. NO.: C-32	REV. DATE: MARCH 2022	REV. NO.: 7
	<b>SECONDARY J-BOX PADMOUNT</b>		<b>STANDARD NO.:</b> <b>U1S3D1</b> PAGE 1 OF 1	



PLAN VIEW

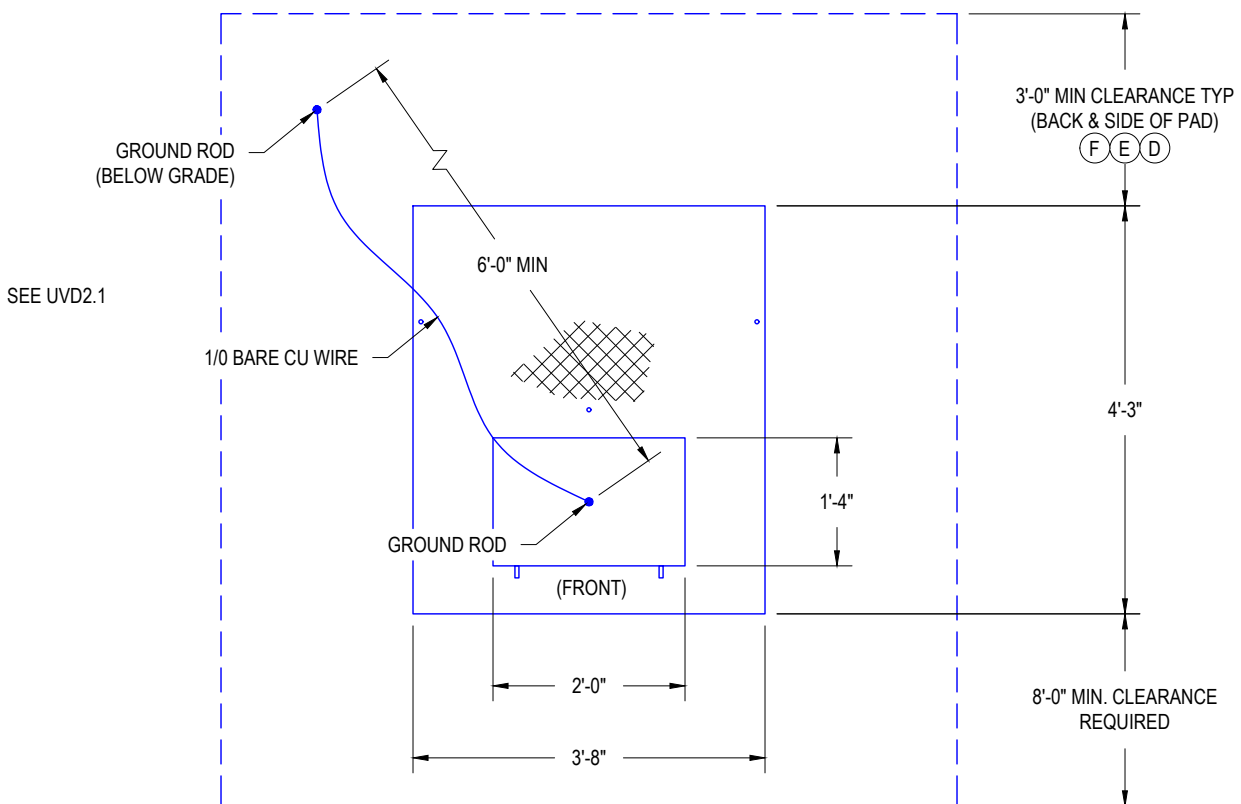


SECTION - 1

NOTES:

- A. ALL INSERTS MUST BE CORROSION RESISTANT.
- B. TOP SURFACE OF PAD MUST BE LEVEL.
- C. FOR INSTALLATION SEE DWG.U12K3X1 IN ESR T007 "SINGLE PHASE TRANSFORMER PAD AND WELL INSTALLATION".
- D. SAP MATERIAL NO. 10000530.

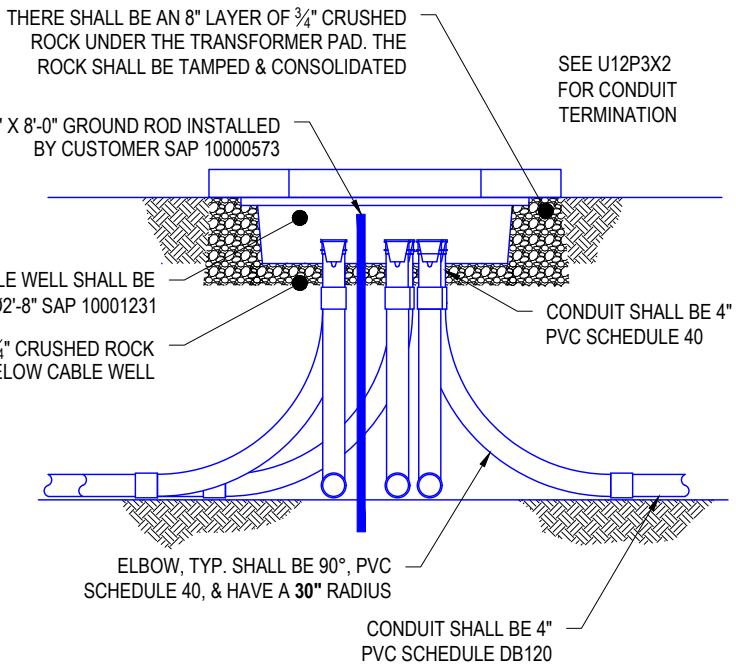
	ESR: T007	ESR PG. NO.: C-33	REV. DATE: MARCH 2023	REV. NO.: 5
	<b>NON-CONCRETE SINGLE PHASE TRANSFORMER PAD 44" X 51"</b>		<b>STANDARD NO.: UVD2.1</b> PAGE 1 OF 1	



**NOTES:**

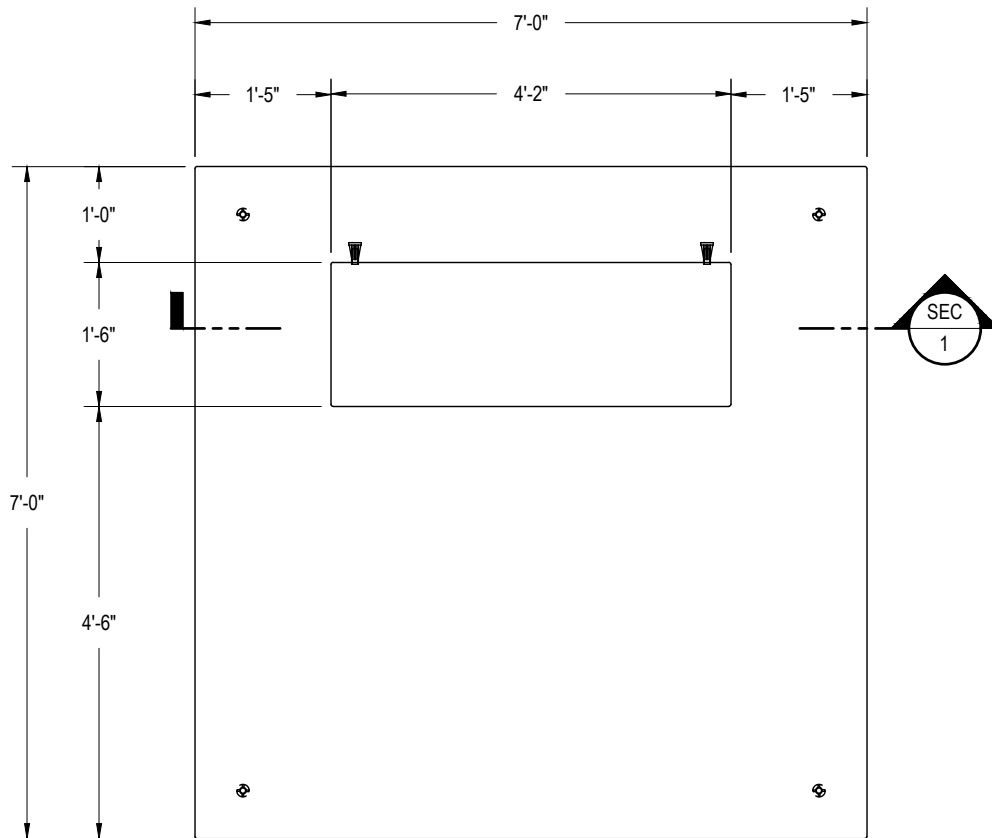
- A. TOP SURFACE OF PAD MUST BE LEVEL.
- B. FOR P.U.E & TRENCH INFORMATION SEE DWG. U12K3X1, "SINGLE PHASE TRANSFORMER PAD & WELL INSTALLATION".
- C. THE PAD FRONT SHALL HAVE A CLEARANCE OF NOT LESS THAN 8'-0" FROM OBJECTS OR STRUCTURES.
- (D) THE TRANSFORMER PAD SHALL BE SO LOCATED THAT THE PAD SIDE OR SIDES ADJACENT TO THE SURFACE OF A BUILDING SHALL HAVE A CLEARANCE OF NOT LESS THAN 3'-0". THIS CLEARANCE MAY BE REDUCED TO 2'-0" IF THE BUILDING SURFACE IS NONCOMBUSTIBLE. THE CLEARANCE SHALL BE NO LESS THAN 8'-0" FROM ALL TREES.
- (E) WHERE THE TRANSFORMER MAY BE LESS THAN 5'-0" FROM VEHICULAR TRAFFIC, PROTECTIVE CHAIN LINK FENCE OR BOLLARDS SHALL BE INSTALLED PER SMUD ENGINEERING DRAWINGS UVD2.4 & UVD2.5. ALL CLEARANCES ARE TO BE APPROVED BY SMUD'S DISTRIBUTION LINE DESIGN DEPARTMENT.
- (F) ANY EXISTING OR PROPOSED SWITCHGEAR OR ELECTRICAL EQUIPMENT MUST PROVIDE NATIONAL ELECTRICAL CODE CLEARANCES FROM THE TRANSFORMER & PAD.
- G. EXPANSION JOINTS SHALL BE INSTALLED BETWEEN THE CONCRETE TRANSFORMER PAD & ADJACENT CONCRETE WALKWAYS, DRIVEWAYS, ETC.
- H. SECOND GROUND ROD SHALL BE INSTALLED PER REQUIREMENTS IN T007. ROD SHALL BE INSTALLED BEYOND THE BACK OF THE PAD. IF PAD BACKS UP TO THE EDGE OF THE PUE THE ROD SHALL BE PLACED TO THE SIDE BETWEEN THE TRENCH & PUE EDGE. THE ROD SHALL BE PLACED WITHIN THE PUE OR DEDICATED RIGHT-OF-WAY.

**PLAN VIEW**

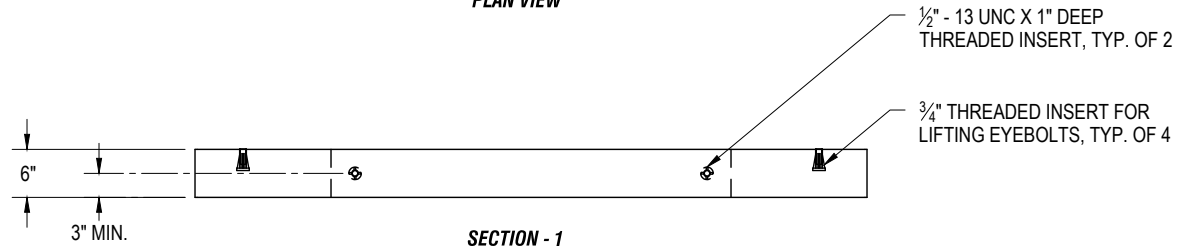


**SECTION VIEW**

 <p>Sacramento Municipal Utility District</p>	<p>ESR: T007, T003</p>	<p>ESR PG. NO.: C-34, C-19</p>	<p>REV. DATE: MARCH 2023</p>	<p>REV. NO.: 3</p>
	<p><b>SINGLE PHASE TRANSFORMER PAD INSTALLATION 44" X 51"</b></p>		<p><b>STANDARD NO.: UVD2.1A</b></p> <p>PAGE 1 OF 1</p>	



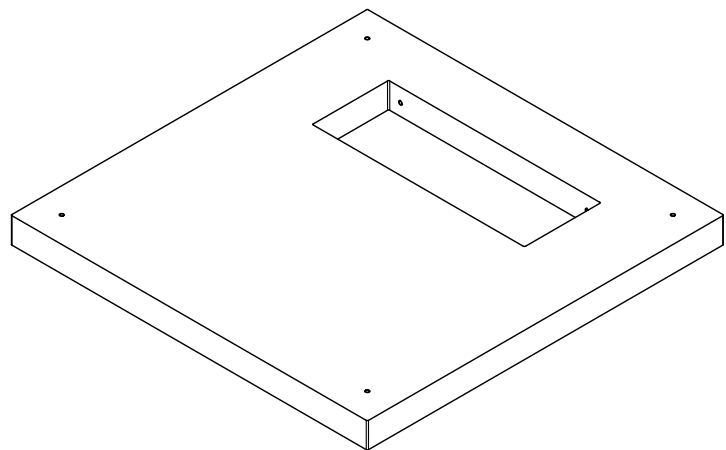
PLAN VIEW



SECTION - 1

**NOTES:**

- A. THE CONCRETE COMPRESSIVE STRENGTH SHALL BE 3000 PSI IN 28 DAYS.
- B. THE PREFORMED REINFORCING STEEL SHALL BE PER ASTM A615 GR. 60.
- C. 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.
- D. THE MANUFACTURERS NAME OR LOGO AND WEIGHT SHALL BE PERMANENTLY MARKED ON AN OUTSIDE EDGE.
- E. FOR CONDUIT ARRANGEMENT AND INSTALLATION REQUIREMENTS, SEE DRAWING UVD2.2A.
- F. APPROXIMATE WEIGHT IS 3,300 LBS.
- G. SMUD STOCK CODE NUMBER: 10011684.
- H. MUST BE DESIGNED TO SUPPORT UNIFORM LOAD OF 12,500 LBS.



ISOMETRIC VIEW



ESR: T007

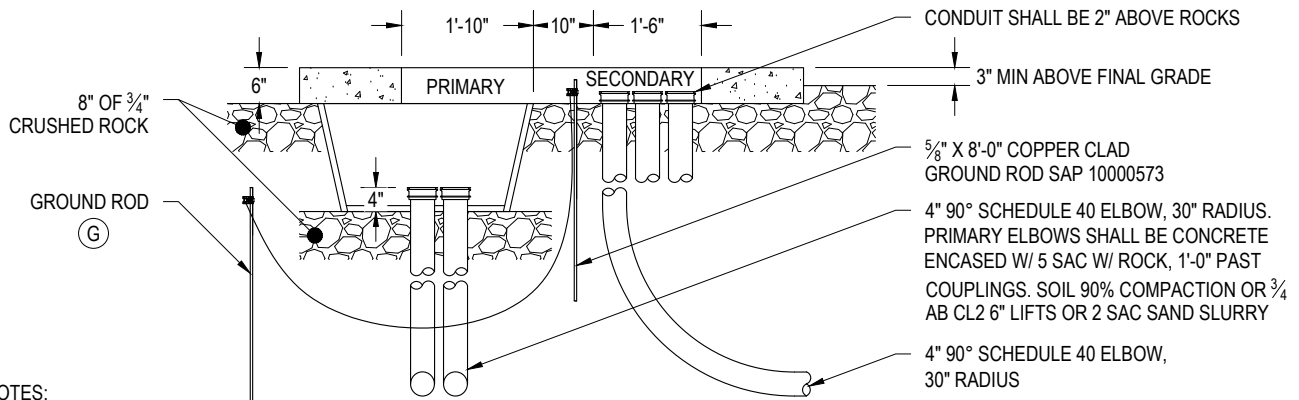
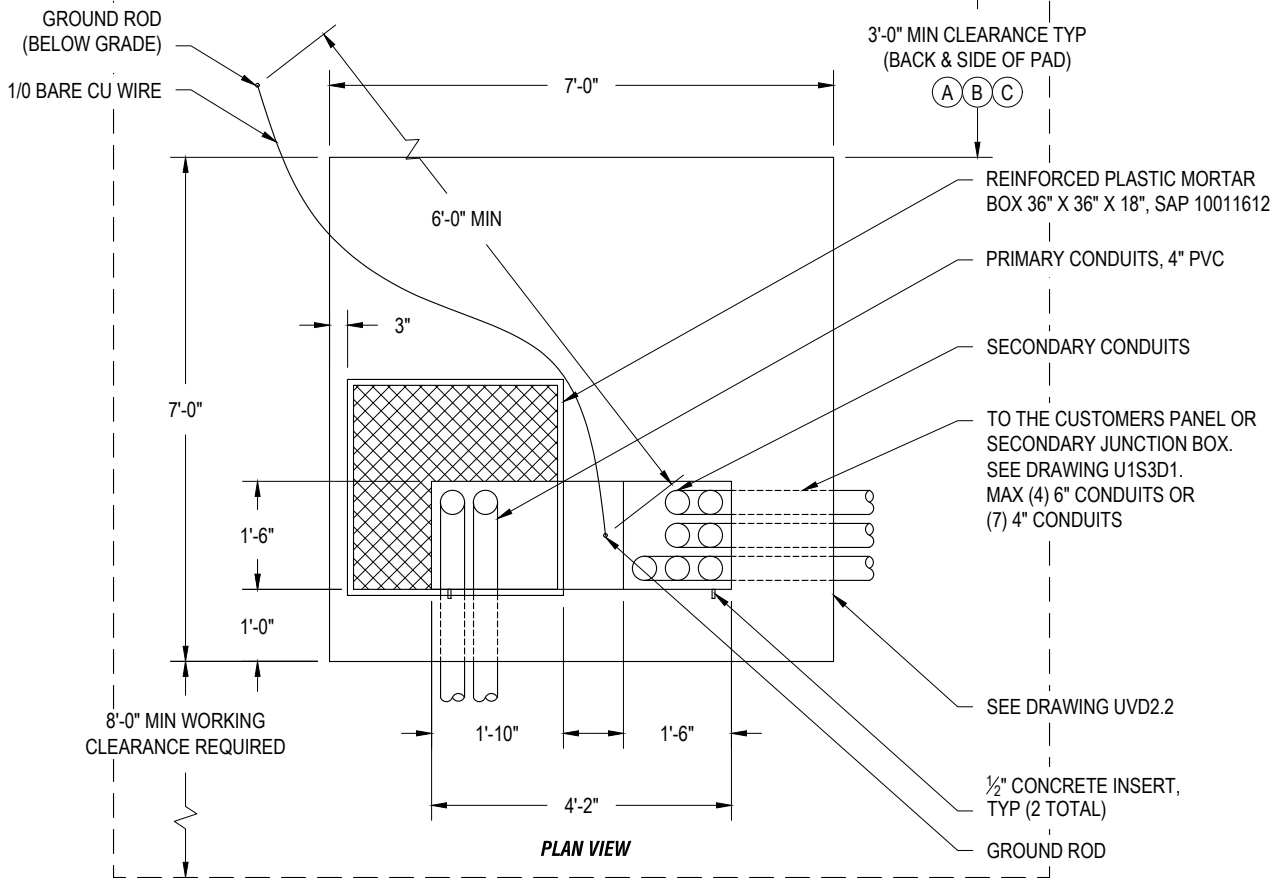
ESR PG. NO.: C-35

REV. DATE: MARCH 2023  
REV. NO.: 6

THREE PHASE PRECAST  
TRANSFORMER PAD  
84" X 84"

STANDARD NO.:  
UVD2.2

PAGE 1 OF 1



**NOTES:**

- (A) 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'-0". THIS CLEARANCE MAY BE REDUCED TO 2'-0" IF THE BUILDING SURFACE IS NONCOMBUSTIBLE. FOR TRANSFORMERS 750KVA & ABOVE CONTACT SMUD'S DISTRIBUTION LINE DESIGN DEPARTMENT FOR SPECIAL CLEARANCE REQUIREMENTS. THE CLEARANCE SHALL BE 8'-0" FROM ALL TREES.
- (B) ANY EXISTING OR PROPOSED SWITCHGEAR OR ELECTRICAL EQUIPMENT MUST PROVIDE NATIONAL ELECTRICAL CODE CLEARANCES FROM THE TRANSFORMER & PAD.
- (C) WHERE THE TRANSFORMER MAY BE LESS THAN 5'-0" FROM VEHICULAR TRAFFIC, PROTECTIVE CHAIN LINK FENCE OR BOLLARDS SHALL BE INSTALLED PER SMUD ENGINEERING DRAWINGS UVD2.4 & UVD2.5. ALL CLEARANCES ARE TO BE APPROVED BY SMUD'S DISTRIBUTION LINE DESIGN DEPARTMENT.
- D. CUSTOMER INSTALLED SECONDARY CABLE SHALL EXTEND A MINIMUM OF 6'-0" OUT OF THE CONDUIT.
- E. EXPANSION JOINTS SHALL BE INSTALLED BETWEEN THE CONCRETE TRANSFORMER PAD & ADJACENT CONCRETE WALKWAYS, DRIVEWAYS, ETC.
- F. SECONDARY CONDUIT SHALL NOT BE INSTALLED UNDER THE PRIMARY WELL.
- (G) SECOND GROUND ROD SHALL BE INSTALLED PER REQUIREMENTS IN T007. THE ROD SHALL BE PLACED WITHIN THE PUE OR DEDICATED RIGHT-OF-WAY.



ESR: T007

ESR PG. NO.: C-36

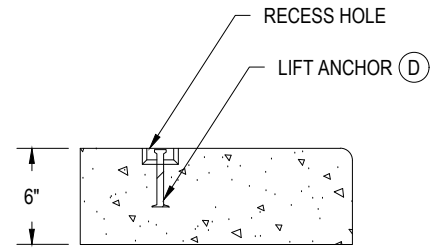
REV. DATE: MARCH 2023  
REV. NO.: 11

**THREE PHASE  
TRANSFORMER PAD INSTALLATION  
PRECAST 84" X 84"**

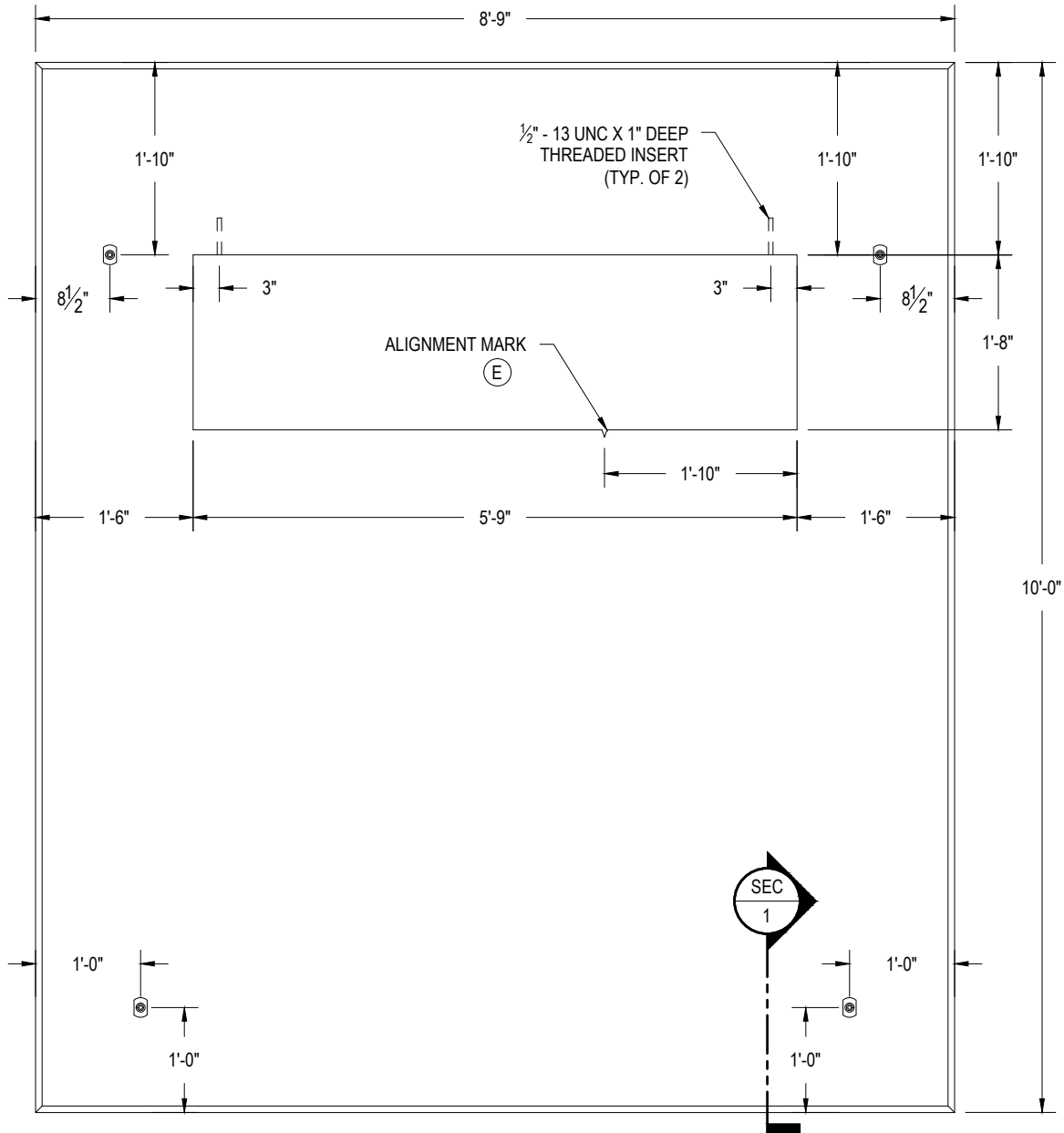
**STANDARD NO.:  
UVD2.2A**

**NOTES:**

- A. CONCRETE COMPRESSIVE STRENGTH IN 28 DAYS SHALL BE 3000 PSI MINIMUM.
- B. PRECAST PAD SHALL BE DESIGNED IN ACCORDANCE WITH THE LATEST EDITION OF ACI 318 TO SUPPORT A 30,000 LB TRANSFORMER AND ANY LOADS IMPOSED DURING LIFTING, HANDLING, AND TRANSPORTATION.
- C. FOR PRIMARY CONDUIT ARRANGEMENT AND TRANSFORMER WELL LOCATION, SEE DRAWING UVD2.3A1.
- D. PRECAST PAD SHALL HAVE LIFTING ANCHORS LOCATED ONE IN EACH CORNER. THE LIFTING ANCHOR SHALL BE HOT TIP GALVANIZED 'SWIFT LIFT P52 ANCHOR' FROM DAYTON/RICHMOND PRODUCTS, OR APPROVED EQUIVALENT. THE ANCHOR SHALL BE AT LEAST 4½" LONG, AND SHALL NOT PROTRUDE FROM THE PAD. (SEE SECTION 1.)
- E. PAD SHALL HAVE AN ALIGNMENT MARK AS SHOWN. THIS MARK IS USED TO ALIGN TRANSFORMER WELL DURING INSTALLATION.
- F. MANUFACTURERS NAME OR LOGO AND WEIGHT SHALL BE PERMANENTLY MARKED ON AN OUTSIDE EDGE.
- G. MANUFACTURE SHALL SUBMIT WET STAMPED STRUCTURAL CALCULATIONS AND DRAWINGS FOR APPROVAL AT THE TIME OF BID.



**SECTION - 1**



ESR: T007

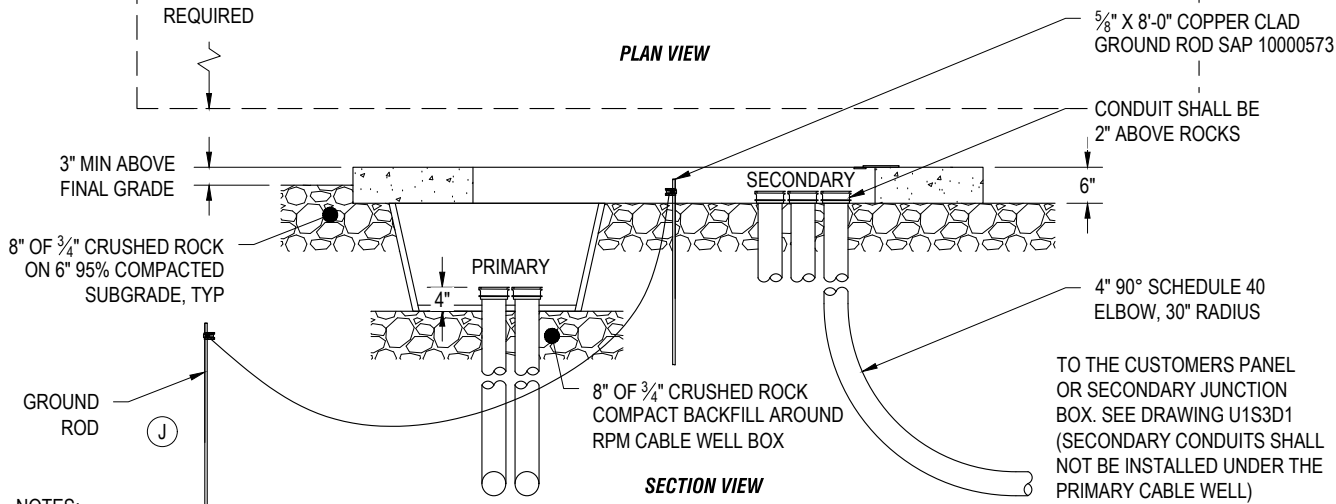
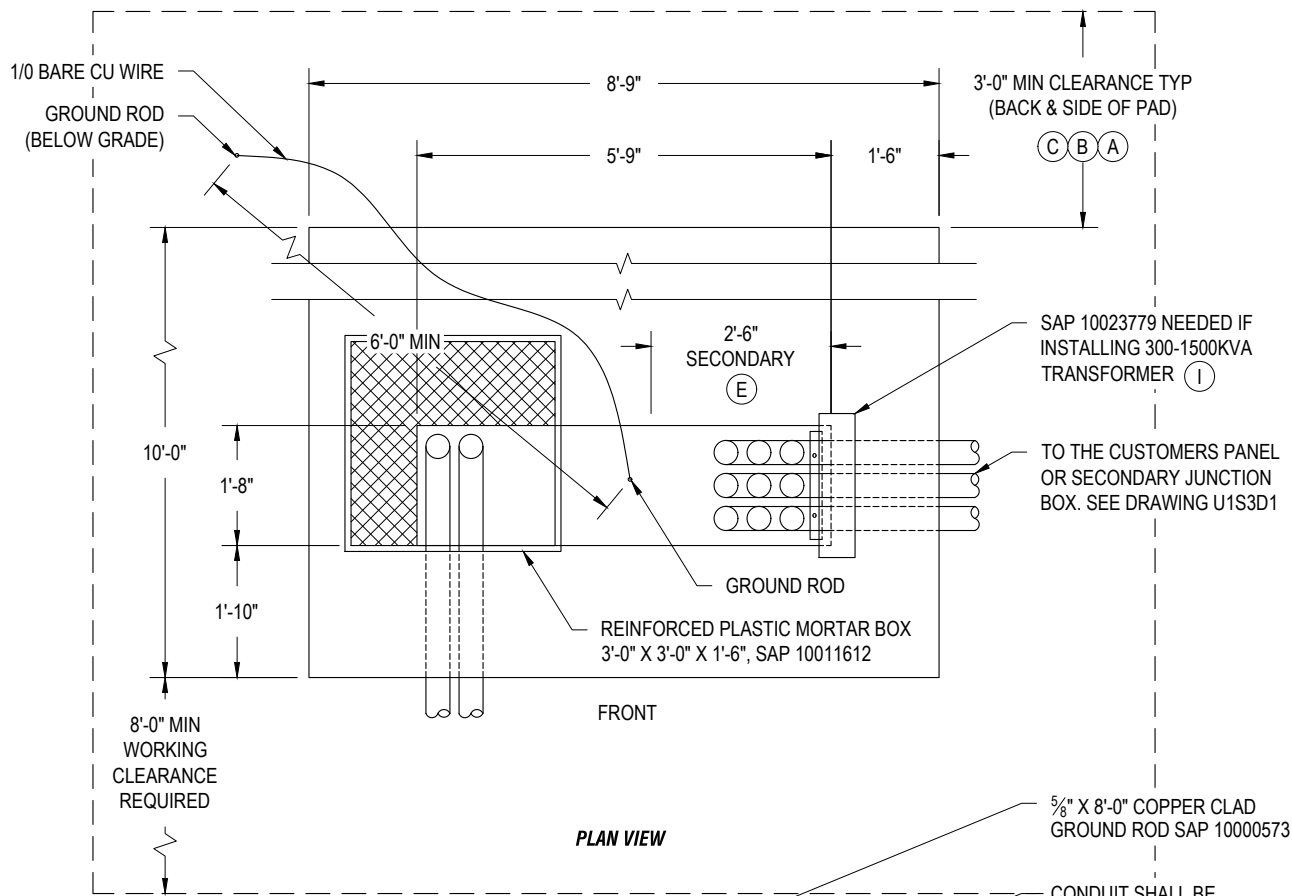
ESR PG. NO.: C-37

REV. DATE: MARCH 2023  
REV. NO.: 8

**THREE PHASE PRECAST  
TRANSFORMER PAD 120" X 105"**

STANDARD NO.:  
**UVD2.3A**





**NOTES:**

- (A) 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'-0". THIS CLEARANCE MAY BE REDUCED TO 2'-0" IF THE BUILDING SURFACE IS NONCOMBUSTIBLE. CONTACT SMUD'S DISTRIBUTION LINE DESIGN DEPARTMENT TO CONFIRM CLEARANCE REQUIREMENTS. THE CLEARANCE SHALL BE 8'-0" FROM ALL TREES.
- (B) ANY EXISTING OR PROPOSED SWITCHGEAR OR ELECTRICAL EQUIPMENT MUST PROVIDE CLEARANCES, FROM THE TRANSFORMER & PAD, LISTED BY NATIONAL ELECTRICAL CODE.
- (C) PROTECTIVE GUARDS SHALL BE INSTALLED PER SMUD ENGINEERING DRAWINGS UVD2.4 & UVD2.5, WHERE THE TRANSFORMER MAY BE LESS THAN 5'-0" FROM VEHICULAR TRAFFIC. ALL CLEARANCES ARE TO BE APPROVED BY SMUD'S DISTRIBUTION LINE DESIGN DEPARTMENT.
- (D) CUSTOMER INSTALLED SECONDARY CABLE MUST EXTEND A MINIMUM OF 6'-0" OUT OF CONDUIT.
- (E) THE MAXIMUM NUMBER OF SERVICE OR SECONDARY CONDUCTORS PER PHASE TO BE CONNECTED TO THE TRANSFORMER IS 12, & THE MAXIMUM SIZE OF CONDUCTOR ALLOWED IS 750 KCMIL. SEE UAD1.5 FOR MORE DETAILS.
- (F) SEE UAD1.5 TO VERIFY IF A SECONDARY JUNCTION BOX IS REQUIRED FOR THE 10'-0" X 8'-9" TRANSFORMER PAD, A 36" X 36" X 18" WELL MAY BE INSTALLED ON THE SECONDARY SIDE IN ORDER TO ACCOMMODATE MORE CONDUITS.
- (G) PRIMARY CONDUIT ELBOWS SHALL BE 90° SCHEDULE 40 WITH A THIRTY INCH RADIUS & CONCRETE ENCASED.
- (H) EXPANSION JOINTS SHALL BE INSTALLED BETWEEN THE CONCRETE TRANSFORMER PAD & ADJACENT CONCRETE WALKWAYS, DRIVEWAYS, ETC.
- (I) DRILL HOLES AT BASE OF TRANSFORMER. ATTACH PLATE WITH 3/8" NUT AND BOLT.
- (J) SECOND GROUND ROD SHALL BE INSTALLED PER REQUIREMENTS IN T007. THE ROD SHALL BE PLACED WITHIN THE PUE OR DEDICATED RIGHT-OF-WAY.



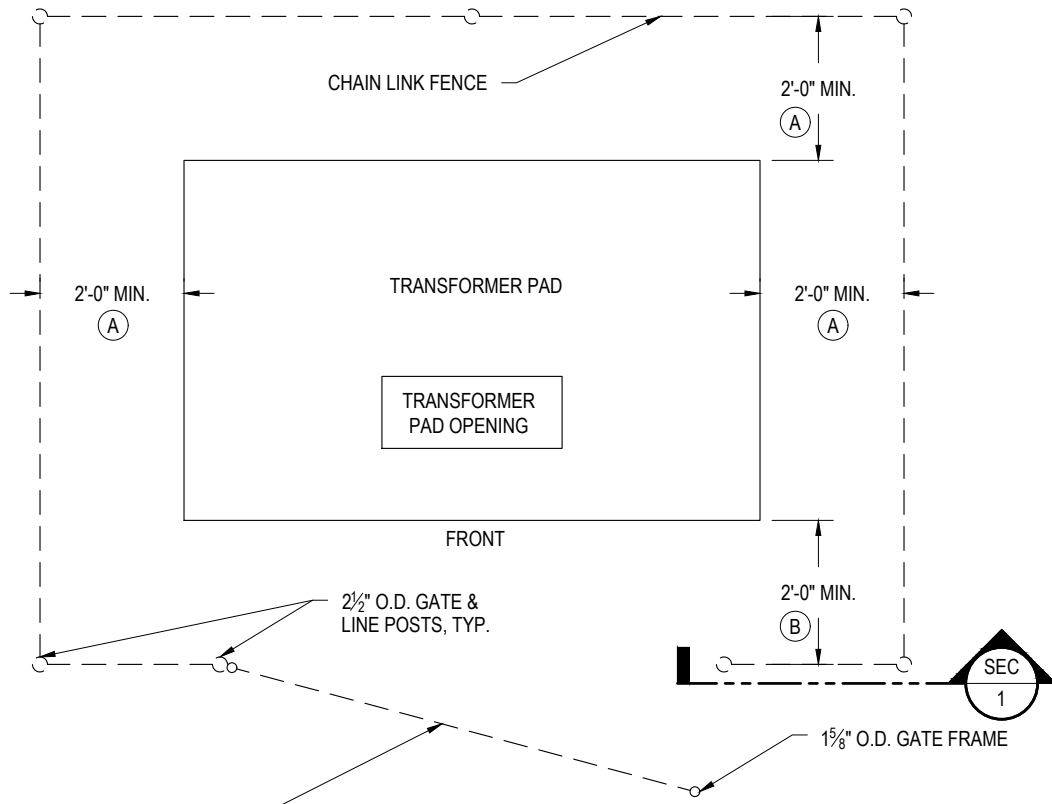
ESR: T007

ESR PG. NO.: C-38

REV. DATE: MARCH 2023  
REV. NO.: 10

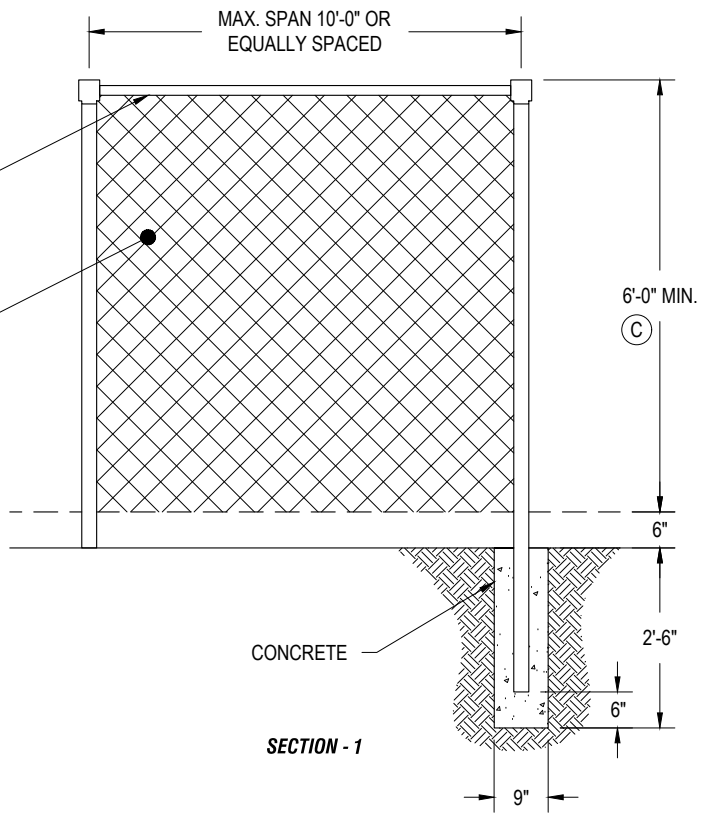
**THREE PHASE  
TRANSFORMER PAD INSTALLATION  
PRECAST 120" X 105"**

STANDARD NO.:  
**UVD2.3A1**



7'-0" GATE (GATE TO BE CENTERED WITH TRANSFORMER PAD OPENING) UNLESS OTHERWISE DETERMINED BY SMUD'S DISTRIBUTION LINE DEPARTMENT

PLAN VIEW



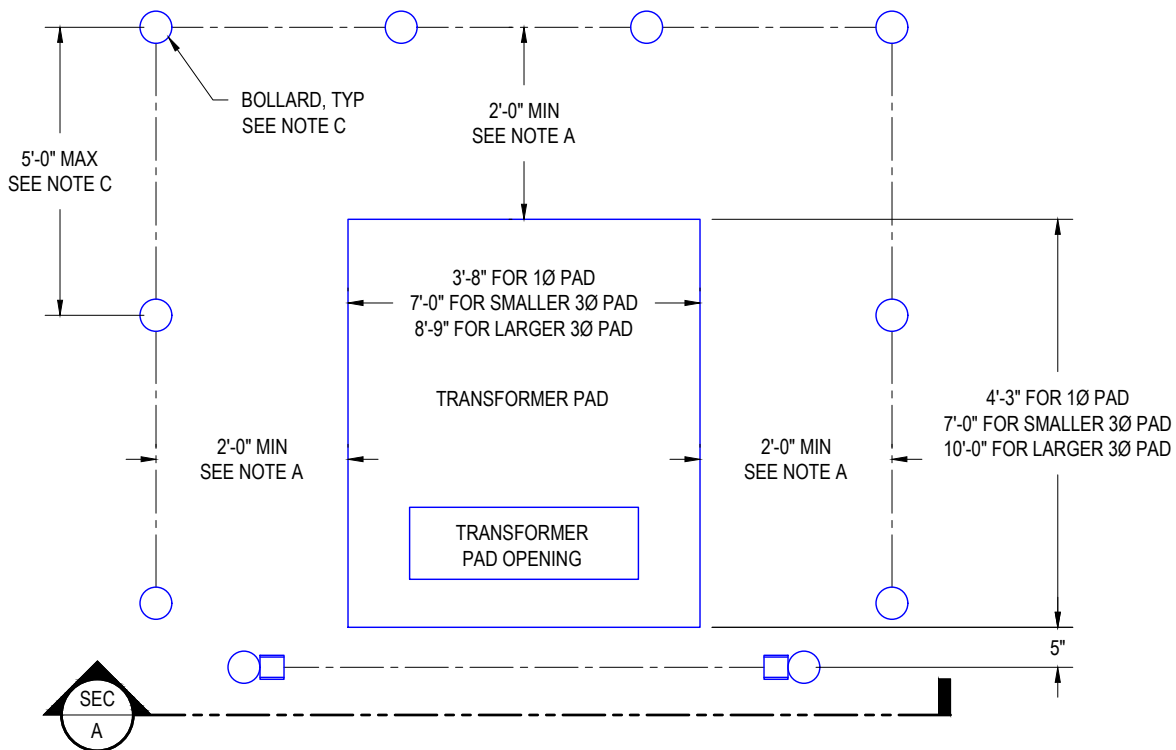
NOTES:

- (A) 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'-0". THIS CLEARANCE MAY BE REDUCED TO 2'-0" IF THE BUILDING SURFACE IS NON-COMBUSTIBLE. TRANSFORMERS 750 KVA AND ABOVE CONTACT SMUD'S DISTRIBUTION LINE DESIGN DEPARTMENT FOR SPECIAL CLEARANCE REQUIREMENTS.
- (B) 8'-0" CLEARANCE SHALL BE PROVIDED IN FRONT OF TRANSFORMER TO PERMIT HOT STICK OPERATION.
- (C) ADDITIONAL FENCE HEIGHT MAY BE REQUIRED BY SMUD'S DISTRIBUTION LINE DESIGN DEPARTMENT.

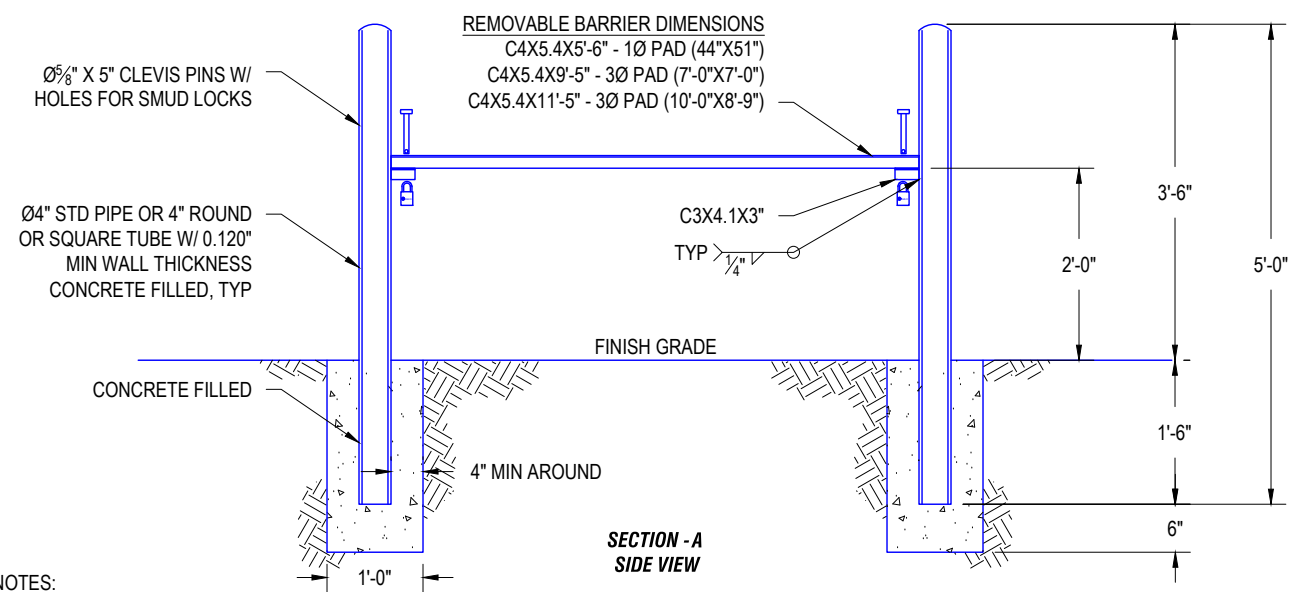


ESR: T007  
 PAD MOUNTED TRANSFORMER GUARD  
 CHAIN LINK FENCE TYPE

ESR PG. NO.: C-39  
 REV. DATE: MARCH 2023  
 REV. NO.: 5  
 STANDARD NO.: UVD2.4  
 PAGE 1 OF 1




PLAN VIEW

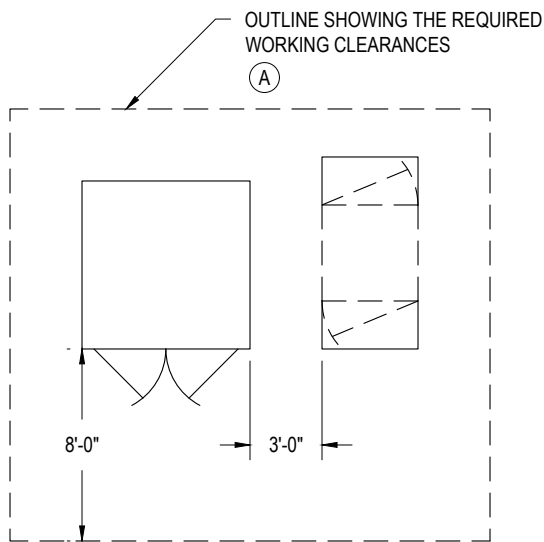


SECTION - A  
SIDE VIEW

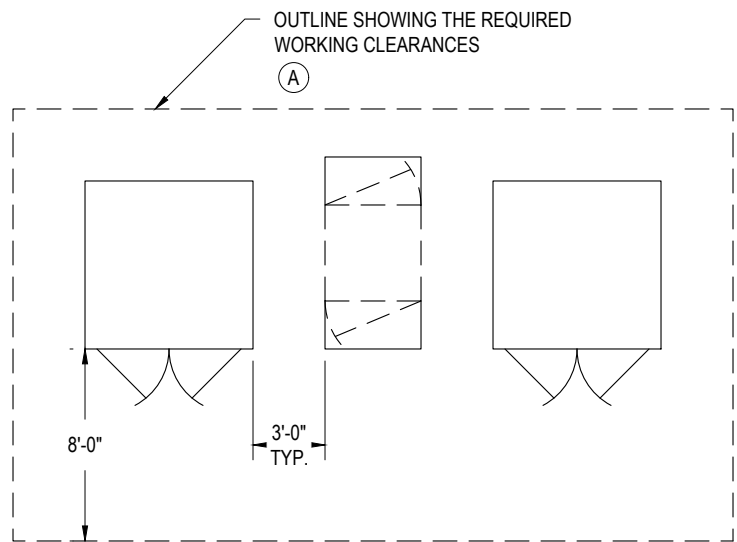
NOTES:

- A. 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'-0". THIS CLEARANCE MAY BE REDUCED TO 2'-0" IF THE BUILDING SURFACE IS NONCOMBUSTIBLE. TRANSFORMERS 750 KVA AND ABOVE CONTACT SMUD'S DISTRIBUTION LINE DESIGN DEPARTMENT FOR SPECIAL CLEARANCE REQUIREMENTS.
- B. 8'-0" CLEARANCE SHALL BE PROVIDED IN FRONT OF UNIT TO PERMIT HOT STICK OPERATION.
- C. 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 5'-0". THE MINIMUM QUANTITY OF BOLLARDS SHALL BE AS FOLLOWS: 5 FOR 1Ø PAD (41" X 55"), 6 FOR THE 3Ø PAD (84" X 84"), AND 8 FOR THE LARGER 3Ø PAD (120" X 105"). 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.
- D. BOLLARDS SHALL BE INSTALLED AROUND PAD MOUNT SMUD EQUIPMENT WHEN THE EDGE OF THE EQUIPMENT IS LESS THAN 5'-0" FROM VEHICULAR TRAFFIC, OR WHEN SMUD'S DISTRIBUTION LINE DESIGN DEPARTMENT DETERMINES THE EQUIPMENT MAY BECOME EXPOSED TO TRAFFIC.
- E. ALL PIPE AND REMOVABLE BARRIER SHALL BE PAINTED BRIGHT YELLOW WITH A RUST RESISTIVE PAINT.

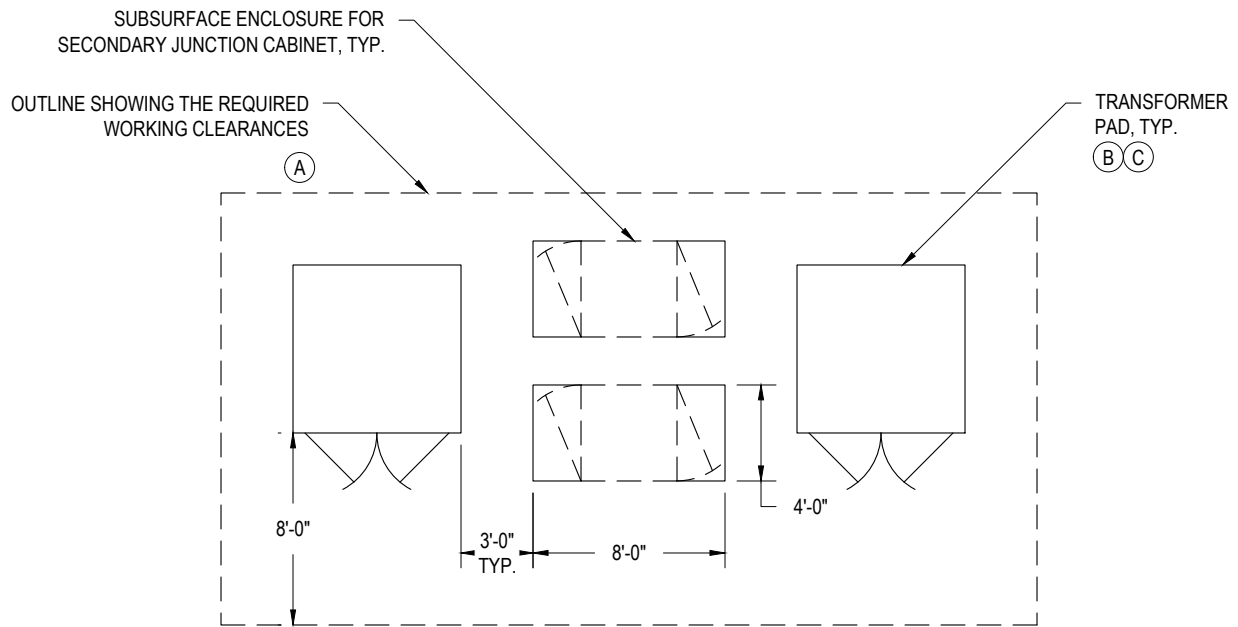
 Sacramento Municipal Utility District	ESR: T007	ESR PG. NO.: C-40	REV. DATE: MARCH 2023	REV. NO.: 10
	<b>PAD MOUNTED TRANSFORMER GUARD          PIPE BOLLARD TYPE WITH REMOVABLE BARRIER</b>			STANDARD NO.: <b>UVD2.5</b> PAGE 1 OF 1



**ONE TRANSFORMER**



**TWO TRANSFORMERS**



**TWO TRANSFORMERS & TWO SECONDARY JUNCTION CABINETS**

**NOTES:**

- (A) A MINIMUM CLEARANCE OF 8'-0" SHALL BE MAINTAINED, WITHOUT OBSTRUCTIONS, IN FRONT OF THE TRANSFORMERS.  
A MINIMUM CLEARANCE OF 3'-0" SHALL BE MAINTAINED FROM ALL COMBUSTIBLE STRUCTURES OR WALLS.  
A MINIMUM CLEARANCE OF 2'-0" SHALL BE MAINTAINED FROM ALL NONCOMBUSTIBLE STRUCTURES OR WALLS.
- (B) TRANSFORMER PAD DIMENSIONS VARY, REFER TO THE SMUD COMMITMENT PERTAINING TO YOUR SPECIFIC PROJECT FOR THE REQUIRED SIZE OF THE TRANSFORMER PAD.
- (C) REFER TO DRAWINGS UVD2.2, UVD2.2A, UVD2.3A AND UVD2.3A1 FOR THE TRANSFORMER PAD DETAILS.
- D. REFER TO DRAWING U1S3D1 IN BOOK 1 FOR SECONDARY JUNCTION BOX DETAILS.
- E. FOR CHAIN LINK FENCE REFER TO UVD2.4.
- F. FOR BOLLARDS REFER TO UVD2.5.



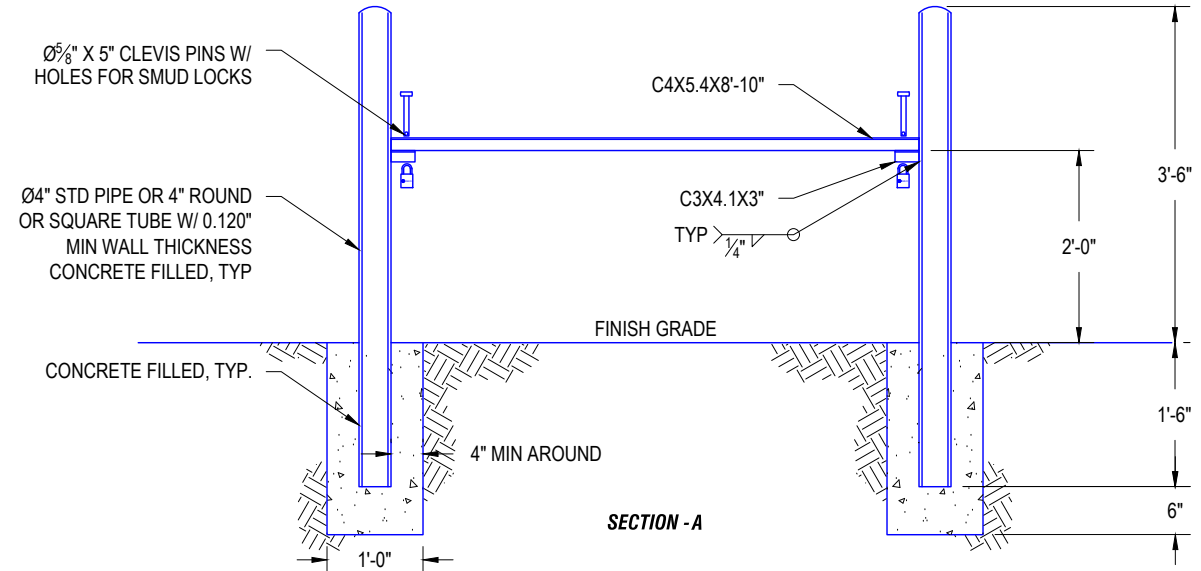
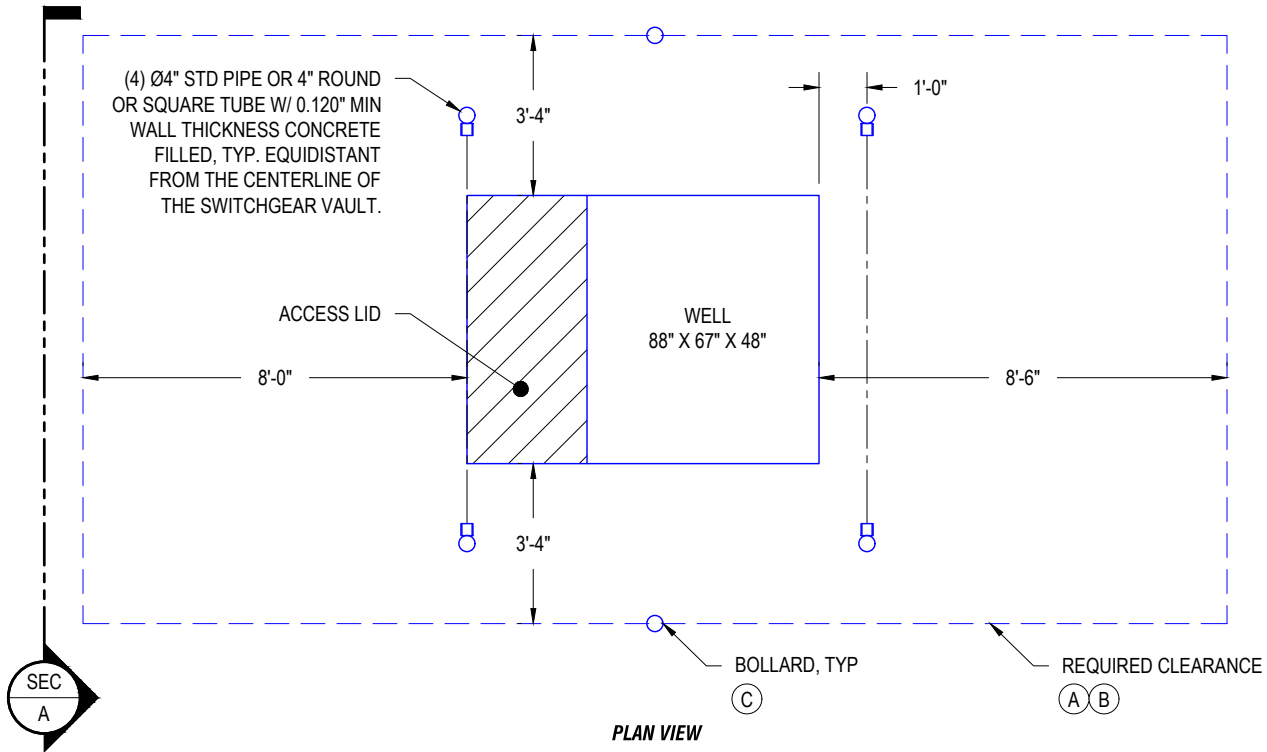
ESR: T007

ESR PG. NO.: C-41

REV. DATE: MARCH 2023  
REV. NO.: 7


**GENERAL ARRANGEMENT FOR  
PADMOUNT SECONDARY J-BOXES**

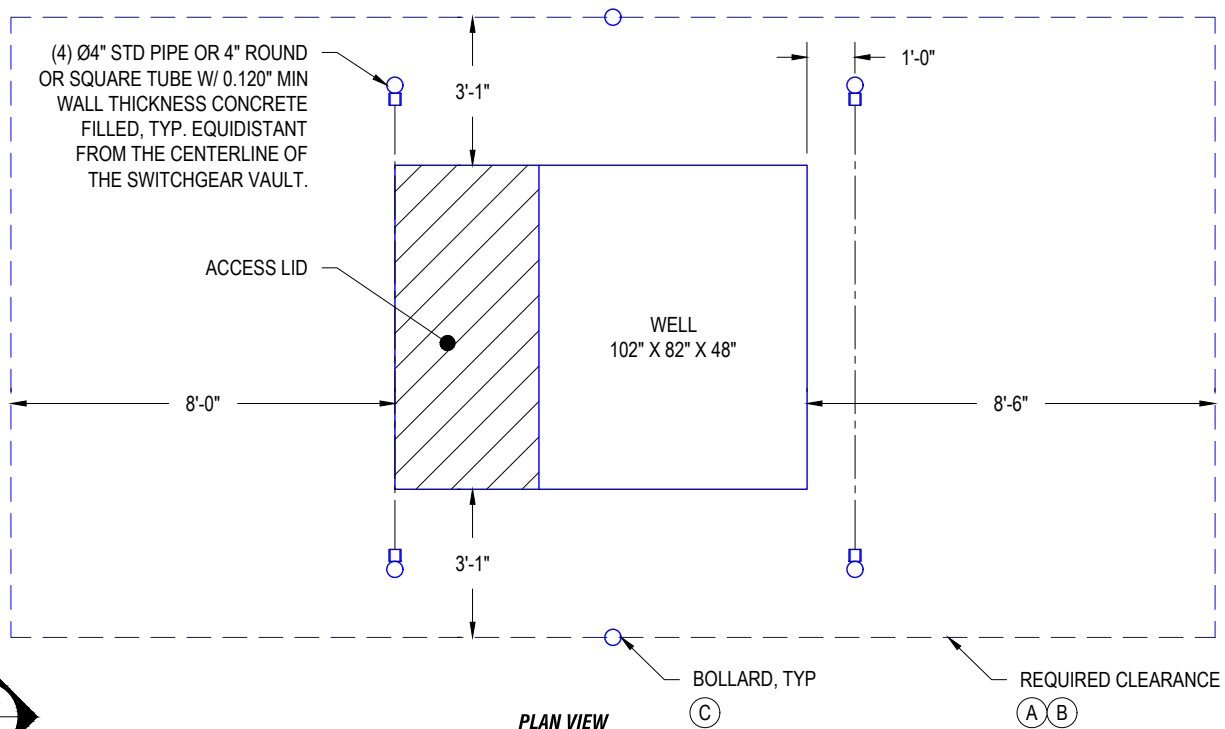
STANDARD NO.:  
**UVD5.4**



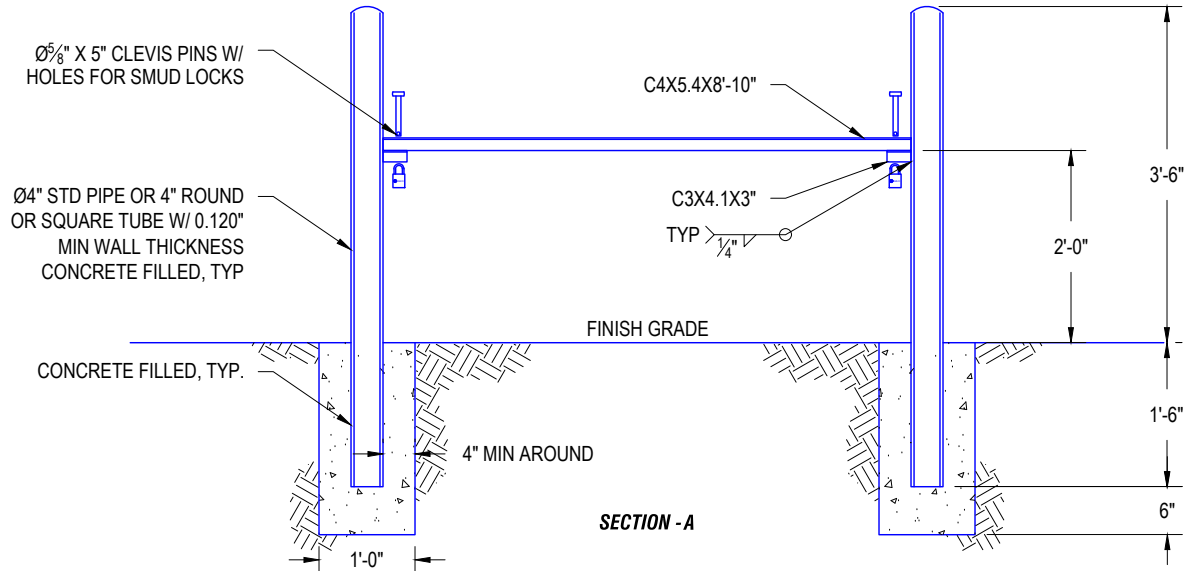
**NOTES:**

- (A) 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.
- (B) ONE (1) BOLLARD SHALL BE LOCATED ON EACH SIDE OF THE SWITCHGEAR AS SHOWN AND SHALL BE EQUAL DISTANCE BETWEEN THE REMOVABLE BARRIERS.
- (C) ALL PIPES AND REMOVABLE BARRIER SHALL BE PAINTED BRIGHT YELLOW WITH RUST RESISTIVE PAINT.
- D. BOLLARDS SHALL BE INSTALLED AROUND PAD MOUNT SMUD EQUIPMENT WHEN THE EDGE OF THE EQUIPMENT IS LESS THAN 5'-0" FROM VEHICULAR TRAFFIC, OR WHEN SMUD'S DISTRIBUTION LINE DESIGN DEPARTMENT DETERMINES THE EQUIPMENT MAY BECOME EXPOSED TO TRAFFIC.

 <p>Sacramento Municipal Utility District</p>	ESR: T007	ESR PG. NO.: C-42	REV. DATE: MARCH 2023	REV. NO.: 2
	<b>GENERAL ARRANGEMENTS FOR DEAD-FRONT PADMOUNT 12KV SWITCHGEAR</b>		<b>STANDARD NO.:</b> <b>UVD5.5A</b> PAGE 1 OF 1	




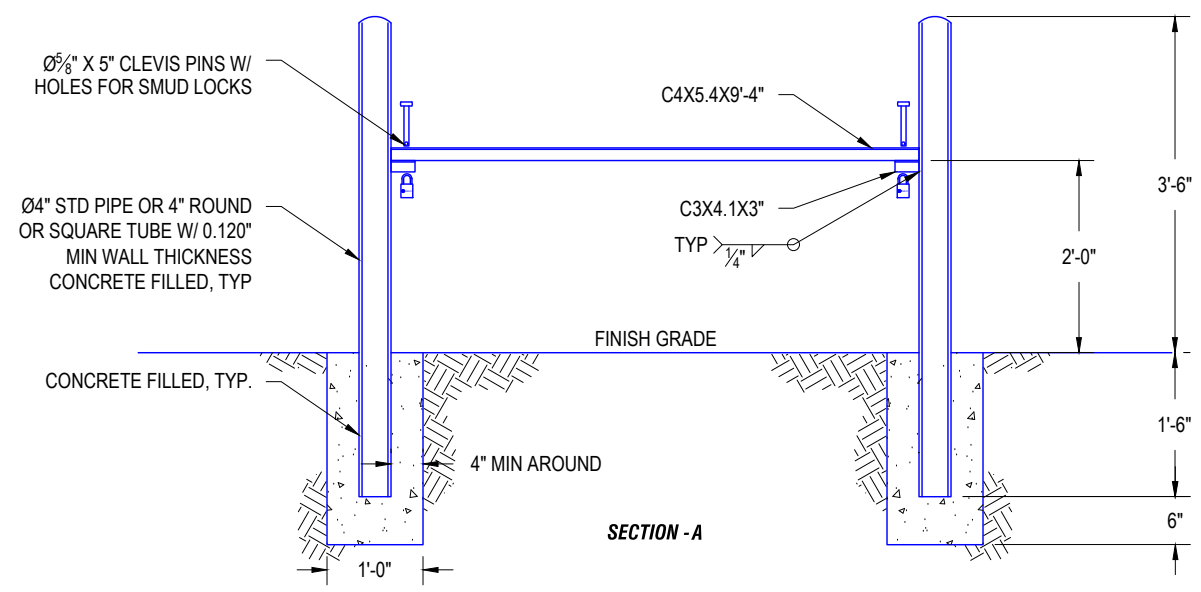
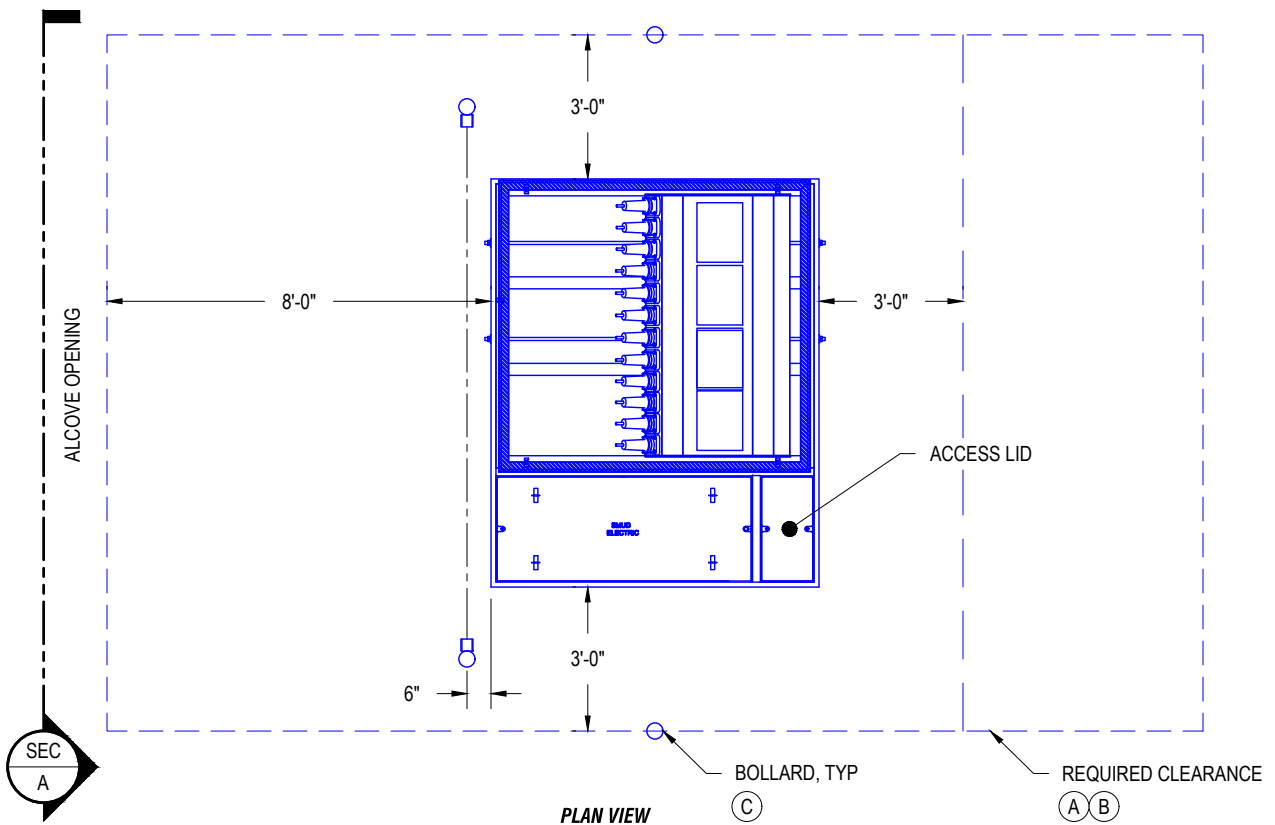
SEC  
A



**NOTES:**


- (A) 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.
- (B) ONE (1) BOLLARD SHALL BE LOCATED ON EACH SIDE OF THE SWITCHGEAR AS SHOWN AND SHALL BE EQUAL DISTANCE BETWEEN THE REMOVABLE BARRIERS.
- (C) ALL PIPES AND REMOVABLE BARRIER SHALL BE PAINTED BRIGHT YELLOW WITH RUST RESISTIVE PAINT.
- D. BOLLARDS SHALL BE INSTALLED AROUND PAD MOUNT SMUD EQUIPMENT WHEN THE EDGE OF THE EQUIPMENT IS LESS THAN 5'-0" FROM VEHICULAR TRAFFIC, OR WHEN SMUD'S DISTRIBUTION LINE DESIGN DEPARTMENT DETERMINES THE EQUIPMENT MAY BECOME EXPOSED TO TRAFFIC.

 <p>Sacramento Municipal Utility District</p>	<p>ESR: T007</p>	<p>ESR PG. NO.: C-43</p>	<p>REV. DATE: MARCH 2023</p>	<p>REV. NO.: 1</p>
	<p><b>GENERAL ARRANGEMENTS FOR DEAD-FRONT PADMOUNT 21KV SWITCHGEAR</b></p>		<p><b>STANDARD NO.: UVD5.5B</b></p> <p>PAGE 1 OF 1</p>	



**NOTES:**

- (A) 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.
- (B) ONE (1) BOLLARD SHALL BE LOCATED ON EACH SIDE OF THE SWITCHGEAR AS SHOWN AND SHALL BE EQUAL DISTANCE BETWEEN THE REMOVABLE BARRIERS.
- (C) ALL PIPES AND REMOVABLE BARRIER SHALL BE PAINTED BRIGHT YELLOW WITH RUST RESISTIVE PAINT.
- D. BOLLARDS SHALL BE INSTALLED AROUND PAD MOUNT SMUD EQUIPMENT WHEN THE EDGE OF THE EQUIPMENT IS LESS THAN 5'-0" FROM VEHICULAR TRAFFIC, OR WHEN SMUD'S DISTRIBUTION LINE DESIGN DEPARTMENT DETERMINES THE EQUIPMENT MAY BECOME EXPOSED TO TRAFFIC.

 <p>Sacramento Municipal Utility District</p>	ESR: T007	ESR PG. NO.: C-44	REV. DATE: MARCH 2023	REV. NO.: 1	
	<b>GENERAL ARRANGEMENTS FOR SF6 VISTA PADMOUNT 21KV SWITCHGEAR</b>			<b>STANDARD NO.: UVD5.5C</b>	
			PAGE 1 OF 1		

BACK OF CURB OR SIDEWALK

DIRECTION OF TRAFFIC

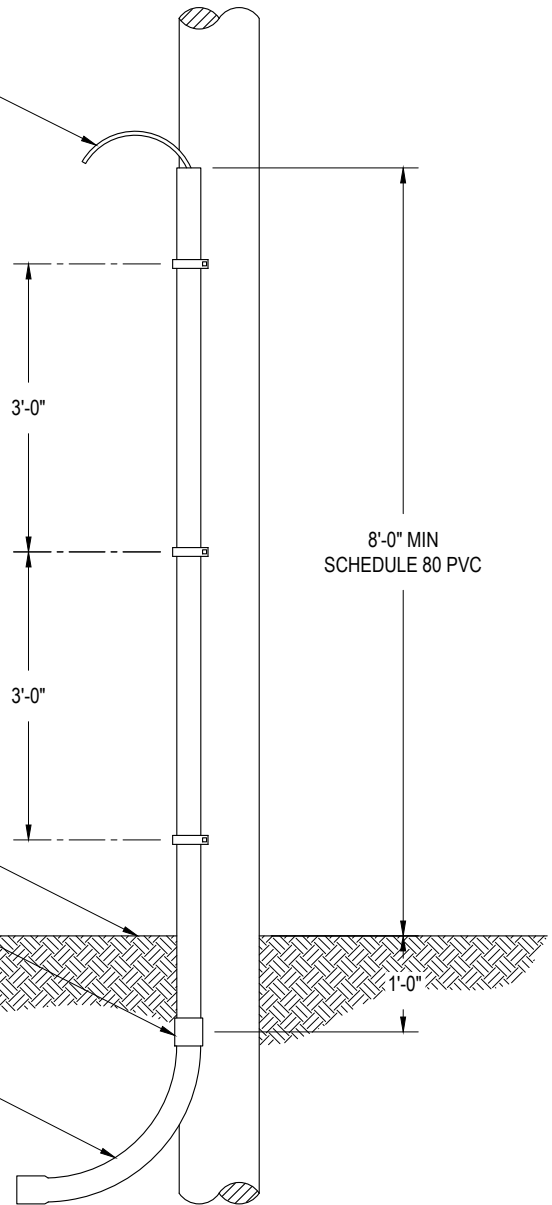
SCHEDULE 80 RISER

PLAN VIEW

PULL TAPE

**TABLE - 1**  
**90° ELBOWS - PVC SCHEDULE 40**

CONDUIT SIZE	MIN VERTICAL RADIUS
2"	18"
3"	18"
4"	30"
6"	48"



SIDE VIEW

**NOTES:**

- A. CONCRETE ENCASEMENT MAY BE REQUIRED ON ELBOWS.
- B. CONDUIT COVER FROM FINAL GRADE WILL BE DEPENDENT ON CONDUIT SIZE.
- C. IF POLE IS NOT INSTALLED, STOP CONDUIT APPROXIMATELY 5'-0" FROM PROPOSED POLE LOCATION.



ESR: T007

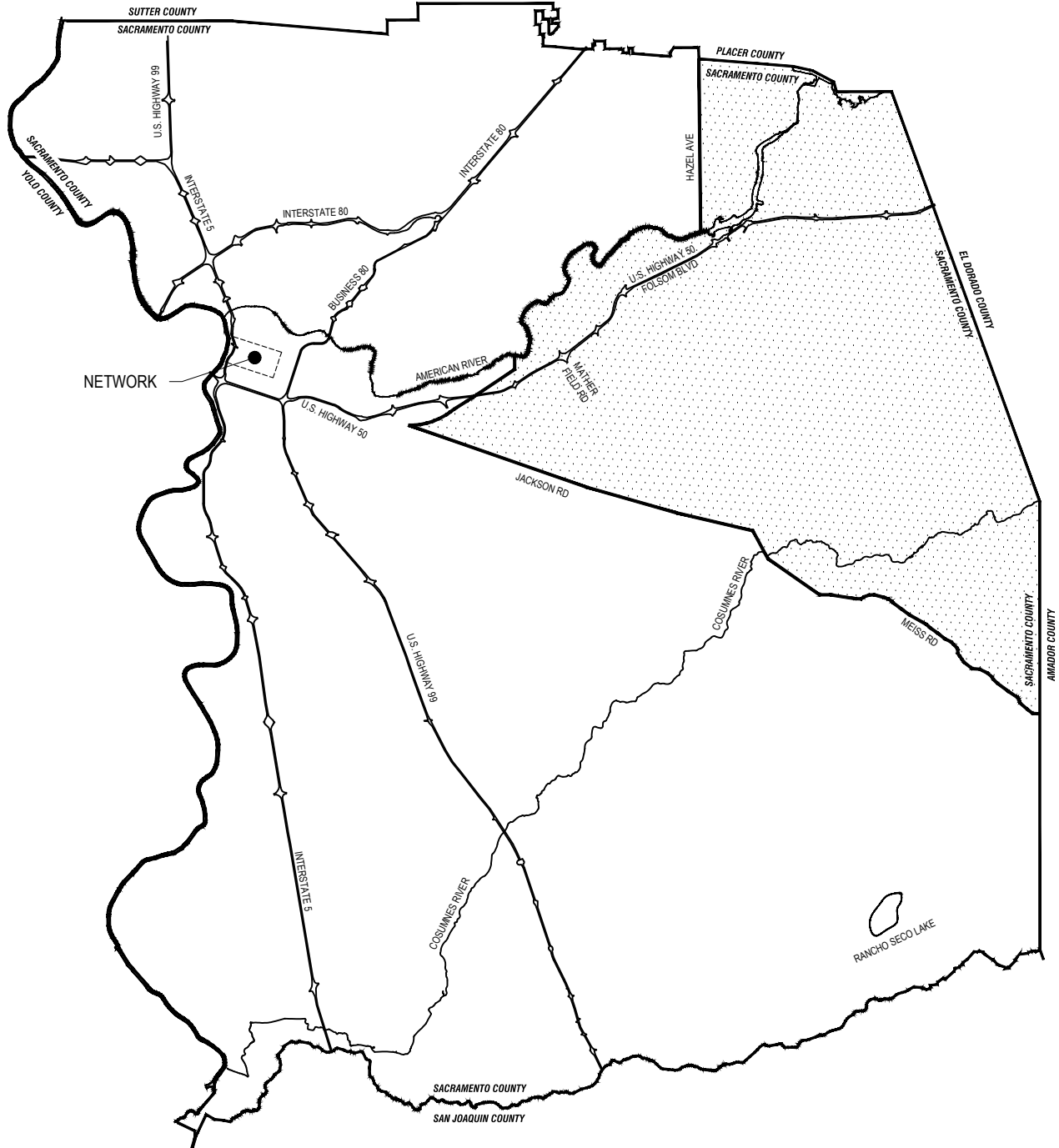
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
REV. DATE: MARCH 2023  
REV. NO.: 5

**TYPICAL DISTRIBUTION RISER**

STANDARD NO.:  
**U1N**





 INDICATES DIFFICULT TRENCHING AREA

**NOTES:**

- A. WHEN TRENCHING IN THE "DIFFICULT TRENCHING AREA", INDICATED ABOVE, SAND BACKFILLING WILL BE REQUIRED.
- B. FOR WORK IN THE NETWORK AREA, SEE ELECTRICAL SERVICE REQUIREMENT T-001 CUSTOMER-BUILT VAULTS.



ESR: T007

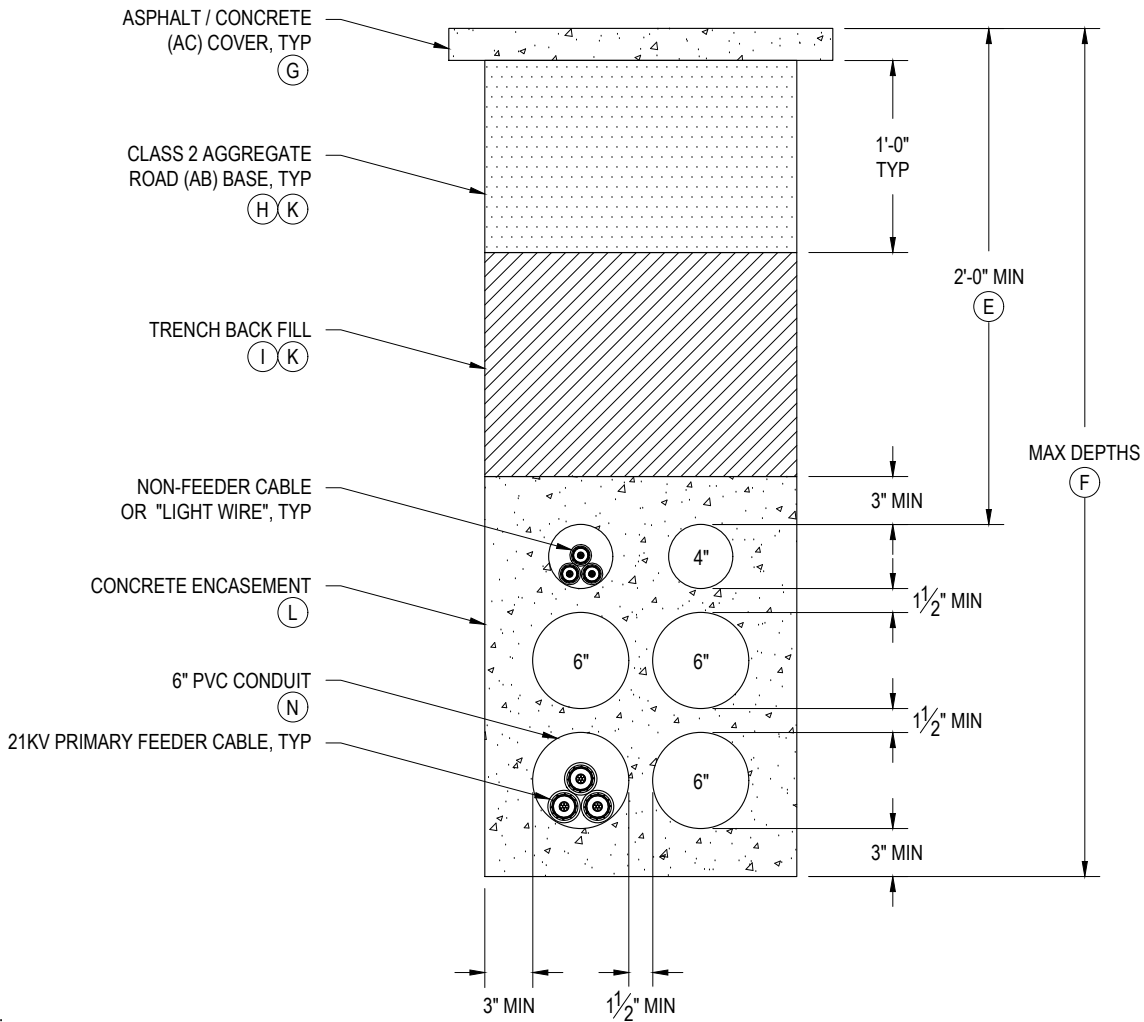
ESR PG. NO.: C-46

REV. DATE: MARCH 2023  
REV. NO.: 3

**DIFFICULT TRENCHING AREAS**

STANDARD NO.:

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**NOTES:**

- A. CONCRETE ENCASUREMENT 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.
- B. CONCRETE ENCASUREMENT 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.
- C. 12kV NETWORK FEEDER CONSTRUCTION WILL REQUIRE CONCRETE ENCASUREMENT AT ALL LOCATIONS.
- D. CONCRETE ENCASUREMENT MAY NOT BE REQUIRED IF CONSTRUCTION WILL OCCUR WITHIN A DEDICATED PUBLIC UTILITY EASEMENT (PUE) "BACK OF WALK" & NOT WITHIN THE PUBLIC ROAD RIGHT-OF-WAY UNLESS SPECIFICALLY NOTED ON THE PLANS.
- E. 2'-0" INCHES OF **MINIMUM** COVER TO THE TOP OF THE HIGHEST CONDUIT (FOR CONCRETE ENCASED) UNLESS NOTED OTHERWISE.
- F. MAXIMUM DEPTH TO THE BOTTOM OF THE ENCASEMENT SHALL NOT EXCEED 4'-11". TEMPORARY EXCURSIONS OR DIPS GREATER THAN 4'-11" TO AVOID CONFLICTS MAY BE PERMITTED IF NECESSARY. HOWEVER, EXTENDED LENGTHS (TYPICALLY ON THE ORDER OF 100'-0" OR MORE) GREATER THAN 6'-0" WILL REQUIRE SMUD ENGINEERING APPROVAL DUE TO POTENTIAL CABLE AMPACITY CONSTRAINTS.
- G. 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.).
- H. CLASS 2 AGGREGATE BASE (TYPICAL) OR AS REQUIRED BY THE APPROPRIATE CITY OR COUNTY AGENCY.
- I. TRENCH BACK FILL MAY BE NATIVE, CONTROLLED DENSITY FILL (CDF), 2-SACK SLURRY CEMENT, OR A SMUD-SPECIFIED LOW-STRENGTH FLUIDIZED THERMAL BACK FILL (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.
- J. BACK FILL SHALL NOT BE CONCRETE OR CEMENT MIX OTHER THAN WHAT IS LISTED IN NOTE I.
- K. THE CITY OR COUNTY MAY ALLOW CDF &/OR SLURRY CEMENT.
- L. 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.
- M. A MINIMUM OF 3" OF CONCRETE COVER IS REQUIRED FOR THE CONCRETE ENCASEMENT. CONDUIT-TO-CONDUIT SPACING BETWEEN SMUD CONDUITS ONLY TO BE AT LEAST 1 1/2".
- N. SEE SMUD ENGINEERING SPECIFICATION SS0801 FOR FURTHER DETAILS REGARDING THE CONDUIT REQUIREMENTS.



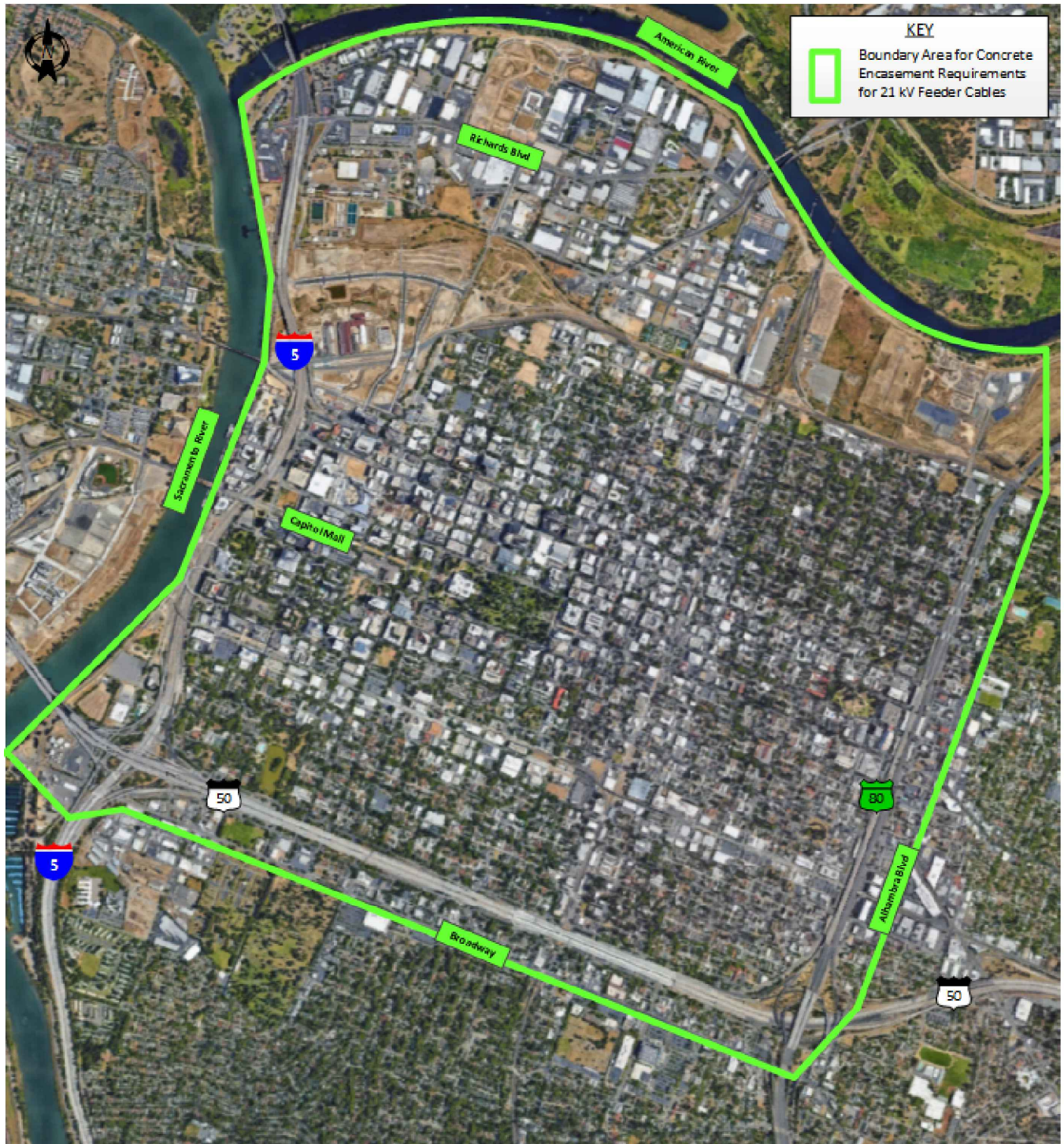
ESR: T007

ESR PG. NO.:C-47A/B

REV. DATE: REV. NO.:  
MARCH 2023 1

**TYPICAL DISTRIBUTION TRENCH IN  
CORE DOWNTOWN AREAS**

STANDARD NO.:  
**U12P3X8**



**NOTES:**

- A. AREA REQUIREMENTS FOR CONCRETE ENCASUREMENT COVERS THE "DOWNTOWN" CORE AREA AS SHOWN ABOVE IN THE BOUNDARY AREA.
- B. THE AREA INCLUDES: SACRAMENTO RIVER TO THE WEST, BROADWAY TO THE SOUTH, ALHAMBRA TO THE EAST & THE AMERICAN RIVER TO THE NORTH.
- C. CONCRETE ENCASUREMENT 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.
- D. CONCRETE ENCASUREMENT REQUIREMENTS MAY EXTEND BEYOND THE ABOVE BOUNDARY AREA IF SPECIFICALLY NOTED ON THE PLANS.



ESR: T007

ESR PG. NO.:C-47A/B

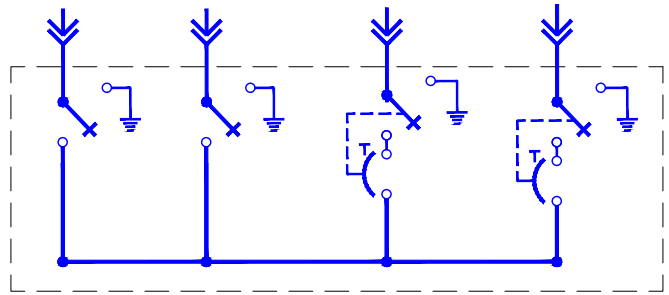
REV. DATE: MARCH 2023  
REV. NO.: 1

**TYPICAL DISTRIBUTION TRENCH IN CORE DOWNTOWN AREAS**

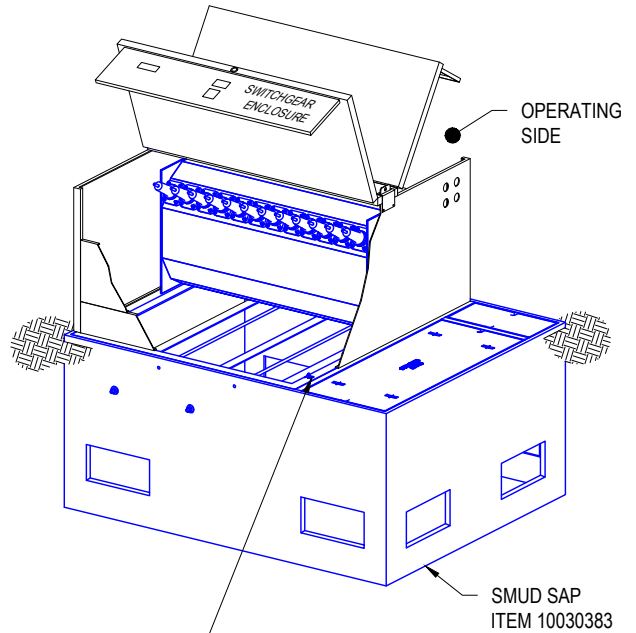
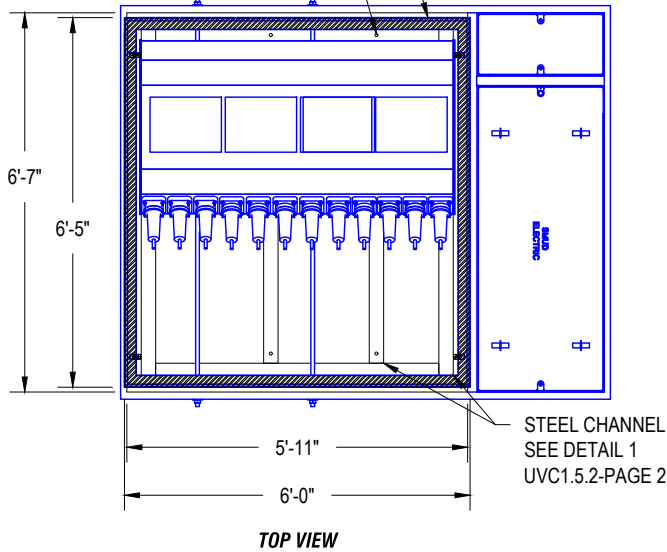
STANDARD NO.:  
**U12P3X8**

PADMOUNT SWITCHGEAR	
SAP ITEM	DESCRIPTION
10015322	SWGR PDMT 21KV SF6 SW 2-600A 3PH FI
10021655	SWG PDMT 21KV SF6 4-WAY W/ SCADA

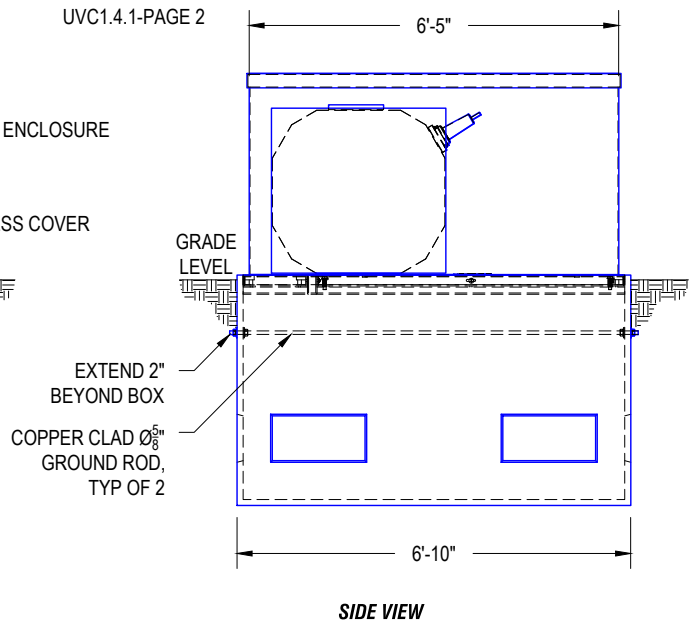
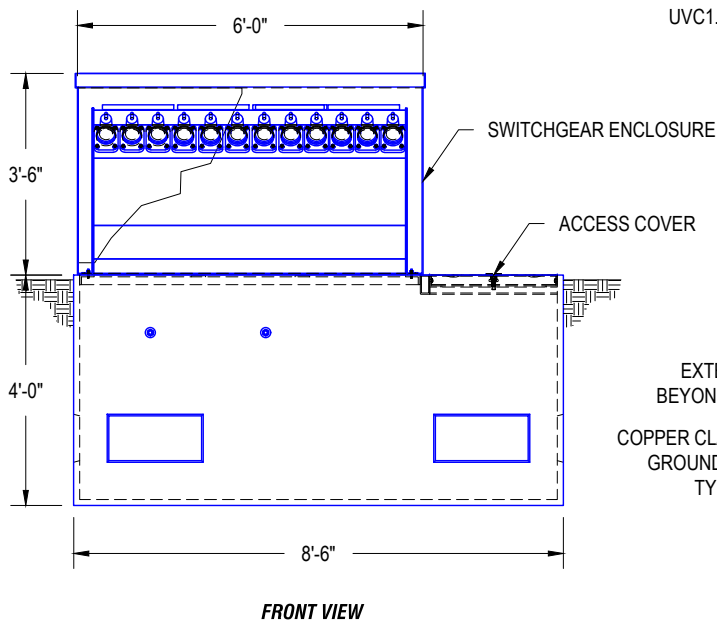
**SWITCH CONFIGURATION**



EQ ENCLOSURE FLANGE  
 $\varnothing_{5/8}$ " HOLE FIELD TO DRILL AS NECESSARY, TYP OF 4 MIN  
 SEE DETAIL 1 UVC1.4.1-PAGE 2



SEE DETAIL 1  
 UVC1.4.1-PAGE 2



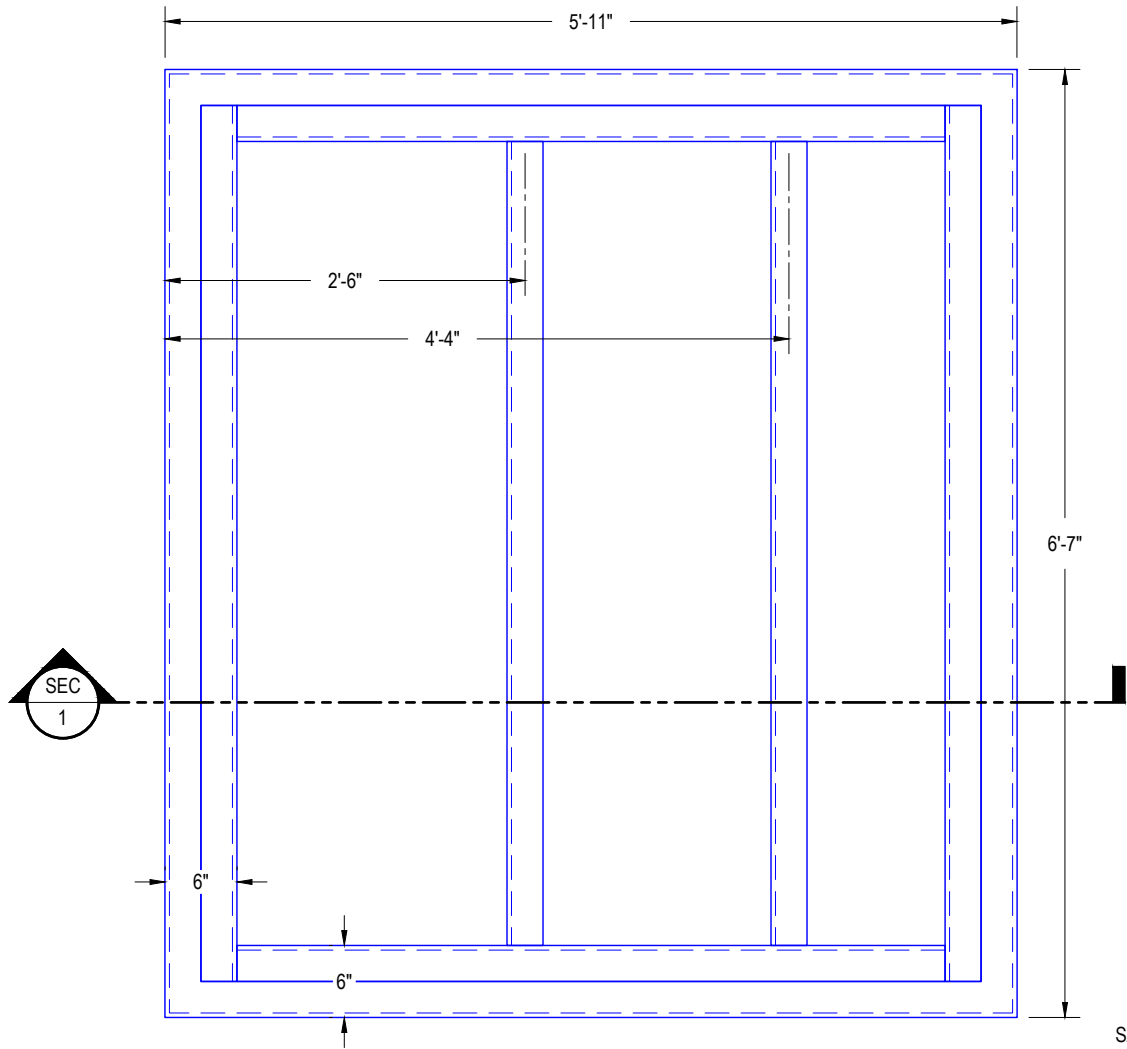
ESR: T007

ESR PG. NO.: C-48

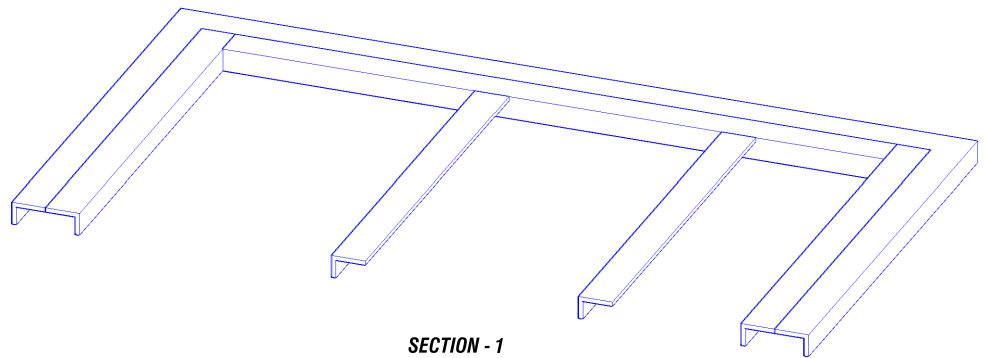
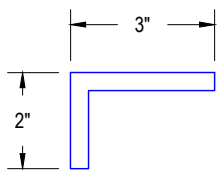
REV. DATE: MARCH 2023  
 REV. NO.: 3

**21KV SF6 PADMOUNT SWITCHGEAR**

STANDARD NO.:  
**UVC1.5.2**



SAP# 10023861



**NOTES:**

- A. FOR GROUNDING DETAILS REF UGA2.5.
- B. FOR INSTALLATION DETAILS REF U12H3X1.
- C. FOR LANDSCAPE CLEARANCE REQUIREMENTS REF UVD5.5.
- D. FOR SUB-SURFACE EXTENSIONS TO CORRECT FOR GRADE CHANGES, PLEASE CONTACT STANDARDS GROUP.
- E. STEEL FRAME SHALL BE GALVANIZED & INCLUDES MOUNTING HOLES FOR REPLACON 1028248S BOX.



ESR: T007

ESR PG. NO.: C-48

REV. DATE: MARCH 2023  
REV. NO.: 3

**21KV SF6 PADMOUNT SWITCHGEAR**

STANDARD NO.:  
**UVC1.5.2**

PAGE 2 OF 2