Electric Service Requirements

Customer Owned and Constructed Transformer Alcove

Engineering Specification T013
December 2014

Powering forward. Together.
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1. **PURPOSE**

This specification is for the construction of a building alcove used to house one or more utility owned transformers, switching cubicles and/or associated secondary boxes. The alcove shall be provided complete with all conduit, wells, pads, boxes, walls, and fences as specified.

The installation of the power cable is not a part of this specification.

The customer shall furnish all materials, labor, equipment, and incidentals necessary to provide a complete building alcove ready for the placement of utility equipment.

1.1. **Standards**

All equipment shall be designed, manufactured, supplied, and installed in accordance with the latest applicable standards of:

(CFC) California Fire Code
(NEMA) National Electric Manufacturers Association
(ANSI) American National Standards Institute
(ASTM) American Society for Testing and Materials
(IEEE) Institute for Electrical and Electronic Engineers
(UL) Underwriter's Laboratory
(CEC) California Electrical Code

1.2. **Permits and Licenses**

Unless noted elsewhere, all permits and licenses necessary to the prosecution of the work shall be secured by the Customer, at his/her own expense, and he/she shall give all notices necessary and incident to the due and lawful prosecution of the work.

2. **DESIGN**

2.1. **General**

The requirements specified in this section are intended to provide SMUD with a space to place service equipment in building areas on Customer’s property. These requirements meet the operational and safety needs of SMUD and safeguard people and property from hazards arising from the use of such equipment. These requirements are not intended as a complete design specification. Any conflict with these requirements and other applicable codes, ordinances, and standards shall be brought to the attention of SMUD in writing using the submittal process. Any variance requests shall be submitted to SMUD in writing. The design of the alcove needs to facilitate installation & maintenance of the installed equipment. In the event of transformer failure/replacement, customer/owner shall be
required to pull the secondary conductors in the clear to enable transformer replacement. If the entrance to the alcove opens up to anything other than a road or alley, prior approval of the location must be obtained.

2.2. Walls and Ceilings
The minimum head room shall be fifteen (15) feet from floor to ceiling. All walls and ceiling shall have a minimum three (3) hour fire rating.

2.3. Floor
2.3.1. The minimum floor space required shall be determined by the equipment required to serve the facility. No facilities shall be located under the floor without prior approval.

2.3.2. The floor space required is detailed in the following attachments:
   - Fig. 1 One transformer
   - Fig. 2 Two transformers, one J-box
   - Fig. 3 One transformer, one Switch

2.3.3. The typical weight of one transformer for design purposes shall be 15,000 pounds occupying a floor space of 50 square feet.

2.3.4. The floor shall be sloped approximately 1% to allow for drainage out the opening of the alcove.

2.3.5. At the alcove opening the alcove floor shall be flush or a maximum of 1” above the outside grade.

2.3.6. The Transformer Pad(s) shall be recessed and flush with the floor.

2.4. Access
There shall be vehicle access to the alcove. There shall also be a 20 foot clear area in front of the alcove the full length of the alcove. This area shall be at the same elevation as the floor of the alcove.

2.5. Duct
All primary and secondary ducts shall be constructed by the Customer. The number and size of ducts for the primary cable will be determined by SMUD. The physical size, number, and location of service cable ducts shall be determined by the Customer. Details of duct systems shall be submitted by the Customer for SMUD approval.

2.6. Fire Suppression and Detection
SMUD requires no fire suppression and detection systems in an alcove. If fire suppression and detection systems are installed, they shall be double interlock pre-action or a clean agent system. Water sprinklers of any type are not allowed in the alcove. All associated detection shall be heat type detectors. It is not prohibited to place smoke detectors in the alcove, but it is
not recommended due to the environment and the high possibility of false alarms.

2.7. Adjacent Walls

2.7.1. The outside wall for a minimum of ten (10) feet around the opening shall be three (3) hour fire rated.

2.7.2. It is advised that no penetrations, openings, vents, or operable windows be placed on the outside wall above the alcove and within 20 feet on either side. This will reduce the chances of contamination to the building in the event of a fire.

2.8. Fencing

2.8.1. A gate shall be provided for each transformer to facilitate transformer operation and maintenance. Submittals are required for the gate design.

2.8.2. Minimum 10’ wide gate(s) shall completely block alcove opening to prevent unauthorized entry. Design of gate(s) shall provide for ventilation. The gate(s) shall be capable of being secured with a SMUD padlock(s).

2.8.3. The entire fence and gate(s) shall be easily removable to allow installation and removal of equipment.

2.9. Grounding

2.9.1. The Customer shall provide ground points in the alcove as specified by SMUD Engineering Specification T007 for specific equipment being installed.

2.9.2. The ground points shall be copper clad ground rods, 5/8” diameter, 8 feet in length, or an equivalent grounding system with prior SMUD approval.

2.9.3. Ground rods shall be driven vertical such that the top end shall be exposed ten (10) inches.

2.9.4. Ground rods shall only be driven in the presence of the SMUD Inspector.

2.10. Foreign Objects

Pipes, ducts, vents, or other foreign objects not required for the service shall not enter or pass through the alcove.

3. MATERIAL

3.1. Material Furnished and Installed by Customer

3.1.1. General

Certain 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 SMUD approval.

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 a material submittal. 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.

3.1.2. Conduit

All four (4) inch, five (5) inch and six (6) inch conduit shall be polyvinylchloride (PVC) DB 120, gray color in accordance with the latest revision of ASTM F512. Conduit shall be any manufacturer meeting specification.

3.1.3. Elbow

All four (4) inch, five (5) inch and six (6) inch elbows shall be polyvinylchloride (PVC), Schedule 40. Elbows shall have a 30 inch radius.

3.1.4. End Bell

End bells shall be solid one piece type, polyvinylchloride (PVC), Schedule 40, gray color. End bells shall conform to NEMA Publication No. TC3, Type III application. End bells shall be the following, or SMUD approved equal:

<table>
<thead>
<tr>
<th></th>
<th>4&quot;</th>
<th>5&quot;</th>
<th>6&quot;</th>
</tr>
</thead>
<tbody>
<tr>
<td>Prime Conduit</td>
<td>EB400</td>
<td>EB500</td>
<td>EB600</td>
</tr>
<tr>
<td>Condux</td>
<td>84610-40</td>
<td>84610-50</td>
<td>84610-60</td>
</tr>
</tbody>
</table>

3.1.5. Conduit Plug

Conduit plugs shall be plastic tape red for appropriate conduit size. Plugs shall be the following or SMUD approved equal:

<table>
<thead>
<tr>
<th></th>
<th>4&quot;</th>
<th>5&quot;</th>
<th>6&quot;</th>
</tr>
</thead>
<tbody>
<tr>
<td>Prime Conduit</td>
<td>PEPT400</td>
<td>PEPT 500</td>
<td>PEPT 600</td>
</tr>
<tr>
<td>Condux</td>
<td>80476-01</td>
<td>80477-00</td>
<td>80478-00</td>
</tr>
</tbody>
</table>

3.1.6. Secondary Junction Box Well

3.1.6.1. The box shall be made from fiberglass reinforced polymer non-concrete.

3.1.6.2. Nominal outside dimensions shall be 96" long by 48" wide by 48" high.

3.1.6.3. The bottom shall be open.
3.1.6.4. Covers are required.

3.1.6.5. Four (4) 5/8 inch diameter inserts filled with rust preventative inhibitor and protected with an installed metal allen screw shall be installed on the top edge of the box for the purpose of anchoring the padmounted secondary junction box.

3.1.6.6. The box shall be the following or SMUD approved equal:

- Replacon RP489348
- Jensen PreCast #PC484SM
- Oldcastle #444SMUD 44/S

3.2. Material Furnished by SMUD and Installed by Customer

SMUD will provide 5/8" x 8' copper clad steel ground rods for installation by the Customer as directed by SMUD.

3.3. Material Furnished and Installed by SMUD

SMUD will provide and install secondary junction box enclosures and terminations as required.

4. SUBMITTALS

4.1. The Customer shall submit documentation showing compliance with this specification. This documentation shall be submitted prior to application for permit with the City of Sacramento. The purpose of this requirement is to allow the Customer to provide the City of Sacramento with SMUD approved documentation.

4.2. The Customer shall submit to SMUD three (3) complete sets of plans and specifications for approval. The submittal shall include the following information:

a) One Line Diagram showing number of conduits, number of service conductors, type, size from the utility transformer, main switchboard and main panels.

b) Site plan showing location of alcove and adjacent streets.

c) Construction drawings including as a minimum: gate(s), exterior elevations, alcove floor, alcove layout with SMUD installed equipment and documentation showing compliance with this specification.

4.3. One complete set of documentation will be returned with SMUD comments. A minimum of ten (10) working days shall be required for submittal review.

4.4. Submittals marked "NOT APPROVED" shall be corrected and resubmitted.

4.5. Approval by SMUD is limited only to areas occupied by SMUD equipment. Approval is only for the purposes of assuring the operability of SMUD.
equipment. SMUD assumes no responsibility for the correct application or safety of owner installed equipment or design.

4.6. Submittals shall be sent to:

    SMUD
    New Services Grid Assets, MS EA105
    P.O. Box 15830
    Sacramento, CA  95852-0830

5.  APPROVAL BY OTHER AGENCIES

The Customer shall submit letters from the City of Sacramento Building Department and other applicable agencies detailing their inspection of the alcove and stating their acceptance and approval. Written approval of acceptance by all applicable agencies must be received by SMUD before SMUD will place equipment.

6.  INSPECTION

6.1. SMUD will provide an Inspector who will be the line of communication between the Customer and SMUD during construction. The hours of work for the Inspector are from 8:00 A.M. to 3:00 P.M., Monday through Friday. All work requiring the presence of the Inspector shall be scheduled during these hours. An advance notice of two (2) full working days shall be given to the Inspector for all work to be inspected.

6.2. The Customer shall notify SMUD’s Inspection Scheduling Group at telephone number (916) 732-5905 to arrange for inspection.

6.3. 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 costs of all tests required under this inspection will be paid by the Customer.

6.4. 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.

6.5. Failure of the Customer to adhere to the above provisions may result in the Customer being required, at his/her expense, to remove, uncover, or otherwise enable inspection of such work by the Inspector.

6.6. Rejected work may result in delaying electric service until these inadequacies are corrected. The costs of correcting rejected work shall be paid by the Customer.
7. INSTALLATION

7.1. Sealing Ducts
All secondary ducts shall be sealed by the customer, after the ducts have been inspected and cable installed. Sealing shall be for the purposes of stopping water, smoke, and fire.

7.2. Testing
7.2.1. Ducts constructed for SMUD installed cable shall be thoroughly cleaned and tested. The test shall involve drawing a mandrel through each duct. The SMUD Inspector will furnish mandrels. The mandrel test shall be pulled only in the presence of the Inspector.

7.2.2. Ducts which do not pass the mandrel test shall be repaired and retested. A brush shall not be used in any plastic duct.

7.2.3. A flat tape polyester pull line with a minimum strength of 2500 lbs. shall be left in each duct as a "sleeper".

8 ATTACHMENTS

Figure 1 - Alcove for One Transformer
Figure 2 - Alcove for Two Transformers and One J-Box
Figure 3 - Alcove for One Transformers and One Switch
NO WINDOWS OR VENTS,
NO PROTRUSIONS
NO INTAKES IN CLEARANCE AREA

CLEARANCE AREA
10' AROUND OPENING
3 HOUR FIRE RATED

CEILING HEIGHT

15' MIN.

ELEVATION
(GATE NOT SHOWN)

SEE ELECTRIC SERVICE
REQUIREMENTS, DISTRIBUTION
UNDERGROUND STRUCTURE,
ENGINEERING SPECIFICATION
T007. DRAWING UVD2.3 OR
UVD2.3A FOR TRANSFORMER
PAD SIZE PER SMUD DESIGNER.

PLAN

20' MIN. CLEAR WORK
AREA TRAFFIC RATED

BUILDING WALL

FIGURE 1
**ELECTRIC SERVICE REQUIREMENTS FOR CUSTOMER OWNED AND CONSTRUCTED TRANSFORMER ALCOVE**

- **No windows or vents**
- **No protrusions**
- **No intakes in clearance area**

**Clearance Area**
- 10' around opening
- 3 hour fire rated

**Elevation**
(Gate not shown)

- **Secondary junction box** (48" x 48")
- See electric service requirements, distribution underground structure, engineering specification T007, drawing UVC1.7 and U1S3D1 for secondary J-box and drawing UVD2.3 or UVD2.3A for transformer pad size, per SMUD designer.

**Plan**
(FIGURE 2)

- 20' min. clear work area traffic rated
- Building wall

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**CONSTRUCTION STANDARDS**

- Alcove
- Two Transformers & One J-Box
- Figure 2
- Page 10
ELECTRIC SERVICE REQUIREMENTS FOR CUSTOMER OWNED AND CONSTRUCTED TRANSFORMER ALCOVE

ELEVATION
(GATE NOT SHOWN)

PLAN
FIGURE 3

NO WINDOWS OR VENTS
NO PROTRUSIONS
NO INTAKES IN CLEARANCE AREA

CLEARANCE AREA
10' AROUND OPENING
3 HOUR FIRE RATED

CEILING HEIGHT

10' MIN.

RPM HANDHOLE BOX
FOR SWITCHGEAR

SEE ELECTRIC SERVICE REQUIREMENTS, DISTRIBUTION UNDERGROUND STRUCTURE, ENGINEERING SPECIFICATION T007. DRAWING UVC1.4 OR UVC1.5 PER SMUD DESIGNER.

SEE ELECTRIC SERVICE REQUIREMENTS, DISTRIBUTION UNDERGROUND STRUCTURE, ENGINEERING SPECIFICATION T007. DRAWING UVD2.3 OR UVD2.5A FOR TRANSFORMER PAD SIZE, PER SMUD DESIGNER.

20' MIN. CLEAR WORK AREA TRAFFIC RATED

8' MIN.

3.5' MIN.

8' MIN.

3.5' MIN.

4' MIN.

8' MIN.

4' MIN.

BUILDING WALL

Alcove
One Transformer & One Switch

Figure 3