3200 IDENTIFICATION

3203 Pull & Measuring Tape, Conduit & Conduit Knockout Identification

3300 SUBSTRUCTURES/CONDUITS

3302.1 - 3302.2 Substructure Applications
3303 Concrete Products – Manholes, Handholes, Covers & Enclosures
3304.1 - 3304.3 False Curb
3308.1 - 3308.2 Handhole (Inside Dimensions – 10-1/4" x 15-3/8")
3309.1 Handhole Polymer Concrete (37" x 26" x 18")
3309.2 Handhole Polymer Concrete (37" x 26" x 26")
3309.3 Handhole Polymer Concrete (Heavy Duty Cover for 3309)
3309.4 Handhole Polymer Concrete (Excavation Dimensions)
3311 Handhole – 14" x 66" x 14" / 14" x 108" x 14"
3312.1 - 3312.2 Handhole (Inside Dimensions – 17" x 30")
3313.1 - 3313.3 Handhole (Inside Dimensions – 24" x 36")
3314.1 - 3314.6 Handhole Equipment Enclosure (Inside Dimensions – 3' x 6')
3315.1 - 3315.4 Handhole Equipment Enclosure (Inside Dimensions – 4' x 6'-6")
3316.1 - 3316.4 Handhole Equipment Enclosure (Inside Dimensions – 5' x 8'-6")
3317.1 - 3317.4 Handhole Equipment Enclosure (Inside Dimensions – 6' x 8') (1829 x 2438)
3325.1 - 3325.2 Manhole, Tub Type – 8' x 14' x 9'-6"
3326.1 - 3326.2 Manhole, Tub Type – 8' x 20' x 9'-6"
3332.1 - 3332.2 48" x 60" Manhole Neck & Cover Traffic Bearing
3364.1 Utility Locations in Local & Collector Streets in San Diego County
3364.2 Utility Locations in Major Streets, Prime Arterials & Expressways in San Diego County
3364.3 Joint Trench Typical Location for Underground Conversions in San Diego County
3365.1 Imported or Native Backfill
3365.2  - 3365.5 Slurry Backfill
3367.1 - 3367.2 Trench Paralleling Foundations
3369 Bio Retention/Wet Facilities Standard
3370.1 - 3370.6 Underground Distribution (UD) Trenches & Utility Positioning – San Diego County
3371.1 - 3371.5 Underground Distribution (UD) Trenches & Utility Positioning – Orange County
3372.1 - 3372.2 Conduit Sizing for Underground Cables
3373.1 Conduit & Conduit Fittings
3373.2 Conduit & Conduit Fittings – ED & DB
3374.1 - 3374.3 Conduit Installation Practices
3375 Conduit Spacer Data
3376.1 - 3376.3 Conduit Encased Multi-Conduit Installation
3377.1 - 3377.2 Conduit Stub Marker & Ball Marker Locating System
3377.3 Gas Stub Marker
3379 Conduit Mandreling
3382 Conduit Substructure Adaptors
3400 PADDS, RETAINING WALLS, CLEARANCES

3409.1 – 3409.2 ..... RTU Pad for Vista Switch with Remote RTU
3410.1 – 3410.2 ..... 600A to 200A Terminator Pad
3414.1 – 3414.2 ..... Capacitor Pad
3415.1 – 3415.2 ..... Service Restorer Pad
3416.1 – 3416.3 ..... 3416 Pad & Handhole Installations for Pad-Mounted 12kV, 200 Amp, Three-Phase Terminating Cabinet
3417.1 – 3417.2 ..... 600 Amp Terminating Cabinet Pad
3418.1 – 3418.3 ..... Box Pad for PME-3 & PME-5 Switches
3419 – 3419.2 ..... Box Pad for 3-Way Pad-Mounted Switch
3421.1 – 3421.6 ..... Single-Phase Transformer/Utility Equipment Pad
3423.1 – 3423.5 ..... Box Pad with Temporary Cover for PME 9, 10, 11 & 2-Sided Trayer Switches
3425.1 – 3425.3 ..... Three-Phase Transformer Pad Installation 3425
3426.1 – 3426.4 ..... Three-Phase Transformer Pad Installation 3426
3427.1 – 3427.4 ..... Three-Phase Transformer Pad Installation 3427
3428.0 – 3428.2 ..... Box Pad for 4-Way Trayer Pad-Mounted Switch
3429.0 – 3429.2 ..... Box Pad for 5-Way Trayer Pad-Mounted Switch
3478 ................ Transformer Sound Enclosure
3481.1 – 3481.2 ..... Equipment Barrier Protection & Clearance
3483.1 – 3483.2A ..... Clearance Requirements for Pad-Mount & Subsurface Equipment from Above Ground Objects
3483.3 ................ Minimum Operating Clearance Requirements for Pad-Mounted Equipment
3483.4 ................ Minimum Operating Clearance Requirements for Subsurface Equipment
3483.5 ................ Minimum Operating Clearance Requirements for Pad-Mounted & Subsurface Equipment
3484.1 – 3484.2 ..... Pad Installation for Pad-Mounted Equipment
3484.3 ................ Fiberglass Retaining Wall for Pad-Mounted Equipment
3485 ................ Substructure Installation on Sloping Grades
3486.1 ................ Retaining Wall Requirements & Clearances
3486.2 ................ Retaining Wall Requirements & Single-Phase Transformer Pad Locations Showing CATV &/or Telco Locations
3486.3 ................ Clearances Between SDG&E Facilities & Other Above Ground Objects
3487.1 ................ Masonry Retaining Walls Type 1 (Level Backfill)
3487.2 ................ Masonry Retaining Walls Type 2 (Sloping Backfill)
3487.3 ................ Masonry Retaining Walls Type 3 (Level Backfill)
3487.4 ................ Masonry Retaining Walls Type 4 (Sloping Backfill)
3487.5 ................ Masonry Retaining Walls Type 5 (Level Backfill)
3487.6 ................ Masonry Retaining Walls Type 6 (Sloping Backfill)
3487.7 ................ Typical Stepped Wall Footing Details
3487.8 ................ Details for Masonry Retaining Wall
3487.9 – 3487.10 ... General Notes for Masonry Retaining Walls

3600 SUBSURFACE SECTIONALIZING EQUIPMENT
3605.1 ................ Substructure Use & Limitations Reference Sheet

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3900 SEALING SERVICE LATERAL CONDUIT, INSTRUCTIONS

3942.1 - 3942.2 Underground Electric Service Lateral Customer-Installed Conduit, Residential or Commercial
3944.1 - 3944.2 Underground Service from Overhead Facilities (Low Voltage), Material Requirements
3948.3 - 3948.4 Sealing Service Lateral Conduit, Instructions
3950 Field Heating Service Lateral Conduits
3960 - 3960.2 Elevation of Customer Facilities Preventing Water Entry

4100 0-600 VOLT CONNECTORS, CONNECTIONS & HANDHOLE INSTALLATION
4173.3 - 4173.5 0-600 Volt Connectors & Handhole Installation for #8 through 500 kCMIL Conductors

4400 LIGHTING
4435 Handhole (Inside Dimensions - 10-¼" x 15-⅜")

4500 GROUNDING INSTALLATIONS
4510.1 Trench Ground Wire (Standard Method)
4510.2 Trench Ground Wire (Alternate)
4510.3 Trench Ground Wire (Standard or Alternate)
4512.1 - 4512.4 Equipment Grounding Installation
4514 Grounding Telco Conductor in Pad-Mounted Equipment
4550 Grounding Telco Conductor in Handhole (3314, 3315 or 3316)

4700 MISCELLANEOUS EQUIPMENT
4705 12kV Service Point Connection for Trolley Traction Station
**SCOPE:** THIS STANDARD SHOWS HOW TO IDENTIFY PULLING AND MEASURING TAPES, CONDUIT, AND CONDUIT KNOCKOUTS.

**INSTALLATION:**


### EXAMPLES OF IDENTIFICATION

![Diagram of identification example]

THE EXAMPLE TO THE LEFT SHOWS THE TYPICAL KNOCKOUT POSITIONS FOR A MANHOLE OR HANDBOLE. FOR THIS EXAMPLE IT IS A 3315 HANDBOLE. THERE IS A VERTICAL LINE WITH A DOUBLE-EENDED ARROW TO SHOW THE KNOCKOUT POSITIONING ON EITHER SIDE OF THE SUBSTRUCTURE.

FOR THE 3325.1A INSTALL TAGS AT THE TOP OF THE CONDUIT TO IDENTIFY THE FACILITY IT IS FED FROM OR FEEDS TOO.

KNOCKOUTS ARE IDENTIFIED BY ASSIGNING AN ALPHA CHARACTER TO EACH COLUMN OF KNOCKOUTS READING FROM LEFT TO RIGHT "A", "B", "C", "D". ASSIGNING A NUMERIC CHARACTER FOR EACH ROW BOTTOM TO TOP, "1", "2", "3", ETC FURTHER IDENTIFIES THEM.

### BILL OF MATERIAL:

<table>
<thead>
<tr>
<th>ITEM</th>
<th>DESCRIPTION</th>
<th>QUANTITY</th>
<th>STOCK NUMBER</th>
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<tr>
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<td>DECAL</td>
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<td>2</td>
<td>11 POSITION TAG HOLDER</td>
<td>AS REQ'D</td>
<td>S413684</td>
</tr>
<tr>
<td>3</td>
<td>TIE STRAP 7-3/4&quot;</td>
<td>AS REQ'D</td>
<td>S739120</td>
</tr>
</tbody>
</table>

### MATERIAL DATA:

CABLE PULLING AND MEASURING TAPE: SDG&E APPROVED TENSILE STRENGTH 2500 LBS, WOVEN POLYESTER HIGH STRENGTH, CONTINUOUS FILAMENT, PRE LUBRICATED 3/4" WITH FOOTAGE MARKING.

### REFERENCE:

A SEE STANDARDS PAGE 3212.7 FOR "IDENTIFICATION DECALS".

B SEE STANDARDS PAGE 3202.3 AND 3202.4 FOR FACILITY CODES AND TAG HOLDER INFORMATION

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## Substructure Applications

For equipment limitations, termination configurations, and unobstructed space requirements, see standards 3605 thru 3649.

### 3309.1

**Handhole**

- **36" x 24-1/4" x 18"**

Handhole can be used in single-family residential, multi-family, and commercial developments for the termination and connection of single-phase secondaries and services. Handhole must be installed in non-traffic areas where vehicles cannot drive over or park on top of handhole. Never install in streets or driveways.

### 3309.2

**Handhole**

- **36" x 24-1/4" x 26"**

Handhole can be used in single-family residential, multi-family, and commercial developments for the termination and connection of single-phase and limited three-phase secondaries and services. Handhole must be installed in non-traffic areas where vehicles cannot drive over or park on top of handhole. Never install in streets or driveways. When a 3309 is required in a traffic area, substitute the 3309 with the 3313 and traffic cover. 3313 requires truck access for installation and maintenance.

### 3311

**Handhole**

- **14" x 66" x 14"**

For primary and secondary cable training between two single-phase pad-mounted transformers connected in an open-delta bank.

### 3311

**Handhole**

- **14" x 108" x 14"**

For primary and secondary cable training between three single-phase pad-mounted transformers connected in a closed delta-bank when HKR transformer cannot be used.

### 3312

**Handhole**

- **17" x 30" x 12"**

Handhole-1 body secondary and under pad

3312 handhole may be used for replacement of existing facilities use 3309.1 if possible. All facilities requiring 30" x 17" box under pad mounted equipment.

### 3313

**Handhole**

- **24" x 36" x 24"**

Handhole can be used in single-family residential, multi-family, and commercial developments for termination and connection of single-phase or three-phase secondaries and services or single-phase primary. Secondaries and primary are not permitted in the same handhole. Handhole with Parkway cover must be installed in areas where vehicles cannot drive over or park on top of handhole. Handhole with a traffic cover may be installed in streets or driveways but only when a non-traffic location is unavailable. Requires truck access for installation and maintenance.
### Substructure Applications

For equipment limitations, termination configurations and unobstructed space requirements, see Standards 3605 Thru 3649.

<table>
<thead>
<tr>
<th>Handhole</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>3314 3' X 6' X 4' Handhole</td>
<td>Handhole can be used in single-family residential, multi-family, and commercial developments for the termination and connection of single-phase and three-phase primary local distribution and/or secondaries and services. Handhole with parkway cover must be installed in areas where vehicles cannot drive over or park on top of handhole. If a new 3314 Handhole is required in a street or driveway where a <strong>non-traffic location is unavailable</strong>, it must be substituted with a 3315 Handhole and traffic cover. If a traffic cover is required on an existing 3314 handhole located in a vehicular area, use the 3315 &quot;Traffic Cover Assembly&quot;. Requires truck access for installation and maintenance. <em>(The 3523 is preferred)</em></td>
</tr>
<tr>
<td>3315 4' X 6'-6&quot; X 6' Handhole</td>
<td>Handhole can be used in single-family residential, multi-family, and commercial developments for the termination and connection of single-phase and three-phase primary local distribution, three-phase primary feeders, secondaries and services. Handhole with parkway cover must be installed in areas where vehicles cannot drive over or park on top of handhole. Handhole with a traffic cover may be installed in streets or driveways but only when a <strong>non-traffic location is unavailable</strong>. Requires truck access for installation and maintenance.</td>
</tr>
<tr>
<td>3316 5' X 8'-6&quot; X 6'-6&quot; Handhole</td>
<td>Handhole can be used in single-family residential, multi-family, and commercial developments for the termination and connection of single-phase and three-phase primary local distribution, three-phase primary feeders, 4-way switch, secondaries and services. Handholes with parkway cover must be installed in areas where vehicles cannot drive over or park on top of handhole. Handholes with traffic cover may be installed in streets or driveways but only when a <strong>non-traffic location is unavailable</strong>. Requires truck access for installation and maintenance.</td>
</tr>
<tr>
<td>3317 6' X 8' 5'-10&quot; Handhole</td>
<td>Handhole can be used in existing single-family residential, multi-family, and commercial developments and other non-new development projects. To be used only to install the &quot;Vista&quot; sub-surface, surface operable 4-way switch, and terminate on switch three-phase primary feeders, single &amp; three-phase local distribution cables. Handhole must be installed in non-traffic areas where vehicles cannot drive over or park on top of handhole. Requires truck access for installation and maintenance.</td>
</tr>
<tr>
<td>3325 8' X 14' X 9'-6&quot; 3326 8' X 20' X 9'-6&quot; Manhole</td>
<td>Manhole can be used in single-family residential, multi-family, and commercial developments for termination and connection of local primary distribution three-phase primary feeders, secondaries and services and on-off or 4-way switches. Manhole can be installed in non-traffic or street locations. Requires truck access for installation and maintenance. See page 3605.2 for 4-way switch manhole requirements.</td>
</tr>
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</table>
**SCOPE:** This standard lists the concrete products used in subsurface installations.

<table>
<thead>
<tr>
<th>CONCRETE PRODUCTS</th>
<th>STANDARD PAGE</th>
<th>TO BE INSTALLED BY</th>
<th>CRANE REQUIRED</th>
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<tbody>
<tr>
<td>HANDHOLE: 3309.1 - 37” X 26” X 18”</td>
<td>3309</td>
<td>CREWS OR CONTRACTOR</td>
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<tr>
<td>3309.2 - 37” X 26” X 26”</td>
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<tr>
<td>HANDHOLE: 14” x 66” x 14”</td>
<td>3311</td>
<td>CREWS OR CONTRACTOR</td>
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<tr>
<td>14” x 108” x 14”</td>
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<tr>
<td>HANDHOLE: 17” x 30” x 12”</td>
<td>3312</td>
<td>CREWS OR CONTRACTOR</td>
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<tr>
<td>HANDHOLE: 24” x 36” x 24”</td>
<td>3313</td>
<td>CREWS OR CONTRACTOR</td>
<td>NO</td>
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<tr>
<td>HANDHOLE: 36” x 72” x 48”</td>
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<td>HANDHOLE: 4’ x 6’-6” x 6’</td>
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<tr>
<td>HANDHOLE: 5’ x 8’-6” x 6’-6”</td>
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<td>HANDHOLE: 6’ x 8” x 6’-6”</td>
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<td>MANHOLE: 8’ x 14’ x 8’-6”</td>
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<tr>
<td>MANHOLE: 8’ x 20’ x 9’-6”</td>
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<tr>
<td>MANHOLE NECK &amp; COVER-TRAFFIC BEARING</td>
<td>3332</td>
<td>CREWS OR CONTRACTOR</td>
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**NOTES:**

1. Special order manholes larger than those listed will be installed by supplier/contractor.

**INSTALLATION:**

A  Supplier will set substructure on job site if excavation is completed.

B  When supplier’s or SDG&E’s equipment cannot get close enough to excavate due to soft sand, etc., a crane will be required.

**REFERENCE:**

For water sealing concrete sections, see standard 3306.

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<table>
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SDG&E ELECTRIC UNDERGROUND CONSTRUCTION STANDARD

CONCRETE PRODUCTS

HANDHOLES, MANHOLES, COVERS AND ENCLOSURES

UG 3303

1 OF 1

X Indicates Latest Revision

Completely Revised

New Page

Information Removed
SCOPE: THIS STANDARD PROVIDES INFORMATION ON HOW TO APPLY, ORDER, AND INSTALL FALSE CURBS.
FALSE CURBS ARE PRIMARILY USED IN ASSOCIATION WITH ROAD IMPROVEMENT PROJECTS. THE FALSE CURB IS AN EFFECTIVE WAY TO ELIMINATE THE NEED TO RELOCATE A PRIMARY HANDHOLE OR MANHOLE WHEN THE OPENING TO THE STRUCTURE ENDS UP IN THE CURB AND GUTTER. FALSE CURBS ARE NOT RECOMMENDED FOR SECONDARY HANDHOLES.

**PREPARATION**

A. IF IT IS DETERMINED BY THE PLANNER DESIGNING THE JOB THAT A FALSE CURB COULD BE USED, THEY SHOULD CONTACT THE LIAISON PLANNER TO ESTABLISH IF IT IS APPROPRIATE FOR THE LOCATION. THE LIAISON PLANNER WILL THEN CONTACT THE APPROPRIATE MUNICIPALITY TO GET APPROVAL FOR THE INSTALLATION.

B. ONCE APPROVAL IS GIVEN BY THE MUNICIPALITY, THE PLANNER SHOULD MAKE ARRANGEMENTS WITH THE C&O CENTER TO DETERMINE IF THE TOP SECTION OF THE STRUCTURE CAN BE LOWERED AND A TRAFFIC COVER INSTALLED. THE FIELD ENGINEER CAN ASSIST WITH MEASUREMENTS FOR THE FALSE CURB AND NEW CURB ALIGNMENT. IF ADDITIONAL HELP IS NEEDED, CONTACT ELECTRIC DISTRIBUTION STANDARDS.

C. ONCE THE DIMENSIONS OF THE FALSE CURB ARE DETERMINED, CONTACT MADRUGA IRON WORKS AT (209) 832-7003, OR FAX (209) 832-2444. IF YOU HAVE MORE THAN ONE FALSE CURB, THEY SHOULD BE LISTED SEPARATELY WITH SPECIFIC DIMENSIONS.

D. A REPRESENTATIVE FROM MADRUGA IRON WORKS WILL THEN FAX A COST QUOTE TO THE REQUESTOR FOR THE COST OF EACH FALSE CURB. THE REQUESTOR WILL NOW NEED TO COMPLETE A REQUISITION FOR MATERIAL & SERVICE FORM (RMS).

**DIMENSIONS**

WHEN ORDERING A FALSE CURB MAKE SURE TO INDICATE THAT ALL DIMENSIONS ARE INSIDE DIMENSIONS (ID).

A. WIDTH (SIDE TO SIDE) THE INSIDE MEASUREMENT FOR THE FALSE CURB IS BASED ON THE OUTSIDE MEASUREMENT OF THE TRAFFIC COVER ON WHICH THE FALSE CURB IS TO BE PLACED. A 3314 OR 3315 HANDHOLE WILL MEASURE 96 INCHES WIDE. A 3316 MEASURES 120 INCHES WIDE. MANHOLES WILL VARY DEPENDING ON THE VINTAGE OF THE STRUCTURE. ALL MEASUREMENTS SHOULD BE FIELD VERIFIED.

B. DEPTH (FRONT TO BACK). MEASURE FROM WHERE THE FACE OF THE NEW CURB AND THE GUTTER MEET TO THE BACK EDGE OF THE STRUCTURE. ADD SIX INCHES TO THIS MEASUREMENT. THIS MEASUREMENT IS THE INSIDE DIMENSION FOR DEPTH.

C. HEIGHT. SPECIFY EITHER A SIX-INCH OR EIGHT-INCH CURB.

**MISCELLANEOUS**

IN ADDITION TO THE DIMENSIONS OF THE FALSE CURB, THE FOLLOWING INFORMATION WILL NEED TO BE INCLUDED IN THE RMS:

A. SPECIFY THAT THE FALSE CURB ASSEMBLY IS THE BOLT DOWN STYLE.

B. AFFIX SDG&E TO THE LOWER FACE OF THE CURB.

**NOTE:** MADRUGA IRON WORKS WILL DETERMINE THE NUMBER OF COVERS ON THE FALSE CURB BASED ON THE OVERALL SIZE OF THE ASSEMBLY.

**PURCHASING**

A. A PURCHASE ORDER MUST BE SUBMITTED.
**INSTALLATION:**


B. THE MUNICIPALITY’S CONTRACTOR WILL WORK WITH THE DISTRICT AND PROJECT COORDINATOR ON THE ACTUAL INSTALLATION OF THE FALSE CURBS. THE CONTRACTOR IS RESPONSIBLE FOR PICK-UP OF MATERIAL FROM THE C&O DISTRICT.

C. UPON COMPLETION OF THE WORK BY THE MUNICIPALITY’S CONTRACTOR, THEY ARE TO SUBMIT A REQUEST FOR PAYMENT. UPON RECEIPT, THE LIAISON PLANNER WILL PREPARE A REQUEST FOR VOUCHER CHECK FORM. PAYMENT IS TO BE MADE TO THE CONTRACTOR AND CHARGED TO THE APPROPRIATE BUDGET.

**DESIGN (DPSS)**

BE SURE TO INDICATE AT THE LOCATION (WHERE THE FALSE CURBS ARE BEING INSTALLED) THAT THE MUNICIPALITY’S CONTRACTOR IS DOING THE INSTALLATION. SDG&E WILL BE LOWERING THE SUBSTRUCTURE AND INSTALLING A TRAFFIC COVER.

**REFERENCE:**

a. SEE STANDARD 3314 FOR HANDHOLE EQUIPMENT ENCLOSURE (INSIDE DIMENSIONS - 3’ X 6’).

b. SEE STANDARD 3315 FOR HANDHOLE EQUIPMENT ENCLOSURE (INSIDE DIMENSIONS - 4’ X 6’).

c. SEE STANDARD 3316 FOR HANDHOLE EQUIPMENT ENCLOSURE INSIDE DIMENSIONS - 5’ X 8’-6”).

d. SEE STANDARD 3332.1 FOR 48” X 60” NECK AND COVER TRAFFIC BEARING.

e. AVAILABLE IN SERVICE STANDARDS AND GUIDE MANUAL.
**SCOPE:** This standard shows the installation and material requirements for a 3-1/2 street light handhole for the City of San Diego "ONLY".

**BILL OF MATERIAL FOR STREET LIGHT HANDHOLE**

<table>
<thead>
<tr>
<th>ITEM</th>
<th>DESCRIPTION</th>
<th>QUANTITY</th>
<th>STOCK NUMBER</th>
<th>ASSEMBLY UNITS</th>
</tr>
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<tbody>
<tr>
<td>1</td>
<td>NO. 3-1/2 HANDHOLE</td>
<td>1</td>
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<td>31/2PB</td>
</tr>
</tbody>
</table>

**NOTES:**

1. The only location for a No. 3-1/2 handhole is in non-vehicular traffic areas (behind curbs, parkway position, etc.).

**TYPICAL PLAN VIEW**

Locate handhole a minimum of two feet to a maximum of two feet from the service point, preferably between the service point and the street light being served.
**INSTALLATION:**

A. Establish the handhole location paying particular attention to gas and foreign utility placements. Any change in location by district construction requires prior approval from service planning.

B. After the location is established, mark out dimensions for the excavation width, length and depth per drawing above. The width and length dimensions given allow extra space for setting the substructure and tamping the backfill.

C. To determine final grade, measure from the top of curb or established grade.

D. Excavation is now prepared for installation of substructure section. After grade level is established, set a string line for checking grade. Set handhole at final grade.

F. Apply silicone grease (stock number S391424), to the bolts when securing the cover to reduce removal and installation difficulties.

G. If right-of-way or obstructions cause a problem, the handhole may be turned to where the long side of the handhole parallels the sidewalk or property line.

**REFERENCE:**

a. See standard 3483 for minimum operating clearance requirements. (Use 3312)

b. See standard 3485 when setting handhole on a sloping grade.

c. See standard 3486 for retaining wall requirements and clearances from reverse subgrade retaining walls. (Use 3312)


* Supplied by City of San Diego.
SCOPE: This standard shows the installation and material requirements for a 3309.1 handhole.

COVER

WEIGHT: 100 pounds max.
PEDESTRIAN LOADING

1/2" X 4" Pull slot
W/ 1/4 center pin
2 places

1/2" inch x 6" coil thread x 3 1/2 lg.
Penta head bolt (2 places)

1/2 S.S. Flat washer (2 places).

2" x 5/8" thru
W/ 1-1/4" x 1/2"
Deep C'bore

= Manufacture's logo

TYPICAL PLAN VIEW

IF THE CUSTOMER IS REQUIRED TO INSTALL A
HANDHOLE IN A SERVICE LATERAL, THE LID
SHALL BE TAGGED WITH A MONEL STAINLESS
STEEL TAG - "CUSTOMER OWNED" UNDER THE
SDG&E LOGO ON THE LID. FOLLOW
UNDERGROUND CONSTRUCTION STANDARD
3211.1,2 FOR TAGGING INSTRUCTIONS.

BODY

WEIGHT: 144 pounds max.

1/2" X 6" Coil thread
Self-aligning
Replaceable MS nut
2 places

Concrete key
(one each side)

1/2" x 13" UNC S.S.
Lifting insert
4 places (one each corner)

NOTE:

USE THE 3313 HANDHOLE AND
STEEL TRAFFIC COVER FOR
TRAFFIC INSTALLATIONS.

BILL OF MATERIAL FOR 3309.1 HANDHOLE:

<table>
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<tr>
<th>ITEM</th>
<th>DESCRIPTION</th>
<th>QUANTITY</th>
<th>STOCK NUMBER</th>
<th>ASSEMBLY UNITS</th>
<th>SAP CU</th>
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<tr>
<td>1</td>
<td>Box, Handhole Secondary, 37-5/8&quot; x 26&quot; x 18&quot;</td>
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<td>S162688</td>
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SERVICE GUIDE Indicates Latest Revision Completely Revised New Page Information Removed

SDG&E ELECTRIC UNDERGROUND CONSTRUCTION STANDARDS

HANDHOLE POLYMER CONCRETE
(37" X 26" X 18")

UG 3309.1

SHEET 1 OF 4
SCOPE: This standard shows the installation and material requirements for a 3309.2 handhole.

COVER

WEIGHT: 100 POUNDS MAX.
PEDESTRIAN LOADING

3309.2 HANDHOLE

1/2" X 4" PULL SLOT
W/ 1/4" CENTER PIN
2 PLACES

1/2" X 6" COIL THREAD X 3-1/2" LG.
PENTA HEAD BOLT (2 PLACES)

1/2" S.S. FLAT WASHER (2 PLACES).

2" X 5/8" THRU W/1-1/4" X 1/2" DEEP C'BORE

TYPICAL PLAN VIEW

IF THE CUSTOMER IS REQUIRED TO INSTALL A HANDHOLE IN A SERVICE LATERAL, THE LID SHALL BE TAGGED WITH A MONEL STAINLESS STEEL TAG "CUSTOMER OWNED" UNDER THE SDG&E LOGO ON THE LID. FOLLOW UNDERGROUND CONSTRUCTION STANDARD 3211.1.2 FOR TAGGING INSTRUCTIONS.

BODY

WEIGHT: 199 POUNDS MAX.

1/2" X 13" UNC S.S.
LIFTING INSERT
4 PLACES
.ONE EACH CORNER.

4" X 4-3/4"
KNOCKOUT
(2 EACH END WALL AS SHOWN)

37-5/8" - 26"

1/2" X 6" COIL THREAD
SELF-ALIGNING
REPLACEABLE MS NUT
2 PLACES

NOTE:

1. USE THE 3313 HANDHOLE AND STEEL TRAFFIC COVER FOR TRAFFIC INSTALLATIONS.

CONCRETE KEY
(ONE EACH SIDE)

4" X 4-3/4"
KNOCKOUT
(2 EACH SIDE WALL AS SHOWN)

BILL OF MATERIAL FOR 3309.1 HANDHOLE:

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<tr>
<th>ITEM</th>
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<th>SAP CU</th>
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SERVICE GUIDE

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SDG&E ELECTRIC UNDERGROUND CONSTRUCTION STANDARDS

HANDHOLE POLYMER CONCRETE

(37" X 26" X 26")

UG 3309.2

SHEET

2 OF 4
**SCOPE:** This standard covers the polymer concrete, box’s 24” x 36” that are 18” deep and 26” deep. Lids are bolted down with 1/2” x 6” hy coil bolts.

**STOCK LID** STOCK 8000 LBS LOAD
RATED
WEIGHT: 100 POUNDS MAX.

**HEAVY DUTY LID** 15,000 LBS LOAD
RATED
WEIGHT: 115 POUNDS MAX.

---

**BILL OF MATERIAL FOR 3309 HANDHOLE:**

<table>
<thead>
<tr>
<th>ITEM</th>
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---

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EXCAVATION DIMENSIONS

INSTALLATION:
A. ESTABLISH THE HANDHOLE LOCATION PAYING PARTICULAR ATTENTION TO GAS AND FOREIGN UTILITY PLACEMENTS. ANY CHANGE IN LOCATION BY CONSTRUCTION REQUIRES PRIOR APPROVAL FROM SERVICE PLANNING.
B. AFTER THE LOCATION IS ESTABLISHED, MARK OUT DIMENSIONS FOR THE EXCAVATION WIDTH, LENGTH AND DEPTH PER DRAWING ABOVE. THE WIDTH AND LENGTH DIMENSIONS GIVEN ALLOW EXTRA SPACE FOR SETTING THE SUBSTRUCTURE AND TAMPPING THE BACKFILL.
C. TO DETERMINE FINAL GRADE, MEASURE FROM THE TOP OF CURB OR ESTABLISHED GRADE.
D. EXCAVATION IS NOW PREPARED FOR INSTALLATION OF SUBSTRUCTURE SECTIONS. AFTER GRADE LEVEL IS ESTABLISHED, SET A STRING LINE FOR CHECKING GRADE. SET HANDHOLE TOP AT FINAL GRADE.
E. BOX SHALL BE SET ON TWO OF COMPACT INCHES 1/4–INCH GRAVEL.
F. IF RIGHT OF WAY OR OBSTRUCTIONS CAUSE A PROBLEM, THE HANDHOLE MAY BE TURNED TO WHERE THE LONG SIDE OF THE HANDHOLE PARALLELS THE SIDEWALK OR PROPERTY LINE.

REFERENCE:
a. SEE STANDARD 3302 FOR SUBSTRUCTURE APPLICATIONS.
b. SEE STANDARD 3483 FOR MINIMUM OPERATING CLEARANCE REQUIREMENTS.
c. SEE STANDARD 3485 WHEN SETTING HANDHOLE ON A SLOPING GRADE.
d. SEE STANDARD 3486 FOR RETAINING WALL REQUIREMENTS AND CLEARANCES FROM REVERSE SUBGRADE RETAINING WALLS.
e. SEE STANDARD 3605 FOR SUBSTRUCTURE USE AND LIMITATIONS REFERENCE SHEET (MAXIMUM NUMBER OF CABLES, CONNECTORS AND CONDUITS).
f. SEE STANDARD 4173 FOR TRENCH DEPTH, CONDUIT AND CABLE INSTALLATION.

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**SCOPE:** This standard covers the 3311-S and 3311-L troughs. These structures go below the pad for open/closed delta transformer installations for cable training. To be used for cable training between single-phase pad-mounted transformers. Use 66" - 2-12KV pad-mounted transformers for open delta banks and pad-mounted switch installations. 108" - 3-12KV pad-mounted transformers for closed delta banks.

**WEIGHT:**
- 986 pounds (max)

**STOCK NUMBER:**
- S162660

**ASSEMBLY UNIT:**
- 3311-S

**REFERENCE:**
- a. AVAILABLE IN SERVICE STANDARDS AND GUIDE MANUAL

---

**SDG&E ELECTRIC UNDERGROUND STANDARD**

**HANDHOLE**
- 14" x 66" x 14"
- 14" x 108" x 14"
**SCOPE:** This standard shows the installation and material requirements for a 3312 handhole.

**NOTE:** The 3312 is for like-in-kind replacement only. If space is available, a 3309.1 or 2 should be used to replace them. The 3309.1&2 is the preferred box for a secondary installation.

The 3312 will still be the box used for under pad application at this time.

**CONCRETE PARKWAY COVER**
- Weight: 110 pounds (max.)
- Pedestrian loading

**3312 HANDHOLE**
- "ELECTRIC" if the customer is required to install a handhole in a service lateral, the lid shall be marked "ELECTRIC" not SDG&E.
- 30-1/2" min. 30-11/16" max.
- Lifting eye
- Swing bolts with nuts.
- 1-13/16"

**BODY**
- Weight: 185 pounds (max.)
- 34-5/8" min. 30" max.
- 20-3/4" min. 22" max.
- 17" min. 18" max.
- Knockout: 1 ea. end (optional)

**POLYMER PARKWAY COVER**
- Weight: 64 pounds (max.)
- Pedestrian loading

**BILL OF MATERIAL FOR SINGLE-BODY HANDHOLE:**
<table>
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<th>ASSEMBLY UNITS</th>
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<tbody>
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<td>1</td>
<td>COVER, PARKWAY (CONCRETE)</td>
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<td>3312C0</td>
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<td>2</td>
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<td>COMPLETE HANDHOLE</td>
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**BILL OF MATERIAL FOR DOUBLE-BODY HANDHOLE:**
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<td>HANDHOLE 3312C0</td>
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<td>HANDHOLE 3312C0</td>
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<tr>
<td>3(1)</td>
<td>COVER, PARKWAY (POLYMER)</td>
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<td>S286818</td>
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</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>3312CP</td>
</tr>
</tbody>
</table>
INSTALLATION:

A. ENSURE THE HANDHOLE LOCATION PAYING PARTICULAR ATTENTION TO GAS AND FOREIGN UTILITY PLACEMENTS. ANY CHANGE IN LOCATION BY DISTRICT CONSTRUCTION REQUIRES PRIOR APPROVAL FROM SERVICE PLANNING.

B. AFTER THE LOCATION IS ESTABLISHED, MARK OUT DIMENSIONS FOR THE EXCAVATION WIDTH, LENGTH AND DEPTH PER DRAWING ABOVE. THE WIDTH AND LENGTH DIMENSIONS GIVEN ALLOW EXTRA SPACE FOR SETTING THE SUBSTRUCTURE AND TAMING THE BACKFILL.

C. TO DETERMINE FINAL GRADE, MEASURE FROM THE TOP OF CURB OR ESTABLISHED GRADE.

D. EXCAVATION IS NOW PREPARED FOR INSTALLATION OF SUBSTRUCTURE SECTIONS. AFTER GRADE LEVEL IS ESTABLISHED, SET A STRING LINE FOR CHECKING GRADE. SET HANDHOLE AT FINAL GRADE.

E. IF RIGHT OF WAY OR OBSTRUCTIONS CAUSE A PROBLEM, THE HANDHOLE MAY BE TURNED TO WHERE THE LONG SIDE OF THE HANDHOLE PARALLELS THE SIDEWALK OR PROPERTY LINE.

REFERENCE:

a. SEE STANDARD 3302 FOR SUBSTRUCTURE APPLICATIONS.

b. SEE STANDARD 3483 FOR MINIMUM OPERATING CLEARANCE REQUIREMENTS.

c. SEE STANDARD 3485 WHEN SETTING HANDHOLE ON A SLOPING GRADE.

d. SEE STANDARD 3486 FOR RETAINING WALL REQUIREMENTS AND CLEARANCES FROM REVERSE SUBGRADE RETAINING WALLS.

e. SEE STANDARD 3605 FOR SUBSTRUCTURE USE AND LIMITATIONS REFERENCE SHEET (MAXIMUM NUMBER OF CABLES, CONNECTORS AND CONDUITS).

f. SEE STANDARD 4173 FOR TRENCH DEPTH, CONDUIT AND CABLE INSTALLATION.

g. AVAILABLE IN SERVICE STANDARDS AND GUIDE MANUAL.
SCOPE: THIS STANDARD SHOWS THE INSTALLATION AND MATERIAL REQUIREMENTS FOR A 3313 HANDHOLE.

HANDHOLE
(INSIDE DIMENSIONS - 24" x 36")

SDG&E ELECTRIC UNDERGROUND STANDARD

UG 3313.1

EDTITORIAL CHANGES
A
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SHEET 1 OF 3

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B | | | | | | | | | | | |
A | EDITORIAL CHANGES | JS | TR | MDJ | 5/26/2016 | D | | | | | |

"ELECTRIC" IF THE CUSTOMER IS REQUIRED TO INSTALL A HANDHOLE IN A SERVICE LATERAL, THE LID SHALL BE MARKED "ELECTRIC" NOT SDG&E.

6" TOP SECTION
WEIGHT: 285 POUNDS (MAX.)

6" INTERMEDIATE EXTENSION SECTION
WEIGHT: 267 POUNDS (MAX.) (TO BE ORDERED ONLY FOR ADDITIONAL HEIGHT)

18" BASE SECTION
WEIGHT: 885 POUNDS (MAX.)

8" x 11" KNOCKOUT
1 EACH END

4" OR 5" x 10" KNOCKOUT - 1 EACH SIDE

2 TON LIFTING ANCHOR
1 EA. SIDE OR 1 EA. END

36" 24" 32"

"P" = PARKWAY COVER

26 1/4" MIN
27 5/8" MAX

1 PICK-HOLE

"T" = TRAFFIC COVER

MANUFACTURER'S INITIALS

"INSIDE DIMENSIONS - 24" x 36"

WEIGHT: 96 POUNDS (MAX.)

WEIGHT: 149.3 POUNDS (MAX.)

LIFTING EYE

39-1/2" 27-1/2"

1-13/16"

PARKWAY COVER

3313 HANDHOLE

STEEL TRAFFIC COVER
### NOTES:

I. HANDHOLE SECTIONS AND PARKWAY COVERS FROM DIFFERENT SUPPLIERS ARE INTERCHANGEABLE.

II. THE PREFERRED LOCATION FOR A 3313 HANDHOLE IS IN NON–VEHICULAR TRAFFIC AREAS (BEHIND CURBS, PARKWAY POSITION, ETC.). USE A PARKWAY COVER IN THESE AREAS.

III. HANDHOLES WITH A TRAFFIC COVER MAY BE INSTALLED IN AREAS WITH VEHICULAR TRAFFIC, BUT ONLY WHEN THERE IS NO NON–TRAFFIC LOCATION AVAILABLE.

IV. LIFTING ANCHORS ARE NOT TO BE USED FOR CABLE PULLING.

### BILL OF MATERIAL FOR PARKWAY 3313 HANDHOLE:

<table>
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<th>ITEM</th>
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<th>STOCK NUMBER</th>
<th>ASSEMBLY UNITS</th>
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### BILL OF MATERIAL FOR TRAFFIC 3313 HANDHOLE:

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</table>

### INSTALLATION:

A. ESTABLISH THE HANDHOLE LOCATION PAYING PARTICULAR ATTENTION TO GAS AND FOREIGN UTILITY PLACEMENTS. RELOCATING THE HANDHOLE REQUIRES PRIOR APPROVAL FROM A CUSTOMER PROJECT PLANNER.

B. AFTER THE LOCATION IS ESTABLISHED, MARK OUT DIMENSIONS FOR THE EXCAVATION WIDTH, LENGTH AND DEPTH PER DRAWING BELOW. THE WIDTH AND LENGTH DIMENSIONS GIVEN ALLOW EXTRA SPACE FOR SETTING THE SUBSTRUCTURE AND TAMPERING THE BACKFILL.
C. TO DETERMINE FINAL GRADE, MEASURE FROM THE TOP OF CURB OR ESTABLISHED GRADE.

D. EXCAVATION IS NOW PREPARED FOR INSTALLATION OF SUBSTRUCTURE SECTIONS. SET HANDHOLE AT FINAL GRADE. PLACE PLASTIC–MASTIC SEALANT BETWEEN ALL SECTIONS.

F. APPLY LUBRICANT (EZ–1) TO THE BOLTS WHEN SECURING THE COVERS TO REDUCE REMOVAL OR INSTALLATION DIFFICULTIES. TIGHTEN DOWN BOLTS WITH TORQUE WRENCH TO 30 FT./LBS. MIN., 40 FT./LBS. MAX.


NOTES:
LOCATE SECONDARY CONDUITS WITHIN 12 INCHES OF THE END OF THE HANDHOLE CLOSEST TO THE SIDEWALK.

REFERENCE:

a) SEE STANDARD 3211 FOR INSTALLATION OF IDENTIFICATION TAG.
b) SEE STANDARD 3302 FOR SUBSTRUCTURE APPLICATIONS.
c) SEE STANDARD 3306 FOR INSTALLATION OF PLASTIC–MASTIC SEALANT.
d) SEE STANDARD 3483 FOR MINIMUM OPERATING CLEARANCE REQUIREMENTS.
e) SEE STANDARD 3485 WHEN SETTING HANDHOLE ON A SLOPING GRADE.
f) SEE STANDARD 3486 FOR RETAINING WALL REQUIREMENTS AND CLEARANCES FROM REVERSE SUBGRADE RETAINING WALLS.
g) SEE STANDARD 3605 FOR SUBSTRUCTURE USE AND LIMITATIONS REFERENCE SHEET (MAXIMUM NUMBER OF CABLES, CONNECTORS AND CONDUITS).
h) SEE STANDARD 3660 FOR CABLE TAP, GROUND GRID AND CONDUIT INSTALLATION ON 6.9 ONE–PHASE SYSTEM.
i) SEE STANDARD 3312 FOR POSITIONING SECONDARY CONDUITS
j) AVAILABLE IN SERVICE STANDARDS AND GUIDE MANUAL.
SCOPE: This standard shows the material and installation requirements for a 3314 handhole.

Concrete Parkways Cover
12" Top Section W/O Covers
Weight: 952 Pound Maximum

Aluminum Lids & Frame
Weight: 225 Pound Maximum

Slip Resistant
Surface Required

"P" - Parkway Cover

3314 Handhole

3315 Traffic Cover Assembly
For existing 3314 handholes only located in a vehicular area, use the 3315 "Traffic Cover Assembly Shown" as a replacement. (See Notes: For New Installations)

Cast Iron Covers
Total weight: 705 Pound Max.

Concrete Cover
Weight: 2,000 Pound Max.

Concrete Necking
Weight: 2,245 Pound Max.

2-Ton Lifting Anchors, Inside-2 EA. Side.
(Outside-2 EA. Side Optional).

1" Dia Coil Inserts

1" Pick Holes

Handhole Equipment Enclosure
(Inside Dimensions - 3' X 6')
HANDHOLE EQUIPMENT ENCLOSURE
(INSIDE DIMENSIONS - 3' X 6')
**NOTES:**

I. HANDHOLE SECTIONS AND PARKWAY COVERS FROM DIFFERENT SUPPLIERS ARE INTERCHANGEABLE.

II. CAST IRON COVERS FROM DIFFERENT SUPPLIERS ARE INTERCHANGEABLE.

III. THE PREFERRED LOCATION FOR A 3314 HANDHOLE IS IN NONVEHICULAR TRAFFIC AREAS
(behind curbs, parkway position, etc.). USE A PARKWAY COVER IN THESE AREAS.

IV. IF A NEW 3314 HANDHOLE IS REQUIRED IN A VEHICULAR AREA, IT MUST BE SUBSTITUTED
WITH A 3315 HANDHOLE AND TRAFFIC COVER. ON AN EXISTING 3314 HANDHOLE LOCATED IN A
VEHICULAR AREA, USE THE 3315 HANDHOLE "TRAFFIC COVER ASSEMBLY."

V. 3314 HANDHOLE "TRAFFIC COVER ASSEMBLY" IS THE SAME SIZE AS THE 3315 HANDHOLE
"TRAFFIC COVER ASSEMBLY."

VI. LIFTING ANCHORS ARE NOT TO BE USED FOR CABLE PULLING.

**BILL OF MATERIAL:**

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<tr>
<th>ITEM</th>
<th>DESCRIPTION</th>
<th>QUANTITY</th>
<th>STOCK NUMBER</th>
<th>COMPLETE PARKWAY HANDHOLE</th>
<th>ASSEMBLY UNITS</th>
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<td>3314FO</td>
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<tr>
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<td>ENCLOSURE, BASE, 3' X 6' X 3' (INSIDE DIMENSIONS)</td>
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<td>3314PC</td>
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<td>5</td>
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<td>6</td>
<td>COVER, HALF WITH/UPPER LIP, PARKWAY (FOR USE IN TRANSFORMER INSTALLATIONS)</td>
<td>1</td>
<td>S286843</td>
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<td>WASHER, 1/2&quot;, FLAT ROUND STAINLESS STEEL</td>
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**INSTALLATION - HANDHOLE WITH "PARKWAY COVER ASSEMBLY":**

A. ESTABLISH THE HANDHOLE LOCATION PAYING PARTICULAR ATTENTION TO FOREIGN UTILITY
PLACEMENTS. RELOCATING THE HANDHOLE REQUIRES APPROVAL FROM PROJECT MANAGEMENT.

B. AFTER THE LOCATION IS ESTABLISHED, MARK OUT DIMENSIONS FOR THE EXCAVATION WIDTH,
LENGTH AND DEPTH DRAWING BELOW. THE WIDTH AND LENGTH DIMENSIONS GIVEN,
ALLOW AN EXTRA 8 INCHES FOR SETTING THE SUBSTRUCTURE.
C. EXCAVATION IS NOW PREPARED FOR INSTALLATION OF SUBSTRUCTURE SECTIONS. PLACE PLASTIC–Mastic SEALANT BETWEEN ALL SECTIONS. DO NOT APPLY SEALANT UNDER THE TOP SECTION IF CONCRETE IS REQUIRED FOR GRADE ADJUSTMENT. ASSURE THE SUBSTRUCTURE WALLS ARE STRAIGHT AND THE FLOOR IS LEVEL.

D. TO DETERMINE FINAL GRADE ONE OF THE TWO FOLLOWING METHODS MAY BE USED: 1) WHEN CURB OR GRADE LEVEL IS ALREADY ESTABLISHED, MEASURE FROM THE TOP OF CURB OR GRADE, OR 2) HAVE THE FIELD ENGINEER SET THE GRADE STAKES. AFTER GRADE LEVEL IS ESTABLISHED, SET A STRING LINE FOR CHECKING GRADE LEVEL.

F. ALIGN HANDHOLE COVER TO FINAL GRADE USING BRICKS OR WOODEN WEDGES. BEFORE POURING CONCRETE (4–SACK MIX WITH 3/8 INCH PEA GRAVEL, OR AS REQUIRED BY CITY OR COUNTY CODES), FRAME THE INSIDE OPEN AREA BETWEEN SECTIONS SO CONCRETE CAN BE POURED FROM THE OUTSIDE OF THE TOP COVER SECTION. MAKE SURE THE BRICKS OR WOODEN WEDGES DO NOT SHOW FROM THE INSIDE ONCE THE CONCRETE IS POURED. THE INSIDE FRAME MAY BE OMITTED IF THE CONCRETE IS NOT TOO WET. IF FRAME IS OMITTED, TROWEL CONCRETE SMOOTH ON THE INSIDE.

G. APPLY EZ–1 TO THE PENTAHED BOLTS WHEN SECURING THE COVERS TO REDUCE REMOVAL OR INSTALLATION DIFFICULTIES. TIGHTEN DOWN BOLTS WITH TORQUE WRENCH TO 30 FT/LBS. MIN., 40 FT./LBS. MAX.

INSTALLATION: EXISTING HANDHOLE WITH A "3315 TRAFFIC COVER ASSEMBLY":

AA. ESTABLISH THE COVER LOCATION PAYING PARTICULAR ATTENTION TO FOREIGN UTILITY PLACEMENTS AND CHECK THE LOCATION OF ANY EXISTING CABLE TAPS.

BB. AFTER THE LOCATION IS ESTABLISHED, MARK OUT DIMENSIONS FOR THE EXCAVATION WIDTH, LENGTH AND DEPTH PER DRAWINGS BELOW AND ON PAGE 3314.5. THE WIDTH AND LENGTH DIMENSIONS GIVEN ALLOW AN EXTRA 8 INCHES FOR SETTING THE 3315 TRAFFIC COVER ASSEMBLY. EXCAVATING MUST BE DONE ACCURATELY FOR PROPER PLACEMENT OF THE "TRAFFIC COVER ASSEMBLY" ASSURING CABLE TAP ACCESS FOR HOT STICK OPERATION.
CC. IF COVER IS GOING TO BE SET IN ANY PORTION OF A CONCRETE GUTTER OR STREET, THE CONCRETE MUST BE "SAW CUT" BEFORE EXCAVATING. ASPHALT MUST BE SCORED WITH A JACKHAMMER OR CLAYOUGHR. MEASURE AROUND EXISTING HANDBOILE AND CUT ACCORDINGLY.

FF. DIG DOWN 18 INCHES AND REMOVE THE EXISTING TOP SECTION (OLD STYLE TWO PIECE METAL TRAFFIC COVER, SEE 3399.104). IF THE EXISTING TOP SECTION IS 24 INCHES, REMOVE IT AND REPLACE WITH A 12 INCH INTERMEDIATE SECTION.

GG. BEFORE SETTING TRAFFIC COVER NECKING, ITEM 6, PAINT THE UNDERSIDE WITH PRIMER. THIS WILL REDUCE ANY REMOVAL DIFFICULTIES IN CASE OF RETROFIT OR GRADE ADJUSTMENTS. SEE INSTALLATION DRAWING ON PAGE 3314.6.

HH. SET THE TRAFFIC COVER, ITEM 6, USING THE INSIDE LIFTING ANCHORS TO PREVENT ANY PROBLEMS REMOVING THE LIFTING DEVICE. LINE UP THE INSIDE EDGE OF THE TRAFFIC COVER NECKING WITH THE INSIDE EDGE OF THE HANDBOLE INTERMEDIATE SECTION ON THE SAME SIDE THE CABLE TAPS ARE LOCATED. IF HANDBOLE DOES NOT HOUSE CABLE TAPS, ALIGN THE INSIDE EDGE OF THE 3315 HANDBOLE TRAFFIC COVER NECKING WITH THE INSIDE EDGE OF THE INTERMEDIATE HANDBOILE SECTION ON THE STREET SIDE. THIS IS THE KEY ALIGNMENT TO THE ENTIRE INSTALLATION. SEE INSTALLATION DRAWING ON PAGE 3314.6.
If any of the traffic cover necking will be set in concrete (along a curb or in a concrete street), wrap 4 or 8 mil polyethylene sheeting completely around the necking and tie with tape. This will prevent existing concrete and new concrete from bonding making it difficult to slide cover in the future. See installing cover in the future on page 3314.6.

To determine final grade, one of the two following methods may be used: 1) When using the grade level, and if not properly established, measure from the top of curb or grade. Or 2) Have the field engineer set the grade stakes. After grade level is established, set a string line for checking grade levels.

Align traffic cover necking to grade using bricks or wooden wedges. Pour concrete (4:1-sack mix with 3/4 inch pea gravel or as required by city or county) inside necking and into the overlapping area of sections. Smooth concrete with spade and trowel. See installation drawing on page 3314.6.

On the outside of the necking, pour and pack concrete underneath with a shovel up to the bottom of the necking and up to final grade level at the curb. Smooth out any excess concrete coming through on inside of handhole. Trim away excess plastic sheeting. See installation drawing on page 3314.6.

Install the concrete cover, Item 7, and cast iron covers, slide outside cast iron covers on first and the center cast iron cover on last. When removing covers, slide center cover off first. See drawing on page 3316.1.

Before backfilling, spray RS-1 emulsion to the inside of the excavation to help the asphalt adhere. Backfill excavation with asphalt and tamp down.

Apply lubricant (EZ-1) to the pentahedra bolts when securing the covers to reduce removal or installation difficulties. Tighten the bolts with torque wrench to 30 ft./lbs. MIN., 40 ft./lbs. MAX.

NOTE:

When traffic cover is removed, check gasket material and replace as needed. SDG&E stock number (5341020).

REFERENCE:

q See Standard 3211 for installation of identification tag.
b See Standard 3302 for substructure applications.
c See Standard 3306 for installation of plastic-mastic sealant.
d See Standard 3365 for slurry backfill.
e See Standard 3483 for minimum operating and clearance requirements.
f See Standard 3485 when setting handhole on a sloping grade.
g See Standard 3486 for retaining wall requirements and clearances from reverse subgrade retaining walls.
h See Standard 3605 for substructure use and limitations reference sheet (maximum number of cables, connectors and conduits).
i See pages 3389.05 and 3399.106 for repairing "old style" 3314 handholes with Parkway covers.
j Available in service standards and guide manual.

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SCOPE: This standard shows the installation and material requirement for a 3315 handhole.

PARKWAY COVER ASSEMBLY
- 12" PARKWAY FRAME
- W/O COVERS
- WEIGHT: 1690 POUND MAXIMUM.
- ALUMINUM FRAME & COVERS
- WEIGHT: 290 POUND MAXIMUM
- SLIP RESISTANT COATING REQUIRED

TRAFFIC COVER ASSEMBLY
- CAST IRON COVERS
- WEIGHT: 580 POUND TOTAL MAX.
- CONCRETE COVER
- WEIGHT: 2900 LBS POUND MAX.
- CONCRETE NECKING
- WEIGHT: 2245 POUND MAX.
- 1" PICK HOLES
- 1" DIA. COIL INSERTS
- 2-TON LIFTING ANCHORS. INSIDE AND OUTSIDE.
- INSIDE AND OUTSIDE 2 EA. SIDE
- OUTSIDE 2 EA. SIDE (OPTIONAL).

"P" = PARKWAY COVER

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**NOTES:**

I. HANDHOLE SECTIONS AND PARKWAY COVERS FROM DIFFERENT SUPPLIERS ARE INTERCHANGEABLE.

II. CAST IRON COVERS FROM DIFFERENT SUPPLIERS ARE INTERCHANGEABLE.

III. THE PREFERRED LOCATION FOR A 3315 HANDHOLE IS IN NONVEHICULAR TRAFFIC AREAS (BEHIND CURBS, PARKWAY POSITION, ETC.). USE A PARKWAY COVER IN THESE AREAS.

IV. HANDHOLES WITH A TRAFFIC COVER MAY BE INSTALLED IN AREAS WITH VEHICULAR TRAFFIC, BUT ONLY WHEN THERE IS NO NON-TRAFFIC LOCATION AVAILABLE.

V. LIFTING ANCHORS ARE NOT TO BE USED FOR CABLE PULLING.

VI. 3315 HANDHOLES ARE DELIVERED BY THE SUPPLIER TO JOB SITE.

**BILL OF MATERIAL FOR PARKWAY 3315 HANDHOLE:**

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<th>ITEM</th>
<th>DESCRIPTION</th>
<th>QUANTITY</th>
<th>STOCK NUMBER</th>
<th>ASSEMBLY UNITS</th>
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<td>S361354</td>
<td>3315FO</td>
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<tr>
<td>2</td>
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<td>S636040</td>
<td>COMPLETE PARKWAY HANDBOKE</td>
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<tr>
<td>6</td>
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<td>1</td>
<td>S334356</td>
<td>COMPLETE PARKWAY HANDBOKE</td>
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<tr>
<td>7</td>
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<tr>
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**BILL OF MATERIAL FOR TRAFFIC 3315 HANDHOLE:**

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<td>GRAVEL, 3/8”-3/4”</td>
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**INSTALLATION:**

A. ESTABLISH THE HANDHOLE LOCATION PAYING PARTICULAR ATTENTION TO FOREIGN UTILITY PLACEMENTS. RELOCATING THE HANDHOLE REQUIRES APPROVAL FROM PROJECT MANAGEMENT.

B. AFTER THE LOCATION IS ESTABLISHED, MARK OUT DIMENSIONS FOR THE EXCAVATION WIDTH, LENGTH AND DEPTH PER DRAWING BELOW. THE WIDTH AND LENGTH DIMENSIONS GIVEN, ALLOW AN EXTRA 8 INCHES FOR SETTING THE SUBSTRUCTURE.
*Excavation depth allows 3 inches for adjustment to final grade and an additional 3 inches for replacement of gravel as base support.

C. Excavation is now prepared for installation of substructure sections. Place plastic-mastic sealant between all sections. Use double seal if field conditions indicate that water will penetrate the joints. Do not apply sealant under the top section if concrete is required for grade adjustment. Assure the substructure walls are straight and the floor is level.

D. To determine final grade, one of the following methods may be used: 1) When curb or grade level is already established, measure from the top of curb or grade or 2) Have the field engineer set the grade stakes. After grade level is established, set a string line for checking grade level.

E. Align handhole cover to final grade using bricks or wooden wedges. Before pouring concrete (4-sack mix with 3/8 inch PEA gravel or as required by city or county codes), frame the inside open area between sections so concrete can be poured from the outside of the top cover section. Make sure the bricks or wooden wedges do not show from the inside once the concrete is poured. The inside frame may be omitted if the concrete is not too wet. If frame is omitted, trowel concrete smooth on the inside.

F. Install conduits using the bottom outside (closest to the wall) knockouts first.

G. When installing the traffic cover, place the outside cast iron covers on first, then slide the center cast iron cover on last. When removing cast iron covers, slide center cover off first. See drawing on page 3315.1.

H. Apply lubricant (EZ-1) to the pentahed bolts when securing the covers to reduce removal or installation difficulties. Tighten down bolts with torque wrench to 30 ft./lbs. min., 40 ft./lbs. max.

NOTE:

1. When traffic cover is removed, check gasket material and replace as needed.

2. See standard stock number (S34+020).

REFERENCE:

a. See standard 3211 for installation of identification tag.
b. See standard 3302 for substructure applications.
c. See standard 3306 for installation of plastic-mastic sealant.
d. See standard 3365 for slurry backfill.
e. See standard 3483 for minimum operating and clearance requirements.
f. See standard 3485 when setting handhole on a sloping grade.
g. See standard 3486 for retaining wall requirements and clearances from reverse subgrade retaining walls.

h. See standard 3605 for substructure use and limitations reference sheet (maximum number of cables, connectors and conduits).
i. Available in service standards and guide manual.
SCOPE: This standard shows the installation and material requirements for a 3316 Handhole.

PARKWAY COVER ASSEMBLY
12" PARKWAY FRAME W/O COVERS
WEIGHT: 1960 # MAXIMUM
ALUMINUM COVERS
WEIGHT: 445 # TOTAL
SLIP RESISTANT COATING
REQUIRED

2-TON LIFTING ANCHORS INSIDE—2 EA. SIDE
(OUTSIDE—2 EA. SIDE OPTIONAL)

TRAFFIC COVER ASSEMBLY:
CAST IRON COVERS
WEIGHT: 860# TOTAL
MAX.
CONCRETE COVER
WEIGHT: 377# MAX.
CONCRETE NECKING
WEIGHT: 253# MAX.

2-TON LIFTING ANCHOR
INSIDE—2 EA. SIDE.

SDG&E ELECTRIC UNDERGROUND CONSTRUCTION STANDARDS
Handhole Equipment Enclosure
(Inside Dimensions — 5' x 8'—6")
12" SPECIAL EXTENSION
SECTION
WEIGHT: 2175# MAX.
TO BE USED WITH 3441
SWITCH PAD INSTALLATION,
OR FOR GRADING, OR
ADDITIONAL HEADROOM.

24" SPECIAL EXTENSION
SECTION
WEIGHT: 4350# MAX.
TO BE USED FOR GRADING,
OR ADDITIONAL HEADROOM.

2 OR 4 TON LIFTING
ANCHOR
INSIDE-2 EA. SIDE

5" DIA KNOCKOUTS
12 EACH END -
6 EACH SIDE

7 1/2" TYPICAL

72" BASE ENCLOSURE
WEIGHT: 16,220 MAX.

2 TON LIFTING
ANCHORS
INSIDE-2 EA. SIDE
(OUTSIDE-2 EA. SIDE
OPTIONAL)

(2) 1/2 X 13
BRONZE INSERTS
(OPPOSITE
CORNERS)

1" DIA
COIL INSERT

5"-0"
8'-6"
3'-0"
7 1/2"

6"
3'-6"
(114"
12" DIA
SUMP HOLE

5'-1/2" MIN.
5" MAX.
4'-1/2" MIN.
5" MAX.
12" DIA
PULL IRONS
2 EACH END AND
2 IN MIDDLE

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NOTES:
I. HANDHOLE SECTIONS AND COVERS FROM DIFFERENT SUPPLIERS ARE INTERCHANGEABLE.
II. THE PREFERRED LOCATION FOR A 3316 HANDHOLE IS IN NONVEHICULAR TRAFFIC AREAS (BEHIND CURBS, PARKWAY POSITION, ETC.). USE A PARKWAY COVER IN THESE AREAS.
III. HANDHOLES WITH A TRAFFIC COVER MAY BE INSTALLED IN AREAS WITH VEHICULAR TRAFFIC, BUT ONLY WHEN THERE IS NO NON–TRAFFIC LOCATION AVAILABLE.
IV. LIFTING ANCHORS ARE NOT TO BE USED FOR CABLE PULLING.
V. 3316 HANDHOLES ARE DELIVERED BY THE SUPPLIER TO JOB SITE.

BILL OF MATERIAL FOR 3316 PARKWAY HANDHOLE:

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<td>16</td>
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BILL OF MATERIAL FOR 3316 TRAFFIC HANDHOLE:

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<td>8</td>
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BILL OF MATERIAL FOR 3316 SPECIAL EXTENSION SECTIONS

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INSTALLATION:
A. ESTABLISH THE HANDHOLE LOCATION PAYING PARTICULAR ATTENTION TO FOREIGN UTILITY PLACEMENTS RELOCATING THE HANDHOLE TO ANOTHER LOCATION REQUIRES APPROVAL FROM PROJECT MANAGEMENT.
B. AFTER THE LOCATION IS ESTABLISHED, MARK OUT DIMENSIONS FOR THE EXCAVATION WIDTH, LENGTH AND DEPTH PER DRAWING BELOW. THE WIDTH AND LENGTH DIMENSIONS GIVEN, ALLOW AN EXTRA 8 INCHES FOR SETTING THE SUBSTRUCTURE.
EXCAVATION DIMENSIONS

* EXCAVATION DEPTH ALLOWS 3 INCHES FOR ADJUSTMENT TO FINAL GRADE AND AN ADDITIONAL 3 INCHES FOR REPLACEMENT OF GRAVEL AS BASE SUPPORT.

C. EXCAVATION IS NOW PREPARED FOR INSTALLATION OF SUBSTRUCTURE SECTIONS. PLACE PLASTIC—MASTIC SEALANT BETWEEN ALL SECTIONS. USE DOUBLE SEAL IF FIELD CONDITIONS INDICATE THAT WATER WILL PENETRATE THE JOINTS. DO NOT APPLY SEALANT UNDER THE TOP SECTION IF CONCRETE IS REQUIRED FOR GRADE ADJUSTMENT. ASSURE THE SUBSTRUCTURE WALLS ARE STRAIGHT AND THE FLOOR IS LEVEL.

D. TO DETERMINE FINAL GRADE, ONE OF THE TWO FOLLOWING METHODS MAY BE USED: 1) WHEN CURB OR GRADE LEVEL IS ALREADY ESTABLISHED, MEASURE FROM THE TOP OF CURB OR GRADE. OR 2) HAVE THE FIELD ENGINEER SET THE GRADE STAKES. AFTER GRADE LEVEL IS ESTABLISHED, SET A STRING LINE FOR CHECKING GRADE LEVEL.

E. ALIGN HANDHOLE COVER TO FINAL GRADE USING BRICKS OR WOODEN WEDGES BEFORE POURING CONCRETE (4—SACK MIX WITH 3/8 INCH GRAVEL OR AS REQUIRED BY CITY OR COUNTY CODES). PROVIDE 1-1/2 INCH CLEARANCE ON ALL SIDES OF THE INSIDE OF THE HANDHOLE COVER. MAKE SURE THE BRICKS OR WOODEN WEDGES DO NOT SHOW FROM THE INSIDE ONCE THE CONCRETE IS POURED. THE INSIDE COVER MAY BE OMITTED IF THE CONCRETE IS NOT TOO WET. IF FRAME IS OMITTED, TROWEL CONCRETE SMOOTH ON THE INSIDE.

F. INSTALL CONDUITS USING THE BOTTOM OUTSIDE (CLOSEST TO THE WALL) KNOCKOUTS FIRST.

G. WHEN INSTALLING THE TRAFFIC COVER, PLACE THE OUTSIDE CAST IRON COVERS ON FIRST THEN THE CENTER CAST IRON COVER ON LAST. WHEN REMOVING CAST IRON COVERS, SLIDE CENTER COVER OFF FIRST. SEE DRAWINGS ON PAGES 3316.1 AND 3316.3.

H. APPLY LUBRICANT (77—1) TO THE PENTADHEAD BOLTS WHEN SECURING THE COVERS TO REDUCE REMOVAL OR INSTALLATION DIFFICULTIES. TIGHTEN DOWN BOLTS WITH TORQUE WRENCH TO 30 FT/LBS MIN. 40 FT/LBS MAX.

I. CORE BORE INDENTIONS ARE PROVIDED AND SHOULD BE UTILIZED WHEN INSTALLING CONDUITS FROM THE SIDE. THESE INDENTIONS ARE EITHER ON THE INSIDE OR OUTSIDE OF THE LONG SIDE WALLS. DO NOT CORE BORE OTHER THAN THE PROVIDED INDENTIONS, AS IT MAY REDUCE THE STRUCTURAL INTEGRITY.

J. MAY BE USED WITH 3341 SWITCH PAD INSTALLATION.

K. MAY BE USED FOR GRADING AND/OR FOR ADDITIONAL HEADROOM.

NOTE:

PP WHEN TRAFFIC COVER IS REMOVED CHECK GASKET MATERIAL AND REPLACE AS NEEDED.

SDG&E STOCK NUMBER (5341020);

REFERENCE:

a) SEE STANDARD 3211 FOR INSTALLATION OF IDENTIFICATION TAG.
b) SEE STANDARD 3302 FOR SUBSTRUCTURE APPLICATIONS.
c) SEE STANDARD 3306 FOR INSTALLATION OF PLASTIC—MASTIC SEALANT.
d) SEE STANDARD 3365 FOR SLURRY BACKFILL.
e) SEE STANDARD 3483 FOR MINIMUM OPERATING AND CLEARANCE REQUIREMENTS.
f) SEE STANDARD 3485 WHEN SETTING HANDHOLE ON A SLOPING GRADE.
g) SEE STANDARD 3486 FOR RETAINING WALL REQUIREMENTS AND CLEARANCES FROM REVERSE SUBGRADE RETAINING WALLS.
h) SEE STANDARD 3605 FOR SUBSTRUCTURE USE AND LIMITATIONS REFERENCE SHEET (MAXIMUM NUMBER OF CABLES, CONNECTORS AND CONDUITS).
SCOPE: THIS STANDARD SHOWS THE INSTALLATION AND MATERIAL REQUIRE FOR THE 3317 HANDHOLE.

12" PARKWAY TOP
SECTION AND COVER
WEIGHT: 4200 POUNDS
(1905 KG)
SLIP NOT COATING
REQUIRED

24" EXTENSION
SECTION
WEIGHT: 5000 POUNDS
(2265 KG)

47" BASE ENCLOSURE
WEIGHT: 16,500 POUNDS
(7577 KG)

SDG&E ELECTRIC UNDERGROUND STANDARD

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CHANGE
BY
APPV
DATE
REV
CHANGE
BY
APPV
DATE

A
EDITORIAL CHANGES
JS
TR
MDJ
5/26/2016
D

Indicates Latest Revision
Completely Revised
New Page
Information Removed

SHEET 1 OF 4

SDG&E ELECTRIC UNDERGROUND STANDARD

HANDBOLE EQUIPMENT ENCLOSURE
(INSIDE DIMENSIONS - 6' X 8') (1829 X 2438)
NOTES:

I. ALL INTERIOR HARDWARE SHALL BE HOT DIPPED GALVANIZED AFTER FABRICATION.

II. HANDHOLE SECTIONS AND COVERS FROM DIFFERENT SUPPLIERS ARE NOT INTERCHANGEABLE.

III. THE ONLY LOCATION FOR A 3317 HANDHOLE IS IN NONVEHICULAR TRAFFIC AREAS (BEHIND CURBS, PARKWAY POSITION, ETC.). THE 3317 IS SUPPLIED WITH PARKWAY COVERS ONLY!

IV. LIFTING ANCHORS ARE NOT TO BE USED FOR CABLE PULLING.

V. 3317 HANDHOLES ARE DELIVERED BY THE SUPPLIER TO JOB SITE.

VI. THIS HANDHOLE TO BE INSTALLED ONLY WHEN THERE IS INSUFFICIENT SPACE FOR PME, TRAYER SWITCH.

BILL OF MATERIAL FOR 3317 HANDHOLE:

<table>
<thead>
<tr>
<th>ITEM</th>
<th>DESCRIPTION</th>
<th>QUANTITY</th>
<th>STOCK NUMBER</th>
<th>ASSEMBLY UNITS</th>
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<td>5</td>
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<td>6</td>
<td>SWITCH SUPPORT</td>
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<td>7</td>
<td>CABLE SUPPORT BRACKET</td>
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<td>8</td>
<td>LOWER PLATEFORM W/SUPPORTS</td>
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<td>9</td>
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<td>PULLING IRON</td>
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<td>11</td>
<td>GRAVEL, 3/8&quot; – 3/4&quot;</td>
<td>AS REO'D</td>
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</table>

INSTALLATION:

A. ESTABLISH THE HANDHOLE LOCATION PAYING PARTICULAR ATTENTION TO FOREIGN UTILITY PLACEMENTS. RELOCATING THE HANDHOLE TO ANOTHER LOCATION REQUIRES APPROVAL FROM PROJECT MANAGEMENT.

B. AFTER THE LOCATION IS ESTABLISHED, MARK OUT DIMENSIONS FOR THE EXCAVATION WIDTH, LENGTH AND DEPTH PER DRAWING BELOW. THE WIDTH AND LENGTH DIMENSIONS GIVEN, ALLOW AN EXTRA 8 INCHES MIN. (203) FOR SETTING THE SUBSTRUCTURE.

C. EXCAVATION IS NOW PREPARED FOR INSTALLATION OF SUBSTRUCTURE SECTIONS. PLACE PLASTOMASTIC SEALANT BETWEEN SECTIONS. USE DOUBLE SEAL IF FIELD CONDITIONS INDICATE THAT WATER WILL PERCOLATE THE JOINTS. DO NOT APPLY SEALANT UNDER THE TOP SECTION IF CONCRETE IS REQUIRED FOR GRADE ADJUSTMENT. ASSURE THE SUBSTRUCTURE WALLS ARE STRAIGHT AND THE FLOOR IS LEVEL.

D. TO DETERMINE FINAL GRADE, ONE OF THE TWO FOLLOWING METHODS MAY BE USED: 1) WHEN CURB OR GRADE LEVEL IS ALREADY ESTABLISHED, MEASURE FROM THE TOP OF CURB OR GRADE OR 2) HAVE THE FIELD ENGINEER SET THE GRADE STAKES. AFTER GRADE LEVEL IS ESTABLISHED, SET A STRING LINE FOR CHECKING GRADE LEVEL.

E. ALIGN HANDHOLE COVER TO FINAL GRADE USING BRICKS OR WOODEN WEDGES. BEFORE POURING CONCRETE (4-SACK MIX WITH 3/8 INCH GRAVEL OR AS REQUIRED BY CITY OR COUNTY CODES). FRAME THE INSIDE OPEN AREA BETWEEN SECTIONS SO CONCRETE CAN BE POURED FROM THE OUTSIDE OF THE TOP COVER SECTION. MAKE SURE THE BRICKS OR WOODEN WEDGES DO NOT SHOW FROM THE INSIDE ONCE THE CONCRETE IS POURED. THE INSIDE FRAME MAY BE OMITTED IF THE CONCRETE IS NOT TOO WET. IF FRAME IS OMITTED, TROWEL CONCRETE SMOOTH ON THE INSIDE.

F. INSTALL CONDUITS USING THE BOTTOM KNOCKOUTS FIRST.

G. INSTALL 2-5" CONDUITS IN THE TWO UPPERMOST KNOCKOUTS OPPOSITE OR UNDER SWITCH WAY 4 FOR SCADA.

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B   |        |    |      |      |      |    |        |    |      |      |      
A   | EDITORIAL CHANGES | JS | TR | MDJ | 5/26/2016 | D  |        |    |      |      |      

Indicates Latest Revision | Completely Revised | New Page | Information Removed

SDG&E ELECTRIC UNDERGROUND STANDARD

HANDHOLE EQUIPMENT ENCLOSURE
(INSIDE DIMENSIONS - 6' X 8') (1829 X 2438)

UG 3317.2
EXCAVATION DEPTH ALLOWS 3 INCHES (76) FOR ADJUSTMENT TO FINAL GRADE AND AN ADDITIONAL 3 INCHES (76) FOR REPLACEMENT OF GRAVEL AS BASE SUPPORT.

REFERENCE:

a. SEE STANDARD 3211 FOR INSTALLATION OF IDENTIFICATION TAG.
b. SEE STANDARD 3302 FOR SUBSTRUCTURE APPLICATIONS.
c. SEE STANDARD 3306 FOR INSTALLATION OF PLASTIC–MASTIC SEALANT.
d. SEE STANDARD 3365 FOR SLURRY BACKFILL.
e. SEE STANDARD 3483 FOR MINIMUM OPERATING AND CLEARANCE REQUIREMENTS.
f. SEE STANDARD 3485 WHEN SETTING HANDBOLE ON A SLOPING GRADE.
g. SEE STANDARD 3486 FOR RETAINING WALL REQUIREMENTS AND CLEARANCES FROM REVERSE SUBGRADE RETAINING WALLS.
h. SEE STANDARD 3605 FOR SUBSTRUCTURE USE AND LIMITATIONS REFERENCE SHEET (MAXIMUM)
i. SEE STANDARD 3670 FOR SUBSURFACE/SURFACE SWITCH.
j. SEE STANDARD 3671 FOR INSTALLATION OF SUBSURFACE/SURFACE OPERABLE SWITCH.
k. AVAILABLE IN SERVICE STANDARDS AND GUIDE MANUAL.
**SCOPE:** This standard shows the installation and material requirements for a 3325 MANHOLE.

**MANHOLE, TUB TYPE**

8' X 14' X 9'-6"

**Final Grade**

16'-4" (196") Long x 10'-4" (124") Wide

**Excavation Dimensions**

- Excavation depth allows 3 inches for adjustment to final grade and an additional 6 inches for placement of gravel as base support.

**MANHOLE, TUB TYPE**

8' X 14' X 9'-6"
NOTES:

I. MANHOLE SECTIONS AND COVERS FROM DIFFERENT SUPPLIERS ARE NOT INTERCHANGEABLE.

II. THE PREFERRED LOCATION FOR A 3325 MANHOLE IS IN NONVEHICULAR TRAFFIC AREAS (BEHIND CURBS, PARKWAY POSITION, ETC.).

III. 3325 MANHOLES ARE DELIVERED BY THE SUPPLIER TO JOB SITE.

IV. LIFTING ANCHORS ARE NOT TO BE USED FOR CABLE PULLING.

BILL OF MATERIAL:

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<th>ITEM</th>
<th>DESCRIPTION</th>
<th>QUANTITY</th>
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<th>STOCK NUMBER</th>
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<td>4</td>
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INSTALLATION:

A. ESTABLISH THE MANHOLE LOCATION PAYING PARTICULAR ATTENTION TO FOREIGN UTILITY PLACEMENTS. RELocATING THE MANHOLE TO ANOTHER LOCATION REQUIRES APPROVAL FROM SERVICE PLANNING.

B. PLACE GRAVEL 6” DEEP ON EXCAVATION BOTTOM AND SET MANHOLE LEVEL.

C. FOR 48” X 60” MANHOLE NECK AND COVER, SEE STANDARD 3332.

D. USE MASTIC SEALING COMPOUND IN ALL SECTIONS (SEE STANDARD 3306).

E. INSTALL CONDUITS USING THE BOTTOM OUTSIDE (CLOSEST TO THE WALL) KNOCKOUTS FIRST.

F. USE #2 AWC BARE COPPER (STOCK NUMBER 812816) FOR GROUNDS WITH SERVICE POST CONNECTOR (STOCK NUMBER 262560).

G. ON INITIAL CABLE INSTALLATION, OCCUPY LOWEST CONDUIT OPENINGS FIRST.

REFERENCE:

1. SEE STANDARD 3332 FOR MANHOLE NECK AND COVER TRAFFIC BEARING.

2. SEE STANDARD 3365 FOR SLURRY BACKFILL.

3. AVAILABLE IN SERVICE STANDARDS AND GUIDE MANUAL.
SCOPE: THIS STANDARD SHOWS THE INSTALLATION AND MATERIAL REQUIREMENTS FOR A 3326 MANHOLE.

TOP SECTION
WEIGHT: 40,000 POUNDS

BASE SECTION
WEIGHT: 41,500 POUNDS

SDG&E ELECTRIC UNDERGROUND STANDARD

MANHOLE, TUB TYPE
8' X 20' X 9'-6"
NOTES:
I. MANHOLE SECTIONS AND COVERS FROM DIFFERENT SUPPLIERS ARE NOT INTERCHANGEABLE.
II. THE PREFERRED LOCATION FOR A 3326 MANHOLE IS IN NONVEHICULAR TRAFFIC AREAS
    (BEHIND CURBS, PARKWAY POSITION, ETC.).
III. 3325 MANHOLES ARE DELIVERED BY THE SUPPLIER TO JOB SITE.
IV. LIFTING ANCHORS ARE NOT TO BE USED FOR CABLE PULLING.

BILL OF MATERIAL:

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EXCAVATION:
* EXCAVATION DEPTH ALLOWS THREE INCHES FOR ADJUSTMENT TO FINAL GRADE AND AN ADDITIONAL SIX INCHES FOR PLACEMENT OF GRAVEL AS BASE SUPPORT.

INSTALLATION:
A. ESTABLISH THE MANHOLE LOCATION PAYING PARTICULAR ATTENTION TO FOREIGN UTILITY PLACEMENTS. RELOCATING THE MANHOLE TO ANOTHER LOCATION REQUIRES APPROVAL FROM SERVICE PLANNING.
B. PLACE GRAVEL SIX INCHES DEEP ON EXCAVATION BOTTOM AND SET MANHOLE LEVEL.
C. FOR 48" X 60" MANHOLE NECK AND COVER, SEE STANDARD 3332.
D. USE MASTIC SEALING COMPOUND IN ALL SECTIONS (SEE STANDARD 3306).
E. INSTALL CONDUITS USING THE BOTTOM OUTSIDE (CLOSEST TO THE WALL) KNOCKOUTS FIRST.
F. USE #2 AWG BARE COPPER (STOCK NUMBER S812816) FOR GROUNDS WITH SERVICE POST CONNECTOR (STOCK NUMBER S262560).
G. ON INITIAL CABLE INSTALLATION, OCCUPY LOWEST CONDUIT OPENINGS FIRST.

REFERENCE:
A. SEE STANDARD 3332 FOR MANHOLE NECK AND COVER TRAFFIC BEARING.
B. SEE STANDARD 3365 FOR SLURRY BACKFILL.
SCOPE: This standard shows the installation and material requirements for the manhole neck, neck extension, and cover used for access to a 3325 and 3326 manhole.

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INSTALLATION:

A. PLACE PLASTIC–MASTIC SEALANT BETWEEN ALL SECTIONS. DO NOT APPLY SEALANT UNDER THE TOP SECTION IF CONCRETE IS REQUIRED FOR GRADE ADJUSTMENT.

B. TO DETERMINE FINAL GRADE, ONE OF THE TWO FOLLOWING METHODS MAY BE USED: 1) CURB OR GRADE LEVEL IS ALREADY ESTABLISHED, MEASURE FROM THE TOP OF CURB OR GRADE OR 2) HAVE THE FIELD ENGINEER SET THE GRADE STAKES. AFTER GRADE LEVEL IS ESTABLISHED, SET A STRING LINE FOR CHECKING GRADE LEVEL.

C. ALIGN MANHOLE COVER TO FINAL GRADE USING BRICKS OR WOODEN WEDGES. BEFORE POURING CONCRETE (4–SACK MIX WITH 3/8 INCH PEA GRAVEL OR AS REQUIRED BY CITY OR COUNTY CODES), FRAME THE INSIDE OPEN AREA BETWEEN SECTIONS SO CONCRETE CAN BE POURED FROM THE OUTSIDE OF THE TOP COVER SECTION. MAKE SURE THE BRICKS OR WOODEN WEDGES DO NOT SHOW FROM THE INSIDE ONCE THE CONCRETE IS Poured. THE INSIDE FRAME MAY BE OMITTED IF THE CONCRETE IS NOT TOO WET. IF FRAME IS OMITTED, TROWEL CONCRETE SMOOTH ON THE INSIDE.

D. DEPTHS OF MANHOLE ROOF BELOW GRADE:
   0” – EXTENSION 1’–0”  9” – EXTENSION 1’–9”
   6” – EXTENSION 1’–6”  12” – EXTENSION 2’–0”

E. APPLY INHIBITOR TO THE BOLTS WHEN SECURING THE COVER TO REDUCE INSTALLATION OR REMOVAL DIFFICULTIES.

NOTES:

I. CAST IRON COVERS FROM DIFFERENT SUPPLIERS ARE INTERCHANGEABLE. THE CONCRETE COVER, NECK SECTION AND NECK EXTENSION SECTION FROM DIFFERENT SUPPLIERS ARE NOT INTERCHANGEABLE.

II. WHEN TRAFFIC COVER IS REMOVED CHECK GASKET MATERIAL AND REPLACE AS NEEDED. SDG&E STOCK NUMBER (S341020).

REFERENCE:

a. SEE STANDARD 3211 FOR INSTALLATION OF IDENTIFICATION TAG.

b. SEE STANDARD 3302 FOR SUBSTRUCTURE APPLICATIONS.

c. SEE STANDARD 3306 FOR INSTALLATION OF PLASTIC–MASTIC SEALANT.

d. SEE STANDARD 3365 FOR SLURRY BACKFILL.

e. SEE STANDARD 3483 FOR MINIMUM OPERATING AND CLEARANCE REQUIREMENTS.

f. SEE STANDARD 3485 FOR SETTING MANHOLE ON SLOPING GRADE.

g. SEE STANDARD 3486 FOR RETAINING WALL REQUIREMENTS AND CLEARANCES FROM REVERSE SUBGRADE RETAINING WALLS.

h. SEE STANDARD 3605 FOR SUBSTRUCTURE USE AND LIMITATIONS REFERENCE SHEET (MAXIMUM NUMBER OF CABLES, CONNECTORS AND CONDUITS).
SCOPE: THIS STANDARD SHOWS TYPICAL UTILITY LOCATIONS IN LOCAL AND COLLECTOR STREETS IN SAN DIEGO COUNTY.

NEW CONSTRUCTION

PROPERTY LINE

10’ TYPICAL

PROPERTY LINE

10’ TYPICAL

TYPICAL STREET

NOTES:

1 AT CATCH BASIN LOCATIONS, JOINT TRENCH SHALL BE 4 FEET MINIMUM FROM BACK OF CURB TO INSIDE WALL OF TRENCH.
SCOPE: THIS STANDARD SHOWS TYPICAL UTILITY LOCATIONS IN MAJOR STREETS, PRIME ARTERIALS, AND EXPRESSWAYS IN SAN DIEGO COUNTY.

NEW CONSTRUCTION

1. MAJOR STREET
2. PRIME ARTERIAL
3. EXPRESSWAY

NOTES:

1. AT CATCH BASIN LOCATIONS, JOINT TRENCH SHALL BE 4 FEET MINIMUM FROM BACK OF CURB TO INSIDE WALL OF TRENCH.
SCOPe: This standard shows typical joint trench location for underground conversions in San Diego County.

UNDERGROUND CONVERSIONS

FIG. 1
SIDEWALK NEXT TO CURB

FIG. 2
SIDEWALK NEXT TO PROPERTY LINE

FIG. 3
SIDEWALK NEXT TO CURB AND PROPERTY LINE

NOTES:

I. SIDEWALK SHALL HAVE A MINIMUM OF FOUR (4) FOOT CLEAR AREA (PATH, NOT INCLUDING CURB) PASSING PEDESTALS, PULLBOXES AND OTHER STRUCTURES (SEE STANDARD 3002).

II. FOR CLEARANCES, SEE UNDERGROUND STANDARDS 3481, 3486, AND 3483.

III. * STREET LIGHTS, GAS, UNDERGROUND ELECTRIC, TELEPHONE AND CATV.

REFERENCE:

a. SEE GAS STANDARDS 7425.1, 7425.2, & 7425.3 [FOR INTERNAL USE ONLY]
**SCOPE:** THIS STANDARD SHOWS TYPICAL PLACEMENT OF BASE, SHADING, AND IMPORTED OR NATIVE BACKFILL MATERIAL FOR SDG&E FACILITIES IN SAN DIEGO COUNTY. IMPORTED OR NATIVE BACKFILL IS THE ALTERNATE BACKFILL MATERIAL, ONE SACK SLURRY IS THE PREFERRED BACKFILL MATERIAL.

**INSTALLATION:**
- A. DOES NOT CONFORM, FOLLOW AGENCY, GOVERNMENTAL REQUIREMENTS. AGENCIES REQUIREMENTS.
- B. SHADING MATERIAL SHALL MEET GAS STANDARD 7405 OR UNDERGROUND 3370/3371 SPECIFICATIONS AND MUST BE APPROVED BY AN SDG&E INSPECTOR.
- C. BACKFILL MATERIAL SHALL MEET THE GOVERNMENTAL (PERMITTING) AGENCIES REQUIREMENTS AND SDG&E STANDARDS. (SEE UNDERGROUND STANDARD 3370, 3371 NOTE D OR GAS STANDARD 7403 NOTE D). ROCKS GREATER THAN 6 INCHES ARE NOT ALLOWED IN BACKFILL MATERIAL.
- D. IF FOREIGN UTILITIES REQUIRE ENCASEMENT, MAINTAIN CLEARANCES AND PROVIDE BASE FOR GAS MAIN.
- E. ONE OR MORE 5 INCH PRIMARY CONDUITS SHALL BE SLURRY ENCASED.
- F. THE MINIMUM COMPACTED SHADING MATERIAL OVER THE UPPERMOST GAS PIPE OR CONDUIT SHALL BE 4 INCHES.

**REFERENCE:**
- a. SEE UNDERGROUND STANDARD 3365.2 (GAS STANDARD 7410) FOR SLURRY BACKFILL.
- b. SEE UNDERGROUND STANDARD 3370, 3371 (GAS STANDARD 7403) FOR UTILITY PLACEMENT, CLEARANCES, MINIMUM SHADING, COVER, AND COMPACTION.
- c. AVAILABLE IN SERVICE STANDARDS AND GUIDE MANUAL
- d. SEE GAS STANDARD G7409

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**SCOPE:**

This standard shows typical placement of base, shading, and slurry backfill for SDG&E facilities in San Diego County.

**INSTALLATION:**

A. All trench resurfacing shall be done according to governmental agencies requirements.

B. Shading material shall meet Gas Standard 7405 or Underground 3370/3371 specifications and must be approved by an SDG&E authorized inspector.

C. Backfill material shall meet the governmental (permitting) agencies requirements and SDG&E standards. The sand used for the one sack slurry or two sack, if required by governmental agencies, must meet the concrete sand specification listed in the standard specifications for public works construction (green book) and contain no gravel. Slurry must be firm before a pavement concrete cap is installed. Slurry is typically used for backfilling around substructures, under equipment pads, for trenches in existing paved areas, and under concrete or paved driveways.

It may not be appropriate to use one sack slurry under the following circumstances:

- Governmental agencies do not allow one sack or may require two sack slurry backfill.
- Inaccessibility of concrete trucks delivering slurry.
- When slurry is not cost effective.
- New residential subdivisions, single family residence service trench
- Shallow weld holes, pot holes, etc.
INSTALLATION CONT:

D. IF FOREIGN UTILITIES REQUIRE ENCASEMENT, MAINTAIN CLEARANCES AND PROVIDE BASE FOR GAS MAIN.

E. ONE OR MORE 5 INCH PRIMARY CONDUITS SHALL BE SLURRY ENCASED.

F. MINIMUM COMPACTED SHADING MATERIAL OVER THE UPPERMOST GAS PIPE OR CONDUIT SHALL BE 4 INCHES. THE GAS MAIN OR GAS SERVICE SHALL NEVER BE CONCRETE OR SLURRY ENCASED AND SHALL HAVE THE PROPER BASE, SHADING, BACKFILL AND COMPACTION.

G. MAINTAIN MIN. 30" COVER OVER PRIMARY, SECONDARIES AND SERVICES ON DIRECT BURIAL CONDUIT INSTALLATIONS.

H. USE APPROVED SDG&E CONDUIT AND SPACERS.

I. ON SERVICES IN PRIVATE YARDS, ALLOW FOR 6" OF TOP SOIL FOR LANDSCAPING PURPOSES.

REFERENCE:

J. SEE UNDERGROUND STANDARD 3370, 3371 (GAS STANDARD 7403) FOR UTILITY PLACEMENT, CLEARANCES, MINIMUM SHADING, COVER, AND COMPACTION.

K. SEE UNDERGROUND STANDARD 3376.1 FOR 1 SACK CONCRETE SLURRY MIX AND 2 SACK 3/8" GRAVEL CONCRETE MIX OR AS REQUIRED BY GOVERNMENTAL AGENCY.

L. SEE UNDERGROUND STANDARD 3365.1 OR GAS STANDARD 7409 FOR ALTERNATE IMPORTED OR NATIVE BACKFILL.
SCOPE: THIS STANDARD SHOWS TYPICAL PLACEMENT OF BASE, SHADING AND ONE SACK SLURRY BACKFILL AS A PREFERRED METHOD OF BACKFILL FOR SDG&E FACILITIES.

INSTALLATION:
A. ONE SACK SLURRY IS THE PREFERRED METHOD FOR BACKFILL.
B. IMPORTED OR NATIVE BACKFILL IS THE ALTERNATE METHOD FOR BACKFILL.
C. SLURRY IS TYPICALLY USED FOR BACKFILLING AROUND SUBSTRUCTURES, UNDER EQUIPMENT PADS, FOR TRENCHES IN EXISTING PAVED AREAS AND UNDER CONCRETE OR PAVED DRIVEWAYS.
D. SLURRY IS THE ONLY ALLOWED BACKFILL AROUND FIBERGLASS BOX PADS.
E. IT MAY NOT BE APPROPRIATE TO USE ONE SACK SLURRY UNDER THE FOLLOWING CIRCUMSTANCES:
   - GOVERNMENTAL (PERMITTING) AGENCIES DO NOT ALLOW ONE SACK SLURRY OR MAY REQUIRE TWO SACK SLURRY BACKFILL.
   - INACCESSIBILITY OF CONCRETE TRUCKS DELIVERING SLURRY.
   - WHEN SLURRY IS NOT COST EFFECTIVE.
   - NEW RESIDENTIAL SUBDIVISIONS, SINGLE FAMILY RESIDENT SERVICES.
   - SHALLOW WELD HOLES, POT HOLES, ETC.

TYPICAL SLURRY INSTALLATIONS

3418, 3419, & 3423 BOX PAD
3713 INSTALLATION OPEN DELTA BANK THREE-PHASE
3314/3316 HANHOLE
3325/3326 MANHOLES
3426/3427 TRANSFORMER PAD WITH 3314 SECTIONS
3714 INSTALLATION CLOSED DELTA BANK THREE-PHASE
STACKED SERVICE CONDUITS
METERING EQUIPMENT
NOTES:
GAS PIPE SHALL NOT BE SLURRY ENCASED. SEE NOTE F

REFERENCE:
A. SEE UNDERGROUND STANDARD PG. 3365.1 (GAS STANDARD G7409) FOR ALTERNATE IMPORTED OR NATIVE BACKFILL.
SCOPE: THIS STANDARD DEMONSTRATES THE 45 DEGREE RULE THAT SHALL BE FOLLOWED WHEN EXCAVATING A TRENCH THAT PARALLELS ANY FOUNDATION.

NOTES:

I. WHERE TRENCHES ARE MADE PARALLEL TO A BUILDING OR STRUCTURE AND ARE DEEPER THAN THE BUILDING OR STRUCTURE FOOTING, SUCH TRENCHES SHALL BE A MINIMUM DISTANCE AWAY FROM THE FOOTING AT LEAST EQUAL TO DEPTH OF THE TRENCH UNLESS PERMISSION TO VARY HEREFROM IS GRANTED BY THE ENFORCING AGENCY.

NOTE THAT THE DEPTH FOR A TRENCH PARALLELING ANY FOUNDATION IS LIMITED BY THE DISTANCE FROM THE FOUNDATION. FOR EXAMPLE, TRENCH DEPTH FOR A TRENCH WITH NEAREST SIDE TWO FEET FROM A FOUNDATION IS LIMITED TO A TWO FOOT DEPTH.
SCOPE: This standard shows a typical service trench excavation paralleling a residential building. (Exception to 45 degree rule on UG. Std. 3367.1/Gas Std. 7415.1)

INSTALLATION:
A. The following condition(s) must be met:
   1. Building has a continuous concrete slab.
   2. Building height is limited to two stories.
   3. Building height is limited to two stories. 12 foot length along the foundation, and must not exceed a 4 foot depth.
   4. Soil conditions must be stable and must not cause undermining of the foundation.
   5. Trench walls must be stable during and after excavation.
B. If the condition(s) in note A cannot be met, then the 45 degree rule must be followed. See Standard 3367.1.

REFERENCE:
a. See Gas Standards 7415.1 & 7415.2 [For internal use only]

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SCOPE:

THIS STANDARD COVERS BIO-RETENTION FACILITIES AND SDG&E'S 600 AMP AND 200 AMP UNDERGROUND ELECTRIC SECONDARY, SERVICES AND GAS FACILITIES LOCATED ON RESIDENTIAL, COMMERCIAL, FEDERAL, STATE, AND MUNICIPAL LAND AND ALL OTHER PROPERTY TYPES. THE STANDARD APPLIES, BUT IS NOT LIMITED TO BIO-RETENTION BASINS AND/OR SWALES. BIO-RETENTION FACILITIES ARE WET FACILITIES THAT WILL REQUIRE MAINTENANCE OVER TIME. THESE FACILITIES WILL REQUIRE MAJOR TRENCHING AND MAY BE LOCATED WITHIN STREETS AND PRIVATE PROPERTY PRESENTING POTENTIAL CONFLICTS WITH SDG&E PRIMARY AND SECONDARY ELECTRIC CABLE AND CONDUITS, ELECTRIC SERVICES, GAS AND ANY OTHER SDG&E FACILITIES.

BIO-RETENTION FACILITIES ARE DESIGNED TO CONTROL WATER RUN-OFF AND POSSIBLE DRAINAGE OVER-FLOW OF STORM WATER. DURING THE DESIGN PHASE FOR THESE FACILITIES CUSTOMERS MUST DESIGN TO MEET THE REQUIREMENTS OF SDG&E UNDERGROUND CONSTRUCTION 3364.1, 3364.2, AND 3364.3 FOR LOCATION, AND NOT ENCROACH ON SDG&E’S STANDARD FACILITY LOCATIONS. SINCE BIO-RETENTION FACILITIES ARE A WET UTILITY, SIMILAR TO STORM DRAINS AND WATER RELATED FACILITIES, THEY MUST COORDINATE WITH SDG&E TRENCHING AND FACILITY LOCATIONS, AND MEET FACILITY SEPARATION REQUIREMENTS SHOWN IN SDG&E UNDERGROUND CONSTRUCTION STANDARD 3370 FOR SAN DIEGO COUNTY AND UNDERGROUND CONSTRUCTION STANDARD 3371 FOR ORANGE COUNTY.

IN ACCORDANCE WITH THESE UNDERGROUND CONSTRUCTION STANDARDS, BIO-RETENTION FACILITIES MUST MAINTAIN 5 FEET SEPARATION WHEN INSTALLED PARALLEL TO ALL SDG&E FACILITIES. A MINIMUM 6 INCH SEPARATION SHALL BE MAINTAINED WHEN BIO-RETENTION DUCTS AND/OR CONDUITS CROSS SDG&E FACILITIES. BIO-RETENTION DUCTS OR CONDUITS THAT CROSS SDG&E FACILITIES MUST BE RIGID PIPE WITHOUT ANY PERFORATION FOR A DISTANCE OF 5 FEET MINIMUM ON EITHER SIDE OF, AND IN THE AREA OF, WHERE THEY CROSS SDG&E FACILITIES. IN ORDER TO MAINTAIN SAFE OPERATIONAL AND MAINTENANCE ACCESS, SDG&E FACILITIES SHALL NOT BE INSTALLED OVER, UNDER OR WITHIN BIO-RETENTION SWALES, BASINS, CELLS OR ANY OTHER OPEN HOLDING AREA FOR BIO-RETENTION.

BIO-RETENTION FACILITIES SHALL NOT ENCROACH ON SDG&E MANHOLES, HAND-HOLES, PAD MOUNTED EQUIPMENT, OVERHEAD POLES AND ANCHORS, AND ANY OTHER OVERHEAD FACILITIES. THIS APPLIES TO GAS METERS, GAS VALVES AND RELATED GAS FACILITIES SUCH AS GAS REGULATION FACILITIES.

NOTE:

I. REFER TO BIO-RETENTION APPLICATION GUIDE FOR MORE INFORMATION ABOUT HOW TO APPLY THE BIO-RETENTION/WET FACILITIES STANDARD.

REFERENCE:

a. SEE UNDERGROUND CONSTRUCTION STANDARD 3364.1 - 3364.3 FOR UTILITY LOCATIONS.

b. SEE UNDERGROUND CONSTRUCTION STANDARD 3370 AND 3371 FOR UNDERGROUND DISTRIBUTION TRENCHES AND UTILITY POSITIONS.
SCOPE: This standard shows typical placement of utilities within trenches for distribution and service in dedicated R/W (street) and private property, and provides the minimum depth and clearance that must be maintained between various utilities occupying the same trench in San Diego County.

I. DRAWINGS ARE NOT TO SCALE.

II. SPACE ALLOTMENTS (OTHER THAN FOREIGN UTILITY) ARE 1/2-INCH LARGER THAN THE NOMINAL SIZE OF GAS MAIN, GAS SERVICE OR ELECTRIC CONDUIT. SEE INSTALLATION NOTE (X) FOR FOREIGN UTILITY SPACE ALLOTMENT.

III. TYPICAL TRENCH SECTIONS ARE DESIGNED FOR INSTALLATIONS WHERE EACH OCCUPANT IS UTILIZING ENTIRE SPACE ALLOTMENT. SIZE OF SPACE ALLOTMENTS MAY BE REDUCED OR ADDITIONAL ALLOTMENTS MAY BE ADDED PROVIDED MINIMUM COVER AND CLEARANCES ARE MAINTAINED, AS LISTED ON PAGE 3370.2. ONLY ONE FOREIGN UTILITY SPACE ALLOTMENT FOR TELCO AND/OR CATV IS ALLOWED PER TRENCH. WIDTH AND DEPTH OF THE TRENCH MUST BE ADJUSTED ACCORDING TO SPACE ALLOTMENTS, MINIMUM CLEARANCES AND MINIMUM COVER.

IV. GAS PIPE REQUIRES A MINIMUM OF 12 INCHES RADIAL SEPARATION FROM ALL UTILITIES.
Main Trench, [Service Trench Public Property] (Minimum Separation From)

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<tr>
<td>U Foreign Utility &amp; Cable</td>
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<tr>
<td>T SDG&amp;E Telecommunications</td>
<td>12&quot; C C C C C</td>
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</tbody>
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Minimum Cover:
- 30" MIN
- 42" MAX
- 4-1/2"x4-1/2"
- 5-1/2"x5-1/2"
- 5-1/2"x5-1/2"
- 2-1/2"x2-1/2"

Service Trench Private Property (Minimum Separation From)

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<tr>
<td>ES Electric Service</td>
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<tr>
<td>ME Multiple Electric</td>
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<td>U Foreign Utility &amp; Cable</td>
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<tr>
<td>L Foreign Utility &amp; Street Light</td>
<td>12&quot; C C C C C</td>
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</tbody>
</table>

Minimum Cover:
- 24" MIN
- 2-1/2"x2-1/2"
**INSTALLATION:**

**A.** An effort should be made to keep the trench depth less than 60 inches. If a person is required to enter a trench 60 inches or deeper, it shall be shored, benched, or sloped to prevent movement of earth that may endanger life or property. The trench configuration, utility positioning and all other related construction must conform to this standard and the state of California Public Utilities Commission General Orders 128 and 1120, and any other appropriate governmental agency having jurisdiction over construction.

**NOTE:** Benching the trench is for safety reasons only and not to be used for installation purposes.

**B.** The trench depth in this standard shall be followed for all normal installations. In installations where the trench depth cannot be met, O.C. 128 requires one of the following: (1) Steel, or (2) Schedule 40 PVC or Schedule 80 PVC conduit with a minimum wall thickness of 0.15 inches, or (3) a 3 inch layer of concrete (2 sack 3/8" rock) above and 2 inches on each side of the conduit. Reduced depths must be approved by both the customer project planner and SDG&E inspector.

**C.** Any conduit combination smaller than 6 inch (not multiple electric-steel or service conduits) are permitted without separation when installed in a horizontal configuration. SDG&E telecommunications space allotment is permitted next to the electric space allotments without separation. (6 inch minimum trench width, 24 inch maximum trench width) (See standard 3376 for conduit/trench configuration).

**D.** Base and Shading Material for Gas Trench Only:

- Material consisting of natural sand or manufactured sand, existing native material, or combinations may be used for base and shading material provided it complies with Gas Standard G7405 and is of a quality that will comply with compaction requirements of governmental agencies. Gas Standard G7405 specifies that the material must have a mixture of particle sizes all smaller than 1/2 inch. Existing native material and imported material provided by a developer does not have to be tested by an independent professional testing firm if, in the opinion of the inspector, it meets the G7405 specification.

**SHADING MATERIAL FOR ELECTRIC TRENCH ONLY:** Electric shading material (ESM) specification. Acceptable material for (DB) direct buried conduits.

- Natural sand, manufactured sand, decomposed granite, rock free sandy loam, existing native material or combination thereof. Aggregate composition shall be capable of passing through a 1/2 inch sieve. Gravels shall not amount to more than 50% of the mixture. Screening or other suitable means may be required at the discretion of the SDG&E inspector to meet this (ESM) shading material specification. Not acceptable are soils of highly organic content identified by odor or spongy feel and highly plastic (SOOGY) clays, silts, or metallic slag.

**BASE AND SHADING MATERIAL FOR JOINT GAS AND ELECTRIC TRENCH:** When both gas and electric are installed in the same trench, the base and shading material which complies with Gas Standard G7405 shall be used for the gas pipe. Electric shading material (ESM) may be used for shading material on electric conduit.

**BACKFILL MATERIAL FOR GAS AND/OR ELECTRIC:**

- The material used for backfilling the trench above the shading material and extending upward to the subgrade shall be free of rocks or clogs larger than 6 inches in any dimension. The coarse material shall be well distributed throughout the finer material. The amount of rocks or clogs shall be limited, in the opinion of the inspector, to allow for bar testing for gas leaks. The backfill material shall meet the requirements of all applicable codes, ordinances and SDG&E standards and be free of debris and organic matter. 1-sack concrete slurry mix is preferred for backfill material if the pipe gas is shaded with a minimum of 4 inches of compacted shading material. 1-sack concrete slurry mix is preferred for backfill. The slurry installation shall meet the requirements of governmental agencies and SDG&E standards.

**BASE INSTALLATION FOR GAS:**

- For gas, 4 inches of base material is required on the bottom of the trench to prevent damage from rocks, sags, or pockets.

**EARTH TRENCH BOTTOM INSTALLATION FOR ELECTRIC:** (FB & DB conduit)

- The 4 inch earth trench bottom shall be stable with a uniform grade containing no hard clogs, rocks, etc. That may damage the conduit. If, in the opinion of the SDG&E inspector, the conduit may be damaged, tamping, wetting or a 3 inch base electric shading material (ESM) may be required.

**SHADING INSTALLATION:**

- A minimum cover of 4 inches of compacted shading material (4 inches after compaction) shall be required above the gas pipe and electric conduit. A minimum cover of 12 inches of compacted shading material will be required if, in the opinion of the inspector, there is an excessive amount of rock and clogs in the backfill. The shading material must be installed and compacted at each level before installing the next utility. The shading material must be installed before the trench is backfilled to prevent damage from rocks, clogs, etc. Gas pipe shall never be concrete or slurry encased, and shall have the proper base, shading, backfill, and compaction.
COMPACTION:

EXTREME CARE SHALL BE TAKEN TO ENSURE THAT SHADING MATERIAL IS ADEQUATELY COMPACTED BOTH UNDERNEATH AND AROUND GAS PIPE AND FITTINGS TO PREVENT EXCESSIVE STRESS AND SHEARING FORCES. HAND TEMP AROUND FITTINGS WHERE MECHANICAL COMPACTED CANNOT BE USED. COMPACTING WITH A HYDRAULIC OR SIMILAR EQUIPMENT SHALL NOT BE ALLOWED ON TRENCHES WHERE POLYETHYLENE PIPE HAS BEEN INSTALLED. WHEN THE SLEEPER'S FOOT METHOD OF COMPACTING IS USED, A MINIMUM OF 18" OF COVER IS REQUIRED BEFORE COMPACTING. WHEEL ROLLING WITH A HEAVY VEHICLE, COMBINED WITH ADEQUATE MECHANICAL COMPACTING, IF NEEDED, IS ALLOWED FOR COMPACTING BACKFILL MATERIAL. PROVIDED A MINIMUM OF 4 INCHES OF MECHANICALLY COMPACTED SHADE MATERIAL AND A MINIMUM OF 12" OF BACKFILL MATERIAL EXISTS OVER THE GAS PIPE OR ELECTRICAL CONDUIT. WHEN FLOODING OF THE TRENCH IS DONE TO CONSOLIDATE BACKFILL, CARE MUST BE TAKEN TO ENSURE THAT GAS PIPE OR ELECTRIC CONDUIT HAS NOT FLOATED FROM ITS POSITION IN THE TRENCH. COMPACT BY THE WATER JETTING METHOD IS NOT ALLOWED. ALLOWED. SHADING AND BACKFILL SHALL BE COMPACTED IN ACCORDANCE WITH GOVERNMENTAL AGENCIES AND SHALL HAVE A MINIMUM OF 90 PERCENT RELATIVE COMPACTION.

ALL BASE, SHADING, AND BACKFILL MATERIAL MUST BE APPROVED BY AN SDG&E INSPECTOR.

E ONE OR MORE 5 INCH PRIMARY CONDUITS SHALL BE SLURRY ENCAUSED.

F FOREIGN UTILITIES MUST NOT BE LOCATED UNDER ANY SDG&E FACILITIES, SUCH AS HANDHOLES, TRANSFORMER PADS, ETC.

G MINIMUM TRENCH WIDTH

<table>
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<tr>
<th>UTILITY</th>
<th>PIPE/CONDUIT SIZE</th>
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<tr>
<td>SINGLE GAS - SERVICE</td>
<td>1 INCH AND LESS</td>
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<td>SINGLE GAS</td>
<td>3 AND 4 INCHES</td>
<td>12 INCHES</td>
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<tr>
<td>SINGLE GAS</td>
<td>6 AND 8 INCHES</td>
<td>18 INCHES</td>
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<td>SPACERS AND 1-SACK CONCRETE SLURRY</td>
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<tr>
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<td>SPACERS AND 1-SACK CONCRETE SLURRY</td>
<td>9 INCHES</td>
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FOR A GAS OR ELECTRIC SERVICE, IF ANY OBSTRUCTION IS ENCOUNTERED (WATER PIPES, ETC.), A 2 FOOT WIDE X 3 FOOT DEEP HOLE MAY BE REQUIRED FOR WORKING ROOM IN THE AREA OF THE OBSTRUCTION. THIS IS TO BE DETERMINED BY AN SDG&E INSPECTOR.

H THE FOREIGN UTILITY (V) SPACE ALLOTMENT MUST BE A MINIMUM OF 6 INCHES BELOW THE GAS MAIN AND 12 INCH HORIZONTAL SEPARATION FROM ALL OTHER UTILITIES MUST BE MAINTAINED. SEE FIGURES 1 AND 2. IF (V) SPACE ALLOTMENT EXCEEDS A 6 INCH HORIZONTAL SEPARATION, IT MUST BE PLACED DIRECTLY ABOVE THE ELECTRIC SPACE ALLOTMENTS AND SHALL NOT EXTEND OUTSIDE OF ALL OTHER UTILITIES FOR INSTALLATION PURPOSES. IF (V) SPACE ALLOTMENT IS 9" X 9" OR SMALLER, IT IS ALLOWED AT THE SAME LEVEL AS THE ELECTRIC. SEE FIGURE 6.

I ALL ELECTRIC TRENCH, REGARDLESS OF THE SIZE, SHALL BE SLURRY ENCASED WITH 1-SACK CEMENT SLURRY. DB CONDUIT MAY ALSO BE SLURRY ENCASED IF INCLUDED IN THE MULTIPLE ELECTRIC PACKAGE. IN A SERVICE TRENCH, ALL DB CONDUIT SHALL BE ENCASED WITH CEMENT SLURRY. 1/2 SACK. DB CONDUIT MAY ALSO BE SLURRY ENCASED IF INCLUDED IN THE MULTIPLE ELECTRIC PACKAGE.
### J. Minimum Separation - Main Trench

#### Utility
- Telco multiple concrete duct (Condex), transite, water, sewer, fuel, oil, diesel, propane gas, sprinkler, drain, leach lines, steel gas main larger than 2", privately owned utilities i.e. private telco, video, audio, security wires, fire alarm, street lighting, etc.
- Water, sewer, existing gas or electric, storm drains, steam, irrigation pipe, sprinkler pipe larger than 4", private telco transite, propane gas
- Sewage leach lines or seepage pits
- Irrigation, sprinkler pipe 4" and less
- Fuel oil, gasoline, diesel

#### Horizontal Separation
- Not permitted in joint trench with gas and/or electric
  - * 5 feet with 3 feet of undisturbed soil
  - 5 feet from main trench for each 1' depth of main trench
  - * 3 feet provided depth of pipe does not exceed depth of gas or electric
  - From gas - 15 feet, from elect. - 5 feet with 3 feet of undisturbed soil

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### MINIMUM SEPARATION SERVICE TRENCH

In a service trench, water, sewer, propane gas, sprinkler, drain, leach lines, privately owned utilities i.e., private telco, video, audio, security wires, fire alarm, street lighting, etc., are not permitted in the same trench with gas or electric. When these facilities parallel gas or electric, 12 inches separation between separate trenches shall be maintained between the utilities with at least 12 inches of undisturbed native soil between trenches. Propane gas shall always have a 5 foot separation. When crossing, a 6 inch vertical separation is required.

( Exception) When there is no SDG&E gas in the service trench, a single natural gas line may be installed in the trench, provided a 12 inch radial separation is maintained. (This is for an individual house on a case by case basis, not a group of houses/buildings).

Fuel oil, gasoline, and diesel lines must maintain a 15 foot separation from gas pipelines and a five foot separation with three feet of undisturbed soil separation from electric conduits.

If field conditions will not permit these separations, then approval of reduced separations must come from both the customer project planner and SDG&E inspector. When field conditions will not permit standard parallel separations, a 12 inch minimum separation is required. Propane gas shall always have a 5 foot separation.

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<tr>
<th>REV</th>
<th>CHANGE</th>
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THE GAS MAIN SHALL BE THE LAST INSTALLED, SHALL BE ON THE PROPERTY SIDE OF THE TRENCH, AND SHALL HAVE A MINIMUM OF INCH PAD (AFTER COMPACTION) OF SHADING MATERIAL THE WIDTH OF THE TRENCH ABOVE ANY FOREIGN UTILITY. ANY CROSSING INVOLVING GAS SHALL MAINTAIN A MINIMUM VERTICAL SEPARATION OF 6 INCHES. A GAS SERVICE INSTALLED IN A MAIN TRENCH OR A SERVICE TRENCH ON PUBLIC PROPERTY SHALL REQUIRE THE SAME COVER AND CLEARANCES AS A GAS MAIN. A GAS SERVICE IN A TRENCH ON PRIVATE PROPERTY MAY BE INSTALLED ON THE SAME LEVEL AS FOREIGN UTILITY OR ELECTRIC, BUT SHALL NOT BE DEEPER THAN THE ELECTRIC SERVICE. SDG&E INSPECTOR IS TO DETERMINE AT WHICH LEVEL THE GAS SERVICE IS INSTALLED ON PRIVATE PROPERTY.

SDG&E INSTALLED STREET LIGHT CIRCUITS, WHEN INSTALLED ALONE IN A TRENCH, SHALL BE AT A MINIMUM DEPTH OF 24 INCHES EVERYWHERE EXCEPT ON PRIVATE PROPERTY, WHERE THE MINIMUM MAY BE 18 INCHES BELOW FINAL GRADE.


MINIMUM HORIZONTAL SEPARATION FROM GAS PIPE TO ANY FOREIGN SUBSTRUCTURE (VAULTS, HANHOLES, ETC.) SHALL BE 12 INCHES.

GAS LINES MUST NOT BE LOCATED UNDER ANY STRUCTURE, SUCH AS BUILDINGS, CARPORTS, PATIOS, BREEZEWAYS, EQUIPMENT PADS, AND FACILITIES, SUCH AS SPICE BOXES FOR ELECTRIC, GAS, TELEPHONE, ETC. TREES OR SHRUBERY MUST NOT BE PLANTED OVER ANY GAS PIPELINE.

A THREE FOOT SEPARATION MUST BE MAINTAINED BETWEEN THE TREE ROOT BALL AND THE GAS PIPELINE.

IF AN AGENCY OR UTILITY SUCH AS THE U.S. GOVERNMENT, SAN DIEGO UNIFIED PORT DISTRICT, TELCO, CATV, ETC. REQUIRES CONCRETE ENCASTEMENT, CONCRETE MAY BE SUBSTITUTE FOR THE BACKFILL. BASE & SHADING SHALL BE PER SDG&E STANDARDS. ON SDG&E CONDUITS, EITHER DIRECT BURIED OR CONCRETE ENCASED, A MINIMUM 6 INCH COMPACTED SHADING MATERIAL SHALL BE INSTALLED OVER THE UPPERMOST DB CONDUITS BEFORE THE CONCRETE BACKFILL IS INSTALLED. ALL OTHER INSTALLATIONS SHALL PROVIDE THE REQUIRED MATERIALS AS SPECIFIED IN THIS STANDARD AND STANDARDS 3365 & 3376. NOTE: THE GAS MAIN, GAS SERVICE SHALL NEVER BE CONCRETE OR SLURRY ENCASED AND SHALL HAVE THE PROPER BASE, SHADING, BACKFILL, AND COMPACTION.

MINIMUM SEPARATION OF ANY FOREIGN UTILITY INCLUDING WATER PIPES, SEWER, ETC., FROM SDG&E SUBSTRUCTURES SHALL BE 12 INCHES. PROPANE GAS SHALL BE 5 FEET.

REFERENCE:

a. SEE STANDARD PAGE 3364.1 FOR UTILITY LOCATIONS IN LOCAL AND COLLECTOR STREETS.

b. SEE STANDARD PAGE 3364.2 FOR UTILITY LOCATIONS IN MAJOR STREETS, PRIME ARTERIALS AND EXPRESSWAYS.

c. SEE STANDARD PAGE 3364.3 FOR JOINT TRENCH TYPICAL LOCATION FOR UNDERGROUND CONVERSIONS.

d. SEE STANDARD PAGE 3365 FOR IMPORTED OR NATIVE BACKFILL MATERIAL.

e. SEE STANDARD PAGE 3365 FOR SLURRY BACKFILL MATERIAL.

f. CONCRETE OR CONCRETE SLURRY ENCASTEMENT OF ELECTRIC CONDUITS SHALL BE IN ACCORDANCE WITH STANDARD 3376.

g. SEE STANDARD PAGE 3376, 3421, 3425, 3426, AND 3427 FOR CONDUIT CONFIGURATIONS ALLOWED IN THE SERVICE TRENCH.

h. SEE STANDARD 4620 TELECOMMUNICATIONS INSTALLATION.

i. FOR TRENCHING AND SHORING QUESTIONS, SEE SDG&E TRENCHING AND SHORING MANUAL.

j. SEE GAS STANDARDS 7403.1, 7403.2, 7403.3, 7403.4, 7403.5, & 7403.6 [FOR INTERNAL USE ONLY] AVAILABLE IN SERVICE STANDARDS AND GUIDE MANUAL.
**SCOPE:** This standard shows typical placement of utilities within trenches for distribution and service in dedicated R/W (street) and private property, and provides the minimum depth and clearance that must be maintained between various utilities occupying the same trench in Orange County.

**I. DRAWINGS ARE NOT TO SCALE.**

**II. SPACE ALLOTMENTS (OTHER THAN FOREIGN UTILITY) ARE 1/2 INCH LARGER THAN THE NOMINAL SIZE OF ELECTRIC CONDUIT.**

**III. TYPICAL TRENCH SECTIONS ARE DESIGNED FOR INSTALLATIONS WHERE EACH OCCUPANT IS UTILIZING HIS ENTIRE SPACE ALLOTMENT. SIZE OF SPACE ALLOTMENT MAY BE REDUCED OR ADDITIONAL ALLOTMENTS MAY BE ADDED PROVIDING MINIMUM COVER AND CLEARANCES ARE MAINTAINED AS LISTED ON PAGE 3371.2. ONLY ONE FOREIGN UTILITY SPACE ALLOTMENT IS ALLOWED PER TRENCH. WIDTH AND DEPTH OF THE TRENCH MUST BE ADJUSTED ACCORDING TO SPACE ALLOTMENTS, MINIMUM CLEARANCES AND MINIMUM COVER.**
### MAIN TRENCH, [SERVICE TRENCH PUBLIC PROPERTY] (MINIMUM SEPARATION FROM)

<table>
<thead>
<tr>
<th>Vertical</th>
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<th>MIN. COVER</th>
<th>FACILITY SPACE ALLOTMENT (MAX)</th>
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<td>S</td>
<td>ES</td>
<td>SL</td>
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<td>ES</td>
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<td>30&quot;</td>
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<tr>
<td>FOREIGN UTILITY STREET LIGHT</td>
<td>12&quot;</td>
<td>12&quot;</td>
<td>12&quot;</td>
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<tr>
<td>GAS</td>
<td></td>
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### SERVICE TRENCH PRIVATE PROPERTY (MINIMUM SEPARATION FROM)

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<td>U</td>
<td>5-1/2&quot; x 5-1/2&quot;</td>
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<tr>
<td>ME</td>
<td>LI</td>
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<td>24&quot; WILL VARY DUE TO BOARD Width = SEE STD 3370</td>
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<td>U</td>
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<td>GAS</td>
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**NOT ALLOWED.**

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**INSTALLATION:**

A AN EFFORT SHOULD BE MADE TO KEEP THE TRENCH DEPTH LESS THAN 60 INCHES. IF A PERSON IS REQUIRED TO ENTER A TRENCH 60 INCHES OR DEEPER, IT SHALL BE SHORED, BENCHES, OR SLOPED TO PREVENT MOVEMENT OF EARTH THAT MAY ENDANGER LIFE OR PROPERTY. THE TRENCH CONFIGURATION, UTILITY POSITIONING AND ALL OTHER RELATED CONSTRUCTION MUST CONFORM TO THIS STANDARD AND THE STATE OF CALIFORNIA PUBLIC UTILITIES COMMISSION GENERAL ORDER 128 AND 1120, AND ANY OTHER APPROPRIATE GOVERNMENTAL AGENCY HAVING JURISDICTION OVER CONSTRUCTION.

NOTE: BENCHING THE TRENCH IS FOR SAFETY REASONS ONLY AND NOT TO BE USED FOR INSTALLATION PURPOSES.

B THE TRENCH DEPTH IN THIS STANDARD SHALL BE FOLLOWED FOR ALL NORMAL INSTALLATIONS. IN INSTALLATIONS WHERE THE TRENCH DEPTH MAY NOT BE MET, G.O. 128 REQUIRES ONE OF THE FOLLOWING: (1) STEEL OR (2) SCHEDULE 40 PVC OR SCHEDULE 80 PVC CONDUIT WITH A MINIMUM WALL THICKNESS OF 0.15 INCHES, OR (3) A 3 INCH LAYER OF CONCRETE (2 SACK 3/8" ROCK) ABOVE AND 2 INCHES ON EACH SIDE OF THE CONDUIT. REDUCED DEPTHS MUST BE APPROVED BY BOTH THE PROJECT MANAGEMENT SPECIALIST AND SDG&E INSPECTOR.

C ANY CONDUIT COMBINATION SMALLER THAN 5 INCH, (NOT MULTIPLE ELECTRIC—ME OR SERVICE CONDUITS) ARE PERMITTED WITHOUT SEPARATION WHEN INSTALLED IN A HORIZONTAL CONFIGURATION, (6 INCH MINIMUM TRENCH WIDTH, 24 INCH MAXIMUM TRENCH WIDTH) (SEE STANDARD 3376 FOR CONDUIT/TRENCH CONFIGURATION).

D SHADING MATERIAL FOR GAS AND/OR ELECTRIC:

WHEN BOTH GAS AND ELECTRIC ARE INSTALLED IN THE SAME TRENCH, THE ELECTRIC SHADING MATERIAL (ESM) SHALL BE USED FOR SHADING THE ELECTRIC CONDUITS. THE LOCAL GAS CO. SHALL SPECIFY THE MATERIAL REQUIRED FOR THEIR PORTION OF THE TRENCH.

**SHADING MATERIAL FOR ELECTRIC TRENCH ONLY: ELECTRIC SHADING MATERIAL (ESM) SPECIFICATION.**

ACCEPTABLE MATERIAL FOR (08) DIRECT BURIED CONDUITS. NATURAL SAND, MANUFACTURED SAND, DECOMPOSED GRANITE, ROCK FREE SANDY LOAM, EXISTING NATIVE MATERIAL OR COMBINATION THEREOF. AGGREGATE COMPOSITION SHALL BE CAPABLE OF PASSING THROUGH A 1/2 INCH SIEVE. GRAVELS SHALL NOT AMOUNT TO MORE THAN 50% OF THE MIXTURE. SCREENING OR OTHER SUITABLE MEANS MAY BE REQUIRED AT THE DISCRETION OF THE SDG&E INSPECTOR TO MEET THIS (ESM) SHADING MATERIAL SPECIFICATION.

E NOT ACCEPTABLE ARE SOILS OF HIGHLY ORGANIC CONTENT IDENTIFIED BY ODOR OR SPONGY FEEL AND HIGHLY PLASTIC (SODGY) CLAYS, SILTS OR METALLIC SLAG.

**BACKFILL MATERIAL FOR GAS AND/OR ELECTRIC:**

THE MATERIAL USED FOR BACKFILLING THE TRENCH ABOVE THE SHADING MATERIAL AND EXTENDING UPWARD TO THE SUBGRADE SHALL BE FREE OF ROCKS OR CLODS LARGER THAN 6 INCHES IN ANY DIMENSION. THE COARSE MATERIAL SHALL BE WELL DISTRIBUTED THROUGHOUT THE FINER MATERIAL. THE AMOUNT OF ROCKS OR CLODS SHALL BE LIMITED, AND MUST BE APPROVED BY AN SDG&E INSPECTOR. THE BACKFILL MATERIAL SHALL MEET THE REQUIREMENTS OF ALL APPLICABLE CODES, ORDINANCES AND SDG&E STANDARDS AND BE FREE OF DEBRIS AND ORGANIC MATTER. 1 – 9 SACK CONCRETE SLURRY MIX IS THE PREFERRED BACKFILL MATERIAL. THE SLURRY INSTALLATION SHALL MEET THE REQUIREMENTS OF GOVERNMENTAL AGENCIES, LOCAL GAS CO. AND SDG&E STANDARDS.

F EARTH TRENCH BOTTOM INSTALLATION FOR ELECTRIC: (EB & DB CONDUIT)

When the trench bottom shall be stable with a uniform grade containing no hard clogs, rocks, etc. that may damage the conduit. If, in the opinion of the SDG&E inspector, the conduit may be damaged, tamping, wetting or a 3 inch base electric shading material (ESM) may be required.

G **SHADING INSTALLATION:**

A MINIMUM COVER OF 4 INCHES OF COMPACTED SHADING MATERIAL (4 INCHES AFTER COMPACTION) SHALL BE REQUIRED ABOVE THE ELECTRIC CONDUIT. A MINIMUM COVER OF 12 INCHES OF COMPACTED SHADING MATERIAL WILL BE REQUIRED IF, IN THE OPINION OF THE INSPECTOR, THERE IS AN EXCESSIVE AMOUNT OF ROCK AND CLODS IN THE BACKFILL. THE SHADING MATERIAL MUST BE INSTALLED AND COMPACTED AT EACH LEVEL BEFORE INSTALLING THE NEXT UTILTY. THE SHADING MATERIAL MUST BE INSTALLED BEFORE THE TRENCH IS BACKFILLED TO PREVENT DAMAGE FROM ROCKS, CLODS, ETC. GAS PIPE SHALL NEVER BE CONCRETE OR SLURRY ENCASED, AND SHALL HAVE THE PROPER BASE, SHADING, BACKFILL, AND COMPACTION.

**COMPACTION:**

EXTREME CARE SHALL BE TAKEN TO ENSURE THAT SHADING MATERIAL IS ADEQUATELY COMPACTED BOTH UNDERNEATH AND AROUND GAS PIPE AND FITTINGS TO PREVENT EXCESSIVE STRESS AND SHEARING FORCES. HAND TAMPER FITTINGS WHERE MECHANICAL COMPACTION CANNOT BE USED. COMPACTING WITH A HYDRAHAMMER OR SIMILAR EQUIPMENT SHALL NOT BE ALLOWED. TRENCH BOTTOM SHALL NOT BE ALLOWED TO FLOOD WITH POLYETHYLENE PIPE HAS BEEN INSTALLED. WHEN THE SHEET'S FOOT METHOD OF COMPACTION IS USED, A MINIMUM OF 18" OF COVER IS REQUIRED BEFORE COMPACTING. WHEEL ROLLING WITH A HEAVY TRUCK, COMBINED WITH ADEQUATE MECHANICAL COMPACTION, IF NEEDED, IS ALLOWED FOR COMPACTING BACKFILL MATERIAL PROVIDED A MINIMUM OF 8 INCHES OF MECHANICALLY COMPACTED SHADE MATERIAL AND A MINIMUM OF 12" OF BACKFILL MATERIAL EXISTS OVER THE GAS PIPE OR ELECTRICAL CONDUIT. WHEN FLOODING OF THE TRENCH IS DONE TO CONSOLIDATE BACKFILL, CARE MUST BE TAKEN TO ENSURE THAT GAS PIPE OR ELECTRIC CONDUIT IS NOT FLOATED FROM ITS POSITION IN THE TRENCH. COMPACTION BY THE WATER JETTING METHOD IS NOT ALLOWED. SHADING AND BACKFILL SHALL BE COMPACTED IN ACCORDANCE WITH GOVERNMENTAL AGENCIES AND SHALL HAVE A MINIMUM OF 90 PERCENT RELATIVE COMPACTION.

ALL BASE, SHADING, AND BACKFILL MATERIAL MUST BE APPROVED BY AN SDG&E INSPECTOR.
**E** ONE OR MORE 5 INCH PRIMARY CONDUITS SHALL BE SLURRY ENCASED.

**F** MINIMUM TRENCH WIDTH

<table>
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<tr>
<th>UTILITY</th>
<th>CONDUIT SIZE</th>
<th>MINIMUM WIDTH</th>
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<tr>
<td>ELECT MAIN TRENCH</td>
<td>ALL CONDUITS SIZES INCLUDING 2-5 INCHES</td>
<td>6 INCHES</td>
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<tr>
<td>JOINT UTILITIES</td>
<td>ALL SIZES</td>
<td>12 INCHES</td>
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<tr>
<td>MULTIPLE ELECTRIC SPACERS AND 1-SACK CONCRETE SLURRY</td>
<td>9 INCHES</td>
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<tr>
<td>SINGLE ELECTRIC 2 INCH CONDUIT</td>
<td>6 INCHES</td>
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<tr>
<td>SINGLE ELECTRIC &amp; FOREIGN UTILITIES (EXCLUDING GAS) 2 INCH CONDUIT</td>
<td>6 INCHES</td>
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<tr>
<td>ELECT SERVICE TRENCH</td>
<td>ALL SIZES</td>
<td>9 INCHES</td>
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<tr>
<td>JOINT UTILITIES</td>
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<td>MULTIPLE ELECTRIC SPACERS AND 1-SACK CONCRETE SLURRY</td>
<td>9 INCHES</td>
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**G** ALL EB CONDUITS REGARDLESS OF THE SIZE SHALL BE CONCRETE ENCASED WITH 1-SACK CEMENT SLURRY. EB CONDUIT MAY ALSO BE CONCRETE OR SLURRY ENCASED IF INCLUDED IN THE MULTIPLE ELECTRIC PACKAGE. IN A SERVICE TRENCH, ALL EB CONDUITS SHALL BE ENCASED WITH CEMENT 1-SACK SLURRY.

**H** MINIMUM SEPARATION MAIN TRENCH

- TELCO MULTIPLE CONCRETE DUCT (CONDEX), TRANSITE, WATER, SEWER, FUEL, OIL, DIESEL, PROPANE GAS, SPRINKLER, DRAIN, LEACH LINES, STEEL GAS MAIN LARGER THAN 2", PRIVATELY OWNED UTILITIES, I.E. PRIVATE TELCO VIDEO, AUDIO, SECURITY WIRES, FIRE ALARMS, STREET LIGHTING ETC., STEEL GAS MAIN LARGER THAN 2"
- WATER, SEWER, EXISTING GAS OR ELECTRIC, STORM DRAINS, STEAM, IRRIGATION PIPE, SPRINKLER PIPE LARGER THAN 4", PRIVATE TELCO TRANSITE, PROPANE GAS
- SEWAGE LEACH LINES OR SEEPAGE PITS
- IRRIGATION, SPRINKLER PIPE 4" AND LESS
- FUEL OIL, GASOLINE, DIESEL

**HORIZONTAL SEPARATION**

- NOT PERMITTED IN TRENCH
- 5 FEET WITH 3 FEET OF UNDISTURBED SOIL
- 5 FEET FROM MAIN TRENCH FOR EACH 1" DEPTH OF MAIN TRENCH
- 3 FEET PROVIDED DEPTH OF PIPE DOES NOT EXCEED DEPTH OF ELECTRIC
- 5 FEET WITH 3 FEET OF UNDISTURBED SOIL

**IN CONSIDERATION OF SAFETY FOR THE GENERAL PUBLIC, PERSONS ENGAGED IN CONSTRUCTION, PROPERTY AND OPERATION AND MAINTENANCE OF SDG&E SYSTEM, PROPANE GAS LINES ARE NOT PERMITTED IN A JOINT TRENCH WITH SDG&E FACILITIES.**

* IF FIELD CONDITIONS WILL NOT PERMIT ANY OF THESE SEPARATIONS, THEN APPROVAL OF REDUCED SEPARATIONS MUST COME FROM BOTH THE CUSTOMER PROJECT PLANNER AND SDG&E INSPECTOR. ON FIELD CONDITIONS THAT WILL NOT PERMIT STANDARD PARALLEL SEPARATIONS, A 12 INCH MINIMUM SEPARATION IS REQUIRED. PROPANE GAS SHALL ALWAYS HAVE A 5 FOOT SEPARATION.
### UNDERGROUND DISTRIBUTION (UD) TRENCHES AND UTILITY POSITIONING - ORANGE COUNTY

#### SDG&E ELECTRIC UNDERGROUND STANDARD SHEET 5 OF 5

**UG 3371.5**

**EDITORIAL CHANGES** 5/26/2016 MDJ JS TR

**REFERENCE:**

- a. See Standard page 3364.1 for utility locations in local and collector streets.
- b. See Standard page 3364.2 for utility locations in major streets, prime arterials and expressways.
- c. See Standard page 3364.3 for joint trench typical location for underground conversions.
- d. See Standard page 3365 for imported or native backfill material.
- e. See Standard page 3365 for slurry backfill material.
- f. See Standard 3367 for trench paralleling foundations.
- g. See Standard 3370 for San Diego County joint trench standard.
- h. Concrete or concrete slurry encasement of electric conduits shall be in accordance with Standard 3376.
- i. See Standard page 3376, 3421, 3425, 3426, and 3427 for conduit configurations allowed in the service trench.
- j. For trenching and shoring questions, see SDG&E trenching and shoring manual.

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**MINIMUM SEPARATION SERVICE TRENCH**

In a service trench, water, sewer, propane gas, sprinkler, drain, leach lines, privately owned utilities i.e. private telco, video, audio, security wires, fire alarm, street lighting etc., are not permitted in the same trench with electric. When these facilities parallel electric, 12 inches separation between separate trenches shall be maintained between the utilities with at least 12 inches of undisturbed native soil between trenches. Propane gas shall always have a 5 foot separation. When crossing, a 6 inch vertical separation is required.

(Exception) When there is no Southern Cal. gas in the service trench, a single natural gas line may be installed in the trench provided a 12 inch radial separation is maintained. (This is for an individual house on a case by case basis, not a group of houses/buildings).

Fuel oil, gasoline, and diesel lines must maintain a five foot separation with three feet of undisturbed soil separation from electric conduits.

If field conditions will not permit these separations, then approval of reduced separations must come from both the customer project planner and SDG&E inspector.

When field conditions will not permit standard parallel separations, a 12 inch minimum separation is required. Propane gas shall always have a 5 foot separation.

---

**NOTES:**

- PLACE INSULATING BARRIER BETWEEN STEAM MAIN AND GAS AND/OR ELECTRIC.

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**A**

Indicates Latest Revision

**B**

Completely Revised

**C**

New Page

**D**

Information Removed

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**SCOPE:** This standard lists the minimum conduit size required for the installation of primary and secondary cables.

**NOTES:**
1. If future load growth requires larger cable than initial requirements, size conduit for future needs. Project management supervisor’s approval is required.

### CONDUIT SIZING CHARTS

#### PRIMARY

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</table>

Indicates Latest Revision | Completely Revised | New Page | Information Removed

SDG&E ELECTRIC UNDERGROUND STANDARD

CONDUIT SIZING FOR UNDERGROUND CABLES

UG 3372.1

SHEET 1 OF 2
NOTES:

II. IF FUTURE LOAD GROWTH REQUIRES LARGER CABLE THAN INITIAL REQUIREMENTS, SIZE CONDUIT FOR FUTURE NEEDS. PROJECT MANAGEMENT SUPERVISOR’S APPROVAL IS REQUIRED.

INSTALLATION:

A. INSTALL CONDUIT AS SPECIFIED ON PAGE 3372.1.

B. 2/0, 350, 750 COMP, 1000 PRIMARY CABLES ARE ONLY PURCHASED IN TRIPLEX CONFIGURATION.

C. 2–1/C #2 SOL PECN–PEJ CABLES MAY BE PARALLELED IN A 3–INCH CONDUIT FOR SINGLE–PHASE 12 KV LOAD.

D. 3–1/C #2 SOL PECN–PEJ CABLES MAY BE PARALLELED IN A 4–INCH CONDUIT FOR THREE–PHASE LOAD.

E. MAY BE INSTALLED IN EXISTING 4–INCH CONDUITS.

F. MAY BE INSTALLED IN EXISTING 3–INCH CONDUITS.

H. CONDUIT FROM A RISER POLE TO THE FIRST LOCATION SHALL BE 2 INCH MINIMUM.

REFERENCE:

a. SEE PAGE 3399.701 (FIELD MAINTENANCE ONLY), FOR "CONDUIT SIZING CHARTS" OF CABLES NO LONGER PURCHASED.

b. SEE PAGE 3942.1 FOR RESIDENTIAL OR COMMERCIAL SERVICE LATERAL CONDUIT REQUIREMENTS.

C. SEE STANDARD 4204 FOR CABLE POLE RISER INSTALLATION.

d. AVAILABLE IN SERVICE STANDARDS AND GUIDE MANUAL.
SCOPE: THIS STANDARD SHOWS THE CONDUIT AND FITTINGS USED TO CONSTRUCT UNDERGROUND CONDUIT SYSTEMS. CONDUIT AND FITTINGS IN THIS STANDARD SHALL BE USED IN BELOW-GROUND OR BRIDGE CELL APPLICATIONS.

NOTES:
- PVC CONDUIT SHALL BE GRAY OR BLACK IN COLOR. NO OTHER COLOR IS ACCEPTABLE FOR SDG&E CONDUIT SYSTEM.
- FOR SCHEDULE 40 AND SCHEDULE 80 ABOVE-GROUND COMPONENTS TO CONSTRUCT CABLE POLE RISERS, SEE UNDERGROUND STANDARD 4204.
- ALL 5" CONDUIT MUST BE ENCASED WITH CONCRETE SLURRY. (1-SACK MIX).
- DB CONDUIT IS REQUIRED FOR INSTALLATIONS REQUIRING DIRECT BURIED MATERIAL, i.e. SAND, DECOMPOSED GRANITE (DG), NATIVE, ETC.
- FOR DIRECT BURIED INSTALLATIONS, DB 60 IS REQUIRED FOR 2", 3" & 5" CONDUIT. DB 100 IS REQUIRED FOR 4" CONDUIT.
- ALL COUPLINGS, BENDS AND SWEEPS CLASSIFIED AS DB ARE TO BE USED WITH DB AND EB CONDUIT.
- DB = DIRECT BURIED CONDUIT.
- EB = ENCASED BURIED CONDUIT.
- THE SHELF LIFE FOR DB CONDUIT, BENDS, AND FITTINGS EXPOSED TO SUNLIGHT IS 6 MONTHS MAXIMUM. 2-#8 FROM A RISER POLE TO THE FIRST LOCATION SHALL BE INSTALLED IN 2" CONDUIT.
- SCHEDULE 40 CONDUIT IS REQUIRED IN BRIDGE CELLS.

<table>
<thead>
<tr>
<th>CONDUIT SIZE</th>
<th>TYPE</th>
<th>LENGTH 'L'</th>
<th>STOCK NUMBER</th>
<th>ASSEMBLY UNITS</th>
</tr>
</thead>
<tbody>
<tr>
<td>2&quot;</td>
<td>DB 60</td>
<td>20'</td>
<td>249632</td>
<td>1EB21N</td>
</tr>
<tr>
<td>3&quot;</td>
<td>DB 60</td>
<td>20'</td>
<td>249684</td>
<td>1EB31N</td>
</tr>
<tr>
<td>4&quot;</td>
<td>DB 100</td>
<td>20'</td>
<td>249710</td>
<td>1EB41N</td>
</tr>
<tr>
<td>5&quot;</td>
<td>** SCH40</td>
<td>10'</td>
<td>251408</td>
<td>1DB5-S</td>
</tr>
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</table>

(PVC) POLYVINYLCHLORIDE CONDUIT

<table>
<thead>
<tr>
<th>CONDUIT SIZE</th>
<th>TYPE</th>
<th>COIL LENGTH</th>
<th>STOCK NUMBER</th>
<th>ASSEMBLY UNIT</th>
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</thead>
<tbody>
<tr>
<td>1&quot;</td>
<td>SDR 9</td>
<td>2000'</td>
<td>249630</td>
<td>1&quot; PE</td>
</tr>
<tr>
<td>2&quot;</td>
<td>SCH 40</td>
<td>2500'</td>
<td>252002</td>
<td></td>
</tr>
<tr>
<td>3&quot;</td>
<td>SCH 40</td>
<td>1000'</td>
<td>252004</td>
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<tr>
<td>4&quot;</td>
<td>SDR 15.5</td>
<td>500'</td>
<td>252006</td>
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<tr>
<td>5&quot;</td>
<td>SCH 80</td>
<td>20' LENGTHS</td>
<td>252008</td>
<td></td>
</tr>
</tbody>
</table>

(PE) POLYETHYLENE CONDUIT

NOTES:
- POLYETHYLENE CONDUIT SHALL BE BLACK OR BLACK WITH THREE EQUALLY SPACED RED STRIPS. NO OTHER COLOR IS ACCEPTABLE FOR THE SDG&E CONDUIT SYSTEM.
- CORRUGATED POLYETHYLENE CONDUIT IS NOT ACCEPTABLE FOR THE SDG&E CONDUIT SYSTEM.

REFERENCE:
- SEE STANDARD 3383 FOR SPlicing OR REPAIRING 1" POLYETHYLENE CONDUIT.

NOTES: ***
- S/N 280384 SCH 40 PVC MAY BE USED AS A REPLACEMENT ON A TEMPORARY BASIS. (DEPENDS ON SUPPLIER OF COUPLING).
## Bill of Material

<table>
<thead>
<tr>
<th>Nominal Conduit Size</th>
<th>Degree of Curvature</th>
<th>Radius of Curvature</th>
<th>Type of Conduit</th>
<th>Stock Number</th>
<th>Concrete Encase</th>
<th>Primary</th>
<th>Sec/Serv</th>
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</thead>
<tbody>
<tr>
<td>2&quot;</td>
<td>22-1/2°</td>
<td>25'-0&quot;</td>
<td>DB 60</td>
<td>321808</td>
<td>1EB2-S</td>
<td>1DB2PS</td>
<td>1DB2SS</td>
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<tr>
<td></td>
<td>45°</td>
<td>24'(Secondary Only)</td>
<td>DB 60</td>
<td>321920</td>
<td>-</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td></td>
<td>45°</td>
<td>36°</td>
<td>DB 60</td>
<td>321810</td>
<td>1EB2-B</td>
<td>1DB2-B</td>
<td>-</td>
</tr>
<tr>
<td></td>
<td>90°</td>
<td>24'(Secondary Only)</td>
<td>DB 60</td>
<td>321844</td>
<td>-</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td></td>
<td>90°</td>
<td>36°</td>
<td>DB 60</td>
<td>321812</td>
<td>1EB2-B</td>
<td>1DB2-B</td>
<td>-</td>
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<tr>
<td></td>
<td>11-1/4°</td>
<td>25'-0&quot;</td>
<td>DB 60</td>
<td>321876</td>
<td>1EB3-C</td>
<td>1DB3-C</td>
<td>1DB3SC</td>
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<td>DB 60</td>
<td>322144</td>
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<td>1DB3PS</td>
<td>1DB3SS</td>
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<td></td>
<td>90°</td>
<td>36°</td>
<td>DB 60</td>
<td>322048</td>
<td>1EB3-B</td>
<td>1DB3-B</td>
<td>1DB3SB</td>
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<tr>
<td></td>
<td>11-1/4°</td>
<td>25'-0&quot;</td>
<td>DB 100</td>
<td>321884</td>
<td>1EB4-C</td>
<td>1DB4-C</td>
<td>1DB4SC</td>
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<td>25'-0&quot;</td>
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<td>321826</td>
<td>1EB4-S</td>
<td>1DB4PS</td>
<td>1DB4SS</td>
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<tr>
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<td>45°</td>
<td>36°</td>
<td>DB 100</td>
<td>321942</td>
<td>1EB4-B</td>
<td>1DB4-B</td>
<td>1DB4SB</td>
</tr>
<tr>
<td></td>
<td>90°</td>
<td>36°</td>
<td>DB 100</td>
<td>322082</td>
<td>1EB4-B</td>
<td>1DB4-B</td>
<td>1DB4SB</td>
</tr>
<tr>
<td></td>
<td>11-1/4°</td>
<td>25'-0&quot;</td>
<td>DB 60</td>
<td>321882</td>
<td>1EB5-C</td>
<td>1DB5-C</td>
<td>1DB5SC</td>
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<tr>
<td></td>
<td>22-1/2°</td>
<td>25'-0&quot;</td>
<td>DB 60</td>
<td>321856</td>
<td>1EB5-S</td>
<td>1DB5PS</td>
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<td>36°</td>
<td>DB 60</td>
<td>321960</td>
<td>1EB5-B</td>
<td>1DB5-B</td>
<td>1DB5SB</td>
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<tr>
<td></td>
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<td>36°</td>
<td>DB 60</td>
<td>322112</td>
<td>1EB5-B</td>
<td>1DB5-B</td>
<td>1DB5SB</td>
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Service Guide: Indicates Latest Revision, Completely Revised, New Page, Information Removed

**SDG&E Electric Standards**

3373.2

Conduit and Conduit Fittings, Ed and DB

**Revision**

Date: 5-9-06

APPD: JJ/MF
**SCOPE:**

This standard shows practices which are essential for proper installation of a conduit system.

**NOTES:**

I. EACH CONDUIT RUN BETWEEN SUBSTRUCTURES, PADS, CUSTOMER SERVICE, RISERS, ETC., SHALL BE ONE SIZE CONDUIT CONTINUOUSLY, I.E., NO REDUCERS ARE ALLOWED WITHIN A CONDUIT RUN EXCEPT WHERE THE CONDUIT ENTERS THE SUBSTRUCTURE OR ABOVE THE GROUND LEVEL ON A RISER POLE. IF A StubOUT IS LARGER THAN THE CONDUIT REQUIRED, CONTINUE USING THE LARGER SIZE CONDUIT TO THE FIRST TERMINATION POINT THEN CONTINUE WITH THE SMALLER CONDUIT SIZED FOR THE CABLE. DEVIATIONS MUST BE APPROVED BY SDG&E’S CONSTRUCTION STANDARDS GROUP.

II. ROUNDNESS OF CONDUIT MUST BE MAINTAINED AT ALL TIMES.

III. DO NOT CUT SWEETS & ELBOWS, THEY ARE NOT SIZED TO ACCEPT COUPLINGS.

IV. ALL BENDS, SWEETS AND ELBOWS SHOWN ON JOB PRINT MUST BE INCLUDED IN CABLE PULLING CALCULATION.

V. FIELD BENDS ARE NOT ACCEPTABLE.

VI. TO AVOID CUTTING THE CONDUIT BENDS, SUBSTRUCTURES AND/OR CABLE POLES WHICH REQUIRE A 90° BEND SHALL BE LOCATED FAR ENOUGH AWAY FROM EACH OTHER TO ALLOW ROOM ENOUGH FOR THE TWO 90° BENDS. THIS WILL VARY DEPENDING ON THE SIZE OF THE 90° BEND.

**BILL OF MATERIAL:**

<table>
<thead>
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<th>DESCRIPTION</th>
<th>CATALOG NO.</th>
<th>STOCK NO.</th>
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<tbody>
<tr>
<td>PERMALITE</td>
<td>405C</td>
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<tr>
<td>CERTAINTEED</td>
<td>85172</td>
<td>213232</td>
</tr>
<tr>
<td>CARLON VC9982</td>
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<td></td>
</tr>
<tr>
<td>GALVANOX PAINT</td>
<td></td>
<td>518064</td>
</tr>
<tr>
<td>COAL TAR EPOXY</td>
<td></td>
<td>241000</td>
</tr>
</tbody>
</table>

**INSTALLATION:**

A. CUTTING CONDUIT/CHAMFERING

A fine-tooth saw should be used to cut conduit (i.e., hacksaw for conduit two inches or less, wood saw for conduit greater than two inches). The conduit must be cut straight and cleaned of burrs. Conduit transitions from schedule 40 or schedule 80 EB or DB conduit shall be chamfered. If conduits are not chamfered by the manufacturer, the conduits must be chamfered in the field with a knife or half round file, etc.

B. TO ASSURE A PROPER JOINT, SDG&E AND CONTRACTORS ARE TO USE ONLY SDG&E APPROVED SOLVENT CEMENTING PVC TO PVC OR ABS TO PVC CONDUIT AS DESCRIBED IN THE BILL OF MATERIAL. MAKE CERTAIN THAT ALL FOREIGN MATTER HAS BEEN WIPED FROM BOTH THE CONDUIT AND FITTINGS. APPLY A LIBERAL AND UNIFORM COAT OF SOLVENT CEMENT TO THE DUCT END A LENGTH EQUAL TO THE DEPTH OF THE BELL OR COUPLING BEING ATTACHED. FOR MAXIMUM STRENGTH ALSO APPLY A LIGHT COAT ON THE INSIDE ON THE COUPLING OR BELLED END. PREVENT EXCESS SOLVENT CEMENT FROM BEING FORCED INTO THE FITTING AT THE INSIDE SHOULDER OF THE CONDUIT.
INSTALLATION CONT'N:

A NATURAL BRISTLE BRUSH OR THE APPLICATOR SUPPLIED WITH THE SOLVENT CONTAINER SHOULD BE USED. PLASTIC BRISTLE BRUSHES SHOULD NOT BE USED AS THE SOLVENT WILL DISSOLVE THE BRISTLES. FOLLOW THE MANUFACTURERS INSTRUCTIONS ON THE SOLVENT CONTAINER. SOLVENT CEMENT WITH A PAST EXPIRATION DATE INDICATED ON THE CONTAINER MUST BE DISCARDED. CONTRACTORS MAY OBTAIN LARGER CONTAINERS OF SOLVENT CEMENT IF NEEDED. THE LARGER CONTAINERS HAVE DIFFERENT CATALOG NUMBERS THAN SPECIFIED ON THE BILL OF MATERIAL.

C. BENDS AND SWEEPS

ANY JOINT INCLUDED IN A SECTION OF CONDUIT TO BE BENT IN A DITCH SHOULD BE FIRMLY STAKED FOR THE DESIRED RADIUS TO ENSURE THAT THE JOINT IS NOT DISTURBED OR DAMAGED BEFORE OR AFTER BACKFILL OR ENCASEMENT IS COMPLETED. IN CASES WHERE A PLASTIC CONNECTION IS MADE WITH THE JOINTS UNDER STRESS DUE TO MISALIGNMENT OR OTHER FACTORS, THE PLASTIC JOINT MUST BE HELD RIGID AFTER INSERTION UNTIL COMPLETELY CURED. WHERE STAKES ARE LOCATED AT THE CENTER OF A BEND OR SWEEP, CARE MUST BE EXERCISED TO PREVENT DEFORMATION OF DUCT DUE TO MOVEMENT BY CONTRACTION AND EXPANSION. STAKES TO BE REMOVED AFTER INITIAL BACKFILL IS PLACED.


D. EXPANSION AND CONTRACTION

DUE TO EXPANSION AND/OR CONTRACTION OF PLASTIC CONDUIT, BACKFILL FROM CENTER OF TRENCH BOTH WAYS OR FROM ONE TIE–IN POINT TOWARD THE OPPOSITE END OF THE TRENCH.

E. TERMINATING CONDUIT, CONDUIT ENTRANCES AND CONNECTIONS

ALL CONDUIT MUST BE WATERTIGHT AND MECHANICALLY SOUND AT THE SUBSTRUCTURE ENTRY POINT. CONDUIT SHALL BE TERMINATED IN SUBSTRUCTURES AS FOLLOWS:

1. CONDUIT END SHALL BE FLUSH WITH THE INTERIOR SURFACE OF SUBSTRUCTURE CONDUIT TERMINATOR.

2. USE A CONDUIT BELL REDUCER WHEN CONDUIT IS SMALLER THAN CONDUIT TERMINATOR KNOCKOUT (EXCEPT WITH 1 INCH CONDUIT). FOR 1 INCH CONDUIT, USE THE SUBSTRUCTURE ADAPTOR(S) SHOWN ON PAGE 3382.1.

3. UNLESS OTHERWISE SPECIFIED ON THE JOB PRINT, INSTALL CONDUIT USING THE BOTTOM SET OF TERMINATOR KNOCKOUTS FIRST. IF ONLY ONE CONDUIT IS REQUIRED, USE THE BOTTOM OUTSIDE (CLOSEST TO WALL) KNOCKOUT.

4. WHEN CONDUITS MUST ENTER THE SUBSTRUCTURE IN ANY AREA WHERE TERMINATION KNOCKOUTS ARE NOT PROVIDED, THE SUBSTRUCTURE MUST BE CORE BORED. CORE BORING LOCATIONS WILL BE SPECIFIED BY THE CUSTOMER PROJECT PLANNER AND MUST BE APPROVED (CLOSEST TO WALL) KNOCKOUT.

WHEN SUBSTRUCTURE REINFORCING STEEL IS EXPOSED BY CORE BORING, IT MUST BE COATED WITH GALVANOX (STOCK NUMBER 516064) AND THEN COATED WITH COAL TAR EPOXY (STOCK NUMBER 241000) TO MOISTURE SEAL. AFTER CONDUIT IS TERMINATED IN THE SUBSTRUCTURE, SEAL THE SUBSTRUCTURE ENTRANCE WITH CEMENT GROUT.
TYPICAL METHODS FOR ROUTING CONDUITS INTO HANDHOLES AND MANHOLES.

NOTES:

VII. In each substructure as many conduit knockouts may be used as needed, providing proper installation is followed and required unobstructed space is maintained. Install conduits using the lower set of knockouts first, unless otherwise specified on job print. If only one conduit is required, use the bottom outside (closet to the wall) knockout.

SINGLE TRENCH

TOP VIEW

22.5° 25' RADIUS BENDS

SEPARATE TRENCHES

TOP VIEW

22.5° 25' RADIUS BENDS

REFERENCES:

a. AVAILABLE IN SERVICE STANDARDS AND GUIDE MANUAL

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**SCOPE:** This standard shows conduit spacers for multi-duct installation.

**BILL OF MATERIAL:**

<table>
<thead>
<tr>
<th>CONDUIT SIZE</th>
<th>DESCRIPTION</th>
<th>QUANTITY</th>
<th>STOCK NUMBER</th>
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</thead>
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<td>5&quot;</td>
<td>INTERMEDIATE SPACER</td>
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<td>663528</td>
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<td>5&quot;</td>
<td>1&quot; BASE SPACER</td>
<td>AS REQ’D</td>
<td>663530</td>
</tr>
<tr>
<td>5&quot;</td>
<td>BASE SPACER (USED IN BRIDGE CELLS)</td>
<td>AS REQ’D</td>
<td>663008</td>
</tr>
</tbody>
</table>

5 INCH VERTICAL SPACER FOR 9 INCH WIDTH TRENCH

**BILL OF MATERIAL:**

<table>
<thead>
<tr>
<th>CONDUIT SIZE</th>
<th>DESCRIPTION</th>
<th>QUANTITY</th>
<th>STOCK NUMBER</th>
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<tbody>
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<td>VERTICAL SPACER</td>
<td>AS REQ’D</td>
<td>663532</td>
</tr>
</tbody>
</table>

**REFERENCE:**

a. AVAILABLE IN SERVICE STANDARDS AND GUIDE MANUAL

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**SCOPE:** This standard shows cement and slurry mixture. Also shown are concrete slurry encased conduit installations.

### Data for Conduits Which Are Normally Installed

<table>
<thead>
<tr>
<th>Number of Conduits in Trench</th>
<th>Concrete Per 100 ft.</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>4&quot; Conduits</td>
</tr>
<tr>
<td>2</td>
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<tr>
<td>4</td>
<td>8.7</td>
</tr>
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<td>6</td>
<td>12.4</td>
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<tr>
<td>8</td>
<td>16.1</td>
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</table>

### Ingredients for 1-Sack Concrete Slurry Mix (Per Yard)

<table>
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<tr>
<th>Material</th>
<th>Amount</th>
<th>CFT</th>
<th>LBS</th>
<th>Sacks</th>
<th>LBS</th>
<th>Max., Total Water (Gals.)</th>
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</thead>
<tbody>
<tr>
<td>CEMENT</td>
<td>0-2</td>
<td>300</td>
<td>194</td>
<td>1</td>
<td>94</td>
<td>60 GALS PER YARD</td>
</tr>
</tbody>
</table>

### Notes:

**SECONDARY SERVICE TRENCH**

(See pages 3421.2, 3425.2, 3426.3 and 3427.3 for conduit placement and trench configuration. See pages 3370.3 or 3371.3 for shading/backfill requirements; and trench depth).

**Installation Where Concrete Slurry Encasement (1-Sack Mix) and Spacers Are Required:**

I. When conduits are in a stacked configuration with spacers, encased buried (EB) conduits must be encased with 1-sack slurry. Direct buried (DB) conduits are also acceptable when extended from a direct buried trench into the stacked configuration.

**Installation for Concrete Slurry Encasement (1-Sack Mix) or Imported/Native Material Without Spacers:**

I. When conduits are side by side on the bottom of the trench (4 conduits max.) in the transition area where the conduits from the bottom of the trench start toward the surface (the straight portion by the 90 bend), spacers may be required to allow the 90 bends to enter straight into the pad opening. Use direct buried (DB) conduit with imported native material. Use encased buried (EB) conduits with concrete slurry encasement (1-sack mix). Direct buried (DB) conduits are also acceptable.

II. If the service conduit extends into the main trench where stacking is required, all conduits shall be installed in one package with spacers and 1-sack slurry.
MAIN TRENCH OR PRIMARY SERVICE TRENCH
INSTALLATION WHERE CONCRETE SLURRY ENCASEMENT (1-SACK MIX) AND SPACERS ARE REQUIRED:

NOTES:
I. SEE PAGES 3370.3 OR 3371.3 FOR SHADING AND BACKFILL REQUIREMENTS AND TRENCH DEPTH.
II. SEE DESIGN MANUAL 5722 FOR FEEDER CONDUIT APPLICATIONS.
III. ALL 5 INCH CONDUITS MUST BE ENCASED WITH CONCRETE SLURRY (1-SACK MIX).

A. EXCAVATE TRENCH TO REQUIRED DEPTH AND WIDTH. SEE STANDARDS 3376, 3370 OR 3371 FOR TRENCHING REQUIREMENTS.

B. MULTI-SIZED CONDUIT SYSTEMS TO BE A MAXIMUM OF TWO CONDUITS WIDE AND FIVE CONDUITS HIGH (UP TO TEN * SPACER POSITIONS IN ONE TRENCH). IF MORE THAN TEN POSITIONS ARE REQUIRED, A SEPARATE CONDUIT BANK SHALL BE INSTALLED IN A SEPARATE TRENCH. MAINTAIN 5 FEET SEPARATION WITH 3 FEET OF UNDISTURBED NATIVE SOIL BETWEEN TRENCHES.

C. ASSEMBLE CONDUITS IN SPACERS ON TOP OF THE GROUND OR IN THE TRENCH. PLACE SPACERS 8 TO 10 FEET APART.

D. SPOT POUR 1-SACK OVER CONDUITS APPROXIMATELY AT 25 FOOT INTERVALS TO PREVENT CONDUITS FROM FLOATING.

E. A CONCRETE ENVELOPE USING 1-SACK CONCRETE MIX (PER TABLE ON PAGE 3376.1) IS TO BE POURED AROUND AND OVER THE CONDUITS. TRENCH BACKFILL MATERIAL SHALL MEET THE GOVERNING AUTHORITY'S REQUIREMENTS AND COMPANY STANDARDS.

F. TWO OR THREE 2 INCH CONDUITS MAY BE INSTALLED IN ONE SPACER POSITION.
(MAXIMUM TWO 5 INCH CONDUITS USING CONDUIT SPACERS - ELECTRIC TRENCH ONLY).

NOTES:
I. ALL 5 INCH PRIMARY CONDUITS MUST BE ENCASED WITH CONCRETE SLURRY (1-SACK MIX).
II. USE DIRECT BURIED (DB) CONDUIT EVEN THOUGH THEY ARE ENCASED IN 1-SACK CONCRETE SLURRY.

(5 INCH CONDUIT INSTALLATIONS WITHOUT SPACERS USING 1-SACK CONCRETE SLURRY - ELECTRIC TRENCH ONLY) MAXIMUM OF 2-5" CONDUITS.)

NOTES:
I. ALL 5 INCH PRIMARY CONDUITS MUST BE ENCASED WITH CONCRETE SLURRY. (1-SACK MIX)
II. USE DIRECT BURIED (DB) 5" CONDUIT EVEN THOUGH THEY ARE ENCASED IN 1-SACK CONCRETE SLURRY.
III. THE EXAMPLES SHOWN ARE TYPICAL. OTHER CONDUIT COMBINATIONS MAY BE USED PROVIDED THE TOTAL NUMBER DOES NOT EXCEED FOUR. 1-INCH CONDUITS MAY BE ADDED AS NEEDED.
IV. ALWAYS INSTALL 5 INCH CONDUITS ON THE OUTER SIDE OF THE TRENCH.
V. THE EXAMPLES SHOWN MAY BE USED IN A JOINT TRENCH CONFIGURATION.

(CONDUIT SMALLER THAN 5 INCH, CONCRETE SLURRY ENCASEMENT 1-SACK MIX OR IMPORTED/NATIVE MATERIAL)

NOTES:
I. ANY CONDUIT COMBINATION SMALLER THAN 5 INCHES MAY BE INSTALLED SIDE BY SIDE ON THE BOTTOM OF THE TRENCH. (6 INCH MINIMUM TRENCH WIDTH, 24 INCH MAXIMUM TRENCH WIDTH).
II. THE CONDUIT COMBINATIONS DESCRIBED MAY BE USED IN A JOINT TRENCH CONFIGURATION.
III. USE DIRECT BURIED (DB) CONDUIT WHEN THEY ARE TO BE ENCASED OR IMPORTED/NATIVE BACKFILL IS USED.
IV. NARROW TRENCHES, 6 INCHES THROUGH 12 INCHES REQUIRE 1-SACK CONCRETE SLURRY OR MINIMUM 90% COMPACTION FOR IMPORTED OR NATIVE MATERIAL.
V. SEE STANDARD 3365 FOR TYPICAL PLACEMENT AND PREFERRED TRENCH MATERIAL.

REFERENCE:
a. AVAILABLE IN SERVICE STANDARDS AND GUIDE MANUAL
SCOPE: This standard shows the installation and material required for installing the conduit stub marker and ball marker locating system used to locate and show the depth of primary, secondary and service conduit stubs.
**BILL OF MATERIAL:**

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<td>BALL MARKER</td>
<td>1</td>
<td></td>
<td>S476492</td>
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<tr>
<td>3</td>
<td>MARKER, GAS STUB (COLOR YELLOW)</td>
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<td>S476304</td>
<td>STUB-J</td>
</tr>
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</table>

**INSTALLATION:**

A. INSTALL CONDUIT STUB MARKERS AND BALL MARKERS ON ALL STUBS (REGARDLESS OF LENGTH), 1’ MAXIMUM INWARD FROM THE END. IF MORE THAN ONE CONDUIT IS STUBBED OUT AT THE SAME LOCATION, INSTALL ONE BALL MARKER ABOVE THE CONDUIT(S) ONLY.

B. LOOP THE STUB MARKER AROUND THE CONDUIT. IF THE MARKER IS NOT LONG ENOUGH TO SHOW ABOVE GRADE LEVEL, TAPE A SECOND MARKER TO THE FIRST MARKER.

C. INSTALL THE PULLING TAPE INSIDE THE CONDUIT LEAVING SLACK AT THE PAD OR SUBSTRUCTURE END. AT THE SAME END, THE PULL ROPE MUST BE SECURELY ATTACHED TO EITHER A CONDUIT CAP OR TIE AND TAPE THE PULL ROPE TO THE END OF THE CONDUIT WITH GRAY TAPE.

D. AT THE CONDUIT STUB END, TIE THE PULLING TAPE TO THE END OF THE CONDUIT AND TAPE THE END OF THE STUB OVER THE PULLING TAPE WITH GRAY TAPE.

**REFERENCE:**

a. SEE STANDARD PAGE 3370 FOR MINIMUM CONDUIT COVER AND CONDUIT PLACEMENT.

b. SEE STANDARD PAGE 3373.2 FOR CONDUIT PLUG OR CONDUIT CAP STOCK NUMBERS.

c. SEE STANDARD PAGE 3377.1 & .3 FOR GAS STUB MARKER AND BALL MARKER LOCATING SYSTEM.

d. SEE "ELECTRIC STANDARD PRACTICE" NO. 226 FOR THE MARKER LOCATING UNIT.

e. SEE GAS STANDARDS D 7243, AND D 7244 FOR POLICY ON MARKING GAS STUBS.

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**SCOPE:** This standard sets forth the procedure for installing a gas service stub locating marker.

**NOTES:**
1. The installer shall furnish and install all the material shown in this standard.

**BILL OF MATERIAL:**

<table>
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<tr>
<th>ITEM</th>
<th>DESCRIPTION</th>
<th>QUANTITY</th>
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**INSTALLATION:**

A. Attach a yellow plastic gas marker to the end of the gas service and extend above grade.

B. Bring the yellow tracer wire up from the poly gas service stub and tape it to the yellow marker at grade level. Cut the tracer wire 2' above grade and coil around the marker at grade level. Seal tip of the tracer wire with Aqua-seal and electrical tape to prevent grounding.

C. An approved ball marker will be installed at each stub in accordance with reference D.

**REFERENCE:**

f. See gas standards 7241, 7244, 7344, & 7243 [for internal use only]
g. Available in service standards and guide manual

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**SDG&E ELECTRIC UNDERGROUND STANDARD**

**GAS STUB MARKER**

**UG 3377.3**
**SCOPE:** THIS STANDARD DESCRIBES THE PROCEDURE FOR MANDRELING CONDUITS AND THE INSTALLATION OF PULLING AND MEASURING TAPE.

**INSTALLATION:**

A. ALL MANDRELING MUST BE DONE IN THE PRESENCE OF QUALIFIED SDG&E PERSONNEL.

B. AFTER CONDUITS ARE INSTALLED, THEY MUST BE MANDRELED BY THE CONDUIT INSTALLER TO CHECK THE INSIDE DIAMETER AND PROVIDE A PATH FREE OF OBSTRUCTIONS.

C. IN EACH CONDUIT RUN, USE A MANDREL EQUIVALENT TO THE SIZE CONDUIT BEING MANDRELED. THE MANDREL MUST BE SIZED TO THE SMALLEST INSIDE CONDUIT DIAMETER FOR THE TOTAL LENGTH OF THE RUN.

D. IF THE MANDREL WILL NOT PASS THROUGH AN OBSTRUCTION, THE CONDUIT MUST BE REPLACED OR REPAIRED AT THAT POINT BY THE INSTALLER.

E. THE PULLING TAPE SHALL BE PULLED IN BEHIND THE MANDREL. WHEN THE PULLING AND MEASURING TAPE IS INSTALLED IT SHALL BE ONE CONTINUOUS LENGTH WITHOUT KNOTS FOR THE ACCURATE MEASUREMENT FOR CONDUCTOR INSTALLATION AND THE PULLING OF CONDUCTORS OR WINCH LINES.

F. THE CONDUIT INSTALLER MUST PROVIDE 3/4” PULLING AND MEASURING TAPE (STOCK NUMBER 721700) IN EACH CONDUIT. THE PULLING TAPE MUST BE APPROVED BY SDG&E AND HAVE A MINIMUM AVERAGE TENSILE STRENGTH OF 2500 LBS. PULLING TAPE TAILS OF 24 INCHES SHALL BE SECURED AT EACH END OF CONDUIT.

**REFERENCE:**

a. AVAILABLE IN SERVICE STANDARDS AND GUIDE MANUAL.

b. SEE SDG&E ELECTRIC STANDARD, PRACTICE MANUAL NUMBER 217, FOR INSTALLATION OF PULLING AND MEASURING TAPE AND MANDRELING.

**MATERIAL DATA:**

CABLE PULLING AND MEASURING TAPE: SDG&E APPROVED TENSILE STRENGTH 2500 LBS, WOVEN POLYESTER HIGH STRENGTH, CONTINUOUS FILAMENT, PRE LUBRICATED 3/4” WITH FOOTAGE MARKING.
SCOPE: This standard shows the accessories and procedures that enable 1 inch conduit to be installed into 5 inch substructure duct terminators.

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<th>ADAPTOR STYLE</th>
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<td>7/25/2016</td>
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SDG&E ELECTRIC UNDERGROUND STANDARD

CONDUIT SUBSTRUCTURE ADAPTORS

UG 3382
INSTALLATION:

A. Use solvent cement to cement the adaptor into the preferred terminator knockout.

B. Make sure the conduit enters the adaptor straight. This requires a mound of dirt approximately one or two feet outside the substructure (see drawing on previous page). Leave 24 inches of the conduit exposed beyond the substructure terminator inside the substructure. This will allow movement of the conduit until the trench is backfilled.

C. After the trench is backfilled, the connection crew shall install either the heat shrink sleeve or tape where the conduit and adaptor join. Next make the final cut on the conduit just beyond the heat shrink sleeve or tape and disregard the excess conduit.

D. On single entrance adaptors (style A on previous page), apply one layer of Aqua-Seal and two layers of gray tape at the point where the conduit enters the adaptor inside the substructure.

E. One entrance of the triple entrance adaptor is capped so it may be used as a two way adaptor. The cap may be cut off if the third conduit entrance is needed.

F. Heat shrink sleeves are required on double and triple entrance adaptors (style B on previous page), instead of the hand taped application. Both methods described will prevent water and other debris from entering the substructure.

REFERENCE:

a. AVAILABLE IN SERVICE STANDARDS AND GUIDE MANUAL
SCOPE: This standard shows RTU pad for S&C remote. Remote terminal units.

3/8" Insert
4 Places

Skid Resistant Surface

Weight: 108 lbs (49 kgs)

Approved manufacturer & part number
Quazite-PL4846WA

Note:
- This pad is not to be poured in place.

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Service Guide: Indicates Latest Revision Completely Revised New Page Information Removed

SDG&E Electric Standards

3409.1 RTU Pad for Vista Switch With Remote RTU

Revision
Date: 6-1-02
APPD
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INSTALLATION:
A. SET PAD LEVEL TO FINAL AND INSTALL EQUIPMENT GROUND.
B. PLACE ONE OR TWO 5 INCH CONDUIT, ONE 2 INCH CONDUIT, ONE 1 INCH CONDUIT AND EQUIPMENT GROUND WITHIN PAD OPENING.
C. TERMINATE ALL CONDUITS FLUSH WITH THE TOP OF THE PAD. DO NOT CUT INTO THE CURVED CURVED PORTION OF THE ELBOWS. RADIUS OF CURVATURE IS 36 INCH MINIMUM OF 3 INCH, 5 INCH CONDUITS.

REFERENCE:
K. SEE STANDARD 3211 FOR PAD IDENTIFICATION.
L. SEE STANDARD 3370 OR 3371 FOR TRENCH, UTILITY POSITIONING, SHADING AND BACKFILL REQUIREMENTS.
N. SEE STANDARD 3481 FOR TRANSFORMER BARRIER PROTECTION.
O. SEE STANDARD 3483 FOR MINIMUM OPERATING AND CLEARANCE REQUIREMENTS (PAD PLACEMENT).
P. SEE STANDARD 3484 FOR PAD INSTALLATION OF PAD—MOUNTED EQUIPMENT.
Q. SEE STANDARD 3486 FOR RETAINING WALL REQUIREMENTS AND CLEARANCES FROM REVERSE SUBGRADE RETAINING WALLS.
R. SEE STANDARD 3487 FOR RETAINING WALLS.
S. SEE STANDARD 4512 FOR EQUIPMENT GROUNDING.
SCOPE: This standard show pad used with the 600A to 200A dead front terminator installed on top of an existing 3314 handhole.

PAD WEIGHT: 1480 # MAX.

PAD SHOULD NOT BE INSTALLED ON EXISTING HANDHOLES LOCATED IN SIDEWALKS.
**BILL OF MATERIAL:**

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**INSTALLATION:**

A. THIS PAD IS NOT TO BE INSTALLED ON NEW CONSTRUCTION. PAD IS TO BE INSTALLED ON THE TOP OF AN EXISTING 3314 HANDHOLE. MAY ALSO BE INSTALLED ON A "B" BOX PROVIDING THE TOP SECTION HAS BEEN MODIFIED OR REPLACED WITH 3314 INTERMEDIATE SECTIONS.

B. WHEN THE EXISTING HANDHOLE TOP SECTION HAS BEEN SET TO A SLOPING GRADE, THE TOP SECTION OF HANDHOLE MUST RE–GRADED AND SET LEVEL.

C. INSTALL A THIN LAYER OF SEALANT MASTIC BETWEEN HANDHOLE TOP SECTION AND PAD.

D. APPLY LUBRICANT SUCH AS EZ–1 TO THE PENTAHED BOLTS WHEN SECURING THE COVERS TO REDUCE REMOVAL OR INSTALLATION DIFFICULTIES. TIGHTEN DOWN BOLTS WITH A TORQUE WRENCH TO 30 FT./IBS MIN., 40FT/IBS. MAX.

**REFERENCE:**

D. SEE STANDARD 3481 FOR BARRIER PROTECTION AND CLEARANCE.

E. SEE STANDARD 3483 FOR MINIMUM OPERATING AND CLEARANCE REQUIREMENTS.

F. SEE STANDARD 3484 FOR PAD INSTALLATION OF PAD–MOUNTED EQUIPMENT.

G. SEE STANDARD 3486 FOR RETAINING WALL REQUIREMENTS AND CLEARANCES FROM REVERSE SUBGRADE RETAINING WALLS.

H. SEE STANDARD 3487 FOR RETAINING WALLS.

I. SEE STANDARD 3524 FOR 600A TO 200A TERMINATOR.
SCOPE: THIS STANDARD SHOWS THE PAD MOUNTED SCADA CAPACITOR PAD AND CONDUIT PLACEMENT USED WITH THE 1200 KVAR PAD-MOUNTED SCADA CAPACITOR.

PAD
WEIGHT: 1850# MAX.

TOP VIEW

DO NOT PLACE PAD IN THIS POSITION
PAD MUST BE PLACED IN PROPER POSITION SO CAPACITOR DOOR (HOUSING THE CONTROL SWITCH), OPENS TOWARD SIDEWALK.

PLACE PAD IN THIS POSITION

FRONT OF PAD

NEW CT 4" CONDUIT

REVISE TO 4" PRIMARY CONDUIT

3" SCADA CONDUIT

13"

30"

SIDEWALK

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REV CHANGE BY DSGN APPV DATE REV CHANGE BY DSGN APPV DATE
A DRAWING UPDATE JC TR JS/MDJ 9/4/2015 D
B
C

Indicates Latest Revision Completely Revised New Page Information Removed

SDG&E ELECTRIC UNDERGROUND CONSTRUCTION STANDARDS
CAPACITOR PAD

UG 3414.1

SHEET 1 OF 2
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INSTALLATION:

A. THIS PAD MAY NOT BE POURED IN PLACE. USE PRECAST PADS ONLY.

B. FOR EQUIPMENT GROUNDING EQUIPMENT SEE STANDARD 4512.

C. TERMINATE ALL CONDUIT Flush WITH TOP OF PAD.

D. 4" CONDUITS SHOULD CONNECT TO THE ORIGINATION POINT OF THE PRIMARY (HANDHOLE/MANHOLE)

REFERENCE:

da. SEE STANDARD 3211 FOR PAD IDENTIFICATION.

b. SEE STANDARD 3481 FOR BARRIER PROTECTION AND CLEARANCE.

c. SEE STANDARD 3483 FOR MINIMUM OPERATING AND CLEARANCE REQUIREMENTS (PAD PLACEMENT).

d. SEE STANDARD 3484 FOR PAD INSTALLATION OF PAD–MOUNTED EQUIPMENT.

e. SEE STANDARD 3486 FOR RETAINING WALL REQUIREMENTS AND CLEARANCES FROM REVERSE SUBGRADE RETAINING WALLS.

f. SEE STANDARD 3487 FOR RETAINING WALLS.

g. SEE STANDARD 3820 FOR PAD–MOUNTED CAPACITOR.

h. SEE STANDARD 3821 FOR INSTALLATION REQUIREMENTS FOR PAD–MOUNTED CAPACITOR.

i. SEE STANDARD 4512 FOR EQUIPMENT GROUNDING INSTALLATION.
**SCOPE:** This standard shows the pad-mounted service restorer pad and conduit placement used with the pad-mounted service restorer.

**NOTES:** - Pad may not be poured in place. Use precast pads only.

**PREFERRED INSTALLATION**

* 64" will normally require a right-of-way. Use alternate installation when right-of-way cannot be obtained.

---

**SERVICE GUIDE**

**3415.1**

**SDG&E ELECTRIC STANDARDS**

**SERVICE RESTORER PAD**

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* DEVIATION REQUEST IS REQUIRED FOR PAD ALTERNATE INSTALLATION
(SEE STANDARD 3005 FOR DEVIATION REQUEST FORM AND PROCEDURE)

PLACE PAD IN THIS POSITION TO ALLOW DOOR, HOUSING CONTROL TO OPEN TOWARD THE SIDEWALK

1-1" SECONDARY CONDUIT
1-1" SUPERVISORY CONDUIT FOR ANTENNA OR 1-2" CONDUIT FOR SUPERVISORY CABLE

3313 HANDHOLE 18" BASE SECTION

TOP VIEW

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INSTALLATION:

A. SET PAD LEVEL TO FINAL GRADE AND INSTALL EQUIPMENT GROUND.
B. TERMINATE CONDUITS 3 INCHES ABOVE THE BOTTOM OF THE 3313 HANDHOLE.
C. INSTALL SECONDARY CONDUIT WHEN SOURCE IS WITHIN PLUS OR MINUS 50 FEET, OTHERWISE INSTALL "N" TRANSFORMER.

REFERENCE:

E. SEE STANDARD 3481 FOR BARRIER PROTECTION AND CLEARANCE.
F. SEE STANDARD 3483 FOR MINIMUM OPERATING AND CLEARANCE REQUIREMENTS (PAD PLACEMENT).
G. SEE STANDARD 3484 FOR PAD INSTALLATION OF PAD-MOUNTED EQUIPMENT.
H. SEE STANDARD 3486 FOR RETAINING WALL REQUIREMENTS AND CLEARANCES FROM REVERSE SUBGRADE RETAINING WALLS.
I. SEE STANDARD 3487 FOR RETAINING WALLS.
J. SEE STANDARD 3575 FOR PAD-MOUNTED SERVICE RESTORER.
K. SEE STANDARD 3576 FOR INSTALLATION REQUIREMENTS FOR PAD-MOUNTED SERVICE RESTORER.
L. SEE STANDARD 4512 FOR EQUIPMENT GROUNDING INSTALLATION.

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**SCOPE:**

THIS STANDARD SHOWS THE PAD AND HANDHOLE USED WITH THE PAD-MOUNTED 200 AMP LOW PROFILE CABLE TERMINATING CABINET. CONDUIT PLACEMENT IS ALSO SHOWN.

**NOTES:**

- PAD SECTION MAY NOT BE POURED IN PLACE.
BILL OF MATERIAL:

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<th>DESCRIPTION</th>
<th>QUANTITY</th>
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<td>3416.1</td>
<td>S514020</td>
<td>3416</td>
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<td>2</td>
<td>3311 HANDHOLE 14&quot; X 66&quot; X 14&quot;</td>
<td>1</td>
<td>3311</td>
<td>S162660</td>
<td>3416PAD</td>
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</tbody>
</table>

INSTALLATION LOCATION DETAIL

INSTALLATION FOR 3416 PAD OVER 3311 HANDHOLE:

A. INSTALL CONDUITS AS SHOWN.

B. THE PAD AND HANDHOLE LOCATION IS TO BE MARKED OUT PAYING PARTICULAR ATTENTION TO FOREIGN UTILITY PLACEMENTS. RELOCATING PAD AND HANDHOLES REQUIRES APPROVAL FROM SERVICE PLANNING. ONCE THE LOCATION HAS BEEN ESTABLISHED, MARK OUT DIMENSIONS FOR AN EXCAVATION OF 2'-5" WIDE X 6'-9" LONG. THE DEPTH OF THE EXCAVATION IS 17 INCHES ALLOWING THE BOTTOM OF THE PAD TO SET 3" BELOW GRADE.

C. PLACE ALL PRIMARY AND SECONDARY CONDUITS WITHIN THE HANDHOLE. TERMINATE PRIMARY AND SECONDARY CONDUITS 3 INCHES ABOVE THE BOTTOM OF HANDHOLE. DO NOT CUT INTO THE CURVED PORTION OF THE ELBOWS.

D. SECONDARY CONDUIT COMBINATIONS

<table>
<thead>
<tr>
<th>2 INCH</th>
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<td>1</td>
<td>7</td>
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</tbody>
</table>

* May include two additional one inch conduits for street lights.

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REFERENCE:

F. SEE STANDARD 3211 FOR INSTALLATION OF IDENTIFICATION TAG.

H. SEE STANDARD 3481 FOR EQUIPMENT BARRIER PROTECTION.

I. SEE STANDARD 3483 FOR MINIMUM OPERATING AND CLEARANCE REQUIREMENTS (PAD PLACEMENT).

J. SEE STANDARD 3484 FOR PAD INSTALLATION OF PAD-MOUNTED EQUIPMENT.

K. SEE STANDARD 3486 FOR RETAINING WALL REQUIREMENTS AND CLEARANCES FROM REVERSE SUBGRADE RETAINING WALLS.

L. SEE STANDARD 3487 FOR RETAINING WALLS.

M. SEE STANDARD 3523 FOR PAD-MOUNTED CABLE TERMINATING CABINET.

N. SEE STANDARD 4510 FOR PREFERRED AND ALTERNATE TRENCH GROUND WIRE.

O. SEE STANDARD 4512 FOR EQUIPMENT GROUNDING INSTALLATION.

P. SEE STANDARD 4514 FOR GROUNDING TELCO CONDUCTOR IN PAD-MOUNTED EQUIPMENT.
SCOPE: THIS STANDARD SHOWS THE PAD AND HANDHOLE USED WITH THE PAD-MOUNTED 600 AMP TERMINATING CABINET. CONDUIT PLACEMENT IS ALSO SHOWN.

NOTES:
- PAD MAY NOT BE POURED IN PLACE. USE PRECAST PADS ONLY.

SERVICE GUIDE

SDG&E ELECTRIC STANDARDS

REVOLUTION

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<td>S514022</td>
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<td>2</td>
<td>HANDHOLE, 3313 BASE SECTION</td>
<td>1</td>
<td>3313</td>
<td>S162664</td>
<td>3417</td>
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</tbody>
</table>

## INSTALLATION:

A. SET PAD LEVEL TO FINAL GRADE AND INSTALL EQUIPMENT GROUND.

B. TERMINATE CONDUITS 3 INCHES ABOVE THE BOTTOM OF THE 3313 HANDHOLE.

## REFERENCE:

E. SEE STANDARD 3481 FOR BARRIER PROTECTION AND CLEARANCE.

F. SEE STANDARD 3483 FOR MINIMUM OPERATING AND CLEARANCE REQUIREMENTS (PAD PLACEMENT).

G. SEE STANDARD 3484 FOR PAD INSTALLATION OF PAD–MOUNTED EQUIPMENT.

H. SEE STANDARD 3486 FOR RETAINING WALL REQUIREMENTS AND CLEARANCES FROM REVERSE SUBGRADE RETAINING WALLS.

I. SEE STANDARD 3487 FOR RETAINING WALLS.

J. SEE STANDARD 3582 FOR INSTALLATION REQUIREMENTS FOR PAD–MOUNTED 600 AMP TERMINATING CABINET.

K. SEE STANDARD 4512 FOR EQUIPMENT GROUNDING INSTALLATION.
SCOPE: THIS STANDARD SHOWS THE BOX PAD AND CONDUIT PLACEMENT FOR THE PME-3 AND PME-5 PAD-MOUNTED AIR BREAK SWITCHES.

WEIGHT: 195 LB (88 KG)
DIMENSIONS 70" X 44" X 32" (1778 X 1118 X 813)

APPEARANCE AND DIMENSIONS MAY VARY SLIGHTLY BETWEEN MANUFACTURERS
NOTE: LOCATE THE LINE SIDE CONDUIT OR FEED TO THE SWITCH IN COMPARTMENT 1. COMPARTMENT 1 SHALL BE LOCATED ON THE RIGHT SIDE OF BOX PAD WHEN VIEWED FROM THE SIDEWALK OR STREET SIDE OF THE BOX PAD.

INSTALLATION - CONDUIT

A. INSTALL CONDUITS AND TERMINATE THEM NOT LESS THAN 3 (76) INCHES ABOVE THE GRAVEL BASE.
B. DO NOT CUT THE 90 DEGREE ELBOWS ON CURVE.
C. STUB 1 – 3 INCH (76) CONDUIT FROM CMPT #2, 4 FEET (1219) FROM THE BOTTOM FLANGE OF BOX PAD.
D. NO MORE THAN 2 CONDUITS MAY BE INSTALLED IN COMPARTMENTS 1 & 2. 1 ADDITIONAL 3 (76) INCH CONDUIT IS ALLOWED IN CMPT 2 FOR SCADA ANTENNA.
E. WHEN TWO CONDUITS ARE INSTALLED IN ONE COMPARTMENT, PLACE CONDUITS SIDE BY SIDE CENTERED ON THE APPROPRIATE DIMENSION.
F. COMPLETELY SLURRY ENCASE ALL 5 INCH 90 DEGREE BENDS TO WITHIN 7 INCHES OF THE FINISH CUT OF THE CONDUIT.

BILL OF MATERIAL:

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<tr>
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<td>3418BP</td>
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<tr>
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<td>GRAVEL, 3/8&quot; – 3/4&quot;</td>
<td>AS REQ'D</td>
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INSTALLATION - BOX PAD

G. ESTABLISH THE BOX PAD LOCATION PAYING PARTICULAR ATTENTION TO FOREIGN UTILITY PLACEMENTS. RELOCATING THE BOX REQUIRES APPROVAL FROM PROJECT MANAGEMENT. WHEN INSTALLING ADJACENT TO NEW OR EXISTING HANDHOLES ALLOW 17 FEET MINIMUM FROM THE CLOSEST EDGE OF HANDHOLE TO THE CENTERLINE OF THE BOX PAD.
H. MARK OUT DIMENSIONS FOR THE EXCAVATION WIDTH AND LENGTH PER DRAWING BELOW. THE WIDTH, AND LENGTH DIMENSIONS GIVEN, ALLOW AN EXTRA 12 (305) INCHES FOR SETTING BOX PAD.
I. ADD 4 (102) INCHES OF GRAVEL TO BOTTOM OF EXCAVATION AND THEN COMPACT THIS MATERIAL BY HAND OR MACHINE.
J. PLACE THE BOX PAD IN THE EXCAVATION WITH THE LONG SIDE OF THE BOX PAD PARALLEL TO AND 15 (381) INCHES FROM THE BACK EDGE OF THE SIDEWALK.
K. LEVEL BOX PAD.
L. SET THE TOP SURFACE OF THE BOX PAD 4 (102) INCHES ABOVE FINAL GRADE.
M. BACKFILL THE OUTSIDE WITH ONE SACK SLURRY. STOP SLURRY 6 (152) INCHES FROM FINISH GRADE, CONTINUE TO BACKFILL WITH NATIVE SOIL TO FINISH GRADE.

REFERENCE:

N. SEE STANDARD 3211 FOR INSTALLATION OF IDENTIFICATION TAG.
O. SEE STANDARD 3365 FOR SLURRY BACKFILL.
P. SEE STANDARD 3483 FOR MINIMUM OPERATING AND CLEARANCE REQUIREMENTS.
Q. SEE STANDARD 3486 FOR RETAINING WALL REQUIREMENTS AND CLEARANCES FROM REVERSE SUBGRADE RETAINING WALLS.
R. SEE STANDARD 4510.1 FOR TRENCH GROUND WIRE (PREFERRED).
S. SEE STANDARD 3583 FOR PME-3 SWITCH INSTALLATION.

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SERVICE GUIDE

REVOLUTION

DATE 8-30-2000

APPD

SDGE ELECTRIC STANDARDS

BOX PAD FOR PME-3 AND PME-5 SWITCHES

3418.3
**SCOPE:**

THIS STANDARD SHOWS THE BOX PAD FOR THE THREE-WAY PAD-MOUNTED SWITCH.

WEIGHT: 210 LBS (95 KG)
DIMENSIONS 60" X 64" X 24" (1524 X 1627 X 610)
BOX PAD AND CONDUIT PLACEMENT

INSTALLATION - CONDUIT

A. INSTALL CONDUITS AND TERMINATE THEM NOT LESS THAN 3 INCHES (76) ABOVE THE GRAVEL BASE.

B. DO NOT CUT THE 90 DEGREE ELBOWS ON CURVE.

C. STUB 1-5" (127) CONDUIT FROM THE STREET SIDE OF WINDOW FOUR FEET FROM THE BOTTOM FLANGE OF BOX PAD.

D. INSTALL ONE CONDUIT PER SWITCH WAY. ONE ADDITIONAL CONDUIT MAY BE INSTALLED FOR SCADA POWER SOURCE.

E. COMPLETELY SLURRY ENCASE ALL 5 INCH 90 DEGREE BENDS TO WITHIN 7 INCHES (178) OF FINISH CUT OF THE CONDUIT.

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<td>601600</td>
<td></td>
</tr>
</tbody>
</table>

INSTALLATION - BOX PAD

F. ALWAYS INSTALL BOX PAD WITH LONG SIDE PARALLELED TO STREET OR SIDEWALK WITH OPENING TO THE RIGHT.

G. ESTABLISH THE BOX PAD LOCATION PAYING PARTICULAR ATTENTION TO FOREIGN UTILITY PLACEMENTS. REL OCATING THE BOX REQUIRES APPROVAL FROM PROJECT MANAGEMENT. WHEN INSTALLING ADJACENT TO NEW OR EXISTING HANDHOLES ALLOW 17 FEET MINIMUM FROM THE CLOSEST EDGE OF HANDHOLE TO THE CENTERLINE OF THE BOX PAD.

H. MARK OUT DIMENSIONS FOR THE EXCAVATION WIDTH AND LENGTH PER DRAWING BELOW. THE WIDTH AND LENGTH DIMENSIONS GIVEN ALLOW AN EXTRA 12 INCHES (305) FOR SETTING BOX PAD.

I. ADD 4 INCHES (102) OF GRAVEL TO BOTTOM OF EXCAVATION AND THEN COMPACT THIS MATERIAL BY HAND OR MACHINE.

J. PLACE THE BOX PAD IN THE EXCAVATION WITH THE LONG SIDE OF THE BOX PAD PARALLELED TO AND AS CLOSE AS POSSIBLE TO BACK EDGE OF SIDEWALK.

K. LEVEL BOX PAD.

L. SET THE TOP SURFACE OF THE BOX PAD 4 INCHES (102) ABOVE FINAL GRADE.

M. BACKFILL THE OUTSIDE WITH ONE SACK SLURRY. STOP SLURRY 6 INCHES (152) FROM FINISH GRADE; CONTINUE TO BACKFILL WITH NATIVE SOIL TO FINISH GRADE.

REFERENCE:

N. SEE STANDARD 3211 FOR INSTALLATION OF IDENTIFICATION TAG.

O. SEE STANDARD 3365 FOR SLURRY BACKFILL.

P. SEE STANDARD 3483 FOR MINIMUM OPERATING AND CLEARANCE REQUIREMENTS.

Q. SEE STANDARD 3486 FOR RETAINING WALL REQUIREMENTS AND CLEARANCES FROM REVERSE SUBGRADE RETAINING WALLS.

R. SEE STANDARD 4510.1 FOR TRENCH GROUND WIRE (PREFERRED)

S. SEE STANDARD 3585, 3586 FOR SWITCH INSTALLATION.
**SCOPE:** This standard shows the pad and installation requirements for the allowable conduit combinations and configurations for a single-phase transformer, three-phase fuse cabinet, single-phase fuse cabinet and single-phase cable terminator. This also includes the 'SP2' short transformer pad used for in-kind replacements where the standard UG 3421 pad will not fit.

**UG 3421 PAD**

**PAD WEIGHT:** 619LBS. MAX.

2-TON LIFTING ANCHOR

**UG 3312 HANDHOLE**

**WEIGHT:** 185LBS. MAX.

(Required for three-phase fuse cabinet, single-phase fuse cabinet and single-phase cable terminator)

**SDG&E ELECTRIC UNDERGROUND CONSTRUCTION STANDARDS**

**UG 3421.1**

**SHEET 1 OF 6**
NOTE:
I. TO BE USED ONLY FOR IN-KIND REPLACEMENTS. NOT FOR NEW INSTALLATIONS.

UG 3421 'SP2' PAD

PAD WEIGHT: 505LBS. MAX.

2-TON LIFTING ANCHOR

NOTE:
I. TO BE USED ONLY FOR IN-KIND REPLACEMENTS. NOT FOR NEW INSTALLATIONS.
VIEW A
UG 3711, UG 3712 INSTALLATION
(TOP VIEW)
SINGLE-PHASE TRANSFORMER

VIEW B
UG 3514 INSTALLATION
(TOP VIEW)
THREE-PHASE FUSE CABINET

VIEW C
UG 3512 INSTALLATION
(TOP VIEW)
SINGLE-PHASE FUSE CABINET

VIEW D
UG 3522 INSTALLATION
(TOP VIEW)
SINGLE-PHASE CABLE TERMINATOR

DO NOT INSTALL CONDUITS IN THIS AREA
SECONDARY CONDUIT AREA

PAD OPENING
PRIMARY CONDUIT AREA

SEE NOTE:

INSIDE EDGE OF 17" X 30" HANDHOLE
(UG 3312)

SIDEWALK SIDE - CABINET DOORS TO OPEN TOWARD PROPERTY

SIDEWALK

SDG&E ELECTRIC UNDERGROUND CONSTRUCTION STANDARDS
SINGLE-PHASE TRANSFORMER /UTILITY EQUIPMENT PAD
NOTES:
I. TRANSFORMER COOLING FINS MAY OVERHANG REAR OF PAD BY 6 INCHES.
II. FIVE INCH CONDUIT NOT ALLOWED IN THESE INSTALLATIONS.
III. PAD MAY NOT BE Poured-IN-PLACE.

BILL OF MATERIAL

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<td>PAD WITH UG 3312 HANDHOLE</td>
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<td></td>
<td></td>
<td>PAD WITH UG 3312 HANDHOLE FC3PAD</td>
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<tr>
<td>2</td>
<td>BODY, HANDHOLE</td>
<td>1</td>
<td>UG 3312</td>
<td>SS1426</td>
<td>UG 3312-1</td>
</tr>
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</table>

INSTALLATION (FOR SINGLE - PHASE TRANSFORMER):

A. SET PAD LEVEL TO FINAL GRADE AND INSTALL EQUIPMENT GROUND.

B. PLACE ALL PRIMARY AND SECONDARY CONDUITS WITHIN THE PAD OPENING AS SHOWN ABOVE. DO NOT CUT INTO THE CURVED PORTION ON THE ELBOWS. RADIUS OF CURVATURE IS 36" MINIMUM FOR 3 INCH AND 4 INCH CONDUITS. PLACE ALL CONDUIT WITH 3/0 OR LARGER CABLE TOWARDS THE REAR OF THE 12 INCH SECONDARY AREA. NOTE: PRIMARY CONDUITS IN RIGHT HAND CORNER SHALL HAVE 2" CLEARANCE FROM FRONT AND SIDE OF PAD.

C. THE CONDUIT CONFIGURATION REQUIREMENT BETWEEN TERMINATING POINTS LIMITS THE SECONDARY CONDUIT CONFIGURATION TO 2 WIDE X 4 DEEP OR 4 WIDE X 2 DEEP (NO ONE CONDUIT IS TO BE COMPLETELY SURROUNDED ON ALL FOUR SIDES BY OTHER CONDUITS), USING SPACERS AND 1 SACK CONCRETE SLURRY BACKFILL. CONDUITS MAY ALSO BE INSTALLED SIDE BY SIDE ON THE BOTTOM OF THE TRENCH WITHOUT SPACERS OR CONCRETE SLURRY (4 CONDUITS MAX.). IN THE TRANSITION AREA WHERE THE CONDUITS FROM THE BOTTOM OF THE TRENCH START TOWARD THE SURFACE (THE STRAIGHT PORTION BY THE 90° BEND), SPACERS MAY BE REQUIRED TO ALLOW THE 90° BENDS TO ENTER STRAIGHT INTO THE PAD OPENING. AT THE SURFACE POINT, THE CONDUITS MAY BE BUNDLED TOGETHER. USE SDG&E APPROVED BASE, SHADING AND BACKFILL.
D. The primary and secondary conduit combinations allowed are shown in the chart below. Read down desired column until the number of runs being installed are located, then read across the row checking for additional allowable runs. The sum of the columns shall not exceed the total conduits allowed.

<table>
<thead>
<tr>
<th>SECONDARY CONDUIT COMBINATIONS</th>
<th>PRIMARY CONDUIT COMBINATIONS</th>
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</thead>
<tbody>
<tr>
<td>2&quot; (EB OR DB)</td>
<td>3&quot; (EB OR DB)</td>
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<tr>
<td>6</td>
<td>-</td>
</tr>
</tbody>
</table>

* Secondary conduits may include two additional one inch conduits for street lights.

** 1-4 or 1-5 inch primary conduit is allowed when the conduit is extended from an existing stubout.

E. Terminate primary and secondary conduits flush with top of pad.

F. When the number of required conduits is less than the total conduits allowed in the table, install conduits in numbered sequence as shown on page UG 3421.3.

G. In soft soils, a concrete backfill (1-sack mix) 12 inches beyond the side edges of the pad and 12 inches deep is required under the transformer pad.

Installation (for three - phase fuse cabinet):

H. Set pad level to final grade and install equipment ground. Terminate conduits 3 inches above bottom of handhole. Install conduits.

I. The maximum primary conduits allowed are ultimate 4 runs of 4" conduit as shown on page UG 3421.3.
J. Set pad level to final grade and install equipment ground. Terminate conduits 3 inches above bottom of handhole. Install conduits as shown on page UG 3421.3.

INSTALL CONDUITS #1 AND #2 WHENEVER THERE IS JUST ONE LINE AND ONE LOAD CABLE.
INSTALL CONDUITS #3 AND/OR #4 FOR THE SECOND LOAD OR LINE CABLE (SEE STANDARD UG 3513 FOR CABLE INSTALLATION ON FUSE CABINET).

REFERENCES:

J. See standard UG 3211 for pad identification.
K. See standard UG 3370 or UG 3371 for trench, utility positioning, shading and backfill requirements.
L. See standard UG 3376 for concrete slurry, shading and type of conduit.
M. See standard UG 3481 for barrier protection and clearance.
N. See standard UG 3486 for single-phase transformer locations next to CATV and/or TELCO.
O. See standard UG 3483 for minimum operating and clearance requirements (pad placement).
P. See standard UG 3484 for pad installation of pad-mounted equipment.
Q. See standard UG 3486 for retaining wall requirements and clearances from reverse subgrade retaining walls.
R. See standards UG 3485 and UG 3487 for retaining walls.
S. See standard UG 3412 for single-phase fused switching cabinet.
T. See standard UG 3522 for single-phase terminator installation.
U. See standards UG 3711, UG 3712 and UG 3713 for transformer installations.
V. See standard UG 4512 for equipment grounding.
W. See standard UG 4514 for grounding Telco conductor in pad-mounted equipment.
SCOPE: THIS STANDARD SHOWS THE BOX PAD W/TEMPORARY COVER AND CONDUIT PLACEMENT FOR THE PAD-MOUNTED PME 9, 10, 11 AIR BREAK AND 2 SIDED 4-WAY TRAYER SWITCHES.

WEIGHT: 150# (68 KG)
DIMENSIONS 77" X 71" X 1-1/2"
(1956 X 1803 X 38)

(Temporary Cover Installation)
SEE PAGE 3423.5

WEIGHT: 200# (91 KG)
DIMENSIONS 78" X 73" X 32"
(1981 X 1854 X 813)

APPEARANCE AND DIMENSIONS MAY VARY SLIGHTLY BETWEEN MANUFACTURERS

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SERVICE GUIDE: X Indicates Latest Revision Completely Revised New Page Information Removed

REVISION
DATE 2-5-2014
APPD RR/DW

SDG&E ELECTRIC STANDARDS

BOX PAD W/TEMPORARY COVER FOR PME 9, 10, 11 AND 2 SIDED TRAYER SWITCHES

3423.1
BOX & CONDUIT PLACEMENT

SIDEWALK
TOP VIEW

FINAL
GRADE

SIDE VIEW

BOX PAD W/TEMPORARY COVER FOR
PME 9, 10, 11 AND 2 SIDED TRAYER SWITCHES

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Completely Revised
New Page
Information Removed

SDG&E ELECTRIC STANDARDS

3423.2

REVISION
DATE 2-5-2014
APPD RR / DW
INSTALLATION - CONDUIT

A. INSTALL CONDUITS AND TERMINATE THEM NOT LESS THAN 3 (76) INCHES ABOVE THE GRAVEL BASE.

B. DO NOT CUT THE 90 DEGREE ELBOWS ON CURVE.

C. STUB 1–3 INCH (76) CONDUIT FROM CMPT #3, 4 FEET (1219) FROM THE BOTTOM FLANGE OF BOX PAD FOR FUTURE SCADA ANTENNA.

D. NO MORE THAN 2 CONDUITS MAY BE INSTALLED IN COMPARTMENTS 1 & 2 AND 4 FOR CABLE PULLING. NO ADDITIONAL CONDUITS MAY BE INSTALLED IN COMPARTMENTS 3.

E. WHEN TWO CONDUITS ARE INSTALLED IN ONE COMPARTMENT, PLACE CONDUITS SIDE BY SIDE CENTERED ON THE APPROPRIATE DIMENSION.

F. COMPLETELY SLURRY ENCASE ALL 5 INCH 90 DEGREE BENDS TO WITHIN 7 INCHES OF THE FINISH CUT OF THE CONDUIT.

BILL OF MATERIAL:

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<td>S514028</td>
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<td>AS REQ'D</td>
<td>S601600</td>
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<td>S286810</td>
<td>PMECOV</td>
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<td>4</td>
<td>BOLT 3/8&quot; X 4&quot; SIMPSON STRONGTIE</td>
<td>4</td>
<td>S152654</td>
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<td>WASHER 3/8&quot;</td>
<td>4</td>
<td>S800160</td>
<td>–</td>
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</table>

INSTALLATION - BOX PAD

G. ESTABLISH THE BOX PAD LOCATION PAYING PARTICULAR ATTENTION TO FOREIGN UTILITY PLACEMENTS. RELOCATING THE BOX REQUIRES APPROVAL FROM PROJECT MANAGEMENT. WHEN INSTALLING ADJACENT TO NEW OR EXISTING HANDHOLES ALLOW 17 FEET MINIMUM FROM THE CLOSEST EDGE OF HANDHOLE TO THE CENTERLINE OF THE BOX PAD.

H. MARK OUT DIMENSIONS FOR THE EXCAVATION WIDTH AND LENGTH PER DRAWING BELOW. THE WIDTH, AND LENGTH DIMENSIONS GIVEN, ALLOW AN EXTRA 12 (305) INCHES FOR SETTING BOX PAD.

I. ADD 4 (102) INCHES OF GRAVEL TO BOTTOM OF EXCAVATION AND THEN COMPACT THIS MATERIAL BY HAND OR MACHINE.

J. PLACE THE BOX PAD IN THE EXCAVATION WITH THE SHORTEST SIDE OF THE BOX PAD PARALLEL TO AND 15 (381) INCHES FROM THE BACK EDGE OF THE SIDEWALK.

K. LEVEL BOX PAD.

L. SET THE TOP SURFACE OF THE BOX PAD 4 (102) INCHES ABOVE FINAL GRADE.

M. BACKFILL THE OUTSIDE WITH ONE SACK SLURRY. STOP SLURRY 6 (152) INCHES FROM FINISH GRADE, CONTINUE TO BACKFILL WITH NATIVE SOIL TO FINISH GRADE.
## CONDUIT COMBINATIONS

<table>
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<tr>
<th>SWITCH TYPE</th>
<th>CMPT #1</th>
<th>CMPT #2</th>
<th>CMPT #3</th>
<th>CMPT #4</th>
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</thead>
</table>
| **PME-9**   | TOTAL = 2  
1 - 5” (127)  
+  
1 - (51) THRU (127) | TOTAL = 2  
1 - 5” (127)  
+  
1 - (51) THRU (127) | TOTAL = 2  
1 - 4” OR 5”  
+  
1 - 3” (76) FOR SCADA ANTENNA ONLY | TOTAL = 2  
2 - 4” OR 5”  
+  
2 - (102) THRU (127) |
| **PME-10**  | “       | “       | TOTAL = 3  
2 - 5” (127)  
+  
1 - 3” (76) FOR SCADA ANTENNA ONLY | TOTAL = 2  
1 - 5” (127)  
+  
1 - 2” THRU 5”  
+  
1 - (51) THRU (127) |
| **TRAYER 2 SIDED 4-WAY** | “       | “       | TOTAL = 2  
1 - 4” OR 5”  
+  
1 - (102) OR (127)  
+  
1 - 3” (76) FOR SCADA ANTENNA ONLY | TOTAL = 2  
1 - 5” (127)  
+  
1 - (51) THRU (127) |
| **PME-11**  | “       | “       | “       | TOTAL = 2  
1 - 4” OR 5”  
+  
1 - (102) OR (127)  
+  
1 - 3” (76) FOR SCADA ANTENNA ONLY |

**NOTE:**

FOR THE PME-10 AND 2 SIDED 4-WAY TRAYER ONLY. WHEN ONLY THREE OF THE FOUR SWITCH POSITIONS WILL BE UTILIZED, PULL CABLES IN COMPARTMENTS 1, 2 AND 4 FIRST!

**REFERENCE:**

Q. SEE STANDARD 3211 FOR INSTALLATION OF IDENTIFICATION TAG.
R. SEE STANDARD 3365 FOR SLURRY BACKFILL.
S. SEE STANDARD 3483 FOR MINIMUM OPERATING AND CLEARANCE REQUIREMENTS.
T. SEE STANDARD 3486 FOR RETAINING WALL REQUIREMENTS AND CLEARANCES FROM REVERSE SUBGRADE RETAINING WALLS.
U. SEE STANDARD 4510.1 FOR TRENCH GROUND WIRE (PREFERRED).

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SCOPE: TEMPORARY 3423 PME AND TRAYER PAD COVER INSTALLATION.

NOTE: ALL PARTIES INCLUDING APPLICANT INSTALLERS, CONTRACT CONSTRUCTION CREWS AND SDG&E CREWS THAT INSTALL THE PAD 3423 ARE REQUIRED TO INSTALL A TEMPORARY PAD COVER AT ALL PME 9, 10 AND 11, AND 2 SIDED TRAYER SWITCH LOCATIONS. NOTE: THE ONLY EXCEPTION TO THIS STANDARD APPLICATION IS THAT THE SWITCH SHALL BE INSTALLED ON THE PAD THE SAME DAY AFTER THE PAD IS INSTALLED.

A. WHEN THE TEMPORARY COVERS ARE REMOVED THEY SHALL BE RETURNED TO THE DISTRICT OF RECORD AND CREDITED BACK AS THE PAD COVER IS REUSABLE FOR OTHER FUTURE INSTALLATIONS.

TEMPORARY COVER:

1. TEMPORARY COVERS WILL FIT ALL 3423 BOX PADS CURRENTLY PURCHASED
2. PLACE COVER ON PAD, CENTER/ALIGN COVER ON BOX PAD FOR DRILLING.
3. USE A 5/16 INCH DRILL BIT AND DRILL MOTOR, DRILL THROUGH COVER AND BOX PAD.
4. INSTALL 4—SELF TAPPING BOLTS STK# 152654 WITH 4—WASHERS STK#B00160
5. TIGHTEN BOLTS BY HAND WITH SOCKET AND RATCHET, DO NOT OVER TORQUE.

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SCAPE: This standard shows requirements for installing a 3425 three-phase pad for dead front transformer application through 300 kVA. Also for 3750 kVA HHR dead front booster transformer and primary meter cabinet.

PAD
WEIGHT: 1900# MAX.

MAXIMUM PRIMARY CONDUITS ALLOWED
2 RUNS OF 4" (EB OR DB) PRIMARY CONDUIT

MAXIMUM PRIMARY CONDUITS ALLOWED FOR PRIMARY METER CABINET:

<table>
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<tr>
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<td>3425-M</td>
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<tr>
<td>162660</td>
<td>3311 HH</td>
<td>3311-S</td>
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</table>
NOTES:
- Transformer cooling fins may overhang rear of pad by 6 inches.
- If number of secondary conduits is greater than maximum shown, use pad per standard 3426 or 3427.
- Transformer pad may not be poured in place. Use precast pads only.

INSTALLATION:

A. 1 inch earth in the bottom of the trench is required to prevent damage from rocks, sags, and pockets.

B. Place all primary and secondary conduits within the pad opening as shown on page 3425.1. Terminate primary and secondary conduits flush with the top of the pad. Do not cut into the curved portion of the elbows. Radius of curvature is 36" minimum for 3 inch, 4 inch and 5 inch conduits.

C. The conduit configuration requirement between terminating points limits the secondary conduit configuration to 2 wide x 3 deep or 3 wide x 2 deep (no one conduit is to be completely surrounded on all four sides by other conduits), using spacers and 1 sack concrete slurry backfill. Conduits may also be installed side by side on the bottom of the trench without spacers or concrete slurry (4 conduits max.). In the transition area where the conduits from the bottom of the trench start toward the surface (the straight portion by the 90° bend), spacers may be required to allow the 90° bends to enter straight into the pad opening. At the surface point, the conduits may be bundled together. Use SDG&E approved base, shading and backfill.

D. Any combination of 3, 4 or 5 inch secondary conduits may be used, provided they do not exceed the total of 6 or the maximum of each size conduit as specified on page 3425.1. An exception would be when the transformer feeds one customer with a 2000 amp main which requires five–5 inch conduits. No future customers are allowed in this installation. Two extra 1 inch or two extra 2 inch conduits may be added to serve street lights, recreation buildings, etc.

E. When number of required conduits is less than the total allowable shown on page 3425.1, install in numbered sequence as shown.

F. In soft soils a concrete backfill (1–sack mix.) is required under the pad, 12 inches beyond the side edges of pad and 12 inches deep.

G. Maximum number of conduits allowed for 200 amp application is 2–4” primary conduits. No combination of different size primary conduits allowed. No secondary conduits allowed.

H. Maximum number of conduits allowed for 600 amp application is 2–5” primary conduits. No combination of different size primary conduits allowed. No secondary conduits allowed.

I. Place primary conduits within the pad opening as shown on page 3425.1. Terminate primary conduits 3” above the bottom of 3311 handhole. 3311 handhole to be installed with primary meter applications. See 4702.1 or 4702.3. Do not cut the curved portion of conduit elbows. Radius of curvature is 36” minimum for 4” or 5” conduits.
INSTALLATION CONT'\:

\( \checkmark \) WHEN METER WILL NOT BE ATTACHED TO PRIMARY METER CABINET, INSTALL 1" CONDUIT TO REMOTE METER LOCATION. 1" CONDUIT NOT REQUIRED WHEN METER ATTACHED.

REFERENCE:

M. SEE STANDARD 3211 FOR PAD IDENTIFICATION.

N. SEE STANDARD 3370 OR 3371 FOR TRENCH, UTILITY POSITIONING, SHADING AND BACKFILL REQUIREMENTS.

O. SEE STANDARD 3376 FOR CONCRETE SLURRY.

P. SEE STANDARD 3481 FOR TRANSFORMER BARRIER PROTECTION.

Q. SEE STANDARD 3483 FOR MINIMUM OPERATING AND CLEARANCE REQUIREMENTS (PAD PLACEMENT).

R. SEE STANDARD 3484 FOR PAD INSTALLATION OF PAD-MOUNTED EQUIPMENT.

S. SEE STANDARD 3486 FOR RETAINING WALL REQUIREMENTS AND CLEARANCES FROM REVERSE SUBGRADE RETAINING WALLS.

T. SEE STANDARD 3487 FOR RETAINING WALLS.

U. SEE STANDARD 3751 FOR TRANSFORMER INSTALLATION.

V. SEE STANDARD 4512 FOR EQUIPMENT GROUNDING.

W. SEE STANDARD 4514 FOR GROUNDING TELCO CONDUCTOR IN PAD-MOUNTED EQUIPMENT.
SCOPE: THIS STANDARD SHOWS REQUIREMENTS FOR INSTALLING A 3426 THREE-PHASE PAD FOR DEAD FRONT TRANSFORMER APPLICATION THROUGH 1000 KVA.

PAD
WEIGHT: 2430# MIN.
2690# MAX.

STOCK NUMBER
PAD
514005

ASSEMBLY UNITS
3426B0 PAD ONLY
3426B3 W/3 HH

MAXIMUM PRIMARY CONDUITS ALLOWED
2 RUNS OF 4" (EB OR DB)
PRIMARY CONDUITS

CONDUIT ARRANGEMENT WITHOUT HANDHOLE FOR ONE CUSTOMER ULTIMATELY (SEE NOTES D & F)
MAXIMUM PRIMARY CONDUITS ALLOWED
2 RUNS OF 4" (EB OR DB)

TYPICAL INSTALLATION FOR 9-3" OR 9-4"
SECONDARY CONDUITS

TYPICAL INSTALLATION FOR 6-5"
SECONDARY CONDUITS

NOTES:
- TRANSFORMER COOLING FINS MAY OVERHANG REAR OF PAD BY 6 INCHES.
- IF THE NUMBER OF SECONDARY CONDUITS IS GREATER THAN THE MAXIMUM SHOWN, USE A PAD PER STANDARD 3427.
- TRANSFORMER PAD MAY NOT BE POURED IN PLACE. USE PRECAST PADS ONLY.
**INSTALLATION:**

A. 1 INCH EARTH IN THE BOTTOM OF TRENCH IS REQUIRED TO PREVENT DAMAGE FROM ROCKS, SAGS AND POCKETS.

B. PLACE ALL SECONDARY CONDUITS WITHIN THE PAD OR HANDHOLE OPENING AS SHOWN ON PAGES 3426.1 OR 3426.2. TERMINATE PRIMARY OR SECONDARY CONDUITS FLUSH WITH THE TOP OF THE PAD. WHEN A HANDHOLE IS REQUIRED FOR SECONDARY CONDUITS, TERMINATE THEM NOT LESS THAN 3 INCHES ABOVE BOTTOM OF HANDHOLE. DO NOT CUT INTO THE CURVED PORTION OF THE ELBOWS. RADIUS OF CURVATURE IS 36 INCHES MINIMUM FOR 3 INCH, 4 INCH AND 5 INCH CONDUITS.

C. THE CONDUIT CONFIGURATION REQUIREMENT BETWEEN TERMINATING POINTS LIMITS THE SECONDARY CONDUIT CONFIGURATION TO 2 WIDE X 5 DEEP OR 5 WIDE X 2 DEEP (NO ONE CONDUIT IS TO BE COMPLETELY SURROUNDED ON ALL FOUR SIDES BY OTHER CONDUITS), USING SPACERS AND ONE SACK CONCRETE SLURRY BACKFILL. CONDUITS MAY ALSO BE INSTALLED SIDE BY SIDE ON THE BOTTOM OF THE TRENCH WITHOUT SPACERS OR CONCRETE SLURRY (4 CONDUITS MAX.). IN THE TRANSITION AREA WHERE THE CONDUITS FROM THE BOTTOM OF THE TRENCH START TOWARD THE SURFACE (THE STRAIGHT PORTION BY THE 90° BEND), SPACERS MAY BE REQUIRED TO ALLOW THE 90° BENDS TO ENTER STRAIGHT INTO THE PAD OPENING. AT THE SURFACE POINT, THE CONDUITS MAY BE BUNDLED TOGETHER. USE SDG&E APPROVED BASE, SHADING AND BACKFILL.

D. THE TOP AND INTERMEDIATE 3314 HANDHOLE SECTIONS MAY BE ELIMINATED WHEN INSTALLATION SERVES ONLY ONE CUSTOMER ULTimately AND CONDUIT REQUIREMENTS DO NOT EXCEED PAGE 3426.1 OR AS SPECIFIED IN NOTE "F". IF MORE THAN FIVE 5 INCH CONDUITS ARE USED (REGARDLESS OF THE NUMBER OF CUSTOMERS), ONE TOP SECTION AND TWO INTERMEDIATE SECTIONS ARE REQUIRED.

F. FOR SECONDARY INSTALLATION WITHOUT A HANDHOLE (ULTIMATELY ONE CUSTOMER ONLY), ANY COMBINATION OF 3 INCH, 4 INCH OR 5 INCH SECONDARY CONDUITS MAY BE USED PROVIDED THEY DO NOT EXCEED A TOTAL OF SIX OR THE TOTAL OF EACH SIZE CONDUIT SHOWN ON PAGE 3426.1. TWO EXTRA 1 INCH OR TWO EXTRA 2 INCH CONDUITS MAY BE ADDED TO SERVE STREET LIGHT, RECREATION BUILDINGS, ETC.

G. FOR SECONDARY INSTALLATIONS WITH A HANDHOLE, ANY COMBINATION OF 3 INCH, 4 INCH, OR 5 INCH SECONDARY CONDUITS MAY BE USED, PROVIDED THEY DO NOT EXCEED THE TOTAL OF 9 OR THE MAXIMUM OF EACH SIZE CONDUIT (9-3", 9-4" OR 6-5"). TWO EXTRA 1 INCH OR TWO EXTRA 2 INCH CONDUITS MAY BE ADDED TO SERVE STREET LIGHT, RECREATION BUILDINGS, ETC.

H. WHEN THE NUMBER OF REQUIRED CONDUITS IS LESS THAN THE TOTAL SHOWN ON THE SKETCHES, INSTALL THE CONDUITS IN NUMBERED SEQUENCE AS SHOWN.
INSTALLATION CONT'

I. IF THE INSTALLATION IS FOR A 12KV TO 4KV TRANSFORMER (HPR TYPE), DO NOT USE HANDHOLE AND TERMINATE CONDUITS FLUSH WITH TOP OF PAD.

J. INSTALL HANDHOLE 36" X 72" (STANDARD 3314), ONE TOP SECTION (STOCK NUMBER 336210), TWO INTERMEDIATE SECTIONS (STOCK NUMBER 336212) AND ONE PARKWAY COVER (WITH LIP STOCK NUMBER 286843).

K. IN SOFT SOILS A CONCRETE BACKFILL (1-SACK MIX.) IS REQUIRED UNDER THE PAD, 12 INCHES BEYOND THE SIDE EDGES OF PAD AND 12 INCHES DEEP.

REFERENCE:

P. SEE STANDARD 3211 FOR PAD IDENTIFICATION.

Q. SEE STANDARD 3370 OR 3371 FOR TRENCH, UTILITY POSITIONING, SHADING AND BACKFILL REQUIREMENTS.

R. SEE STANDARD 3376 FOR CONCRETE SLURRY, SHADING AND TYPE OF CONDUIT.

S. SEE STANDARD 3481 FOR TRANSFORMER BARRIER PROTECTION.

T. SEE STANDARD 3483 FOR MINIMUM OPERATING AND CLEARANCE REQUIREMENTS (PAD PLACEMENT).

U. SEE STANDARD 3484 FOR PAD INSTALLATION OF PAD—MOUNTED EQUIPMENT.

V. SEE STANDARD 3486 FOR RETAINING WALL REQUIREMENTS AND CLEARANCES FROM REVERSE SUBGRADE RETAINING WALLS.

W. SEE STANDARD 3487 FOR RETAINING WALLS.

X. SEE STANDARD 3751 FOR TRANSFORMER INSTALLATION.

Y. SEE STANDARD 4512 FOR EQUIPMENT GROUNDING.

Z. SEE STANDARD 4514 FOR GROUNDING TELCO CONDUCTOR IN PAD—MOUNTED EQUIPMENT.
**SCOPE:**

THIS STANDARD SHOWS THE REQUIREMENTS FOR INSTALLING A 3427 THREE-PHASE PAD FOR DEAD FRONT TRANSFORMER APPLICATION FROM 1500 KVA THROUGH 2500 KVA AND 3000 KVA LIVE FRONT TRANSFORMER. DEADFRONT TRANSFORMERS BETWEEN 225 KVA & 1000 KVA MAX. ARE TO BE USED ON THIS PAD. WHENEVER THE CONDUIT REQUIREMENTS ARE GREATER THAN THE MAXIMUM SHOWN ON PAGE 3425.2 OR 3426.2. (SEE STANDARD 3756 FOR CONDUIT PLACEMENT OF STEP-DOWN TRANSFORMER INSTALLATION).

PAD

WEIGHT: 4000# MIN. 4100# MAX.

**STOCK NUMBER**

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<tr>
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<table>
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<td>3427B3</td>
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**MAXIMUM PRIMARY CONDUITS ALLOWED**

2 RUNS OF 4" (EB OR DB) PRIMARY CONDUITS

CONDUIT ARRANGEMENT WITHOUT HANDHOLE FOR ONE CUSTOMER ULTIMATELY (SEE NOTES D & F)
MAXIMUM PRIMARY CONDUITS ALLOWED
2 RUNS OF 4" (EB OR DB)

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<tr>
<td></td>
<td>CONCRETE BACKFILL 3427CB</td>
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NOTES:
- SET TRANSFORMER ON THE PAD AS FAR TO THE LEFT AS POSSIBLE IN ORDER TO OBTAIN MAXIMUM CLEARANCE IN THE SECONDARY COMPARTMENT FOR CABLE TRAINING.
- TRANSFORMER COOLING FINS MAY OVERHANG REAR OF PAD BY 6 INCHES.
- TRANSFORMERS BETWEEN 225 KVA AND 1000 KVA MAY BE USED ON THIS PAD WHENEVER THE CONDUIT REQUIREMENTS ARE GREATER THAN THE MAXIMUM SHOWN ON PAGE 3425.2 OR 3426.2.
- PAD MAY NOT BE POURED IN PLACE. USE PRECAST PADS ONLY.

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INSTALLATION:

A. 1 INCH EARTH IN THE BOTTOM OF THE TRENCH IS REQUIRED TO PREVENT DAMAGE FROM ROCKS, SAGS OR POCKETS.

B. PLACE ALL SECONDARY CONDUITS WITHIN THE PAD OR HANDHOLE OPENING AS SHOWN ON PAGES 3427.1 OR 3427.2. TERMINATE PRIMARY OR SECONDARY CONDUITS FLUSH WITH TOP OF THE PAD. WHEN A HANDHOLE IS REQUIRED FOR SECONDARY CONDUITS, TERMINATE THEM NOT LESS THAN 3 INCHES ABOVE BOTTOM OF HANDHOLE. DO NOT CUT INTO THE CURVED PORTION OF THE ELBOWS. RADIUS OF CURVATURE IS 36 INCHES MINIMUM FOR 3 INCH, 4 INCH AND 5 INCH CONDUITS.

C. THE CONDUIT CONFIGURATION REQUIREMENT BETWEEN TERMINATING POINTS LIMITS THE SECONDARY CONDUIT CONFIGURATION TO 2 WIDE X 6 DEEP OR 6 WIDE X 2 DEEP (NO ONE CONDUIT IS TO BE COMPLETELY SURROUNDED ON ALL FOUR SIDES BY OTHER CONDUITS) USING SPACERS AND 1 SACK CONCRETE SLURRY BACKFILL. CONDUITS MAY ALSO BE INSTALLED SIDE BY SIDE ON THE BOTTOM OF THE TRENCH WITHOUT SPACERS OR CONCRETE SLURRY (4 CONDUITS MAX.). IN THE TRANSITION AREA WHERE THE CONDUITS FROM THE BOTTOM OF THE TRENCH START TOWARD THE SURFACE (THE STRAIGHT PORTION BY THE 90° BEND), SPACERS MAY BE REQUIRED TO ALLOW THE 90° BENDS TO ENTER STRAIGHT INTO THE PAD OPENING. AT THE SURFACE POINT, THE CONDUITS MAY BE BUNDLED TOGETHER. USE SDG&E APPROVED BASE, SHADING AND BACKFILL.

D. THE 3314 HANDHOLE SECTIONS ARE NOT REQUIRED WHEN INSTALLATION SERVES ONLY ONE CUSTOMER ULTIMATELY AND CONDUIT REQUIREMENTS DO NOT EXCEED PAGE 3427.1 OR AS SPECIFIED IN NOTE "F". IF MORE THAN FIVE 5 INCH CONDUITS ARE USED (REGARDLESS OF THE NUMBER OF CUSTOMERS), ONE TOP SECTION AND TWO INTERMEDIATE ARE REQUIRED.

E. FOR SECONDARY INSTALLATIONS WITHOUT A HANDHOLE (ULTIMATELY ONE CUSTOMER ONLY), ANY COMBINATION OF 3 INCH, 4 INCH OR 5 INCH SECONDARY CONDUITS MAY BE USED PROVIDED THEY DO NOT EXCEED THE TOTAL OF EACH SIZE CONDUIT SHOWN ON PAGE 3427.1. TWO EXTRA 1 INCH OR TWO EXTRA 2 INCH CONDUITS MAY BE ADDED TO SERVE STREET LIGHT, RECREATION BUILDINGS, ETC.

F. FOR SECONDARY INSTALLATIONS WITH A HANDHOLE, ANY COMBINATION OF 3 INCH, 4 INCH OR 5 INCH SECONDARY CONDUITS MAY BE USED PROVIDED THEY DO NOT EXCEED THE TOTAL OF 12 OR THE MAXIMUM OF EACH SIZE CONDUIT (12-3", 12-4" OR 12-5"). TWO EXTRA 1 INCH OR TWO EXTRA 2 INCH CONDUITS MAY BE ADDED TO SERVE STREET LIGHT, RECREATION BUILDINGS, ETC.

G. WHEN NUMBER OF REQUIRED CONDUITS IS LESS THAN TOTAL SHOWN ON SKETCHES, INSTALL CONDUITS IN NUMBERED SEQUENCE AS SHOWN.
INSTALLATION CONT:

I. Install handhole 36" x 72" (standard 3314), one top section (stock number 332610), two intermediate sections (stock number 336212) and one parkway cover (with lip stock number 286843).

J. A concrete backfill (1-sack mix.) is required under the pad, 12 inches beyond the side edges of pad and 12 inches deep.

REFERENCE:

P. See standard 3211 for pad identification.

Q. See standard 3370 or 3371 for trench, utility positioning, shading and backfill requirements.

R. See standard 3376 for concrete slurry, shading and type of conduit.

S. See standard 3481 for transformer barrier protection.

T. See standard 3483 for minimum operating and clearance requirements (pad placement).

U. See standard 3484 for pad installation of pad-mounted equipment.

V. See standard 3486 for retaining wall requirements and clearances from reverse subgrade retaining walls.

W. See standard 3487 for retaining walls.

X. See standard 3751 for transformer installation.

Y. See standard 4512 for equipment grounding.

Z. See standard 4514 for grounding telco conductor in pad-mounted equipment.
SCOPE: THIS STANDARD SHOWS THE BOX PAD TRAYER 4-WAY SWITCH.
INSTALLATION - CONDUIT
A. INSTALL CONDUITS AND TERMINATE THEM NOT LESS THAN 3 INCHES (76) ABOVE THE GRAVEL BASE.
B. DO NOT CUT THE 90 DEGREE ELBOWS ON CURVE.
C. SCADA ANTENNA CONDUIT IS TO BE LOCATED ON THE LEFT SIDE OF THE WINDOW.
   STUB-OUT CONDUIT OUT 4 FT.
D. INSTALL ONE CONDUIT PER SWITCH POSITION.
E. COMPLETELY SLURRY ENCASE ALL 5 INCH 90 DEGREE BENDS TO WITHIN 7 INCHES (178) OF FINISH CUT OF THE CONDUIT.

NOTE: IDENTIFIES CONDUIT LOCATION FOR SWITCH WAY POSITION.

BILL OF MATERIAL:

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<th>DESCRIPTION</th>
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<tr>
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<td>1 SACK SLURRY</td>
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<td>BOX PAD EXCAVATION</td>
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</tbody>
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INSTALLATION - BOX PAD
F. ALWAYS INSTALL BOX PAD WITH WINDOW SIDE PARALLELED TO STREET OR SIDEWALK.
G. ESTABLISH THE BOX PAD LOCATION PAYING PARTICULAR ATTENTION TO FOREIGN UTILITY PLACEMENTS. RELOCATING THE BOX REQUIRES APPROVAL FROM PROJECT MANAGEMENT. WHEN INSTALLING ADJACENT TO NEW OR EXISTING HANDHOLES ALLOW 17 FEET MINIMUM FROM THE CLOSEST EDGE OF HANDHOLE TO THE CENTERLINE OF THE BOX PAD.
H. MARK OUT DIMENSIONS FOR THE EXCAVATION WIDTH AND LENGTH PER DRAWING BELOW. THE WIDTH AND LENGTH DIMENSIONS GIVEN ALLOW AN EXTRA 12 INCHES (305) FOR SETTING BOX PAD.
I. ADD 4 INCHES (102) OF GRAVEL TO BOTTOM OF EXCAVATION AND THEN COMPACT THIS MATERIAL BY HAND OR MACHINE.
J. PLACE THE BOX PAD IN THE EXCAVATION WITH THE WINDOW SIDE OF THE BOX PAD PARALLELED TO AND AS CLOSE AS POSSIBLE TO BACK EDGE OF SIDEWALK.
K. LEVEL BOX PAD.
L. SET THE TOP SURFACE OF THE BOX PAD 4 INCHES (102) ABOVE FINAL GRADE. MAYBE SET AT 6" FOR MINOR GRADE ADJUSTMENTS TO BACK OR SIDES OF PAD.
M. BACKFILL THE OUTSIDE WITH ONE SACK SLURRY. STOP SLURRY 6 INCHES (152) FROM FINISH GRADE; CONTINUE TO BACKFILL WITH NATIVE SOIL TO FINISH GRADE.

REFERENCE:
N. SEE STANDARD 3211 FOR INSTALLATION OF IDENTIFICATION TAG.
O. SEE STANDARD 3365 FOR SLURRY BACKFILL.
P. SEE STANDARD 3463 FOR MINIMUM OPERATING AND CLEARANCE REQUIREMENTS.
Q. SEE STANDARD 3466 FOR RETAINING WALL REQUIREMENTS AND CLEARANCES FROM REVERSE WHEELBASE RETAINING WALLS.
R. SEE STANDARD 4510.1 FOR TRENCH GROUND WIRE (PREFERRED)
S. SEE STANDARD 3550 FOR SWITCH INSTALLATION.
SCOPE: THIS STANDARD SHOWS THE BOX PAD TRAYER 5-WAY SWITCH.

MANUFACTURER PROGLASS, INC SG1045630

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SERVICE GUIDE

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<th>Completely Revised</th>
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<td>BOX PAD FOR 5-WAY TRAYER PAD-MOUNTED SWITCH</td>
<td>3429.0</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
INSTALLATION - CONDUIT

A. Install conduits and terminate them not less than 3 inches (76) above the gravel base.
B. Do not cut the 90 degree elbows on curve.
C. SCADA antenna conduit is to be located on the left side of the window.
D. Install one conduit per switch position.
E. Completely slurry encase all 5 inch 90 degree bends to within 7 inches (178) of finish cut of the conduit.

NOTE: Identifies conduit location for switch way position.

BILL OF MATERIAL:

<table>
<thead>
<tr>
<th>ITEM</th>
<th>DESCRIPTION</th>
<th>QUANTITY</th>
<th>STOCK NUMBER</th>
<th>ASSEMBLY UNITS</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>BOX PAD</td>
<td>1</td>
<td>S514036</td>
<td>3429BP</td>
</tr>
<tr>
<td>2</td>
<td>GRAVEL, 3/8&quot; - 3/4&quot;</td>
<td>AS REQ'D</td>
<td>601600</td>
<td></td>
</tr>
<tr>
<td>3</td>
<td>1 SACK SLURRY</td>
<td>AS REQ'D</td>
<td>656400</td>
<td></td>
</tr>
<tr>
<td>4</td>
<td>BOX PAD EXCAVATION</td>
<td>1</td>
<td></td>
<td>X3429</td>
</tr>
</tbody>
</table>

INSTALLATION - BOX PAD

F. Always install box pad with window side paralleled to street or sidewalk.
G. Establish the box pad location paying particular attention to foreign utility placements. Relocating the box requires approval from project management.
When installing adjacent to new or existing handholes allow 17 feet minimum from the closest edge of handhole to the centerline of the box pad.
H. Mark out dimensions for the excavation width and length per drawing below. The width and length dimensions given allow an extra 12 inches (305) for setting box pad.
I. Add 4 inches (102) of gravel to bottom of excavation and then compact this material by hand or machine.
J. Place the box pad in the excavation with the window side of the box pad paralleled to and as close as possible to back edge of sidewalk.
K. Level box pad.
L. Set the top surface of the box pad 4 inches (102) above final grade. Maybe set at 6" for minor grade adjustments to back or sides of pad.
M. Backfill the outside with one sack slurry. Stop slurry 6 inches (152) from finish grade; continue to backfill with native soil to finish grade.

REFERENCE:

N. See Standard 3211 for installation of identification tag.
O. See Standard 3365 for slurry backfill.
P. See Standard 3483 for minimum operating and clearance requirements.
Q. See Standard 3486 for retaining wall requirements and clearances from reverse subgrade retaining walls.
R. See Standard 4510.1 for trench ground wire (preferred)
S. See Standard 3550 for switch installation.

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SERVICE GUIDE | Indicates Latest Revision | Completely Revised | New Page | Information Removed
REVISON | | | |
DATE 4-29-08 | BOX PAD FOR 5-WAY TRAYER PAD-MOUNTED SWITCH | 3429.2
APPD TR/MC | | | |
SCOPE: This standard shows the dimensional criteria for installation of pad-mounted transformer sound enclosures. Enclosures are to be used when transformers noise is to be reduced.

INSTALLATION:
A. CUSTOMER SHALL INSTALL, OWN, AND MAINTAIN TRANSFORMER ENCLOSURE.
B. ENCLOSURE WALLS SHALL CONSIST OF REINFORCED CONCRETE, NOT LESS THAN 6 INCHES IN THICKNESS, OR REINFORCED CONCRETE BLOCK, NOT LESS THAN 8 INCHES IN THICKNESS.
C. THE ENCLOSURE MUST BE DESIGNED TO MEET BUILDING CODE REQUIREMENTS. THE DESIGN CALCULATIONS AND DRAWINGS ARE TO BE STAMPED AND SIGNED BY A CIVIL OR STRUCTURAL ENGINEER REGISTERED IN THE STATE OF CALIFORNIA.
D. INSIDE DIMENSIONS OF ENCLOSURE TO BE BASED ON TRANSFORMER PAD SELECTION AS DESIGNATED BY SDG&E PLANNER/DESIGNER.

<table>
<thead>
<tr>
<th>PAD (UGS REF.)</th>
<th>A (WIDTH)</th>
<th>B (LENGTH)</th>
<th>C (LENGTH)</th>
<th>D (HEIGHT)</th>
</tr>
</thead>
<tbody>
<tr>
<td>3421</td>
<td>94&quot;</td>
<td>72&quot;</td>
<td>90&quot;</td>
<td>52&quot;</td>
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<td>83&quot;</td>
<td>101&quot;</td>
<td>89&quot;</td>
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<tr>
<td>3426</td>
<td>126&quot;</td>
<td>99&quot;</td>
<td>117&quot;</td>
<td>98&quot;</td>
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<tr>
<td>3427</td>
<td>146&quot;</td>
<td>116&quot;</td>
<td>134&quot;</td>
<td>114&quot;</td>
</tr>
</tbody>
</table>

THESE ARE MINIMUM REQUIREMENTS FOR DEAD FRONT TRANSFORMER INSTALLATIONS THROUGH 1000KVA. HEIGHT REQUIREMENTS MAY INCREASE FOR LARGER TRANSFORMER INSTALLATIONS. FUTURE LOAD ADDITIONS SHOULD BE CONSIDERED.

F. ENCLOSURE COVER TO BE PITCHED (2%) TO PROMOTE DRAINAGE TO SIDE OR REAR OF ENCLOSURE.

G. ENCLOSURE COVER TO BE CONSTRUCTED OF STEEL OR STEEL REINFORCED CONCRETE SOLID COVER TO BE REMOVABLE AND FITTED WITH FOUR (4) REMOVABLE LIFTING EYES. COVER WEIGHT SHALL BE STENCILED ON THE UNDER SIDE OF THE COVER.

H. ENCLOSURE COVER TO BE SECURED TO WALL STRUCTURE WITH PINS OR BOLTS TO PREVENT LATERAL MOVEMENT.

I. WHEN OPTIONAL ENCLOSURE GATE IS PROVIDED USE LENGTH C SHOWN ABOVE, GATE TO BE OF TYPE CONSTRUCTION TO PROVIDE FULL VENTILATION. GATE MUST BE A MINIMUM OF 18 INCHES IN FRONT OF TRANSFORMER PAD. GATE TO BE LATCHED WITH HASP TO PROVIDE FOR SDG&E PADLOCK.

J. MINIMUM CRANE OPERATING HEADROOM CLEARANCE IS 20 FEET ABOVE PAD. UTILITY TRUCK ACCESS TO BE WITHIN 10 FEET OF ENCLOSURE.

K. VENT OPENINGS ARE REQUIRED IN WALL 8" X 16", (8 INCHES UP FROM BASE AND 8 INCHES FROM EACH REAR CORNER). DO NOT VENT INTO BUILDINGS.

L. CONCRETE IS REQUIRED BETWEEN THE WALL AND THE PAD AND SHALL BE A MINIMUM OF 3–1/2 INCHES THICK. SLOPE CONCRETE SLIGHTLY TOWARD THE FRONT IN ALL INSTALLATIONS.

M. PAD LOCATED OR POSITIONED IN RELATION TO ADJACENT BUILDINGS SHALL BE PER UNDERGROUND STANDARD 3483.5 SERVICE GUIDE 500.4).

N. OPEN SIDE OF ENCLOSURE REQUIRES 8'-0" CLEAR WORK AREA IN FRONT OF PAD. AVOID FACING OPEN SIDE TO ADJACENT BUILDINGS OR INACCESSIBLE AREAS.

REFERENCES:
Q. SEE STANDARD 3483 FOR MINIMUM OPERATING CLEARANCE REQUIREMENTS FOR PAD–MOUNTED AND SUBSURFACE EQUIPMENT.

P. SEE STANDARD 3484 TO SET TRANSFORMER PADS FOR NOISE CONTROL.

Q. SEE DESIGN STANDARD 5612 FOR TRANSFORMER NOISE CRITERIA.

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This standard illustrates barrier post usage when needed to protect SDG&E facilities from passenger vehicles, trucks, forklifts, trailers or other heavy mobile items (like dumpsters for example).

Please see underground standard 3483 for specific operating clearances.

Requirements for pad-mounted equipment. See design manual 5240.2/.3 for criteria to locate pad-mounted equipment in public right-of-way. See design manual 5240.4 to determine when to install barrier posts to protect pad-mounted equipment along side roadways.

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**CUSTOMER WARNING**

Call "Underground Service Alert" (U.S.A.)

Two working days before you dig to verify the location of underground utilities.

Call toll free: 1-800-227-2600

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**SDG&E ELECTRIC STANDARDS**

**EQUIPMENT BARRIER PROTECTION AND CLEARANCE**
NOTES:
- CAUTION MUST BE TAKEN WHEN INSTALLING BARRIER POSTS SO THAT THEY DO NOT MAKE CONTACT WITH ANY UNDERGROUND UTILITIES.
- DO NOT INSTALL TRAFFIC POSTS IF ABOVE GROUND OBJECTS EXIST WHICH PROTECT PAD–MOUNTED EQUIPMENT FROM VEHICULAR TRAFFIC.

INSTALLATION:
A. USE 4 INCH STEEL PIPE, (NOT GALVANIZED) WITH A MINIMUM WALL THICKNESS OF 0.188 INCHES. THE PIPE SHALL BE PRIMED AND PAINTED WHITE.
B. AN 8 FOOT MINIMUM CLEARANCE FROM ANY ABOVE GROUND OBJECT, IS REQUIRED IN FRONT OF THE PAD ON THE SIDE THE EQUIPMENT DOOR OPENS FOR HOT STICK OPERATION.
C. WHEN USING THE LARGER 3427 TRANSFORMER PAD OR PAD–MOUNTED SWITCH PAD, ADDITIONAL BARRIERS ARE REQUIRED AS SHOWN.
D. ALL BARRIERS REQUIRED IN FRONT OF THE EQUIPMENT DOORS MUST BE REMOVABLE.
E. THE CONCRETE ENCASEMENT SHALL BE A MINIMUM OF 6 INCHES THICK IN STABLE SOIL AND 12 INCHES THICK IN SANDY OR UNSTABLE SOIL.
F. MAY BE REDUCED TO 24 INCHES IN TIGHT AREAS.
G. INCREASE DISTANCE AS REQUIRED FOR A THREE–PHASE TRANSFORMER WITH HANDHOLE.
H. DRILL FOUR 1/4 INCH DIAMETER HOLES AS SHOWN TO PREVENT SUCTION WHEN POSTS ARE REMOVED.
I. A WELDED CAP OR BLANK MAY BE USED IN LIEU OF CONCRETE CAP.
J. DRILL A 11/16 INCH HOLE COMPLETELY THROUGH REMOVABLE POST. THIS WILL ALLOW FOR A 5/8 INCH BOLT WHICH MAY BE USED FOR REMOVAL OF THE POST.
### SCOPE:

This standard shows the minimum retaining wall and operating clearances required for pads and subsurface structures.

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#### PAD Usage

<table>
<thead>
<tr>
<th>Pad Usage</th>
<th>Const STD</th>
<th>Pad or Structure Dimensions and Minimum Operating Width</th>
<th>Minimum Clearance Dimensions</th>
</tr>
</thead>
<tbody>
<tr>
<td>RTU PAD</td>
<td>3409</td>
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</tr>
<tr>
<td>Three-phase cable terminating cabinet 600A to 200A</td>
<td>3410</td>
<td>7'-3&quot; (2210) 4'-9&quot; (1461) 18&quot; (457) 18&quot; (457) 18&quot; (457) 8&quot; (2438)</td>
<td></td>
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<tr>
<td>Three-phase capacitor</td>
<td>3414</td>
<td>5'-4&quot; (1626) 5'-0&quot; (1524) 8&quot; (2438) 8&quot; (2438) 18&quot; (457)</td>
<td></td>
</tr>
<tr>
<td>Three-phase service restorer</td>
<td>3415</td>
<td>5&quot; (1524) 4'-9&quot; (1461) 18&quot; (457) 18&quot; (457) 18&quot; (457) 8&quot; (457)</td>
<td></td>
</tr>
<tr>
<td>Three-phase cable terminating cabinet (200 AMP)</td>
<td>3416</td>
<td>6'-8&quot; (2210) 2'-6&quot; (762) 18&quot; (457) 18&quot; (457) 18&quot; (457) 8&quot; (2438)</td>
<td></td>
</tr>
<tr>
<td>Three-phase cable terminating cabinet (600 AMP)</td>
<td>3417</td>
<td>4&quot; (1219) 3'-10&quot; (1168) 8&quot; (2438) 8&quot; (2438) 18&quot; (457)</td>
<td></td>
</tr>
<tr>
<td>Three-phase PME 3 switch (600 AMP)</td>
<td>3418</td>
<td>5'-10&quot; (1788) 3'-8&quot; (1118) 8&quot; (2438) 8&quot; (2438) 18&quot; (457) 4'-4&quot; (1321)</td>
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<tr>
<td>3-Way vista box pad</td>
<td>3419</td>
<td>5'-4&quot; (1626) 5'-1&quot; (1524) 3' (1219) 8&quot; (457) 18&quot; (457) 18&quot; (457)</td>
<td></td>
</tr>
<tr>
<td>Single-phase cable terminator (future transformer installations)</td>
<td>3421</td>
<td>3'-10&quot; (1168) 4'-0&quot; (1219) 18&quot; (457) 18&quot; (457) 18&quot; (457) 8&quot; (2438)</td>
<td></td>
</tr>
<tr>
<td>Three-phase fuse cabinet (vertical &amp; horizontal mount)</td>
<td>3421</td>
<td>4'-0&quot; (1219) 3'-10&quot; (1168) 8&quot; (2438) 8&quot; (2438) 18&quot; (457)</td>
<td></td>
</tr>
<tr>
<td>Single-phase fused sectionizing cabinet</td>
<td>3421</td>
<td>4'-0&quot; (1219) 3'-10&quot; (1168) 8&quot; (2438) 8&quot; (2438) 18&quot; (457)</td>
<td></td>
</tr>
<tr>
<td>Single-phase cable terminator (25-167 KVA)</td>
<td>3421</td>
<td>3'-10&quot; (1168) 4&quot; (1219) 18&quot; (457) 18&quot; (457) 18&quot; (457) 8&quot; (2438)</td>
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<tr>
<td>Pad mounted</td>
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<td>3'-10&quot; (1168) 4&quot; (1219) 48&quot; (1219) 18&quot; (457) 18&quot; (457) 8&quot; (2438)</td>
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<tr>
<td>MVI fuse cabinet</td>
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<td>6'-1&quot; (1854) 6'-6&quot; (1811) 8&quot; (2438) 8&quot; (2438) 4'-4&quot; (1321)</td>
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<tr>
<td>Three-phase PME 9 switch (600 AMP)</td>
<td>3423</td>
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<tr>
<td>Three-phase PME 10 switch (600 AMP)</td>
<td>3423</td>
<td>6'-1&quot; (1854) 6'-6&quot; (1811) 8&quot; (2438) 8&quot; (2438) 4'-4&quot; (1321)</td>
<td></td>
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<tr>
<td>Three-phase PME 11 switch (600 AMP)</td>
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<td>6'-1&quot; (1854) 6'-6&quot; (1811) 8&quot; (2438) 8&quot; (2438) 4'-4&quot; (1321)</td>
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<tr>
<td>Three-phase automatic transfer switch (600 AMP S &amp; C)</td>
<td>3423</td>
<td>6'-1&quot; (1854) 6'-6&quot; (1811) 8&quot; (2438) 8&quot; (2438) 18&quot; (457) 6&quot; (1829)</td>
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## PAD USAGE (CONTINUED)

<table>
<thead>
<tr>
<th>PAD USAGE</th>
<th>CONST STD.</th>
<th>PAD OR STRUCTURE DIMENSIONS AND MINIMUM OPERATING WIDTH</th>
<th>MINIMUM CLEARANCE DIMENSIONS</th>
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<tr>
<td>THREE-PHASE PRIMARY METER CABINET</td>
<td>3425</td>
<td>6'-6&quot; (1981), 4'-11&quot; (1499)</td>
<td>'a': 18&quot;, 'b': 18&quot;, 'c': 5&quot;, 'd': 8&quot;</td>
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<td>THREE-PHASE TRANSFORMER</td>
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<td>6'-6&quot; (1981), 4'-11&quot; (1499)</td>
<td>'a': 18&quot;, 'b': 18&quot;, 'c': 2&quot;, 'd': 8&quot;</td>
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<td>THREE-PHASE TRANSFORMER</td>
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<td>6'-3&quot; (1905), 4'-11&quot; (1499)</td>
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<td>THREE-PHASE LIVEFRONT TRANSFORMER</td>
<td>3427</td>
<td>8'-2&quot; (2489), 7'-8&quot; (2337)</td>
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<tr>
<td>THREE-PHASE TRAYER SWITCH 4-WAY</td>
<td>3428</td>
<td>7'-0&quot; (2134), 4'-8&quot; (1422)</td>
<td>'a': 4'-4&quot;, 'b': 18&quot;, 'c': 2&quot;, 'd': 8&quot;</td>
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<tr>
<td>THREE-PHASE TRAYER SWITCH 5-WAY</td>
<td>3429</td>
<td>8'-8&quot; (2642), 4'-8&quot; (1422)</td>
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</table>

### CABLE JUNCTION PEDESTAL

<table>
<thead>
<tr>
<th>STRUCTURE USAGE</th>
<th>CONST STD.</th>
<th>PAD OR STRUCTURE DIMENSIONS AND MINIMUM OPERATING WIDTH</th>
<th>MINIMUM CLEARANCE DIMENSIONS</th>
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<tbody>
<tr>
<td>PRIMARY</td>
<td>3523A</td>
<td>4'-10&quot; (1473), 2'-6&quot; (762)</td>
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</tbody>
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### SUBSTRUCTURE CLEARANCES FROM ABOVE GROUND OBJECTS

<table>
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<tr>
<th>SUBSTRUCTURE USAGE</th>
<th>CONST. STD.</th>
<th>PAD OR STRUCTURE DIMENSIONS AND MINIMUM OPERATING WIDTH</th>
<th>MINIMUM CLEARANCE DIMENSIONS</th>
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<tr>
<td>SECONDARY</td>
<td>3312</td>
<td>1'-10&quot; (559), 2'-11&quot; (689)</td>
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<td>2'-8&quot; (813), 3'-8&quot; (1118)</td>
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<tr>
<td>SECONDARY/PRIMARY</td>
<td>3314</td>
<td>6'-8&quot; (2032), 3'-8&quot; (1118)</td>
<td>'a': 5', 'b': 18&quot;, 'c': 8&quot;, 'd': 5'</td>
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<tr>
<td>SECONDARY/PRIMARY</td>
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<td>7'-6&quot; (2288), 5'-0&quot; (1524)</td>
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<tr>
<td>SECONDARY/PRIMARY</td>
<td>3316</td>
<td>9'-6&quot; (2896), 6'-0&quot; (1829)</td>
<td>'a': 5', 'b': 18&quot;, 'c': 8&quot;, 'd': 5'</td>
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<tr>
<td>PRIMARY SWITCH ENCLOSURE</td>
<td>3317</td>
<td>10'-0&quot; (3048), 8'-0&quot; (2438)</td>
<td>'a': 5', 'b': 18&quot;, 'c': 8&quot;, 'd': 5'</td>
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<tr>
<td>NECK SECTION, SECONDARY/PRIMARY</td>
<td>3332</td>
<td>10'-0&quot; (1930), 8'-0&quot; (1676)</td>
<td>'a': 5', 'b': 18&quot;, 'c': 8&quot;, 'd': 5'</td>
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</tbody>
</table>
NOTES:
- THIS STANDARD DOES NOT APPLY TO EXISTING COMMUNICATION PEDESTALS PROVIDING THEY ARE NO CLOSER THAN 4 INCHES TO THE PAD AND THEY DO NOT OBSTRUCT THE DOORS OR THE 8 FOOT WORK SPACE.
- THIS PAGE DOES NOT APPLY TO PREFORMED RETAINING WALLS IN STANDARD 3484.3.
- WALL MOUNTED FUSE CABINETS REQUIRE 8' MINIMUM CLEARANCE IN FRONT OF THE CABINET FOR HOT STICK OPERATION.
- THE OPERATING CLEARANCES DESCRIBED IN THIS STANDARD SHALL APPLY TO BUSHES, HEDGES AND OTHER LANDSCAPING MATERIALS. LOW GROUND COVER IS EXCLUDED.
- PAD SIDE OPPOSITE WINDOW OPENING (SEE STANDARD 3414)
- ** 5 FOOT OPERATING CLEARANCE IS REQUIRED ONLY FOR HOT STICK OPERATION OF LOADBREAK EQUIPMENT (CABLE TAP(S) WITH LOADBREAK ELBOWS LOCATED ON THE STREET SIDE OF HANDHOLE), IF THIS LOADBREAK EQUIPMENT IS NOT PRESENT OR NO FUTURE CABLE TAPS ARE ANTICIPATED IN THIS AREA, MAINTAIN 18" MINIMUM CLEARANCE.

*** RETAINING WALLS ARE NOT REQUIRED WHEN THE SLOPE REMAINS 6" BELOW AND PARALLEL TO THE JOINT BETWEEN THE BASE AND COVER OF TERMINATOR, SEE STD. 3523.4A

REFERENCE:
A. SEE STANDARDS 3486.2 FOR RETAINING WALL REQUIREMENTS AND ONE-PHASE TRANSFORMER PAD LOCATIONS SHOWING CATV AND/OR TELCO LOCATIONS.
B. SEE STANDARDS 3486.3 FOR CLEARANCES BETWEEN SDG&E FACILITIES AND OTHER ABOVE GROUND OBJECTS.
NOTES:

- 'x' = 8 foot min. for hot stick operation.
- 'y' = slope of grade in front of the pad not to exceed 8 foot horizontal run to 3 foot vertical rise.
- 'z' = 6 foot min. flat grade for hot stick operation.
- An effort should be made to keep the 'x' measurement to a flat grade. If this is not possible, the 'x' measurement shall not exceed an 8 foot horizontal run to 3 foot vertical rise.
- An 8 foot clearance is required in front of the pad-mount equipment for hot stick operation. SDG&E handholes and manholes may occupy or be installed within the 8 foot clearance. Provide a 5 foot clearance from pads to 33 1/4 and larger substructures.

REFERENCE:

A. See Standard 3486 for retaining wall requirements and clearances from reverse subgrade retaining walls.

B. See Standard 3484 for installation of pad mounted equipment.
NOTES:

- 'X' = 5 FOOT MIN. WHEN HOT STICK OPERATION IS REQUIRED, OTHERWISE BASIC CLEARANCES APPLY ACCORDING TO THE "MINIMUM OPERATING CLEARANCE REQUIREMENTS" ON PAGES 3483.1, .2, .3, AND .5.

- IF THE SUBSTRUCTURE IS NOT TO BE LOCATED IN THE STREET, AN EFFORT SHOULD BE MADE TO KEEP THE 'X' MEASUREMENT TO A FLAT GRADE. IF THIS IS NOT POSSIBLE, THE 'X' MEASUREMENT SHALL NOT EXCEED AN 8 FOOT HORIZONTAL RUN TO 3 FOOT VERTICAL RISE.

- A 5 FOOT CLEARANCE IS REQUIRED IN FRONT OF THE SUBSTRUCTURE FOR HOT STICK OPERATION. SDG&E HANDHOLES AND MANHOLES MAY OCCUPY OR BE INSTALLED WITHIN THE 8 FOOT CLEARANCE REQUIRED IN FRONT OF SDG&E "PAD-MOUNTED" EQUIPMENT. PROVIDE A 5 FOOT CLEARANCE FROM PAD TO 3314 AND LARGER SUBSTRUCTURES.

REFERENCE:

A. SEE STANDARD 3485 FOR INSTALLATIONS OF SUBSTRUCTURES ON SLOPING GRADERS.
INSTALLATION:

A. CLEARANCES SHALL BE MEASURED FROM ALL ABOVE-GROUND OBJECTS. PADS WHERE DIMENSION "d" IS LESS THAN 5 FEET FROM EDGE OF PAVEMENT OR FRONT OF CURB, AND NO ABOVE-GROUND OBJECTS TO PROTECT EQUIPMENT EXIST, SHALL HAVE BARRIER PROTECTION PER STANDARD 3481.

B. DIMENSION "c" SHALL BE THE SAME AS DIMENSION "d" WHEN CABLE TAPS ARE ON BOTH SIDES OF THE HANDBOle.

C. CLEARANCES ARE REQUIRED AT THE SIDE(S) OR END(S) OF SUBSTRUCTURES, PAD-MOUNTED EQUIPMENT, ETC., WHERE HOT STICK OPERATION IS REQUIRED. SDG&E HANDBOLES AND MANHOLES MAY OCCUPY OR BE INSTALLED WITHIN THE REQUIRED CLEARANCES. PROVIDE A 5 FOOT CLEARANCE FROM PADS TO 3314 AND LARGER SUBSTRUCTURES.

D. FOR EQUIPMENT CONTAINING OIL & CAPACITORS NEXT TO COMBUSTIBLE BUILDINGS, THE "a", "b", "c" DIMENSIONS SHALL NOT BE LESS THAN 3 FEET FROM BUILDING SURFACES. FOR ALL TRANSFORMERS, DIMENSION "c" MUST BE INCREASED TO 3'-6" FOR COMBUSTIBLE BUILDING SURFACES OR 2'-6" FOR NONCOMBUSTIBLE BUILDING SURFACES ALLOWING ROOM FOR TRANSFORMER COOLING FINS IN EACH INSTALLATION. "a" & "b" DIMENSIONS MAY BE REDUCED TO 2 FEET IF BUILDING SURFACES ARE NONCOMBUSTIBLE (AS DEFINED IN G.O. 128 RULE 34.3 D) AND NOISE CLEARANCE REQUIREMENTS ARE MET FOR TRANSFORMERS.

"NONCOMBUSTIBLE" BUILDING SURFACES OR MATERIALS APPROVED BY THE UNIFORM BUILDING CODE AS HAVING A MINIMUM FIRE RATING OF ONE HOUR INCLUDE BUT ARE NOT LIMITED TO:
- STEEL STUDDED DRYWALL, STEEL STUDDED STUCCO OR OTHER MATERIALS ON STEEL STUDS HAVING MINIMUM FIRE RATING OF ONE HOUR;
- BRICK, CLAY, TILE, CONCRETE, IRON, STEEL AND STONE.

"COMBUSTIBLE" BUILDING SURFACES OR MATERIALS INCLUDE BUT ARE NOT LIMITED TO:
- WOOD STUDDED STUCCO AND WOOD STUDDED DRYWALL.

IF ROOF OVERHANG IS 20 FEET OR LESS ABOVE TOP OF ANY PAD-MOUNTED EQUIPMENT, THE MINIMUM HORIZONTAL CLEARANCE FROM END OF OVERHANG TO THE NEAREST EDGE OF THE PAD SHALL NOT BE LESS THAN 3'-6" OR 2'-6" IF THE OVERHANG IS NONCOMBUSTIBLE AND THE CLEARANCE DOES NOT CREATE A NOISE PROBLEM. IF THE ROOF OVERHANG IS MORE THAN 20 FEET, THE PAD-MOUNTED EQUIPMENT MAY BE PLACED UNDER THE OVERHANG. IF IN DOUBT THAT A NOISE PROBLEM MAY DEVELOP, CONTACT DESIGN PLANNING.

F. PADS ARE PERMITTED IN THE SIDEWALKS PROVIDED THE WALK IS WIDER THAN 4 FEET NOT INCLUDING THE CURB. A 4 FOOT USEABLE WALKWAY (NOT INCLUDING THE CURB) MUST BE PROVIDED FOR WHEELCHAIR ACCESS. DO NOT INSTALL PADS IN TRAILS SUCH AS BIKE, JOGGING, WALKING, EQUESTRIAN, ETC.

G. ANY UNDERGROUND FACILITY, SUBSURFACE OR PAD-MOUNTED WITH LOADBREAK CAPABILITY, e.g., CABLE TAPS IN HANDBOLES, PAD-MOUNTED TRANSFORMERS AND FUSED SWITCHING CABINET, SHALL MAINTAIN A 25 FOOT RADIAL CLEARANCE FROM ANY TANK, VENT OF FILL-TUBE THAT CONTAINS FLAMMABLE LIQUIDS, GASES, VAPORS OR MIXTURES. DIESEL FUEL IS COMBUSTIBLE BUT NOT FLAMMABLE, THEREFORE DIESEL TANKS ARE ALLOWED WITHIN THE 25 FOOT RADIUS. SEE SERVICE GUIDE PG. 311 FOR INSTALLING UNDERGROUND SERVICE LATERAL TO GASOLINE DISPENSING AND SERVICE STATIONS.

REFERENCE:

H. SEE STANDARD 3478 FOR TRANSFORMER SOUND ENCLOSURE.
I. SEE STANDARD 3481 FOR EQUIPMENT BARRIER PROTECTION AND CLEARANCE.
J. SEE STANDARD 3484 FOR PAD INSTALLATION OF PAD-MOUNTED EQUIPMENT AND 3484.1 FOR SETTING TRANSFORMER PADS FOR NOISE CONTROL.
K. SEE STANDARD 3486 FOR RETAINING WALL REQUIREMENTS AND CLEARANCES FROM REVERSE SUBGRADE RETAINING WALLS.
L. SEE STANDARD 3485 AND 3487 FOR RETAINING WALLS.
M. SEE DESIGN MANUAL STANDARD 5612 FOR TRANSFORMER NOISE CLEARANCE REQUIREMENTS.

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SCOPE: THIS STANDARD SHOWS THE INSTALLATION OF PADS USED FOR MOUNTING PAD-MOUNTED EQUIPMENT.

BILL OF MATERIAL:

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INSTALLATION:

A. SET PADS TO FINAL GRADE. SET 3416 PAD 6 INCHES ABOVE AND 3 INCHES BELOW FINAL GRADE.

B. PADS ARE PERMITTED IN THE SIDEWALK PROVIDED THE WALK IS WIDER THAN 4 FEET NOT INCLUDING THE CURB. IN A SIDEWALK OR PAVED AREAS, SET PADS 2 INCHES ABOVE THE PAVEMENT, SET 3440 PAD 3" ABOVE THE PAVEMENT. IN AREAS WHERE THERE IS LIMITED SPACE AND THE 4 FEET CANNOT BE OBTAINED THE PAD MAY BE SET FLUSH WITH THE WALK IN ORDER TO OBTAIN, THE REQUIRED 4 FOOT DISTANCE. THIS IS PROVIDED IT IS APPROVED BY GOVERNMENTAL (PERMITTING AGENCIES) AND IT IS NOT A LOW AREA WHERE WATER MAY DRAIN OR COLLECT.

C. FOR PADS ON SLOPING GRADES BEHIND SIDEWALKS, IN PAVED OR UNPAVED AREAS SET UP TO HALF OF THE PAD BELOW GRADE ON THE HIGH SIDE OF THE SLOPE (DO NOT EXCEED HALF THE PAD). ON THE LOW SIDE OF THE SLOPE SET THE PAD TO THE FINAL GRADE (SEE SKETCH ABOVE).

D. SET TRANSFORMER PADS FOR NOISE CONTROL AS FOLLOWS:
   - TRANSFORMER PADS WITHIN A PAVED AREA, LEAVE 6 INCHES OF EARTH BENEATH THE PAD AND FELT EXPANSION JOINT AROUND THE SIDES OF THE PAD OR INSTALL A FELT EXPANSION JOINT BENEATH AND AROUND THE SIDES OF THE PAD.
   - TRANSFORMER PADS LOCATED OVER AN UNDERGROUND PARKING AREA OF A BUILDING MUST BE PLACED BETWEEN WALLS AND NOT OVER BEARING WALLS.

REFERENCE:

G. SEE STANDARD 3211 FOR EQUIPMENT PAD IDENTIFICATION.
H. SEE STANDARD 3478 FOR TRANSFORMER SOUND ENCLOSURE.
I. SEE STANDARD 3481 FOR EQUIPMENT BARRIER PROTECTION.
J. SEE STANDARD 3483 FOR MINIMUM OPERATING CLEARANCE REQUIREMENTS (PAD PLACEMENT).
K. SEE STANDARD 3486 FOR RETAINING WALL REQUIREMENTS AND CLEARANCES FROM REVERSE SUBGRADE RETAINING WALLS.
L. SEE STANDARD 3487 FOR RETAINING WALL REQUIREMENTS.
M. SEE STANDARD 4510 FOR PREFERRED AND ALTERNATE TRENCH GROUND WIRE INSTALLATION.
N. SEE STANDARD 4512 FOR EQUIPMENT GROUNDING INSTALLATION.
O. SEE STANDARD 4514 FOR GROUNDING TELCO CONDUCTOR IN PAD-MOUNTED EQUIPMENT.
**SCOPE:** This standard shows the installation and material required to set equipment pad on sloping grades.

**NOTES:**
- An 8 foot clearance is required in front of the pad–mounted equipment for hot stick operation. Company handholes and manholes may occupy or be installed within the 8 foot clearance. Provide a 5 foot clearance from pads to 3314 and larger substructures.

**INSTALLATION:**
A. Align pad to final grade.
B. Install concrete block as required.
C. For 600 amp three–phase pad–mounted switch, slurry backfill (1 sack sand slurry) 22 inches deep around the 3423 pad box.
D. Install prefomed plastic retaining walls as required.
E. Slope of grade in front of the pad not to exceed 8 foot horizontal run to 3 foot vertical rise.
F. Butt the front of the pad against the wall.

**REFERENCE:**
I. See standards 3483 for minimum operating and clearance requirements (pad placement).
J. See standard 3484 for installation of pad mounted equipment.
K. See standard 3486 for retaining wall requirements and clearances from reverse subgrade retaining walls.
**SCOPE:**
This standard shows the preformed plastic retaining wall used to protect pad-mounted equipment against corrosion from soil contact on sloping grades.

**TYPICAL INSTALLATION**

**NOTES:**
- Wall shall be used on sloping grades where a retaining wall of 14 inches or less is required. Maximum slope of retained earth: 4 to 1 (horizontal run to vertical rise).
- This type wall to be used only in installations per the "Wall Usage Table" above.

**INSTALLATION:**
A. Set the pad, excavate around the pad area allowing room for the wall. Excavation shall be level, allowing an extra 7 inches outside the wall for backfill and tamping.
B. The bottom portion of the excavation shall start 2 inches below ground level and continue into the sloping bank.
C. Set the wall, fill and tamp the backfill. The preferred installation is to butt the 4-1/4 inch portion against the sidewalk as shown in detail A. If this is not possible, pour concrete between the pad and sidewalk. In rural areas without sidewalks, concrete is not required in front of the pad & wall.
D. Concrete or asphalt is required between the wall and the pad and shall be a minimum of 3-1/2 inches thick. Slope the concrete or asphalt slightly toward the front in all installations.

**REFERENCE:**
G. See standard 3484 for installation of pad-mounted equipment.
H. See standard 3486 for clearances from reverse subgrade retaining walls.
I. See standard 3487 for masonry retaining wall.
J. See standard 4512 for equipment grounding.

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**SCOPE:** This standard shows the installation and material required to set substructures on sloping grades.

**SUBSURFACE TRANSFORMER ENCLOSURE**
(FIELD MAINTENANCE ONLY)
3399.401 AND 3399.404

**MULTI-SECTION HANDHOLES**
3399.101, 3314, 3315, 3316

**MANHOLES - 36" OPENING**
(FIELD MAINTENANCE ONLY)
3399.201, 3399.202, 3399.306, 3399.307

**MANHOLES - 48" OPENING**
3325, 3326, 3399.203, 3399.205, 3399.305

**INSTALLATION:**

A. Align top section to final grade. Pour concrete (4-sack mix with 3/8" pea gravel or as required by city or county codes).

**REFERENCE:**

B. See Standard 3483 for minimum operating and clearance requirements (substructure placement).

C. See Standard 3486 for retaining wall requirements and clearances from reverse subgrade retaining walls.

D. See Standard 3487 for retaining walls where banks or excessive slopes exist.

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<th>Indicates Latest Revision</th>
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SCOPE: This standard shows when retaining walls are required (top drawing) and minimum clearance requirements from pad-mounted and/or subsurface equipment from reverse subgrade retaining walls (bottom drawing).

WHEN RETAINING WALLS ARE REQUIRED

NOTES:
- This standard does not apply to the preformed plastic retaining wall shown on standard 3484.

INSTALLATION:
A. Walls are required when slope comes within three feet of a flat grade adjacent to a pad or substructure. The flat grade is established from the top of a pad. (See example above).
B. SDG&E will determine when walls are required if they are not included on the job print.

MINIMUM CLEARANCE REQUIREMENTS FROM PAD-MOUNTED AND/OR SUBSURFACE EQUIPMENT TO REVERSE SUBGRADE RETAINING WALLS

INSTALLATION:
A. Minimum operating clearance requirements specified in standard 3483 shall prevail when hot stick operation of loadbreak equipment is required.
B. Walls are required when slope comes within two feet of a flat grade adjacent to a pad or substructure. The flat grade is established from the bottom of a pad.
C. A minimum of 90% compaction is required under the pad area and the two foot flat grade area adjacent to the pad and/or substructure.
D. Safety fencing shall be installed when required by city or county codes.
F. SDG&E will determine when walls are required if they are not included on the job print.

REFERENCE:
G. See standard 3483 for minimum operating clearance requirement (substructure placement).
H. See standard 3484 and 3487 for retaining walls.
I. See standard 3423 for switch pad clearance requirements.
SCOPE: THIS STANDARD SHOWS SINGLE-PHASE TRANSFORMER PAD LOCATIONS ADJACENT TO CATV AND/TELCO AND RETAINING WALLS FOR SINGLE-PHASE TRANSFORMERS.

MINIMUM AREA REQUIRED FOR SINGLE-PHASE PAD RIGHT OF WAY IS (6'-8" X 8'-6")

PAD AND FOREIGN UTILITY LOCATIONS MAY BE REVERSED

CONCRETE AREA A

MEASUREMENT PER CATV AND/OR TELCO REQUIREMENTS

LOT LINE

SINGLE-PHASE TRANSFORMER PAD

DOOR

SIDEWALK

8" 18"

6'-8"

80"

3'-0"

18"

90"

7'-6"

46"

3'-0"

48"

18"

APPLICATION:

A. THE CONCRETE AREA SHALL BE A MINIMUM OF 3 1/2" INCHES THICK. SLOPE THE CONCRETE TOWARD THE FRONT OR SIDEWALK.

REFERENCE:

F. SEE STANDARD 3483 FOR PAD CLEARANCE REQUIREMENTS WITHOUT CATV AND/OR TELCO.

G. SEE STANDARD 3486 FOR RETAINING WALL REQUIREMENTS AND CLEARANCES FROM REVERSE SUBGRADE RETAINING WALLS.

H. SEE STANDARD 3487 FOR RETAINING WALLS.

I. SEE STANDARD 4512 FOR EQUIPMENT GROUNDING INSTALLATION.

J. SEE STANDARD 3486.3 CLEARANCES BETWEEN SDG&E FACILITIES AND OTHER ABOVE GROUND OBJECTS.

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SCOPE: THE PURPOSE OF THIS DRAWING IS TO ILLUSTRATE THE REQUIRED CLEARANCES FROM ABOVE GROUND OBJECTS AND MINIMUM HOT STICK CLEARANCE.

REFERENCE: SEE STANDARD 3486.2 FOR RETAINING WALL REQUIREMENTS AND SINGLE-PHASE PAD LOCATIONS SHOWING CATV FOR TELCO LOCATIONS.
SCOPE: THIS STANDARD SHOWS RETAINING WALLS FOR LEVEL BACKFILL TO PROTECT PAD-MOUNTED AND SUBSURFACE EQUIPMENT.

TYPICAL SECTION
5'-4" max

TYPICAL SECTION
over 5'-4"

DIMENSIONS AND REINFORCING STEEL

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NOTES: 1. THIS STANDARD WAS DEVELOPED BASED ON THE SAN DIEGO REGIONAL STANDARD DRAWINGS. 2. SEE STANDARD DRAWING 3487.7 FOR STEPPED WALL FOOTING DETAILS. 3. SEE STANDARD DRAWINGS 3487.8, 3487.9 AND 3487.10 FOR ADDITIONAL NOTES AND DETAILS. 4. FILL ALL BLOCK CELLS WITH GROUT.

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REVISION  SDG&E ELECTRIC STANDARDS

DATE 5-20-2013  MASONRY RETAINING WALLS TYPE 1 (LEVEL BACKFILL)  3487.1

APPD TR / DW
SCOPE: This standard shows retaining walls for sloping backfill to protect pad-mounted and subsurface equipment.

NOTES: 1. This standard was developed based on the San Diego regional standard drawings.
2. See standard drawing 3487.7 for stepped wall footing details.
3. See standard drawings 3487.8, 3487.9 and 3487.10 for additional notes and details.
4. Fill all block cells with grout.

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**SCOPE:**
This standard shows retaining walls for level backfill to protect pad-mounted and subsurface equipment.

**NOTES:**
1. This standard was developed based on the San Diego Regional Standard Drawings.
2. See Standard Drawing 3487.7 for stepped wall footing details.
3. See Standard Drawings 3487.8, 3487.9 and 3487.10 for additional notes and details.
4. Fill all block cells with grout.

**DIMENSIONS AND REINFORCING STEEL**

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SCOPE: THIS STANDARD SHOWS RETAINING WALLS FOR SLOPING BACKFILL TO PROTECT PAD-MOUNTED AND SUBSURFACE EQUIPMENT.

DIMENSIONS AND REINFORCING STEEL

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<td>0'-10&quot;</td>
<td>#4 @ 16&quot;</td>
<td>#6 @ 16&quot;</td>
<td>#6 @ 8&quot;</td>
<td>8 @ 4&quot;</td>
<td>12&quot; x 12&quot;</td>
</tr>
</tbody>
</table>

NOTES:
1. THIS STANDARD WAS DEVELOPED BASED ON THE SAN DIEGO REGIONAL STANDARD DRAWINGS.
2. SEE STANDARD DRAWING 3487.7 FOR STEPPED WALL FOOTING DETAILS.
3. SEE STANDARD DRAWINGS 3487.8, 3487.9 AND 3487.10 FOR ADDITIONAL NOTES AND DETAILS.
4. FILL ALL BLOCK CELLS WITH GROUT.

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SERVICE GUIDE | Indicates Latest Revision | Completely Revised | New Page | Information Removed
--- | --- | --- | --- | ---
3487.4 | | | | |

SDG&E ELECTRIC STANDARDS

Revision
DATE 10-28-08
APPD TR / MC
**SCOPE:**
This standard shows retaining walls for level backfill to protect pad-mounted and subsurface equipment.

**TYPICAL SECTION**
5'-4" max

**DIMENSIONS AND REINFORCING STEEL**

<table>
<thead>
<tr>
<th>WALL HEIGHT</th>
<th>W(min)</th>
<th>T(min)</th>
<th>R</th>
<th>S</th>
<th>BARS A</th>
<th>BARS B</th>
<th>BARS C</th>
<th>BARS D</th>
<th>BARS E</th>
<th>KEY SIZE (wide x high)</th>
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<tr>
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<td>2'-1&quot;</td>
<td>0'-8&quot;</td>
<td>0'-9&quot;</td>
<td>0'-8 1/2&quot;</td>
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**NOTES:**
1. This standard was developed based on the San Diego Regional Standard Drawings.
2. See Standard Drawing 3487.7 for stepped wall footing details.
3. See Standard Drawings 3487.8, 3487.9 and 3487.10 for additional notes and details.
4. Fill all block cells with grout.

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**SERVICE GUIDE**

<table>
<thead>
<tr>
<th>REVISION</th>
<th>SERVICE GUIDE</th>
</tr>
</thead>
<tbody>
<tr>
<td>DATE 5-20-2013</td>
<td>Indicates Latest Revision</td>
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</table>

**SDG&E ELECTRIC STANDARDS**

**MASSONRY RETAINING WALLS TYPE 5**
(LEVEL BACKFILL)

3487.5
**SCOPE:**

This standard shows retaining walls for sloping backfill to protect pad-mounted and subsurface equipment.

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**DIMENSIONS AND REINFORCING STEEL**

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<tr>
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**NOTES:**

1. This standard was developed based on the San Diego regional standard drawings.
2. See standard drawing 3487.7 for stepped wall footing details.
3. See standard drawings 3487.8, 3487.9 and 3487.10 for additional notes and details.
4. Fill all block cells with grout.

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SCOPE: This standard shows retaining walls for level or sloped backfill to protect pad-mounted and subsurface equipment.

NOTES: 1. This standard was developed based on the San Diego Regional Standard Drawings.
2. Fill all block cells with grout.
3. Wall heights and footing types vary depending on selected retaining wall type and site conditions.
SCOPE: THIS STANDARD SHOWS RETAINING WALLS FOR LEVEL OR SLOPED BACKFILL TO PROTECT PAD-MOUNTED AND SUBSURFACE EQUIPMENT.

NOTES: 1. THIS STANDARD WAS DEVELOPED BASED ON THE SAN DIEGO REGIONAL STANDARD DRAWINGS.
2. FILL ALL BLOCK CELLS WITH GROUT.
3. ALL MASONRY WALLS SHALL BE CONSTRUCTED WITH CAP, KEY AND DRAINAGE DETAILS AS SHOWN HEREON.
4. 4" DIAMETER DRAIN MAY BE FORMED BY PLACING A BLOCK ON ITS SIDE.
GENERAL NOTES:
1. WALLS ARE TO BE USED ONLY FOR THE LOADING CONDITIONS SHOWN FOR EACH TYPE WALL. THE DESIGN HEIGHTS ARE MEASURED FROM THE TOP OF THE FOUNDATION, NOT FROM FINISHED GRADE & ARE NOT TO BE EXCEEDED WHEN USING THESE STANDARD DESIGNS. WALLS NOT MEETING THE SPECIFICATIONS IN THIS STANDARD ARE TO BE DESIGNED BY CIVIL/STRUCTURAL ENGINEERING FOR THE SPECIFIC CONDITIONS REQUIRED.

2. THE CONTRACTOR SHALL PROVIDE & MAINTAIN ADEQUATE ERECTION, SHORING AND BRACING AS REQUIRED FOR STABILITY OF ALL WALLS & EMBANKMENTS DURING ALL PHASES OF CONSTRUCTION.

3. BEFORE COMMENCING ANY EXCAVATIONS, THE CONTRACTOR SHALL VERIFY THE LOCATION OF ALL UNDERGROUND UTILITIES, VALVE BOXES, VAULTS OR ANY OTHER UNDERGROUND OBSTRUCTIONS, AND NOT PERFORM ANY WORK THAT WILL INTERFERE WITH THEIR SERVICE. NOTIFY SDG&E OF ANY OBSTRUCTIONS FOUND THAT INTERFERE WITH CONSTRUCTION.

4. TO INSURE PROPER BONDING BETWEEN THE FOOTING & WALL, A MORTAR KEY SHALL BE FORMED BY EMBEDDING A FLAT 2x4 FLUSH WITH & AT THE TOP OF THE FRESHLY POURED FOOTING. THE 2x4 SHOULD BE REMOVED AFTER THE CONCRETE HAS STARTED TO HARDEN (APPROXIMATELY 1 HOUR).

5. WALL DRAINS SHALL BE PROVIDED AS SHOWN IN THIS STANDARD.

6. NO BACKFILL MATERIAL SHALL BE PLACED AGAINST MASONRY RETAINING WALLS UNTIL GROUT HAS REACHED DESIGN STRENGTH OR UNTIL GROUT HAS CURED FOR A MINIMUM OF 28 DAYS & BUILDING DEPARTMENT INSPECTION IS COMPLETE. COMPACTION OF BACKFILL MATERIAL BY JETTING OR PONDING WITH WATER WILL NOT BE PERMITTED. EACH LAYER OF BACKFILL SHALL BE MOISTENED & THOROUGHLY TAMPED, ROLLED OR OTHERWISE COMPACTED UNTIL THE RELATIVE COMPACTING IS NOT LESS THAN 90%.

7. SAFETY FENCING SHALL BE INSTALLED AT THE TOP OF THE WALL AS REQUIRED BY THE AGENCY.

REINFORCED CONCRETE:
1. ALL CONCRETE SHALL HAVE A MINIMUM COMPRESSIVE STRENGTH AT 28 DAYS OF 2,000 PSI, MAXIMUM 4" SLUMP (MAX. SLUMP OF 8" PERMITTED WITH ADDITION OF APPROVED PLASTICIZER) & MAXIMUM 1" AGGREGATE. MAXIMUM WATER/CEMENT RATIO TO BE 0.45. CEMENT SHALL CONFORM TO 'TYPE II MODIFIED' AS DEFINED BY THE MOST CURRENT EDITION OF CALTRANS STANDARD SPECIFICATIONS.

2. ALL REINFORCING STEEL SHALL BE WELL-SECURED IN POSITION PRIOR TO PLACING CONCRETE.

3. BOTTOMS OF FOUNDATIONS SHALL BE CLEANED OF LOOSE MATERIAL & DAMPENED PRIOR TO PLACING CONCRETE IN FOOTINGS.

4. CONSTRUCTION JOINTS ARE TO BE USED ONLY WHERE SHOWN ON THE APPROVED PLANS. ADDITIONAL JOINTS PROPOSED BY THE CONTRACTOR MUST BE APPROVED BY SDG&E PRIOR TO START OF CONSTRUCTION. THE SURFACE OF ALL CONSTRUCTION JOINTS SHALL BE CLEANED & ROUGHENED BY REMOVING THE ENTIRE SURFACE AND EXPOSING CLEAN AGGREGATE SOLIDLY EMBEDDED IN MORTAR PRIOR TO PLACING NEW CONCRETE. SURFACE AT JOINTS SHALL BE ROUGHENED TO 3/4" MINIMUM AMPLITUDE.

5. ALL CONCRETE SHALL BE MIXED, DELIVERED, PLACED AND CURED PER THE LATEST EDITION OF ACI 301. MECHANICAL VIBRATORS SHALL BE USED.
CONCRETE BLOCK MASONRY:
1. CONCRETE MASONRY UNITS SHALL BE TYPE I MEDIUM WEIGHT UNITS IN CONFORMANCE WITH ASTM C90 (f’m = 1500 psi).
2. MORTAR SHALL BE TYPE S IN CONFORMANCE WITH ASTM C270 WITH AN ULTIMATE COMpressive STRENGTH OF 1800 PSI.
3. GROUT SHALL HAVE AN ULTIMATE COMpressive STRENGTH OF 2000 PSI.
4. ALL CELLS SHALL BE SOLID GROUTED & CONSOLIDATED WITH A MECHANICAL VIBRATOR.
5. WHEN GROUTING IS STOPPED FOR ONE HOUR OR LONGER, HORIZONTAL CONSTRUCTION JOINTS SHALL BE FORMED BY STOPPING THE GROUT POUR 1½" BELOW THE TOP OF THE UPPERMOST UNIT.
6. APPLY CLEAR WATER REPELLENT SEALER TO ALL EXPOSED SURFACES AFTER REQUIRED MOISTURE CONTENT IS REACHED, IN ACCORDANCE WITH THE MANUFACTURER’S RECOMMENDATIONS (5 YEAR GUARANTEE).

REINFORCING STEEL:
1. REINFORCING STEEL SHALL CONFORM TO ASTM A615, GRADE 60.
2. BAR LAP SPLICE LENGTHS SHALL BE 48 BAR DIAMETERS MINIMUM.
3. FOOTING DOWELS SHALL MATCH VERTICAL REINFORCING IN SIZE, GRADE & SPACING UNLESS OTHERWISE NOTED.
4. ALL DETAILING, FABRICATION AND ERECTION OF REINFORCING STEEL SHALL CONFORM TO THE LATEST EDITION OF ACI 315, DETAILS AND DETAILING OF CONCRETE REINFORCING.
5. MINIMUM CONCRETE COVER FOR REINFORCING STEEL SHALL BE AS FOLLOWS UNLESS SHOWN OTHERWISE ON DRAWINGS:
   CONCRETE CAST AGAINST EARTH .......... 3"  
   ALL OTHER .................................. 2"

INSPECTIONS:
CALL THE GOVERNING JURISDICTION FOR INSPECTIONS AS FOLLOWS:
* WHEN THE FOOTING HAS BEEN FORMED & CLEANED, WITH THE STEEL TIED SECURELY IN FINAL POSITION AND READY FOR CONCRETE PLACEMENT.
* WHERE CLEANOUT HOLES ARE NOT PROVIDED:
   AFTER THE BLOCKS HAVE BEEN Laid UP TO A HEIGHT OF 4 FT. OR FULL HEIGHT FOR WALLS UP TO 5 FT., WITH STEEL IN PLACE BUT BEFORE THE GROUT IS Poured AND AFTER THE FIRST LIFT IS PROPERLY GROUTED, THE BLOCKS HAVE BEEN Laid UP TO THE TOP OF THE WALL WITH THE STEEL TIED SECURELY IN PLACE BUT BEFORE THE UPPER LIFT IS GROUTED.
* WHERE CLEANOUT HOLES ARE PROVIDED:
   AFTER THE BLOCKS HAVE BEEN Laid UP TO THE TOP OF THE WALL, WITH THE STEEL TIED SECURELY IN PLACE, BUT BEFORE GROUTING.
* AFTER GROUTING IS COMPLETE & AFTER WALL DRAINAGE IS IN PLACE BUT BEFORE EARTH BACKFILL IS PLACED.
* FINAL INSPECTION WHEN ALL WORK HAS BEEN COMPLETED.

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<table>
<thead>
<tr>
<th>SUBSTRUCTURE</th>
<th>MAJOR USE LIMITATION</th>
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<tbody>
<tr>
<td>3309.1 36&quot; x 24-1/4&quot; x 18&quot; SINGLE-PHASE HANDHOLE</td>
<td>3309.1 HANDHOLE SINGLE PHASE ALLOWS A MAX OF 3 CONNECTORS WITH 8 TERMINAL POSITIONS EACH. THE 8 RUNS SHALL NOT EXCEED ONE RUN 500 KCMIL, 3 RUNS 350 KCMIL, TWO RUNS 3/0 AND ONE STREET LIGHT RUN.</td>
</tr>
<tr>
<td>3309.2 36&quot; x 24-1/4&quot; x 26&quot; SINGLE-PHASE HANDHOLE</td>
<td>3309.2 HANDHOLE SINGLE PHASE ALLOWS A MAXIMUM 3 CONNECTORS WITH 7 TERMINAL POSITIONS EACH. THE 7 RUNS SHALL NOT EXCEED 2 RUNS 500 KCMIL, 2 RUNS 350 KCMIL, AND TWO RUNS 3/0 AND ONE STREET LIGHT RUN.</td>
</tr>
<tr>
<td>3309.2 36&quot; x 24-1/4&quot; x 26&quot; THREE-PHASE HANDHOLE</td>
<td>3309.2 HANDHOLE THREE-PHASE ALLOWS A MAXIMUM OF 4 CONNECTORS WITH 7 TERMINAL POSITIONS EACH. THIS SHALL NOT EXCEED 5 RUNS THREE-PHASE CONSISTING OF ONE RUN 350 KCMIL AND 4 RUNS 3/0 AND ONE STREET LIGHT RUN.</td>
</tr>
<tr>
<td>3311 14&quot; x 66&quot; x 14&quot; HANDHOLE</td>
<td>FOR PRIMARY AND SECONDARY CABLE TRAINING BETWEEN TWO SINGLE-PHASE PAD-MOUNT TRANSFORMERS CONNECTED IN AN OPEN DELTA BANK.</td>
</tr>
<tr>
<td>3311 14&quot; x 108&quot; x 14&quot; HANDHOLE</td>
<td>FOR PRIMARY AND SECONDARY CABLE TRAINING BETWEEN THREE SINGLE-PHASE PAD-MOUNT TRANSFORMERS FOR CLOSED DELTA BANK, WHEN HKR TRANSFORMER CANNOT BE USED.</td>
</tr>
<tr>
<td>3312 17&quot; x 30&quot; x 12&quot; HANDHOLE-1 BODY SECONDARY AND UNDER PAD</td>
<td>3312 HANDHOLE MAY BE USED FOR REPLACEMENT OF EXISTING FACILITIES, ALL FACILITIES REQUIRING 30&quot; x 17&quot; BOX UNDER PAD MOUNTED EQUIPMENT.</td>
</tr>
<tr>
<td>3313 24&quot; x 36&quot; x 24&quot; HANDHOLE (SECONDARY)</td>
<td>HANDHOLE ALLOWS A MAXIMUM OF FOUR RUNS OF 350 KCMIL SINGLE-PHASE OR THREE-PHASE PLUS SERVICES SMALLER THAN 350, OR A MAXIMUM OF THREE RUNS OF 500 KCMIL SINGLE-PHASE OR THREE-PHASE. NO PRIMARY AND SECONDARY ALLOWED TOGETHER. NO 1000 KCMIL ALLOWED.</td>
</tr>
<tr>
<td>3313 24&quot; x 36&quot; x 24&quot; HANDHOLE (PRIMARY)</td>
<td>HANDHOLE ALLOWS SINGLE-PHASE (6.9KV OR 12KV) PRIMARY CABLE DEADBREAK CONNECTIONS FOR TWO RUNS (200 AMP TEE CONNECTOR WITH DEADBREAK ELBOWS ONLY, NOT A STRAIGHT SPLICE) OR ONE 3-WAY CABLE TAP AND LOADBREAK ELBOWS WITH THREE CABLE RUNS MAXIMUM. #2 SOLID IS THE MAXIMUM CABLE ON EACH INSTALLATION. NO FUSED ELBOWS OR 4-WAY CABLE TAPS ALLOWED. NO SECONDARY ALLOWED.</td>
</tr>
<tr>
<td>3314 36&quot; x 6&quot; x 48&quot; HANDHOLE (PRIMARY &amp; SECONDARY)</td>
<td>FOR THREE-PHASE #2/0 OR SMALLER PRIMARY CABLE PLUS SECONDARIES (500 KCMIL MAX). AN UNOBSTRUCTED SPACE OF 18&quot; X 42&quot; MUST BE MAINTAINED. EXAMPLE: A MAXIMUM INSTALLATION WOULD BE THREE 4-WAY CABLE TAPS WITH LOADBREAK ELBOWS ON ONE WALL AND TWO RUNS OF 3/C - 2/0 ON OPPOSITE WALL. ONE OF THESE RUNS CAN HAVE THREE STRAIGHT SPLICES (PAGE 3646.1, FIGURE 1). THIS WOULD NOT ALLOW ANY SECONDARIES, FUSED OR ELBOWS. TO OBTAIN REQUIRED UNOBSTRUCTED SPACE, THE 3/C - 2/0 SPLICES AND STRAIGHT RUN MUST BE RACKED ON THE SMALL CABLE HOOKS (SEE STANDARD 4178). SEE STANDARD 3649 FOR EQUIPMENT COMBINATION GUIDELINES.</td>
</tr>
</tbody>
</table>
**SCOPE:** This standard shows customer installed conduit for a residential or commercial service lateral.

<table>
<thead>
<tr>
<th>CUSTOMER INSTALLED SERVICE EQUIPMENT OR BUS AMPACITY</th>
<th>CUSTOMER INSTALLED SERVICE RISER Bend and Service Lateral Conduit SIZE FOR 3 OR 4-WIRE RUN</th>
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<tr>
<td><strong>RESIDENTIAL &amp; MULTI-FAMILY</strong> <em>2</em></td>
<td><strong>COMMERCIAL &amp; INDUSTRIAL</strong> <em>2</em></td>
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<tr>
<td>0-200 AMPs <em>1</em></td>
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<tr>
<td>201-400 AMPs 1 Ø</td>
<td>1-3&quot;  *3</td>
</tr>
<tr>
<td>201-400 AMPs 3 Ø</td>
<td>1-4&quot;  *3</td>
</tr>
<tr>
<td>401-800 AMPs</td>
<td>2-4&quot;  *5, *6</td>
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<td>801-1200 AMPs</td>
<td>3-4&quot;</td>
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<td>1201-1600 AMPs</td>
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<td>2501-3000 AMPs</td>
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<td>3001-3500 AMPs</td>
<td>5-4&quot;</td>
</tr>
<tr>
<td>3501-4000 AMPs</td>
<td>7-5&quot;</td>
</tr>
</tbody>
</table>

* 225 AMPS RESIDENTIAL

**DEPTH OF TRENCH** IS DETERMINED BY TYPE OF SUBSTRUCTURE AT SOURCE. VERIFY WITH SDG&E INSPECTOR PRIOR TO EXCAVATION.

**SDG&E UNDERGROUND DISTRIBUTION SYSTEM:**

1. SOURCE: MANHOLE, HANDHOLE OR PAD-MOUNT TRANSFORMER.
   SDG&E WILL FURNISH, INSTALL, OWN AND MAINTAIN - (SUBJECT TO INSTALLATION CHARGES CONSULT SDG&E PLANNER):

2. SERVICE LATERAL CONDUCTORS AND CONNECTORS FROM SDG&E UNDERGROUND DISTRIBUTION SYSTEM, ITEM 1, TO CUSTOMER'S SERVICE TERMINATING FACILITY, ITEM 8. SDG&E WILL MAKE CONNECTIONS.
   CUSTOMER SHALL FURNISH, INSTALL, OWN AND MAINTAIN AT THEIR EXPENSE:

3. A CLEAR ROUTE ON ANY PRIVATE PROPERTY, THAT IS CLEAR OF OBSTRUCTIONS WHICH WOULD INHIBIT THE CONSTRUCTION OF SERVICE FACILITIES. SERVICE LATERAL CONDUIT FROM SOURCE (ITEM 1) TO TERMINATING FACILITY (ITEM 8). CONDUIT SIZE SHALL BE BASED ON AMPERE CAPACITY OF BUS OR SERVICE EQUIPMENT, WHICHER IS GREATER AND DISTANCE FROM TRANSFORMER TO TERMINATING FACILITY (ITEM 8). CONDUIT MATERIAL FROM ITEM 1 TO ITEM 8 SHALL BE APPROVED NONMETALLIC CONDUIT IN ACCORDANCE WITH SDG&E STANDARD 3373. BETWEEN ITEM 6 AND ITEM 8 THE CONDUIT INSTALLER MUST PROVIDE A 3/4" PULLING AND MEASURING TAPE IN EACH CONDUIT. THE PULLING TAPE MUST BE APPROVED BY SDG&E AND HAVE A MINIMUM AVERAGE TENSILE STRENGTH OF 2500 LBS, AND BE WOVEN POLYESTER HIGH STRENGTH, CONTINUOUS FILAMENT, PRE-LUBRICATED WITH FOOTAGE MARKING. PULLING TAPE TAILS OF 24 INCHES SHALL BE SECURED AT EACH END OF THE CONDUIT. THE PULLING TAPE SHALL BE PULLED IN BEHIND THE MANDREL. WHEN THE PULLING AND MEASURING TAPE IS INSTALLED IT SHALL BE ONE CONTINUOUS LENGTH WITHOUT NOCKS FOR THE ACCURATE MEASUREMENT FOR CONDUCTOR INSTALLATION AND THE PULLING OF CONDUCTORS OR WINCH LINES. LEAVE AT LEAST 2 FEET BEYOND EACH END OF CONDUIT RUN. FLEX CONDUIT IS NOT PERMITTED.

4. TRENCH, BACKFILL, PAVEMENT REPAIR, AND STRUCTURES SHALL BE IN ACCORDANCE WITH SDG&E AND LOCAL GOVERNMENTAL AUTHORITY REQUIREMENTS. CUSTOMER TO OBTAIN EXCAVATION PERMIT FOR TRENCHING IN STREET RIGHT-OF-WAY AS REQUIRED BY LOCAL GOVERNMENTAL AUTHORITY. SDG&E INSPECTION IS REQUIRED PRIOR TO BACKFILLING TRENCH.

5. ADAPTER COUPLINGS FOR CONNECTING BENDS TO STRAIGHT CONDUIT.

6. CONDUIT RISER BEND.

7. SIZE AND NUMBER OF CONDUIT RUNS TO BE DESIGNATED BY SDG&E.

8. SERVICE TERMINATING ENCLOSURE PER SDG&E SERVICE STANDARDS PAGES 701-708.

9. TYPE AND SCHEDULE OF CONDUIT ON OR WITHIN A BUILDING OR STRUCTURE TO BE INSTALLED PER BUILDING INSPECTORS REQUIREMENTS AND MUST BE LISTED AND LABELED. NORMAL SCHEDULE 40 PVC IS ALLOWED INSIDE A BUILDING WALL AND SCHEDULE 80 PVC IS REQUIRED WHEN EXPOSED ON AN EXTERIOR WALL. CONSULT WITH APPROPRIATE INSPECTION AUTHORITY. FLEX CONDUIT IS NOT PERMITTED.

10. CONDUIT MANUFACTURER MUST BE SDG&E APPROVED.
INSTALLED:

A. CONTACT PROJECT MANAGEMENT AT THE NEAREST SDG&E REGIONAL OFFICE FOR A SERVICE AND METER LOCATION PRIOR TO START OF CONSTRUCTION.

B. SERVICE LATERAL CONDUIT SPECIFIED IN THE CONDUIT TABLE IS LIMITED TO A 150 FOOT MAXIMUM LENGTH, WITH NOT MORE THAN 3-90 DEGREE HORIZONTAL OR VERTICAL BENDS OR 270 DEGREES TOTAL DEFLECTION THROUGH THE SERVICE RUN. IF GREATER THAN 150 FEET, REFER TO STANDARD 4003. PLANNER AND ELECTRIC CONSTRUCTION APPROVAL IS REQUIRED IF LIMITATIONS ARE EXCEEDED.

C. A 3-WIRE, 100 AMPERE, SINGLE-PHASE MAIN CAN BE SERVED BY A 2-INCH CONDUIT. A 3-WIRE, 200 AMPERE, OR LESS, SINGLE-PHASE MAIN FOR TEMPORARY CONSTRUCTION POWER CAN BE SERVED BY A 2-INCH CONDUIT. ITEM 3 SHALL BE THE SAME SIZE AND TYPE MATERIAL STOCKED BY SDG&E AS SHOWN ON PAGE 3373.2.

D. ENGINEERS AND ARCHITECTS PROPOSALS FOR ALL SWITCHBOARDS 1000 AMPERES, OR LARGER, SHALL BE SUBMITTED TO THE NEAREST PROJECT MANAGEMENT OFFICE FOR STUDY AND APPROVAL BY SDG&E'S DISTRIBUTION PLANNING AND SERVICE STANDARDS SECTIONS.

E. REPLACEMENT OR ENLARGEMENT OF SERVICE LATERAL CONDUITS DUE TO RELOCATION OR INCREASED LOAD WILL BE ACCOMPLISHED BY THE CUSTOMER UNDER THE PROVISIONS OF ITEMS 3 THROUGH 10 ON PAGE 305. MAINTENANCE OF THE CUSTOMER'S SERVICE LATERAL CONDUITS OUTSIDE THE BUILDING WALL WILL BE UNDERTAKEN BY SDG&E UNDER EMERGENCY CONDITIONS AND MAY BE DONE AT THE CUSTOMER'S EXPENSE. CONSULT THE NEAREST SDG&E REGIONAL OFFICE.

F. CONDUITS SHALL BE SEALED PER STANDARD 3948 (G.O. 128, RULE 31.6).

G. A 24-INCH MINIMUM COVER OVER THE CONDUIT IS REQUIRED FOR ALL NORMAL INSTALLATIONS ON PRIVATE PROPERTY AND 30 INCH MINIMUM COVER IN RIGHT-OF-WAY OR PUBLIC PROPERTY. IN ALL INSTALLATIONS WHERE THE MINIMUM COVER CANNOT BE MET G.O. 128 REQUIRES ONE OF THE FOLLOWING: 1) STEEL CONDUIT, 2) SCHEDULE 40 PVC OR SCHEDULE 80 PVC CONDUIT WITH A MINIMUM WALL THICKNESS OF 0.15 INCHES, OR 3) AT LEAST A 3-INCH LAYER OF CONCRETE ABOVE AND 2 INCHES ON EACH SIDE OF THE CONDUIT. REDUCED DEPTHS MUST BE APPROVED BY THE CUSTOMER PROJECT PLANNER AND SDG&E INSPECTOR.

H. THE TRENCH MUST HAVE AN EVEN SLOPING GRADE TO ALLOW ROOM FOR A 90 DEGREE BEND INTO THE BOTTOM OF ANY CUSTOMER OWNED OR SDG&E FACILITY. DO NOT CUT BENDS. THE TRENCH DEPTH IS TO BE DETERMINED AT THE "PRECONSTRUCTION MEETING".

I. WHEN TRENCHING TO AN EXISTING FACILITY, THE APPLICANT/CONTRACTOR SHALL COMPLETE THE TRENCH AND INSTALLATION OF CONDUIT UP TO THE EXISTING FACILITY UNLESS IT IS DETERMINED BY AN AUTHORIZED SDG&E EMPLOYEE THAT SUCH AN INSTALLATION PERFORMED BY THE APPLICANT/CONTRACTOR WOULD EXPOSE WORKERS TO OR CREATE A HAZARD. IN THIS CASE, SDG&E WOULD PERFORM TRENCHING AS INDICATED ON WORK ORDER. DIGGING UNDER PADMOUNTED EQUIPMENT AND INSTALLATION OF CONDUIT INTO PADMOUNTED EQUIPMENT WILL ALWAYS BE THE RESPONSIBILITY OF SDG&E.

K. SERVICE CONDUIT WILL ONLY BE ALLOWED UNDERNEATH THE BUILDING BEING SERVED BY THE CABLE IN THE CONDUIT. NO CONDUIT IS ALLOWED UNDER ONE BUILDING TO SERVE ANOTHER BUILDING.

REFERENCE:

M. SEE STANDARD 3367 FOR TRENCH PARALLELING FOUNDATIONS.

N. SEE STANDARD 3372 FOR CONDUIT SIZING.

Q. SEE STANDARD 3373 FOR SDG&E CONDUIT AND FITTINGS.

P. SEE STANDARD 3376 FOR CONCRETE SLURRY REQUIREMENTS.

Q. SEE STANDARDS 3421, 3425, 3426 AND 3427 FOR CONDUIT PLACEMENT.

R. SEE STANDARD 3941 FOR RESIDENTIAL RISER AND CONDUIT.

S. SEE STANDARD 3944 FOR MATERIAL REQUIREMENTS OF AN U.G. SERVICE FROM O.H. FACILITIES.

T. SEE STANDARD 3948 FOR SEALING CONDUITS.

U. SEE STANDARD ON OH PAGE 1404.2/U.G. PAGE 4204.2 FOR CABLE POLE CONDUIT REQUIREMENTS.

V. SEE STANDARD 3950 FOR FIELD HEATING SERVICE LATERAL CONDUIT.
SCOPE: This standard shows who provides, installs, owns and maintains material and labor required for a single low voltage service fed from overhead facilities.

CONTACT THE SDG&E INSPECTOR FOR INSTRUCTIONS ON TRENCHING NEAR THE POLE. SDG&E INSPECTION IS REQUIRED PRIOR TO BACKFILLING TRENCH.

SDG&E OVERHEAD DISTRIBUTION SYSTEM:

1. SOURCE POLE AS DESIGNATED BY SDG&E PLANNER.

SDG&E TO FURNISH, INSTALL, OWN AND MAINTAIN – (SUBJECT TO INSTALLATION CHARGES CONSULT SDG&E PLANNER):

2. SERVICE LATERAL CONDUCTOR AND CONNECTORS. SDG&E TO FURNISH MATERIAL AT CUSTOMERS EXPENSE INSTALL, OWN AND MAINTAIN:

* CUSTOMER TO PROVIDE, SDG&E TO INSTALL, OWN AND MAINTAIN:

3. PVC CONDUIT SCHEDULE 40.
4. PVC CONDUIT SCHEDULE 80.

CUSTOMER SHALL FURNISH, INSTALL, OWN AND MAINTAIN AT THEIR EXPENSE:

5. PVC CONDUIT BEND – SCHEDULE 80. MINIMUM RADIUS OF BEND:

   3 INCH = 36 INCH RADIUS.

   4 INCH AND 5 INCH = 48 INCH RADIUS.

   THE LARGER RADIUS AT THE POLE IS NECESSARY TO ALLOW FOR VERTICAL CABLE PULLING TENSION.

6. A CLEAR ROUTE ON ANY PRIVATE PROPERTY, THAT IS CLEAR OF OBSTRUCTIONS WHICH WOULD INHIBIT THE CONSTRUCTION OF SERVICE FACILITIES. SERVICE LATERAL CONDUIT FROM SOURCE (ITEM 1) TO TERMINATING FACILITY (ITEM II). CONDUIT SIZE SHALL BE BASED ON AMPERE CAPACITY OF BUS OR SERVICE EQUIPMENT, WHICHEVER IS GREATER AND DISTANCE FROM TRANSFORMER TO TERMINATING FACILITY (ITEM II).

7. SECONDARY HANDHOLE. VERIFY IF REQUIRED WITH SDG&E PLANNER. IF HANDHOLE IS REQUIRED, THE LID SHALL BE MARKED "SDG&E".

8. TRENCH, BACKFILL, PAVEMENT REPAIR AND PROTECTIVE STRUCTURES SHALL BE IN ACCORDANCE WITH SDG&E AND LOCAL GOVERNMENTAL AUTHORITY REQUIREMENTS. CUSTOMER TO OBTAIN EXCAVATION PERMIT FOR TRENCHING IN STREET RIGHT-OF-WAY AS REQUIRED BY LOCAL GOVERNMENTAL AUTHORITY.


10. CONDUIT RISER BEND. MINIMUM BENDING RADIUS PER SERVICE GUIDE PAGE 305.

11. SERVICE TERMINATING ENCLOSURE PER SDG&E SERVICE STANDARDS PAGES 701-708.

12. TYPE AND SCHEDULE OF CONDUIT ON OR WITHIN THE BUILDING TO BE INSTALLED PER BUILDING INSPECTORS REQUIREMENTS AND MUST BE LISTED AND LABELED. NORMALLY SCHEDULE 40 PVC IS ALLOWED INSIDE A BUILDING WALL AND SCHEDULE 80 PVC IS REQUIRED WHEN EXPOSED ON AN EXTERIOR WALL. CONSULT WITH APPROPRIATE BUILDING INSPECTOR. FLEX CONDUIT IS NOT PERMITTED.

13. CONDUIT MANUFACTURER MUST BE SDG&E APPROVED.

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INSTALLATION:

A. A 24 INCH MINIMUM COVER OVER THE CONDUIT SHALL BE FOLLOWED FOR ALL NORMAL INSTALLATIONS ON PRIVATE PROPERTY, 30 INCH MINIMUM COVER IN RIGHT-OF-WAY OR PUBLIC PROPERTY. SEE SERVICE GUIDE 356/UG 3370 FOR ALL OTHER APPLICATIONS. IN INSTALLATIONS WHERE THE MINIMUM COVER CANNOT BE MET, G.O. 128 REQUIRES ONE OF THE FOLLOWING: 1) STEEL CONDUIT, 2) SCHEDULE 40 PVC AND SCHEDULE 80 PVC CONDUIT WITH A MINIMUM WALL THICKNESS OF 0.15 INCHES, OR 3) AT LEAST A 3 INCH LAYER OF CONCRETE ABOVE AND 2 INCHES ON EACHSIDE OF THE CONDUIT. REDUCED DEPTHS MUST BE APPROVED BY THE CUSTOMER PROJECT PLANNER AND SDG&E INSPECTOR.

B. THE TRENCH MUST HAVE AN EVEN SLOPING GRADE TO ALLOW FOR A 90 DEGREE BEND INTO THE BOTTOM OF ANY CUSTOMER OWNED OR SDG&E FACILITY. DO NOT CUT BENDS. THE TRENCH DEPTH IS TO BE DETERMINED AT THE "PRECONSTRUCTION MEETING".

C. WHEN TRENCHING TO AN EXISTING FACILITY, THE APPLICANT/CONTRACTOR SHALL COMPLETE THE TRENCH AND INSTALLATION OF CONDUIT UP TO THE EXISTING FACILITY UNLESS IT IS DETERMINED BY ANY AUTHORIZED SDG&E EMPLOYEE THAT SUCH AN INSTALLATION PERFORMED BY THE APPLICANT/CONTRACTOR WOULD EXPOSE WORKERS TO OR CREATE A HAZARD. IN THE THIS CASE, SDG&E WOULD PERFORM TRENCHING AS INDICATED ON WORK ORDER. DIGGING UNDER PADMOUNTED EQUIPMENT AND INSTALLATION OF CONDUIT INTO PADMOUNTED EQUIPMENT WILL ALWAYS BE THE RESPONSIBILITY OF SDG&E.

REFERENCE:

D. SEE STANDARD 3367 FOR TRENCH PARALLELING FOUNDATIONS.

F. SEE STANDARD 3373 FOR SDG&E CONDUIT AND FITTINGS.

G. SEE STANDARD 3376 FOR CONCRETE SLURRY REQUIREMENTS.

H. SEE STANDARDS 3421, 3425, 3426 AND 3427 FOR CONDUIT PLACEMENT.

I. SEE STANDARD 3941 FOR RESIDENTIAL RISER AND CONDUIT.

J. SEE STANDARD 3942 FOR MATERIAL REQUIREMENTS OF A U.G. SERVICE FROM U.G. FACILITIES.

K. SEE STANDARD 3948 FOR SEALING CONDUITS.

L. SEE ON PAGE 1404.2/UG PAGE 4204.2 FOR CABLE POLE CONDUIT REQUIREMENTS.
**SCOPE:**

This standard covers conduit sealing with Tyco Rayflate and conductor break out boots. The application of these products is designed to prevent water entry into customer and SDG&E facilities, when the SDG&E service point is a higher elevation than the customer's service point of entry.

**APPLICATION: CABLE BREAKOUTS (CBR)**

The cable breakout boots are designed to keep water out only and should always be used at the higher elevation in transformers and secondary hand holes.

<table>
<thead>
<tr>
<th>TYCO CONDUIT CONDUCTOR</th>
<th>STOCK NUMBER</th>
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<tbody>
<tr>
<td>NUMBER</td>
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<tr>
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<td>3- NO. 2 TO 350</td>
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<td>S160650</td>
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<tr>
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<td>S160654</td>
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<tr>
<td>CBR-4-4-A</td>
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<td>4- NO .750, 1000</td>
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**INSTALLATION:**

Select size of CBR to seal cable and conduit, once cable is installed clean cable and conduit surfaces. Follow manufactures instructions for installation. Caution apply heat slow and evenly to prevent distortion of conduit.
SCOPE: THE RAYFLATE DUCT SEALING SYSTEM HAS BEEN DESIGNED FOR USE IN CONJUNCTION WITH PLASTIC, CONCRETE, OR STEEL DUCTS WITH SINGLE OR MULTIPLE CONDUCTORS. THE RDSS SEALING SYSTEM SHOULD PREVENT WATER ENTRY INTO CUSTOMER VAULTS, METER ROOMS, MANHOLES, AND HAND HOLES. THE RAYFLATE BLADDER IS A FLEXIBLE METALLIC LAMINATED HIGH TEMPERATURE SEALANT.

APPLICATION: FOLLOW MANUFACTURES INSTRUCTION FOR INSTALLATION OF THE RDSS BLADDER. CLEAN ALL SURFACES OF CABLE AND CONDUITS TO BE SEALED. THE SEALING SYSTEM CAN SEAL SINGLE CONDUCTOR UNJACKETED CONCENTRIC OR JACKETED CABLE, DUPLEX, TRIPLEX AND QUAD CONDUCTORS, PRIMARY AND SECONDARY. FOR MULTIPLE CONDUCTORS USE THE CORRECT RDSS–CLIP TO SEAL BETWEEN THE CONDUCTORS TO MAKE A POSITIVE SEAL WHEN APPLYING RDSS INFLATABLE BLADDER. SEE TABLE 1 THE RDSS–IT–16 INFLATION TOOL IS USED TO INFLATE THE BLADDER, THE TOOL IS POWERED BY A CO2 CARTRIDGE. THE BLADDER IS INFLATED TO 45 PSI IN THE GREEN ZONE ON THE GAUGE. CO2 REPLACEMENT STOCK NUMBER #S209412

<table>
<thead>
<tr>
<th>CONDUIT SIZE, WITH 1 CONDUCTOR</th>
<th>RAYFLATE DUCT SEAL</th>
<th>STOCK NUMBER</th>
<th>ADD–CLIP FOR MULTIPLE CONDUCTORS</th>
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<td>RDSS–CLIP–75</td>
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SCOPE: THIS STANDARD PROVIDES THE REQUIREMENTS AND CONDITIONS ALLOWING FIELD HEATING OF SERVICE LATERAL CONDUITS INSTALLED ABOVE GRADE ONLY.

NOTE: THIS STANDARD PROVIDES A MEANS TO AVOID EXCAVATING INTO AN EXISTING BUILDING FOOTING WHEN CONVERTING EXISTING OVERHEAD SERVICES TO UNDERGROUND (SEE FIGURE 1). IT ALSO APPLIES TO EXISTING OR NEW SERVICES WHEN A HORIZONTAL OFFSET IS REQUIRED DUE TO FIELD CONDITIONS (SEE FIGURE 2). THIS STANDARD IS NOT INTENDED TO CORRECT POOR WORKMANSHIP. CARE SHOULD BE TAKEN TO INSTALL SERVICE EQUIPMENT IN A MANNER ALLOWING THE SERVICE LATERAL CONDUIT RISER TO EXIT THE GROUND AND RUN STRAIGHT UP INTO THE TERMINATING ENCLOSURE EXCEPT WHERE PRE-EXISTING FIELD CONDITIONS EXIST.

FIGURE 1
VERTICAL OFFSET SIDE VIEW

FIGURE 2
HORIZONTAL OFFSET FRONT VIEW

EXISTING BUILDING
FOOTING

"NOT TO SCALE"

INSTALLATION:

1. THIS STANDARD APPLIES TO 2-INCH, 3-INCH AND 4-INCH CONDUIT SIZES ONLY.

2. ONLY MANUFACTURER’S RECOGNIZED FIELD CONDUIT HEATING EQUIPMENT SHALL BE USED. DEGRADATION OF THE CONDUIT’S SHAPE, WRINKLES, DISCOLORATION, BURN MARKS, OR PAINT IS NOT ALLOWED. SDG&E’S INSPECTOR WILL DETERMINE IF THE HEATED CONDUIT IS ACCEPTABLE.

3. 45 DEGREES MAXIMUM ALLOWABLE DEFLECTION ON RISER. THE DEFLECTION IN RISER IS INCLUDED IN THE MAXIMUM 270 DEGREE TOTAL DEFLECTION IN THE SERVICE LATERAL CONDUIT RUN. REFER TO STANDARD 305.1, INSTALLATION NOTE B. FOR ADDITIONAL INFORMATION.

4. WHEN CONVERTING AN EXISTING SERVICE TO UNDERGROUND, MANDREL NEW CONDUIT TO THE TOP OF THE ELBOW EXTENDING TO GRADE PRIOR TO CONNECTING THE RISER CONDUIT. ALLOW ENOUGH PULL ROPE TO EXTEND THROUGH RISER, WITH A MINIMUM 12-INCH TAIL TO BE LEFT IN THE TERMINATING ENCLOSURE.

5. NEW SERVICES REQUIRE MANDRELING OF ALL NEW CONDUIT, INCLUDING THE CONDUIT RISER.
SCOPE: This standard covers the elevation of customer primary and secondary service laterals when they are lower than that of the SDG&E facility that serves them and preventing water entry, options are listed below:

Residential and Light Commercial: When the elevation of the SDG&E facility serving the customer panel is greater than 10 feet above, an additional secondary hand hole shall be installed as close as possible to the customer panel and the service lateral to the customer panel is to be sealed. This will prevent water entry due to water head pressure in the conduit created by the elevation of the higher facility. See standard 3605.1 in the underground construction standards for correct box size. See figure 1. Std. Page 3960.1.

Exterior Wall Flush, Semiflush or Surface Mounted Service Equipment: When the elevation change is greater than 10 feet and water entry is an issue a safety over flow fitting may be installed in the customer riser below the panel. See standard 304 in the service standards & guide manual for installation instructions.

Note: This installation is for exterior wall mounted panel use only. It is the installer’s responsibility to follow all applicable state and local electrical codes. See figure 2. Std. Page 3960.1.

Larger Three-Phase Customers Using Cable: When the elevation change is greater than 10 feet or the panel is located in the customer sub-structure, a secondary outdoor pull section or terminator may be located next to the point of elevation transition to prevent water entry. See figure 3. Std. Page 3960.1.

Transformer with Bus Duct: If the transformer is within 3 feet of the building structure, use weather proof bus duct to make a transition through the wall and down into the sub-structure to prevent water entry. See figure 4. Std. Page 3960.1.

To prevent water entry, when the conduit is installed all joints shall be fully glued 360 degrees for strength and a water tight seal. Conduits shall be protected during back filling with soil to prevent rock damage, crushing/compressing, cracking, kinking or pulling out of the forms and structures. Cement slurry conduits shall have duct separators and be secured in the trench to prevent the conduit package from floating during the back fill process that can damage the conduit and create potential future leaks.

When the water table rises, we know water will migrate in trenches and disturbed soil. Large buildings with surrounding disturbed soil will allow water to accumulate around the sub-structure and any cold/casting joint, cracks, saw cuts, or PVC conduit transitions through cement, will cause leaks. See Std. Page 3960.2.

Unoccupied conduits transitioning from one sub-structure to another may be plugged at both ends with expandable duct plugs. Conduits with conductors can use the Tyco sealing system, application and installation instructions are located on standards page 3948.3,4.

A) NOTE CONDUIT SEPARATION, THIS ALLOWS A HIGH QUALITY POLYMER SEALANT TO BE APPLIED 360 DEGREES AROUND THE CONDUIT ON THE OUTSIDE OF THE FOUNDATION.

B) AFTER THE CONDUIT IS SEALED WATER PROOF MASTIC SEALANT IS APPLIED TO THE CONCRETE AND THE AREA AROUND THE CONDUIT TO PREVENT WATER ENTRY.

HANDHOLE INSTALLATION

FINAL POSITION

C

D

I

A

HANDHOLE MAY BE INSTALLED ON EITHER SIDE OF LOT LINE OR IN CENTER OF LOT LINE IN AREA WITH LIMITED SPACE. BUTT AGAINST BACK OF SIDEWALK

CONDUIT TERMINATION AREA SHALL BE WITHIN 12" MAX FROM END OF SUBSTRUCTURE

TYPICAL PLAN VIEW

LOT LINE

PROPERTY LINE

SIDEWALK

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SERVICE GUIDE

Indicates Latest Revision

Completely Revised

New Page

Information Removed

SDG&E ELECTRIC STANDARDS

4173.3

0–600 VOLT CONNECTORS AND HANDHOLE INSTALLATION FOR #8 THROUGH 500 KCMIL CONDUCTORS

REVISION

DATE 6-17-2014

APPD TR / DW
CAUTION: 1. WHEN INSTALLING HEAT SHRINK SLEEVES, DO NOT ALLOW FLAME TO BE APPLIED TO CONNECTOR INSULATION AS TRACES OF 'HCl' (HYDROCHLORIC ACID) AND 'CO' (CARBON MONOXIDE) GASES WILL BE GIVEN OFF.

INSTALLATION:

A. CUT THE CONDUIT (NOT THE 90 DEGREES). SEE STANDARD 3948 FOR SEALING SERVICE LATERAL CONDUITS. IF A CONDUIT IS (OTHER THAN SERVICE LATERAL CONDUIT) EMPTY FOR FUTURE CABLE PULLING, SECURE THE MEASURING AND PULLING TAPE AND INSTALL AQUA-SEAL (STOCK NUMBER 442976) AND GRAY TAPE (STOCK NUMBER 721120) SECURELY TO PREVENT WATER ENTRY. FOR EXCESSIVE WATER ENTRY PROBLEMS, USE CONDUIT SEALANT DESCRIBED IN STANDARD 3948. CONDUITS MUST ENTER HANDHOLE AT ONE END FOR MAXIMUM TRAINING ROOM. SET HANDHOLE(S). COMPACT SOIL TO 90% AROUND HANDHOLE AREA. DO NOT BACKFILL WITH LARGE ROCKS THAT COULD BREAK HANDHOLE WHEN TAMPERED. (SEE STANDARD 3305 FOR SETTING TO FINAL GRADE, IF SLOPED).

B. CUT AND PREPARE CABLE.

C. FINAL CONNECTOR POSITION MUST ENSURE THAT CONNECTOR WILL NOT TOUCH CONCRETE OR ABRASION DAMAGE WILL CAUSE PREMATURE FAILURE. PROVIDE PROPER CABLE LENGTHS AND CABLE TRAINING TO PREVENT ABRASION.

D. MINIMUM CONDUCTOR BENDING RADIUS IS 5 TIMES CABLE DIAMETER.

F. BOLT DOWN LID (G.O. 128, 32.7)

G. IF RIGHT OF WAY OR OBSTRUCTIONS CAUSE A PROBLEM THE HANDHOLE MAY BE TURNED TO WHERE THE LONG SIDE OF THE HANDHOLE PARALLELS THE SIDEWALK OR PROPERTY LINE.

H. 3309.1 HANDHOLE SINGLE PHASE ALLOWS A MAX OF 3 CONNECTORS WITH 8 TERMINAL POSITIONS EACH. THE 8 RUNS SHALL NOT EXCEED ONE RUN 500 KCMIL, 3 RUNS 350 KCMIL, TWO RUNS 3/0 AND ONE STREET LIGHT RUN.

3309.2 HANDHOLE SINGLE PHASE ALLOWS A MAXIMUM 3 CONNECTORS WITH 7 TERMINAL POSITIONS EACH. THE 7 RUNS SHALL NOT EXCEED 2 RUNS 500 KCMIL, 2 RUNS 350 KCMIL, AND TWO RUNS 3/0 AND ONE STREET LIGHT RUN.

3309.2 HANDHOLE THREE-PHASE ALLOWS A MAXIMUM OF 4 CONNECTORS WITH 7 TERMINAL POSITIONS EACH. THIS SHALL NOT EXCEED 5 RUNS THREE-PHASE CONSISTING OF ONE RUN 350 KCMIL AND 4 RUNS 3/0 AND ONE SINGLE PHASE STREET LIGHT RUN.

(EXAMPLE)

LOCATIONS CONTAINS LOCATIONS CONTAINS LOCATIONS CONTAINS
1 RUN 2 RUNS 3 RUNS
1ST RUN 2ND RUN

REFERENCE:

I. SEE STANDARD 3312 FOR THE HANDHOLE MEASUREMENTS.

J. SEE STANDARD 3370 FOR TRENCH DEPTHS, BASE SHADING AND BACKFILL REQUIREMENTS.

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SCOPE: THIS STANDARD SHOWS THE INSTALLATION AND CONNECTIONS FOR THE NO. 3-1/2 HANDHOLE USED WHEN INSTALLING STREET LIGHTS OWNED BY THE CITY OF SAN DIEGO.

BILL OF MATERIAL:

<table>
<thead>
<tr>
<th>ITEM</th>
<th>DESCRIPTION</th>
<th>QUANTITY</th>
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<td>1</td>
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<td>AS REQ'D</td>
<td>196176</td>
<td>U/2-#8</td>
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<tr>
<td>2</td>
<td>1&quot; POLYETHYLENE CONDUIT</td>
<td>AS REQ'D</td>
<td>249630</td>
<td>1&quot; PE</td>
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<tr>
<td>3</td>
<td>NO. 3-1/2 HANDHOLE</td>
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<td>*</td>
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</table>

INSTALLATION:

A 1" POLYETHYLENE CONDUIT FROM SERVICE POINT.

B 1" POLYETHYLENE CONDUIT TO STREET LIGHT.

C NO CONNECTIONS ARE REQUIRED IF ONLY ONE STREET LIGHT IS CONNECTED TO SERVICE POINT. LOOP CABLE THROUGH HANDHOLE TO SERVICE POINT.

REFERENCE:

D SEE STANDARD 3308 FOR HANDHOLE DIMENSIONS.

E SEE STANDARD 3308.1 FOR EXCAVATION DIMENSIONS.

* HANDHOLE SUPPLIED BY CITY OF SAN DIEGO.
**SCOPE:**
This standard shows the standard trench ground wire installations and equipment grounds for all new construction for all parties used to provide grounding, conduit, and pad installations. This includes all neutrals supplied from the substation bank and neutrals supplied by a grounding bank and trench grounds for Delta underground systems. All parties are required to use the GEM (ground enhancement material) to cover the trench ground. All persons, including SDG&E inspectors and construction administrators, shall verify that the GEM is used to cover trench grounds. The GEM material may be installed dry over the ground for both, slurry or native back fill of the trench. See drawings below for GEM installation. The GEM must cover the trench ground as the drawing shows. If the trench is short in length the alternate trench ground method STD.4510.2 may be used (the use of the GEM is still required by this standard).

**FIGURE 1**

**FIGURE 2**

**FIGURE 3**
(for vaults only)

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<th>APPV</th>
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</tbody>
</table>

**SERVICE GUIDE**

| SHEET 1 OF 3 | SDG&E ELECTRIC UNDERGROUND CONSTRUCTION STANDARDS | UG 4510.1 |

**ASSEMBLY UNITS**

TG-T-W
SCOPE: This standard shows the alternate trench ground wire installations and equipment grounds for all new construction. When the trench is short and cannot meet STD. 4510.1, all parties shall use the alternate grounding method, as outlined below, for conduit and pad installations. This includes all neutrals supplied from the substation bank and neutrals supplied by a grounding bank and trench grounds for delta underground systems. All parties are required to use the GEM (ground enhancement material) to cover the trench ground. All persons, including SDG&E inspectors and construction administrators, shall verify that the GEM is used to cover trench grounds. The GEM material may be installed dry over the ground for both, slurry or native back fill of the trench. See drawings below for GEM installation (the GEM must cover the trench ground as the drawing shows).

FIGURE 4

FIGURE 5

ASSEMBLY UNITS
TG-T-R

6" MIN.

24" EXPOSED TAILOUT

B 24" EXPOSED TAILOUT

GROUND WIRE

TRENCH BOTTOM OF TRENCH

6" MAX

6" MIN.

FIGURE 6 (FOR VAULTS ONLY)

1" CONDUIT IMBEDDED IN VAULT WALL, SEALED PER 3960.2

GROUND ENHANCEMENT MATERIAL (GEM)

4/0 BS CU

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BILt OF MATERIAL:

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<tr>
<th>ITEM</th>
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<th>QUANTITY</th>
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<td>PAD</td>
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<td>REFER TO WORK ORDER</td>
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<td>GDWIRE</td>
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<td>GROUND ROD, 5/8” X 8’-0”, COPPERWELD</td>
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<td>S603072</td>
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<td>4</td>
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<td>S259010</td>
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<tr>
<td>5</td>
<td>4/0 BARE STRAND CU</td>
<td>AS REG'D</td>
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<tr>
<td>6</td>
<td>GROUND ENHANCEMENT MATERIAL (GEM)</td>
<td>AS REG'D</td>
<td>S424390</td>
<td>-</td>
</tr>
</tbody>
</table>

NOTES:
CUSTOMER PRIMARY SERVICE TRENCHES, CUSTOMER PRIMARY METERING, CUSTOMER PRIMARY EQUIPMENT INSTALLATIONS, APPLICANT INSTALLED, SDG&E INSTALLED TRENCH GROUNDS AND ALL PRIMARY EQUIPMENT.

ALL PARTIES THAT ARE INVOLVED IN THE INSTALLATION OF ABOVE TRENCH GROUND OR EQUIPMENT GROUNDS SHALL USE THE SDG&E STANDARD TRENCH AND EQUIPMENT STANDARD GROUND METHOD THAT INCORPORATES THE GEM (GROUND ENHANCEMENT MATERIAL) COVERING THE GROUND WIRE IN THE TRENCH IN UNDERGROUND STANDARD (4510.1 AND 4510.2). THIS GROUND METHOD USING THE GEM MATERIAL PRODUCES THE LOWEST GROUND RESISTANCE FOR ALL SOIL CONDITION. INSPECTORS AND CONTRACT ADMINISTRATORS SHALL VERIFY THE USE OF THE GEM MATERIAL AND THIS IS THE ONLY TRENCH GROUND METHOD SDG&E APPROVES.

INSTALLATION:
A GROUND RODS TO HAVE A SIX-FOOT MINIMUM SEPARATION.
B LEAVE 24 INCHES OF WIRE (EXPOSED TAILOUT) ABOVE THE TOP OF FINAL GRADE.
D LOCATE GROUND RODS SO THEY DO NOT TOUCH CONDUITS. GENERAL ORDER 128 REQUIRES GROUND RODS TO BE DRIVEN. THEY MAY BE DRIVEN AT AN ANGLE IF IT IS DIFFICULT IF NOT IMPOSSIBLE TO DRIVE STRAIGHT DOWN.

REFERENCE:
a SEE STANDARD 3484.1 FOR PAD INSTALLATION OF PAD-MOUNTED EQUIPMENT.
C SEE STANDARD 4002.2 FOR WIRE INFORMATION.
SCOPE: This standard shows single-phase equipment grounding installation used with standard or alternate trench ground wire, as installed per standard 4510. All equipment grounds shall meet 4510.1 or 4510.2. OEM (ground enhancement material) is required.
SECTION VIEW
(PAD WITH 3312 HANDHOLE(S))

SECTION VIEW
(3416 PAD WITH 3311 HANDHOLE)

24” EXPOSED TAILOUT

TRENCH
GROUND WIRE

COMPRESSION CONNECTOR

FINAL GRADE

EQUIPMENT GROUNDING INSTALLATION

SDG&E ELECTRIC UNDERGROUND STANDARD

UG 4512.2
**SCOPE:** THIS STANDARD SHOWS THREE-PHASE EQUIPMENT GROUNDING INSTALLATION USED WHEN TRENCH GROUND WIRE (STANDARD AND ALTERNATE) IS INSTALLED, STANDARD 4510.

**NOTE:** THE TRENCH GROUND METHOD USING GEM IS REQUIRED FOR ALL EQUIPMENT, SEE 4510.1. 4510.2
BILL OF MATERIAL:

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<td>PAD</td>
<td>1</td>
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<td>2</td>
<td>WIRE, BARE COPPER, #2, 7 STR. SOFT DRAWN</td>
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<td>S812816</td>
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<td>4</td>
<td>GROUND ENHANCEMENT MATERIAL (GEM)</td>
<td>AS REQ'D</td>
<td>S424390</td>
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</tbody>
</table>

INSTALLATION:

A. IN CASES WHERE THERE ARE TWO GROUND WIRES, SQUEEZE THE GROUND WIRES TOGETHER WITH A COMPRESSION CONNECTOR. WHERE THERE IS ONLY ONE TRENCH GROUND WIRE, ADD THE SECOND 24" TAILOUT WIRE. SDG&E SHALL FURNISH AND INSTALL THE COMPRESSION CONNECTOR AND THE SECOND 24" TAILOUT WIRE.

B. (STANDARD) OR (ALTERNATE) TRENCH GROUND WIRE IS REQUIRED, FOR ALL EQUIPMENT AND TRENCH GROUNDS.

C. BUTT TRENCH GROUND WIRE AGAINST 3314 HANDHOLE.

D. IN CASES WHERE THERE ARE TWO GROUND WIRES, SQUEEZE THE GROUND WIRES TOGETHER WITH A COMPRESSION CONNECTOR. WHERE THERE IS ONLY ONE TRENCH GROUND WIRE, ADD THE SECOND 24" TAILOUT WIRE. SDG&E SHALL FURNISH AND INSTALL THE COMPRESSION CONNECTOR AND THE SECOND 24" TAILOUT WIRE.

NOTE:

1. GEM (GROUND ENHANCEMENT MATERIAL) IS REQUIRED.

REFERENCE:

a. SEE STANDARD 3484.1 FOR PAD INSTALLATION USED FOR MOUNTING PAD-MOUNTED EQUIPMENT.

b. SEE STANDARD 4002.2 FOR WIRE INFORMATION.

c. SEE STANDARD 4510 FOR (STANDARD) AND (ALTERNATE) TRENCH GROUND WIRE INSTALLATION.

d. SEE STANDARD 4514 FOR GROUNDING TELCO CONDUCTOR IN PAD-MOUNTED EQUIPMENT.

e. SEE STANDARD PAGES 3426.4 & 3427.4 FOR THREE-PHASE TRANSFORMER PAD INSTALLATION.

f. AVAILABLE IN SERVICE STANDARDS AND GUIDE MANUAL
**SCOPE:** THIS STANDARD SHOWS GROUND WIRE INSTALLATION AT PAD–MOUNTED EQUIPMENT.

**REFERENCE:**

**INSTALLATION:**

A. SDG&E HAS AGREED TO CONNECT TELCO #6 AWG COPPER GROUND WIRE TO SDG&E’S GROUNDING SYSTEM AT SDG&E’S PAD–MOUNTED EQUIPMENT. TELCO PERSONNEL WILL RUN THIS TO SDG&E’S PAD LOCATION BEFORE THE PAD IS SET.

B. IN SOME CASES, TELCO MAY INSTALL THEIR GROUND WIRE IN AN IDENTIFIED GROUND WIRE CONDUIT. IF THE CONDUIT IS PRESENT, ONE OF THE FOLLOWING CONDITIONS MUST BE MET:

1. THE TELCO GROUND WIRE MUST BE PRESENT,
2. IF THE TELCO GROUND WIRE IS NOT PRESENT, TELCO SHOULD HAVE IDENTIFIED THE CONDUIT AND SEALED IT WITH A PERMANENT CAP OR,
3. IF THE TELCO GROUND WIRE IS NOT PRESENT AND THE TELCO CONDUIT IS NOT SEALED, THEN SDG&E SHOULD CUT OFF THE CONDUIT BELOW GRADE LEVEL TO PREVENT FUTURE UNAUTHORIZED WIRE ENTRY. (SDG&E NEED NOT CAP THE TELCO CONDUIT.)

C. WHEN COMPLETING THE SDG&E EQUIPMENT GROUNDING CONNECTIONS, SKIN THE TELCO WIRE AND CONNECT IT TO ONE OF OUR GROUND GRID TAILOUTS AS SHOWN IN THE ABOVE DIAGRAM.

D) USE COMPRESSION CONNECTORS, SEE STANDARD 4172.2 FOR COMPRESSION CONNECTORS.

**REFERENCE:**

a. SEE STANDARD 4512 FOR EQUIPMENT GROUNDING.

b. AVAILABLE IN SERVICE STANDARDS AND GUIDE MANUAL
**SCOPE:** THIS STANDARD DESCRIBES CONNECTION TO TELCO GROUND, IF PRESENT

---

**BILL OF MATERIAL:**

<table>
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<th>DESCRIPTION</th>
<th>STOCK NUMBER</th>
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<tbody>
<tr>
<td>SEALING COMPOUND</td>
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**NOTES:**

I. IF TELCO GROUND WIRE IS PRESENT AT THE TIME OF INSTALLATION OF THE HANDHOLE, INSERT GROUND WIRE TAIL BETWEEN PAD AND TOP SECTION OR HANDHOLE SECTIONS THROUGH THE GROUT OR PLASTIC MASTIC SEALANT.

II. GROUNDING OF TELCO CONDUCTORS MUST BE AUTHORIZED ON INDIVIDUAL CONSTRUCTION ORDERS FOR BOTH NEW AND EXISTING HANDHOLES.

---

**INSTALLATION:**

A. OPEN HANDHOLE AND MAKE SURE THERE IS NO EQUIPMENT AT THE DRILLING LOCATION.

B. DRILL A 1/2" HOLE IN THE END AT ONE OF THE LOCATIONS SHOWN IN FIG.1 TO AVOID REBAR.

C. TAKE THE #6 AWG INSULATED COPPER GROUND WIRE FURNISHED BY PT&T AND PUT THROUGH THE HOLE AND INTO THE HANDHOLE.

D. FILL THE DRILLED HOLE WITH EPOXY PUTTY (STOCK NUMBER S442976).

E. SKIN THE INSULATION AND CONNECT TO THE GROUND OR NEUTRAL WIRE IN THE HANDHOLE WITH A COPPER COMPRESSION CONNECTOR. IF NO GROUND WIRE IS AVAILABLE, ATTACH TO THE GROUND ROD.

---

**REFERENCE:**

a. SEE STANDARD PAGE 4172.1 FOR COPPER COMPRESSION CONNECTORS.
SCOPE: This design standard provides guidelines for the connection of SDG&E’s 12kV distribution system to a primary metered service point for the 600 volt DC trolley system.

THE FOLLOWING REQUIREMENTS SHALL BE MET WHEN MAKING THIS CONNECTION:

NOTES:

1. SDG&E shall locate its substructure as close as practicable to the customer’s ground grid but in no case shall the substructure be in contact with the customer’s ground grid (grounding electrode system).

2. The concentric neutrals from SDG&E’s cable shall not be connected to the customer’s equipment.

3. The cable termination in the customer’s switchgear cabinet shall be a livefront delta connection.

REFERENCE:

1. Service Standards & Guide 685.
