

# Electric Service Requirements



1007 Elwell Court  
Palo Alto, CA 94303



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TEMPORARY ELECTRIC SERVICE INFORMATION PACKAGE  
RESIDENTIAL ELECTRIC SERVICE INFORMATION PACKAGE  
COMMERCIAL/MULTI-FAMILY ELECTRIC SERVICE INFORMATION  
PACKAGE  
ELECTRIC VEHICLE CHARGER INFORMATION FORM  
GLOSSARY OF TERMS

## **IMPORTANT MESSAGE ABOUT REVISIONS**

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To meet changes in technology and electrical safety codes, the City of Palo Alto ELECTRIC SERVICE REQUIREMENTS manual are subject to revision at any time. The customer is responsible for ensuring their electrical installations comply with the most current version of the Service Requirements at the time the project is approved.

The most current version of the Manual and Standard Drawings can be found on our website at: [www.cityofpaloalto.org/ElectricServiceRequirements](http://www.cityofpaloalto.org/ElectricServiceRequirements)



# NOTABLE CHANGES FROM PREVIOUS RELEASE

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SECTION	DESCRIPTION OF CHANGE
ALL	Changed references to "National Electric Code" to "California Electrical Code"
I. TEMPORARY SERVICE REQUIREMENTS	No major changes
II. RESIDENTIAL UNDERGROUND AND OVERHEAD SERVICE REQUIREMENTS	
II.I.C.1	Submittals should include a layout of ALL buildings and structures in relation to the property lines.
II.I.C.2	Submit one set of service equipment drawings to Electric Engineering for review.
II.II.A.1.c	Services over 400A require approval of Electric Engineering Manager
II.II.B.1.h	Customer installs/replaces, boxes, conduits, and conductors from service point to meter.
II.II.B.1.i	Customer installs cable form meter to service box at base of pole, not secondary level.
II.II.B.4.b	Service lateral may not exceed 100 feet unless approved by Engineering.
II.II.B.4.d	Only one service lateral per parcel, no exceptions for residential parcels.
II.II.C.2.b	Added reference to drawing SR-MT-E-1035.
II.II.C.5.b	Corrected EUSERC reference to drawing 302A
II.II.D.1.e	Deleted "face of building wall facing pole line" as an option for point of attachment.
II.II.D.1	Added requirement that weatherhead be between 18" and 48" above the roof.
III. COMMERCIAL SECONDARY SERVICE REQUIREMENTS	
III.I	Easement documents (if necessary) are required before energizing service.
III.II.G.1.c	Service lateral may not exceed 100 feet unless approved by Engineering.
III.II.I.1.a	Revised reference to Utility Rate Schedule E-15, F.2
III.II.I.5	Added requirement that weatherhead be between 18" and 48" above the roof.
IV. COMMERCIAL PRIMARY SERVICE REQUIREMENTS	
	No major changes
V. MULTIFAMILY SERVICE REQUIREMENTS	
V.II.G.1.c	Service lateral may not exceed 100 feet unless approved by Engineering.
VI. RESIDENTIAL SUBDIVISION SERVICE REQUIREMENTS	
VI.II.F.1.b	Service lateral may not exceed 100 feet unless approved by Engineering.
VI.II.F.1.c	Press on lug requirement for panels $\geq$ 400 A

DRAWING NUMBER	DESCRIPTION OF CHANGE
DT-SE-U-1032	Revised conduit size for 200A services to 3" (inch) Added note, 600A residential service requires Engineering Manager approval.
DT-SS-C-1005	Corrected notation references Allow ground wire to be run under pad Added note for compaction testing requirement Added note for 6" slurry required below pad. Updated note for type of rebar required, "#4".

# NOTABLE CHANGES FROM PREVIOUS RELEASE

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DRAWING NUMBER	DESCRIPTION OF CHANGE
DT-SS-U-1002	<p>Added PGE-466</p> <p>Added note – 6" width of slurry backfill or 12" width backfill of <math>\frac{3}{4}</math>" base rock at 95% compression required for boxes subject of vehicular traffic.</p> <p>Added note – 12"x12" concrete collar required around all boxes 3'x5' or larger.</p> <p>Added note – steel lids for replacement purposes <u>only</u>.</p> <p>Revised note 8, a minimum 6" bedding of <math>\frac{3}{4}</math>" drainrock required below box.</p>
DT-SS-U-1003	<p>Added joint trench detail</p> <p>Added notation references</p> <p>Added requirement for <math>\frac{3}{4}</math>" aggregate in concrete and 5 lbs. of red oxide per cubic yard (Note 17).</p>
DT-SS-U-1038	New Standard Drawing – Concrete Collar for Vaults
SL-SS-C-1023	Corrected note on bolt diameter
SR-CN-O-1009	<p>Added references for installations in driveways.</p> <p>Revised not on allowable weatherhead heights.</p> <p>Revised note on point of attachment.</p> <p>Added notes on allowable panel height.</p> <p>Updated diagram</p>
SR-CN-U-1010	<p>Added references for installations in driveways.</p> <p>Added notes on allowable panel height.</p> <p>Updated diagram</p> <p>Revised conduit size for 200A services to 3" (inch)</p>
SR-MT-E-1013	Added references for installations in driveways.
SR-MT-E-1014	277/480V panels $\leq$ 200A use a 7 jaw socket, no potential transformers required.
SR-MT-E-1035	New Standard Drawing – Meter Installation in Residential Driveway
SR-TS-U-1008	Revised conduit size for 200A services to 3" (inch)
SR-XF-E-1020	<p>Corrected note numbers in various locations</p> <p>Revised transformer secondary pad diagram (8 holes)</p> <p>Added note – Utilities will provide lugs to terminate cables at transformer secondary, customer to provide lugs to terminate at tap box or panel.</p>

# INTRODUCTION

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**ELECTRIC SERVICE REQUIREMENTS** is a guide for electrical installations in the City of Palo Alto (CPA). Designed for Utilities' customers, contractors, architects, and engineers, it provides the minimum installation requirements for all new and remodeled residential and commercial property. Observing these regulations can help reduce design costs and expedite the processing time to review and approve your plans.

The Utilities Department establishes electrical standards that enable the Electric Utility to supply uniform, satisfactory, and safe service to customers in the City of Palo Alto. These regulations may differ from those of PG&E and other electric companies. Therefore, please note that standards set by other utilities may not be acceptable within our jurisdiction.

**ELECTRIC SERVICE REQUIREMENTS** will assist both the planning and construction phases of your electrical installation. For easy referral, each section details important procedures and specifications. A glossary, index, specification drawings, and other references are also included.

In addition to these requirements, each customer is also responsible for complying with the California Electrical Code and all applicable regulations of the State of California and the City of Palo Alto.

If you need more information on specific electric service topics, refer to the **Electric Utilities Service Directory** on the following page.



# ELECTRIC UTILITIES SERVICE DIRECTORY

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The Engineering Division of The City of Palo Alto Utilities (CPAU) is responsible for developing and implementing the specifications and planning for all City of Palo Alto electric power facilities. The Electric Operations Division operates and maintains all electric power facilities and new construction.

Below is a list of the departments that can assist you in planning your electric service.

SERVICE	DEPARTMENT	TELEPHONE (650)
Billing (Service Fees)	Utilities Administration	329-2528
Building Permits	Building Inspection	329-2496
Claims Against City	City Attorney	329-2171
Electric ON/OFF	Utilities Customer Service	329-2161
Electric Upgrades	Development Center	617-3110
Encroachment Permits	Public Works Engineering	329-2209
Legal Matters	City Attorney	329-2171
Magnetic Field Concerns	Utilities Engineering	566-4500
Meter Reading	Utilities Customer Service	329-2161
New Street Lights	Utilities Engineering	566-4500
Photovoltaic Installations	Development Center	617-3110
Power Outages	Utilities Dispatch	496-6914
Street Light Problems	Utilities Dispatch	496-6914
Temporary Service	Development Center	617-3110
Tree Growth on Poles	Public Works	496-6954
Underground Inspection	Utilities Operations	496-5934
Utility Bills	Utilities Customer Service	329-2161



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**SECTION I – TEMPORARY SERVICE REQUIREMENTS**

This section discusses the City of Palo Alto's service requirements and procedures for installing customer-owned temporary service facilities.

Temporary electric service cannot be used for permanent service, or connected for more than one year. If you require this service for more than one year, resubmit your application for an extension of the Temporary Service Permit.

**I. TEMPORARY SERVICE REQUESTS**

- A. Processing and Permits
- B. Fees
- C. Customer Responsibilities
- D. Service Connection
- E. Service Removal

**II. TEMPORARY SERVICE SPECIFICATIONS**

- A. Pole Requirements
- B. Clearances
- C. Guying or Bracing
- D. Service Conduits
- E. Service Entrance Conductors
- F. Meters and Enclosures
- G. Grounding

**III. LIST OF DRAWINGS**

1. Drawing SR-TS-O-1006 - Overhead Temporary Service
2. Drawing SR-TS-O-1007 - Temporary Service Structures
3. Drawing SR-TS-U-1008 - Underground Temporary Service
4. Drawing SR-CL-O-1017 - Clearance for Service Pole for Supply Service Drop

## **SECTION I**

## **TEMPORARY SERVICE REQUIREMENTS**

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### **I. TEMPORARY SERVICE REQUESTS**

To receive temporary service, the customer must meet all the requirements of the **California Electrical Code (Latest edition)** and install equipment rated adequately for the job. For temporary electric service requests, please call the Utilities Electric Engineering office at (650) 566-4500.

#### **A. PROCESSING AND PERMITS**

##### **1. Temporary Service Permits**

- a. The customer must fill-out and submit Utility Service Application for temporary electric service.
- b. The customer must obtain a temporary service permit from the Building Department.
- c. All fees must be paid.

#### **B. FEES**

##### **1. Determining and Paying Fees**

- a. Contact the Utilities Electric Engineering office at (650) 566-4500 for determining fees for establishing temporary service to the proposed project.
- b. After the application for temporary service is submitted, the Electric Engineering Division will determine the following:
  - The feasibility of underground or overhead service.
  - Verify or stake the temporary service location.
  - The requirement for an Intermediate Service Pole (on service line drops in excess of 100 feet).
  - Service voltage.
- c. Pay the required fees at the Revenue Collection Center located in the City Hall lobby, 1<sup>st</sup> floor – 250 Hamilton Avenue, Palo Alto, CA 94301.

#### **C. CUSTOMER RESPONSIBILITIES**

**1. Service Conditions**

The customer performs all the necessary work and provides the material for installing a temporary service (e.g. installing the wood post, weather head, braces, support, conduits, underground cables and meter panel). Installation must conform to the California Electrical Code and City's standards and specifications.

**2. Underground Service Inspection**

If the temporary service is underground, ensure location meets City requirements before trenching. The City requires an inspection of all underground trenches and conduits prior to backfilling the trench. Call the Electrical Underground Inspector at (650) 496-5934 to set up the inspection.

**3. Building Department**

The customer must request a general inspection of the electrical installation before the temporary service can be connected. Call the Building Department at (650) 329-2496 to set up the inspection.

**D. SERVICE CONNECTION****1. Building Department**

After the inspection has been completed and approved, and all fees are paid, Utilities Customer Service will issue a meter "set tag" for electric service connection

**2. Electric Operations Department**

The Electric Operations Department sets the meter and energizes service after the customer meets all temporary electric service requirements of the City of Palo Alto, the Building Department approves the inspection, and all fees are paid.

**E. SERVICE REMOVAL****1. Customer Responsibility**

The customer is responsible for notifying the City for removal of the temporary service by calling the Development Center at (650) 617-3110.

**2. Customer Service Office**

The Customer Service Office issues a meter removal tag.

**3. Electric Operations Department**

A service crew will remove the electric meter and disconnect the temporary overhead or underground service to the customer's equipment.

**SECTION I****TEMPORARY SERVICE REQUIREMENTS**

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**II. TEMPORARY SERVICE SPECIFICATIONS**

A temporary overhead service may be connected to a portable structure if the structure is securely anchored. See drawing SR-TS-O-1007 for details.

**A. POLE REQUIREMENTS****1. Pole Location**

All temporary service pole locations are reviewed by the Utilities Department. To contact a representative, call (650) 566-4500.

**2. Pole Requirements**

- a. Temporary service poles may be either rectangular or round:
  - Rectangular poles must have a 6 inch x 6 inch (nominal) minimum cross section.
  - Round poles must have a minimum top diameter of 6 inches.
- b. Allow for a sufficient height to provide all required clearances.
  - Refer to drawing SR-CL-O-1017.
- c. Do not use redwood, pine, or other softwoods.
- d. For safety, treat the pole butt with a suitable wood preservative.

**B. CLEARANCES****1. Location**

- a. Locate temporary service poles and sheds on private property only.
- b. Locate customer-owned service poles at least 10 feet and no more than 100 feet from the utility pole.
- c. Any exceptions require written authorization from the Electric Engineering Division.

## **SECTION I**

## **TEMPORARY SERVICE REQUIREMENTS**

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- d. The service may not cross over any existing, or proposed, structures or neighboring properties; and must have a clear unobstructed path to the utility pole.

### **2. Minimum Clearance for Conductors**

The following describes the minimum allowable vertical clearances for overhead services. See drawing SR-CL-O-1017 for details.

- a. Over the center of the street (any portion of the road that is more than 12 feet from either curb): 18 feet.
- b. Vertical clearance 1 foot off of curb: 16 feet
- c. Over driveways, or other areas accessible by vehicles: 16 feet.
- d. Over sidewalks:
  - Commercial: 16 feet.
  - Residential: 12 feet.
- e. Ground clearance at the point of attachment: 10 feet.

## **C. GUYING OR BRACING**

### **1. Service Drop Spans**

- a. Temporary service poles may either be down-guyed or push-braced.
- b. Where the service drop span length exceeds 50 feet or crosses a street, a guy or push brace must be installed on the service pole.

### **2. Wooden Push Braces**

- a. Two wooden push braces are required for each pole and must be at least 2 inches by 4 inches.
- b. Attach the braces securely to the pole with bolts.
- c. Attach the braces securely to a stake of adequate size and length to support the loading, minimum 2 inches by 4 inches x 3 feet deep.

Refer to drawing SR-TS-O-1006 for further instructions on push bracing.

### **3. Portable Structures**

Portable structures must be properly braced and anchored before the service drop is connected. See drawing SR-TS-O-1007 for details.

## **D. SERVICE CONDUITS**

### **1. Size**

The minimum acceptable conduit size for temporary overhead service is 1-1/4 inches.

### **2. Fittings**

- a. Enclose all wires between the weather-head and the meter in electrical metallic tubing, schedule 40 PVC (on wood poles), or rigid steel conduit.
- b. Make all conduit fittings rain tight.

**Note:** Water pipes and fittings are not approved for use as electrical conduits.

### **3. Underground Conduits**

Underground service conduits must be adequate for the conductors used. Conduits must be sized per drawing DT-SE-U-1032.

- The minimum acceptable conduit size is 2 inches. No half-inch sizes allowed.
- Use Schedule 40 or DB-120 PVC conduit.

### **4. Service Boxes**

The Utility designates the location and size of service boxes. For assistance, contact the Electrical Underground Inspector at (650) 496-5934.

## **SECTION I**

## **TEMPORARY SERVICE REQUIREMENTS**

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### **E. SERVICE ENTRANCE CONDUCTORS**

#### **1. Size Requirements**

Size the service entrance conductors per drawing SR-TS-U-1008 for underground services or SR-TS-O-1006 for overhead services. A full size neutral is required.

#### **2. Installation Requirements**

- a. Run the service entrance conductors continuously (without splices) from the Utility's point of service to the meter socket.
- b. Clearly mark the service entrance neutral conductor with white tape.
- c. Extend underground service conductors 48 inches into the service box. A Utility representative must be present while working inside the service box. Call (650) 496-5934 to schedule a Utility representative.
- d. Use Underwriters Laboratories (U.L.) approved service entrance conductors with 600 volt insulation.
- e. Underground service to panels  $\geq$  400 Amps require press on lugs on cable terminations at the panel unless otherwise approved by Utilities Electrical Engineering.

### **F. METERS AND ENCLOSURES**

#### **1. Equipment**

- a. All **California Electrical Code GFCI** (Ground Fault Circuit Interrupter) requirements must be met.
- b. Protect the main switch, receptacles, and other equipment on the load side of the meter with a weatherproof design or weatherproof enclosures. Electric equipment and meter enclosures must be protected from accidental damage. Service equipment must be type NEMA-3R.

#### **2. Meter Sockets**

- a. For 120/240 volt single-phase, three wire loads:
  - Install a 4-Jaw, Class 200 meter socket for 200 Amp

## **SECTION I**

## **TEMPORARY SERVICE REQUIREMENTS**

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- residential services. Reference EUSERC drawings #301 and #305.
- Install a 4-Jaw, Class 320 meter socket for 400 Amp residential services. Reference EUSERC drawings #301 and #305.
- b. For 120/208 volt single-phase, three wire loads:
- Install a 5-Jaw, Class 200 meter socket. Reference EUSERC drawings #301.
- c. For 208 or 240 volt three-phase loads up to 200 Amp service:
- Install a 7-Jaw, Class 200 meter socket. Reference EUSERC drawings #304 and #305.
- d. Locate the center of the meter between 48 and 75 inches above grade level.
- e. For three-phase metering requirements, consult the Electric Metering Department at (650) 496-6978.
- f. Test bypass switches are required for three-phase temporary service.
- g. Ring-type meter sockets are required.

### **G. GROUNDING**

#### **1. Requirements**

- a. Bond and ground all exposed non-current-carrying metal parts.
- b. Grounding must comply with the California Electrical Code
- c. Ground metallic service heads, when used with a PVC service riser, to the customer's equipment ground.

#### **2. Grounding Path**

- a. Connect all metallic enclosures and conduits to the common ground.
- b. Establish a permanent and unbroken path when grounding

## **SECTION I**

## **TEMPORARY SERVICE REQUIREMENTS**

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circuit neutrals, equipment, and conductor enclosures.

- c. Locate the connection to the grounding electrode 6 inches above ground, or in a location easily accessible for inspection.
  - Use a 5/8 inch X 8 foot ground rod for the grounding electrode.

### **3. Ground Conductors**

- a. Extend a continuous ground conductor (in a separate conduit) from the neutral terminal of the service switch to the grounding electrode
- b. Protect ground conductors against mechanical injury by enclosing in metallic conduit or armor cladding and by using an approved grounding hub and clamp.
  - Connect both the armor/conduit and ground conductor to the ground rod.
- c. Use at least 8 AWG copper for No. 2 or smaller service entrance conductors. Refer to the California Electrical Code for ground conductor sizing specifications.
- d. For services greater than 100 Amperes, consult Utilities Electric Engineering at (650) 566-4500.

## **SECTION II**

## **RESIDENTIAL UNDERGROUND AND OVERHEAD SERVICE REQUIREMENTS**

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### **SECTION II – RESIDENTIAL UNDERGROUND AND OVERHEAD SERVICE REQUIREMENTS**

This section discusses the City of Palo Alto's requirements for establishing electric service to new or upgraded residential installations. The same requirements apply to both underground and overhead service, unless specified otherwise.

#### **I. RESIDENTIAL SERVICE REQUESTS**

- A. Planning
- B. Utility Service Application
- C. Submittals
- D. Approvals
- E. Service Connection Fees
- F. Construction
- G. Inspection
- H. Service Energizing

#### **II. RESIDENTIAL SERVICE SPECIFICATIONS**

- A. General
- B. Underground Services
- C. Meter and Service Equipment
- D. Overhead Services
- E. Swimming Pools, Spas, and Hot Tubs

## **SECTION II**

## **RESIDENTIAL UNDERGROUND AND OVERHEAD SERVICE REQUIREMENTS**

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### **III. LIST OF DRAWINGS**

1. Blank Residential Utility Service Application
2. Drawing SR-CL-O-1011 - Service Drop Clearance Requirements
3. Drawing SR-CL-O-1015 - Minimum Ground Clearances for Residential Service Drops
4. Drawing SR-CL-O-1017 - Clearance for Service Pole
5. Drawing SR-CL-O-1018 - Clearances from Swimming Pools, Hot Tubs and Spas
6. Drawing SR-CN-O-1009 - Typical Overhead Service Installation
7. Drawing SR-CN-U-1010 - Residential Underground Service Requirements
8. Drawing SR-MT-E-1012 - Minimum Clearances of Meter Socket from Obstructions
9. Drawing SR-MT-E-1013 - Clearance for Meter Cabinet Enclosures
10. Drawing SR-MT-E-1014 - Diagram of Connections, Meter Sockets
11. Drawing SR-MT-E-1035 - Meter Installation in Residential Driveway
12. EUSERC Acceptability Table

## **SECTION II**

## **RESIDENTIAL UNDERGROUND AND OVERHEAD SERVICE REQUIREMENTS**

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### **I. RESIDENTIAL SERVICE REQUESTS**

Customer must observe the following procedures. This will help the City to ensure that electric service to the proposed project is provided by the requested date.

The City of Palo Alto will connect electric service when the customer fulfills the conditions, inspection requirements and pays necessary fees as required. Fees must be paid within 90 days of invoicing or the fee is subject to repricing.

#### **A. PLANNING**

##### **1. Building Department Permit Requirements**

- a. Contact the City of Palo Alto Building Department for building permit requirements during the initial planning stages of the project.
- b. The Building Department requires approval from Electric Engineering Division before issuing an electric permit for new electric service, upgrading existing electric service, or to relocating existing electric service equipment. Contact Utilities Engineering at 650-566-4500.

##### **2. Temporary Service**

- a. If you require Temporary Service, refer to **SECTION I – TEMPORARY SERVICE REQUIREMENTS**.

##### **3. Other Utilities**

This manual discusses only those requirements applicable to the Electric Utility for requesting electric service.

- a. In addition, the customer's responsibilities include:
  - Contacting other utilities such as telephone and cable television companies, and the Water, Gas, and Wastewater Department of the City of Palo Alto.
  - Coordinating all utility service installation and making payment early in the project to avoid possible delays.

## **SECTION II**

## **RESIDENTIAL UNDERGROUND AND OVERHEAD SERVICE REQUIREMENTS**

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### **B. UTILITY SERVICE APPLICATIONS**

#### **1. Utility Service Application Submittal**

- a. Utility Service Applications are available through the Development Center located at: 285 Hamilton Avenue, Palo Alto, CA 94301; 1007 Elwell Court, Palo Alto, CA 94303; or on the City of Palo Alto website.
- b. Submit a completed Utility Service Application to the Development Center with all relevant information e.g. desired service date, contact phone and fax number, e-mail, property address, and billing information.
- c. Electric Engineering will attempt to contact the customer in order to obtain any additional or missing information required on the Utility Service Application. An incomplete Utility Service Application may cause delays in providing electric service to the proposed project or development.
- d. For services over 200 amps, loads must be calculated according to the **California Electrical Code\*** Article 220 and the calculations must be included with the Utility Service Application or as an attachment.
- e. The **REFERENCE SECTION** and City web site address provides a sample blank Utility Service Application.

### **C. SUBMITTALS**

Plans submitted to the Development Center should include the following information:

#### **1. Site and Design Plans**

A set of plans consisting of these items:

- Location of existing and proposed electric facilities.
- Location of new/existing poles, swimming pools, hot tubs, or spas (if applicable)
- Layout of all buildings and structures, and the location of property lines.
- Proposed meter location.
- Type of service: Overhead or Underground

**2. Service Equipment Drawings**

Service Amp Ratings:

- For services rated 200 amps or less, drawings are not required. See the Metering and Service Equipment section for meter requirements.
- For service equipment rated 201-400 amps, submit one set of the manufacturer's catalog cut sheets.
- If the service is over 400 amps submit one set of service equipment factory drawings to the Electric Engineering Division for review and approval. Submit your switchgear and equipment drawings to:

Electric Engineering Division  
1007 Elwell Court, Palo Alto 94303  
Phone # (650) 566-4516 or (650) 566-4500  
Fax # (650) 566-4536

- Contact the Metering Department at 650-496-6978 at least five working days in advance for scheduling panel pre-installation inspections and meter wiring.

**D. APPROVALS****1. Electric Engineering**

- a. Electric Engineering Division will perform a preliminary plan review. If an advance engineering fee is required, the customer will be billed.
- a. After reviewing the plan, Electric Engineering does the following:
  - Provides specific comments and requirements on the proposed project.
  - Approves the site plan with appropriate comments, notes, and changes.
  - Indicates the applicable service connection fees to be paid.
  - Requests re-submittal, if the original plans are unacceptable.

## **SECTION II**

## **RESIDENTIAL UNDERGROUND AND OVERHEAD SERVICE REQUIREMENTS**

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### **E. SERVICE CONNECTION FEES**

#### **1. Utility Rate Schedule**

Pay all applicable fees and charges listed in the current Utility Rate Schedule E-15 (see **Reference Section**) before starting construction.

- There is no fee for upgrading an existing electric service at the same location, or within 10 feet, (200 Amps max) as long as it is approved by the Engineering Manager and a new service drop is not required.
- All fees must be paid and inspections completed before the Utility will connect service.

### **F. CONSTRUCTION**

#### **1. Prerequisites**

- a. Proceed with construction once you receive approval from the Utilities Engineering Department. Building Department approval is required for the meter panel installation.
- b. Discuss any issues regarding electric service that arise during construction with the Utility.
  - For new underground service, contact the Electrical Underground Inspector at (650) 496-5934.
  - For new overhead service, contact the Electric Engineering Estimator at (650) 566-4500.

**Note:** The typical lead time needed to engineer and install City's electric facilities is 30 to 45 days after **all** fees are paid.

### **G. INSPECTION**

#### **1. Underground Service Inspection**

- a. All new underground electric services require inspection and approval from both the Building Department and Electrical Underground Inspector. The Building Department Inspector must inspect and approve the meter panel before the meter is set. The Electric Underground Inspector must inspect the

## **SECTION II**

## **RESIDENTIAL UNDERGROUND AND OVERHEAD SERVICE REQUIREMENTS**

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conduits in the trench prior to backfilling and the cables prior to energizing.

- b. Contact the following to set up inspection:
  - For all work on the Utility side of the meter, contact the Electrical Underground Inspector at (650) 496-5934. This includes underground service conduits and service lateral conductors installed before backfilling.
  - For all electrical work on the customer side of the meter, contact the Building Inspections at (650) 329-2496. This includes all service equipment and connections beyond the meter.

### **2. Overhead Service Inspection**

All new and upgraded overhead electric services require inspection and approval from the Building Department Inspector before energizing. Call the Building Department at 650-329-2496 for scheduling inspections.

## **H. SERVICE ENERGIZING AND METER SETTING**

### **1. Prerequisites**

The Utility energizes service and sets the meter(s) only when all of the following conditions are fulfilled:

- All City of Palo Alto inspections have been completed and approved.
- Fees are paid in full.
- Utilities Customer Service issues a meter "set tag" which authorizes the Utilities Department to energize the service.
- Customer grants Public Utility Easements (P.U.E.), if requested by the Utilities Engineering Department.
- Customer has complied with all the requirements stated above.

**SECTION II****RESIDENTIAL UNDERGROUND AND  
OVERHEAD SERVICE REQUIREMENTS**

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## **SECTION II**

## **RESIDENTIAL UNDERGROUND AND OVERHEAD SERVICE REQUIREMENTS**

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### **II. RESIDENTIAL SERVICE SPECIFICATIONS**

#### **A. GENERAL**

##### **1. Services Available**

- a. Residential services are normally 120/240 volt 3-wire, single-phase, 400 amps maximum.
- b. Some residential areas are served by a 120/208 volt 3-wire system (two phases and a neutral of a three-phase, 4-wire system).
  - A maximum service of 200 amps is available.
- c. All services over 400 amps require approval by the Electric Engineering Manager and must be underground. If the customer requires a three phase service for the proposed project/development, the installation must comply with the **Commercial Secondary Service Requirements**.
- d. Not all service voltages are available at all locations. Consult the Electric Engineering Division on service voltage availability.

##### **2. Point of Service**

The Utility designates an electric service point for the customer.

- For underground services, the service point will be a designated City of Palo Alto electric splice box or transformer housing.
- For overhead services, the service point will be the connection at the customer's weather head.
- Customer will be responsible for all the work (e.g. trenching, conduit and secondary cable installation etc.) from the designated service point up to the meter/panel location.

##### **3. Underground Utility Districts**

Only underground services are permitted in an underground utility district.

##### **4. Distribution Lines and Service Extensions**

- a. Coordinate projects requiring the extension of high voltage

## **SECTION II**

## **RESIDENTIAL UNDERGROUND AND OVERHEAD SERVICE REQUIREMENTS**

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distribution lines with the Utility.

- This applies to project sites located more than 100 feet away from the Utility lines.
- b. Extension of the existing distribution lines (if feasible) will be done at customer's expense.

### **5. Connections to Electric Utility Secondary**

The City of Palo Alto Electric Operations Department makes all disconnections and connections to the Utility's electrical system.

### **6. Easements**

Public Utility Easements (P.U.E.) on private property may be required for installing electric equipment and substructure. The easement documents must be recorded before the service will be energized. Where required, the nominal easements are as follows:

- Cable in conduit – 5 ft. wide for total length
- Transformer up to 500 kVA – 10 ft. wide x 10 ft. long [3 ft. clear space on three sides and 8 ft. clear space in front for operation]
- Transformer larger than 500 kVA – 13 ft. wide x 13 ft. long [3 ft. clear space on three sides and 8 ft. clear space in front for operation]
- Padmounted Switch – 12 ft. wide x 10 ft. long [3 ft. clear space on three sides and 8 ft. clear space in front for operation]
- Padmount Load Break Junction – 5 ft. wide x 5 ft. long [8 ft. clear space in front for operation]
- Primary Vault – 10 ft. wide x 10 ft. long
- Primary Pull Box – 6 ft. wide x 5 ft. long
- Secondary Pull Box – 5 ft. wide x 5 ft. long

The exact easement requirements may vary depending on the installation and will be determined by City of Palo Alto Electrical Engineering Division.

## **B. UNDERGROUND SERVICES**

### **1. Conduit Installation Requirements**

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## **SECTION II**

## **RESIDENTIAL UNDERGROUND AND OVERHEAD SERVICE REQUIREMENTS**

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- a. Call Underground Service Alert (USA) at (800) 227-2600 before digging.
- b. If you are digging in the vicinity of Utility underground facilities and need further direction, please contact the Electric Engineering Division at (650) 566-4500.
- c. You must obtain a street opening permit from the City's Public Works Engineering Department before digging in the public right-of-way. This includes sidewalks, driveways and planter strips.
- d. The customer (or contractor) is responsible for installing conduits from the service point to the meter.
- e. Contact the Electric Underground Inspector at (650) 496-5934 at least 48 hours before digging to confirm the routing of the new underground service.
- f. Conduit installation must be approved by the City of Palo Alto Electric Underground Inspector before backfilling.
- g. All conduits, new or existing, shall be mandrel tested prior to installation of new service conductors.
- h. For underground service from an underground electric system:
  - The customer installs/replaces, as necessary, boxes, conduits and conductors from the service point to the meter. Enough cable will be provided to reach from the meter to the service box, including excess cable in the box equal to twice the length of the box.
- i. For underground service from an overhead electric system:
  - The customer installs the service box at the base of the pole, conduits, 4" riser stub up pole, and enough cable to reach from the meter to the service box at the base of the pole, including excess cable in the box equal to twice the length of the box.
  - The Utility will run the cable up the pole, cover the cable on the pole, and connect the service.

### **2. Conduit Requirements**

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## SECTION II

## RESIDENTIAL UNDERGROUND AND OVERHEAD SERVICE REQUIREMENTS

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- a. Conduits for residential service must be sized per City of Palo Alto Standard Drawing DT-SE-U-1032. Utilities Engineering Department does not permit installation of half inch conduits. Bending Radius for conduits must be in accordance with the following **Table 2-C**.

Conduit Size	Minimum Radius
2 Inches	24 Inches
3 inches	36 inches
4 Inches	36 Inches
5 Inches	60 Inches
All Risers	36 inches

**Table 2-C: Minimum Bending Radius**

- b. Conduits must be sized for aluminum conductors. However, customer has the option to install either aluminum or copper conductors.
- c. Use only Schedule 40 or DB -120 PVC conduit for below ground installations. Use galvanized rigid steel conduit for above ground installations.
- d. Conduit bends must not exceed 270 degrees.
- e. No more than three 90 degree bends (270 degrees total) are allowed between pull boxes in a conduit run.
- f. The minimum cover requirement for residential service conduits is 24 inches in non-traffic areas and 30 inches in traffic areas unless otherwise approved by the Electric Engineering Division.
- g. See Drawing DT-SS-U-1003 in the **REFERENCE SECTION** for additional requirements.

### 3. Junction Boxes

## **SECTION II**

## **RESIDENTIAL UNDERGROUND AND OVERHEAD SERVICE REQUIREMENTS**

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- a. Install junction boxes at the base of all poles to expedite riser installation and pole replacement.
- b. For secondary service, the Utility requires a service box.
  - The customer is responsible for installing the box.

### **4. Conductors**

- a. The customer or contractor is responsible for installing all underground service lateral conductors from the meter to the service point, crimping lugs (if required), and terminating cables at the panel. A utility representative must be present when working in utility owned facilities.
- b. Service lateral may not exceed 100 feet in length unless approved by Utilities Engineering.
- c. Press on lugs are required for cable terminations on service panels  $\geq$  400 Amps.
- d. The Utility allows only one service lateral per parcel.
- e. Size the service entrance conductors per drawing DT-SE-U-1032. A full size neutral is required.
- f. To install aluminum conductors, the meter socket terminals must be UL approved for use with aluminum conductors.
  - An oxidation inhibitor must be used on aluminum conductors at the meter terminals.
- g. The Utility takes responsibility for maintenance of the service lateral conductors after acceptance by the Utility. The customer is responsible for maintaining conduits and boxes. If the conduits are deteriorated to the extent that the conductors cannot be removed or reinstalled, then it shall be the customer's responsibility to repair or replace the conduits.

### **5. Service Conductors within Buildings**

The service conductors must terminate at a disconnect switch immediately after entering the building. Installations must comply with California Electrical Code section 230-70 concerning the location of the disconnect switch and section 230-6 for the definition of conductors considered outside of a building.

## **SECTION II**

## **RESIDENTIAL UNDERGROUND AND OVERHEAD SERVICE REQUIREMENTS**

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### **6. Fiber Optic Conduits**

Utilities recommends that when installing conduits for secondary facilities, the customer should install a separate 2" conduit for provision of fiber optic, or other communications, service. CPAU can assist with determining the best locations for these facilities.

## **C. METERING AND SERVICE EQUIPMENT**

### **1. Metering Locations**

- a. Meter locations must be approved by Utilities Electric Engineering.
- b. Locate the meter on the outside of the building.
  - The preferred location is a readily accessible area near the corner of the building closest to the Utility service point.
- c. Maintain 18 inches of horizontal separation from the nearest edge of the electric meter panel to the gas riser and 6 inches from the gas houseline. See drawing SR-CN-0-1009 in the **REFERENCE SECTION**.
- d. Provide a level working space 30 inches wide and 36 inches deep in front of each electric meter.
- e. Meters must be accessible to the Utility for meter reading and maintenance.
  - Locating meters in locked rooms, cabinets, or fenced enclosures is not permitted.
- f. Do not locate meters within carports, breezeways, porches or other areas that might be enclosed at some future date.
- g. Do not install meters or metering equipment in ventilator shafts, clothes closets, broom closets, lavatories or basements.
- h. Do not install meters in or over stairways, doorways, windows, sinks, wash-trays, or driveways.
- i. Do not install electric meters above gas meters or in any other hazardous location.

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## **RESIDENTIAL UNDERGROUND AND OVERHEAD SERVICE REQUIREMENTS**

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- j. Do not install meters near doors or swinging windows which may obstruct the meter.
- k. When water can enter into the wire and conduit system and migrate into the meter panel and/or building, the customer or customer's contractor shall provide a means to discharge the excess water or water pressure from the conduit system. The means to allow the discharge of water or water pressure can be:
  - A pull box installed at the base of the riser to the meter panel or
  - A fitting or series of fittings installed in the conduit riser to the meter panel to channel the water out of the service conduit system away from the service wires.

If a box is installed, it must have a bolt-down cover to prohibit insertion and/or extension of any object or wire into the meter panel.

Any fitting or series of fittings must be constructed and installed in such a manner to prevent physical damage to the wires or conduit riser contained within the conduit system.

The conduit shall be sealed at the service panel.

### **2. Meter Height**

- a. The center of the electric meter socket must be between 48 and 75 inches above final grade.
- b. When the meter is installed in a location susceptible to damage by vehicles (i.e. in or along a driveway, etc.) the meter shall be protected by either guard posts or installed at a suitable height (within requirements of item a.) to prevent contact. See drawing SR-MT-E-1035 in the **REFERENCE SECTION**.
- c. For multi-meter applications refer to the applicable EUSERC drawings.

### **3. Meter Socket**

- a. Install the meter socket in a true vertical plane.

## **SECTION II**

## **RESIDENTIAL UNDERGROUND AND OVERHEAD SERVICE REQUIREMENTS**

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- b. Seal any unused meter socket location with internally removable covers.
- c. Do not use die-cast meter sockets as a wiring gutter for more than two meters.
- d. Residential, self-contained meter sockets must be U.L. approved, with a maximum current rating equal to or greater than the current rating of the associated service equipment.
- e. Connect neutral taps to the service neutral conductor behind sealed panels.
  - Wire nuts are not permitted.
- f. Sockets with test bypass devices are not allowed for electric panels rated 200 Amps or less.
- g. 4-jaw meter sockets are normally used for 120/240 volt, 3-wire service.
- h. 5-jaw sockets are required where service is 120/208 volt, 3-wire.
- i. Ring-type meter sockets are required.

### **4. Metering Arrangement**

- a. Current-carrying conductors must run from the meter to the customer's disconnect switch and overload protective devices, such as fuses or circuit breakers, without interruption or splices.
- b. Un-metered service conductors and metered load conductors must be in separate conduits, raceways, or wiring gutters.

### **5. Metering Residential Services over 200 Amps**

- a. Test bypass facilities are required for residential electric panels rated greater than 400 or three-phase service.
- b. The City permits the use of Class 320 meter sockets with 400 amp service equipment. Refer to EUSERC drawing 302A.

### **6. Meter Cabinets and Enclosures**

## **SECTION II**

## **RESIDENTIAL UNDERGROUND AND OVERHEAD SERVICE REQUIREMENTS**

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- a. Design the cabinet so that the roof, doors, and supports do not interfere with the meter installation.
- b. The clearance between the sealing flanges of the meter socket and the inside of the closed cabinet door must be at least 7 inches. See drawing SR-MT-E-1013 in the **REFERENCE SECTION**.
- c. Fit doors properly with adequate handles, hinges, and latches to insure positive opening and closing.

### **7. Meter Panels**

- a. Meter panels must meet EUSERC requirements as accepted by the City of Palo Alto. See EUSERC drawings 301.
  - Consult the Electric Metering Department at (650) 496-6978 for details.
- b. Only ring type socket panels are accepted.
- c. Meter panels for overhead services are required to accept both overhead and underground service connections.

### **8. Service Disconnect**

- a. Use only U.L. approved service disconnect equipment.
- b. Install the service disconnect on the load side of the meter.
- c. Wiring between the meter and the service disconnect must be installed in an approved conduit or enclosure.
  - Use sealable gutters only as approved by Electric Metering Department.

### **9. Non-Installation of Meters**

The City of Palo Alto will not install meters until the customer meets all of the above requirements.

- All work must be approved by the proper inspecting authorities.
- See: **Section I. - Residential Service Requests** for the inspection requirements.

## **SECTION II**

## **RESIDENTIAL UNDERGROUND AND OVERHEAD SERVICE REQUIREMENTS**

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### **10. Short Circuit Duty**

- a. The available short circuit current at the customer's service equipment will be 10,000 amps symmetrical for residential services of 200 amps or less.
- b. Consult the Electric Engineering Division for short circuit duty of residential panels larger than 200 amps.

## **D. OVERHEAD SERVICES**

### **1. Service Drop**

- a. A "service drop" is the span of overhead wires furnished by the Utility which run from the utility's pole to the customer's point of attachment.
- b. Service drops may not exceed 100 feet (80 feet for 400 Amp panels) without permission from the Utility.
  - This also requires bracing of the service mast.
- c. Locate the point of attachment at or near the corner of the structure that is nearest to the pole used for the service drop.
- d. The point of attachment of the service drop is the attachment to the dwelling.
- e. The point of attachment may be either on the building wall near the utility line or on a periscope fixed to the building's roof not more than 18 inches back of the roofline.
- f. The point of attachment to the building must be approved by the Utility and shall comply with GO 95 clearance requirements.
- g. Install an approved, rain tight weather-head at a point suitable for connecting the service entrance conductors to the service drop.
- h. Locate the weather-head no more than 24 inches from the point of attachment.
  - The weather head must be higher than the point of attachment.

## **SECTION II**

## **RESIDENTIAL UNDERGROUND AND OVERHEAD SERVICE REQUIREMENTS**

- i. The point of attachment and weatherhead shall be between 12 and 18 feet above grade and safely accessible by ladder. Working space for a ladder equal to a depth of 1/4 the height of the ladder top support is required.
- j. The weatherhead, if located over the roof, shall be between 18" and 48" above the roof, 24" to 30" recommended.
- k. If the service periscope extends more than 30" above the roof it shall be braced against the service conductor pull.

### **2. Service Drop Clearances**

- a. The height of the point of attachment on the customer's building must be sufficient to provide the necessary ground clearances. See drawing SR-CL-O-1015 in the **REFERENCE SECTION**.
- b. The section of the service lateral between the edge of the roof and the point of attachment to the weather-head shall not pose a tripping hazard for personnel maintaining the roof.
- c. Provide a radial clearance of 3 feet from building exits, windows, doors, or other openings where human contact might be expected.
- d. If a service drop is located above a horizontal plane through the top edge of the openings mentioned in c. above, the following applies:
  - The 3 feet minimum radial clearance may be reduced to 1 foot.
  - Refer to drawing SR-CL-O-1011 in the **REFERENCE SECTION** and the California Electrical Code for illustrations of radial clearances.

### **3. Service Entrance Conductors**

- a. Refer to the California Electrical Code Article 338 for wire size and type requirements.
- b. The service entrance conductors must be continuous and without splices.
- c. Provide a minimum of 24 inches of conductors extending outside of the weather head for connection to the service

## **SECTION II**

## **RESIDENTIAL UNDERGROUND AND OVERHEAD SERVICE REQUIREMENTS**

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drop.

### **4. Service Entrance Riser Conduits**

- a. The customer installs and maintains all service riser conduits and conductors.
- b. Refer to the California Electrical Code Chapter 9, tables 4 and 5 for conduit size requirements.
- c. Run conduits in one continuous length from weather head to the service equipment.
  - Condulets and sleeves are not allowed in the riser conduits.
- d. Provide fire protection as specified by the Building Department when service risers are enclosed in flammable materials.

## **E. SWIMMING POOLS, HOT TUBS AND SPAS**

### **1. Clearances**

- a. Avoid installing service drops over swimming pools, hot tubs and spas whenever possible.
- b. The City requires compliance with all clearance requirements of the California Electrical Code, Article 680.8.
  - For details, refer to drawing SR-CL-O-1018 in the **REFERENCE SECTION**.
- c. If in the opinion of CPAU an overhead service installation designed to meet the stipulated clearance requirements is unsafe for utility workers, the service will be required to be underground.

**SECTION III – COMMERCIAL SECONDARY SERVICE  
REQUIREMENTS**

This section discusses the requirements for establishing commercial secondary service. The largest size of padmounted transformer the City will install to provide commercial secondary electric service is 2500 kVA.

**I. COMMERCIAL SECONDARY SERVICE REQUESTS**

- A. Planning
- B. Final Submittals
- C. Approvals
- D. Service Connection Fees
- E. Construction
- F. Inspection
- G. Service Energizing

**II. COMMERCIAL SECONDARY SERVICE SPECIFICATIONS**

- A. General
- B. Conduits
- C. Junction Boxes
- D. Transformer Pads and Transition Cabinets
- E. Bus duct Requirements
- F. Vaults and Switch Pads
- G. Conductors
- H. Metering and Service Equipment
- I. Overhead Construction

**III. LIST OF DRAWINGS**

See **Drawings**, located in the **REFERENCE SECTION**, to find the drawings listed below.

1. Blank Commercial Utility Service Application Information Package
2. Drawing DT-SS-U-1001 - Installation of Steel Riser Conduit on Wood Pole
3. Drawing DT-SS-U-1001A - Installation of PVC Riser on Wood Pole
4. Drawing DT-SS-U-1002 - Underground Junction Boxes
5. Drawing DT-SS-U-1003 - Underground Duct Lines, Concrete Encased
6. Drawing DT-SS-U-1038 - Concrete Collar Surrounding a Vault
7. Drawing DT-PR-U-1004 - Direct Buried Conduit
8. Drawing DT-SS-C-1005 - Concrete Transformer Pad
9. Drawing SR-MT-E-1012 - Required Minimum Clearances of Meter Sockets
10. Drawing SR-MT-E-1013 - Clearance for Meter Cabinet Enclosures
11. Drawing SR-MT-E-1014 - Diagram of Connections, Meter Sockets
12. Drawing SR-CL-O-1016 - Ground Clearances for Commercial Service Drops
13. Drawing SR-XF-E-1020 - Transition Cabinet
14. Drawing DT-SS-U-1025 - Mandrel Testing
15. Drawing DT-SS-U-1026 - Switch Pad
16. EUSERC Acceptability Table

**I. COMMERCIAL SECONDARY SERVICE REQUESTS**

Please observe the following procedures to ensure that the electric service is provided to the proposed project by the requested date. The City of Palo Alto will not energize the electric service until completion of the following:

- All the necessary fees are paid.
- The electric installation is inspected and approved.
- A meter set tag is issued by the Building Department.
- Necessary easements are recorded or Utilities has a signed letter of intent from the owner.

**A. PLANNING****1. Initial Planning**

Before the preliminary project submittal, contact the Electric Engineering Division to discuss your project. An advance engineering fee may be required.

**2. Preliminary Submittals**

Submit your preliminary project information and site plans to the Development Center at 285 Hamilton Avenue or Utilities Electric Engineering at 1007 Elwell Court for review. Include the following information in each service application:

**a. Utility Service Applications**

- Utility Service Applications are available at the Development Center.
- Supply as much preliminary information as possible; incomplete Utility Service Applications will delay the service approval process. An Electric Engineering representative will attempt to contact you for any missing information.
- Submit the Utility Service Application no later than the site and design submittals to the Planning Department at the Development Center.
- Provide customer contact addresses, email addresses and phone numbers

The **REFERENCE SECTION** provides a sample blank Utility

## **SECTION III**

## **COMMERCIAL SECONDARY SERVICE REQUIREMENTS**

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Service Application. In order for the City to properly size the transformer, please include inrush data for welding equipment and X-Ray equipment, locked rotor current for the largest motor, etc.

- b. Site and Design Plans should include the following:

- Building layout and location of property lines, proposed parking, landscaping including existing trees, and swimming pools/spas.
- Proposed customer switchgear and other service locations.
- Elevations of multistory buildings close to sidewalks and show clearance to existing overhead power lines.
- Proposed location for the Utility padmount transformer.

Exclude plumbing, fire protection, mechanical, civil, and structural drawings unless used for electrical items.

**Note:** At this time, Electric Engineering does field checks and reviews the preliminary submittals. It then returns comments to the customer requesting any necessary modifications. The Planning Department will also receive a copy of the comments.

### **3. Other Utilities**

This manual discusses only those requirements applicable to the Electric Utility for electric service requests.

- a. The customer's responsibilities also include:

- Contacting other utilities such as telephone and cable television companies, and the Water, Gas, and Wastewater Department of the City of Palo Alto.
- Coordinating all utility service installations early in the project to avoid possible delays.

### **4. Temporary Service**

If you require temporary service, refer to **SECTION I – TEMPORARY SERVICE REQUIREMENTS** for the installation requirements.

**B. FINAL SUBMITTALS**

Electric Engineering accepts the final submittal when the customer is ready to apply for a Building Department permit. Include all of the required, updated project information below and any relevant electrical drawings.

**1. Final Submittal Information**

All conditions of approval from preliminary planning submittals must be met.

- a. Updated Utility Service Application:
  - Please include complete and accurate information. Incomplete Utility Service Applications will slow the approval process and may delay special equipment orders.
- b. Updated site plan:
  - Incorporate all of the previous comments from Electric Engineering to the preliminary design.
  - Also include information on any landscaping, fencing, etc. that will be located near Utility equipment.
- c. Service equipment location:
  - Include drawings to show both the location and access to the service equipment.
- d. Electrical one-line drawings:
  - Provide the type, ratings and settings of the main circuit breaker.
  - Show any equipment that uses high levels of harmonic current such as variable speed drives, process equipment, workstations, etc.
  - Show power factor correction and harmonic mitigation equipment.
  - Show any emergency or standby generators.
- e. Applicable civil drawings showing substructures for electric service and telecom (fiber cabling to connect to City fiber optic cable system).

**2. Switchboard Submittals**

Send switchboard drawings to the Electric Engineering Division, 1007 Elwell Court, Palo Alto 94303.

- a. The customer must submit switchboard information during construction, before the fabrication of the switchboard.
  - See: **Section G – Service Energizing** for further information.

**C. APPROVALS****1. Approval Process**

- a. Electric Engineering will perform a preliminary plan review to determine if a non-refundable Advance Engineering Fee is required. If the Advance Engineering Fee is required, the customer will be billed. Engineering will not proceed with its work until the Advance Engineering Fee has been paid.
- b. Electric Engineering reviews the final submittals then does the following:
  - Issues specific comments and requirements to the applicant on the proposed service.
  - Approves the site plan incorporating appropriate comments, notes, and changes and returns it to the applicant.
  - Estimates the applicable service connection fees to be paid.
  - Requests re-submittal if the plans are unacceptable.

**Note:** The approved drawings must be kept at the job site and made available to the Electrical Underground Inspector upon request.

**2. Required Approvals**

- a. Complete and obtain approval from the Electrical Underground Inspector for all substructure work before trenching or excavation starts.

- Primary and secondary conduits are subject to mandrel testing before acceptance.
- b. Pads and vaults must be approved before the City installs the cable and sets the switch and/or transformer.
  - The City will schedule cable installation and the setting of the transformer and/or switch approximately two weeks after approving the substructures.
- c. For additional information on specific approval requirements, please refer to **Commercial Secondary Service Specifications** on page 56 of this section.

**D. SERVICE CONNECTION FEES****1. Charges**

- a. The service connection fees are based on Utility Rate Schedule E-15.
- b. The Utility estimates applicable fees and charges based upon the installation costs.
- c. Service work scheduled during non-working hours at the customer's convenience or to avoid impacting electrical service to other customers will be billed at the double-time rate.
  - If the City schedules the work during non-working hours for the City's convenience, there is no charge for the overtime costs.
- d. The connection fee for new developments (single family, multi-family, or commercial/industrial inclusive) consisting of 30 (thirty) units or more, will include the estimate of the cost to furnish all electric meters with CPAU approved Automated Meter Reading Encoder Receiver Transmitter (ERT).

**2. Payment**

Pay all fees before starting construction to avoid delays in service.

**Note:** The typical lead time needed to engineer and install City electric facilities is 30 to 45 days after **all** fees have been paid.

**E. CONSTRUCTION****1. Prerequisites**

Construction may proceed once you receive approval from Electric Engineering and a building permit from the Building Department.

**2. Switchboard Submittals**

- a. Before fabrication of the switchboard, the customer must submit the switchboard drawings with relevant information to the Electric Engineering Division located at 1007 Elwell Court, Palo Alto 94303.
- b. All service entrance and metering compartment designs must be approved before installation.
- c. If the service is 400 amps or larger, submit factory drawings for approval. Otherwise, catalog cut sheets are acceptable.
- d. Submit one set of the manufacturer's switchboard drawings to the Electric Engineering Division before fabrication of the switchboard.
- e. The City requires conformance to all EUSERC standards for switchgear. See the EUSERC acceptability table in the **REFERENCE SECTION** for details.

**Note:** Some switchgear equipment allowed by other utility companies (such as PG&E) may be unacceptable in the City of Palo Alto.

**3. Utility Contacts and Information**

- a. Discuss any questions regarding your electrical service that arise during construction with Electric Engineering.
  - For new underground service, contact the Electrical Underground Inspector at (650) 496-5934.
  - For new overhead service, contact the Electric Engineering Estimator at (650) 566-4500.
  - For information regarding pads, vaults, ducts, and bus ducts, contact the Electrical Underground Inspector.
  - For information regarding meters, potential transformers, and current transformers, contact the Electric Metering

Department at (650) 496-6978.

- For information regarding the selection of transformers, contact the Electric Engineering Estimator at (650) 566-4500.

**F. INSPECTION****1. Underground Service Inspection**

- a. All new underground electric services require inspection and approval from both the Building Department and the Electrical Underground Inspector. The Building Department Inspector must inspect and approve the meter panel before the meter is set. The Underground Inspector must inspect the electrical conduit in the trench prior to backfilling and the cables prior to energizing.
- b. Contact the following to set up inspection:
  - For all work on the Utility side of the service point, contact the Electrical Underground Inspector at (650) 496-5934. This includes underground service conduits installed before backfilling, as well as service lateral conductors.
  - For all electrical work on the customer side of the service point, contact the Building Department Inspector at (650) 329-2496. This includes all service equipment and connections beyond the meter.

**G. SERVICE ENERGIZING****1. Service Conditions**

The City of Palo Alto energizes the service and sets the meter(s) only when the customer meets the following conditions:

- All fees are paid in full.
- The customer has complied with all of the requirements in this section.
- Utilities Customer Service issues a meter "set tag" which permits the Utility to energize the service.
- All easements required by the City have been granted.

**2. Energizing Time**

Once all of the above conditions are met, the City typically energizes commercial secondary electric service within five working days.

**II. COMMERCIAL SECONDARY SERVICE SPECIFICATIONS****A. GENERAL****1. Services Available**

- a. The available standard service voltages are shown below. Please note that not all service voltages are available at every service location.

**Single-Phase Secondary Service**

120/240 volts, 1-phase, 3-wire, maximum 400 amps  
120/208 volts, 1-phase, 3-wire, maximum 200 amps

**Three-Phase Secondary Service**

208Y/120 volts, 3-phase, 4-wire  
480Y/277 volts, 3-phase, 4-wire

Service availability for the following voltages is limited and may not be available at all locations. Consult Utilities Electric Engineering at 650-566-4500 and obtain approval prior to planning the service voltage to the project.

240Δ/120 volts, 4-wire, maximum 400 amps  
240Δ volts, 3-wire, maximum 400 amps

- b. For additional information on service voltages, refer to Rule and Regulation # 3.

**2. General Load Limitations for Single-Phase Service**

Single-phase service is provided under the following conditions:

- a. Where the size of any single motor does not exceed 7-1/2 horsepower.
- b. In locations where the utility maintains a 120/208 volt system, the service supply is limited to 200 amperes.

(Loads in excess receive 3-phase, 4-wire service).

**3. General Load Limitations for Three-Phase Service**

Three-phase secondary service supplies a maximum of 480 volts. Table

### **SECTION III**

### **COMMERCIAL SECONDARY SERVICE REQUIREMENTS**

III-A below indicates the load requirements for secondary service.

Nominal Voltage	Minimum Load Requirements	Maximum Load
208Y/120	Demand load justifies a 75 kVA transformer	750 kVA
480Y/277	Demand load justifies a 112 kVA transformer	2,500 kVA (See below)

**TABLE III-A: Three-Phase Service Load Requirements**

**Note:** If the maximum demand exceeds 2500 kVA, the customer receives electric service at the primary voltage of 12,470 volts, and the customer must provide the primary switchgear and transformer(s).

**The following conditions apply to three-phase service and any service over 400 ampere:**

- a. A padmounted transformer is required.
- b. The Utilities Director, or his/her designee, may authorize the installation of submersible or vault installed facilities if in their opinion, padmounted equipment installation would not be feasible or practical.
- c. Submersible or vault installed facilities shall be considered Special Facilities as described in Rule and Regulation 20, and all costs associated with the installation, including continuing ownership and maintenance, will be borne by the applicant. (See Rule and Regulation 3 for details)
- d. The customer must provide adequate space for installation, or reimburse the Utility for additional costs to locate the transformer outside the property boundaries.

For information regarding three-phase service over 480 volts, refer to Rule and Regulation # 3.

#### **4. Point of Service**

- a. The Utility establishes the service point for the customer.
  - For underground services, the service point will be a

designated City of Palo Alto electric splice box, padmounted transformer housing, vault or pole.

- For overhead services, the service point will be the customer's weatherhead.

## **5. Underground Services**

All services over 400 amps or located in underground districts must be constructed underground. An easement for a padmount transformer may be required.

## **6. Overhead Services**

- a. New or upgraded services up to 400 amps may be constructed overhead at the Utility's discretion, provided the service is not in an underground district.

## **7. Electric Underground Facilities**

- a. For information on the location of existing underground facilities, call the Underground Service Alert (USA) at (800) 227-2600.
- b. If you are digging near a Utility electric underground facility and need further direction, contact the Electric Underground Inspector at (650) 496-5934 to meet you in the field.
- c. You must obtain a street-opening permit from the Department of Public Works before digging in a street right-of-way. This includes sidewalks, driveways, and planter strips.

## **8. Connections to Electric Utility Secondary**

The City of Palo Alto Electric Operations Department makes all connections to the Utility's electrical system.

## **9. Easements**

An easement may be required wherever facilities are installed on the private property for Utility use. The easement must be recorded or a signed letter of intent received by the Utility before the service will be energized. Where required, the nominal easements are as follows:

- Cable in conduit – 5 ft. wide for total length
- Transformer up to 500 kVA – 10 ft. wide x 10 ft. long [3 ft. clear space on three sides and 8 ft. clear space in front for

operation]

- Transformer larger than 500 kVA – 13 ft. wide x 13 ft. long [3 ft. clear space on three sides and 8 ft. clear space in front for operation]
- Padmounted Switch – 12 ft. wide x 10 ft. long [3 ft. clear space on three sides and 8 ft. clear space in front for operation]
- Padmount Load Break Junction – 5 ft. wide x 5 ft. long [8 ft. clear space in front for operation]
- Primary Vault – 10 ft. wide x 10 ft. long
- Primary Pull Box – 6 ft. wide x 5 ft. long
- Secondary Pull Box – 5 ft. wide x 5 ft. long

The exact easement requirements may vary depending on the installation and will be determined by City of Palo Alto Electrical Engineering Division.

## **B. CONDUITS**

**Note:** All electrical substructures from the service point to the switchgear must be installed by the customer. See Utility Rule and Regulation #18-A.4.

### **1. Secondary Conduit Installation**

- a. The customer (or contractor) is responsible for installing conduits from the service point to the meter.
- b. Use only Schedule 40 or DB-120 PVC conduit for below ground installations. Use Schedule 40 PVC, Schedule 80 PVC or galvanized rigid steel conduit for above ground installations. Use galvanized rigid steel conduit for above ground installations exposed to damage from vehicles. Protective guard posts on both sides of the conduit may be required, depending on the situation.
- c. No individual conduit bend shall exceed 90 degrees.
- d. No more than three 90 degree bends (270 degrees total) are allowed in a conduit run.
- e. The minimum cover requirement for service conduits is 24 inches in non-traffic areas and 30 inches in traffic areas, unless otherwise approved by the Electric Engineering Division.

**Table III-B** shows the acceptable conduit sizes and minimum bending radius for secondary conduit installations.

Conduit Size	Minimum Radius
2 inches	24 inches
3 inches	36 inches
4 inches	36 inches
5 inches	60 inches
All Risers	36 Inches

**Table III-B: Acceptable Conduit Sizes and Minimum Bending Radius**

## **2. Sizing Secondary Conduits**

- a. Conduits must be sized per City of Palo Alto Standard Drawing DT-SE-U-1032 from the service point to the meter.
- b. Customer has the option to install either aluminum or copper conductors.
- c. For requirements regarding secondary conduit installation into vaults, refer to **Section F. - Vaults and Switch pads**.

## **3. Secondary Conduit Approval**

- a. Conduit installation must be approved by the Electric Underground Inspector before backfilling.
- b. All conduits, new or existing, shall be mandrel tested prior to installation of new service conductors.

## **4. Primary Conduit Installation**

- a. Install all primary conduits according to the City of Palo Alto Standard Drawing DT-SS-U-1003 in the **REFERENCE SECTION**.
- b. Installing primary conduits to the transformer:
  - Use two 4-inch primary conduits from an existing vault or

junction box, or a new switch pad, to the new transformer pad.

- c. Installing primary conduits to the switch pad:
  - The Utility will determine the conduit requirements between existing vaults and new switch pads.
- d. Primary conduits must be concrete encased unless approved otherwise by Electric Engineering.
  - Install at a minimum depth of 30 inches from the top of the encasement unless otherwise approved by Electric Engineering.
- e. Do not place more than two 90 degree bends in a primary conduit run.
- f. Conduit runs over 500 feet in length require additional pull boxes.
- g. Use only 4 inch and 5 inch conduits for the primary conduit.
- h. Additional requirements may be established during the project review.

## **5. Primary Conduit Testing and Inspection**

- a. Primary conduits and trenches must be inspected and approved by the Electrical Underground Inspector before backfilling.
- b. Primary conduits must be mandrel tested before approval.
- c. Install a 3/8 inch polypropylene pull line in all primary ducts.

## **6. Fiber Optic Conduits**

Utilities recommends that when installing conduits for secondary or primary facilities, the customer install a separate 2" conduit for provision of fiber optic, or other communications, service. CPAU can assist with determining the best locations for these facilities.

## **C. JUNCTION BOXES**

### **1. Installation**

- a. Install a junction box at the base of riser poles to allow for future riser pole replacement.
- b. Conduit runs over 500 feet in length require additional pull boxes.
- c. Junction boxes used for commercial services must meet the requirements of drawing DT-SS-U-1002 in the **REFERENCE SECTION**.
- d. See the **REFERENCE SECTION** for additional information on junction box installation.

**D. TRANSFORMER PADS AND TRANSITION CABINETS****1. Transformer Pads**

- a. The Utility determines the appropriate size and type of transformer for each facility.
- b. Install the transformer pad and guard posts according to drawing DT-SS-C-1005 in the **REFERENCE SECTION**.
- c. The customer must maintain the required vertical and horizontal clearances for the transformer as specified by the Utility.

The following horizontal clearances are required:

- Pad Mounted equipment shall have a minimum of 8 feet in front of the equipment doors.
- Minimum of 3 feet clearance from the edge of the concrete pad is required around the non-operable sides of the pad mounted equipment.

The following vertical clearances are required:

- 20 feet minimum for single phase pad mounted transformers.
  - 30 feet minimum for three phase pad mounted transformers.
- d. Customer will provide a retaining wall around the pad mount equipment, if required by CPAU and per CPAU's requirements.

**Note:** The Electrical Underground Inspector must approve the transformer

pads/substructure.

## **2. Transition Cabinets**

- a. The customer is required to provide a transition cabinet as the interconnection point between the service lateral and the service entrance conductors if the service equipment rating is greater than 1600 amps.
  - Exception: A transition cabinet is not required, if the customer installs busway from the main switchgear to the Utility's padmount transformer. In this case, the customer will own and maintain the bus duct. The City will be responsible only up to the transformer secondary terminals.
  - Exception: A transition cabinet is not required, if the customer installs extra flexible cable as shown in Drawing SR-SF-E-1020 and DT-SE-U-1032. In this case, the customer will own and maintain the cable. The City will be responsible only up to the transformer secondary terminals.

Either exception must be approved by CPAU Electric Engineering and Operations Divisions.

- b. Size the transition cabinet according to the main switchboard rating.
  - Submit the transition cabinet design to the Electric Engineering Division for approval.
- c. For services supplied by 150 kVA to 750 kVA padmount transformers:
  - Provide four, 4 inch, secondary conduits between the Utility side of the transition cabinet and the transformer secondary compartment.
  - Cable-in-duct or busway may be used between the transition cabinet and the switchgear.
- d. For services provided by 1000 kVA and larger transformers:
  - Provide suitable busway between the transition cabinet and the secondary compartment of the transformer.
- e. A recommended transition cabinet design is included in drawing SR-XF-E-1020 in the **REFERENCE SECTION**. Drawings showing the use of the transition cabinet are also included.

**E. BUSWAY CONNECTIONS****1. Transformers**

- a. All electric services using padmount transformers of 1000 kVA or greater capacity must have a busway connection to the transformer.
- b. Use 500 kcmil, 600 V, extra-flexible, copper conductor for the connections between the transformer secondary terminals and the busway conductors. The customer must provide the busway, cables and all connecting hardware.
  - Busway must comply with the California Electrical Code and be U.L. listed.
- c. The Utility will designate a specific transformer to use at the customer's facility.
  - For design of the busway, the customer will contact Electric Engineering to schedule measurement of the transformer. The customer is responsible for cutting the transformer case to accept the busway connection.
- d. The customer will own and maintain all busway and hardware from the main switchgear or transition cabinet to the Utility's transformer secondary terminals.

**2. Inspection and Approval**

- a. Provide detailed drawings of the proposed busway to Electric Engineering.
  - The Utility must review and approve the drawings before installation of the busway.
- b. Submit the busway pattern to the Utility for approval.
- c. The City Building Inspector must inspect and approve the busway installation between the customer's switchgear and the transition cabinet.
- d. The Electrical Underground Inspector must inspect and approve the busway installation from the transition cabinet to the transformer.

- e. A preferred busway connection design for use within the transformer secondary compartment is shown in drawing SR-XF-E-1020 in the **REFERENCE SECTION**.

**F. VAULTS AND SWITCH PADS****1. Permits**

Obtain a Street Opening Permit from the Department of Public Works before digging in a street right-of-way (this includes sidewalks, driveways, and planter strips).

**2. Vault Requirements**

- a. New vaults must meet Utility standards.
  - The Utility will specify the vault size and top section requirements.
  - Consult the Utility for vault specifications and standards.
  - Some "pre-approved" designs are available.
- b. When installing conduits into an existing vault, always core drill from the outside.
- c. The Utility will designate the proper location for core drilling into the vault. The Electrical Underground Inspector must be present during the core drilling.

**3. Switch Pad Requirements**

The customer must provide the switch pad and box for the installation of a padmount switch. See drawing DT-SS-U-1026 in the **REFERENCE SECTION** for requirements.

**G. CONDUCTORS**

**Note:** The City of Palo Alto Electric Operations Department makes all connections and terminations to the Electric Utility distribution system. See Utility Rule & Regulation # 18C.

**1. Secondary and Service Lateral Conductors**

- a. The customer or contractor is responsible for installing all

underground service lateral conductors from the meter to the service point, crimping lugs, and terminating cables at the panel. A utility representative must be present when working in utility owned facilities.

- b. All secondary conductors must be rated 600 volts and meet U.L. standards for conduit installation.
- c. Services may not exceed 100 feet in length without approval of Utilities Engineering.
- d. Size the service entrance conductors per drawing DT-SE-U-1032. A full size neutral is required.
- e. The Utility allows only one service lateral per parcel.
  - For exceptions see: Utility Rule and Regulation # 20-C.3 in the **REFERENCE SECTION**.
  -
- f. All crimp lugs must be U.L. approved for the assembly and provided by the customer.
  - Use an approved oxidation inhibitor on aluminum conductors.
- g. The Utility takes responsibility for maintenance of the service lateral conductors after acceptance by the Utility. The customer is responsible for maintaining conduits and boxes. If the conduits are deteriorated to the extent that the conductors cannot be removed or reinstalled, then it shall be the customer's responsibility to repair or replace the conduits.

## **2. Primary Conductors**

- a. Only the Utility installs and terminates primary conductors.
- b. The Utility will bill the cost of furnishing and installing primary conductors.
  - See: Utility Rate Schedule E-15.

## **3. Service Conductors within Buildings**

The service conductors must terminate at a disconnect switch immediately after entering the building. Installations must comply with the California Electrical Code section 230-70 concerning the location of the disconnect switch and section 230-6 for the definition

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of conductors considered outside a building.

## **H. METERING AND SERVICE EQUIPMENT**

### **1. Metering Locations**

**Note:** All meters and switchgear must meet EUSERC requirements and the City of Palo Alto's standards for meter installations. See the EUSERC acceptability table in the **REFERENCE SECTION**.

- a. All meter locations must be approved by the Electric Engineering Division.
- b. All service equipment must be located above grade level unless otherwise approved by Electric Engineering.
- c. Maintain 18 inches of horizontal separation from the nearest edge of the electric meter panel to the gas riser piping and 6 inches from the gas house line. See drawing SR-CN-0-1009 in the **REFERENCE SECTION**.
- d. Provide a level working space of 30 inches wide and 36 inches deep in front of each electric meter.
- e. Meters must be accessible to the Utility for meter reading and maintenance.
  - Locating meters in locked rooms, cabinets, or fenced enclosures is permitted only after approval by the Utility.
  - The customer is responsible for having the lock keyed for Utility use.
- f. Do not locate meters within carports, breezeways, porches or other areas that may later be enclosed.
- g. Do not install meters or metering equipment in ventilator shafts, closets, or lavatories.
- h. Do not install meters in or over stairways, doorways, windows, sinks, or driveways.
- i. Do not install electric meters above gas meters or in any other hazardous location.
- j. Do not install meters where they could be obstructed by doors or

swinging windows.

- k. When water can enter into the wire and conduit system and migrate into the meter panel and/or building, the customer or customer's contractor shall provide a means to discharge the excess water or water pressure from the conduit system. The means to allow the discharge of water or water pressure can be:
  - A box installed at the base of the riser to the meter panel or
  - A fitting or series of fittings installed in the conduit riser to the meter panel to channel the water out of the service conduit system and away from the service wires.

If a box is installed, it must have a bolt-down cover to prohibit insertion and/or extension of any object or wire into the meter panel.

Any fitting or series of fittings must be constructed and installed in such a manner to:

- Prevent physical damage to the wires or conduit riser contained within the conduit system, and
- Prevent access to, insertion of, and/or extension of any object or wire into the conduit and wire system or into the meter panel.
- For additional information on meter standards, refer to Electric Utility Service Equipment Requirements Committee (EUSERC) manual.
- The **REFERENCE SECTION** also provides drawings showing electric meter installations.

The conduit shall be sealed at the service panel.

## **2. Meter Height**

- a. The height of the center of the meter socket(s) must be 48 to 75 inches above final grade.
- b. When the meter is installed in a location susceptible to damage by vehicles (i.e. in or along a driveway, etc.) the meter shall be protected by either guard posts or installed at a suitable height (within requirements of item a.) to prevent contact.

**3. Meter Sockets**

- a. Install the meter socket in a true vertical plane.
- b. Seal any unused meter socket locations with internally removable covers.
- c. Do not use die-cast meter sockets as a wiring gutter for more than 2 meters.
- d. To find the meter socket requirements for various service voltages, refer to the **REFERENCE SECTION**.
- e. Ring-type sockets are required.
- f. Class 320 meters are not acceptable for commercial panels/services.

**4. Meter Cabinets and Enclosures**

- a. Design the cabinet so that the roof, doors and supports do not interfere with the meter installation.
- b. Do not use shallow cabinets which have holes cut in the door for the meter to protrude through.
- c. The clearance between the sealing flanges of the meter socket and the inside of the closed cabinet door must be at least 9 inches. See drawing SR-MT-E-1013 in the **REFERENCE SECTION**.
- d. Hinged doors must not exceed 48 inches in width.
  - Provide hinged doors with a device to hold them open safely at ninety degree angle.
- e. Fit doors properly with adequate hinges and latches to insure positive opening and closing.
- f. Construct cabinets exposed to the weather for rain-tightness and of weather resistant materials. For outdoor installations, cabinet must be NEMA 3R type.
  - Flash and seal all top openings where conduits enter and leave.

**5. Meter Panels**

- a. Meter panels must meet the EUSERC requirements as accepted by the City of Palo Alto.
  - See the EUSERC acceptability table 200-E in the **REFERENCE SECTION**.
- b. The Utility will install current transformers and wire the meter socket for services over 200 amperes or 480Y/277 volt services.
- c. All commercial service panels shall have test bypass facilities.
- d. The customer's protective devices are required to properly protect their facilities and coordinate with CPAU's protective devices to avoid exposing other customers to unnecessary service interruptions. At CPAU's discretion, proof of coordination may be required and approval of equipment/settings must be given, prior to energizing customer facilities.

**6. Service Disconnect**

- a. Use only a UL approved service disconnect.
- b. Install the service disconnect on the load side of the metering section of the switchboard.
- c. In locations where more than 6 meters are installed, provide a main disconnect on the Utility side of the meters.

**I. OVERHEAD CONSTRUCTION****1. Service Connection**

- a. The Utility may allow overhead electric service if the customer meets all conditions for exception to underground service.
  - See: Utility Rate Schedule E-15, F.2.
  - See: **Specifications - Required Underground Service.**
- b. Service drops may not exceed 100 feet (80 feet for 400 Amp services) without permission from the Utility.
  - This also requires special bracing of the service mast.

- c. Locate the point of attachment at or near the corner of the structure that is nearest to the pole used for the service drop.
- d. The point of attachment may be either on the building wall near the utility line or on a periscope fixed to the building's roof not more than 18 inches back of the roofline or face of the building wall facing the pole line.
- e. The point of attachment and weatherhead shall be between 12 and 18 feet above grade and safely accessible by ladder. Working space for a ladder equal to a depth of 1/4 the height of the ladder top support is required.

## **2. Service Drop**

A "service drop" is the span of overhead wires furnished by the Utility, which run from the pole to the customer's point of attachment.

- This does not include the "drip loops" which are formed by connecting the ends of the customer's service entrance wires to the service drop.

## **3. Point of Attachment**

- a. The point of attachment of the service drop is the attachment to the dwelling or weatherhead.
- b. The point of attachment to the building must be approved by the Utility.

## **4. Service Drop Clearances**

- a. The height of the point of attachment on the customer's building must be sufficient to provide the necessary ground clearances. See drawing SR-CL-O-1016 in the **REFERENCE SECTION**.
- b. If the service periscope extends more than 30" above the roof it shall be braced against the service conductor pull.
- c. Provide a radial clearance of 3 feet from building exits, windows, doors, or other openings where human contact might be expected.
- d. If a service drop is located above a horizontal plane through the top edge of the openings mentioned in c. above, the following applies:

- The 3 foot minimum radial clearance may be reduced to 1 foot.
- Refer to drawing SR-CL-O-1011 in the **REFERENCE SECTION** and the California Electrical Code for illustrations of radial clearances.
- e. Refer to drawing SR-CL-O-1018 in the **REFERENCE SECTION** for clearance requirements of service drops over swimming pools, hot tubs, and spas.

## **5. Weatherheads**

- a. Install an approved, rain-tight weatherhead at a suitable point for connecting the service entrance conductors to the service drop.
- b. Locate the weatherhead as close to the service attachment point as practical.
  - The distance from the weatherhead to the service attachment point must not exceed 24 inches. See drawing SR-CN-O-1009 in the **REFERENCE SECTION**.
  - The weatherhead should be higher than the point of attachment.
- c. The weatherhead, if located over the roof, shall be between 18" and 48" above the roof, 24" to 30" recommended.

## **6. Service Entrance Conductors**

- a. Refer to the California Electrical Code Article 338 for conductor size and type requirements.
- b. The service entrance conductors must be continuous and without splices.
- c. Provide a minimum of 24 inches of conductors extending outside of the weatherhead for connection to the service drop.

## **7. Service Entrance Riser Conduits**

- a. Use the size and type of service entrance conduits required by the California Electrical Code.
  - For 200-ampere service, the Utility recommends 2-inch

- conduit.
- For 400-ampere service, the Utility recommends 4-inch conduit.
  - Overhead services larger than 400 Amperes are not permitted.
- b. Conduits should be one continuous length from service head to the meter socket, service panel, or switchgear.
- Do not use condulets or sleeves in the riser conduits.
- c. Provide fire protection as specified by the Building Department when service risers are enclosed in flammable materials.
- 8. Underground Areas**
- Only underground services are permitted in an underground utility district.
- 9. Rear Lot Lines**
- Service panels which can accept overhead or underground connections are required for new or upgraded overhead services.

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**SECTION IV – COMMERCIAL PRIMARY SERVICE  
REQUIREMENTS**

This section discusses the requirements for establishing commercial primary service. The City of Palo Alto provides primary electric service whenever the customer's load is greater than 2500 kVA.

**I. COMMERCIAL PRIMARY SERVICE REQUESTS**

- A. Planning
- B. Final Submittals
- C. Approvals
- D. Service Connection Fees
- E. Construction
- F. Inspection
- G. Service Energizing

**II. COMMERCIAL PRIMARY SERVICE SPECIFICATIONS**

- A. General
- B. Conduit
- C. Junction Boxes
- D. Vaults and Switch Pads
- E. Conductors
- F. Metering and Service Equipment

**III. LIST OF DRAWINGS**

See the **REFERENCE SECTION** for the drawings listed below.

1. Blank Commercial Utility Service Application Information Package
2. Drawing DT-SS-U-1002 – Underground Junction Boxes
3. Drawing DT-SS-U-1003 - Underground Duct Lines - Concrete Encased
4. Drawing DT-SS-U-1038 - Concrete Collar Surrounding a Vault
5. Drawing DT-SS-U-1026 - Concrete Switch Pad Detail
6. EUSERC Acceptability Table

**I. COMMERCIAL PRIMARY SERVICE REQUESTS**

Please observe the following procedures to ensure electric service by your requested date. The City will not connect electric service until the customer meets all inspection requirements and pays all necessary fees.

**A. PLANNING****1. Initial Planning**

Before the preliminary project submittal, contact the Electric Engineering Division to discuss your project. An advance engineering fee may be required.

**2. Preliminary Submittals**

Submit your preliminary project information and site plans to the Development Center at 285 Hamilton Avenue for review. Include the following information in each service application:

**a. Utility Service Applications**

- Submit Utility Service Applications for the entire development.
- Utility Service Applications are available through the Development Center.
- Supply as much preliminary information as possible; incomplete Utility Service Applications will delay the service approval process. An Electric Engineering representative will attempt to contact you for any missing information.
- Provide customer contact addresses and phone numbers.
- Submit the Utility Service Application no later than the site and design submittals to the Development Center.

The **REFERENCE SECTION** provides a sample blank Utility Service Application. Please include inrush data for welding and X-Ray equipment, largest motor locked rotor current, etc.

**b. Site and Design Plans should include the following:**

- Building layout and location of property lines, proposed parking, and landscaping including existing and

proposed trees.

- Proposed customer switchgear and other service equipment locations.
- Elevation of multistory buildings close to sidewalks where overhead power lines exist.

Exclude plumbing, fire protection, mechanical, civil, and structural drawings unless used for electrical items.

**Note:** At this time, Electric Engineering does field checks and reviews the preliminary submittals. It then returns comments to the customer requesting any necessary modifications. The Planning Department will also receive a copy of the comments.

### **3. Other Utilities**

This manual discusses only those requirements applicable to the Electric Utility for electric service requests.

- a. The customer's responsibilities also include:

- Contacting other utilities such as telephone and cable television companies, and the Water, Gas, and Wastewater Department of the City of Palo Alto.
- Coordinating all utility service installations and payments early in the project to avoid possible delays.

### **4. Temporary Service**

- a. If you require Temporary Service, refer to **SECTION I – TEMPORARY SERVICE REQUIREMENTS** for the installation requirements.

## **B. FINAL SUBMITTALS**

Electric Engineering accepts the final submittal when the customer is ready to apply for a Building Department permit. Include all of the required updated project information below and any relevant electrical drawings.

### **1. Final Submittal Information**

All conditions of approval from the preliminary planning submittal must be met.

## a. Updated Utility Service Application:

Please include complete and accurate information.  
Incomplete Utility Service Applications will slow the approval process and delay special equipment orders.

## b. Updated site plan:

- Incorporate all of the previous comments from Electric Engineering to the preliminary design.
- Also include information on any landscaping, fencing, etc. that will be located near Utility equipment.

## c. Service equipment location:

Include drawings to show both the location and access to the service equipment.

## d. Electrical one-line drawings:

- Provide the main circuit breaker type, ratings and relay settings.
- Show any equipment that draws high levels of harmonic current such as adjustable speed drives, process equipment, workstations, etc.
- Show power factor correction and harmonic mitigation equipment.
- Show any emergency or standby generators.

## e. Applicable civil drawings regarding substructure.

- Show vault/box orientation and conduit entrance location details.
- Show duct beam cross section

**2. Switchboard Submittals**

The customer must submit switchboard information before the fabrication of the switchboard. Send switchboard drawings to the Electric Engineering Division, 1007 Elwell Court, Palo Alto, CA 94303.

**Note:** Do not substitute catalog cut sheets for factory drawing

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submittals.

## **C. APPROVALS**

### **1. Approval Process**

- a. Electric Engineering reviews the final submittals; then does the following:
  - Issues specific comments and requirements to the Applicant on the proposed service.
  - Approves the site plan incorporating appropriate comments, notes, and changes and returns it to the Applicant.
  - Estimates the applicable service connection fees to be paid.
  - Requests resubmittal if the plans are unacceptable.

**Note:** Electric Engineering does not issue the approval until all requested changes from previous comments are incorporated into the final design. The customer cannot obtain a construction permit until after the final approval. The corrected drawings should be kept at the job site and made available to the Electrical Underground Inspector on request.

### **2. Required Approvals**

- a. Complete and obtain approval from the Electrical Underground Inspector for all substructure work before the start of trenching or excavation.
  - Primary conduits are subject to mandrel testing before acceptance.
- b. Pads and vaults must be approved before the City pulls the cable or sets any switch.
  - The City will schedule cable installation and the setting of switches approximately two weeks after approving the substructures.
- c. For additional information on specific approval requirements, please refer to **Section II. – Commercial Primary Electric Service Specifications.**

**D. SERVICE CONNECTION FEES****1. Charges**

- a. The service connection fees are based upon Utility Rate Schedule E-15.
- b. The Utility estimates applicable fees and charges based upon the installation costs.
  - Advanced engineering fees must be paid to start the engineering process and are non-refundable. The engineering fees will be credited against the estimated job cost prior to the collection of construction fees.
  - To request an invoice, contact the Utility Administration office at (650) 329-2528.
- c. Service work scheduled during non-working hours at the customer's convenience or to avoid impacting electrical service to other customers will be billed at the double-time rate. If the City schedules service work during non-working hours for the City's convenience, there is no charge for the overtime differential costs.

**2. Payment**

Pay all fees before starting construction to avoid delays in service.

**Note:** The typical lead time to engineer and install City electric facilities is 30 to 45 days after **all** fees have been paid.

**E. CONSTRUCTION****1. Prerequisites**

Construction may proceed once you receive approval from the Electric Engineering Division and a building permit from the Building Department.

**2. Switchboard Submittals**

- a. Before fabrication of the switchboard, the customer must submit the switchboard information to the Electric Engineering

## **SECTION IV**

## **COMMERCIAL PRIMARY SERVICE REQUIREMENTS**

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Division at 1007 Elwell Court, Palo Alto, CA 94303.

- b. All service entrance and metering compartment designs must be approved before installation.
- c. Submit three sets of the manufacturer's switchboard drawings before the fabrication of the switchboard.
- d. The City requires conformance to all EUSERC standards for switchgear as accepted by the City of Palo Alto. See EUSERC drawings 401, 402, 403 and 408 in the **REFERENCE SECTION**.
- e. Overcurrent relay settings must be approved by CPAU before the service is energized.

**Note:** Some switchgear equipment allowed by other utility companies (such as PG&E) may be unacceptable in the City of Palo Alto.

### **3. Utility Contacts and Information**

- a. Discuss any questions regarding your electrical service that arise during construction with Electric Engineering.
  - For new underground service, contact the Electrical Underground Inspector at (650) 496-5934.
  - For information regarding pads, vaults, ducts, and bus ducts, contact the Electric Engineering Division at (650) 566-4500.
  - For information regarding meters, potential transformers and current transformers contact the Electric Metering Department at (650) 496-6978.

## **F. INSPECTION**

### **1. Underground Service Inspection**

- a. All new underground electric services require inspection and approval from both the Building Department and the Electrical Underground Inspector.

**Note:** Underground service conduits and substructures must be inspected before backfilling.

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- b. Contact the following to set up the inspection:
    - For all work on the Utility side of the service point, contact the Electrical Underground Inspector at (650) 496-5934. This includes underground conduits installed before backfilling.
    - For all electrical work on the customer side of the service point, contact the Building Department Inspector at (650) 329-2496. This includes all service equipment and connections beyond the meter.

## **G. SERVICE ENERGIZING**

### **1. Service Conditions**

- a. The City of Palo Alto energizes the service and sets the meter(s) only when the customer meets the following conditions:
  - All fees are paid in full.
  - Public utility easements (P.U.E.) required by the City are granted.
  - The customer has met all the requirements in this section.
  - Utilities Customer Service issues a meter "set tag" which permits the Utility to energize the service.
  - Overcurrent protective device settings are approved by the Utility.

### **2. Energizing Time**

Once all of the conditions above are met, the City will schedule the service connection as soon as practical.

**SECTION IV****COMMERCIAL PRIMARY  
SERVICE REQUIREMENTS**

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**II. COMMERCIAL PRIMARY SERVICE SPECIFICATIONS****A. GENERAL****1. Services Available**

- a. Developments where the estimated load exceeds 2500 kVA receive service at the available primary voltage of 12,470 volts.
  - Existing customers with loads exceeding 2500 kVA are also required to receive service at the primary voltage.
  - The City retains the right to change its primary line voltage at any time after providing reasonable advance notice to the customer. Any changes to customer's facilities to accommodate the City's change shall be at the customer's expense.
- b. The standard primary service protection is a padmount fault interrupter owned and maintained by the City, installed at the customer's expense. Any exceptions to this policy must be approved by the Electric Engineering Division. The customer must provide a pad and easement for the fault interrupter.
- c. Electric Engineering determines the maximum demand and the service voltage.
- d. For more information on service voltages, refer to Rule and Regulation #3.

**B. CONDUITS****1. Primary Conduit Installation**

- a. The customer (or contractor) is responsible for installing all electrical substructures from the "point of service" to the switchboard.
  - See: Utility Rule and Regulation #20.B.1.
- b. Install all primary conduits according to the City of Palo Alto Standard Drawing DT-SS-U-1003 (see the **REFERENCE SECTION**).

## **SECTION IV**

## **COMMERCIAL PRIMARY SERVICE REQUIREMENTS**

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- c. To install primary conduits to the point of service, use two 5-inch conduits between the box (point of service) and the primary switchgear.
- d. Primary conduits must be concrete encased unless otherwise approved by Electric Engineering.
  - Install at a minimum depth of 30 inches from the top of the encasement unless otherwise approved by Electric Engineering. See drawing DT-SS-U-1003 in the **REFERENCE SECTION**.
- e. Do not use more than two 90-degree, 60 inch radius bends in a conduit run.
- f. Additional requirements may be established during the project review.

### **2. Primary Conduit Testing and Inspection**

- a. Primary conduits and trenches must be inspected and approved by the Utility (Electrical Underground Inspector) before the backfill.
- b. Primary conduits shall be mandrel tested before approval.
- c. Install a 3/8 inch polypropylene pull line in all primary ducts.

### **3. Fiber Optic Conduits**

Utilities recommends that when installing conduits for secondary or primary facilities, the customer install a separate 2" conduit for provision of fiber optic, or other communications, service. CPAU can assist with determining the best locations for these facilities.

## **C. JUNCTION BOXES**

### **1. Installation**

- a. Install junction boxes for all cable runs exceeding 500 feet.
- b. Junction boxes used for primary services must meet the requirements of drawing DT-SS-U-1002.
- c. Refer to the **REFERENCE SECTION** for additional information on junction box installation.

**D. VAULTS AND SWITCH PADS****1. Permits**

Obtain a Street Opening Permit from the Department of Public Works before digging in a street right-of-way. This includes sidewalks, driveways and planter strips.

**2. Vault Requirements**

- a. When installing conduits into an energized vault, always core drill from the outside. City's Electrical Underground Inspector must be present during the core drilling. Contact the Electrical Underground Inspector at (650) 496-5934.
- b. The Utility will designate the proper location for core drilling into the vault.
- c. New vaults must meet Utility standards.
  - The Utility will specify the vault size and top section requirements.
  - Consult the Utility for vault specifications and standards.
  - Some "pre-approved" designs are available.

**3. Switch Pad Requirements**

The customer must provide the switch pad and box for the installation of the padmount switch.

- The pad and box must meet the requirements of Drawing DT-SS-U-1026 in the **REFERENCE SECTION**.

**E. CONDUCTORS**

**Note:** The City of Palo Alto Electric Operations Department makes all connections to the Utility's electrical system. See: Utility Rule and Regulation #18-C.

**1. Primary Conductors**

- a. Only the Utility installs and terminates primary conductors.

## **SECTION IV**

## **COMMERCIAL PRIMARY SERVICE REQUIREMENTS**

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- b. The City will bill the cost of furnishing and installing primary conductors.
  - See: City of Palo Alto Rate Schedule, E-15
- c. The Utility will terminate the primary conductors in the switchgear.

### **F. METERING AND SERVICE EQUIPMENT**

#### **1. Metering Locations**

**Note:** All meters and switchgear must meet EUSERC requirements and the City of Palo Alto's standards for meter installations. See EUSERC drawings 401, 402, 403 and 408 in the **REFERENCE SECTION**. Consult the Electric Metering Department at 650-496-6978 for details.

- a. All meter locations must be approved by the Electric Engineering Division.
- b. All service equipment must be located above grade level.
- c. Provide a level working space 30 inches wide and 36 inches deep in front of each meter.
- d. Meters must be accessible to the Utility for meter reading and maintenance.
  - Locating meters in locked rooms or fenced enclosures is permitted only after approval by the Utility.
  - The customer is responsible for having the lock keyed for Utility use.

#### **2. Meter Height**

- a. The height of the center of the electric meter socket must be between 48 and 75 inches above final grade unless otherwise approved by the Electric Metering Department.
- b. When the Service Equipment is installed in a location susceptible to damage by vehicles (i.e. in or along a driveway, etc.) the meter and equipment shall be protected by guard posts.

**3. Meter Sockets**

- a. Install the meter socket in a true vertical plane.
- b. Primary service meters require two Form 5S 8-jaw meter sockets. The switchgear shall have space for installing 2-PT's and 2-CT's. One jumper bar for one CT will be provided. Neutral bushings are not required. Concentric neutral cables will be terminated on the ground bus.
- c. Switchgear shall have thermostatically-controlled space heaters in the metering section.
- d. 1-2" conduit knock-out shall be provided in the secondary side of the metering compartment for installing communication cables.
- e. Do not use shallow cabinets with holes cut in the door for the meter to protrude through.
- f. The clearance between the sealing flanges of the meter socket and the inside of the closed cabinet door must be at least 9 inches.
- g. Hinged doors must be 48 inches wide. See EUSERC drawing 407 in the **REFERENCE SECTION**.
  - Provide hinged doors with devices to hold them open safely.
- h. Ring-type sockets are required.

**4. Potential and Current Transformers (“PT” and “CT” respectively)**

The Utility will install all potential and current transformers.

**5. Meter Panels**

Meter panels must meet EUSERC requirements as accepted by the City of Palo Alto. High voltage switchgear panels require a pre-installation inspection. Consult the Electric Metering Department at 650-496-6978 for details.

**6. Primary Circuit Breakers and Protective Devices**

## **SECTION IV**

## **COMMERCIAL PRIMARY SERVICE REQUIREMENTS**

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- a. Equipment and devices must be UL approved and also conform to NEC and ANSI standards.
- b. Customer-owned primary protective devices must coordinate properly with the Utility-owned fault interrupter or other protective device.
- c. It shall be the customer's responsibility to complete a relay coordination and fault study. This study shall be submitted to the CPAU Electric Engineering Division for review and approval prior to the purchase of relays and/or other pertinent protective switchgear. The available short-circuit current will be provided by the CPAU Engineering Department with other engineering specifications.

### **7. Additional Requirements**

Due to changing industry standards, Utilities Engineering may have additional requirements for switchgear panels and meter sockets other than those listed in this manual. Contact Utilities Engineering prior to procuring the switchgear panel and its accessories.

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**SECTION V – MULTIFAMILY SERVICE REQUIREMENTS**

This section discusses the requirements for establishing electric service to multifamily dwellings. The City of Palo Alto provides this service to buildings that consist of multiple units, such as apartments and condominiums.

**I. MULTIFAMILY SERVICE REQUESTS**

- A. Planning
- B. Final Submittals
- C. Approvals
- D. Service Connection Fees
- E. Construction
- F. Inspection
- G. Service Energizing

**II. MULTIFAMILY SERVICE SPECIFICATIONS**

- A. General
- B. Conduits
- C. Junction Boxes
- D. Transformer Pads
- E. Vaults and Switch Pads
- F. Conductors
- G. Metering and Service Equipment

**III. LIST OF DRAWINGS**

See: **Drawings**, located in the **REFERENCE SECTION**, to refer to the drawings listed below.

1. Blank Commercial Utility - Service Application\* Information Package
2. Example of Completed - Commercial Utility Service Application
3. Drawing DT-SS-C-1005 - Concrete Transformer Pad
4. Drawing DT-SS-U-1001 - Installation of Steel Riser Conduit on Wood Pole
5. Drawing DT-SS-U-1001A - Installation of PVC Riser on Wood Pole
6. Drawing DT-SS-U-1002 - Underground Junction Boxes
7. Drawing DT-SS-U-1003 - Underground Duct Lines - Concrete Encased
8. Drawing DT-SS-U-1025 - Mandrel Testing
9. Drawing DT-SS-U-1026 - Concrete Switch Pad Detail
10. Drawing DT-SS-U-1038 - Concrete Collar Surrounding a Vault
11. Drawing DT-PR-U-1004 - Direct Buried Conduit
12. Drawing SR-MT-E-1012 - Required Minimum Clearances of Meter Sockets
13. Drawing SR-MT-E-1013 - Clearance for Meter Cabinet Enclosures
14. Drawing SR-MT-E-1014 - Meter Socket - Diagram of Connections
15. Drawing SR-XF-E-1020 - Transition Cabinet
16. Drawing SL-SS-C-1021 - Street Light Foundation - 10' to 14'
17. Drawing SL-SS-C-1022 - Street Light Foundation - 20' to 25'
18. Drawing SL-SS-C-1023 - Street Light Foundation - 30'
19. Drawing SL-SS-C-1024 - Street Light Foundation - Pedestal Type
20. EUSERC Acceptability Table

\* The Utility Commercial Service Application is used for Multifamily Service.

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**I. MULTIFAMILY SERVICE REQUESTS**

Please observe the following procedures to ensure electric service by your requested date. The City of Palo Alto will not connect electric service until the customer meets all inspection requirements and pays all necessary fees.

**A. PLANNING****1. Initial Planning**

- a. Before the preliminary project submittal, contact the Electric Engineering Division to discuss your project. An advance engineering fee may be required.

**2. Preliminary Submittals**

Submit your preliminary project information and site plans to the Development Center at 285 Hamilton Avenue or Utilities Electric Engineering at 1007 Elwell Court for review. Include the following information in each service application:

**a. Utility Service Applications**

- Utility Service Applications are available through the Development Center.
- Supply as much preliminary information as possible; incomplete Utility Service Applications will delay the service approval process. An Electric Engineering representative will attempt to contact you for any missing information.
- Provide customer contact addresses, email addresses and phone numbers.
- Submit the Utility Service Application no later than the site and design submittals to the Planning Department at the Development Center.

The **REFERENCE SECTION** provides a sample blank Utility Service Application and an example completed Utility Service Application. In order for the City to properly size the transformer, please include inrush data for welding equipment and X-Ray equipment, largest motor locked rotor current, etc.

- b. Site and Design Plans should include the following:

- Building layout and location of property lines, proposed parking, and landscaping including existing trees.
- Proposed customer switchgear and other service equipment locations.
- Elevation of multistory buildings close to sidewalks where overhead power lines exist.
- Proposed location for the Utility padmount transformer.

Exclude plumbing, fire protection, mechanical, civil, and structural drawings unless used for electrical items.

**Note:** At this time, Electric Engineering does field checks and reviews the preliminary submittals. It then returns comments to the customer requesting any necessary modifications via the Development Center.

### **3. Other Utilities**

This manual discusses only those requirements applicable to the Electric Utility for electric service requests.

- a. The customer's responsibilities also include:

- Contacting other utilities such as telephone and cable television companies, and the Water, Gas, and Wastewater Department of the City of Palo Alto.
- Coordinating all utility service installations early in the project to avoid possible delays.

### **4. Temporary Service**

- a. If you require temporary service, refer to **SECTION I – TEMPORARY SERVICE REQUIREMENTS** for the installation requirements.

## **B. FINAL SUBMITTALS**

Electric Engineering accepts the final submittal when the customer is ready to apply for a Building Department permit. Include all of the required, updated project information below and any relevant electrical drawings.

### **1. Final Submittal Information**

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All conditions of approval from preliminary planning submittals must be met.

- a. Updated Utility Service Application:
  - Please include complete and accurate information. Incomplete Utility Service Applications will slow the approval process and may delay special equipment orders.
- b. Updated site plan:
  - Incorporate all of the previous comments from Electric Engineering to the preliminary design.
  - Also include information on any landscaping, fencing, etc. that will be located near Utility equipment.
- c. Service equipment location:
  - Include drawings to show both the location and access to the service equipment.
- d. Electrical one-line drawings:
  - Provide the type, ratings and settings of the main circuit breaker.
  - Show any equipment that uses high levels of harmonic current such as variable speed drives, process equipment, workstations, etc.
  - Show any emergency or standby generators.
- e. Applicable civil drawings regarding substructures.
  - Show vault/box orientation and conduit entrance location details.
  - Show duct beam cross section

## **2. Switchboard Submittals**

Send switchboard drawings to the Electric Metering Department, 3201 East Bayshore Road, Palo Alto 94303.

- a. The customer must submit switchboard information during construction, before the fabrication of the switchboard.

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- See: **Section G - Service Energizing** for further information.

## C. APPROVALS

### 1. Approval Process

- a. Electric Engineering will perform a preliminary plan review to determine if an Advance Engineering Fee is required. If the Advance Engineering Fee is required, the customer will be billed. Engineering will not proceed with its work until the Advance Engineering Fee has been paid.
- b. Electric Engineering reviews the final submittals, and then does the following:
  - Issues specific comments and requirements to the applicant on the proposed service.
  - Approves the site plan incorporating appropriate comments, notes, and changes and returns it to the applicant.
  - Estimates the applicable service connection fees to be paid.
  - Requests resubmittal if the plans are unacceptable.

**Note:** The corrected drawings should be kept at the job site and made available to the Electrical Underground Inspector upon request.

### 2. Required Approvals

- a. Complete and obtain approval from the Electrical Underground Inspector for all substructure work before trenching or excavation starts.
  - Primary conduits are subject to mandrel testing before acceptance.
- b. Pads and vaults must be approved before the City pulls the cable and sets the switch and transformer.
  - The City will schedule cable installation and the setting of the transformer and switch approximately two weeks

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after approving the substructures.

- c. For additional information on specific approval requirements, please refer to **Section V.II - Multifamily Service Specifications**.

## **D. SERVICE CONNECTION FEES**

### **1. Charges**

- a. The service connection fees are based on Utility Rate Schedule E-15.
- b. The Utility estimates applicable fees and charges based upon the installation costs.
- c. Service work scheduled during non-working hours at the customer's convenience or to avoid impacting electrical service to other customers will be billed at the double-time rate.
  - If the City schedules the work during non-working hours for the City's convenience, there is no charge for the overtime differential costs.
- d. The connection fee for new developments (single family, multi-family, or commercial/industrial inclusive) consisting of 30 (thirty) units or more will include the estimate of the cost to furnish all electric meters with CPAU approved Automated Meter Reading Encoder Receiver Transmitter's.

### **2. Payment**

Pay all fees before starting construction to avoid delays in service.

**Note:** The typical lead time needed to engineer and install City electric facilities is 30 to 45 days after **all** fees have been paid.

## **E. CONSTRUCTION**

### **1. Prerequisites**

Construction may proceed once you receive approval from Electric Engineering and a building permit from the Building Department.

**2. Switchboard Submittals**

- a. Before fabrication of the switchboard, the customer must submit the switchboard information to the Electric Engineering Division at 1007 Elwell Court, Palo Alto, CA 94303.
- b. All service entrance and metering compartment designs must be approved before installation.
- c. If the service is 400 amps or larger, submit factory drawings for approval. Otherwise, catalog cut sheets are acceptable.
- d. Submit one set of the manufacturer's switchboard drawings to the Electric Metering Department before fabrication of the switchboard.
- e. The City requires conformance to all EUSERC standards for switchgear. See the EUSERC acceptability table in the **REFERENCE SECTION** for details.

**Note:** Some switchgear equipment allowed by other utility companies (such as PG&E) may be unacceptable in the City of Palo Alto.

**3. Utility Contacts and Information**

Discuss any questions regarding your electrical service that arise during construction with Electric Engineering.

- For new underground service, contact the Electrical Underground Inspector at (650) 496-5934.
- For new overhead service, contact the Electric Engineering Estimator at (650) 566-4500.
- For information regarding pads, vaults, ducts, and bus ducts, contact the Electrical Underground Inspector.
- For information regarding meters, potential transformers, and current transformers, contact the Electric Metering Department at (650) 496-6978.
- For information regarding the selection of transformers, contact the Electric Engineering Estimator at (650) 566-4500.

**F. INSPECTION****1. Underground Service Inspection**

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- a. All new underground electric services require inspection and approval from both the Building Department and the Electrical Underground Inspector. The Building Department Inspector must inspect and approve the meter panel before the meter is set. The Underground Inspector must inspect the electrical conduit in the trench prior to backfilling and the cables prior to energizing.
  - b. Contact the following to set up inspection:
    - For all work on the Utility side of the service point, contact the Electrical Underground Inspector at (650) 496-5934. This includes underground service conduits installed before backfilling, as well as service lateral conductors.
    - For all electrical work on the customer side of the service point, contact the Building Department Inspector at (650) 329-2496. This includes all service equipment and connections beyond the meter.

## **G. SERVICE ENERGIZING**

### **1. Service Conditions**

The City of Palo Alto energizes the service and sets the meter(s) only when the customer meets the following conditions:

- All fees are paid in full.
- The customer has complied with all of the requirements in this section.
- Utilities Customer Service issues a meter "set tag" which permits the Utility to energize the service.
- All easements required by the City have been granted.

### **2. Energizing Time**

Once all of the conditions above are met, the City typically energizes multifamily electric service in two to five working days.

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**II. MULTIFAMILY SERVICE SPECIFICATIONS****A. GENERAL****1. Service Conditions**

The City of Palo Alto defines multiple family dwellings as one or more buildings located within the property boundaries, which consist of multiple units.

- a. The Electric Utility reserves the right to install City equipment, including primary and secondary distribution cables and transformers, within the property boundaries.
- b. Each building on the property requires one service lateral to deliver individually metered service to each apartment or condominium.
- c. Duplexes and cottages usually receive residential, single family service.
  - Consult the Utility when planning for this service.

**2. Services Available**

- a. The standard service voltages shown below are available to multiple family dwellings.

**Single-Phase Service**

- 120/240 volt, 3-wire service.
- The maximum transformer size is 75 kVA.

**Three-Phase Service**

- 120/208 volt, 4-wire service.
- The transformer size is limited to 75 to 750 kVA.

Larger facilities requiring more than a 750 kVA transformer receive 277/480 volt service or service at the available primary voltage.

- b. For additional information on service voltages, refer to Rule and Regulation #3.

**3. General Load Limitations for Single-Phase Service**

Single-phase service is provided under the following conditions:

- a. Where the size of any single motor does not exceed 7-1/2 horsepower.
- b. In locations where the utility maintains a 120/208 Volt system, the service supply is limited to 200 Amperes.

(Loads in excess receive three-phase, 4-wire service).

**4. General Load Limitations for Three-Phase Service**

Three-phase secondary service supplies a maximum of 480 volts.

**Table V-1** below indicates the range of load requirements for the service.

<b>Normal Voltage</b>	<b>Minimum Load Requirements</b>	<b>Maximum Load</b>
208Y/120	Demand load justifies a 75 kVA transformer	750 kVA
480Y/277	Demand load justifies a 112 kVA transformer	2,500 kVA (See below)

**TABLE V-1: Three-Phase Service Load Requirements**

**Note:** If the maximum demand exceeds 2500 kVA, the customer receives electric service at the available primary voltage of 12,470 volts and the customer must provide the primary switchgear and transformers.

**The following conditions for service apply:**

- a. A padmounted service transformer is required unless otherwise approved by the Utility.
  - The customer must provide adequate space for installation, or reimburse the Utility for additional costs to locate the transformer outside the property boundaries.
  - The customer must provide adequate space for transformer installation or arrange to receive service at primary voltage at customer expense.

**5. Service Point**

The Utility determines the service point for the customer.

- For underground services, the service point will be a designated City of Palo Alto electric splice box, transformer housing, or pole.

**6. Underground Services**

All services over 400 amps or located in underground districts must be underground.

**7. Overhead Services**

- a. New or upgraded services up to 400 amps may be overhead at the Utility's discretion, provided the service is not in an underground district.
- b. For 400 amp overhead services, the Utility may require an easement for a padmount transformer.
- c. Service drops may not exceed 100 feet (80 feet for 400 Amp services) without permission from the Utility.

**8. Distribution Lines and Service Extensions**

Coordinate projects requiring the extension of high-voltage distribution lines with the Electric Utility. An advance engineering fee will be required.

**9. Electric Underground Facilities**

- a. For information on the location of existing underground facilities, call the Underground Service Alert (USA) at (800) 227-2600.
- b. If you are digging near a City electric underground facility and need further direction, contact a representative at (650) 496-5934 to meet you in the field.
- c. You must obtain a street-opening permit from the Department of Public Works before digging in a street right-of-way. This includes sidewalks, driveways, and planter strips.

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**10. Connections to Electric Utility Secondary**

The City of Palo Alto Electric Operations Department makes all connections to the Utility's electric distribution system.

**11. Easements**

An easement may be required wherever facilities are installed for City use. The easement must be recorded or a signed letter of intent received by the Utility before the service will be energized. Where required, the nominal easements are as follows:

- Cable in conduit – 5 ft. wide for total length
- Transformer up to 500 kVA – 10 ft. wide x 10 ft. long [3 ft. clear space on three sides and 8 ft. clear space in front for operation]
- Transformer larger than 500 kVA – 13 ft. wide x 13 ft. long [3 ft. clear space on three sides and 8 ft. clear space in front for operation]
- Padmounted Switch – 12 ft. wide x 10 ft. long [3 ft. clear space on three sides and 8 ft. clear space in front for operation]
- Padmount Load Break Junction – 5 ft. wide x 5 ft. long
- Primary Vault – 10 ft. wide by 10 ft. long
- Primary Pull Box – 6 ft. wide by 5 ft. long
- Secondary Pull Box – 5 ft. wide by 5 ft. long

The exact easement requirements may vary depending on the installation and will be determined by City of Palo Alto Electrical Engineering Division.

**B. CONDUITS**

**Note:** All electrical substructures from the service point to the switchgear must be installed by the customer. See: Utility Rule and Regulation #18-A.4.

**1. Secondary Conduit Installation**

- a. The customer (or contractor) is responsible for installing conduits from the service point to the meter.

- b. Use only Schedule 40 or DB-120 PVC conduit for below ground installations. Use galvanized rigid steel conduit for above ground installations.
- c. No individual Conduit bend shall exceed 90 degrees.
- d. No more than three 90 degree bends (270 degrees total) are allowed between pull boxes in a conduit run.
- e. The minimum cover requirement for service conduits is 24 inches in non-traffic areas and 30 inches in traffic areas, unless otherwise approved by the Electric Engineering Division.

**Table III-B** shows the acceptable conduit sizes and minimum bending radius for secondary conduit installations.

Conduit Size	Minimum Radius
2 inches	24 inches
3 inches	36 inches
4 inches	36 inches
5 inches	*60 inches
Risers	36 inches

**Table III-B: Acceptable Conduit Sizes and Minimum Bending Radius**

## 2. Sizing Secondary Conduits

- a. Conduits must be sized per City of Palo Alto Standard Drawing DT-SE-U-1032 from the service point to the meter.
- b. Customer has the option to install either aluminum or copper conductors.
- c. For requirements regarding secondary conduit installation into vaults, refer to **Section F. – Vaults and Switch pads**.

**3. Secondary Conduit Approval**

- a. Conduit installation must be approved by the Electric Underground Inspector before backfilling.
- b. All conduits, new or existing, shall be mandrel tested prior to installation of new service conductors.

**4. Primary Conduit Installation**

- a. Install all primary conduits according to the City of Palo Alto Standard Drawing DT-SS-U-1003 in the **REFERENCE SECTION**.
- b. Installing primary conduits to the transformer:
  - Use two 4-inch primary conduits from an existing vault or junction box, or a new switch pad, to the new transformer pad.
- c. Installing primary conduits to the switch pad:
  - The Utility will determine the conduit requirements between existing vaults and new switch pads.
- d. Primary conduits must be concrete encased unless approved otherwise by Electric Engineering.
  - Install at a minimum depth of 42 inches from the top of the encasement. See drawing DT-SS-U-1003 in the **REFERENCE SECTION**.
- e. Do not place more than two 90-degree bends in a primary conduit run.
- f. Conduit runs over 500 feet in length require additional pull boxes.
- g. Use only 4 inch and 5 inch conduits for the primary conduit.
- h. Additional requirements may be established during the project review.

**5. Primary Conduit Testing and Inspection**

- a. Primary conduits and trenches must be inspected and

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approved by the Utility before the backfill.

- b. Primary conduits must be mandrel tested before approval.
- c. Install a 3/8 inch polypropylene pull line in all primary ducts.

## **6. Fiber Optic Conduits**

Utilities recommends that when installing conduits for secondary or primary facilities, the customer install a separate 2" conduit for provision of fiber optic, or other communications, service. CPAU can assist with determining the best locations for these facilities.

## **C. JUNCTION BOXES**

### **1. Installation**

- a. Install a junction box at the base of riser poles to allow for future riser pole replacement.
- b. Conduit runs over 500 feet in length require additional pull boxes.
- c. Junction boxes used for commercial services must meet the requirements of Drawing DT-SS-r.
- d. Refer to the **REFERENCE SECTION** for additional information on junction box installation.

## **D. TRANSFORMER PADS AND TRANSITION CABINETS**

### **1. Transformer Pads**

- a. The Utility determines the appropriate size and type of transformer for each facility.
- b. Install the transformer pad and guard posts according to Drawing DT-SS-C-1005 in the **REFERENCE SECTION**.
- c. The customer must maintain the required vertical and horizontal clearances for the transformer as specified by the Utility.

The following horizontal clearances are required:

- Pad Mounted equipment shall have a minimum of 8 feet in front of the equipment doors.
- Minimum of 3 feet clearance from the edge of the concrete pad is required around the non-operable sides of the pad mounted equipment.

The following vertical clearances are required:

- 20 feet minimum for single phase pad mounted transformers.
- 30 feet minimum for three phase pad mounted transformers.

**Note:** The Electrical Underground Inspector must approve the transformer pads/substructure.

## **2. Transition Cabinets**

- a. The customer is required to provide a transition cabinet as the interconnection point between the service lateral and the service entrance conductors if the secondary current exceeds 1600 amps.
  - Exception: A transition cabinet is not required if the customer installs busway from the main switchgear to the Utility's padmount transformer. In this case, the customer will own and maintain the bus duct. The City will be responsible only up to the transformer secondary terminals.
- b. Size the cabinet according to the main disconnect rating.
  - Submit the transition cabinet design to the Electric Engineering Division for approval.
- c. For services supplied by 150 kVA to 750 kVA padmount transformers:
  - Provide four, 4 inch secondary conduits between the Utility side of the transition cabinet and the transformer secondary compartment.
  - Cable-in-duct or busway may be used between the transition cabinet and the switchgear.

- d. For services provided by 1000 kVA and larger transformers:
  - Provide suitable busway between the transition cabinet and the secondary compartment of the transformer.
- e. A recommended transition cabinet design is included in drawing SR-XF-E-1020 in the **REFERENCE SECTION**. Drawings showing the use of the transition cabinet are also included.

**E. BUSWAY CONNECTIONS****1. Transformers**

- a. All electric services using padmount transformers of 1000 kVA or greater capacity must have a busway connection to the transformer.
- b. Use 500 kcmil, 600 – V, extra-flexible, copper conductor for the connections between the transformer secondary terminals and the busway conductors. The customer must provide the busway, connectors, and cables.
  - Busway must comply with the California Electrical Code and be U.L. listed.
  - Connectors shall be crimped and selected as part of a UL approved assembly for the cable.
- c. The Utility will designate a specific transformer to use at the customer's facility.
  - For design of the busway, the customer shall contact Electric Engineering to schedule measurement of the transformer. The customer is responsible for cutting the transformer case to accept the busway connection.
- d. The customer will own and maintain all busway from the main switchgear or transition cabinet to the Utility's transformer.

**2. Inspection and Approval**

- a. Provide detailed drawings of the proposed busway to Electric Engineering.
  - The Utility must review and approve the drawings before

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installation of the busway.

- b. Submit the busway pattern to the Utility for approval.
- c. The City Building Inspector must inspect and approve the busway installation between the customer's switchgear and the transition cabinet.
- d. The Underground Electrical Inspector must inspect and approve the busway installation from the transition cabinet to the transformer.
- e. A preferred busway connection design for use within the transformer secondary compartment is shown in drawing SR-XF-E-1020 in the **REFERENCE SECTION**.

## **F. VAULTS AND SWITCH PADS**

### **1. Permits**

Obtain a Street Opening Permit from the Department of Public Works before digging in a street right-of-way (this includes sidewalks, driveways, and planter strips).

### **2. Vault Requirements**

- a. When installing conduits into an energized vault, always core drill from the outside. City's Underground Electrical Inspector must be present during the core drilling. Contact the Electrical Underground Inspector at (650) 496-5934.
- b. The Utility will designate the proper location for core drilling into the vault.
- c. New vaults must meet Utility standards.
  - The Utility will specify the vault size and top section requirements.
  - Consult the Utility for vault specifications and standards.
  - Some "pre-approved" designs are available.

### **3. Switch Pad Requirements**

The customer must provide the switch pad and box for the installation of a padmount switch. See drawing DT-SS-U-1026 in

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the **REFERENCE SECTION** for requirements.

## **G. CONDUCTORS**

**Note:** The City of Palo Alto Electric Operations Department makes all connections and terminations to the City Electric Utility distribution system. See: Utility Rule and Regulation #18-C.

### **1. Secondary and Service Lateral Conductors**

- a. The customer (or contractor) is responsible for installing all underground secondary service conductors and providing crimp lugs.
- b. All secondary conductors must be rated 600 volts and meet U.L. standards for conduit installation.
- c. Service lateral may not exceed 100 feet unless approved by Utilities.
- d. Size service entrance conductors per drawing DT-SE-U-1032. A full size neutral is required.
- e. The Utility allows only one service lateral per parcel.
  - For exceptions see: Utility Rule and Regulation 20.C.
- f. All crimp lugs must be U.L. approved and provided by the
  - Use an oxidation inhibitor on aluminum conductors.
- g. The Utility takes responsibility for maintenance of the service lateral conductors after acceptance by the Utility. The customer is responsible for maintaining conduits and boxes. If the conduits are deteriorated to the extent that the conductors cannot be removed or reinstalled, then it shall be the customer's responsibility to repair or replace the conduits.

### **2. Primary Conductors**

- a. Only the Utility installs and terminates primary conductors.
- b. The Utility will bill the cost of furnishing and installing primary conductors.
  - See: City of Palo Alto Rate Schedule E-15 in the

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**REFERENCE SECTION.****4. Service Conductors within Buildings**

The service conductors must terminate at a disconnect switch immediately after entering the building. Installations must comply with the California Electrical Code section 230-70 concerning the location of the disconnect switch and section 230-6 for the definition of conductors considered outside a building.

**H. METERING AND SERVICE EQUIPMENT****1. Metering Locations**

**Note:** All meter and switchgear must meet both the EUSERC requirements and the City of Palo Alto's standards for meter installations. See the EUSERC acceptability table in the **REFERENCE SECTION**.

- a. All meter locations must be approved by Utilities Electric Engineering.
  - Master metering is not permitted.
- b. Group all meters together at one location at each building. For multi-meter installation, refer to EUSERC drawings.
  - See: **Meter Sockets**
- c. All service equipment must be located above grade level unless otherwise approved by Electric Engineering.
- d. Maintain 18 inches of horizontal separation from the nearest edge of the electric meter panel to the gas riser and 6 inches from the gas houseline. See drawing SR-CN-0-1009 in the **REFERENCE SECTION**.
- e. Provide a level working space 30 inches wide and 36 inches deep in front of each meter.
- f. Meters must be accessible to the Utility for meter reading and maintenance.
  - Locating meters in locked rooms, cabinets, or fenced enclosures is permitted only after approval by the Utility.

- The customer is responsible for having the lock keyed for City use.
- g. Do not install meters or metering equipment in ventilator shafts, closets, or lavatories.
- h. Do not install meters in or above stairways, doorways, windows, sinks, wash trays, or driveways.
- i. Do not install electric meters above gas meters or in any other hazardous location.
- j. Do not install meters where they could be obstructed by doors or swinging windows.
- k. For more information on metering installations, refer to the California Electrical Code and The State of California Electric Safety Orders.
  - See drawings in the **REFERENCE SECTION** for illustrations of approved meter installations.

**2. Meter Height**

- a. The center of the electric meter socket(s) must be 48 to 75 inches above final grade unless otherwise approved by Electric Engineering.
- b. When the Service Equipment is installed in a location susceptible to damage by vehicles (i.e. in or along a driveway, etc.) the meter and equipment shall be protected by guard posts to prevent contact.
- c. For multi-meter installations refer to the applicable EUSERC drawings.

**3. Meter Sockets**

- a. Install the meter socket in a true vertical plane.
- b. Seal any unused meter socket locations with internally removable covers.
- c. Do not use die-cast meter sockets as a wiring gutter for more than 2 meters.
- d. To find the meter socket requirements for a specific service

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voltage, see the **REFERENCE SECTION**.

- f. Ring-type sockets are required.

#### **4. Meter Cabinets and Enclosures**

- a. Design the cabinet so that the roof, doors, and supports do not interfere with the meter installation.
- b. Do not use shallow cabinets which have holes cut in the door for the meter to protrude through.
- c. The clearance between the sealing flanges of the meter socket and the inside of the closed cabinet door must be at least 9 inches. See drawing SR-MT-E-1013 in the **REFERENCE SECTION**.
- d. Hinged doors must not exceed 48 inches in width.
  - Provide hinged doors with a device to hold them open safely.
- e. Fit doors properly with adequate hinges and latches to insure positive opening and closing.
- f. Construct cabinets exposed to the weather for rain tightness and of weather resistant materials.
  - Flash and seal all top openings where conduits enter and leave.

#### **5. Meter Panels**

- a. Meter panels must meet the EUSERC requirements as accepted by the City of Palo Alto.
  - See the EUSERC acceptability table in the **REFERENCE SECTION**.
- b. The Utility will install current transformers and wire the meter socket for services over 200 amps or 480Y/277 volt services.

#### **6. Service Disconnect**

- a. Use only a U.L. approved service disconnect.
- b. Install the service disconnect on the load side of the metering

## **SECTION V**

## **MULTIFAMILY SERVICE REQUIREMENTS**

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section of the switchboard.

- c. In locations where more than 6 meters are installed, provide a main disconnect on the Utility side of the meters.

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**SECTION VI – RESIDENTIAL SUBDIVISION SERVICE  
REQUIREMENTS**

This section discusses the requirements for establishing electric service to new residential subdivisions in Palo Alto. Subdivisions are normally constructed on dedicated public streets, where lots are designed for detached, single-family homes or townhomes.

For the requirements on individual electric service to single-family homes, please refer to: **SECTION II - RESIDENTIAL UNDERGROUND AND OVERHEAD SERVICE REQUIREMENTS**.

**Note:** The service fees in **SECTION II** do not apply to homes in new subdivisions.

**I. SUBDIVISION SERVICE REQUESTS**

- A. Planning
- B. Final Submittal of the Tentative Parcel Map
- C. Approvals
- D. Service Connection Fees
- E. Construction
- F. Inspection
- G. Service Energizing

**II. RESIDENTIAL SUBDIVISION SERVICE SPECIFICATIONS**

- A. General
- B. Conduits
- C. Junction Boxes
- D. Transformer Pads
- E. Vaults and Switch Pads
- F. Conductors

## **SECTION VI**

## **RESIDENTIAL SUBDIVISION SERVICE REQUIREMENTS**

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G. Metering and Service Equipment

H. Street Lights

### **III. LIST OF DRAWINGS**

See: **Drawings**, located in the **REFERENCE SECTION**, for the applicable drawings.

**I. SUBDIVISION SERVICE REQUESTS**

Please observe the following procedures to ensure electric service by your requested date. The City of Palo Alto will not connect electric service until the customer meets all inspection requirements and pays all necessary fees.

**A. PLANNING****1. Initial Planning**

- a. Contact the City of Palo Alto Electric Engineering Division during the initial planning of the project.
- b. Submit information to Electric Engineering simultaneously with your preliminary submittal of the subdivision plan to the Public Works Department.

**2. Preliminary Submittals**

Present your preliminary project information, site plans and tentative subdivision parcel map to Electric Engineering for review. Include the following information:

- a. Subdivision Preliminary Tentative Parcel Map including:
  - Lot lines
  - Curbs, sidewalks, planter strips, and driveways
  - Trees and landscaping
  - Existing and proposed utilities (water, gas, wastewater, telephone etc.) if known.

**Note:** At this time, Electric Engineering does field checks of the subdivision and reviews the preliminary submittals.

**b. Review Process**

After the preliminary review, Electric Engineering returns the preliminary tentative subdivision parcel map to the developer with the following information:

- Substructure requirements for the electric distribution, services and streetlights
- Type of street light poles and luminaires to be installed

- Easement requirements

After receiving this information, send copies of the preliminary design to the telephone and cable TV companies to determine their requirements.

### **3. Other Utilities**

This manual discusses only those requirements applicable to the Electric Utility for providing electric service.

- a. The customer's responsibilities also include:

- Contacting other utilities such as telephone and cable television companies, and the Water, Gas, and Wastewater Department of the City of Palo Alto
- Coordinating all utility service installations and payments early in the project to avoid unnecessary delays

### **4. Temporary Service**

If you require Temporary Service, refer to **SECTION I – TEMPORARY SERVICE REQUIREMENTS** for the installation requirements.

## **B. FINAL SUBMITTAL OF THE TENTATIVE PARCEL MAP**

Electric Engineering reviews the final submittal of the tentative parcel map when the customer is ready to apply for subdivision approval from the Public Works Department. Include the following updated project information:

### **1. Final Submittal Requirements**

- a. Tentative Subdivision Parcel Map:

- Incorporate all of the previous comments from Electric Engineering into the preliminary design.
- Also include information on any landscaping, fencing, etc. that will be located near Utility equipment.
- Include any information on easements required for the project.

- b. Applicable civil drawings regarding substructures

**C. APPROVALS****1. Approval Process**

- a. Electric Engineering reviews the final submittals and then does the following:
  - Issues specific comments and requirements to the Public Works Department on the proposed subdivision.
  - Approves the subdivision parcel map after the applicant has incorporated all comments, notes and changes.
  - Estimates the applicable service connection fees to be paid.
  - Requests resubmittal if the plans are unacceptable.

**Note:** Electric Engineering does not issue the approval until all requested changes from previous comments are incorporated into the final design. The customer cannot obtain a construction permit until after the final approval.

- b. While Electric Engineering recommends street light equipment, the street light design is subject to review by the Architectural Review Board.

**2. Easement Requests**

All easements for Utility electrical equipment must be shown on the tentative parcel map. The City of Palo Alto requests easements to place Utility equipment on private property at the time of the subdivision approval.

**3. Approvals Required During Construction**

- a. Obtain approval from the Electrical Underground Inspector for all substructure work.
  - Primary and secondary conduits are subject to mandrel testing.
- b. Pads and vaults must be approved before the Utility pulls the cable and sets the switch and transformer.
  - The Utility schedules cable installation and setting of the

## **SECTION VI**

## **RESIDENTIAL SUBDIVISION SERVICE REQUIREMENTS**

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transformers and switches only after all paving, sidewalk and street installations are complete.

- c. For additional information on specific approval requirements, please refer to **II. - Residential Subdivision Service Specifications**.

### **D. SERVICE CONNECTION FEES**

#### **1. Charges**

- a. The service connection fees are based on Utility Rate Schedule E-15. An advance engineering fee may be required.
- b. The Utility estimates applicable fees based on the installation costs.
- c. Service work scheduled outside of normal working hours for the applicant's convenience will be billed at the double-time rate.
- d. The connection fee for new developments (single family, multi-family, or commercial/industrial inclusive) consisting of 30 (thirty) units or more will include the estimate of the cost to furnish all electric meters with CPAU approved Automated Meter Reading Encoder Receiver Transmitter's.

#### **2. Payment**

Pay all fees before your requested service date to avoid service delays.

**Note:** The typical lead time needed to engineer and install City facilities is 30 to 45 days after **all** fees have been paid.

### **E. CONSTRUCTION**

#### **1. Prerequisites**

Construction may proceed once all applicable approvals, permits, and fees are received from the City.

#### **2. Utility Contacts and Information**

- a. Discuss any questions regarding electrical service that arise during construction with the Utility.
  - For new underground service, contact the Electrical Underground Inspector at (650) 496-5934.
  - For temporary overhead service, contact the Electric Engineering Estimator at (650) 566-4500.
  - For information regarding pads, vaults, ducts, and bus ducts, contact the Electrical Underground Inspector at (650) 496-5934.
  - For metering information, contact Electric Metering at (650) 496-6978.

For information regarding transformers, contact the Electric Engineering Estimator at (650) 566-4500.

## F. INSPECTION

### 1. Substructure Inspection

All substructure installations (conduits, boxes, streetlights etc.) on the subdivision parcel map must be inspected and approved by the Electrical Underground Inspector.

### 2. Underground Service Inspection

- a. All new underground services to single-family homes within a subdivision require inspection and approval from both the Building Department and the Electrical Underground Inspector before energizing.

**Note:** Underground service conduits and substructures must be inspected before backfilling. Refer to **Section VI – Specifications** for more information.

- b. Contact the following to set up inspection:
  - For all work on the Utility side of the meter, contact the Electrical Underground Inspector at (650) 496-5934. This includes underground service conduits installed before backfilling, as well as service lateral conductors.
  - For all electrical work on the customer side of the meter, contact the Building Department Inspector at (650) 329-2496. This includes all service equipment and

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connections beyond the meter.

**G. SERVICE ENERGIZING****1. Prerequisites**

- a. The Utility energizes service and sets the meter(s) only when the customer meets these conditions:
  - All fees are paid in full.
  - The customer has complied with all of the procedure requirements noted above.
  - Utilities Customer Service issues a meter "set tag," which permits the Utility to energize the service.
  - All easements required by the City have been granted.

**II. SUBDIVISION SERVICE SPECIFICATIONS****A. GENERAL****1. Services Available**

- a. Residential services are normally 120/240 volt 3-wire, single-phase, 400 amps maximum.
- b. Some residential areas are served by a 120/208 volt 3-wire system (two phases and a neutral of a three-phase, 4-wire system).
  - A maximum service of 200 amps is available.
- c. All services over 400 amps require approval by Electric Engineering and must be underground. The customer may be required to install a three phase service which must comply with the **Commercial Secondary Service Requirements**.
- d. Not all service voltages are available at all locations. Consult the Electric Engineering Division on service voltage availability.

**2. Point of Service**

The Utility establishes a service point for the customer.

- For underground services, the service point will be a designated City of Palo Alto electric splice box or transformer housing.
- For overhead services, the service point will be the connection at the customer's weather head.

**3. Underground Utility Districts**

Only underground services are permitted in an underground utility district.

**4. Distribution Lines and Service Extensions**

- a. Coordinate projects requiring the extension of high voltage distribution lines with the Utility.

- This applies to project sites located more than 100 feet away from the Utility lines.
- b. Extension of the existing distribution lines (if feasible) will be done at the customer's expense.

## **5. Connections to Electric Utility Secondary**

The City of Palo Alto Electric Operations Department makes all connections to the Utility's electric system.

## **6. Easements**

Public Utility Easements (P.U.E.) on private property may be required for installing electric equipment and substructure. The easements must be recorded or a signed letter of intent received by the Utility before the service will be energized. Where required, the nominal easements are as follows:

- Cable in conduit – 5 ft. wide for total length
- Transformer up to 500 kVA – 10 ft. wide x 10 ft. long [3 ft. clear space on three sides and 8 ft. clear space in front for operation]
- Transformer larger than 500 kVA – 13 ft. wide x 13 ft. long [3 ft. clear space on three sides and 8 ft. clear space in front for operation]
- Padmounted Switch – 12 ft. wide x 10 ft. long [3 ft. clear space on three sides and 8 ft. clear space in front for operation]
- Padmount Load Break Junction – 5 ft. wide x 5 ft. long
- Primary Vault – 10 ft. wide by 10 ft. long
- Primary Pull Box – 6 ft. wide by 5 ft. long
- Secondary Pull Box – 5 ft. wide by 5 ft. long

The exact easement requirements may vary depending on the installation and will be determined by City of Palo Alto Electrical Engineering Division.

## **B. CONDUITS**

**Note:** Within the subdivision, the developer must install all electrical substructures required for distribution line extensions to the subdivision.  
See: Utility Rule and Regulation #16-A.2.

**1. Secondary Conduit Installation**

- a. Install all secondary conduits according to the City of Palo Alto Standard Drawing DT-SS-U-1004 in the **REFERENCE SECTION**.
- b. The developer must install all conduits required within the subdivision.
- c. Use only Schedule 40 or DB-120 PVC conduit, or rigid galvanized steel conduit.
- d. No individual conduit bend shall exceed 90 degrees.
- e. No more than three 90 degree bends (270 degrees total) are allowed between pull boxes in a conduit run.
- f. The minimum cover requirement for secondary and service conduits is 24 inches in non-traffic areas and 30 inches in traffic areas unless otherwise approved by Electric Engineering.
- g. Use Schedule 80 PVC or galvanized steel conduit for above ground installations exposed to damage from vehicles.

See **Table VI - 1** below for conduit sizes and minimum bending radius.

<b>Conduit Size</b>	<b>Minimum Radius</b>
2 Inches	24 Inches
3 inches	36 inches
4 Inches	36 Inches
5 Inches	*60 Inches
Riser	36 inches

**Table VI-1: Acceptable Conduit Sizes and Minimum Bending Radius**

**2. Sizing Service Conduits**

- a. Conduits must be sized per City of Palo Alto Standard Drawing DT-SE-U-1032 from the service point to the meter.
- b. Customer has the option to install either aluminum or copper conductors.
- c. For requirements regarding secondary conduit installation into vaults, refer to **Section F. – Vaults and Switch pads**.

**3. Installation**

- a. Install all primary conduits according to the City of Palo Alto Standard Drawing DT-SS-U-1003 in the **REFERENCE SECTION**.
- b. Primary conduits must be concrete encased unless approved otherwise by Electric Engineering.
  - Install at a minimum depth of 30 inches from the top of the encasement unless otherwise approved by Electric Engineering.
- c. Do not use more than two 90 degree bends between pull boxes in a primary conduit run.
- d. Conduit runs over 500 feet in length require additional pull boxes.
- e. Use only 4 inch or 5 inch conduits for primary conductors.

**4. Conduit Testing and Inspection**

- a. All conduits and trenches must be inspected and approved by the Electric Underground Inspector prior to backfilling.
- b. All conduits will be mandrel tested before approval.
- c. Install a 3/8-inch polypropylene pull line in all ducts.

**5. Fiber Optic Conduits**

Utilities recommends that when installing conduits for secondary or primary facilities, the customer install a separate 2" conduit for provision of fiber optic, or other communications, service. CPAU

can assist with determining the best locations for these facilities.

**C. JUNCTION BOXES****1. Installation**

- a. The developer installs all primary and secondary junction boxes shown in the subdivision parcel map.
- b. All junction boxes must meet the requirements of City of Palo Alto Standard Drawing DT-SS-U-1002.
- c. Refer to the **REFERENCE SECTION** for additional information on junction box installations.

**D. TRANSFORMER PADS****1. Installation Requirements**

- a. The developer installs all transformer pads shown in the subdivision parcel map.
- b. Install the transformer pad and guard posts (if specified) according to City of Palo Alto Standard Drawing DT-TR-C-1005 in the **REFERENCE SECTION**.

**Note:** The Electrical Underground Inspector must approve the transformer pads.

**E. VAULTS AND SWITCH PADS****1. Permits**

Obtain a Street Opening Permit from the Department of Public Works before digging in a street right-of-way. This includes sidewalks, driveways and planter strips.

**2. Vault Requirements**

- a. When installing conduits into an energized vault, always core drill from the outside. City's Underground Electrical Inspector must be present during the core drilling. Contact the Electrical Underground Inspector at (650) 496-5934.
- b. The Utility will designate the proper location for core drilling into the

vault.

- c. New vaults must meet Utility standards.
  - The Utility will specify the vault size and top section requirements.
  - Consult the Utility for vault specifications and standards.
  - Some "pre-approved" designs are available.

### **3. Switch Pad Requirements**

The customer must provide the switch pad and box for the installation of a padmount switch.

- The switch pad and box must meet the requirements of Drawing DT-SS-U-1026 in the **REFERENCE SECTION**.

## **F. CONDUCTORS**

**Note:** The City of Palo Alto Electric Operations Department makes all connections and terminations to the Electric Utility distribution system. See Utility Rule and Regulation 18.B.

### **1. Conductors**

- a. The developer or contractor is responsible for installing all underground service conductors and crimp lugs (if required) beyond the service point. A utility representative must be present when working in utility owned facilities.
- b. Service lateral may not exceed 100 feet in length unless approved by Utilities Engineering.
- c. Press on lugs are required for cable terminations on service panels  $\geq$  400 Amps.
- d. The Utility allows only one service lateral per parcel.
  - Size the service entrance conductors per City of Palo Alto Standard Drawing DT-SE-U-1032. A full size neutral is required.
- e. To install aluminum conductors, the meter socket terminals must be UL approved for use with aluminum conductors.

- An oxidation inhibitor must be used on aluminum conductors at the meter terminals.
- f. The Utility takes responsibility for maintenance of the service lateral conductors after acceptance by the Utility. The customer is responsible for maintaining conduits and boxes. If the conduits are deteriorated to the extent that the conductors cannot be removed or reinstalled, then it shall be the customer's responsibility to repair or replace the conduits.

**2. Service Conductors within Buildings**

- a. The service conductors must terminate at a disconnect switch immediately after entering the building. Installations must comply with California Electrical Code section 230-70 concerning the location of the disconnect switch and section 230-6 for the definition of conductors considered outside of a building.

**G. METERING AND SERVICE EQUIPMENT****1. Metering Locations**

- a. All meter locations must be approved by Utilities Electric Engineering.
- b. Locate the meter on the outside of the building.
  - The preferred location is a readily accessible area near the corner of the building closest to the Utility service point.

**Exception:** Exceptions are allowed only for special structural needs. Obtain advance written approval from Utilities Electric Engineering.

- c. All service equipment must be located above grade level unless otherwise approved by Electric Engineering.
- d. Maintain 18 inches of horizontal separation from the nearest edge of the electric meter panel to the gas riser and 6 inches from the gas houseline. See drawing SR-CN-0-1009 in the **REFERENCE SECTION**.
- e. Provide a level working space 30 inches wide and 36 inches deep in front of each electric meter.

- f. Meters must be accessible to the Utility for meter reading and maintenance.
  - Locating meters in locked rooms, cabinets, or fenced enclosures is permitted only after approval by the Utility.
  - The customer is responsible for having the lock keyed for Utility use.
- g. Do not locate meters within carports, breezeways, porches, or other areas that may later be enclosed.
- h. Do not install meters or metering equipment in ventilator shafts, clothes closets, broom closets, or lavatories.
- i. Do not install meters in or over stairways, doorways, windows, sinks, wash-trays, or driveways.
- j. Do not install electric meters above or below gas meters
- k. Do not install meters near doors or swinging windows in the area within the door or window width.
- l. When water can enter into the wire and conduit system and migrate into the meter panel and/or building, the customer or customer's contractor shall provide a means to discharge the excess water or water pressure from the conduit system. The means to allow the discharge of water or water pressure can be as follows:
  - A box installed at the base of the riser to the meter panel.
  - A fitting or series of fittings installed in the conduit riser to the meter panel to channel the water out of the service conduit system and away from the service wires.

If a box is installed, it must have a bolt-down cover to prohibit insertion and/or extension of any object or wire into the meter panel.

Any fitting or series of fittings must be constructed and installed in such a manner to prevent physical damage to the wires or conduit riser contained within the conduit system.

## **2. Meter Height**

- a. The center of the electric meter socket must be between 48 and 75 inches above final grade.
- b. When the meter is installed in a location susceptible to damage by vehicles (i.e. in or along a driveway, etc.) the meter shall be protected by either guard posts or installed at a suitable height (within requirements of item a.) to prevent contact.

**3. Meter Socket**

- a. Install the meter socket in a true vertical plane.
- b. Seal any unused meter socket location with internally removable covers.
- c. Do not use die-cast meter sockets as a wiring gutter for more than two meters.
- d. Residential, self-contained meter sockets must be U.L. approved, with a maximum current rating equal to or greater than the current rating of the associated service equipment.
- e. Connect neutral taps to the service neutral conductor behind sealed panels.
  - Wire nuts are not permitted.
- f. Sockets with test bypass devices are not allowed for electric panels rated 200 Amps or less.
- g. 4-jaw meter sockets are normally used for 120/240 Volt, 3-wire service.
- h. 5-jaw sockets are required where service is 120/208 Volt, 3-wire.
- i. Ring type meter sockets are required.

**4. Metering Arrangement**

- a. Run current-carrying conductors from the meter to the customer's disconnect switch and protective overload devices, such as fuses or circuit breakers, without interruption or splices.

- 
- b. Run unmetered service wires and metered load wires in separate conduits, raceways, or wiring gutters.

**5. Metering Residential Services over 200 Amps**

- a. Test bypass facilities shall be installed for residential electric panels rated greater than 200 Amps.
- b. The City permits the use of Class 320 meter sockets with 400 amp service equipment. Refer to EUSERC drawing 302B in the **REFERENCE SECTION**.

**6. Meter Cabinets and Enclosures**

- a. Design the cabinet so that the roof, doors, and supports do not interfere with the meter installation.
- b. The clearance between the sealing flanges of the meter socket and the inside of the closed cabinet door must be at least 7 inches. See drawing SR-MT-E-1013 in the **REFERENCE SECTION**.
- c. Fit doors properly with adequate handles, hinges, and latches to insure positive opening and closing.

**7. Meter Panels**

- a. Meter panels must meet EUSERC requirements as accepted by the City of Palo Alto. See drawing 301 in the **REFERENCE SECTION**.
  - Consult the Electric Metering Department at (650) 496-6978 for details.
- b. Only ring type socket panels are accepted.
- c. Meter panels for overhead services are required to accept both overhead and underground service connections.

**8. Service Disconnect**

- a. Use only U.L. approved service disconnect equipment.
- b. Install the service disconnect on the load side of the meter.
- c. Wiring between the meter and the service disconnect must be installed in an approved conduit or enclosure.

- Use sealable gutters only as approved by Electric Metering Department.

**9. Non-Installation of Meters**

- a. The City of Palo Alto will not install meters until the customer meets all of the above requirements.
  - All work must be approved by the proper inspecting authorities.
  - See: **Section I. – Residential Service Requests** for the inspection requirements.

**10. Short Circuit Duty**

- a. The available short circuit current at the customer's service equipment will not exceed 10,000 amps symmetrical for residential services of 200 amps or less.
- b. Consult the Electric Engineering Division for short circuit duty of residential services larger than 200 amps.

**H. STREET LIGHTS****1. Electroliers**

- a. Electroliers must be approved by both the Planning Department and the Architectural Review Board before the installation.
  - Utilities Electric Engineering will recommend the type of electrolier to be installed.

**2. Developer Requirements**

- a. The subdivision developer must furnish and install the following to the nearest street light box or service box:

- Electrolier (pole and luminaire)
- Foundation (if required)
- Street Light Substructure (conduits and boxes)
- Cables

## **SECTION VI**

## **RESIDENTIAL SUBDIVISION SERVICE REQUIREMENTS**

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- b. The developer must meet all Electric Utility requirements for the equipment listed above.

## LIST OF REFERENCES

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<u>STANDARD NUMBER</u>	<u>DESCRIPTION</u>
DT-CL-U-1031	PADMOUNT CLEARANCE REQUIREMENTS
DT-SE-U-1032	UNDERGROUND SERVICE CONDUIT AND CABLE REQUIREMENTS
DT-SS-C-1005	CONCRETE TRANSFORMER PAD
DT-SS-C-1028	PRECAST CONCRETE PAD FOR LBC CABINET
DT-SS-U-1001	INSTALLATION OF STEEL RISER CONDUIT ON WOOD POLE
DT-SS-U-1001A	INSTALLATION OF PVC RISER ON WOOD POLE
DT-SS-U-1002	UNDERGROUND JUNCTION BOXES
DT-SS-U-1003	UNDERGROUND DUCT LINES – TYPICAL TRENCH SECTION DETAILS
DT-SS-U-1025	MANDREL TESTING
DT-SS-U-1026	CONCRETE SWITCH PAD DETAIL
DT-SS-U-1038	CONCRETE COLLAR SURROUNDING A VAULT
SL-SS-C-1021	STREET LIGHT FOUNDATION - 10' TO 14'
SL-SS-C-1022	STREET LIGHT FOUNDATION - 20' TO 25'
SL-SS-C-1023	STREET LIGHT FOUNDATION - 30'
SL-SS-C-1024	STREET LIGHT FOUNDATION - PEDESTAL TYPE
SR-CL-O-1011	SERVICE DROP CLEARANCE REQUIREMENTS
SR-CL-O-1015	MINIMUM GROUND CLEARANCES FOR RESIDENTIAL SERVICE DROPS
SR-CL-O-1016	GROUND CLEARANCES FOR COMMERCIAL SERVICE DROPS
SR-CL-O-1017	CLEARANCE FOR SERVICE POLE FOR SUPPLY SERVICE DROP
SR-CL-O-1018	CLEARANCES FROM SWIMMING POOLS, HOT TUBS AND SPAS
SR-CN-O-1009	TYPICAL OVERHEAD SERVICE INSTALLATION
SR-CN-U-1010	RESIDENTIAL UNDERGROUND SERVICE REQUIREMENTS
SR-MT-E-1012	REQUIRED MINIMUM CLEARANCES OF METER SOCKETS
SR-MT-E-1013	CLEARANCE FOR METER CABINET ENCLOSURES
SR-MT-E-1014	DIAGRAM OF CONNECTIONS, METER SOCKETS
SR-MT-E-1035	METER INSTALLATION IN RESIDENTIAL DRIVEWAY
SR-MT-M-1019	VOLTAGE TRANSFORMER MOUNTING PLATE
SR-TS-O-1006	OVERHEAD TEMPORARY SERVICE
SR-TS-O-1007	TEMPORARY SERVICE STRUCTURES
SR-TS-U-1008	UNDERGROUND TEMPORARY SERVICE
SR-XF-E-1020	TRANSITION CABINET

## LIST OF REFERENCES

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### **DESCRIPTION**

EUSERC ACCEPTABILITY TABLE

TEMPORARY ELECTRIC SERVICE INFORMATION PACKAGE

RESIDENTIAL ELECTRIC SERVICE INFORMATION PACKAGE

COMMERCIAL/MULTI-FAMILY ELECTRIC SERVICE INFORMATION PACKAGE

ELECTRIC VEHICLE CHARGER INFORMATION FORM

GLOSSARY OF TERMS

## PURPOSE AND SCOPE:

THIS DOCUMENT CONTAINS INFORMATION RELATING TO THE PLACEMENT OF PAD MOUNTED ELECTRICAL EQUIPMENT. THIS IS A GUIDE FOR DETERMINING THE MINIMUM REQUIREMENTS FOR EACH SPECIFIC INSTALLATION.

## CLEARANCES:

1. CLEARANCES FROM BUILDING WALLS (SEE SHT. 6) - OIL FILLED PAD MOUNTED EQUIPMENT SHALL HAVE THE FOLLOWING CLEARANCES:
  - A. 3 FEET MINIMUM FROM ANY BUILDING WALL TO THE EDGE OF THE PAD. THIS CLEARANCE MAY BE REDUCED TO 2 FEET IF THE BUILDING SURFACE IS NONCOMBUSTIBLE, WITH APPROVAL OF ELECTRIC UTILITY ENGINEERING.
2. DOORWAY AND WINDOW CLEARANCE (SEE SHT. 6) - PAD MOUNTED EQUIPMENT SHALL NOT BE PLACED WHERE IT IMPEDES THE FLOW OF AIR OR TRAFFIC THROUGH A DOORWAY OR WINDOW. CLEARANCE SHALL BE 10 FEET RADIALLY FROM THE DOORWAY OR WINDOW TO THE CLOSEST EDGE OF THE PAD.
3. VERTICAL CLEARANCE FROM OVERHANGS (SEE SHT. 7) - TO PROVIDE SPACE FOR HOISTING EQUIPMENT SO THAT IT CAN BE REPLACED, THE FOLLOWING VERTICAL CLEARANCES FROM THE TOP OF THE PAD ARE REQUIRED:
  - A. 20 FEET MINIMUM FOR 1Ø PAD MOUNTED EQUIPMENT.
  - B. 30 FEET MINIMUM FOR 3Ø PAD MOUNT EQUIPMENT.
  - C. WHEN REQUIRED FOR INSTALLATIONS SUCH AS IN DRY VAULTS, THE CLEARANCES FOR PAD MOUNT EQUIPMENT MAY BE REDUCED TO 10 FEET FROM THE TOP OF THE PAD. THIS REDUCED CLEARANCE WILL GREATLY INCREASE THE REPLACEMENT TIME, SINCE THE EQUIPMENT MUST BE JACKED AND ROLLED OUT TO A POSITION WHERE THE CLEARANCE IS ADEQUATE TO HOIST IT.

APPROVED Engineering Manager		ENGINEERING STANDARD <b>PAD MOUNT CLEARANCE REQUIREMENTS</b>					
				1.	09/08	REVISED NOTES 1 AND 2	TT
		REV DATE		DESCRIPTION		APPR	
DRAWN BY Manager		CITY OF PALO ALTO CALIFORNIA		NTS	<b>DT-CL-U-1031</b>		1 OF 9
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## HORIZONTAL WORK SPACE REQUIREMENTS:

4. CLEAR AND LEVEL WORK AREAS ARE REQUIRED AROUND PAD MOUNTED EQUIPMENT TO PROVIDE A SAFE WORKING SPACE TO OPERATE AND MAINTAIN THE EQUIPMENT.
5. PAD MOUNTED EQUIPMENT (SEE SHT. 9);
  - A. 8 FEET MINIMUM IN FRONT OF ALL EQUIPMENT DOORS TO PROVIDE ROOM TO OPERATE WITH HOT STICKS.
  - B. 3 FEET MINIMUM FROM NON-OPERABLE SIDES. THIS CLEARANCE MAY BE REDUCED WITH APPROVAL BY THE ELECTRICAL ENGINEERING DEPARTMENT FOR LANDSCAPING OBSTRUCTIONS (DECORATIVE WALLS, PLANTERS, ROCKS, ETC.) THAT MAY BE PLACED NEXT TO THE PAD ON NON OPERABLE SIDES.

## PROTECTION FROM VEHICULAR TRAFFIC:

6. PHYSICAL PROTECTION FROM VEHICULAR TRAFFIC SHALL BE PROVIDED IN ACCORDANCE WITH THE LEVEL OF EXPOSURE. BARRIER POSTS, ETC., ARE INTENDED TO PROVIDE REASONABLE WARNING FROM ACCIDENTAL VEHICULAR CONTACT, RATHER THAN PREVENTING ALL POSSIBLE CONTACT. WHEN THE ELECTRIC ENGINEERING, OR OPERATIONS, DEPARTMENT DETERMINES IT NECESSARY, THE APPLICANT WILL PROVIDE PHYSICAL PROTECTION AS SPECIFIED BY THE CITY. (SEE DT-SS-C-1005)
7. PAD MOUNTED EQUIPMENT HAVING THE FOLLOWING SET BACKS MAY NOT REQUIRE THE CUSTOMER TO PROVIDE ADDITIONAL PHYSICAL PROTECTION:
  - A. SINGLE-FAMILY, DUPLEX AND OTHER LOW DENSITY RESIDENTIAL AREAS: 3 FEET MINIMUM FROM THE EDGE OF THE CURB.
  - B. COMMERCIAL, APARTMENT, CONDOMINIUM AND OTHER HIGH DENSITY AREAS: 9 FEET FROM THE EDGE OF THE ROAD OR CURB DUE TO HIGH VEHICULAR TRAFFIC AND FREQUENT TRUCK BACKING. THE DESIGN OF THE PARTICULAR LAYOUT MAY, OF COURSE, CALL FOR AN INCREASE OR DECREASE IN THESE DIMENSIONS. FOR EXAMPLE, A 3 FOOT SET BACK IS OFTEN ADEQUATE FOR PARTS OF THE COMMERCIAL PARKING LOTS WHERE TRAFFIC FLOW IS CONSTRAINED AND BACKING PERPENDICULAR TO CURB IS UNLIKELY.

APPROVED 2008	ENGINEERING STANDARD				
Original Signed and Approved by Engineering Manager	PAD MOUNT CLEARANCE REQUIREMENTS	1.	09/08	REVISED NOTES	TT
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CHECKER	PV		NTS	DT-CL-U-1031	2 OF 9
			SCALE	STANDARD DWG. NO.	SHEET NO.

8. STEEL POSTS ARE THE STANDARD MEANS FOR PROVIDING SUCH PHYSICAL PROTECTION. SUITABLE ALTERNATIVES TO THESE PROTECTIVE POSTS MAY BE PROPOSED BY THE APPLICANT FOR CITY APPROVAL.
9. ALL BARRIER POSTS AT THE SAME INSTALLATION SITE WILL BE THE SAME HEIGHT AND SHALL BE PAINTED PADMOUNT GREEN.
10. A BUILDING CAN BE CONSIDERED AS PHYSICAL PROTECTION PROVIDED IT IS LOCATED AT A POINT WHERE A POST WOULD BE NORMALLY REQUIRED.
11. LOCATE BARRIER POSTS SO THAT THEY DO NOT INTERFERE WITH OPENING OF THE EQUIPMENT'S DOORS. CERTAIN TYPES OF PAD MOUNTED EQUIPMENT HAVE DOORS IN BOTH FRONT AND BACK AND REQUIRE 8'-0" MINIMUM CLEARANCE AND CAREFUL BARRIER POST PLACEMENT TO ALLOW THE DOORS TO BE OPENED.
12. USE REMOVABLE POSTS WHEN:
  - A. POSTS ARE INSTALLED LESS THAN 8 FEET IN FRONT OF THE EQUIPMENT'S DOORS.
  - B. WHERE FIXED POSTS WOULD OBSTRUCT ACCESS FOR INSTALLATION OR REPLACEMENT OF THE EQUIPMENT.

#### HAZARDOUS LOCATIONS:

13. THE FOLLOWING GUIDE IS TO BE USED WHEN INSTALLING PAD MOUNTED EQUIPMENT IN AREAS WHERE HAZARDOUS LIQUIDS AND GASES ARE DISPENSED OR STORED IN SEALED CONTAINERS:
  - A. LIQUEFIED FLAMMABLE GASES: DO NOT INSTALL PAD MOUNTED EQUIPMENT WITHIN 20 FEET OF A GAS DISPENSER WITHOUT CONFORMING TO THE REGULATIONS CONCERNING INSTALLATION OF ELECTRICAL EQUIPMENT IN HAZARDOUS AREAS (REFER TO ARTICLES E500-1, E500-2, E514-1 AND E514-2 OF TITLE 24, PART 3, STATE BUILDING STANDARDS).
  - B. ANY CONTAINER WHICH STORES FLAMMABLE LIQUID OR GAS WILL BE CONSIDERED EQUIVALENT TO A "COMBUSTIBLE WALL". THE MINIMUM REQUIRED CLEARANCE IS 3 FEET.

APPROVED BY Engineering Manager	2008	ENGINEERING STANDARD <b>PAD MOUNT CLEARANCE REQUIREMENTS</b>					
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				SCALE	STANDARD DWG. NO.	SHEET NO.	

## OIL CONTAINMENT:

14. OIL ENCLOSURES ARE REQUIRED BY THE STATE OF CALIFORNIA IF PAD MOUNTED TRANSFORMERS ARE LOCATED IN AREAS WHERE OIL FROM A RUPTURED TANK COULD FLOW TOWARDS A COMBUSTIBLE SURFACE. OIL ENCLOSURES MAY CONSIST OF FIRE RESISTANT DIKES, CURBED AREAS OR BASINS, OR TRENCHES FILLED WITH COARSE CRUSHED STONE. THEY MUST BE CAPABLE OF HOLDING THE TOTAL VOLUME OF OIL CONTAINED IN THE EQUIPMENT TANK. THE CONSTRUCTION OF REQUIRED OIL CONTAINMENT FACILITIES MAY IN NO WAY IMPEDE THE REQUIRED WORK SPACE AREA. THE CUSTOMER WILL BE RESPONSIBLE FOR PROVIDING ADEQUATE OIL CONTAINMENT ENCLOSURES TO SATISFY THE REQUIREMENTS OF THE STATE OF CALIFORNIA AND ENVIRONMENTAL PROTECTION REGULATIONS.

## RETAINING WALLS:

15. RETAINING WALLS SHALL BE PROVIDED WHEN THE CITY DETERMINES IT NECESSARY TO PROTECT EQUIPMENT AGAINST LANDSLIDES, DRAINAGE WASH, DRIFTING SANDS, ETC. THE APPLICANT IS RESPONSIBLE FOR THE INSTALLATION AND MAINTENANCE OF THE RETAINING WALL. THE RETAINING WALL SHALL BE DESIGNED TO PROVIDE A BARRIER OF SUFFICIENT STRENGTH AND SUITABLE CONSTRUCTION TO PROVIDE ADEQUATE PROTECTION AND WORKING SPACE AROUND THE EQUIPMENT. TYPICAL EXAMPLE OF RETAINING WALL PLACEMENT ARE SHOWN IN SHT. 8 OF THIS DOCUMENT.
16. RETAINING WALLS GREATER THAN 2 FEET IN HEIGHT WILL REQUIRE A DRAIN PIPE AS SHOWN IN SHT. 8 OF THIS DOCUMENT. DRAIN PIPE SHALL BE A 3" PERFORATED PLASTIC PIPE, COVERED FIRST BY MARAFI DRAIN CLOTH, THEN BY DRAIN ROCK AND FINALLY BACKFILLED.
17. TREATED REDWOOD OR PRESSURE-TREATED DOUGLAS FIR POSTS (NOMINAL 4"x4" MINIMUM) AND PLANKS (NOMINAL 2" OR THICKER) MAY BE USED FOR RETAINING WALLS. POSTS SHOULD BE 24" OR LESS IN LENGTH AND EXTENDED AT LEAST 12" BELOW GROUND AND NOT MORE THAN 12" ABOVE GROUND.
18. THE WORKING AREA WITHIN THE RETAINING WALL WILL BE AT THE SAME LEVEL OR BELOW THE PAD BEING PROTECTED. THE AREA WILL BE KEPT WEED FREE AND COVERED WITH A DECORATIVE COVERING.

APPROVED BY Engineering Manager		ENGINEERING STANDARD <b>PAD MOUNT CLEARANCE REQUIREMENTS</b>					
				1.	09/08	REVISED NOTE 14, ADDED NOTE 16	TT
				REV	DATE	DESCRIPTION	APPR
DRAWN BY	TT	CITY OF PALO ALTO CALIFORNIA		NTS		DT-CL-U-1031	4 OF 9
CHECM'D	PV			SCALE		STANDARD DWG. NO.	SHEET NO.

### TRUCK ACCESSIBILITY:

19. PAD MOUNTED EQUIPMENT MUST BE ACCESSIBLE TO CITY TRUCKS. TRUCKS MUST BE ABLE TO BE BACKED UP TO WITHIN 5 FEET OF THE PAD ON:

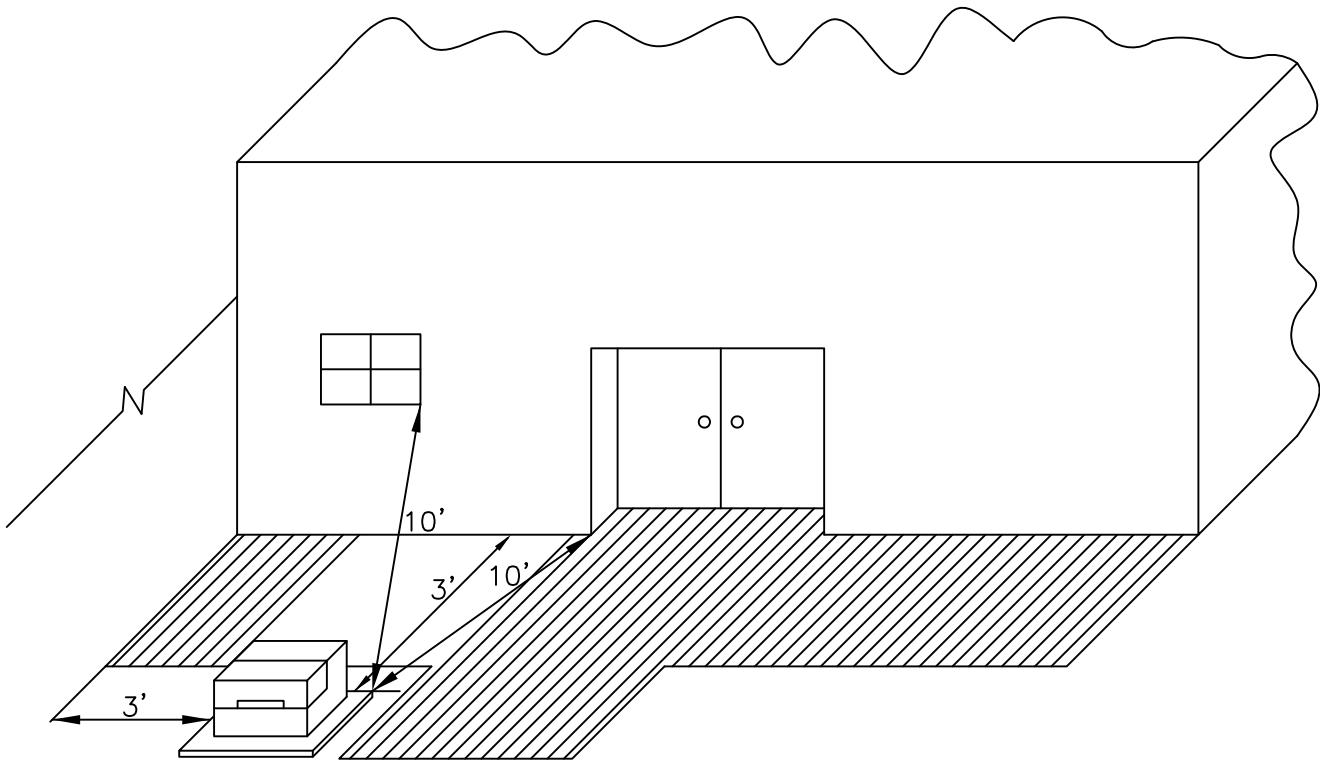
- A. A SURFACE CAPABLE OF WITHSTANDING TRUCK WEIGHT OF 24 TONS AND
- B. A PATH THAT IS A MINIMUM OF 12 FEET WIDE AND
- C. A MINIMUM VERTICAL CLEARANCE OF 14 FEET SHALL BE MAINTAINED FROM THE STREET TO THE EQUIPMENT PAD.

IF THE PATH TO THE EQUIPMENT PAD REQUIRES ANY TURNS BY CITY TRUCKS, THE MINIMUM REQUIREMENTS OF 12'x14' PREVIOUSLY DESCRIBED MAY NEED TO BE INCREASED. CONSULT CITY ENGINEER WHEN SUCH SITATIONS OCCUR. FOR LOCATIONS WHERE THE STANDARD ACCESSIBILITY REQUIREMENT ARE NOT MET, CONSULT WITH THE CITY FOR OTHER OPTIONS.

### FUTURE CONSTRUCTION:

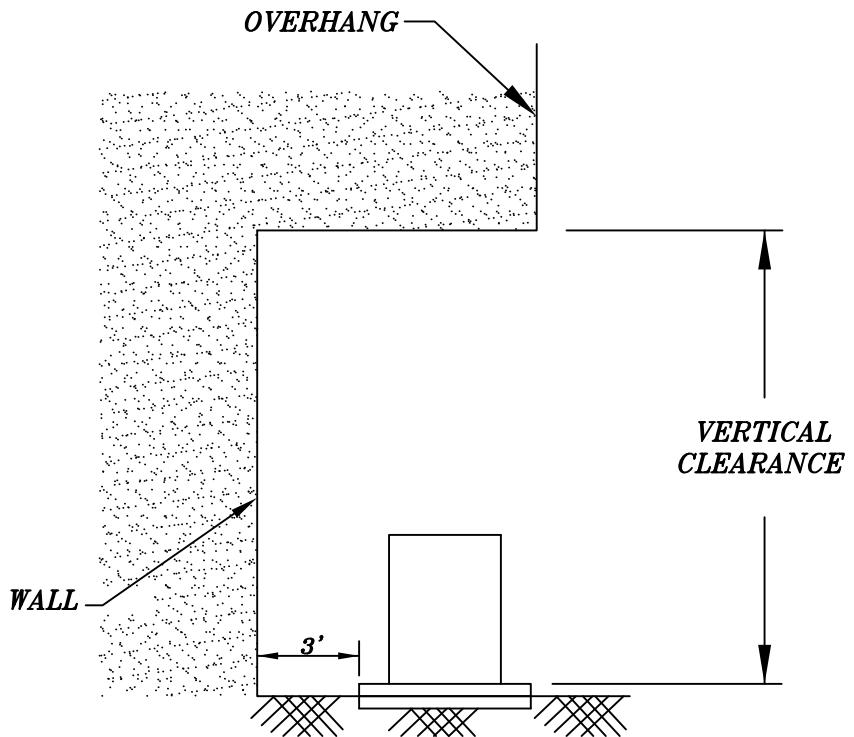
20. CONSIDERATION SHOULD BE GIVEN NOT ONLY TO CONDITIONS EXISTING AT THE TIME OF INSTALLATION BUT ALSO TO POSSIBLE FUTURE STRUCTURES AND EQUIPMENT WHICH COULD INTERFERE WITH REQUIRED CLEARANCES OR ACCESSIBILITY. ON THOSE INSTALLATIONS WHERE THERE IS A HIGH PROBABILITY OF A FUTURE OBSTRUCTION, INSTALL A CLEARANCE REQUIREMENT SIGN ON THE EQUIPMENT.

APPROVED BY Engineering Manager	Original Signed and Approved 2008	ENGINEERING STANDARD <b>PAD MOUNT CLEARANCE REQUIREMENTS</b>					
DRAWN BY	TT MD	1. 09/08		REVISED NOTES		TT	
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CITY OF PALO ALTO CALIFORNIA		NTS		<b>DT-CL-U-1031</b>		<b>5 OF 9</b>	
SCALE		STANDARD DWG. NO.		SHEET NO.			



**BUILDING, DOORWAY & WINDOW MINIMUM CLEARANCES**  
**NOT TO SCALE**

APPROVED BY Manager	Original Signed and Approved Manager	2008	ENGINEERING STANDARD <b>PAD MOUNT CLEARANCE REQUIREMENTS</b>				
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CITY OF PALO ALTO CALIFORNIA		NTS		<b>DT-CL-U-1031</b>		<b>6 OF 9</b>	
SCALE		STANDARD DWG. NO.		SHEET NO.			

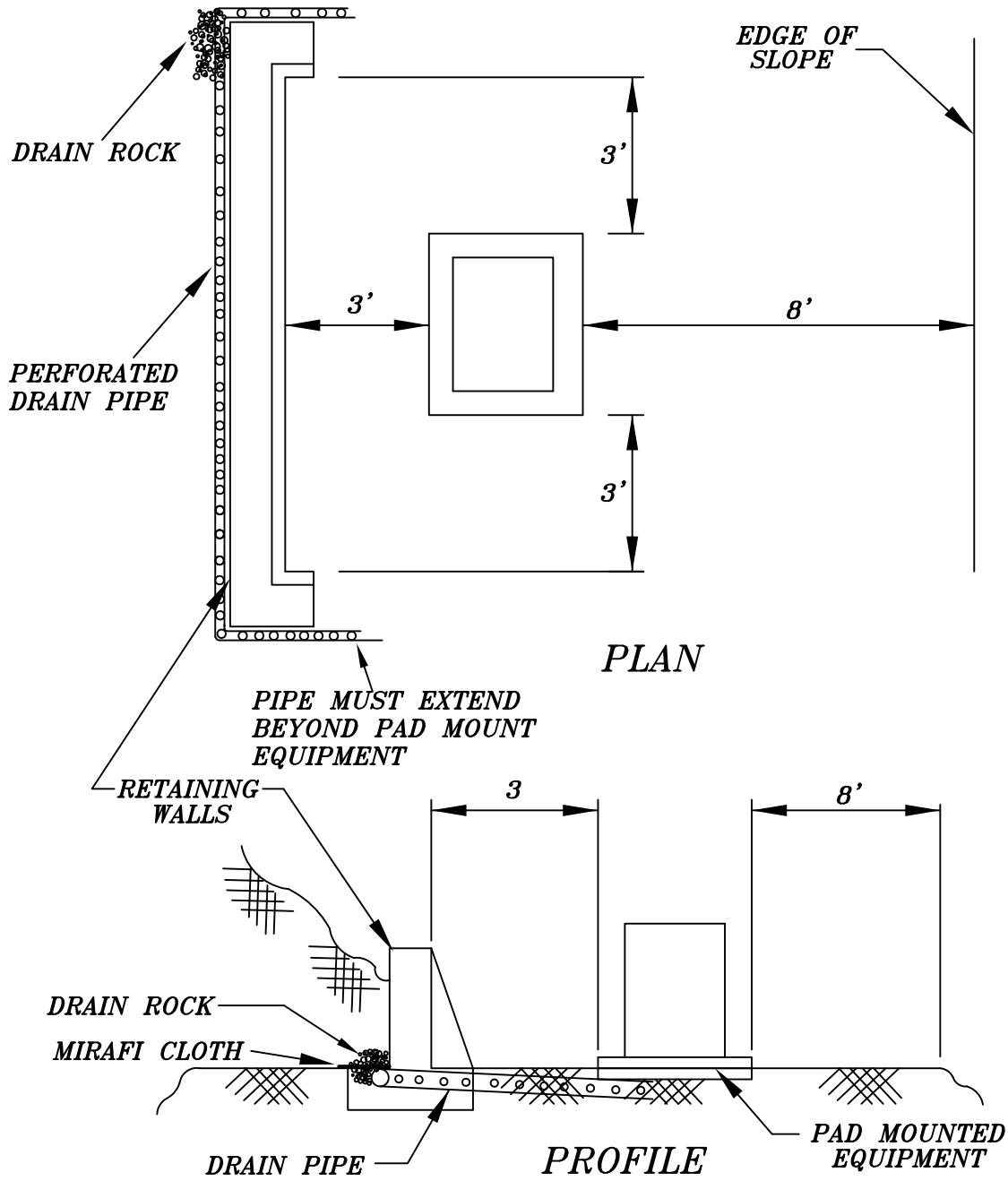


#### ***VERTICAL CLEARANCE REQUIREMENTS***

<b>VERTICAL CLEARANCE</b>	<b>EQUIPMENT</b>
20'	1Ø PAD MOUNTED
30'	3Ø PAD MOUNTED

### **MINIMUM CLEARANCES FOR PAD MOUNTED EQUIPMENT**

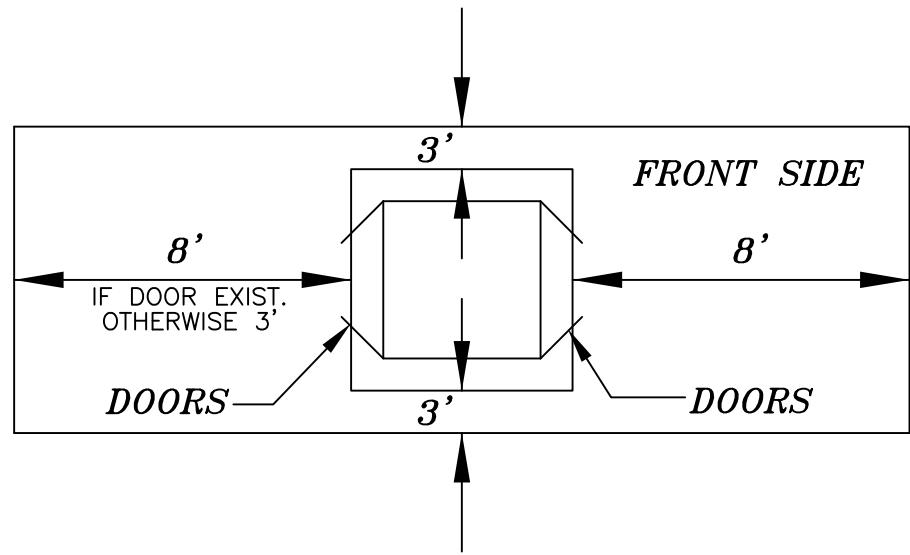
APPROVED <i>[Signature]</i> 2008 BY <i>[Signature]</i>		ENGINEERING STANDARD <b>PAD MOUNT CLEARANCE REQUIREMENTS</b>				
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CHEC'D <i>[Signature]</i>	PV			SCALE	STANDARD DWG. NO.	SHEET NO.



## EXAMPLE OF PAD MOUNTED EQUIPMENT INSTALLATION ON SLOPED TERRAIN

APPROVED <i>Original Signed and Approved by Engineering Manager</i>	2008	ENGINEERING STANDARD <b>PAD MOUNT CLEARANCE REQUIREMENTS</b>		
		1. 09/08	REVISED DRAWING	TT
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				APPR
		NTS	<b>DT-CL-U-1031</b>	<b>8 OF 9</b>
		SCALE	STANDARD DWG. NO.	SHEET NO.
CHECKED	PV			

*PAD MOUNTED SWITCH OR CAPACITOR*



*WORK SPACE FOR PAD MOUNTED SWITCHES  
AND CAPACITORS*

APPROVED <i>Original Signed and Approved</i> BY Engineering Manager	2008	ENGINEERING STANDARD <b>PAD MOUNT CLEARANCE REQUIREMENTS</b>			
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CITY OF PALO ALTO CALIFORNIA			NTS	DT-CL-U-1031	9 OF 9
			SCALE	STANDARD DWG. NO.	SHEET NO.



THIS DRAWING OUTLINES THE MINIMUM REQUIREMENTS FOR CONDUIT AND CABLE INSTALLED BY CUSTOMERS, CONTRACTORS, OR DEVELOPERS FOR THE SERVICE LATERAL TO ANY NEW OR UPGRADED ELECTRIC SERVICE PANEL. LARGER THAN SPECIFIED CABLE AND CONDUIT MAY BE REQUIRED FOR A GIVEN PANEL SIZE TO MEET ALLOWABLE VOLTAGE DROP AND FLICKER LEVELS.

#### CONDUITS AND CABLE REQUIREMENTS FOR RESIDENTIAL SERVICE

Maximum Service Equipment "Panel" Rating (Amps) (80% Rated Services)	Conduit Size and Quantity	Aluminum Cables Required (per phase) – Full Size Neutral Required (AWG or kcmil)	Copper Cables Required (per phase) – Full Size Neutral Required (AWG or kcmil)
125	1 – 2"	1 – 1/0	1 – # 2
200	1 – 3"	1 – 4/0	1 – 2/0
400	1 – 4"	1 – 350	1 – 4/0
600 ▲	2 – 4"	2 – 350	2 – 4/0

▲ Only allowed with Engineering Managers Approval.

#### CONDUIT AND CABLE REQUIREMENTS FOR COMMERCIAL/INDUSTRIAL SERVICES – SINGLE PHASE

Maximum Service Equipment "Panel" Rating (Amps) (100% Rated Services)	Minimum Conduit Size and Quantity	Aluminum Cables Required (per phase) – Full Size Neutral Required (AWG or kcmil)	Copper Cables Required (per phase) – Full Size Neutral Required (AWG or kcmil)
125	1 – 2"	1 – 4/0	1 – 1/0
200	1 – 3"	1 – 4/0	1 – 4/0
400	1 – 4"	1 – 750	1 – 500
600	2 – 4"	2 – 500	2 – 350

#### CONDUIT AND CABLE REQUIREMENTS FOR COMMERCIAL/INDUSTRIAL SERVICES – THREE PHASE

Maximum Service Equipment "Panel" Rating (Amps) (100% Rated Services)	Conduit Size and Quantity	Aluminum Cables Required (per phase) – Full Size Neutral Required (AWG or kcmil)	Copper Cables Required (per phase) – Full Size Neutral Required (AWG or kcmil)
400	1 – 4"	1 – 750	1-500
600	2 – 4"	2 – 500	2 – 350
800	2 – 4"	2 – 750	2 – 500
1000	3 – 4"	3 – 750	3 – 500
1200	4 – 4"	4 – 750	3 – 750 or 4 – 500
1600	4 – 4"	4 – 750	4 – 500
1800 *	4 – 4"	None Approved	4 – 500 X-Flex
2000 *	6 – 4"	None Approved	6 – 500 X-Flex
2500 *	6 – 4"	None Approved	6 – 500 X-Flex
3000 *	7 – 4"	None Approved	7 – 500 X-Flex
4000 *	7 – 4"	None Approved	7 – 500 X-Flex
(Max Demand 2500 kVA)			

\* Bus Way/Transition Cabinet – See CPAU drawing SR-XF-E-1020 for details – may be used in place of conduit and X-Flex cables. Installations must comply with the most recent version of the National Electric Code (NEC).

5	7/16	Revised conduit for 200A panel, 3"	TT
4	5/15	Added note - 600A req Mgr Appvl	TT
3	5/13	Added cable for 1ph 600A Panels	TT
2	1/12	Revised footnote	TT
1	9/09	Revised 400A, 1ph Svc Cable	TT
REV	DATE	DESCRIPTION	APPR
APPROVED _____ <i>Original Signed and Approved by Engineering Manager</i>	ENGINEERING STANDARD <b>UNDERGROUND SERVICE CONDUIT AND CABLE REQUIREMENTS</b>		
ENGR _____ DRAWN _____ CHECKED _____	CITY OF PALO ALTO CALIFORNIA		
TITLE _____ AMD _____ PV _____	NTS	DT-SE-U-1032	1 OF 2
	SCALE	STANDARD NO.	SHEET NO.

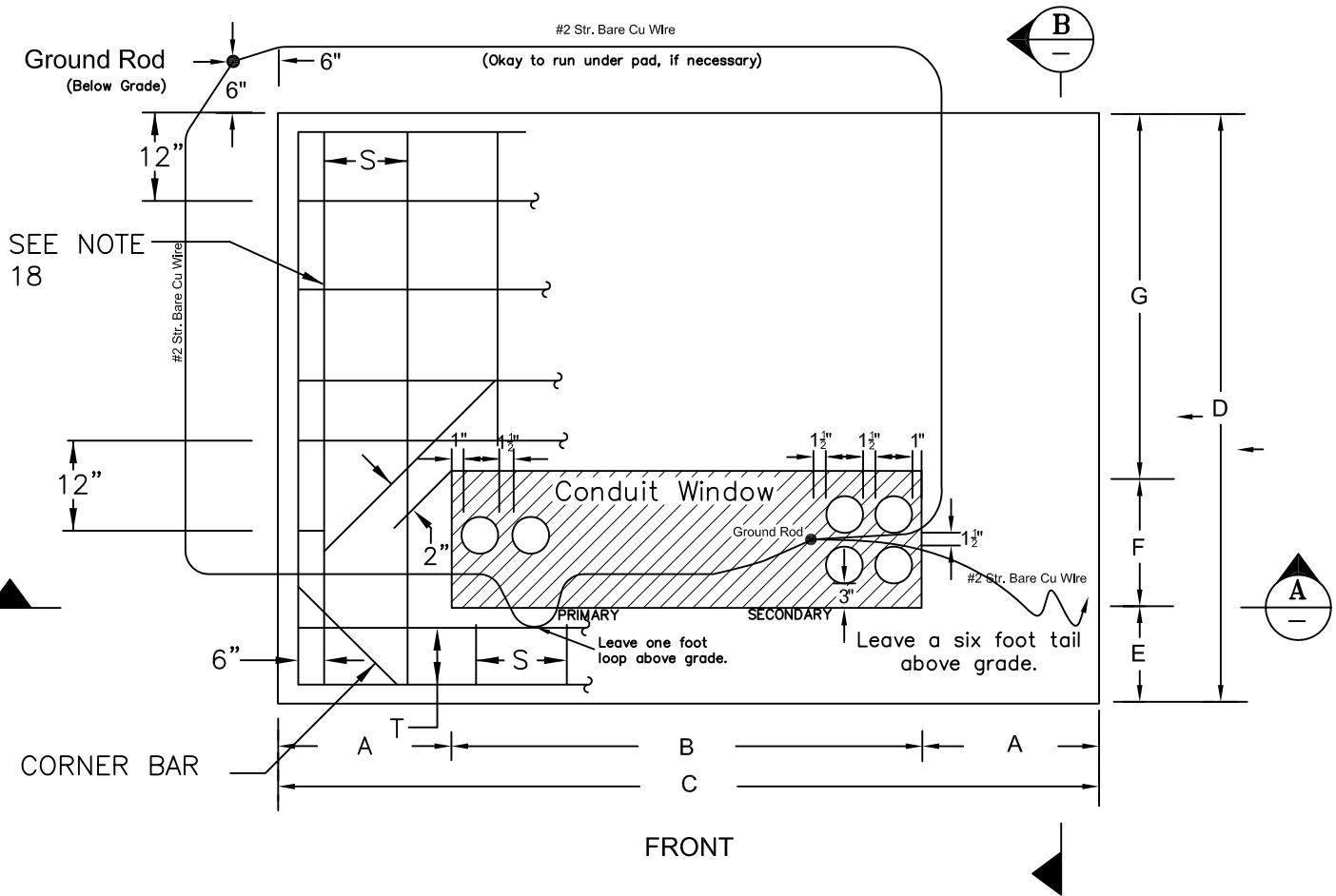
NOTES:

- THE INSTALLATION OF A 4000 A PANEL MUST BE APPROVED BY CITY OF PALO ALTO UTILITIES (CPAU) ELECTRIC ENGINEERING DEPARTMENT. IT IS LIMITED TO A MAXIMUM PEAK DEMAND OF 2500 KVA.
  - STANDARD ALLOWABLE SERVICE CABLE SIZES – #2, 1/0, 2/0, 4/0, 350, 500, AND 750 (AWG OR KCMIL) ALUMINUM OR COPPER PER THE TABLES.
  - SERVICE LATERAL MAY NOT EXCEED 100 FEET UNLESS APPROVED BY UTILITIES ELECTRIC ENGINEERING.
  - "X-FLEX" IS COBRA WIRE & CABLE, INC., EXTRA FLEXIBLE CABLE, 600V, 105 °C, X-FLEX (PART # A1530MB-DBS) OR CPAU APPROVED EQUIVALENT, PER CPAU DRAWING SR-XF-E-1020.
  - "X-FLEX" CABLES ARE A CPAU NON-STANDARD CABLE . WHEN USED, THE DESIGNATED SERVICE POINT SHALL BE THE SECONDARY TERMINALS OF THE TRANSFORMER. THE CUSTOMER IS RESPONSIBLE FOR MAINTENANCE, OR REPLACEMENT IF NECESSARY, OF THESE CABLES.
  - "X-FLEX" CABLES REQUIRE A CRIMP TYPE LUG SUITABLE FOR FINE STRAND CABLE. SEE CPAU DWG SR-XF-E-1020 FOR DETAILS. CUSTOMER IS RESPONSIBLE FOR TERMINATING AND CONNECTING CABLES AT SWITCHGEAR OR TRANSITION CABINET. CPAU WILL TERMINATE AND CONNECT CABLES AT TRANSFORMER.
  - ALLOWABLE CONDUIT SIZES – 2, 3, 4, and 5 INCH.  $\frac{1}{2}$  INCH SIZES ARE NOT PERMITTED.
  - CONDUIT AND CABLE SIZES INDICATED ARE THE MINIMUM ALLOWABLE SIZES PER PANEL RATING.
  - EXISTING  $1\frac{1}{2}$ " OR 2" CONDUIT MAY BE ALLOWED FOR PANEL UPGRADES IN THE SAME LOCATION IF THEY MEET AMPACITY AND CONDUIT FILL REQUIREMENTS, AND IS APPROVED BY CPAU ENGINEERING.
  - THE FOLLOWING CABLE INSULATION TYPES ARE ALLOWED: XLP, THWN-2, USE-2, OR OTHERWISE RATED FOR UNDERGROUND SERVICE ENTRANCE USE AND APPROVED BY CPAU ELECTRIC ENGINEERING DEPARTMENT.
  - CONDUIT SHALL BE SCHEDULE 40, PER UL STD 651 & NEMA TC 2, OR DB-120 PVC CONDUIT, PER NEMA TC 6 & TC 8 AND ASTM F-512, FOR BELOW GROUND INSTALLATIONS; GALVANIZED RIGID STEEL CONDUIT SHALL BE USED FOR ABOVE GROUND INSTALLATIONS.
  - NO MORE THAN FOUR SERVICE CONDUITS WILL BE INSTALLED TO ANY ONE TRANSFORMER, UNLESS APPROVED BY ELECTRIC ENGINEERING FOR USE WITH "X-FLEX" CABLES AND TRANSFORMERS WITH SECONDARY BUSHING SUPPORTS.
  - CONDUIT BENDS MUST NOT EXCEED 90° WITH NO MORE THAN 3 – 90° BENDS (270° TOTAL) BETWEEN PULL BOXES.
  - ALLOWABLE BEND RADIUS:

CONDUIT SIZE	MINIMUM BEND RADIUS
2 inch	24 inches
3 inch	36 inches
4 inch	36 inches
5 inch	60 inches
All risers	36 inches

APPROVED <i>Original Signed by Manager</i>	200  ENGR. MANAGER	ENGINEERING STANDARD  UNDERGROUND SERVICE CONDUIT AND CABLE REQUIREMENTS				
			6	9/16	Added note for existing 2" except	TT
			REV	DATE	DESCRIPTION	APPR
DRAWN <i>Manager</i>	MD	CITY OF PALO ALTO CALIFORNIA	NTS	DT-SE-U-1032	2 OF 2	
CHECKED <i>PV</i>	PV		SCALE	STANDARD NO.	SHEET NO.	

PAD & REINFORCING BAR DIMENSIONS



TRANSFORMER		PAD DIMENSIONS, INCHES										
KVA	LBS(APROX)	A	B	C	D	E	F	G	H**	J**	S**	T**
* 25-75 1Ø	2500	12	30	54	60	10	15	35	12	6	12	6
75-112.5	3000-4500	20	40	80	74	15	20	39	12	6	12	10
150-500	4000-6500	20	48	88	74	15	20	39	12	6	12	10
750-1000	9000-11000	26	48	100	100	15	24	61	15	9	6	10
1500	13000	26	56	108	114	15	24	75	15	9	4	10
2000-2500	20000	29	56	114	120	15	24	81	15	9	4	10

\* THIS PAD SHOULD BE USED FOR SINGLE PHASE 75 KVA TRANSFORMERS,  
NOT THREE PHASE 75 KVA TRANSFORMERS.

\*\* REQUIREMENT FOR PADS POURED IN PLACE

11	6-15	REVISED NOTES, GENERAL REVISION	TT
10	2-09	GENERAL REVISION	TT
9	7-97	REVISED NOTES	MJ/TF
8	1-97	REVISED PAD DIMENSIONS	PV/TL
7	5-96	REVISED PAD DIMENSIONS	PV/TL
REV	DATE	DESCRIPTION	APPR

APPROVED 7/1994

*MDR*  
*Original designed  
and Approved  
by Engineer*

ENGR. MANAGER

DRAWR. PEV MJ

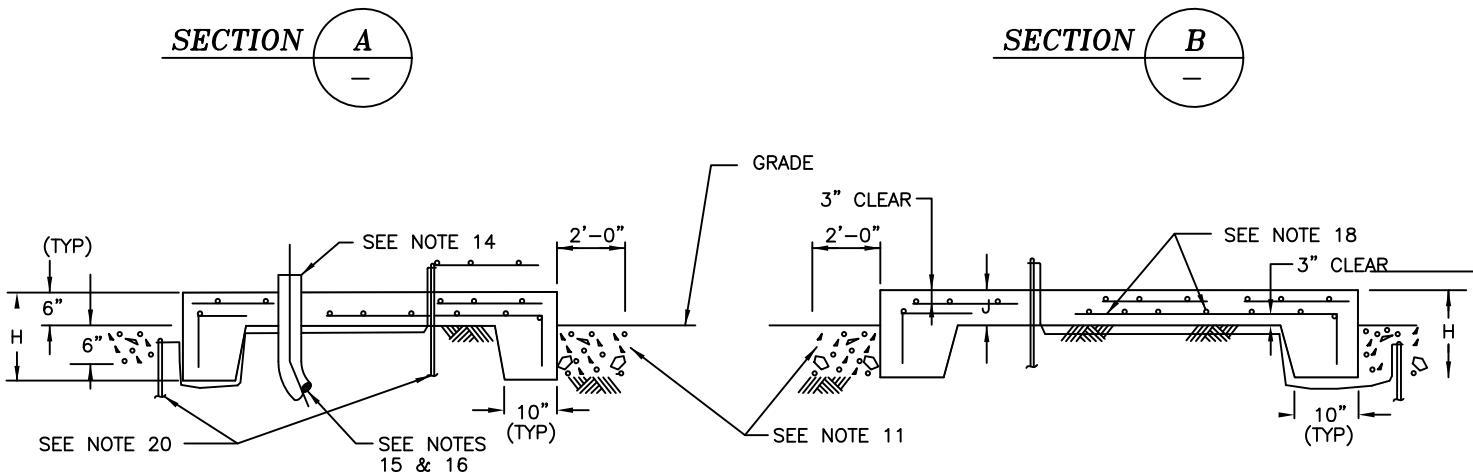
CHECKED PEV

ENGINEERING STANDARD  
CONCRETE TRANSFORMER PAD

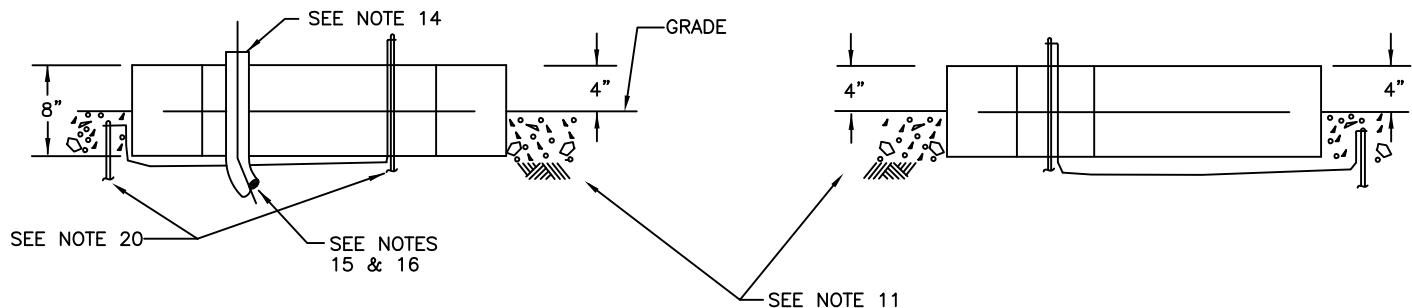
CITY OF PALO ALTO  
CALIFORNIA

NTS DT-SS-C-1005 1 OF 4

SCALE STANDARD NO. SHEET NO.

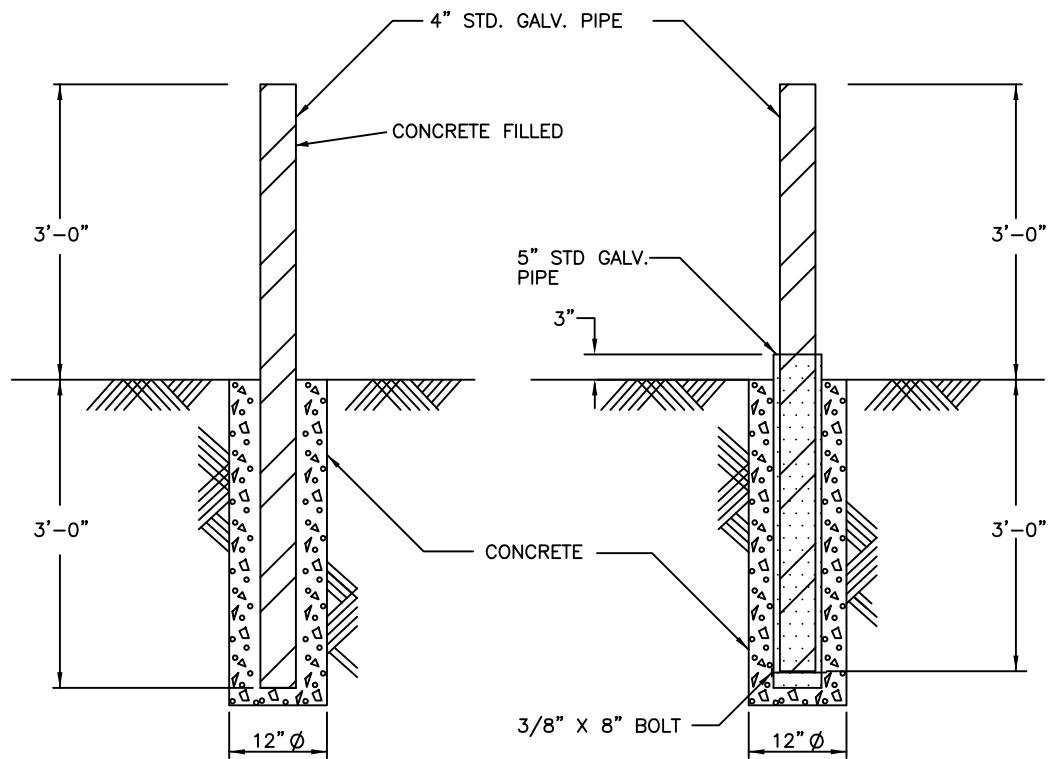


## DETAILS FOR PADS POURED IN PLACE



## DETAILS FOR PRECAST PADS

APPROVED <i>M. O. S.</i> MANAGER Engineering Original Signed and Approved by Manager	ENGINEERING STANDARD CONCRETE TRANSFORMER PAD	11 5 4 3 REV	6-15 2-09 7-99 2-88 DATE	CORRECTED REFERENCE NUMBERS GENERAL REVISION REVISED NOTES / ADDED NOTE 19 GENERAL NOTES DESCRIPTION	TT TT TF/SF APPN
BIGR: PEV DRAWN: /MJ MJ CHECKED: PEV	CITY OF PALO ALTO CALIFORNIA		NTS	DT-SS-C-1005	2 OF 4
			SCALE	STANDARD NO.	SHEET NO.



**DETAIL 1**

PERMANENT GUARD POST

**DETAIL 2**

REMOVABLE GUARD POST

USE REMOVABLE GUARD POSTS WHEN INSTALLED LESS THAN 8 FEET IN FRONT OF EQUIPMENT DOORS OR WHERE PERMANENT POSTS WOULD OBSTRUCT ACCESS FOR INSTALLATION OR MAINTENANCE.

GUARD POST INSTALLATION MUST BE COORDINATED WITH CONDUIT INSTALLATION TO AVOID CONFLICTS.

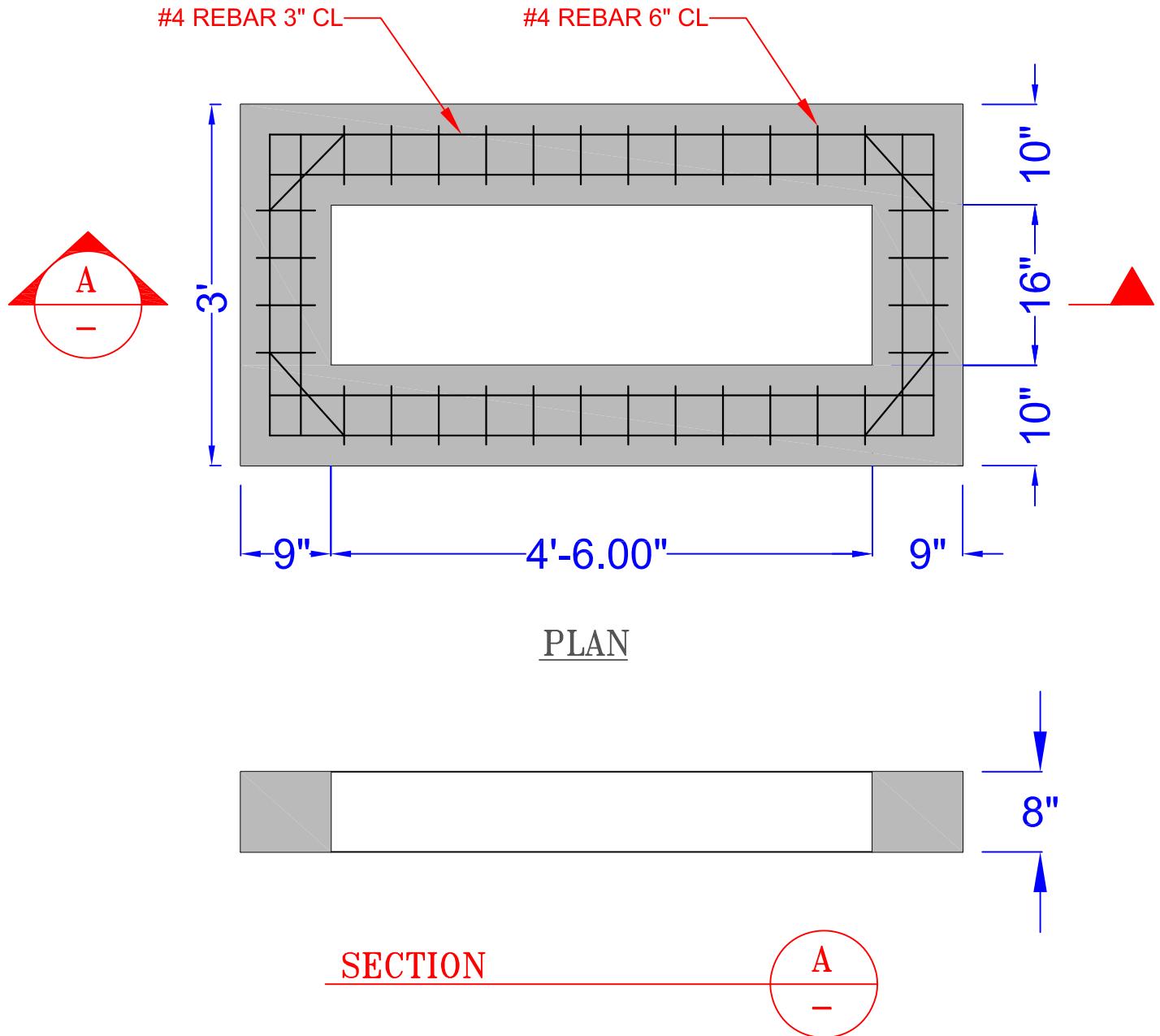
CONTACT CPAU ENGINEERING OR UNDERGROUND INSPECTOR FOR GUARD POST PLACEMENT LOCATIONS DETAIL.

APPROVED <u>3/1994</u> <i>MJR</i> Original assigned by Engineering Manager	ENGINEERING STANDARD <b>CONCRETE TRANSFORMER PAD</b>			
ENGR. MANAGER	5	2-09	GENERAL REVISION	TT
EDR	3	2-88	GENERAL REVISION	
DRAWN BY <u>PEV</u> <u>MJ</u>	REV	DATE	DESCRIPTION	APPR
CHECKED BY <u>PEV</u> <u>MJ</u>	<b>CITY OF PALO ALTO</b> CALIFORNIA		NTS DT-SS-C-1005 3 OF 4	
	SCALE	STANDARD NO.	SHEET NO.	

## NOTES

1. DISTURBED EARTH UNDER THE PAD SHALL BE REPLACED BY SAND OR OTHER SUITABLE MATERIAL COMPACTED TO 95% OF MAXIMUM DRY DENSITY (ASTM D-1557). COMPACTION TEST RESULTS SHALL BE PROVIDED TO THE CPAU INSPECTOR.
2. PLACE 6" DEPTH ONE SACK, PER CUBIC YARD, SLURRY IMMEDIATELY BELOW THE PAD.
3. CONCRETE IS REQUIRED BETWEEN ALL CONDUITS, LEVEL TO TOP OF THE PAD.
4. CONCRETE SHALL BE DESIGNED TO ATTAIN A STRENGTH OF 3000 PSI IN 28 DAYS.
5. AFTER PLACING, MOIST CURE CONCRETE FOR 7 DAYS BEFORE PLACING EQUIPMENT.
6. WOOD FLOAT FINISH TOP OF SLAB. ALL EDGES AND CORNERS ARE TO BE FINISHED SMOOTH.
7. EXPOSED HORIZONTAL SURFACES ARE TO BE SLOPED SLIGHTLY FOR DRAINAGE.
8. A MINIMUM OF 6 FEET SHALL BE MAINTAINED BETWEEN GROUND RODS.
9. CAP ALL CONDUITS.
10. CONTACT CPAU FOR APPROVED PRE-CAST TRANSFORMER PADS.
11. PADS NOT SECURED IN PLACE BY CONCRETE OR ASPHALT SHALL HAVE A 2' WIDE BY 6" DEEP STRIP OF 90% COMPACTED GRAVEL ALONG ALL EDGES.
12. A MINIMUM OF 3 FEET OF RADIAL CLEARANCE BETWEEN THE TRANSFORMER PAD AND ANY OTHER STRUCTURE SHALL BE PROVIDED (SEE NOTE 21).
13. IF THE TRANSFORMER IS TO BE LOCATED IN AN AREA SUBJECT TO VEHICULAR TRAFFIC, BARRIERS SHALL BE PROVIDED IN ACCORDANCE WITH DETAIL 1 OR 2 ON SHEET 3. CONTACT CPAU ENGINEERING OR UG INSPECTOR FOR THE TYPE, NUMBER REQUIRED, AND LOCATION OF BARRIERS.
14. PLASTIC CONDUITS SHALL BE TERMINATED WITH END BELLS. GALVANIZED STEEL CONDUITS SHALL BE TERMINATED WITH GROUND BUSHINGS. ALL CONDUITS AND ENDS WILL BE TO THE FINAL GRADE OF THE PAD.
15. CONDUIT RISER BENDS SHALL HAVE A MINIMUM RADIUS OF 36".
16. PRIMARY CONDUITS SHALL BE LOCATED IN THE LEFT HALF OF THE CONDUIT OPENING. SECONDARY CONDUITS SHALL OCCUPY THE RIGHT HALF. (SEE SHEET 1)
17. CLEARANCE AROUND THE TRANSFORMER PAD SHALL BE PER CPAU STANDARD DWG. DT-CL-U-1031.
18. ALL REBAR SHALL BE #4 A-615 GRADE 40. REBAR JOINTS SHALL BE FIRMLY AND SECURELY HELD IN POSITION BY WIRING AT INTERSECTIONS WITH NO. 16 GAUGE WIRE.
19. THE MAXIMUM NUMBER OF CONDUITS ENTERING THE SECONDARY SLOT SHALL BE FOUR. CONTACT THE ELECTRIC UTILITY PROJECT ENGINEER FOR DESIGNS REQUIRING MORE THAN FOUR SECONDARY CONDUITS.
20. GROUND ROD AND CLAMP, 5/8" X 8'. SEE CPAU STANDARD DWG. # DT-SS-U-1001 FOR MATERIALS INFORMATION.
21. TRANSFORMER ANCHORS SHALL BE INSTALLED BY CPAU ACCORDING TO MANUFACTURER'S INSTRUCTIONS. EXPANSION BOLT SHALL BE "PARABOLT" BY MOLY OR APPROVED EQUIVALENT. MINIMUM EMBEDMENT LENGTH AND EDGE DISTANCE SHALL MEET THE MANUFACTURER'S REQUIREMENTS.
22. A MINIMUM OF 8 FEET CLEARANCE SHALL BE MAINTAINED FROM THE FRONT OF THE PAD FOR OPERATIONAL NEEDS. A MINIMUM OF 3 FEET SHALL BE MAINTAINED ON UNOPERABLE SIDES AND BACK. ALL MEASUREMENTS ARE TAKEN FROM THE EDGE OF THE PAD. SEE CPAU ENGINEERING STANDARD DT-CL-U-1031.
23. UNLESS OTHERWISE APPROVED BY CPAU, A BOX SHALL BE INSTALLED NEXT TO THE TRANSFORMER PAD. PRIMARY CONDUITS ENTERING THE PAD WILL FIRST GO TO THIS BOX. REFER TO APPLICABLE LAYOUT DRAWING FOR LOCATION AND SIZE. SEE CPAU STANDARD DWG. # DT-SS-U-1002 FOR BOX INSTALLATION DETAILS.

APPROVED <u>MDR</u> 1994 <i>Original assigned by Engineering Manager</i>		ENGINEERING STANDARD <b>CONCRETE TRANSFORMER PAD</b>		11	6-15	REVISED NOTES	TT
ENGR	DATE	5	2-09	GENERAL REVISION			TT
DRAWN	REV	4	7-99	REVISED NOTES / ADDED NOTE 19			TF/SF
CHECKED	PEV	3	2-88	GENERAL NOTES			
SCALE		STANDARD NO.		SHEET NO.			
CITY OF PALO ALTO CALIFORNIA		NTS		DT-SS-C-1005		4 OF 4	



NOTES:

1. PLACE 6" 95% COMPACTED SAND UNDER N52 (30"X60") CHRISTY OR APPROVED EQUAL BOX WITH A Poured 1" BASE.
2. PAD CONSTRUCTION SHALL BE PER STD # DT-SS-C-1005. IF A PRE-CAST PAD AS SIZED ABOVE IS USED, YOU DO NOT NEED THE FOOTING THICKNESS AS SHOWN ON STD DWG# DT-SS-C-1005 SH 1 OF 3.
3. PLACE PAD WINDOW CENTERED WITH THE BOX.

ENGINEERING STANDARDS

APPROVED	7/199
M. BENNAN	
SR. ENGINEER / MANAGER	
ENGR	P.E. # 12345
DRWN	DRAFTED
CHKD.	X

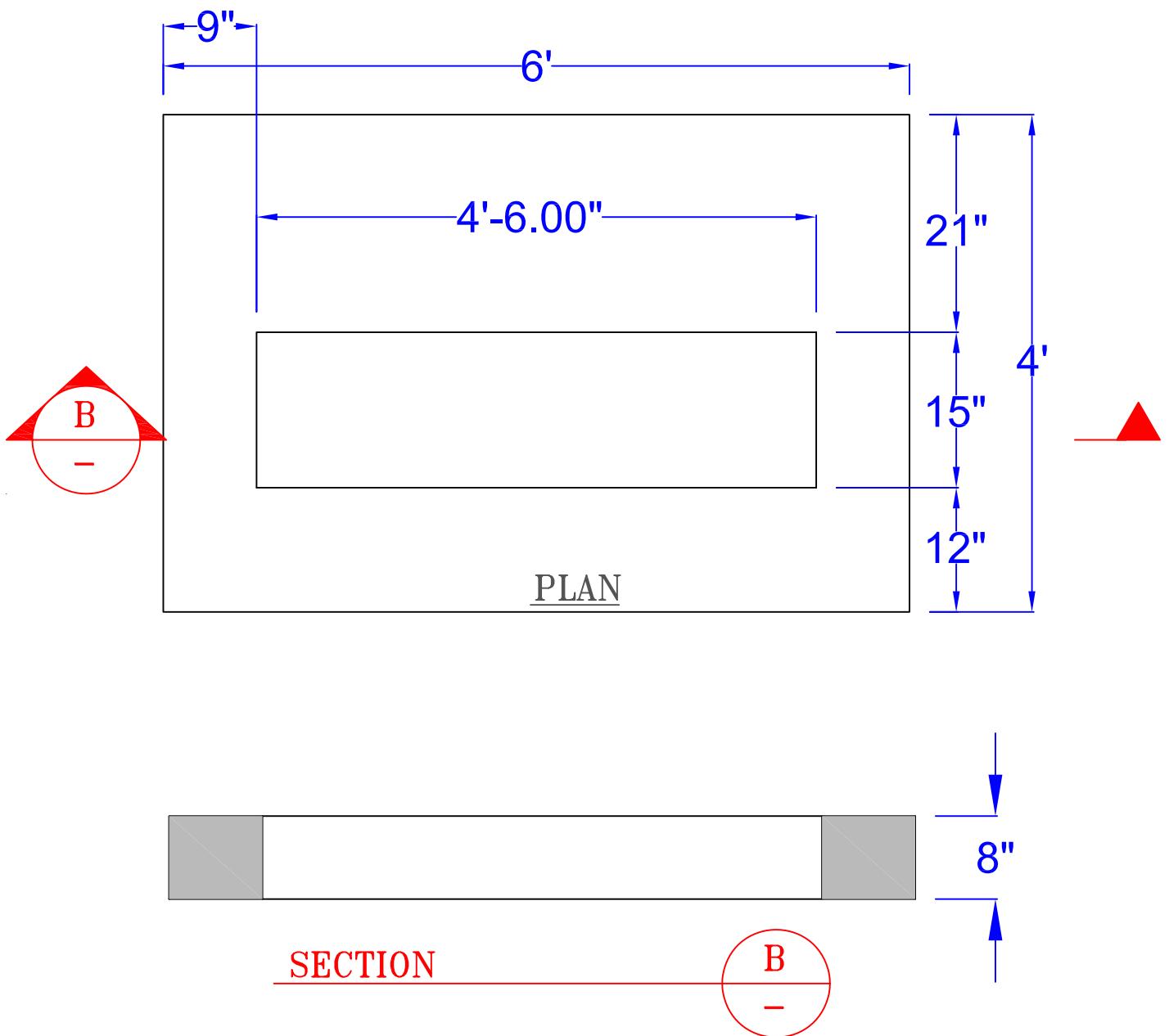
Original signed  
and Approved  
by Engineering  
Manager

PRE-CAST CONCRETE PAD  
FOR LBC CABINET



City of Palo Alto  
California  
UTILITIES, ELECTRIC ENGINEERING

REV.	DATE	APPR.	DESCRIPTION
2	6/15	TT	REVISED NOTE 1
1	1/12	TT	ADDED SHEET 3
MAP #	CKT #	SCALE	W.O.# / DRAWING #
X	X	NTS	DT-SS-C-1028
			SHEET 1 OF 3



**NOTES:**

1. THIS PAD CALLS FOR THE INSTALLATION OF A PRECAST VAULT BENEATH THE PAD.
2. VAULT SHALL BE SIZED AND INSTALLED PER THE REQUIREMENTS OF CPAU STANDARD DRAWING # DT-SS-U-1002
3. PAD WINDOW SHOULD BE CENTERED OVER BOX.

ENGINEERING STANDARDS

APPROVED	7/19/04
M. READING	
SUPERVISOR/PROJECT MANAGER	
ENGR.	J. LATH
DRWN	R. HANLEY T.
CHKD.	X

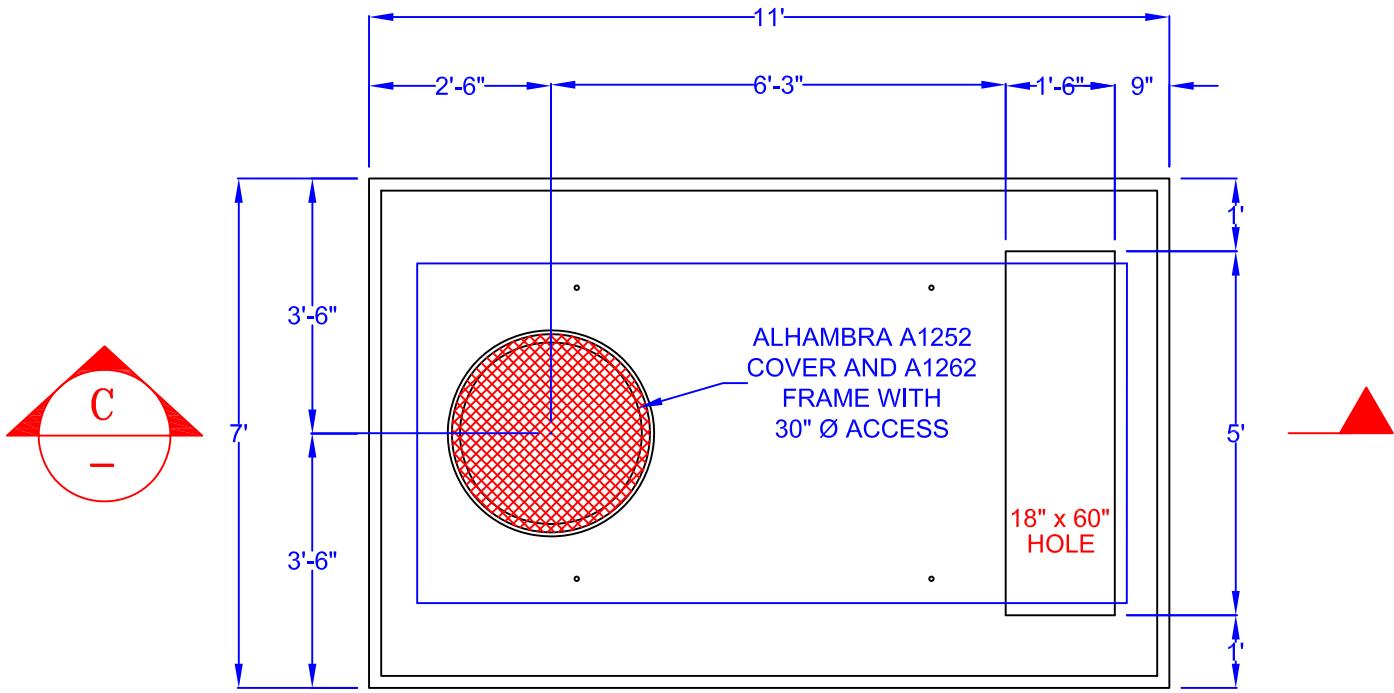
*Original is signed  
and Approved  
by Engineering  
Manager*

PRE-CAST CONCRETE PAD  
FOR LBC CABINET

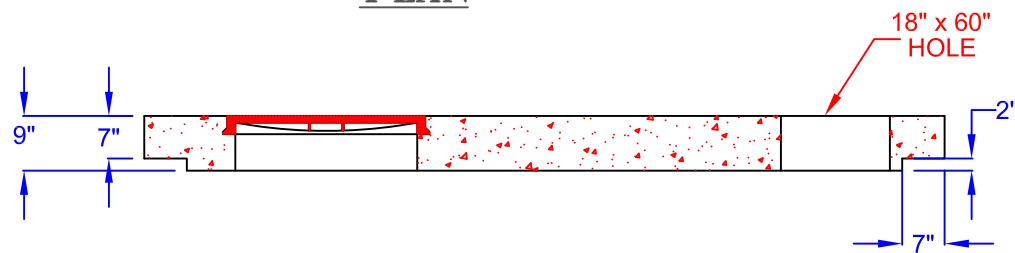


City of Palo Alto  
California  
UTILITIES, ELECTRIC ENGINEERING

REV.	DATE	APPR.	DESCRIPTION
MAP #	CKT #	SCALE	W.O.# / DRAWING #
X	X	NTS	DT-SS-C-1028
			SHEET 2 OF 3



PLAN



SECTION

**NOTES:**

1. THIS PAD CALLS FOR THE INSTALLATION OF A PRECAST VAULT BENEATH THE PAD.
2. VAULT SHALL BE INSTALLED PER THE REQUIREMENTS OF CPAU STANDARD DRAWING # DT-SS-U-1002
3. PAD WINDOW AND MANHOLE OPENING SHOULD BE CENTERED OVER BOX.

ENGINEERING STANDARDS

APPROVED	7/19/04
M. READING	
SUPERVISOR/MANAGER	
ENGR.	LATH
DRWN	RANIEL T.
CHKD.	X

*Original is signed  
and Approved  
by Engineering  
Manager*

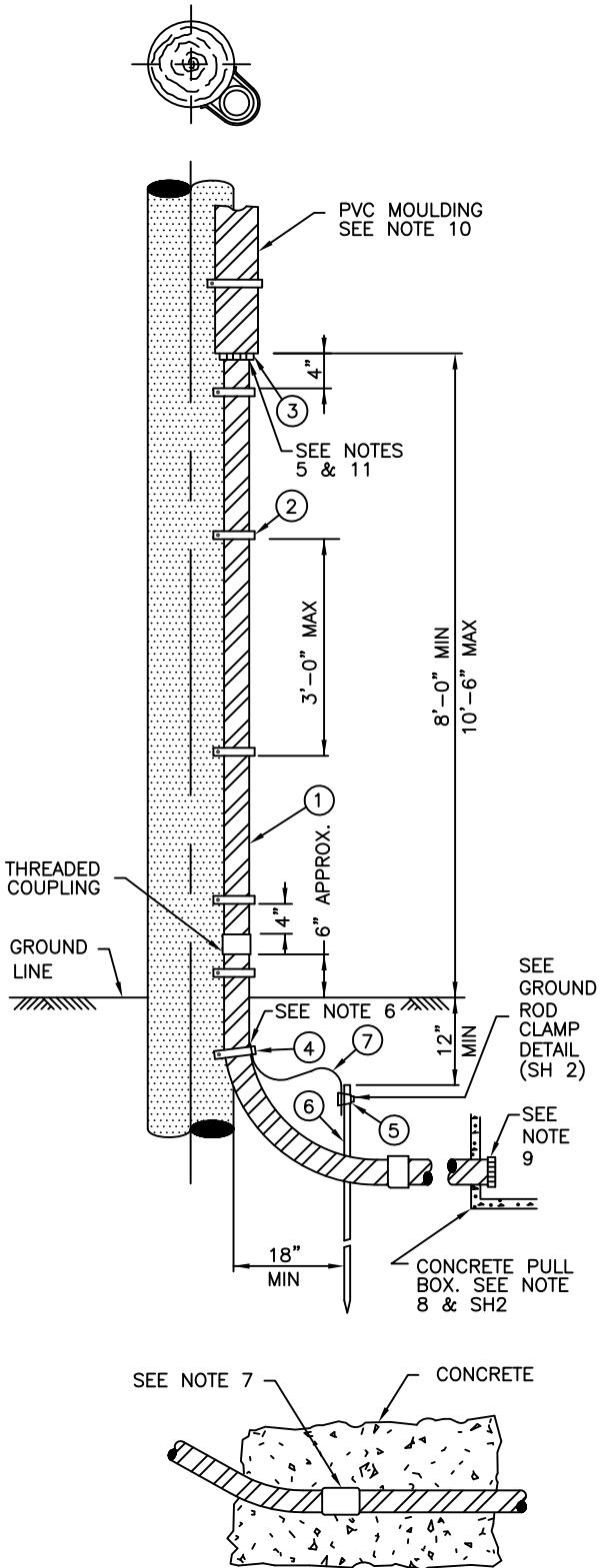
PRE-CAST CONCRETE PAD  
FOR LBC CABINET



City of Palo Alto  
California  
UTILITIES, ELECTRIC ENGINEERING

REV.	DATE	APPR.	DESCRIPTION
1	1/12	TT	ADDED BOX DETAILS
MAP #	CKT #	SCALE	W.O.# / DRAWING #
X	X	NTS	DT-SS-C-1028
			SHEET 3 OF 3





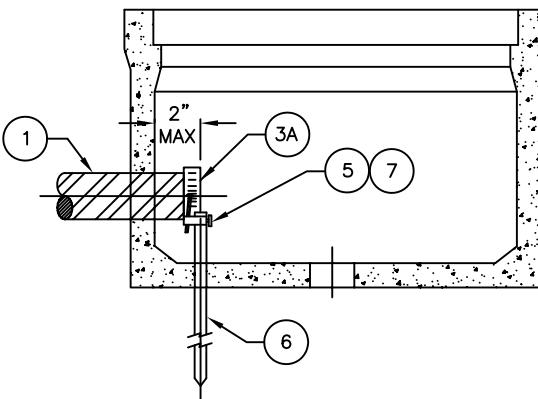
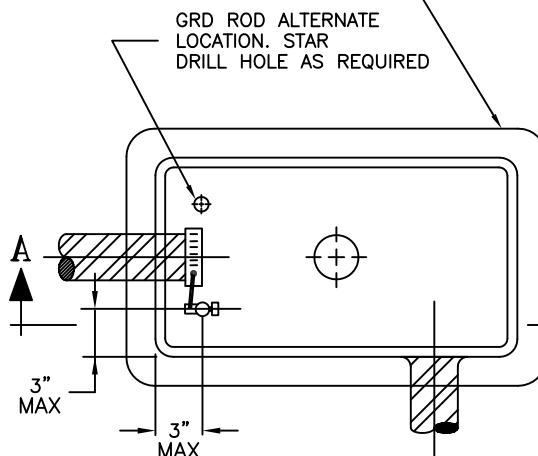
## NOTES:

- 1 THIS DWG. ILLUSTRATES THE INSTALLATION REQUIREMENTS FOR RIGID STEEL RISER CONDUIT ON WOOD POLES. THESE REQUIREMENTS APPLY TO RISER INSTALLATIONS OF ALL VOLTAGES.
- 2 THE RISER CONDUIT SHALL BE LOCATED IN A QUADRANT ON THE POLE AS DIRECTED BY THE ELECTRIC UTILITY ON THE APPLICABLE LAYOUT DWG.
- 3 THE MIN RADIUS ALLOWED IN THE BEND SHALL BE 36" FOR PRIMARY CONDUIT. UNLESS OTHERWISE SPECIFIED BY THE ELECTRIC UTILITY. A FACTORY BEND MAY BE USED FOR SECONDARY CONDUIT.
- 4 NO WELDING, BRAZING OR TORCH CUTTING SHALL BE MADE ON THE RISER CONDUIT. THE HEAT WILL DESTROY THE GALVANIZED COATING ON THE CONDUIT.
- 5 ALL SECONDARY VOLTAGE RISER (600 VOLTS OR LESS) CONDUIT SHALL HAVE AN INSULATING BUSHING AT THE TOP (ITEM-3)
- 6 ALL PRIMARY VOLTAGE RISER (600 VOLTS OR GREATER) CONDUIT SHALL HAVE A GROUNDING BUSHING (ITEM-4)
- 7 IF A TRANSITION FROM METALLIC TO NON METALLIC CONDUIT IS MADE, A FACTORY ADAPTER MUST BE USED SEE NOTE 9
- 8 UNLESS OTHERWISE APPROVED BY ELECTRIC UTILITY, CONDUIT SHALL TERMINATE AT A PRECAST BOX AT THE BASE OF THE RISER POLE. REFER TO THE APPLICABLE LAYOUT DWG. FOR THE EXACT LOCATION OF THE BOX. SEE DWG. NO. DT-SS-U-1002 FOR THE SIZE AND TYPE OF BOX REQUIRED. SEE SHEET NO. 2 FOR ALTERNATE GRD LOCATION.
- 9 WHEN THE ALTERNATE GROUNDING LOCATION IS USED (SEE SHEET 2), THE RISER CONDUIT MUST BE A CONTINUOUS RUN OF GALVANIZED RIGID STEEL.
- 10 WHERE THE CUSTOMER FURNISHES & INSTALLS THE RISER CONDUIT, THE ELECTRIC UTILITY SHALL FURNISH AND INSTALL THE RISER MOLDING EXTENDING FROM THE RISER CONDUIT TO THE OVERHEAD CONDUCTOR LEVEL ON THE POLE.
- 11 ANY MATERIALS SUBSTITUTION MUST BE APPROVED IN ADVANCE BY THE ELECTRIC UTILITY.
- 12 THE BEND OR SWEEP USED AT THE BOTTOM OF THE RISER CONDUIT SHALL BE RIGID GALVANIZED STEEL.

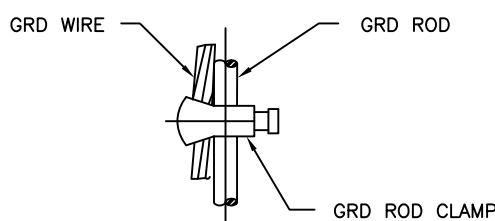
## NON-METALLIC DUCT CONCRETE ENCASED

APPROVED <u>3/1994</u>			ENGINEERING STANDARD			3	1-12	REVISED NOTE 8		TT
			INSTALLATION OF STEEL RISER CONDUIT ON WOOD POLES			2	4-86	REVISED NOTES		
						1	5-67	ADDED SHT 2 & REVISED MATL. LIST		
ENGR	PEV		REV	DATE	DESCRIPTION					APPR
DRAWN	UES/ MJ	MJ	CITY OF PALO ALTO CALIFORNIA			NTS		DT-SS-U-1001		1 OF 2
CHECKED	PEV		SCALE		STANDARD NO.		SHEET NO.			

SEE CPA STD DWG.  
DT-SS-U-1002 FOR  
PROPER BOX SIZE



SECTION A-A



GRD ROD CLAMP ASSY.

## LIST OF MATERIALS

ITEM	DESCRIPTION	SIZE	MANUFACTURER	CAT. NO.
1	HOT DIPPED GALVANIZED RIGID STEEL CONDUIT	AS REQUIRED	-	-
2	GALVANIZED HANGER IRON USE 1/4" X 2 1/2" GALV. LAG SCREWS	NO. 1 7/8" 16 GA	-	-
3	CONDUIT TOP GROUNDING BUSHING	2"	UNION INSULATING	96-2
		3"	UNION INSULATING	96-3
		4"	UNION INSULATING	96-4
		5"	UNION INSULATING	96-5
		6"	UNION INSULATING	96-6
		O-Z COMPANY	HBL-6121	
FOR SUBSTITUTE, SEE NOTE 11				
3A	CONDUIT BOTTOM GROUNDING BUSHING	2"	O-Z COMPANY	RBL-2021
		3"	O-Z COMPANY	RBL-3121
		4"	O-Z COMPANY	RBL-4121
		5"	O-Z COMPANY	RBL-5121
		6"	O-Z COMPANY	RBL-6121
		FOR SUBSTITUTE, SEE NOTE 11		
4	CONDUIT GROUND CLAMP	2"	O-Z COMPANY	CG 2022
		3"	T & B COMPANY	3903
		4"	O-Z COMPANY	CG 3122
		5"	T & B COMPANY	3904
		6"	O-Z COMPANY	CG 4122
		7"	T & B COMPANY	3905
5	GROUND ROD CLAMP	DIA	WIRE SIZE	
		5/8"	NO. 4 TO 2/0	ANDERSON ELEC. HUBBARD JOSLYN
		3/4"	NO. 4 TO 2/0	LINE MATERIAL ELEC. WEAVER MATERIAL ELEC
6	GROUND ROD	DIA	LENGTH	
		5/8"	8'-0"	BLACKBURN HUBBARD LINE MATERIAL JOSLYN
		3/4"	12'-0"	HUBBARD LINE MATERIAL JOSLYN
7	STANDARD BARE COPPER WIRE	NO. 4 AWG MIN	-	-

APPROVED 3/1994

MDB

ENGR. MANAGER

ENGINEERING STANDARD

INSTALLATION OF STEEL RISER  
CONDUIT ON WOOD POLES

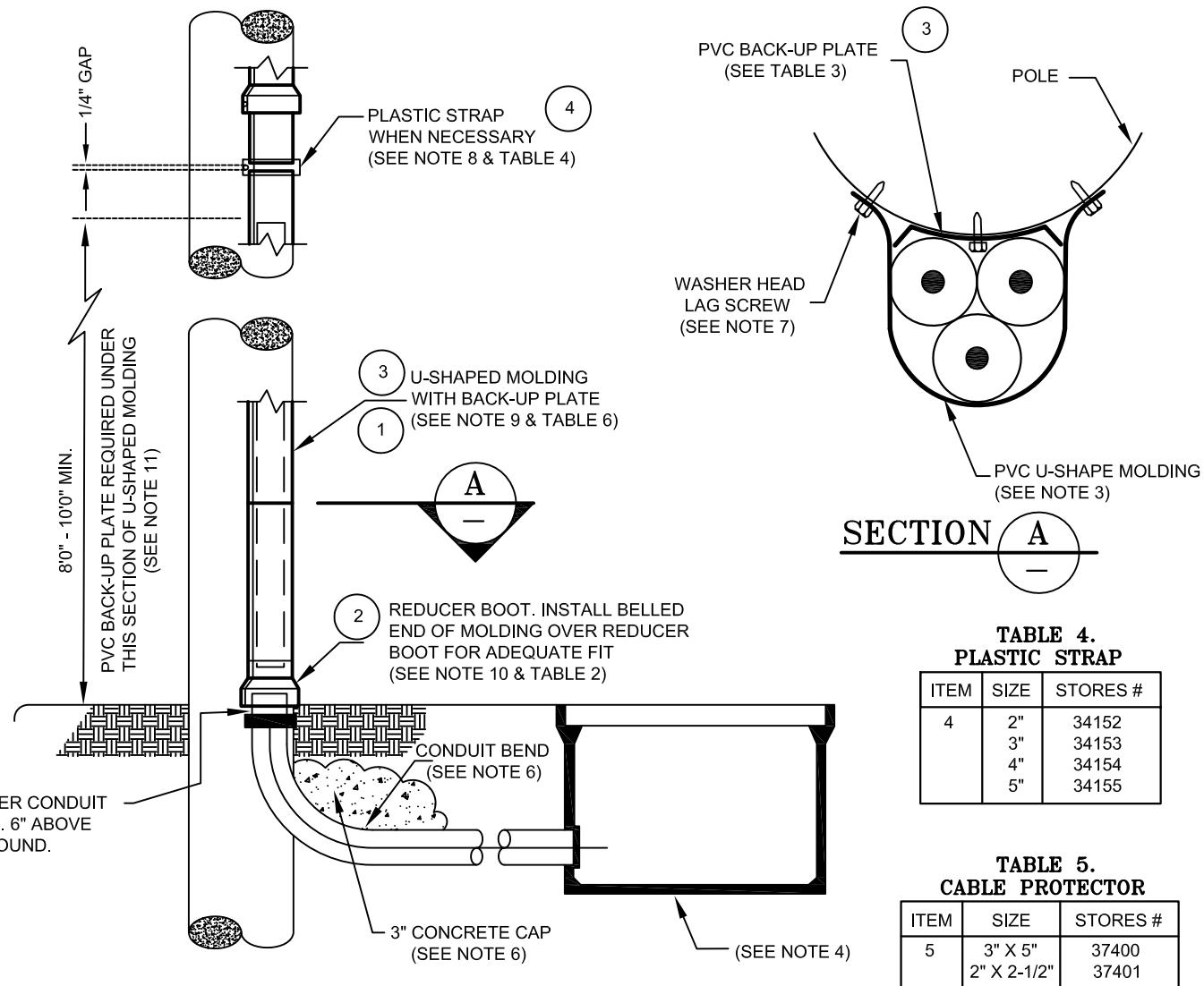
ENGR. PEV

DRAWN UES/  
MJ MJ

CHECKED PEV

CITY OF PALO ALTO  
CALIFORNIA

2	10-08	REVISED SECTION A-A	TT
1	5-67	REVISED MATL. LIST & ADDED SH 2	
REV	DATE	DESCRIPTION	APPR
NTS	DT-SS-U-1001	2 OF 2	
SCALE	STANDARD NO.	SHEET NO.	



**TABLE 1.**  
**U-SHAPED MOLDING**

ITEM	SIZE	TYPE	STORES #
1	2"	SCH. 80	34122
	3"	SCH. 80	34123
	4"	SCH. 40	34124
	5"	SCH. 40	34125

**TABLE 2.**  
**REDUCER BOOT**

ITEM	SIZE	STORES #
2	2" X 3"	34132
	4" X 2"	34133
	4" X 3"	34134
	5" X 4"	34135

**TABLE 3.**  
**BACKING PLATE**

ITEM	SIZE	STORES #
3	2"	34142
	3"	34143
	4"	34144
	5"	34145

**TABLE 6.**  
**RECOMMENDED U-SHAPED MOLDING SIZES**

VOLTAGE	CABLE SIZE AWG OR KCMIL	MOLDING SIZE
15 KV	#2 (2-3 COND.) 1/0 (3 COND.) 350 (3 COND.) 500 (3 COND.) 750 (3 COND.)	3" 4" 4" 5" 5"
600 V	#2 1/0 4/0 350 500 750	2" 2" 2" 2" 3" 3"

APPROVED <i>Original Signed and Approved by Engineering Manager</i>	ENGINEERING STANDARD		
	INSTALLATION OF PVC RISER CONDUIT ON WOOD POLES		
ENGR. <i>[Signature]</i>	2	7/16	CONVERTED TO AUTOCAD
DRAWN <i>[Signature]</i>	1	6/94	DRAWING RENAMED
CHECKED <i>[Signature]</i>	REV	DATE	DESCRIPTION
			APPR
CITY OF PALO ALTO CALIFORNIA		NTS	DT-SS-U-1001A
		SCALE	STANDARD NO.
			SHEET NO.

## WOOD POLE RISER INSTALLATION NOTES

UNLESS OTHERWISE SPECIFIED, THIS CONSTRUCTION STANDARD SHALL BE USED FOR ALL WOOD POLE RISER INSTALLATIONS.

U-SHAPED PVC MOLDING SHALL BE MANUFACTURED FROM UNPLASTICIZED POLYVINYL CHLORIDE COMPOUND AND SHALL MEET THE REQUIREMENTS OF NEMA PUBLICATION PH 41-1986 AND NEMA PUBLICATION TC2-1983 AS APPROPRIATE. THE STANDARD SIZES USED SHALL BE 2", 3", 4", AND 5". TO COMPLY WITH THE IMPACT TEST REQUIREMENTS, 2" AND 3" SHALL BE SCHEDULE 80 AND THE 4" AND 5" SHALL BE SCHEDULE 40.

FOR RISERS IN EXCESS OF 750 VOLTS G.O. 95 RULE 54.6E 1988 SPECIFIES THE USE OF A MOLDING THAT MEETS THE IMPACT TEST REQUIREMENTS OF EPC-80-PVC AND REQUIRING AN ADDITIONAL BACKUP PLATE OF PVC MATERIAL.

### NOTES:

1. AS A MATTER OF CONVENIENCE, THESE REQUIREMENTS SHALL APPLY TO PRIMARY AND SECONDARY RISER INSTALLATIONS ON WOOD POLES INCLUDING STREET LIGHT AND COMMUNICATIONS LINES.
2. THE RISER CONDUIT SHALL BE LOCATED IN A QUADRANT ON THE POLE AS DIRECTED BY THE ELECTRIC UTILITY.
3. THE TOP OF THE RISER SHALL HAVE A NYLON CABLE PROTECTOR.
4. UNLESS OTHERWISE APPROVED BY THE ELECTRIC UTILITY, A NINETY DEGREE ELBOW AND A PRECAST BOX SIZE AS SPECIFIED SHALL BE INSTALLED AT THE BASE OF THE RISER POLE. REFER TO THE APPLICABLE LAYOUT DRAWING FOR THE EXACT LOCATION OF THE BOX.
5. ANY MATERIALS SUBSTITUTED MUST BE APPROVED BY THE ELECTRIC UTILITY PRIOR TO INSTALLATION.
6. UNLESS OTHERWISE SPECIFIED, THE BEND OR SWEEP USED AT THE BOTTOM OF THE RISER MOLDING FACTORY SHALL BE OF PVC SCHEDULE 40 MATERIAL AND SHALL BE CAPPED WITH CONCRETE (3" THICKNESS) ALONG THE INSIDE PORTION OF THE BEND. THE CONCRETE SHALL BE COLORED RED BY THE ADDITION OF MILLER'S RED OXIDE PIGMENT TO THE CONCRETE MIX. COLOR WILL BE THE SATISFACTION OF THE UTILITIES UNDERGROUND INSPECTOR.
7. THE U-SHAPED MOLDING SHALL BE ATTACHED TO THE POLE WITH 1/4" X 2" NEOPRENE WASHER HEAD LAG SCREWS AT 18" INTERVALS BELOW THE 8 FT. LEVEL AND AT 36" INTERVALS ABOVE THE 8 FT. LEVEL. THESE SCREWS SHOULD BE INSTALLED SNUG AGAINST THE MOLDING BUT NOT DRIVEN TIGHT IN ORDER TO PERMIT EXPANSION OF THE MOLDING DUE TO TEMPERATURE CHANGES.
8. IT IS ACCEPTABLE TO INSTALL A PLASTIC STRAP WHEN IT IS NECESSARY TO JOIN TWO SECTIONS OF MOLDING WITH PLAIN ENDS. A 1/4" SPACING MUST BE PROVIDED BETWEEN THE ENDS TO ALLOW FOR THERMAL EXPANSION.
9. ONE TEN FOOT SECTION OF PVC BACKUP PLATE SHALL BE FASTENED TO THE POLE AT THE LOWER SECTION OF THE RISER WITH 6d GALVANIZED NAILS.
10. USE REDUCER BOOTS TO JOIN DIFFERENT SIZED U-SHAPED MOLDINGS TOGETHER AND TO JOIN DIFFERENT SIZED U-SHAPED MOLDINGS TO CONDUIT BENDS. TWO REDUCER BOOTS MAY BE USED IN SERIES WHERE A DOUBLE REDUCTION IS REQUIRED.

APPROVED _____		ENGINEERING STANDARD			
ENGR. NAME/SEEDED <i>Original Signed 2nd Approved By Engineering Manager</i>		INSTALLATION OF PVC RISER CONDUIT ON WOOD POLES			
ENGR.	DRAWN BY	DATE	DESCRIPTION	APPR	
		2 7/16	CONVERTED TO AUTOCAD		
		1 6/94	DRAWING RENAMED		
REV	DATE				
CHECKED	TT	NTS	DT-SS-U-1001A	2 OF 2	
		SCALE	STANDARD NO.	SHEET NO.	

PURPOSE: THIS DRAWING PROVIDES INFORMATION ON THE INSTALLATION REQUIREMENTS, BOX TYPES, AND BOX SIZES ALLOWED FOR UNDERGROUND ELECTRIC UTILITY APPLICATION.

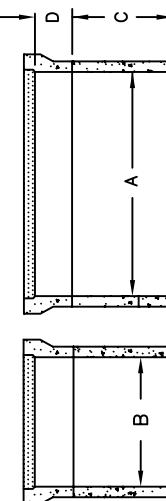
Box Manufacturer and Catalog Number	Utility Vault Company	Inside Dimensions (Inches)	External Dimensions (Inches)	Voltage	Maximum # of Spliced or Looped Cables in Box	Maximum Conduit Size (inches)	Maximum # of Conduits	Application
Quazite Corporation	Christy Concrete Products, Inc.							Traffic Signal, Street Light or Communications ONLY
PG1118	N-9 ■	17 10 12	10 12 10	Secondary	# 2	8 ♦	2	4
PG1324	N-30 ▲	24 13 18	18 8 8	Secondary	# 2	12 ♦	2	3
PG1730	N-36 ▲	30 17 18	18 8 8	Secondary	4/0	12	2	Pull box for secondary cables
PG2436	N-40 ▲	36 24 30	30 8 8	Secondary	350	16 (2)	4	Pull box for secondary cables
PG3048	N-48 ▲	48 30 36	36 8 8	Secondary	750	24 (2)	4	Pull box for secondary cables
-----	444-LA-CPA	42 42 (3' 6") (3' 6")	42 42 (3' 6") (3' 6")	Secondary - NOT APPROVED FOR NEW INSTALLATIONS	750 Primary 1/0	24 (2)	4	6 ♦
-----	CPA-3536	60 36 42	42 6 12	Secondary	750	24 (3)	4	Pull box for secondary cables
-----	CPA-3546	60 36 54	54 6 12	Primary	350	12 (2)	4	- 200 A primary cables - 6 - 200 A Splices
-----	644-LA-CPA	66 42 (5' 6") (3' 6")	39 6 (4' 6") (3' 3")	Secondary - ENGINEERING APPROVAL REQUIRED FOR NEW INSTALLATIONS	750 Primary 350	32 (2) 16 (3)	4	- Submersible Load Break - Pull box for 600 A primary cables - NOT Allowed in Full Traffic Applications - 2 sets - 200A or 600A splices - 4 way 200A Padmount Load Break Junction
-----	PGE-466	78 48 60	60 (5' 0") (4' 0")	Secondary	750	32 (4)	4	- 2 sets - 200A or 600A splices - 4 way 200A Padmount Load Break Junction
-----	CPA-4686	102 54 84	84 6 12	Primary	750	16 (2)	5	- 1 Ph Submersible Transformer ≤ 100 Kva - 6 - 600 A primary cables
-----	38Y-510-LA-CPA	120 60 84	84 (7' 0") (5')	Secondary	750	32 (4)	4	- 6 - 600 A splices or connectors - 3 way 200 A Switch - Submersible Transformer ≤ 150 kVA
-----	38Y-612-LA-CPA	144 72 84	84 (6' 0") (12' 0")	Primary	750	16 (3)	5	- 6 - 600 A primary cables - 6 - 600 A primary splices or connectors - 600 A Switch - Submersible Transformer ≤ 300 kVA
-----				Secondary	750	32	4	- 6 - 600 A primary cables - 6 - 600 A primary splices or connectors - 600 A Switch - Submersible Transformer ≤ 750 kVA
-----				Primary	750	16 (3)	5	- Padmount Switch

LEGEND:

- For Traffic Signal, Streetlight, or Communications ONLY
- ▲ For Use in Substations ONLY
- ♦ No more than 4 of maximum size
- No more than 6 of maximum size
- ◆ No more than 1-set of maximum size (set = 4 conductors)
- ▲ No more than 2-sets of maximum size (set = 4 conductors)
- No more than 3-sets of maximum size (set = 4 conductors)
- ♦ No more than 4-sets of maximum size (set = 4 conductors)

TABLE 1 – BOX TYPE, SIZE, & APPLICATION

APPROVED <u>3/1994</u> <u>Residential</u> <u>Engineering Manager</u> <u>Engineering Manager</u> <u>Engineering Manager</u>		REV DATE	DESCRIPTION	APPR
<b>UNDERGROUND JUNCTION BOXES</b>		7-13	ADD PG1118, REV BOX SIZE	JP
<b>CITY OF PALO ALTO CALIFORNIA</b>		8-9-15	ADD PGE-466	
<b>BOX DIMENSIONS</b>		7-1-09	REVISED	TT
<b>DT-SS-U-1002</b>		5-3-95	REVISED	PV/MU
		4-7-89	REVISED	DH
		REV DATE	DESCRIPTION	APPR
SCALE	STANDARD NO.	SHEET NO.		

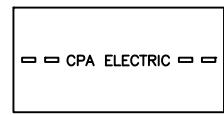
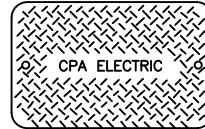


BOX DIMENSIONS

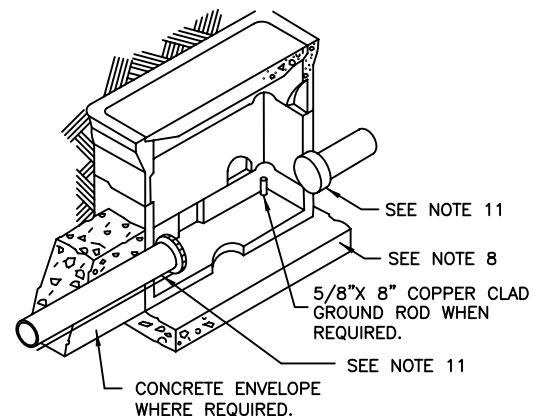
TABLE 2 – COVER TYPES BY APPLICATION

Manufacturer and Catalog Number		
Box	Application/Cover Type	Catalog Number
<b>Utility Vault Company</b>		
444-LA-CPA	Full Traffic	444 Roof Slab with inside-outside frame assembly and one (1) 30" manhole frame and cover
	Transformer (1-phase)	Pad size as required by transformer
644-LA-CPA	Non-Traffic, Submersible Load Break Junction	Aluminum Adjustable Frame with torsion assist slip resistant covers (3'6" x 5'6")
	Full Traffic - ONLY allowed with CPAU Approval	644 Roof Slab with inside-outside frame assembly and one (1) 30" manhole frame and cover
	Load Break Cabinet (60" wide)	Load Break Pad (48" x 72" x 8")
	Load Break Cabinet (44" wide)	Load Break Pad Type 2, with A-1252 Cover (48" x 72" x 8")
577-LA-CPA	Full Traffic	577 Roof Slab with inside-outside frame assembly and two (2) 30" manhole frames and covers
	Non-Traffic	Incidental Quick Release Slip Resistant Aluminum Plates & Adjustable Frame Assembly
	Submersible Transformer	Precast Roof Slab - Tapered Lift Out Cover with Two (2) 30" Grated Cast Iron Covers
CPA-3536 CPA-3546	Full Traffic	Full Traffic Rectangular Splice Cover/Frame Assembly with Round Covers
	Non-Traffic	CPA Adjustable Frame with Torsion Assist Cover Assembly
PGE-466	Non-Traffic / Submersible Transformer	Incidental Quick Release Slip Resistant Aluminum Plates & Adjustable Frame Assembly
	Full Traffic	Full Traffic Cover/Frame Assembly with Two (2) Round Covers
	Load Break Cabinet (44" wide)	Load Break Pad Type 2, with A-1252 Cover
CPA-4686	Non-Traffic	Incidental Quick Release Slip Resistant Aluminum Plates & Adjustable Frame Assembly
	Full Traffic	Full Traffic Cover/Frame Assembly with Three (3) Round Covers
	600A Switch, 600 A Splices or Separable Connectors - TRAFFIC	Full Traffic Cover/Frame Assembly with Three (3) Round Covers
	600A Switch, 600 A Splices or Separable Connectors - NON-TRAFFIC	Incidental Quick Release Slip Resistant Aluminum Plates & Adjustable Frame Assembly
	Submersible Transformer	CPA Heavy FVT Frame (5") & CPA 24"x29" Grated Cast Iron Cover
38Y-510-LA-CPA	Submersible Switch	Precast Roof Slab - Tapered Lift Out Cover with Three (3) 30" Solid Cast Iron Covers
	Submersible Transformer	Precast Roof Slab - Tapered Lift Out Cover with Three (3) 30" Grated Cast Iron Covers
	Switch (Type A)	711-CPA Switch Pad Roof Slab Type A
	Switch (Type B)	711-CPA Switch Pad Roof Slab Type B
	Switch (Type C)	711-CPA Switch Pad Roof Slab Type C
38Y-612-LA-CPA	Switch	Precast Roof Slab - Tapered Lift Out Cover with Three (3) 30" Solid Cast Iron Covers
	Three Phase Transformer	Precast Roof Slab - Tapered Lift Out Cover with Three (3) 30" Grated Cast Iron Covers

Manufacturer and Catalog Number		
Box	Cover Type	Catalog Number
<b>Quazite Corporation</b>		
PG1118	Heavy Duty w/ 2 Bolts	PG1118HA00
PG1324	Heavy Duty w/ 2 Bolts	PG1324HA00
PG1730	Heavy Duty w/ 2 Bolts	PG1730HA00
PG2436	Heavy Duty w/ 2 Bolts	PG2436HA00
PG3048	Heavy Duty w/ 2 Bolts	PG3048HA00
<b>SUBSTATION APPLICATIONS ONLY</b>		
<b>Steel covers for replacement purposes only</b>		
<b>Christy Concrete Products, Inc.</b>		
N-9	Non-Traffic - Concrete	N9T
	Traffic - Steel	N9-61J
N-30	Non-Traffic - Concrete	N30T
	Traffic - Steel	N30-61J
N-36	Non-Traffic - Concrete	N36T
	Traffic - Steel	N36-61J
N-40	Non-Traffic - Concrete	N40T
	Traffic - Steel	N40-61J
N-48	Non-Traffic - Concrete	N48T
	Traffic - Steel	N48-61J



**STEEL COVER**  
REPLACEMENT PURPOSE ONLY



**TYPICAL BOX/CONDUIT INSTALLATION**

APPROVED <u>3/1994</u> <i>MOR signed and Approved by Engineering Manager</i>	ENGINEERING STANDARD		7	9-15	ADD PGE-466	JP
ENGR <u>PEV</u>	DRAWN <u>UEF</u>	CHECKED <u>MJ</u>	6	1-09	REVISED	TT
REV	DATE	DESCRIPTION	5	1-09	REVISED	TT
			4	3-95	REVISED	PV/MJ
			3	7-89	REVISED	DH
			REV	DATE	DESCRIPTION	APPR
CITY OF PALO ALTO CALIFORNIA			NTS	DT-SS-U-1002		2 OF 3
			SCALE	STANDARD NO.	SHEET NO.	

## NOTES

1. UNUSUAL FIELD CONDITIONS MAY DICTATE BOX DIMENSIONS FOR DESIGNS DIFFERENT FROM THOSE SPECIFIED IN THIS DRAWING. THE DETAILS FOR INSTALLATIONS VARYING FROM THESE SPECIFICATIONS WILL BE FURNISHED BY ELECTRIC UTILITY.
2. ALL BOXES SHALL BE COMPLETE WITH BODY, COVER, SOLID BASE, AND NECESSARY EXTENSIONS. A SOLID, CONCRETE FLOOR IS REQUIRED FOR ALL BOXES.
3. ALL NON-CONCRETE ENCLOSURES (BODY, BASE, COVER, AND EXTENSIONS WHERE REQUIRED) SHALL MEET TIER 15 REQUIREMENTS AS SPECIFIED IN SCTE 77 2007 (OR LATEST VERSION) AND PER CPAU SPECIFICATION SS-01-09 – SPECIFICATION FOR NON-CONCRETE ENCLOSURES.
4. THE NUMBER OF EXTENSIONS REQUIRED IS DEPENDENT ON THE DEPTH OF THE CONDUIT. THE CONDUIT SHALL ENTER STRAIGHT INTO THE BOX, PARALLEL WITH THE COVER, I.E. WITH NO VERTICAL BENDS OR SWEEPS.
5. ALL NON-ROUND COVERS ON ALL BOXES MUST BE SECURED BY RECESSED HOLD-DOWN BOLTS.
6. ALL BOXES SHALL HAVE COVERS APPROVED BY CPAU AND HAVE A NON-SLIP SURFACE.
7. THE WORDS "CPA ELECTRIC", "CPA SL", "CPA TS", OR "CPA COMM" SHALL BE CAST OR INSCRIBED IN THE SURFACE OF ALL COVERS, 30"X48" AND SMALLER DEPENDING ON APPLICATION. LARGER BOXES SHALL HAVE "CPA-HIGH VOLTAGE" INSCRIBED ON THE FRAME.
8. BOXES LARGER THAN 30"X48" SHALL HAVE PROVISIONS FOR ATTACHING A METAL PLATE INDICATING THE VAULT NUMBER (I.E. LOCATION NUMBER), ALONG WITH THE CORRESPONDING NUMBER PLATE. CONTACT THE UTILITY ENGINEER FOR THE NUMBER BEFORE ORDERING THE BOX.
9. THE BASE OF EACH BOX SHALL BE PLACED ON A MINIMUM 6" BEDDING OF 3/4" DRAIN ROCK ON UNDISTURBED OR 95% COMPACTED EARTH. THE BOXES SHALL BE INSTALLED SO THE COVERS ARE LEVEL WITH THE ADJACENT CURB, DRIVEWAY, OR SIDEWALK GRADE.
10. FOR 30"X48" OR SMALLER BOXES, AN ALLOWANCE SHALL BE MADE FOR THE THICKNESS OF THE COVER TO ENSURE THE COVER IS FLUSH WITH THE FINISH GRADE. WHEN NO FINISH GRADE IS ESTABLISHED, BOX COVERS SHALL BE 2" ABOVE THE ADJACENT TERRAIN.
11. IT IS INTENDED THAT CONDUITS SHALL ENTER CONCRETE BOXES THROUGH THE KNOCKOUTS PROVIDED. BOX WALL MAY BE CUT OR CORE DRILLED AT OTHER LOCATIONS TO PROVIDE CONDUIT ENTRY WITH APPROVAL OF THE CPAU UNDERGROUND INSPECTOR.
12. STEEL CONDUITS SHALL EXTEND NO MORE THAN 2" INTO A BOX AND SHALL BE TERMINATED WITH GROUNDING BUSHINGS. PLASTIC CONDUITS SHALL BE TERMINATED WITH BELL ENDS, FLUSH WITH THE WALL OF THE BOX. BELL ENDS MAY NOT PROJECT INTO THE BOX. ALL CONDUIT ENTRANCES SHALL BE GROUTED.
13. BOXES USED IN HEAVY TRAFFIC AREAS SHALL BE DESIGNED FOR H-20-44 TRAFFIC LOADING.
14. BOXES 3'X5' OR LARGER SUBJECT TO MOTOR VEHICLE TRAFFIC, BACKFILL WITH A 6" MINIMUM WIDTH OF TWO SACK SLURRY, OTHERWISE BACKFILL WITH 12" MINIMUM WIDTH OF ¾" BASE ROCK AT 95% COMPACTION.
15. BOXES 3'X5' OR LARGER REQUIRE A 12" X 12" CONCRETE COLLAR WITH REBAR AROUND THE FRAME AND VAULT. CONCRETE SHALL BE CLASS 2, CONTAINING SIX (6) SACKS OF CEMENT PER CUBIC YARD AND SHALL PROVIDE A MINIMUM COMPREHENSIVE STRENGTH OF 3500 POUNDS PER SQUARE INCH AT 28 DAYS (MUST MEET CITY OF PALO ALTO SIDEWALK REQUIREMENTS, SECTION 16). TWO PINTS OF LAMPBLACK PER CUBIC YARD OF CONCRETE IS REQUIRED. (SEE DRAWING# DT-SS-U-1038 FOR DETAILS)
16. STEEL TRAFFIC LIDS ARE FOR REPLACEMENT PURPOSES ONLY.
17. ALL BOXES LISTED IN TABLE 1 SHALL BE SIZED FOR THE LARGEST CONDUCTOR THEY ARE EXPECTED TO CONTAIN.
18. FOR BOX INSTALLATION AT THE BASE OF A POLE RISER, SEE CPAU DWG'S DT-SS-U-1001 AND DT-SS-U-1001A.

9	9-16	CORRECTED NOTE 14	TT
7	9-15	REVISED	JP
6	1-12	REVISED	TT
5	1-09	REVISED	TT
4	3-95	REVISED	PV/MJ
3	7-89	REVISED	DH
REV	DATE	DESCRIPTION	APPR

APPROVED	3-99 4
MDR	Original signed
ENGR.	NAME
DRAWN	YES MJ
CHECKED	PEV

ENGINEERING STANDARD  
**UNDERGROUND  
JUNCTION BOXES**

**CITY OF PALO ALTO  
CALIFORNIA**

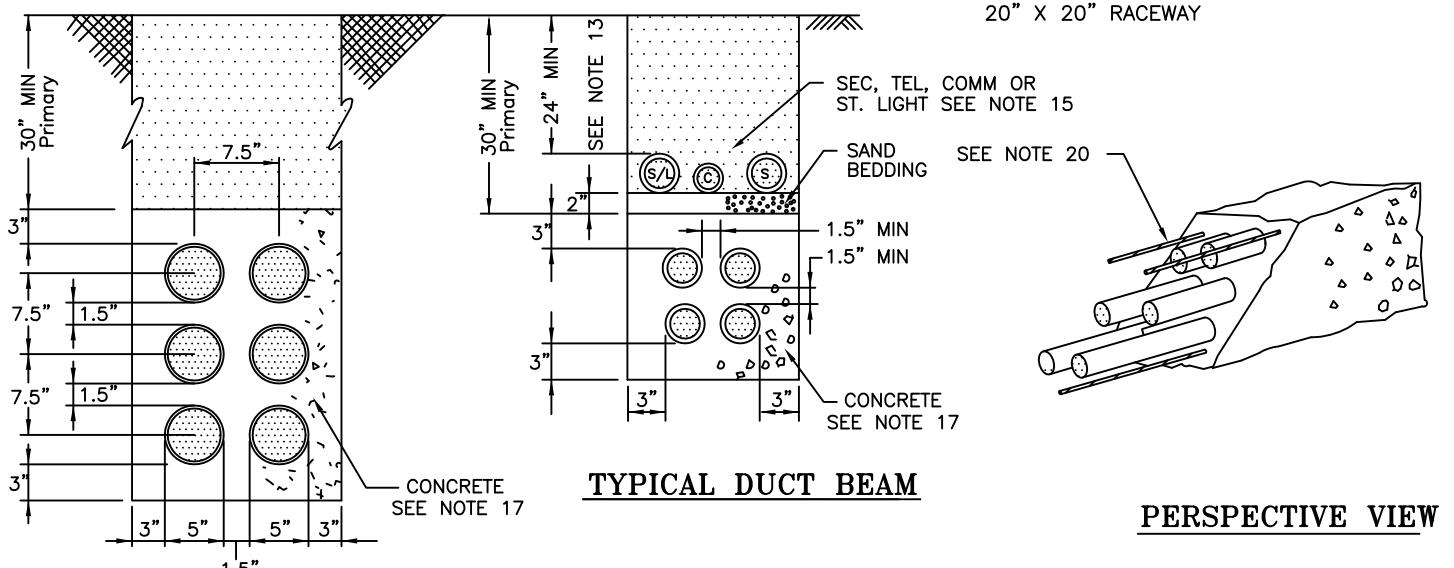
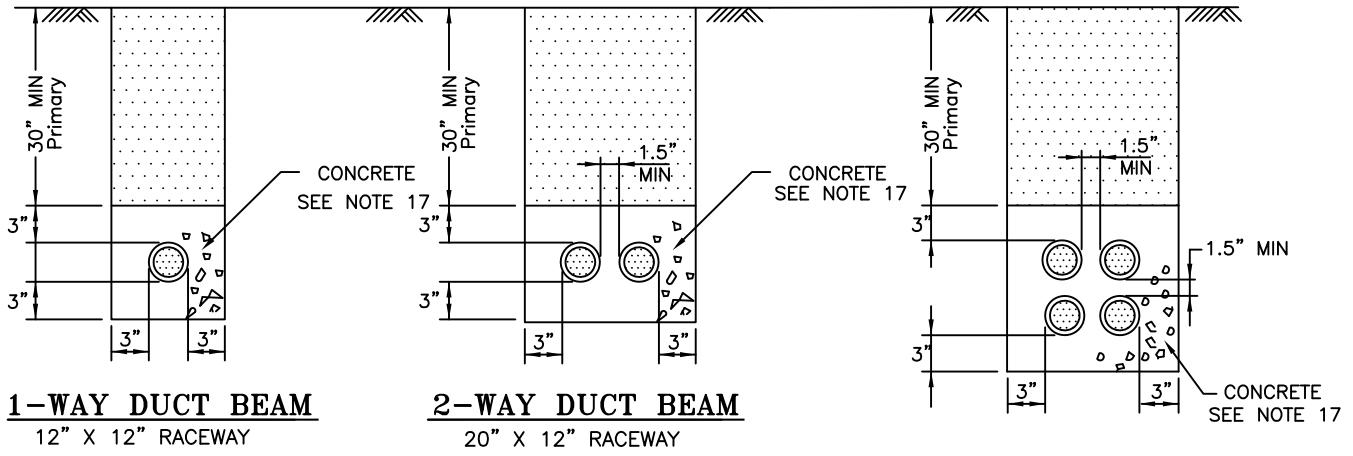
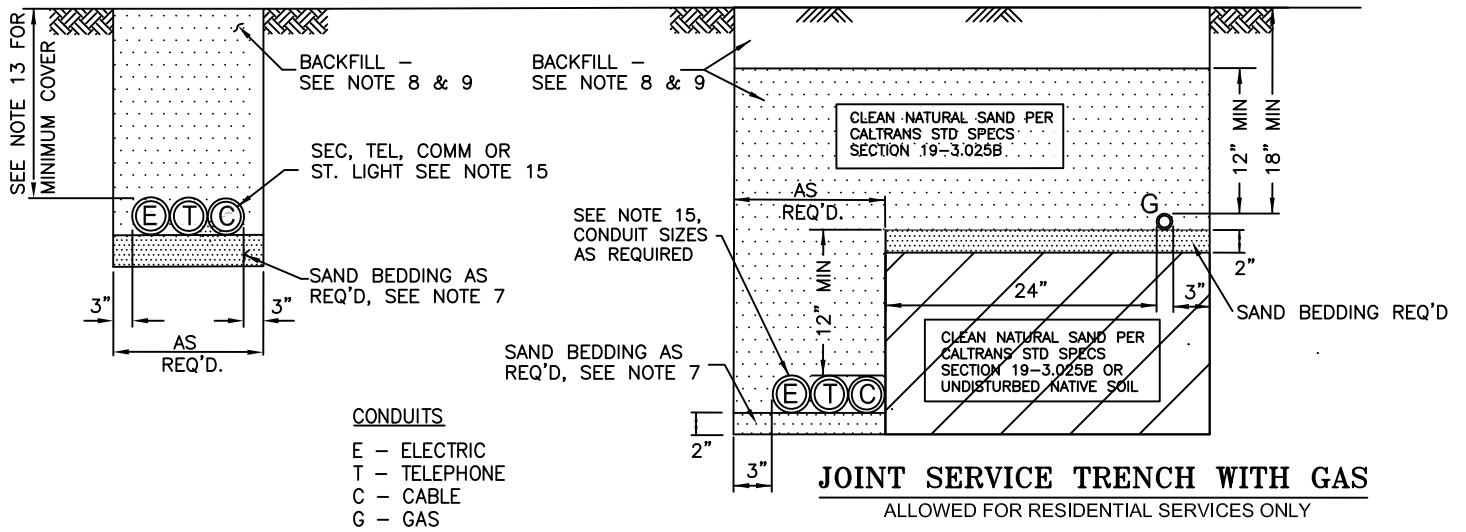
NTS DT-SS-U-1002

3 OF 3

SCALE STANDARD NO.

SHEET NO.





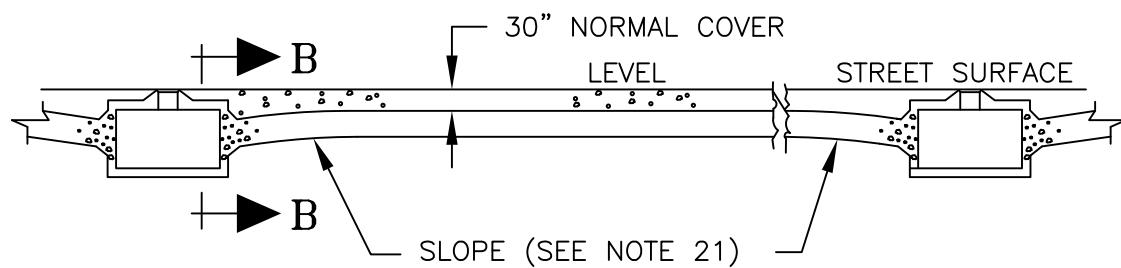
APPROVED	20
ENGR.	MANAGER
DRAWN BY	TD
CHECKED BY	PV

*Original Signed  
by Engineering  
Manager*

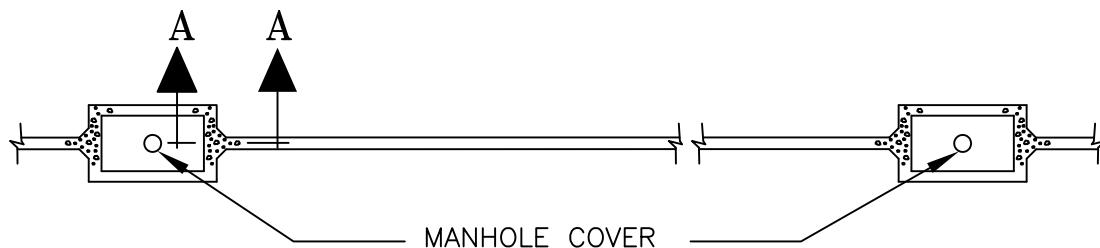
ENGINEERING STANDARD  
**UNDERGROUND DUCT LINES**  
TYPICAL TRENCH SECTION DETAILS

**CITY OF PALO ALTO**  
CALIFORNIA

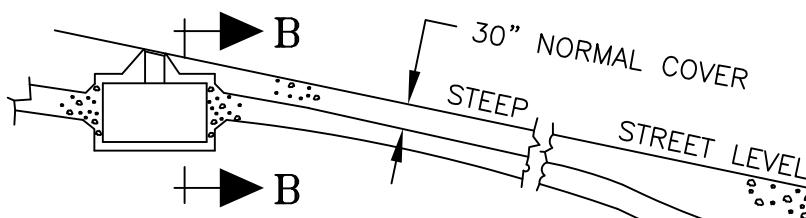
10	7/16	CORRECTED NOTATIONS	TT
4	6/13	ADDED JOINT TRENCH & NOTES	TT
3	10/09	REVISED MIN PRIMARY COVER	TT
2	8/08	COMBINED DT-SS-U-1003 DT-PR-U-1004	TT
1	6/06	REVISED NOTES	JT
REV	DATE	DESCRIPTION	APPR
NTS	DT-SS-U-1003	1 OF 4	
SCALE	STANDARD NO.	SHEET NO.	



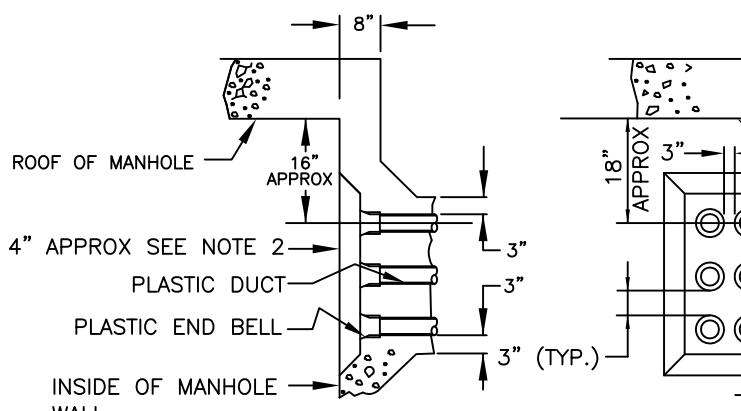
SECTIONAL ELEVATION



PLAN VIEW

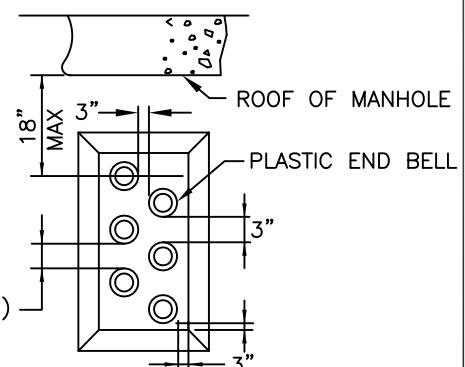


SECTIONAL ELEVATION



SECTION A-A

ALT. SECTION B-B  
DUCT WINDOW



SECTION B-B  
DUCT WINDOW

APPROVED _____ 20		ENGINEERING STANDARD		CORRECTED COVER DIMENSION		TT
ENGR. MAM GEF		UNDERGROUND DUCT LINES		DT-SS-U-1003		TT
DRAWN _____		TYPICAL TRENCH SECTION DETAILS		DT-PR-U-1004		FINCH
CHECKED PV		CHANGED NOTE 2				
REV	DATE	DESCRIPTION		APPR		
CITY OF PALO ALTO		NTS		DT-SS-U-1003		2 OF 4
CALIFORNIA		SCALE		STANDARD NO.		SHEET NO.

Original Signed  
and Approved  
by Manager  
Engineering

NOTES:

1. DIRECT BURIED PRIMARY CONDUIT IS NOT AN APPROVED CONSTRUCTION METHOD. PRIMARY CONDUITS SHALL BE CONCRETE ENCASED, UNLESS OTHERWISE APPROVED BY UTILITIES ENGINEER.
2. JOINT TRENCH WITH NATURAL GAS OR PRIVATE STREETLIGHT SYSTEMS IS NOT ALLOWED UNLESS APPROVED BY CITY OF PALO ALTO UTILITIES ELECTRIC AND WATER, GAS, WASTEWATER ENGINEERING DEPARTMENTS.
3. APPROVED CONDUIT MATERIALS:
  - a. SCHEDULE 40 PVC
  - b. TYPE "DB 60" (SECONDARY) OR "DB 120" (PRIMARY) PLASTIC CONDUIT
  - c. HOT DIPPED GALVANIZED RIGID STEEL CONDUIT.
4. EVERY EFFORT MUST BE MADE TO OBTAIN A STRAIGHT WATER-TIGHT CONDUIT LINE TRUE TO THE CENTER LINE OF THE TRENCH.
5. SHARP TURNS MUST BE AVOIDED. UNLESS APPROVED BY THE CITY OF PALO ALTO UTILITIES ELECTRICAL ENGINEER, FACTORY OFFSETS SHALL NOT BE USE. ALLOWABLE BEND RADIUS:

CONDUIT SIZE	MINIMUM BEND RADIUS
2 inch	24 inches
3 inch	36 inches
4 inch	36 inches
5 inch	60 inches
All risers	36 inches

6. NO MORE THAN 2-90° BENDS (180°) IN PRIMARY OR 3-90° (270°) IN SECONDARY CONDUIT RUNS. ALL BENDS AND SWEEPS (90°) MUST BE ENCASED IN CONCRETE (MINIMUM 3") ALONG THE INSIDE RADIUS.
7. IF THE ELECTRIC UNDERGROUND INSPECTOR DETERMINES THAT THE BOTTOM OF THE TRENCH IS ROCKY, A 2" SAND BEDDING MUST BE INSTALLED BEFORE THE CONDUIT.
8. BACKFILL IN UNIMPROVED AREAS. 12" OF CLEAN NATURAL SAND PER CALTRANS STD SPECS SEC 19-3.025B ON TOP OF THE UPPERMOST CONDUIT, 90% COMPACTION; TOPPED WITH EXCAVATED NATIVE SOIL, 85% COMPACTION.
9. BACKFILL IN IMPROVED AREAS (STREETS, SIDEWALKS, DRIVEWAYS, ETC. OF ASPHALT OR CONCRETE) THE BACKFILL MATERIAL SHALL BE IN ACCORDANCE WITH THE CITY OF PALO ALTO PUBLIC WORKS DEPARTMENT STANDARD DRAWING NO. 401, TRENCHES - TYPICAL CROSS-SECTIONS.
10. ALL CONDUITS MUST BE MANDRELLED (STD. DWG DT-SS-U-1025). THIS TEST MUST BE WITNESSED BY THE ELECTRIC UNDERGROUND INSPECTOR.
11. A 3/8" POLYPROPYLENE PULL LINE (MIN. 150 LBS. TEST) MUST BE INSTALLED IN EACH CONDUIT.
12. CONDUIT SPACING SHALL BE MAINTAINED BY SPACERS, APPROVED BY THE CITY OF PALO ALTO, INSTALLED NO MORE THAN 7 FEET APART. CONDUITS MUST BE SECURELY BOUND TO THE SPACERS.
13. MINIMUM COVER FOR DIRECT BURIED CONDUIT:
 

a. SECONDARY (NON TRAFFIC)	24"
b. COMMUNICATION (NON TRAFFIC)	24"
c. SECONDARY (TRAFFIC)	30"
d. COMMUNICATION (TRAFFIC)	30"
14. MINIMUM CLEARANCE OF ELECTRIC LINES FROM OTHER UTILITY LINES:
 

a. VERTICAL CLEARANCE FROM CROSSING UTILITY LINES	12"
b. HORIZONTAL CLEARANCE FROM NATURAL GAS LINES	24"
c. HORIZONTAL CLEARANCE FROM WATER/WASTEWATER LINES	48"

10	7/16	REVISED NOTE 5, ADD 3"	TT
9	1/12	REVISED NOTES 8,9	TT
8	5-09	REVISED NOTES 6 & 15	TT
7	10/09	ADDED NOTE 14	TT
6	5-09	COMBINED DT-SS-U-1003 DT-PR-U-1004	TT
5	6-99	MODIFIED NOTES	JT
REV	DATE	DESCRIPTION	APPR

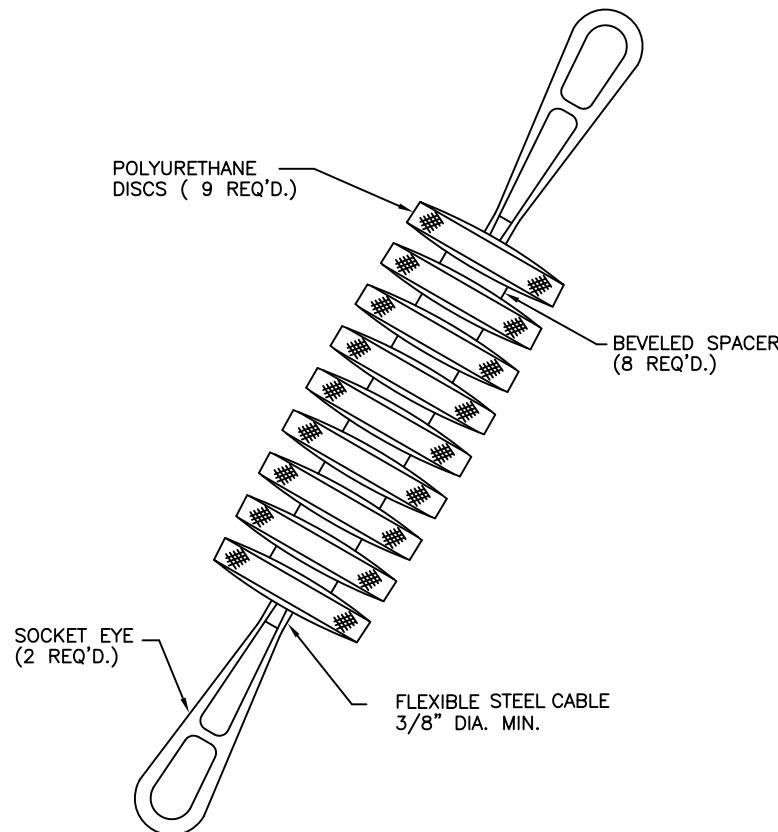
APPROVED _____ 20	ENGINEERING STANDARD	
<b>UNDERGROUND DUCT LINES</b>		
TYPICAL OPEN CUT TRENCH SECTION DETAILS		
ENGR. _____	MANAGER _____	
DRAWN _____	MD	
CHECKED _____	PV	
CITY OF PALO ALTO CALIFORNIA		
NTS	DT-SS-U-1003	3 OF 4
SCALE	STANDARD NO.	SHEET NO.

*Original Signed  
and Approved  
by Engineering  
Manager*

NOTES:

15. HORIZONTAL SPACING BETWEEN JOINTLY INSTALLED SECONDARY, COMMUNICATION, TELEPHONE, AND STREETLIGHTING CABLES OR CONDUIT MAY BE RANDOM UNLESS OTHERWISE SPECIFIED. THERE SHALL BE A MINIMUM OF 1" CLEARANCE AROUND ALL CONDUITS AT GROUND LEVEL.
16. JOINT TRENCH WITH GAS IS ONLY ALLOWED FOR RESIDENTIAL SERVICES AND WITH THE APPROVAL OF BOTH UTILITIES ELECTRIC AND WGW ENGINEERING. REFER TO CPAU WGW DRAWING NUMBER WGW-02 FOR ADDITIONAL DETAILS.
17. THE CONCRETE SHALL BE READY-MIXED, CLASS B PORTLAND CEMENT CONCRETE, CONTAINING 3 SACKS OF CEMENT PER CUBIC YARD AND 3/4" AGGREGATE. THE CONCRETE SHALL BE COLORED RED BY THE ADDITION OF 5 POUNDS OF RED OXIDE PIGMENT PER CUBIC YARD OF CONCRETE MIX. COLOR WILL BE TO THE SATISFACTION OF THE ELECTRIC UNDERGROUND INSPECTOR.
18. DURING CONCRETING, THE DUCTS SHALL BE HELD SECURELY IN PLACE WITH STAKES, PLASTIC SPACERS, ETC. WOODEN TIE-DOWN STAKES SHALL BE REMOVED IMMEDIATELY AFTER THE CONCRETE IS POURED.
19. BENDS IN DUCT LINES SHALL BE OF MAXIMUM PRACTICAL RADIUS.
20. WHEN A BREAK IS MADE IN THE POURING OF THE DUCT BEAM, A 3-FOOT LONG 5/8" DIA STL RE-BAR SHALL BE INSERTED HORIZONTALLY AT EACH CORNER OF THE DUCT BEAM, LEAVING 18" TO TIE INTO THE SUBSEQUENT POUR.
21. SLOPE TO BE 3" IN 100 FT, IF POSSIBLE OR 1" IN 100 FT MIN. ON LEVEL GROUND, SLOPE DUCT LINE FROM CENTER TO EACH MANHOLE.
22. VERTICAL STAGGERING OF DUCT IN THE VAULT WINDOW, SHOWN IN SECTION B-B, ON SHEET 2, IS PREFERRED.
23. HORIZONTAL DIRECTIONAL BORING IS ALLOWED FOR INSTALLATION OF SECONDARY CONDUITS ONLY WHEN APPROVED BY UTILITY ELECTRIC ENGINEER. IT IS NOT ALLOWED FOR THE INSTALLATION OF PRIMARY CONDUITS.
24. DIRECTIONAL BORING IS NOT ALLOWED IF IN THE OPINION OF UTILITY ENGINEERING OR THE ELECTRIC UNDERGROUND INSPECTOR, THE EXISTING FACILITIES OR OTHER CONFLICTS CREATE NAVIGATIONAL PROBLEMS.
25. ALL UTILITY COVER AND SEPARATION REQUIREMENTS MUST BE MET FOR THE ENTIRE LENGTH OF THE BORE RUN. UTILITY EASEMENTS MUST BE HONORED.
26. POTHOLING SHALL BE DONE AT KEY LOCATIONS, AS PER THE INSTRUCTIONS OF THE ELECTRIC UNDERGROUND INSPECTOR, PRIOR TO COMMENCING HORIZONTAL DIRECTIONAL BORING.
27. A THOROUGH INVESTIGATION SHALL BE PERFORMED TO IDENTIFY KNOWN UTILITY SYSTEMS PARALLELING OR CROSSING THE PROPOSED BORE ROUTE PRIOR TO COMMENCING DIRECTIONAL BORING.

APPROVED _____ 20		ENGINEERING STANDARD <b>UNDERGROUND DUCT LINES</b> TYPICAL TRENCH SECTION DETAILS		10	7/16	REVISED NOTE 17	TT
ENGR	MANAGER	6	6-08	COMBINED DT-SS-U-1003 DT-PR-U-1004			TT
DRAWN	MD	5	6-09	MODIFIED NOTES		JT	
CHECKED	PV	4	7-99	MODIFIED NOTES		FINCH	
Original Signed by Manager Engineering		CITY OF PALO ALTO CALIFORNIA		NTS	DT-SS-U-1003	4 OF 4	
		SCALE		STANDARD NO.		SHEET NO.	



DUCT SIZE	MANDREL SIZE *	SAFE WORKING LOAD **
1-1/2"	1-1/4"	1400
2-0"	1-3/4"	2330
3-0"	2-3/4"	2330
4-0"	3-3/4"	4800
5-0"	4-3/4"	4800
6-0"	5-3/4"	4800

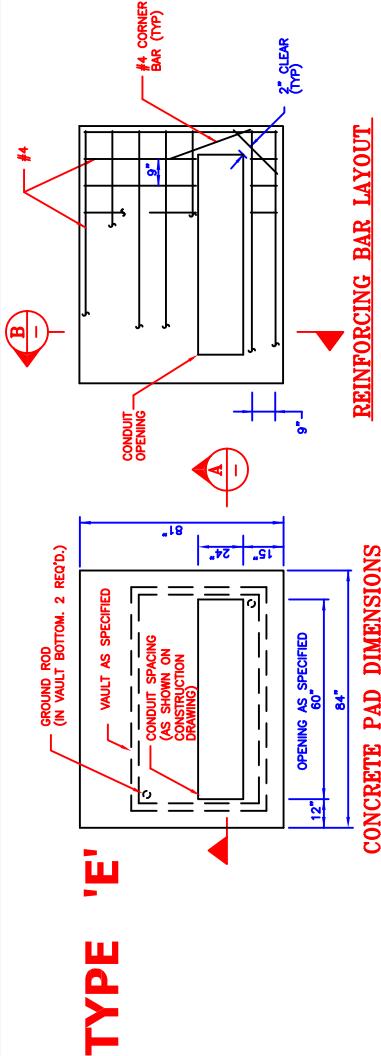
NOTES:

1. THE FLEXIBLE MANDREL IS CONSTRUCTED OF POLYURETHANE DISCS OF GRADUATED SIZES STRUNG ON A CABLE 3/8" MINIMUM DIAMETER SEPARATED BY BEVELED SPACERS AND EQUIPPED WITH DROP-FORGED STEEL SOCKET EYES ON EACH END.
2. REMOVE SHARP EDGES FROM EACH DISC TO AVOID DAMAGE TO THE DUCT.
3. ALL TESTING SHALL BE WITNESSED BY THE ELECTRIC UNDERGROUND INSPECTOR.
4. ALL CONDUITS, NEW OR EXISTING, SHALL BE TESTED AND APPROVED PRIOR TO INSTALLATION OF ANY CABLES.

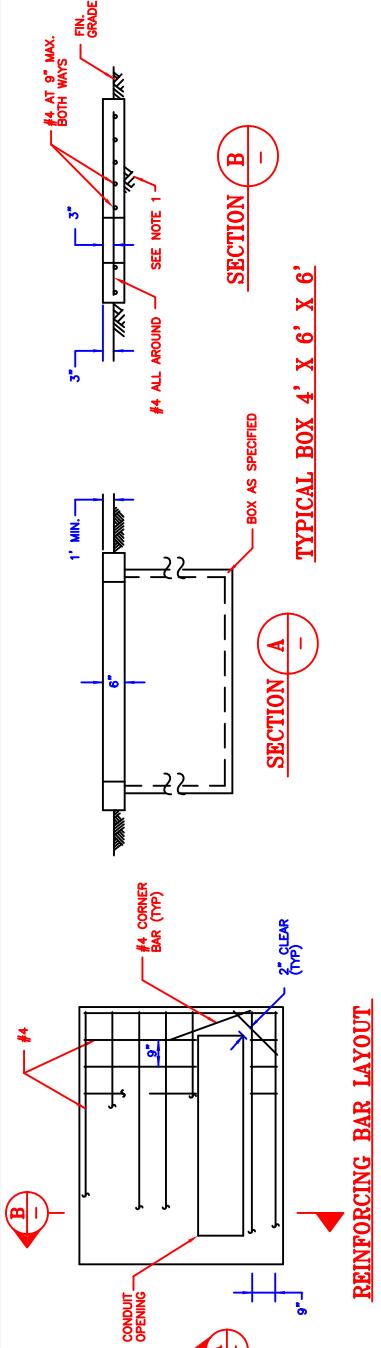
\* OUTSIDE DIAMETER OF THE 3 CENTER DISCS.  
 \*\* SAFETY FACTOR (HORIZONTAL PULL ONLY.)

APPROVED _____ <i>Original Signed and Approved by Manager</i>	ENGINEERING STANDARD				
	MANDREL TESTING				
ENGR. NAME	1	11/08	ADDED NOTE 3 & 4		TT
DRAWN BY	REV	DATE	DESCRIPTION		APPR
CHECKED PEV	CITY OF PALO ALTO CALIFORNIA		NTS	DT-SS-U-1025	1 of 1
			SCALE	STANDARD NO.	SHEET NO.

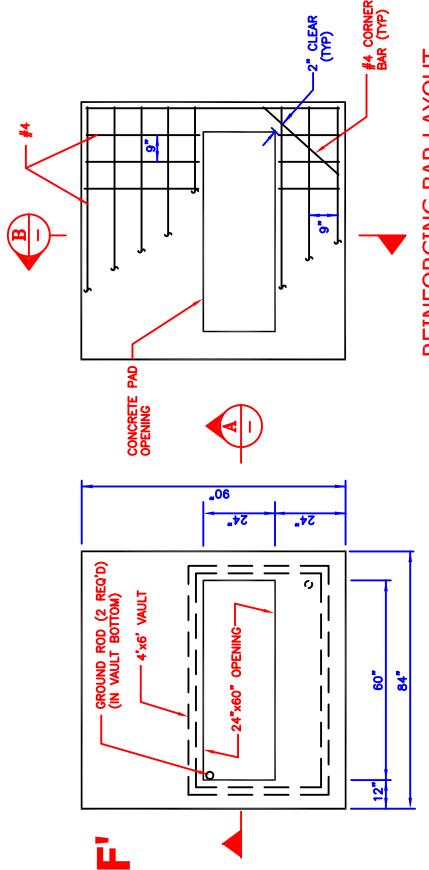




CONCRETE PAD DIMENSIONS



REINFORCING BAR LAYOUT



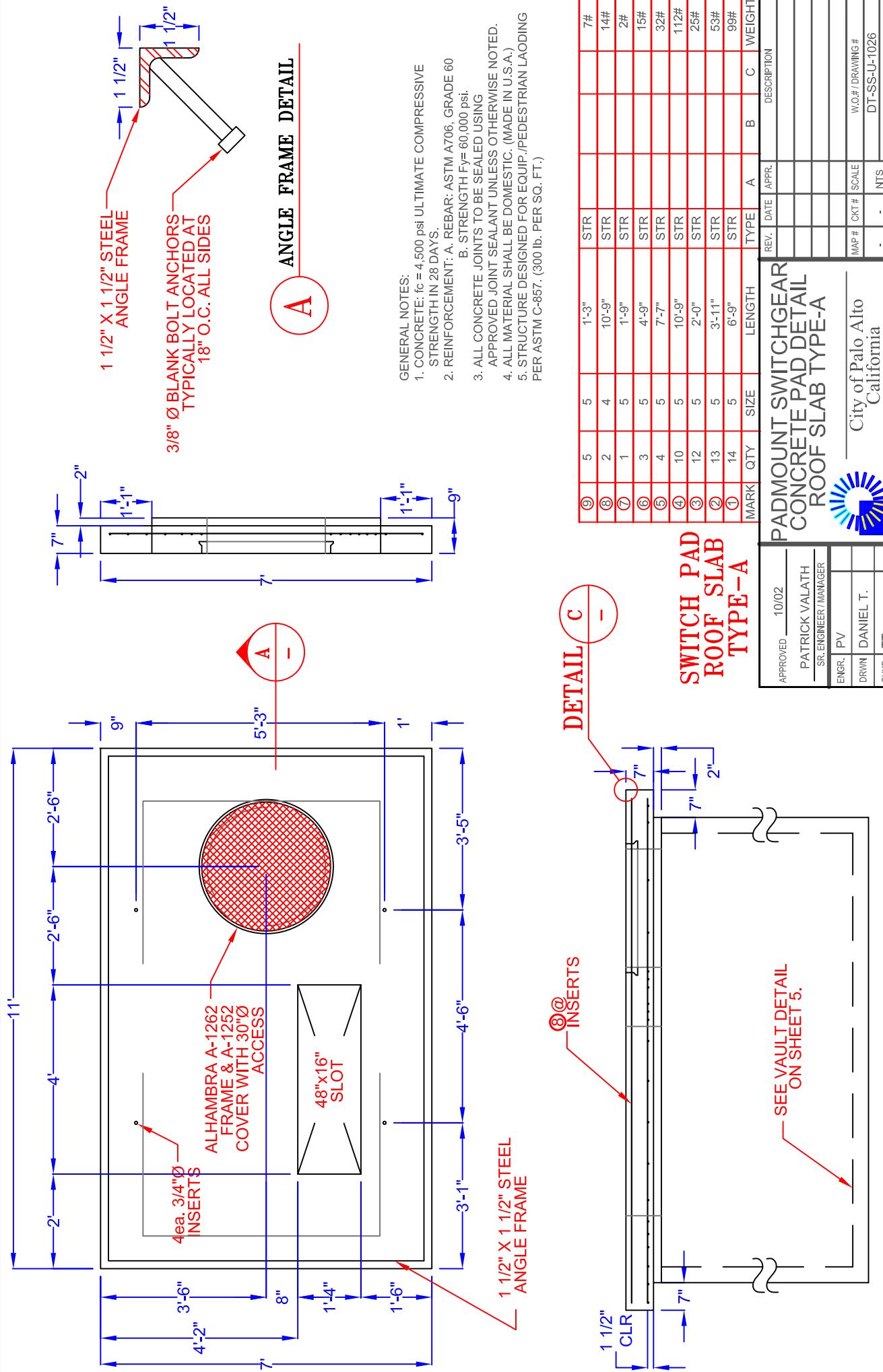
CONCRETE PAD DIMENSIONS

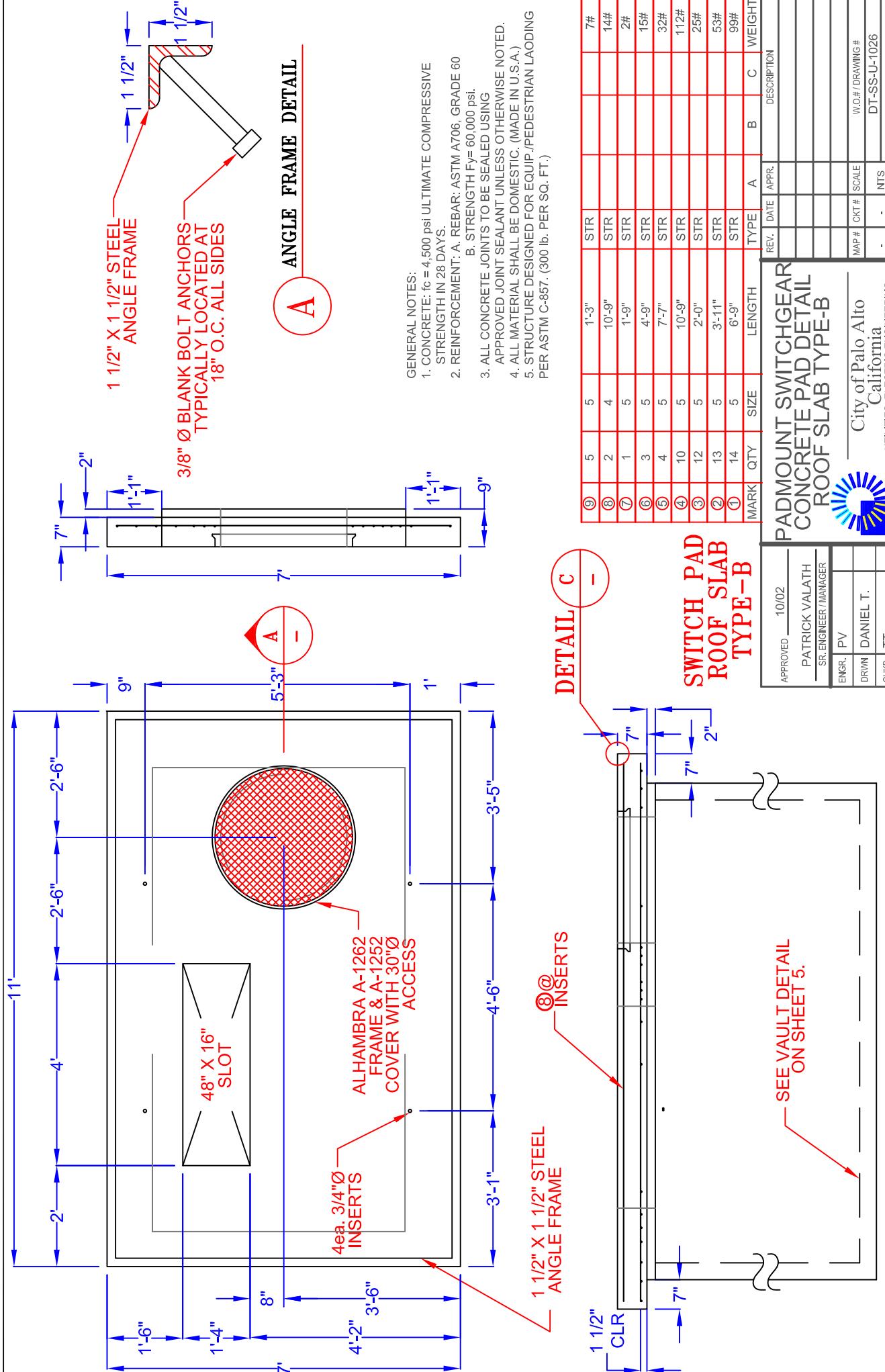
## NOTES.

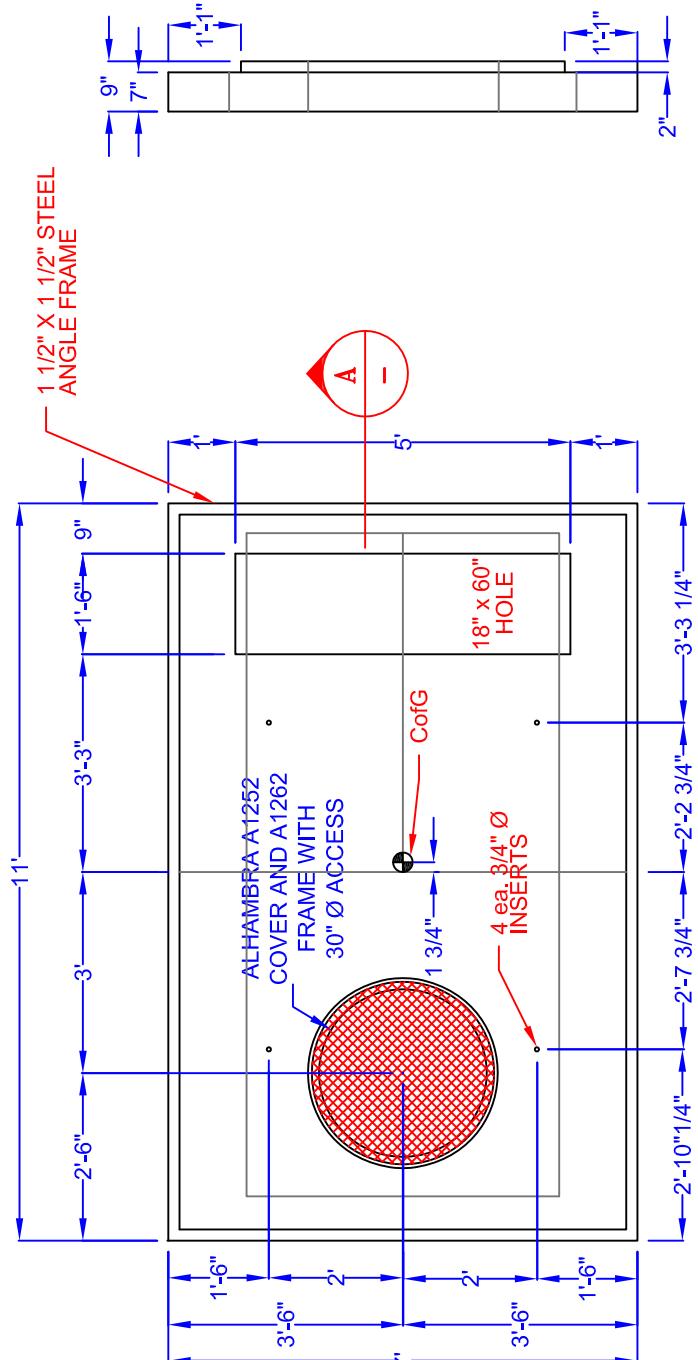


ENGINEERING STANDARDS

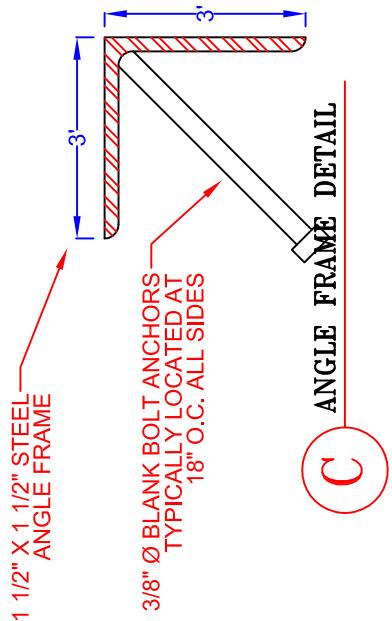
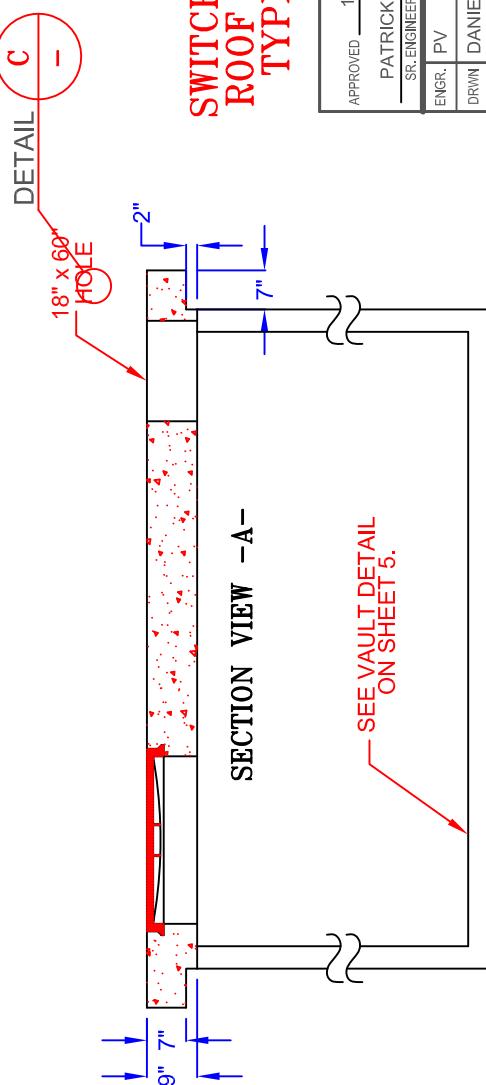
APPROVED	10/02	PATRICK VALATH	SR. ENGINEER / MANAGER	ENGR.	PV	DRWNR	DANIEL T.	CHKD.	IT	REV.	DATE	APPR.	DESCRIPTION	MAP #	CK#	SCALE	W.O.#	DRAWING #			
PADMOUNT SWITCHGEAR CONCRETE PAD DETAIL TYPE E & F										City of Palo Alto California				-	-	NTS	DT-S5-U-1026	1	OF	F	
														UTILITIES, ELECTRIC ENGINEERING							







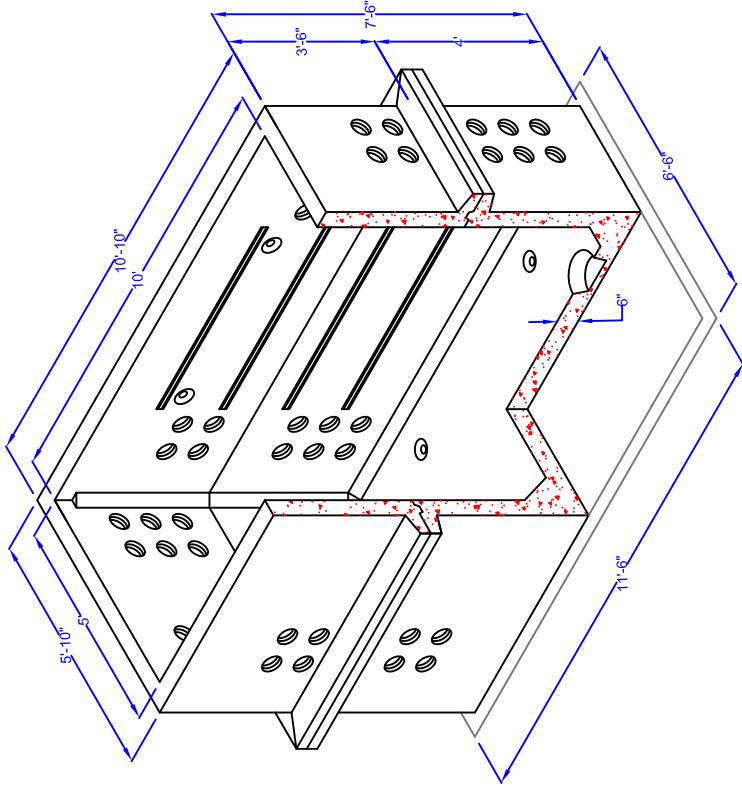
**C SECTION VIEW**



**STEEL GENERAL NOTES:**

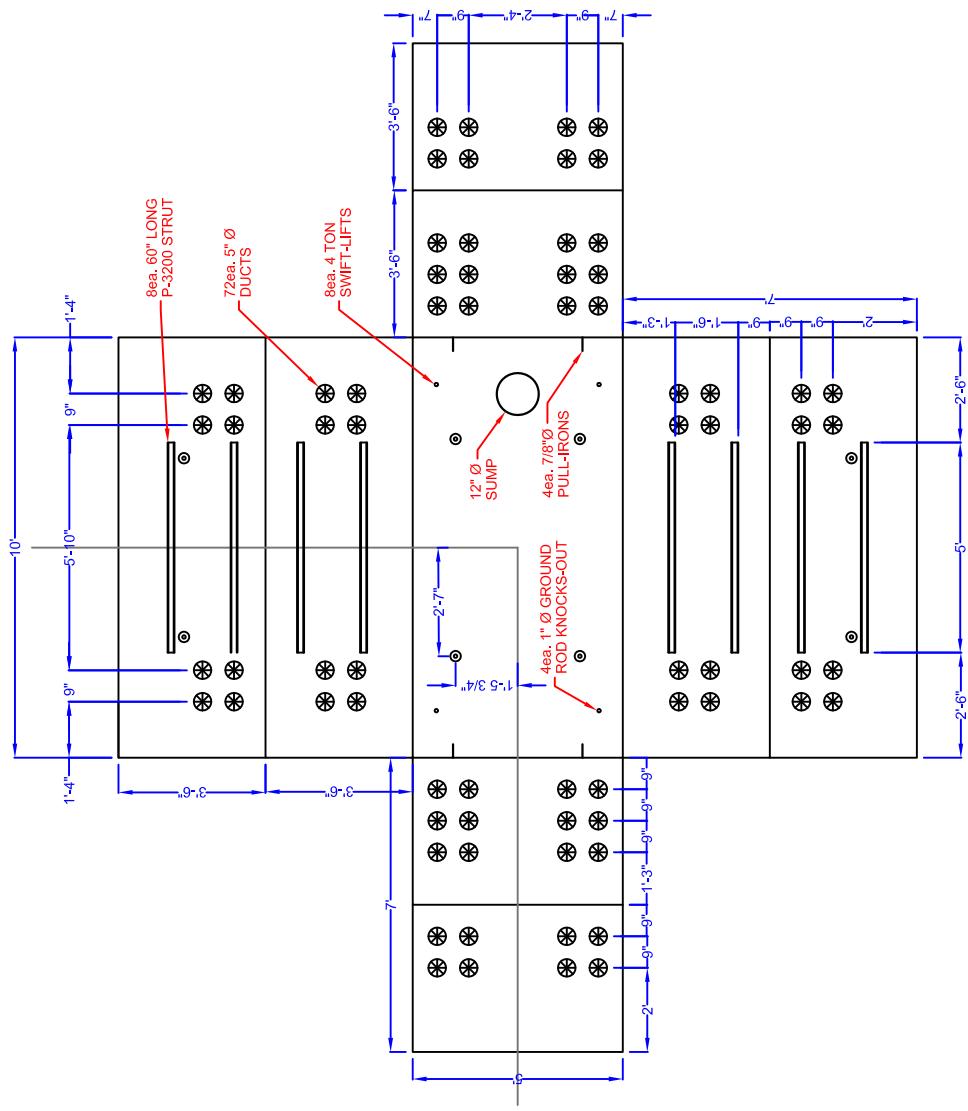
1. STEEL: ASTM A36, GALVANIZE AFTER FABRICATION.
  2. GALVANIZATION: ASTM A132.
  3. WELDING: AWS D1.1.
- GENERAL NOTES:**
1. CONCRETE:  $f_c = 4,500$  psi ULTIMATE COMPRESSIVE STRENGTH IN 28 DAYS.
  2. REINFORCEMENT: A. REBAR: ASTM A706, GRADE 60 B. STRENGTH  $F_y = 60,000$  psi.
  3. ALL CONCRETE JOINTS TO BE SEALED USING APPROVED JOINT SEALANT UNLESS OTHERWISE NOTED.
  4. ALL MATERIAL SHALL BE DOMESTIC. (MADE IN U.S.A.)
  5. STRUCTURE DESIGNED FOR EQUIP./PEDESTRIAN LOADING PER ASTM C-857. (300 lb. PER SQ. FT.)

REV.	DATE	APPR.	DESCRIPTION
			PADMOUNT SWITCHGEAR CONCRETE PAD DETAIL
			ROOF SLAB TYPE-C
			City of Palo Alto California UTILITIES, ELECTRIC ENGINEERING
			10/02 PATRICK VALATH SR. ENGINEER / MANAGER ENGR. PV DRWN DANIEL T. CHRD. TT
MAP #	CKT #	SCALE	W.O.# / DRAWING #
-	-	NTS	DT-SS-U-1026
SHEET	4	OF	5



TOP WEIGHT: 9,800#  
BASE WEIGHT: 11,400#

ENGINEERING STANDARDS



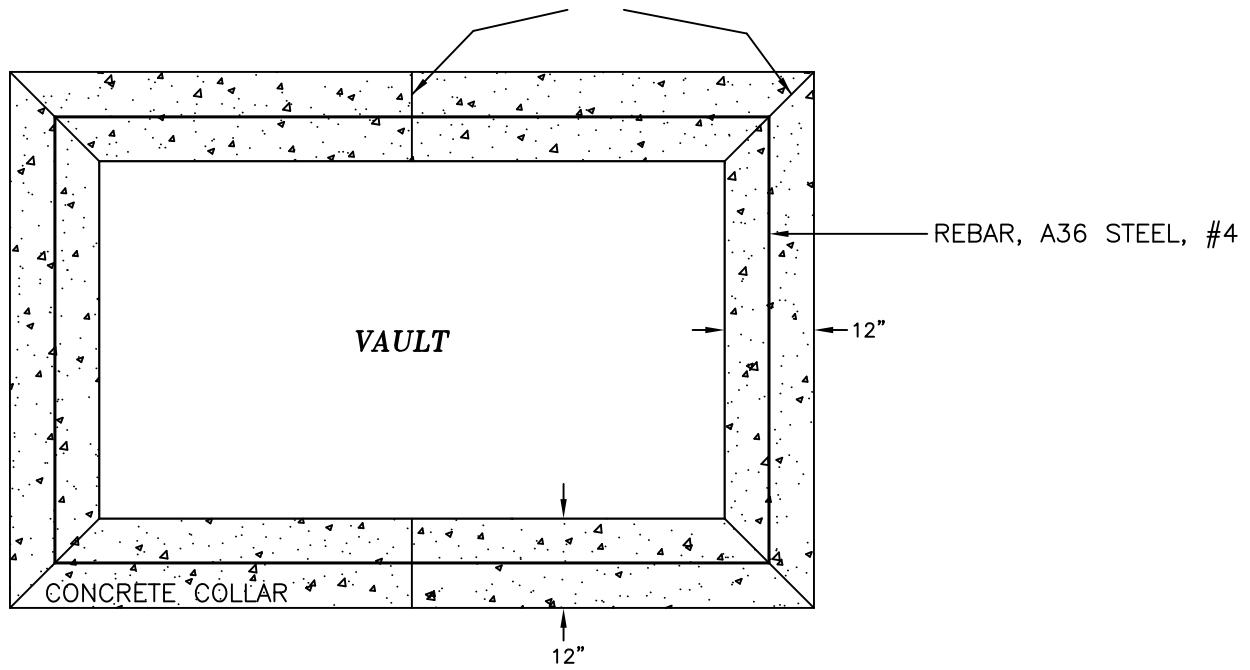
GENERAL NOTES:  
1. CONCRETE:  $f_c = 4,500$  psi ULTIMATE COMPRESSIVE

- STRENGTH IN 28 DAYS.**  
**2. REINFORCEMENT: A. REBAR: ASTM A706, GRADE 60**  
**B. STRENGTH F<sub>y</sub> = 60,000 psi.**  
**3. ALL CONCRETE JOINTS TO BE SEALED USING**  
**APPROVED JOINT SEALANT UNLESS OTHERWISE NOTED.**  
**4. ALL MATERIAL SHALL BE DOMESTIC. (MADE IN U.S.A.)**  
**5. STRUCTURE DESIGNED FOR EQUIP./PEDESTRIAN LOADS**  
**PER ASTM C-857. (300 lb. PER SQ. FT.)**

APPROVED	10/02	REV.	DATE	APPR.	DESCRIPTION
PATRICK VALATH					
SR. ENGINEER / MANAGER					
ENGR.	PV	MAP #	CKT #	SCALE	W.O.# / DRAWING #
DRWNN	DANIEL T.	-	-	NTS	DT-SS-U-1026
CHK'D.	TT	SHEET	5	OF	5
			City of Palo Alto California		
			UTILITIES, ELECTRIC ENGINEERING		
					



CONTRACTION JOINTS = 1 1/4" DEEP



*TOP VIEW*

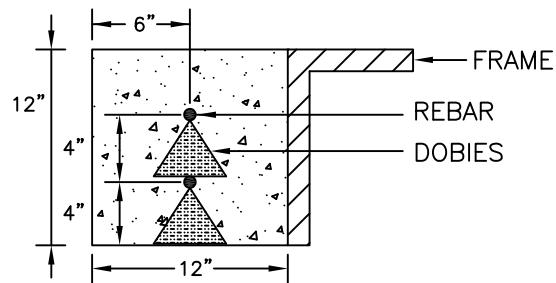
VAULT

- REBAR, A36 STEEL, #4

-12"

12”

### CROSS SECTION VIEW

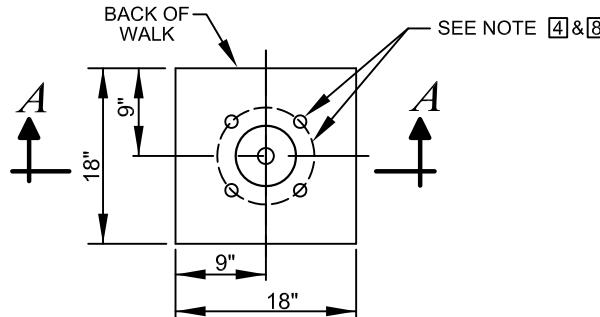


## **NOTES:**

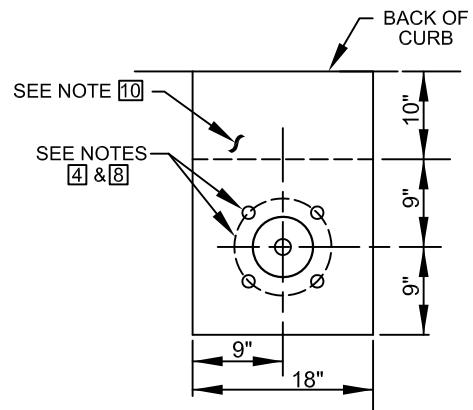
- 1.) CONCRETE SHALL CONFORM TO THE APPLICABLE REQUIREMENTS OF SECTION 16 OF THE CITY OF PALO ALTO PUBLIC WORKS STANDARDS.
  - 2.) USE CLASS 2 CONCRETE – A MIX OF 6 SACKS OF CEMENT PER CUBIC YARD WITH 3/4" AGGREGATE.
  - 3.) USE TWO (2) PINTS OF LIQUID LAMPBLACK PER CUBIC YARD.
  - 4.) BACKFILL BELOW COLLAR SHALL BE PER CPAU STANDARD DT-SS-U-1002.
  - 5.) BROOMED FINISH.

APPROVED	<i>Original Signed and Approved by Engineering Manager</i>	ENGINEERING STANDARD					
ENGR	MANAGER	CONCRETE COLLAR SURROUNDING A VAULT				REV	
ENGR	IN					DATE	
DRAWN	EM					DESCRIPTION	
CHECKED	HN					APPR	
CITY OF PALO ALTO CALIFORNIA				NTS	DT-SS-U-1038	1 OF 1	
				SCALE	STANDARD NO.	SHEET NO.	

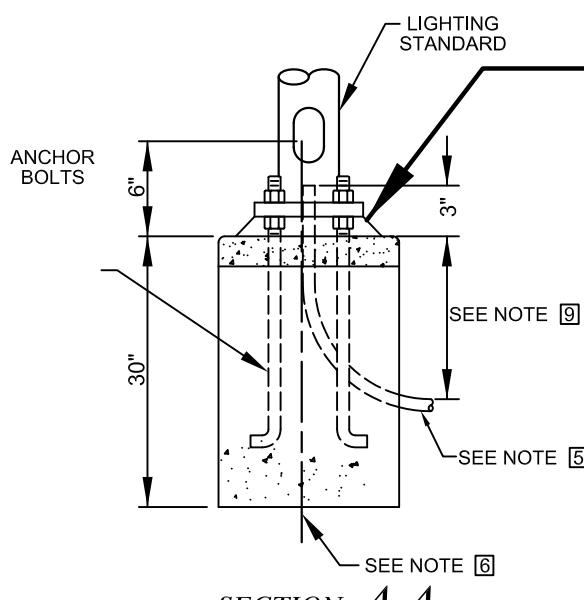




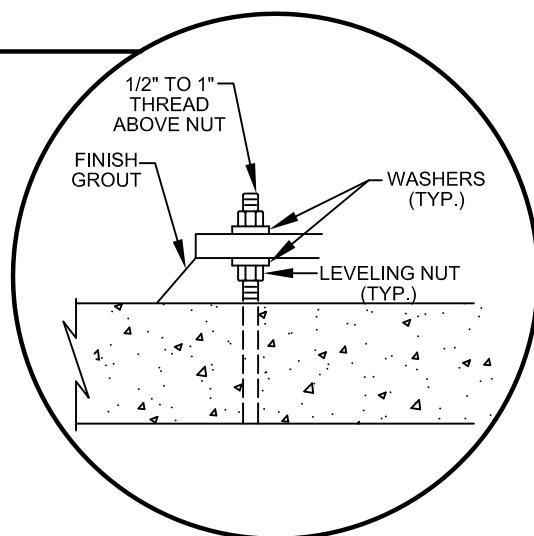
10'-14' MOUNTING HEIGHT  
ADJACENT TO SIDEWALK



10'-14' MOUNTING HEIGHT  
ADJACENT TO CURB



SECTION A-A

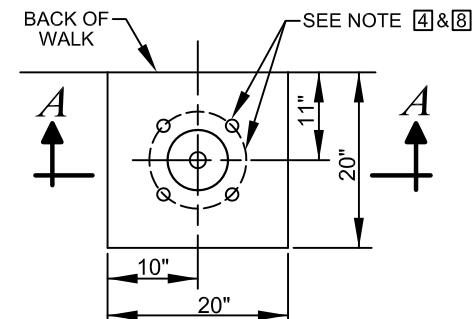


### NOTES:

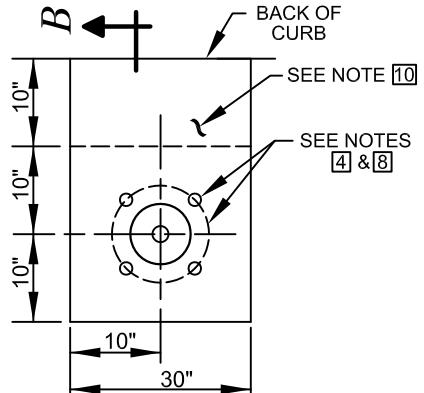
1. STOP FOUNDATION POUR 6" BELOW GRADE. PLACE FINISH CAP AFTER STANDARD IS SET AND PLUMBED. ALLOW FOR 2" UNDER STANDARD BASE AND GROUT UNDER BASE(SEE DETAIL)
2. CONCRETE IN FOUNDATION SHALL BE CLASS "B"
3. TOP 6" OF FOUNDATION MUST BE POURED AFTER POLE IS MOUNTED AND PLUMBED.
4. BOLT CIRCLE DIA. TO BE USED IS TO MATCH SUPPLIED POLE.
5. UNLESS OTHERWISE NOTED, ALL CONDUITS SHALL BE P.V.C. 2" MINIMUM.
6. ALL FOUNDATIONS REQUIRE 5/8" X 8' GROUND ROD. FOR GROUNDING SYSTEM SEE ELECTRIC UTILITY STANDARD DWG. DT-SS-U-1001 SHEET 2.
7. ALL FOUNDATIONS SHALL BE POURED AGAINST UNDISTURBED SOIL.
8. 3/4" DIA. X 17" X 3" GALVANIZED STEEL ANCHOR BOLTS WITH TWO HEX NUTS, TWO FLAT WASHERS AND TWO LOCKWASHERS - FOUR EACH REQUIRED PER POLE.
9. AS REQUIRED TO MATCH EXISTING OR NEW STREET LIGHT CONDUIT BEING INSTALLED.
10. THIS AREA REQUIRES ONLY 6" THICKNESS OF CONCRETE.

APPROVED 3/1994		ENGINEERING STANDARD  10' - 14' STREET LIGHT FOUNDATION	1	5/2013	ADDED DETAIL DRAWING.		JAT	
<i>MDB</i> ENGR. MANAGER								
REV	DATE	DESCRIPTION		APPR				
ENGR	PEV				NTS	SL-SS-C-1021		
DRAWN	UES				SCALE	STANDARD NO.	SHEET NO.	
CHKD.	PEV	CITY OF PALO ALTO CALIFORNIA						

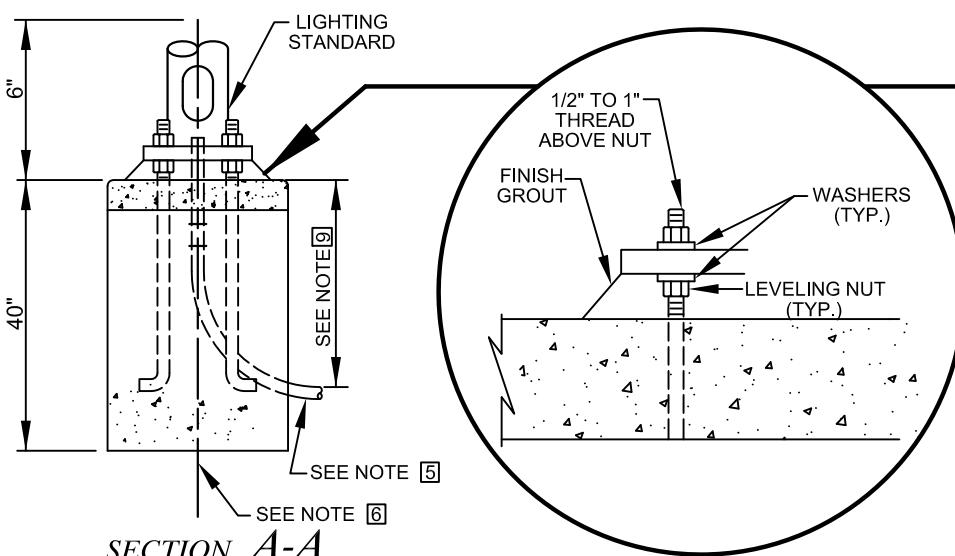




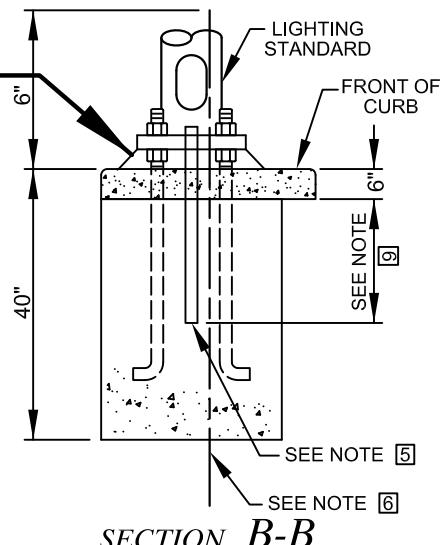
20' - 25' MOUNTING HEIGHT  
ADJACENT TO SIDEWALK



20' - 25' MOUNTING HEIGHT  
ADJACENT TO CURB



SECTION A-A



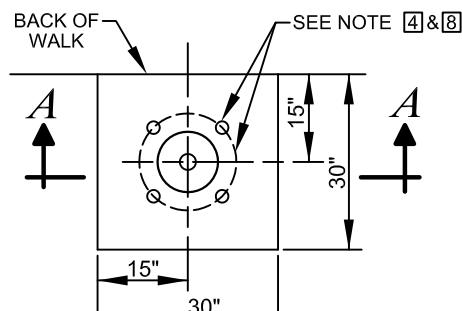
SECTION B-B

### NOTES:

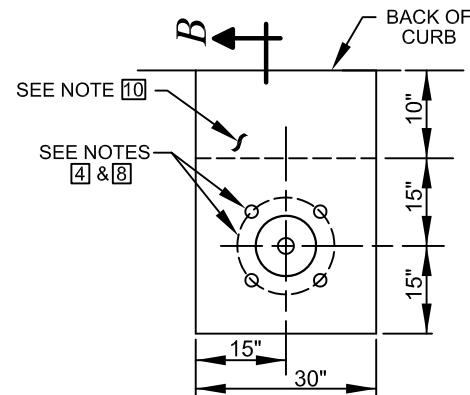
1. STOP FOUNDATION POUR 6" BELOW GRADE. PLACE FINISH CAP AFTER STANDARD IS SET AND PLUMBED. ALLOW FOR 2" UNDER STANDARD BASE AND GROUT UNDER BASE(SEE DETAIL)
2. CONCRETE IN FOUNDATION SHALL BE CLASS "B"
3. TOP 6" OF FOUNDATION MUST BE POURED AFTER POLE IS MOUNTED AND PLUMBED.
4. BOLT CIRCLE DIA. TO BE USED IS AS FOLLOWS:
  - a. 20' POLE - 9" TO 10" DIA.
  - b. 25' POLE - 10" TO 11" DIA.
5. UNLESS OTHERWISE NOTED, ALL CONDUITS SHALL BE P.V.C. 2" MINIMUM.
6. ALL FOUNDATIONS REQUIRE 5/8" X 8' GROUND ROD. FOR GROUNDING SYSTEM SEE ELECTRIC UTILITY STANDARD DWG. DT-SS-U-1001 SHEET 2.
7. ALL FOUNDATIONS SHALL BE POURED AGAINST UNDISTURBED SOIL.
8. 1" DIA. X 3' X 4" GALVANIZED STEEL ANCHOR BOLTS WITH TWO HEX NUTS, TWO FLAT WASHERS AND TWO LOCKWASHERS - FOUR EACH REQUIRED PER POLE.
9. AS REQUIRED TO MATCH EXISTING OR NEW STREET LIGHT CONDUIT BEING INSTALLED.
10. THIS AREA REQUIRED ONLY 6" THICKNESS OF CONCRETE.

APPROVED 3/1994 <i>MDB</i> ENGR. MANAGER		ENGINEERING STANDARD 20' - 25' STREET LIGHT FOUNDATION	1	5/2013	ADDED DETAIL DRAWING.		JAT
ENGR	PEV						
DRAWN	UES						
CHKD.	PEV						
CITY OF PALO ALTO CALIFORNIA		NTS	SL-SS-C-1022				
			SCALE	STANDARD NO.	SHEET NO.		

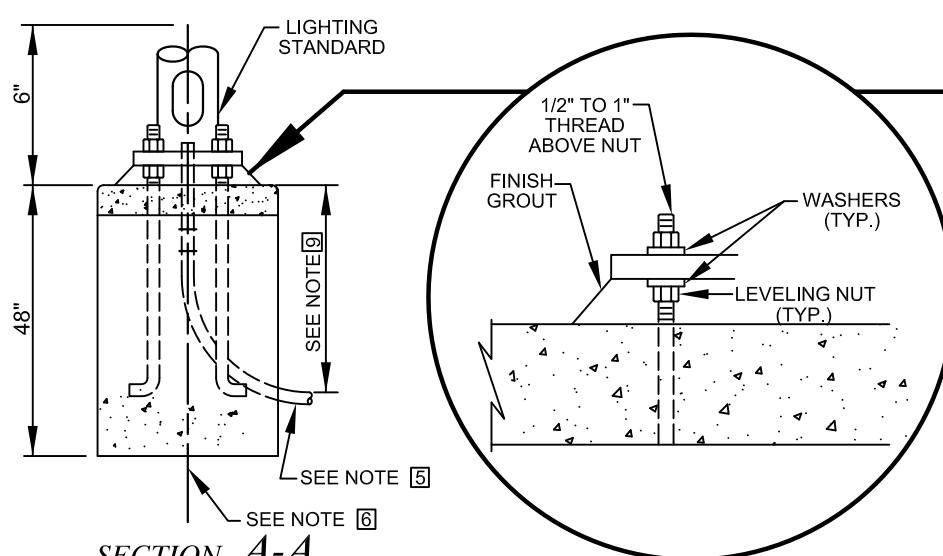




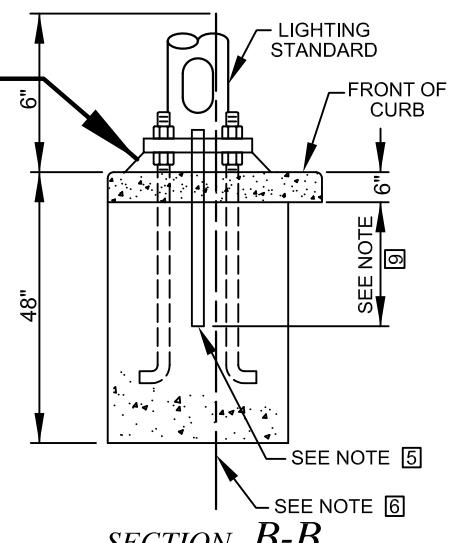
30' MOUNTING HEIGHT  
ADJACENT TO SIDEWALK



30' MOUNTING HEIGHT  
ADJACENT TO CURB



SECTION A-A



SECTION B-B

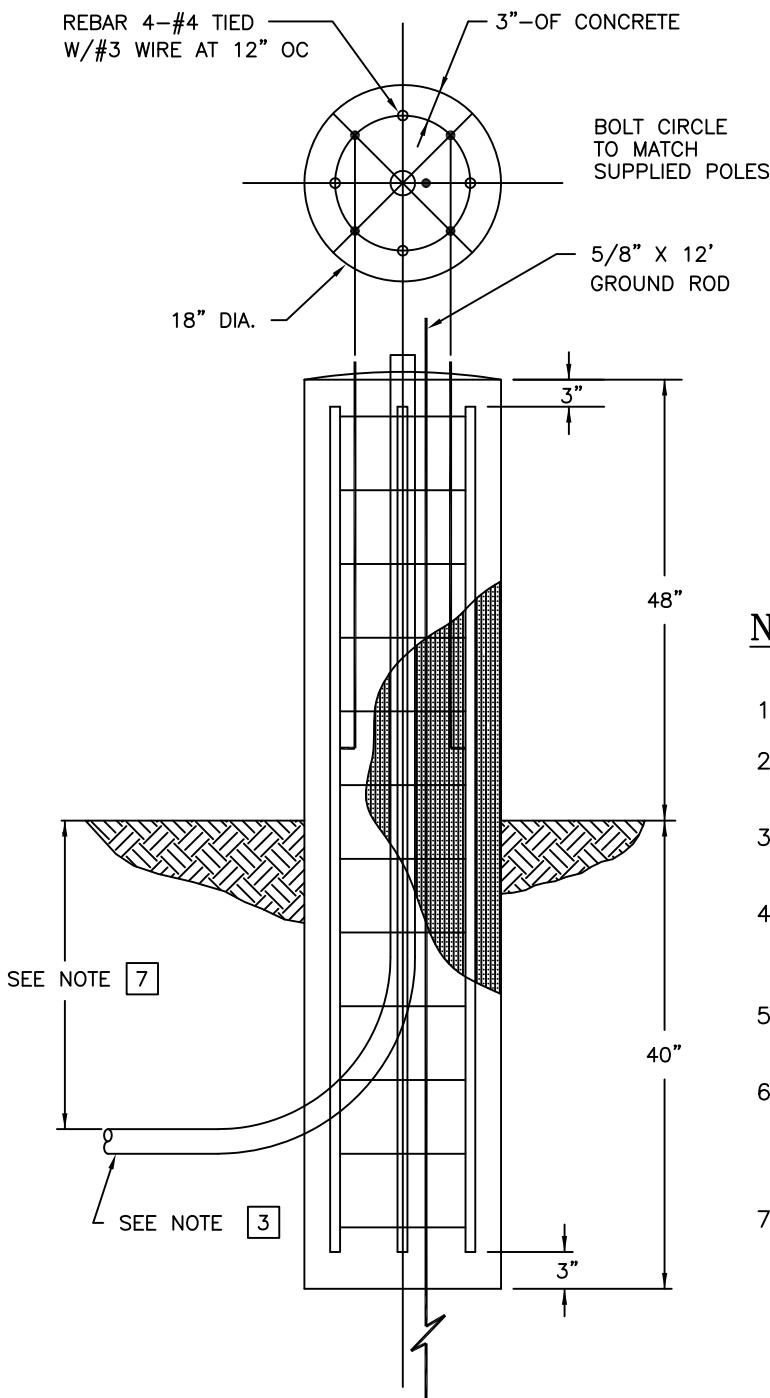
### NOTES:

1. STOP FOUNDATION POUR 6" BELOW GRADE. PLACE FINISH CAP AFTER STANDARD IS SET AND PLUMBED. ALLOW FOR 2" UNDER STANDARD BASE AND GROUT UNDER BASE(SEE DETAIL)
2. CONCRETE IN FOUNDATION SHALL BE CLASS "B"
3. TOP 6" OF FOUNDATION MUST BE POURED AFTER POLE IS MOUNTED AND PLUMBED.
4. BOLT CIRCLE DIA.: 11" TO 12"
5. UNLESS OTHERWISE NOTED, ALL CONDUITS SHALL BE P.V.C. 2" MINIMUM.
6. ALL FOUNDATIONS REQUIRE 5/8" X 8' GROUND ROD. FOR GROUNDING SYSTEM SEE ELECTRIC UTILITY STANDARD DWG. DT-SS-U-1001 SHEET 2.
7. ALL FOUNDATIONS SHALL BE POURED AGAINST UNDISTURBED SOIL.
8. 1" DIA. X 3' X 4" GALVANIZED STEEL ANCHOR BOLTS WITH TWO HEX NUTS, TWO FLAT WASHERS AND TWO LOCKWASHERS - FOUR EACH REQUIRED PER POLE.
9. AS REQUIRED TO MATCH EXISTING OR NEW STREET LIGHT CONDUIT BEING INSTALLED.
10. THIS AREA REQUIRED ONLY 6" THICKNESS OF CONCRETE.

APPROVED 3/1994 <i>MDB</i> ENGR. MANAGER		ENGINEERING STANDARD 30' STREET LIGHT FOUNDATION	1	5/2013	ADDED DETAIL DRAWING.		JAT	
			2	6/2015	REVISED NOTE 4		TT	
			REV	DATE	DESCRIPTION		APPR	
ENGR	PEV		NTS	SL-SS-C-1023				
DRAWN	UES/MJ	CITY OF PALO ALTO CALIFORNIA	SCALE		STANDARD NO.	SHEET NO.		
CHKD.	PEV							



## STREET LIGHT FOUNDATION FOR TRAFFIC EXPOSED AREAS

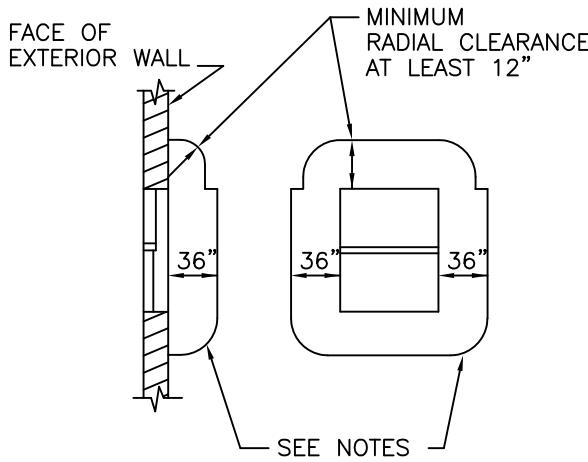


## NOTES:

1. CONCRETE IN FOUNDATION SHALL BE CLASS "B"
  2. BOLT CIRCLE DIA. TO BE USED IS TO MATCH SUPPLIED POLES.
  3. UNLESS OTHERWISE NOTED, ALL CONDUITS SHALL BE P.V.C. 2" MINIMUM.
  4. ALL FOUNDATIONS REQUIRE 5/8" X 12' GROUND ROD. FOR GROUNDING SYSTEM SEE ELECTRIC UTILITY STANDARD DWG. DT-SS-U-1001 SHEET 2.
  5. ALL FOUNDATIONS SHALL BE POURED AGAINST UNDISTURBED SOIL.
  6. 1" DIA. X 3' X 4" GALVANIZED STEEL ANCHOR BOLTS WITH TWO HEX NUTS, TWO FLAT WASHERS AND TWO LOCKWASHERS - FOUR EACH REQUIRED PER POLE.
  7. AS REQUIRED TO MATCH EXISTING OR NEW STREET LIGHT CONDUIT BEING INSTALLED.

APPROVED <i>mDB</i> ENGR. MANAGER	ENGINEERING STANDARD STREET LIGHT PEDESTAL FOUNDATION						
				1	11/08	CHANGED DWG NUMBER FROM DT-SS-U-1024 TO CURRENT	TT
		REV	DATE	DESCRIPTION			APPR
ENGR	PEV	CITY OF PALO ALTO CALIFORNIA			NTS	SL-SS-C-1024	1 of 1
DRAWN	UES/ MJ	MJ			SCALE	STANDARD NO.	SHEET NO.
CHECKED	PEV						

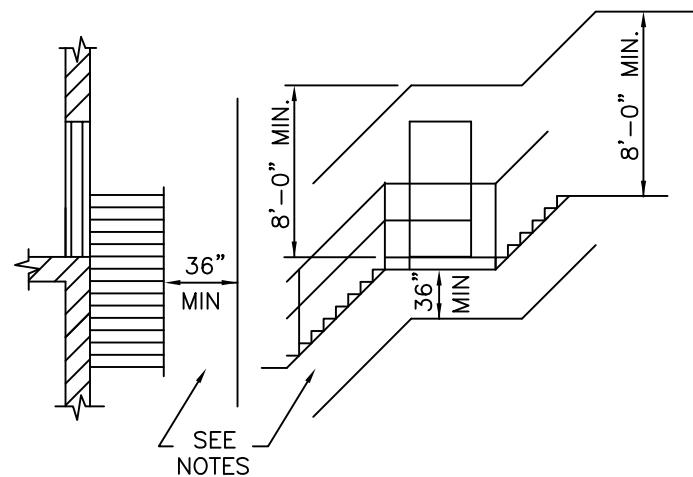




SIDE VIEW

FRONT VIEW

CLEARANCE REQUIRED  
AROUND WINDOWS



SIDE VIEW

FRONT VIEW

CLEARANCE REQUIRED  
AROUND DOORS

#### LEGEND:

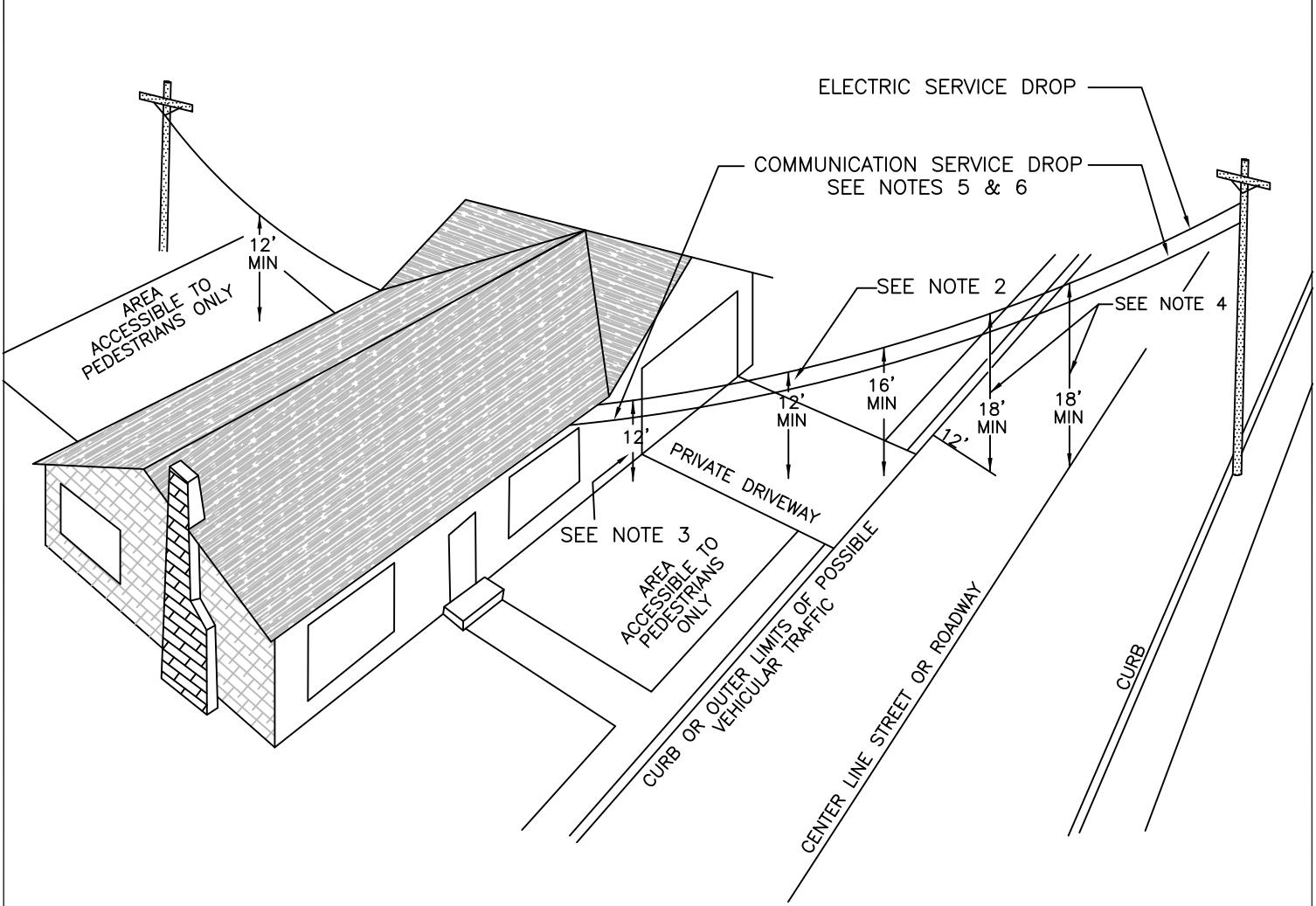
— BOUNDARY OF CLEARANCE AREA THROUGH WHICH CONDUCTORS MUST NOT PASS.

#### NOTES:

1. SERVICE WIRES SHOULD NOT BE ATTACHED TO THE BUILDING WALL WITHIN THE ABOVE CLEARANCE AREA AND SHOULD NOT PASS THROUGH CLEARANCE SPACE ILLUSTRATED IN SKETCHES.
2. GENERAL ORDER 95, ISSUED BY THE CALIFORNIA PUBLIC UTILITIES COMMISSION REQUIRES THAT:
  - A. ALL PORTIONS OF THE SERVICE DROP SHALL HAVE A MINIMUM HORIZONTAL CLEARANCE OF 3 FEET FROM ANY EXIT, WINDOW, OR OTHER POINT AT WHICH HUMAN CONTACT MIGHT BE EXPECTED.
  - B. THE SERVICE DROP SHALL BE LOCATED TO MINIMIZE INTERFERENCE WITH OR ENDANGERING WORKMEN AND FIREMEN IN THE PERFORMANCE OF THEIR DUTIES. THIS MEANS THAT SERVICE DROPS SHALL BE LOCATED SO THAT A FIREMAN CAN PLACE A LADDER AGAINST ANY WINDOW WITHOUT INTERFERENCE OR DANGER.

APPROVED <u>3/1994</u> 			ENGINEERING STANDARD <b>SERVICE DROP CLEARANCE REQUIREMENTS FOR WINDOWS, DOORS, FIRE ESCAPES, STAIRWAYS, BALCONIES, ETC.</b>					
ENGR. MANAGER			2	8-08	REVISED NOTES		TT	
			1	9-99	CHANGED NOTES		FINCH	
			REV	DATE	DESCRIPTION		APPR	
ENGR	PEV		<b>CITY OF PALO ALTO CALIFORNIA</b>			NTS	SR-CL-0-1011	1 of 1
DRAWN	UES/MJ	MJ				SCALE	STANDARD NO.	SHEET NO.
CHECKED	PEV							





**NOTES:**

VERTICAL CLEARANCES ABOVE GROUND:

1. CROSSING ABOVE RR TRACKS WITHOUT OVERHEAD TROLLEY WIRE 25 FEET MINIMUM
2. CROSSING ABOVE PRIVATE DRIVEWAYS OR OTHER AREAS ACCESSIBLE TO VEHICLES 12 FEET MINIMUM
3. CROSSING ABOVE AREAS ACCESSIBLE TO PEDESTRIANS ONLY (MAY BE REDUCED, SEE UTILITIES ENGINEERING FOR POSSIBLE EXCEPTIONS) 12 FEET MINIMUM
4. CROSSING ABOVE PUBLIC STREET MORE THAN 12 FEET FROM CURB LINE 18 FEET MINIMUM
5. ELECTRICAL SERVICE DROP RADIAL CLEARANCE FROM COMMUNICATION SERVICE DROP:
 

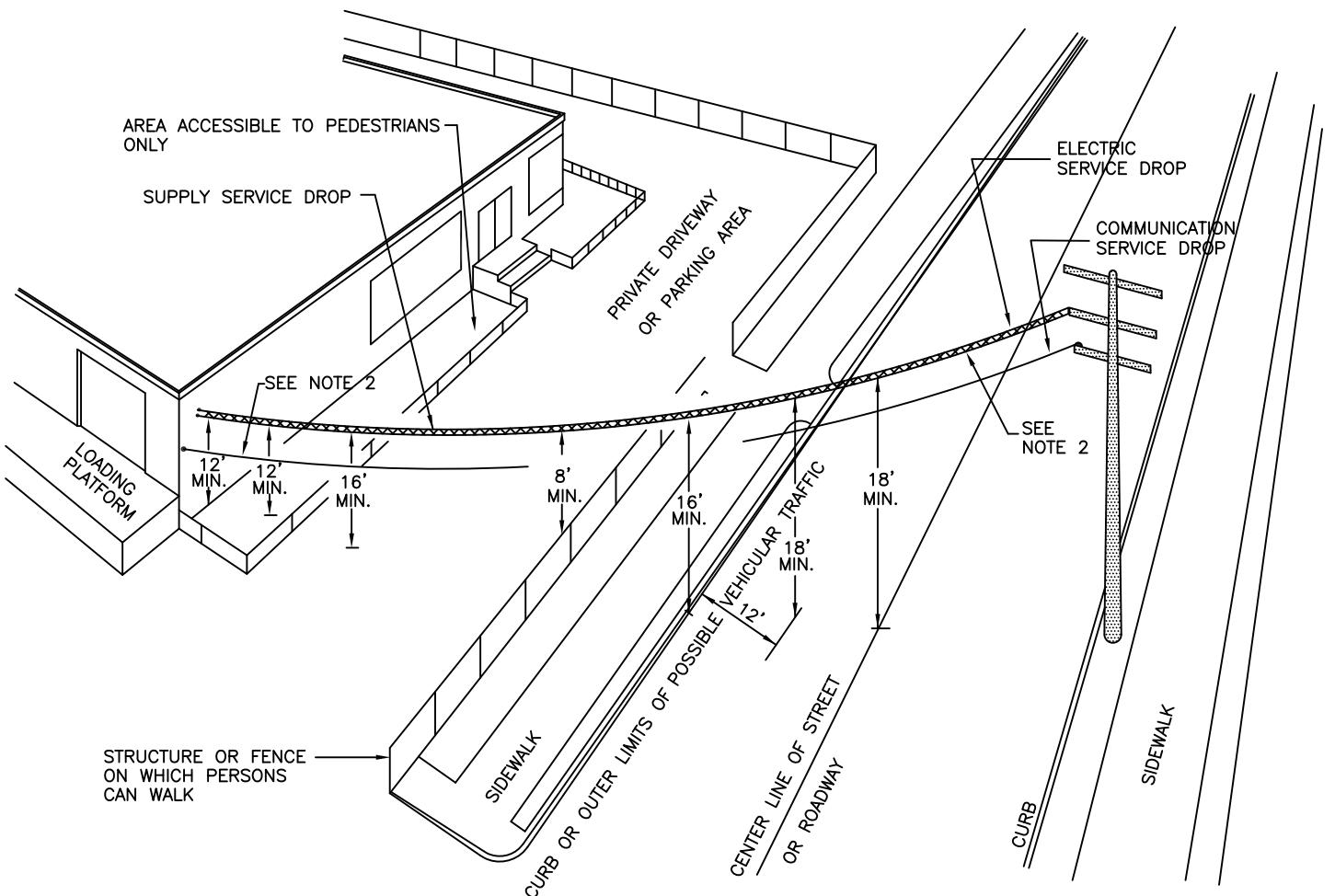
WITHIN 15 FEET OF BUILDING POINT OF ATTACHMENT	12 INCHES MINIMUM
GREATER THAN 15 FEET FROM BUILDING POINT OF ATTACHMENT	24 INCHES MINIMUM
6. TERMINATE THE ELECTRIC SERVICE DROP ABOVE, OR AT THE SAME LEVEL AS, THE COMMUNICATION DROPS AT THE BUILDING.
7. SERVICE DROP LENGTH SHALL NOT EXCEED 100 FEET (80 FEET MAX IF 4/O SERVICE IS REQUIRED, TYPICALLY A 400 AMP SERVICE).

REFERENCE: GENERAL ORDER 95, RULE 54.8-B.

APPROVED <u>3/1994</u> <u>MDB</u>		ENGINEERING STANDARD <b>MINIMUM GROUND CLEARANCES FOR SUPPLY SERVICE DROPS, 0-300 VOLTS RESIDENTIAL PREMISES</b>	3	1/12	REVISED NOTES 5 & 6		TT	
ENGR. MANAGER			2	8/08	REVISED		TT	
			1	6/99	REVISED		FINCH	
ENGR	PEV		REV	DATE	DESCRIPTION		APPR	
DRAWN	MJ							
CHECKED	PEV				NTS	SR-CL-O-1015	1 OF 1	
					SCALE	STANDARD NO.	SHEET NO.	

**CITY OF PALO ALTO  
CALIFORNIA**





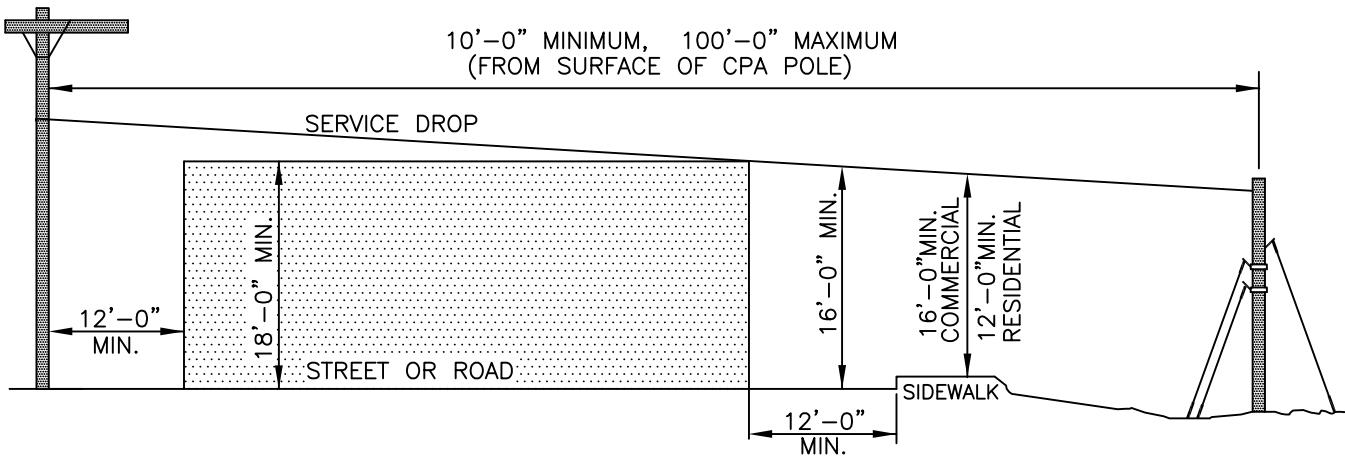
**NOTES:**

1. VERTICAL GROUND CLEARANCE WHEN CROSSING ABOVE RR TRACKS WITHOUT OVERHEAD TROLLEY WIRE IS 25 FEET MINIMUM.
2. ELECTRICAL SERVICE DROP RADIAL CLEARANCE FROM COMMUNICATION SERVICE DROP:  
WITHIN 15 FEET OF BUILDING POINT OF ATTACHMENT 12 INCHES MINIMUM  
GREATER THAN 15 FEET FROM BUILDING POINT OF ATTACHMENT 24 INCHES MINIMUM
3. REFER TO GENERAL ORDER 95 RULE 54.8B-(4) FOR SERVICE DROP CLEARANCES OVER BUILDINGS.
4. TERMINATE THE ELECTRIC SERVICE DROP ABOVE, OR AT THE SAME LEVEL, AS THE COMMUNICATION DROPS AT THE BUILDING.
5. CPA UTILITIES ENGINEERING MUST BE CONSULTED ON ALL COMMERCIAL JOBS. THIS SHALL BE DONE IN THE PLANNING STAGE OF THE JOB.
6. ELECTRIC METER MUST BE LOCATED OUTSIDE THE BUILDING. TANDEM-LOCKED METER ROOMS READILY ACCESSIBLE TO THE METER READER DURING NORMAL WORKING HOURS, MUST BE APPROVED BY THE ELECTRIC ENGINEERING MANAGER.
7. SERVICE DROP LENGTH SHALL NOT EXCEED 100 FEET (80 FEET MAX IF 4/0 IS SERVICE REQUIRED).

REFERENCE: GENERAL ORDER 95, RULE 54.8-B.

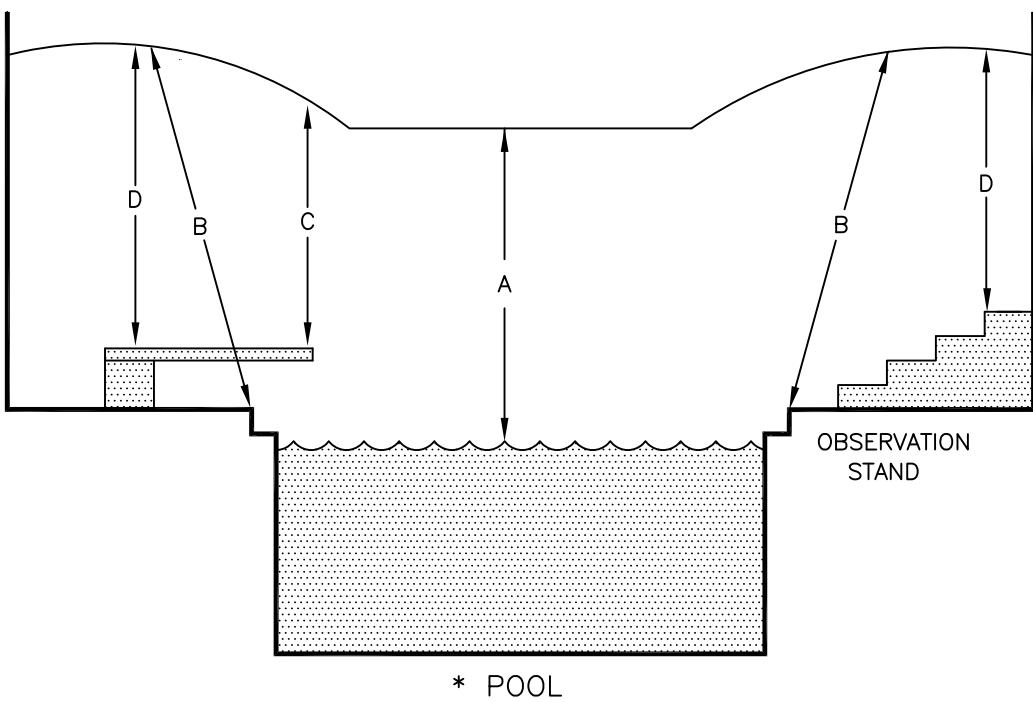
APPROVED 3/1994		ENGINEERING STANDARD					
<i>M. O. Bland</i> ENGR. MANAGER		GROUND CLEARANCES FOR SUPPLY SERVICE DROPS, 0-750 VOLTS INDUSTRIAL & COMMERCIAL PREMISES		2	1/12	REVISED NOTES	
ENGR	PEV	1	6/99	REVISED		FINCH	
REV	DATE	DESCRIPTION		APPR			
DRAWN	MJ	CITY OF PALO ALTO CALIFORNIA		NTS	SR-CL-O-1016		1 OF 1
CHECKED	PEV	SCALE	STANDARD NO.		SHEET NO.		





APPROVED <u>3/1994</u>			ENGINEERING STANDARD						
<u>M. B. Bland</u> ENGR. MANAGER			CLEARANCE FOR SERVICE POLE FOR SUPPLY SERVICE DROP 0-300 VOLTS						
			1	5/13	REVISED CLEARANCE BOX			TT	
			REV	DATE	DESCRIPTION			APPR	
ENGR	PEV		CITY OF PALO ALTO CALIFORNIA			NTS	SR-CL-0-1017		1 OF 1
DRAWN	MJ					SCALE	STANDARD NO.		SHEET NO.
CHECKED	PEV								





NOTES

1. REQUIRED CLEARANCES APPLY TO PUBLIC, COMMERCIALY OPERATED, AND RESIDENTIAL POOLS.

DIMENSION

A. VERTICAL CLEARANCE FROM HIGHEST WATER LEVEL:	22.5 FEET
B. RADIAL CLEARANCE FROM TOP EDGE OF POOL WALL	22.5 FEET
C. VERTICAL CLEARANCE FROM DIVING BOARD OR PLATFORM THAT IS OVER THE WATER SURFACE OF THE POOL:	14.5 FEET
D. VERTICAL CLEARANCE ABOVE DIVING BOARD OR PLATFORM THAT IS <u>NOT</u> OVER THE WATER SURFACE OF THE POOL:	14.5 FEET

2. HORIZONTAL LIMIT OF CLEARANCES ARE TO THE OUTER EDGE OF ANY ITEMS IDENTIFIED IN ITEMS A TO D, BUT NO LESS THAN 10 FEET OUT FROM THE INSIDE WALL OF POOL.
3. INSTALLATION OF SERVICE DROPS ABOVE SWIMMING POOLS, HOT TUBS, AND SPAS SHALL BE AVOIDED.
4. IF IN THE OPINION OF CITY OF PALO ALTO UTILITIES ENGINEERING AND OPERATIONS PERSONNEL AN OVERHEAD SERVICE INSTALLATION DESIGNED TO MEET THE STIPULATED CLEARANCE REQUIREMENTS CREATES AN UNSAFE WORKING CONDITION FOR UTILITY WORKERS, THE SERVICE WILL BE REQUIRED TO BE UNDERGROUND.

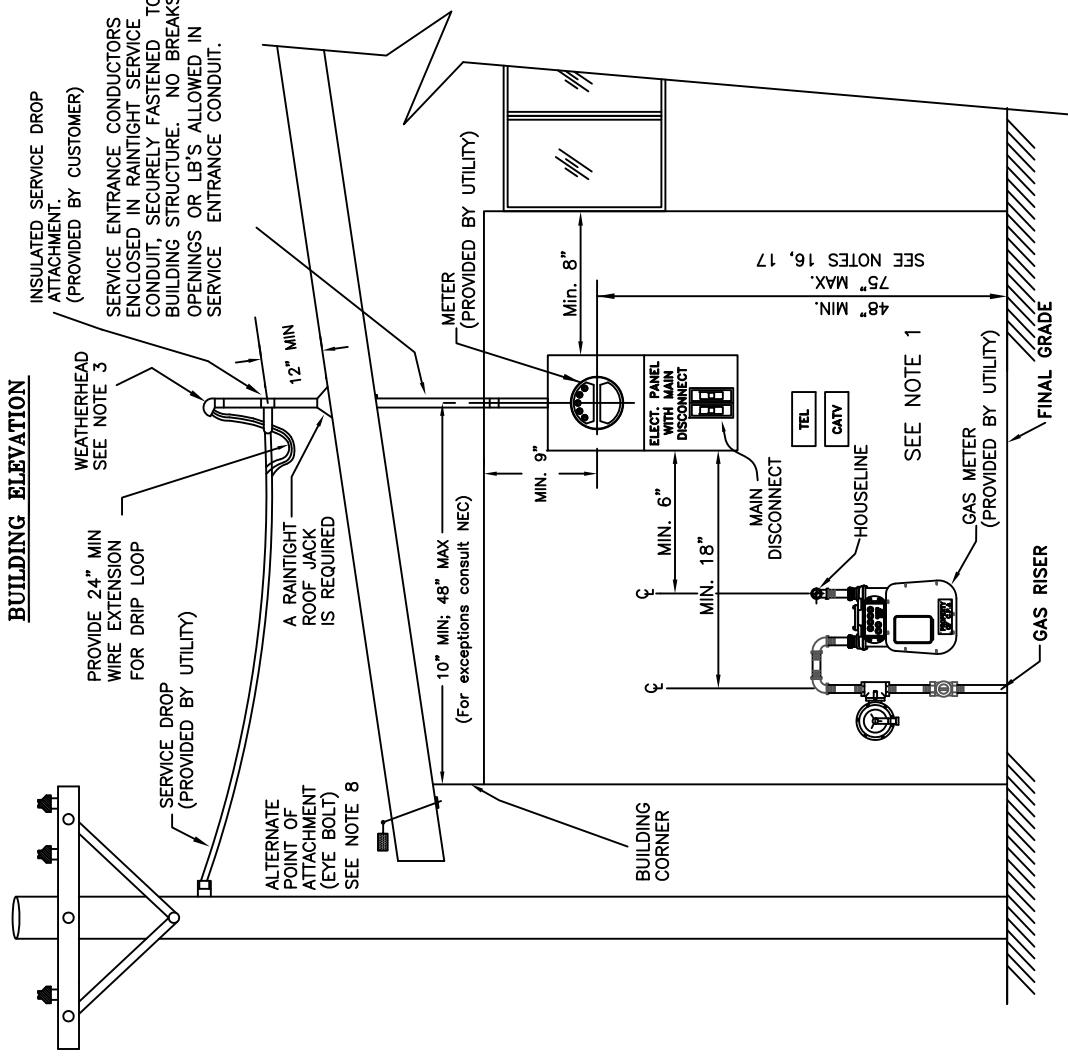
**REFERENCE:**  
CALIFORNIA ELECTRICAL CODE, ARTICLE 680.8

APPROVED <u>3/1994</u>  <u>MDB</u> ENGR. MANAGER	ENGINEERING STANDARD CLEARANCES FROM SERVICE DROPS 0-750 VOLTS SWIMMING POOLS, HOT TUBS & SPAS		
2	10/09	REV CLEARANCES/NOTES – CEC	
1	6/99	REVISED	
REV	DATE	DESCRIPTION	
ENGR	PEV	NTS	
DRAWN	MJ	SR-CL-O-1018	
CHECKED	PEV	1 OF 1	
		SCALE	STANDARD NO.
			SHEET NO.

**CITY OF PALO ALTO  
CALIFORNIA**



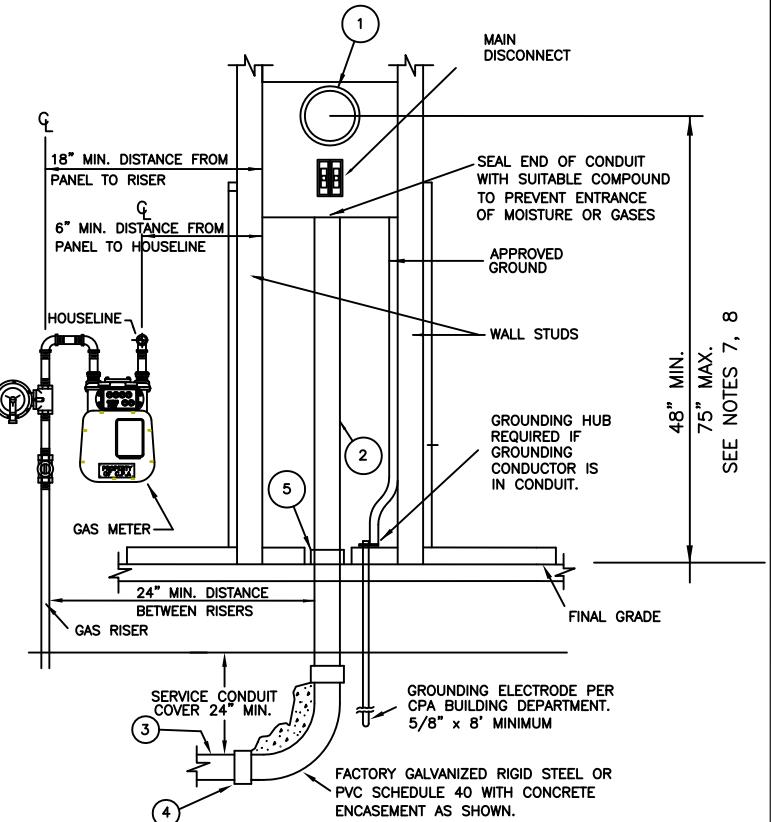
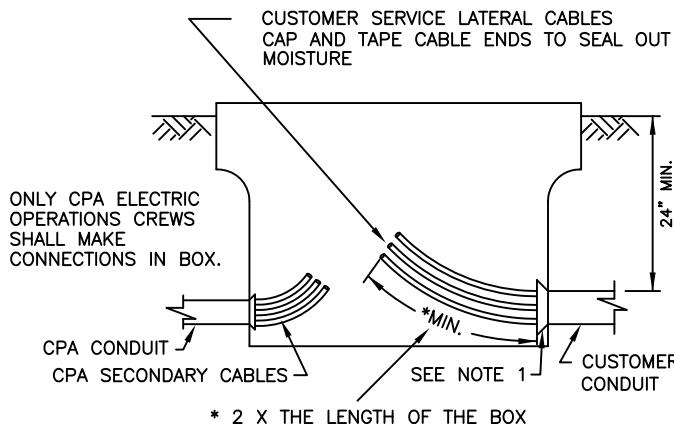
### BUILDING ELEVATION





## MATERIALS:

1. METER MOUNTING DEVICE WITH MAIN DISCONNECT BUILT INTO THE SAME CABINET.
2. UNDERGROUND SERVICE ENTRANCE CONDUIT SHALL BE CONTINUOUS; NO BREAKS, OPENINGS, OR LB'S ARE ALLOWED. CONDUIT SHALL BE GALVANIZED RIGID STEEL OR PVC SCH 40.
3. UNDERGROUND CONDUIT SHALL BE PVC SCHEDULE 40, TYPE DB-120, OR HOT DIPPED GALVANIZED RIGID STEEL.
4. PLASTIC TO STEEL ADAPTOR, IF PLASTIC CONDUIT IS USED FOR 3.
5. MAY REDUCE TO CEC REQUIREMENTS.



## NOTES:

1. STEEL CONDUITS SHALL EXTEND 2" MAX. INTO BOX AND SHALL TERMINATE WITH INSULATED BUSHINGS. PLASTIC CONDUITS SHOULD BE TERMINATED WITH BELL ENDS FLUSH WITH THE WALL OF THE BOX. ALL CONDUIT ENTRANCES SHALL BE GROUTED. SEE CPA STANDARD DRAWING DT-SS-U-1002.
2. IF THE GRADE OF THE TOP OF THE UTILITY SERVICE BOX IS MORE THAN ONE FOOT ABOVE THE END OF THE CONDUIT THAT TERMINATES AT THE BUILDING, BOTH ENDS OF THE SERVICE CONDUIT SHALL BE SEALED BY CUSTOMER WITH APPROVED PLUGS. SUFFICIENT MEASURES SHALL BE PROVIDED TO ENSURE WATER DOES NOT ENTER METER.
3. IF THE GRADE OF THE METER IS BELOW THE GRADE OF THE UTILITY BOX, AN ADDITIONAL BOX MUST BE PLACED IN THE GROUND JUST BEFORE THE METER FOR DETAILS PLEASE CONTACT ELECTRIC ENGINEERING
4. CPAU INSPECTOR MUST BE PRESENT WHEN INSTALLING CONDUIT OR PULLING CABLES INTO CPAU BOX.
5. A SPLICE BOX MAY BE REQUIRED IF ALLOWABLE CABLE PULLING TENSION WILL BE EXCEEDED.
6. EXISTING 1½" OR 2" CONDUIT MAY BE ALLOWED FOR PANEL UPGRADES IN THE SAME LOCATION IF THEY MEET AMPACITY AND CONDUIT FILL REQUIREMENTS, AND IS APPROVED BY CPAU ENGINEERING.

7. SEE CPAU ENG STD DWG SR-MT-E-1012 FOR MINIMUM CLEARANCE REQUIREMENTS AROUND METER PANELS AND SR-MT-E-1035 FOR REQUIREMENTS ON METERS INSTALLED IN DRIVEWAYS.

8. PER CEC ARTICLE 404.8(A) THE HIGHEST POSITION OF THE BREAKER HANDLE MUST BE LESS THAN 79" ABOVE GRADE/FLOOR.

9. PRESS ON LUGS ARE REQUIRED FOR CABLE TERMINATIONS ON SERVICE PANELS 400A OR LARGER, SEE PANEL MANUFACTURER FOR APPROVED LUGS.

## SERVICE LATERAL CONDUIT AND CABLE SIZE

Service Voltage (Volts)	Main Service (Amps)	Customer's Minimum Conduit Size	CPAU Approved Conductor Size **	
			AL	CU
120/240 1-phase 3 wire	125	2"	1/0	2
	200	3"	4/0	2/0
	400*	4"	350	4/0
120/208 1-phase 3 wire	200	3"	4/0	2/0

\* CLASS 320 (UNDERGROUND RESIDENTIAL ONLY)

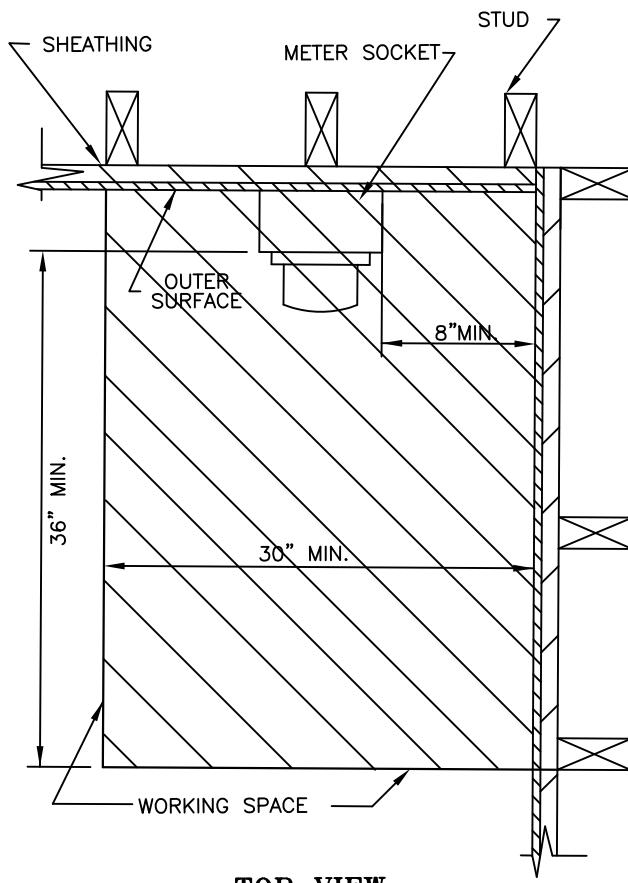
\*\* CONDUCTOR SIZE IS PER PHASE AND A FULL SIZE NEUTRAL IS REQUIRED.

5	9-16	ADDED 2" CONDUIT EXCEPTION	TT
4	3-16	REV NOTES, TABLE, & DWG	TT
3	5-13	ADDED GAS METER CLEARANCES	TT
2	1-12	REVISED MATERIALS & NOTES	TT
1	10-08	REVISED NOTE 2	TT
REV	DATE	DESCRIPTION	APPR

APPROVED 11/2006		ENGINEERING STANDARD	
ENGR. NAME		RESIDENTIAL UNDERGROUND SERVICE REQUIREMENTS	
BEGR	PEV		
DRAWN	U/MJ	MJ	
CHECKED	PEV		
CITY OF PALO ALTO CALIFORNIA		NTS	SR-CN-U-1010
		SCALE	STANDARD NO.
			SHEET NO.

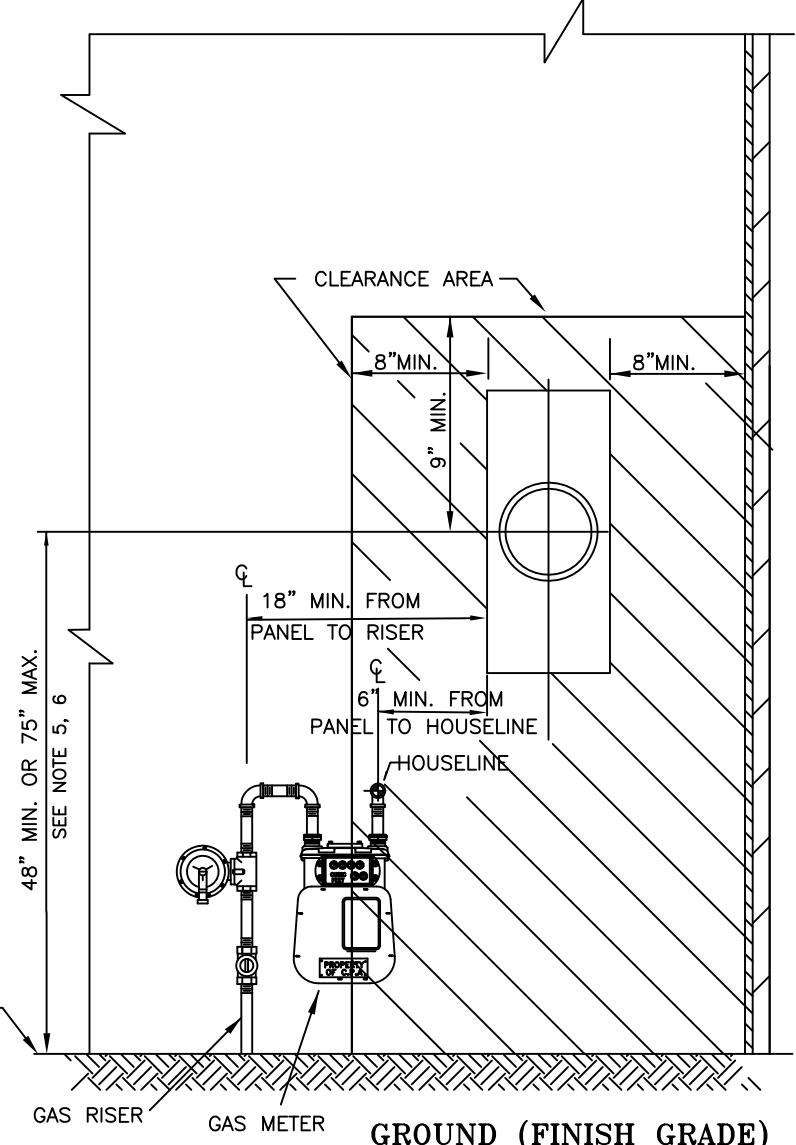
Original Signed  
and Approved  
by Engineering  
Manager





TOP VIEW

NO OBSTRUCTIONS ALLOWED  
IN SHADED AREA.



GROUND (FINISH GRADE)

NOTES:

1. THERE MUST BE AN 8 INCH MINIMUM CLEARANCE BETWEEN THE NEAREST EDGE OF THE METER PANEL AND ANY OBSTRUCTION OR WINDOW.
2. SUITABLE WORKING SPACE, AT LEAST 30 INCHES WIDE X 36 INCHES DEEP, SHALL BE PROVIDED IN FRONT OF THE METER SOCKET TO ALLOW FOR INSTALLATION, TESTING AND READING.
3. METERS SHALL BE LOCATED SO THAT THEY WILL NOT BE DAMAGED BY A SWINGING WINDOW OR DOOR.
4. THE WALL SURFACES ON EITHER SIDE OF A DOOR, FOR A DISTANCE EQUAL TO THE WIDTH OF THE DOOR, IS UNACCEPTABLE AS A METER LOCATION.
5. PER CEC ARTICLE 404.8(A) THE HIGHEST POSITION OF THE BREAKER HANDLE MUST BE LESS THAN 79" ABOVE GRADE/FLOOR.
6. SEE CPAU ENG STD SR-MT-E-1035 FOR REQUIREMENTS ON METERS INSTALLED IN DRIVEWAYS.

7	3-16	REVISED NOTES	TT
6	6-14	ADDED GUARD POST NOTE	TT
5	7-13	REVISED GAS METER	TT

APPROVED 3/1994

M. O. Bland

ENGR. MANAGER

ENGINEERING STANDARD  
REQUIRED MINIMUM CLEARANCES OF  
METER SOCKET FROM OBSTRUCTIONS

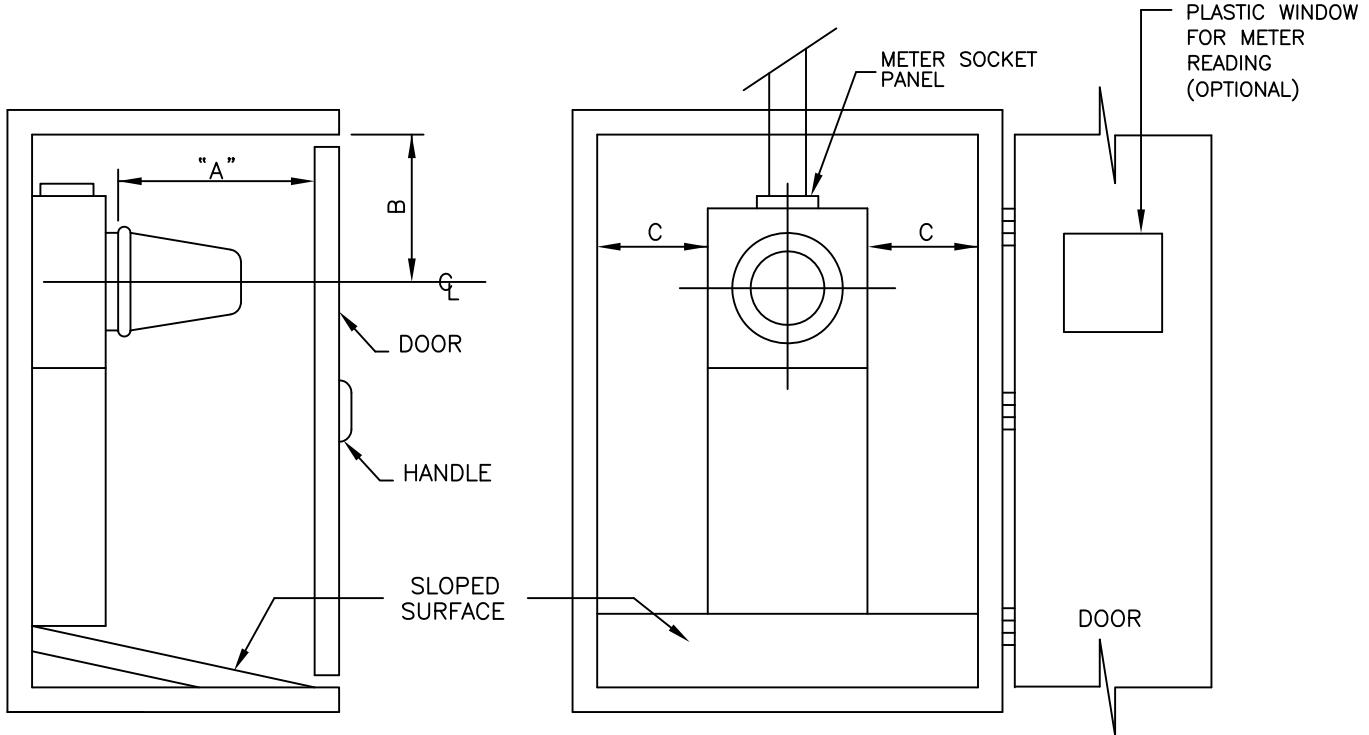
4	1-11	REVISED CLEARANCES AND NOTES	TT
3	8-08	REVISED CLEARANCES AND NOTES	JT
2	6-06	REVISED CLEARANCES	TF
REV	DATE	DESCRIPTION	APPR

ENGR	PEV	
DRAWN	UES /MJ	
CHECKED	PEV	

CITY OF PALO ALTO  
CALIFORNIA

NTS	SR-MT-E-1012	1 OF 1
SCALE	STANDARD NO.	SHEET NO.





SIDE VIEW

FRONT VIEW

DIMENSION "A" : 7" MINIMUM FOR RESIDENTIAL METERS.  
9" MINIMUM FOR COMMERCIAL AND APARTMENT METERS.

15" MAXIMUM  
15" MAXIMUM

DIMENSION "B" : 7" MINIMUM FOR RESIDENTIAL METERS.  
9" MINIMUM FOR COMMERCIAL AND APARTMENT METERS.

DIMENSION "C" : 2-1/2" MINIMUM FOR RESIDENTIAL METERS.  
5" MINIMUM FOR COMMERCIAL AND APARTMENT METERS.

NOTE: DIMENSION "A" APPLIES ONLY TO THAT PORTION OF THE CABINET ENCLOSING DOOR IN FRONT OF THE METER.

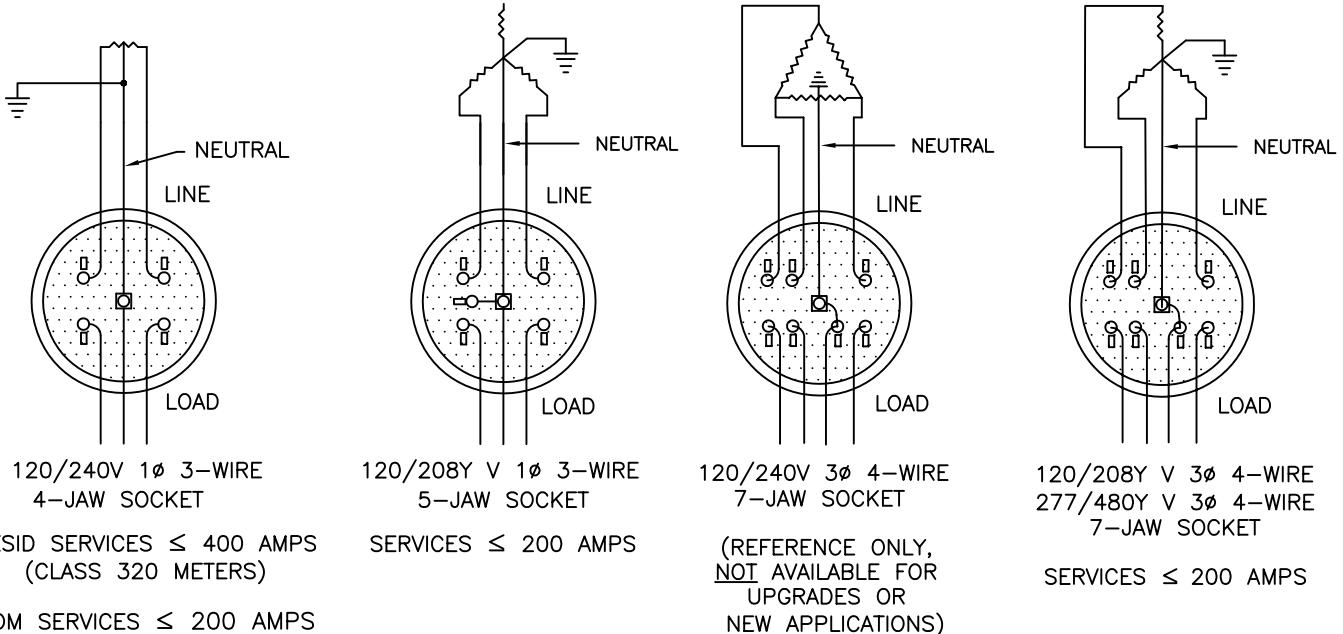
NOTE:

1. THE CABINET SHOULD BE DESIGNED SO THAT NEITHER THE ROOF NOR THE DOOR SUPPORTS INTERFERE WITH THE INSTALLATION OF THE METER.
2. AT LEAST 16" VERTICAL AND HORIZONTAL CLEAR SPACE SHALL BE PROVIDED DIRECTLY IN FRONT OF THE SOCKET (8" ABOVE AND BELOW, AND 8" ON EITHER SIDE OF THE CENTER OF THE METER SOCKET).
3. THE CABINET DOORS SHALL HAVE SIDE HINGES, WILL OPEN GREATER THAN 90 DEGREES, AND WILL HAVE A LATCH TO KEEP IT IN THE OPEN POSITION.
4. METER CABINET ENCLOSURES INSTALLED IN LOCATIONS SUSCEPTIBLE TO VEHICULAR DAMAGE MUST COMPLY WITH THE REQUIREMENTS OF CPAU STD DWG SR-MT-E-1035.

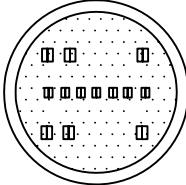
APPROVED _____	199	ENGINEERING STANDARD  CLEARANCE FOR METER CABINET ENCLOSURES				
ENGR. _____	MANAGER _____		2	3/16	ADDED NOTE 4	TT
DRAWN _____	DESIGNER _____		1	11/08	REVISED NOTES AND DIMENSIONS	TT
CHECKED _____	PEV		REV	DATE	DESCRIPTION	APPR
<i>Original Signed and Approved by Engineering Manager</i>		CITY OF PALO ALTO CALIFORNIA	NTS	SR-MT-E-1013	1 OF 1	
		SCALE	STANDARD NO.	SHEET NO.		



### SELF CONTAINED METER SOCKETS



### TRANSFORMER RATED METER SOCKETS



120/240 V 1 $\phi$  3-WIRE: COM SERVICES  $>$  200 AMPS  
 120/208Y V 3 $\phi$  4-WIRE: SERVICES  $>$  200 AMPS  
 277/480Y V 3 $\phi$  4-WIRE: SERVICES  $>$  200 AMPS  
**13-JAW SOCKET**

### NOTES:

- TEST BYPASS DEVICES ARE NOT ALLOWED FOR RESIDENTIAL ("RESID") SERVICES  $\leq$  200 A AND ARE REQUIRED FOR RESIDENTIAL SERVICES GREATER THAN 400 A OR FOR 3-PHASE SERVICE.
- TEST BYPASS FACILITIES ARE REQUIRED FOR ALL COMMERCIAL ("COM") PANELS AND ANY 3-PHASE SERVICE.
- LINE CONDUCTORS SHALL ALWAYS BE CONNECTED TO THE TOP TERMINALS OF THE SOCKET, AND LOAD CONDUCTORS CONNECTED TO THE BOTTOM TERMINALS OF THE SOCKET.
- NEUTRAL TAPS SHALL BE CONNECTED TO THE SERVICE NEUTRAL CONDUCTOR AND LOCATED BEHIND SEALED PANELS. WIRE NUTS ARE NOT PERMITTED.
- RESIDENTIAL, SELF-CONTAINED METER SOCKETS SHALL BE UL APPROVED AND SHALL HAVE A MAXIMUM CURRENT RATING EQUAL TO OR GREATER THAN THE CURRENT RATING OF THE ASSOCIATED SERVICE EQUIPMENT.
- METER SOCKETS WITH EXTRUDED OR CAST ALUMINUM JAWS ARE NOT ACCEPTABLE AND WILL NOT BE CONNECTED.
- THE NEUTRAL WIRE (WHITE) SHALL BE CONTINUOUS WITHOUT A SPLICING FROM THE WEATHERHEAD THROUGH THE SOCKET BONDING LUG TO THE NEUTRAL BAR IN THE MAIN SWITCH. WITH SPECIAL PERMISSION, THE NEUTRAL WIRE MAY BE BROKEN IF THE SOCKET IS EQUIPPED WITH AN APPROVED CONNECTION DEVICE.
- THE UTILITY WILL INSTALL THE NECESSARY TRANSFORMERS AND WIRE TRANSFORMER RATED METER SOCKETS.
- FOR RESIDENTIAL SWITCHBOARDS ABOVE 200 AMPS AND ALL COMMERCIAL SWITCHBOARDS FINAL SERVICE EQUIPMENT SUBMITTALS MUST BE PROVIDED TO, AND APPROVED BY CPAU ENGINEERING, PRIOR TO PROCUREMENT AND INSTALLATION. INSTALLATION MUST BE APPROVED BY CITY OF PALO ALTO BUILDING DEPARTMENT AND CPAU BEFORE CONNECTION TO CPAU'S ELECTRIC SYSTEM.
- VOLTAGE TRANSFORMERS ARE REQUIRED FOR ANY SERVICE  $>$  480 V.

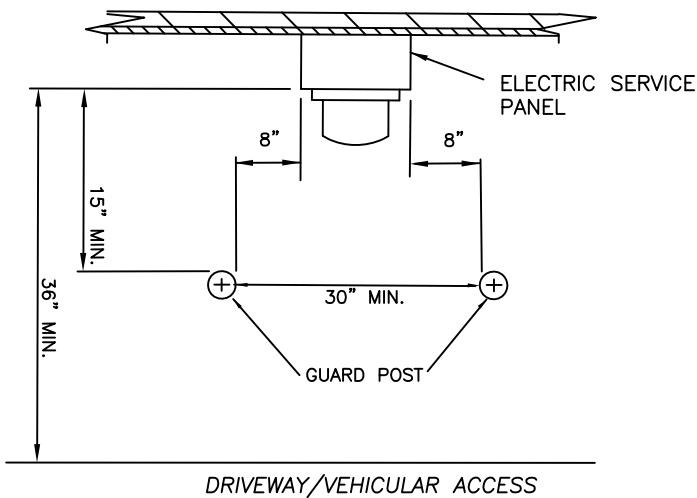
### TEST BYPASS SWITCH REQUIREMENTS

SERVICE TYPE/SIZE	TEST BYPASS SWITCH:
<u>TEMPORARY POWER</u> 3-PHASE 1-PHASE	REQUIRED NOT REQUIRED
<u>PERMANENT POWER</u> COMMERCIAL RESIDENTIAL	REQUIRED FOR ALL NOT ALLOWED $\leq$ 200 AMPS $>200A \& \leq 400A$ $>400$ AMPS 3-PHASE
	ALLOWED, NOT REQUIRED REQUIRED REQUIRED

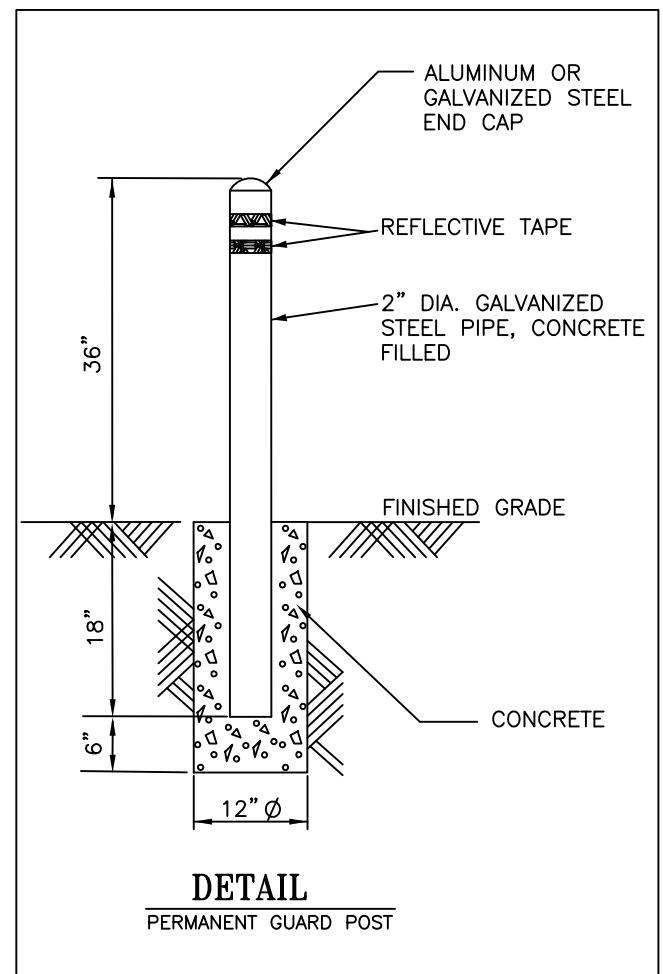
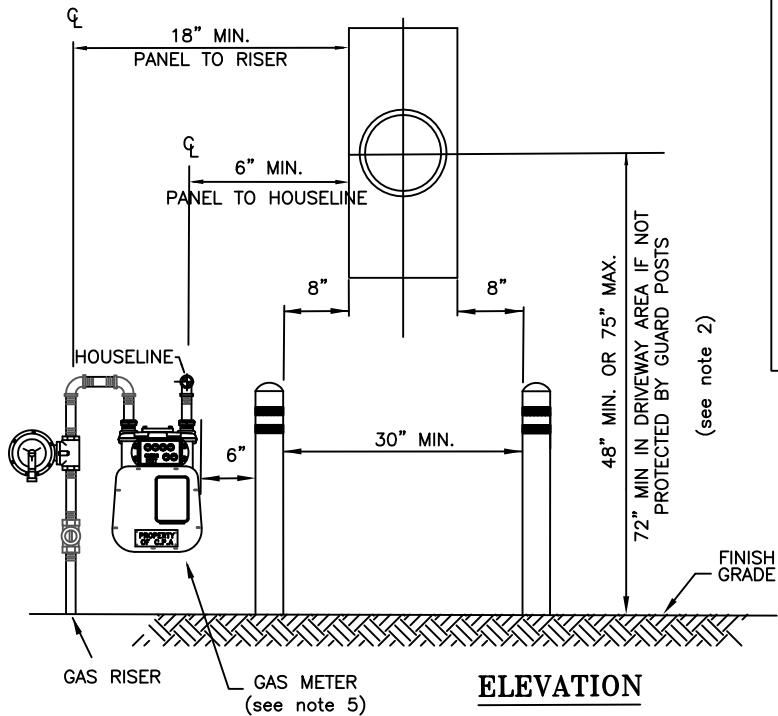
APPROVED <u>3/1994</u> <i>M. B. Bland</i> ENGR. MANAGER	ENGINEERING STANDARD <b>DIAGRAM OF ELECTRIC METER SOCKETS</b>	4	8/08	Allow 480V no PT required	TT
		3	6/13	Added meter connections	TT
		2	8/08	REVISED – Test bypass reqs.	TT
		1	6/99	REVISED	FINCH
		REV	DATE	DESCRIPTION	APPR
ENGR	PEV		NTS	SR-MT-E-1014	1 OF 1
DRAWN	MJ		SCALE	STANDARD NO.	SHEET NO.
CHECKED	PEV				

**CITY OF PALO ALTO CALIFORNIA**





PLAN VIEW



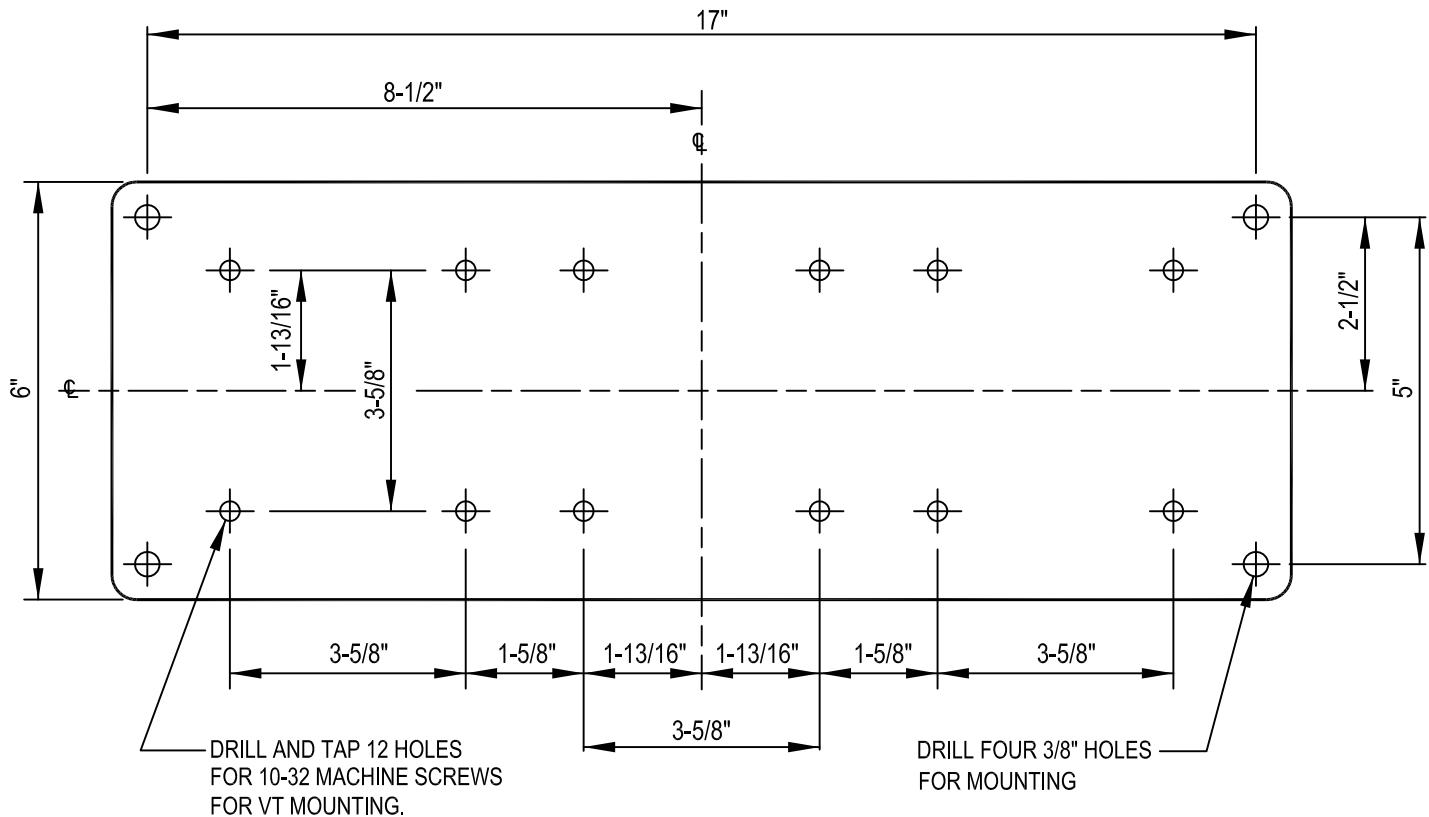
NOTES:

1. METERS INSTALLED IN LOCATIONS SUSCEPTIBLE TO VEHICULAR DAMAGE SHALL BE PROTECTED BY GUARD POSTS OR INSTALLED AT A SUITABLE HEIGHT TO PREVENT CONTACT.
2. PER CEC ARTICLE 404.8(A), THE HIGHEST POSITION OF THE BREAKER HANDLE MUST NOT BE MORE THAN 79" ABOVE GRADE/FLOOR.
3. THIS STANDARD IS FOR RESIDENTIAL INSTALLATIONS ONLY, NOT FOR MULTIFAMILY DWELLINGS.
4. PERMANENT FIXED POSTS ARE REQUIRED.
5. REFER TO CPAU STD. DWG. WG-W-06 FOR GUARD POST REQUIREMENTS AROUND GAS METERS.

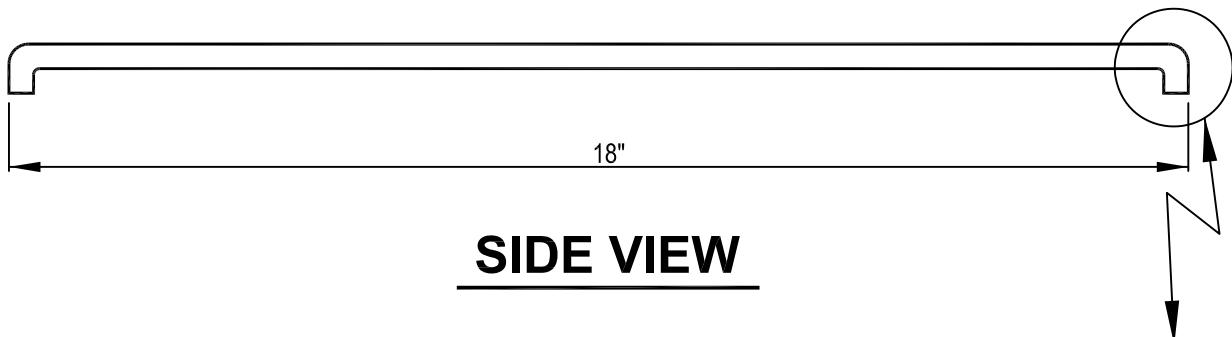
APPROVED _____		ENGINEERING STANDARD					
ENGR. MANAGER		METER INSTALLATION IN RESIDENTIAL DRIVEWAY		1 3-16		ADDED NOTE 2	
DRAWN	BY	REV	DATE	DESCRIPTION			BY
ENG'D				NTS	SR-MT-E-1035		1 OF 1
CHECKED	JT			SCALE	STANDARD NO.		SHEET NO.

Original Signed  
and Approved  
by Engineering  
Manager





**TOP VIEW**

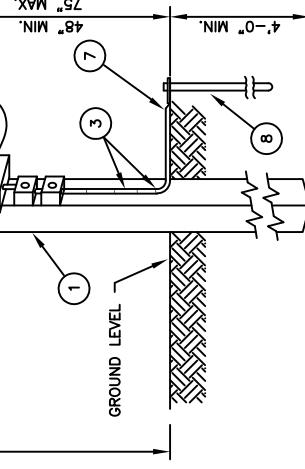
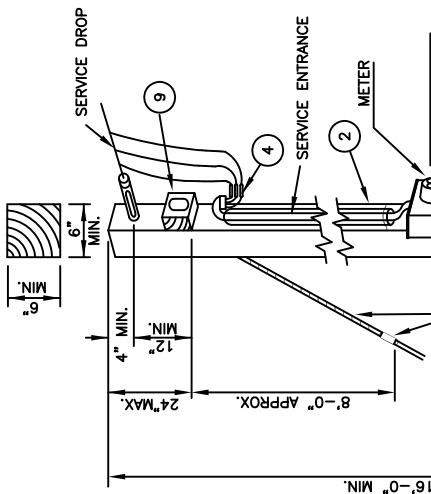


**NOTES:**

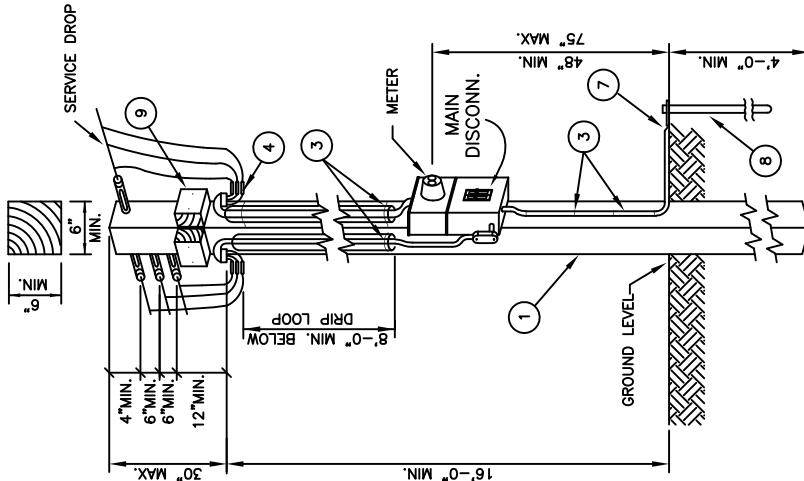
1. TYPICAL LOCATION IS VERTICAL ON HINGED SIDE OF CT COMPARTMENT.
2. LOCATE IN FRONT OF BUS.
3. MAINTAIN ADEQUATE CLEARANCE FROM BUS FOR VT's.  
(DUNCAN DVE-6 VT's ARE 4-1/4 INCHES HIGH)  
(ABB PPW VT's ARE 4-1/2 INCHES HIGH)

APPROVED	07/1997	ENGINEERING STANDARD				
MANAGER	MGR	VOLTAGE TRANSFORMER				
ENGR.	MANAGER	MOUNTING PLATE		1	07/05	AS SHOWN
ENGR.	PEV	REV	DATE	DESCRIPTION		PEV
DRAWN	PEV					APPR
CHECKED	PEV	CITY OF PALO ALTO		NTS	SR-MT-M-1019	1 of 1
DRAWN BY Manager Engineering		CALIFORNIA		SCALE	STANDARD NO.	SHEET NO.



**SERVICE DROP CABLE TO RECEPTACLES****SERVICE DROP CABLE TO OVERHEAD LINE****NOTES:**

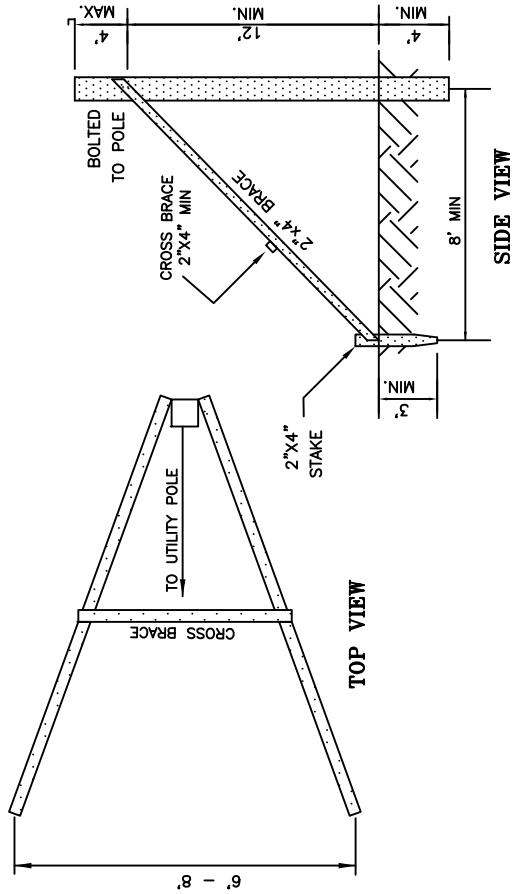
- POLE - 6"X 6"X 20'-0" (MIN. LENGTH)
- CONDUIT - GALV. RIGID STEEL, EMT, OR PVC SCH 40
- CONDUIT - GALV. RIGID STEEL WITH PIPE STRAP
- WIRE, INSULATED, SIZE AS REQ'D. (24" MIN. EXTENSION FROM WEATHERHEAD FOR Drip LOOP)
- GUY CABLE - 1/4" MIN. GALV. STEEL WITH GUY STRAIN INSULATOR (10,000 LB. MIN.), ANCHOR AND FITTINGS.
- PUSH BRACE - TWO 2" X 4" MIN. TIMBER (BOLTED TO POLE) WITH CROSS BRACE.
- CONDUIT GROUNDING HUB AND CLAMP
- GROUND - 5/8" X 8' ROD
- WOOD BLOCK - 4" X 4" X 6"

**LOCATE SERVICE POLES SUCH THAT:**

- IT IS ON PRIVATE PROPERTY ONLY.
- IT IS AT LEAST 10' BUT NO MORE THAN 100' FROM THE UTILITY POLE.
- THERE IS A CLEAR UNOBSTRUCTED PATH TO THE UTILITY POLE FOR THE SERVICE DROP.
- IT DOES NOT REQUIRE THE SERVICE DROP TO CROSS OVER ANY BUILDINGS OR OTHER PROPERTY.
- CONTACT UTILITIES ELECTRIC ENGINEERING AT (650) 566-4500 IF THERE ARE QUESTIONS ON PLACEMENT.

APPROVED 12/2006	ENGINEERING STANDARD	4	6/13	REVISED NOTES, 2 BRACES
<i>Signature</i> Engineering Manager	OVERHEAD TEMPORARY SERVICE	3	11/08	REVISED
<i>Signature</i> Drawing Manager		2	12/06	REVISED
<i>Signature</i> Check Manager		1	6/99	REVISED
	REV DATE			DESCRIPTION

NTS	SR - TS - O - 1006	1 of 1
SCALE	STANDARD NO.	SHEET NO.

**WOOD BRACE****RECOMMENDED SERVICE ENTRANCE CONDUCTOR**

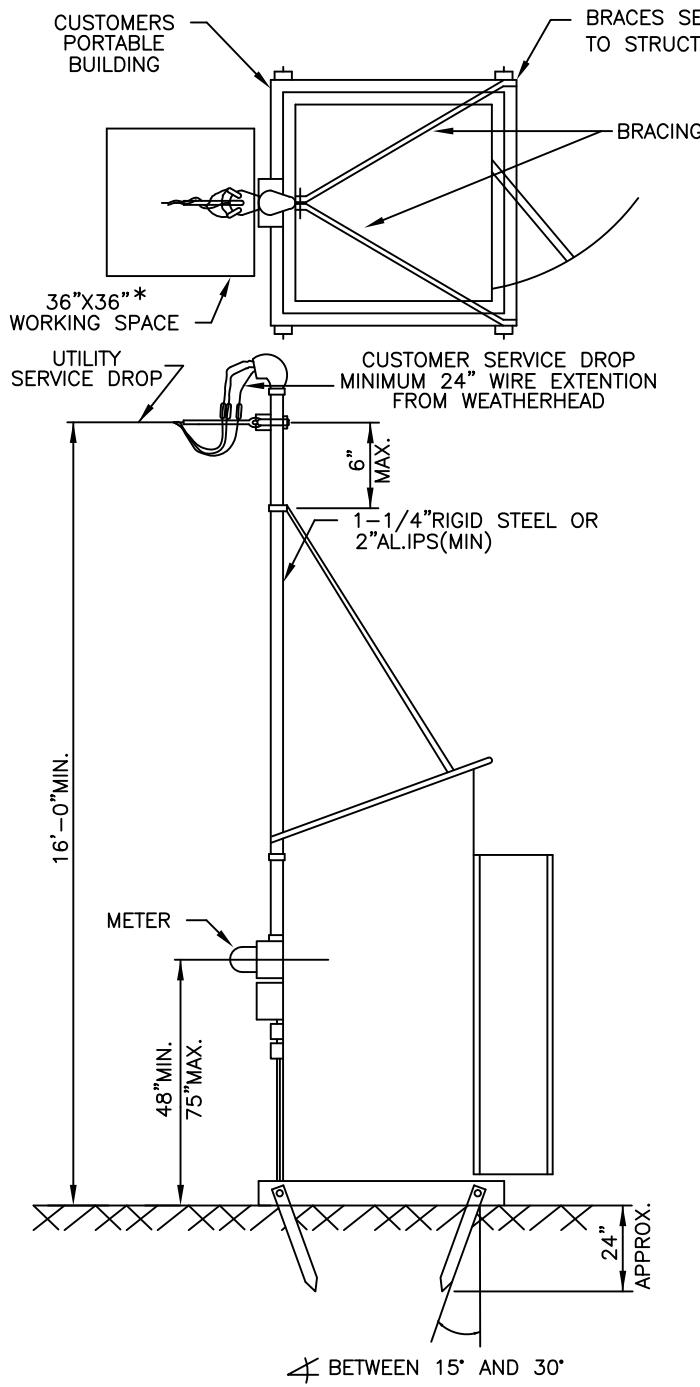
Service Voltage (Volts)	Main Service (Amps)	Customer's Minimum Conduit Size	CPAU Approved Conductor Size	
			AL	CU
120/240	125	2"	1/0	2
1-phase	200	2"	4/0	2/0
3 wire	400*	4"	750	500
120/208	200	2"	4/0	2/0
1-phase 3 wire				

\* Note: Class 320 (Residential only)

NTS	SR - TS - O - 1006	1 of 1
SCALE	STANDARD NO.	SHEET NO.

CITY OF PALO ALTO  
CALIFORNIA





#### \* FOOTNOTE:

WORKING SPACE IN FRONT OF METER SHALL NOT BE OBSTRUCTED.

### TEMPORARY SERVICE ATTACHMENT

TEMPORARY SERVICES SHALL NOT ATTACH TO ANY STRUCTURE CONSIDERED TO BE OF INADEQUATE STRENGTH. THE STRUCTURE SHALL BE WELL-FIXED AND CAPABLE OF SUPPORTING THE SERVICE SPAN.

### PORTABLE BUILDINGS

SMALL SHEDS, OFFICES, TOILETS, ETC. ARE NOT CONSIDERED WELL-FIXED UNLESS STAKED IN PLACE AS SHOWN.

### ANCHORING:

THE STRUCTURE SHOULD BE SECURELY ANCHORED IN PLACE BY ONE OF THE FOLLOWING:

1. FOUR 2"X4" MIN. WOOD STAKES DRIVEN AT LEAST 2' INTO THE GROUND AND ATTACHED TO THE STRUCTURE'S FRAMEWORK.
2. FOUR STEEL STAKES, WITH STRENGTH EQUIVALENT TO 3/4" RIGID STEEL PIPE, DRIVEN AT LEAST 2' INTO THE GROUND AND ATTACHED TO THE STRUCTURE'S FRAMEWORK BY 1/4" MIN. BOLTS OR LAG SCREWS. STEEL STAKES MAY ALSO BE SECURED BY CROSMEMBERS FIRMLY CONTACTING THE UPPER SURFACE OF THE BASE OF THE STRUCTURE.

CONTACT UNDERGROUND SERVICE ALERT AT 1-800-227-2600 TO LOCATE UNDERGROUND FACILITIES PRIOR TO INSTALLING ANCHORS.

### PERISCOPE MAST BRACING

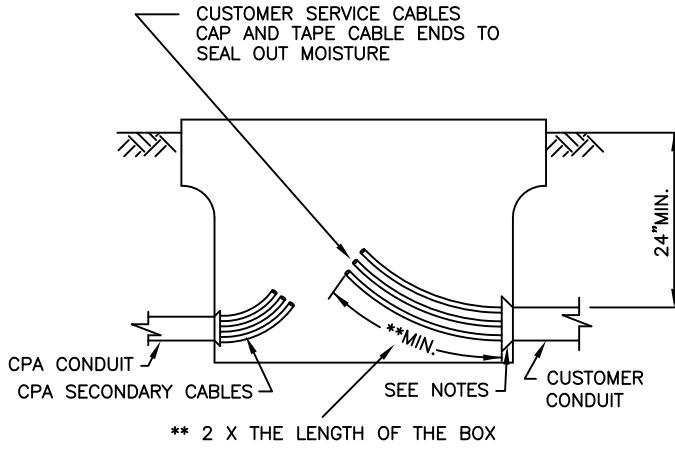
TWO GALVANIZED STEEL BRACES (3/4" GALV. RIGID STEEL PIPE OR 1-1/4"X1-1/4"X1/8" GALV. STEEL ANGLE IRON MIN.) SECURELY BOLTED OR LAGGED TO THE FRAMEWORK WITH 3/8"X3" LAG SCREWS WITH A 90° SPREAD SECURED TO THE PERISCOPE NO MORE THAN 6" BELOW THE POINT OF ATTACHMENT.

### LOCATE TEMPORARY SERVICE STRUCTURES SO THAT:

- IT IS ON PRIVATE PROPERTY ONLY.
- SERVICE ATTACHMENT POINT IS AT LEAST 10' BUT NO MORE THAN 100' FROM THE UTILITY POLE.
- THERE IS A CLEAR UNOBSTRUCTED PATH TO THE UTILITY POLE FOR THE SERVICE DROP.
- IT DOES NOT REQUIRE THE SERVICE DROP TO CROSS OVER ANY BUILDINGS OR OTHER PROPERTY.
- CONTACT UTILITIES ELECTRIC ENGINEERING AT (650) 566-4500 IF THERE ARE QUESTIONS ON PLACEMENT.

APPROVED _____	199	ENGINEERING STANDARD TEMPORARY SERVICE STRUCTURES					
ENGR. _____	MANAGER _____			2	1/12	RENAMED & REVISED	TT
DRAWN _____	DES. _____			1	8/08	REVISED	TT
CHECKED _____	PEV _____			REV	DATE	DESCRIPTION	APPR
Original Signed and Approved by Engineering Manager		CITY OF PALO ALTO CALIFORNIA		NTS	SR-TS-0-1007		1 of 1
				SCALE	STANDARD NO.		SHEET NO.

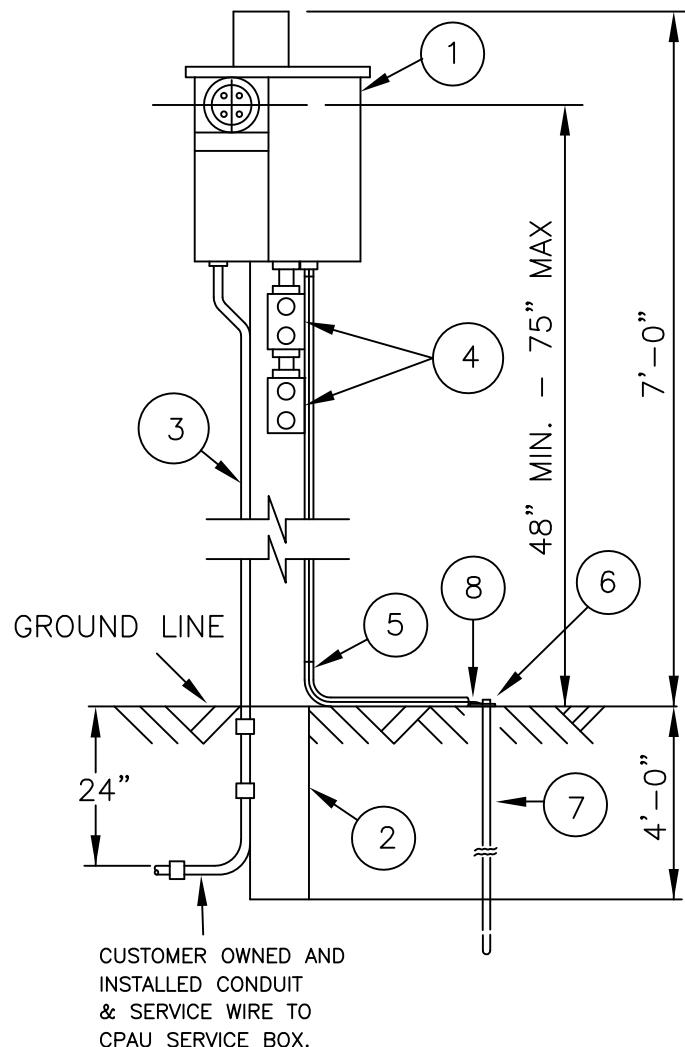




ONLY CPA ELECTRIC OPERATIONS CREWS  
SHALL MAKE CONNECTIONS IN THE BOX

#### NOTES:

1. TRENCH TO BE INSPECTED BY THE ELECTRIC UNDERGROUND INSPECTOR PRIOR TO BACKFILLING. INSPECTOR MUST BE PRESENT WHEN INSTALLING CONDUIT OR PULLING CABLE INTO CPAU BOX.
2. STEEL CONDUITS SHALL EXTEND 2" MAX. INTO BOX AND SHALL TERMINATE WITH INSULATED BUSHINGS. PLASTIC CONDUITS SHOULD BE TERMINATED WITH BELL ENDS FLUSH WITH THE WALL OF THE BOX. ALL CONDUIT ENTRANCES SHALL BE GROUTED.



#### SERVICE LATERAL CONDUIT AND CABLE SIZE

Service Voltage (Volts)	Main Service (Amps)	Customer's Minimum Conduit Size	CPAU Approved Conductor Size **	
			AL	CU
120/240 1-phase 3 wire	125	2"	1/0	2
	200	3"	4/0	2/0
	400*	4"	350	4/0
120/208 1-phase 3 wire	200	3"	4/0	2/0

\* CLASS 320 (UNDERGROUND RESIDENTIAL ONLY)

\*\* CONDUCTOR SIZE IS PER PHASE AND A FULL SIZE NEUTRAL IS REQUIRED.

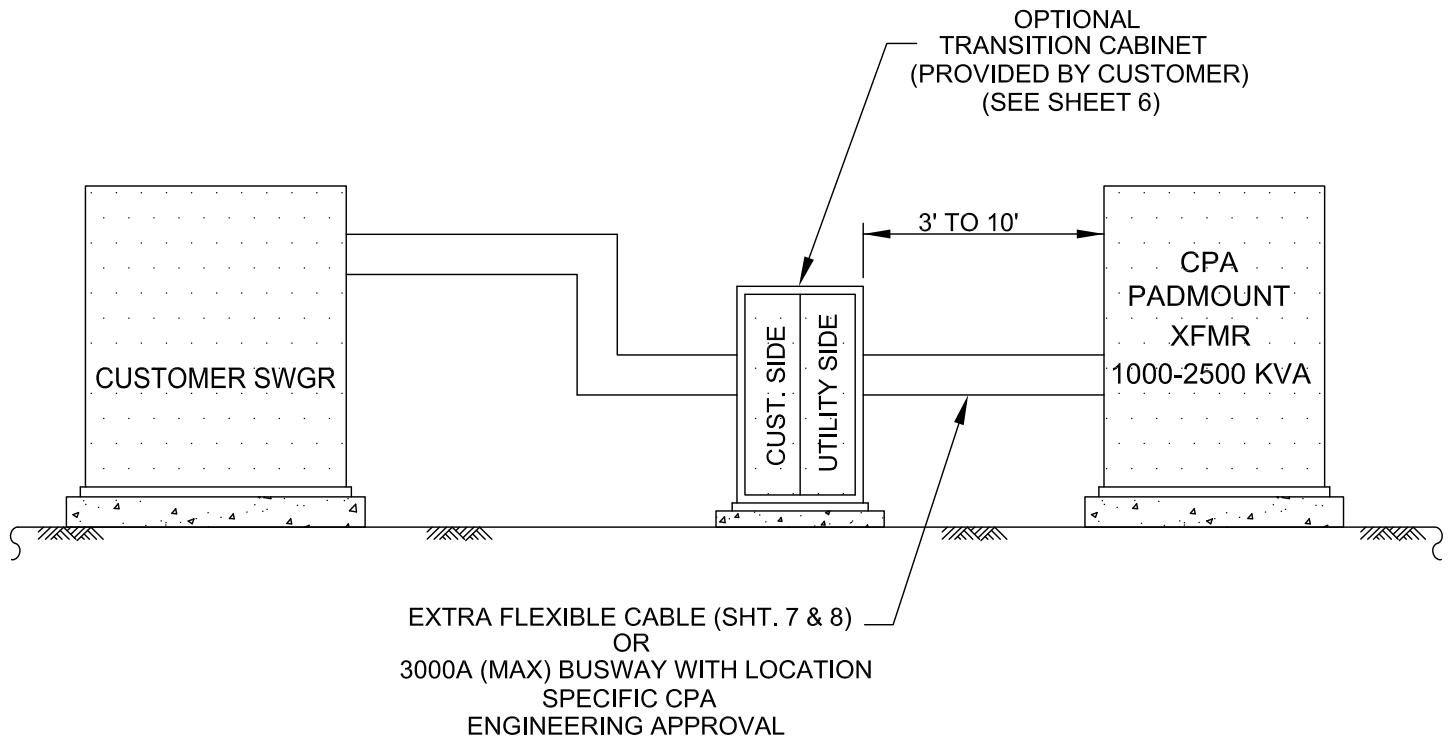
#### MATERIALS:

1. SERVICE TERMINATION ENCLOSURE, COMBINATION METER SOCKET PANEL AND MAIN DISCONNECT
2. POST, MIN. DIM. 4" X 4" X 11'-0".
3. CONDUIT, GALVANIZED RIGID STEEL OR PVC SCH 40, MIN. SIZE 2".
4. WEATHERPROOF OUTLETS.
5. CONDUIT, GALVANIZED RIGID STEEL WITH PIPE STRAP.
6. HUB AND CLAMP GROUNDING.
7. GROUND ROD, 5/8" X 8'
8. GROUND WIRE, BARE COPPER (SIZE IN ACCORDANCE WITH ELECT. CODES & LOCAL REQ.)

APPROVED 11/2006	ENGINEERING STANDARD		3	7/16	REVISED CONDUIT TABLE	TT
MANAGER	UNDERGROUND TEMPORARY SERVICE		2	1/12	REVISED MATERIAL ITEM 3, 5	TT
ENGR			1	8/08	REVISED	TT
DRAWN	PEV	REV	DATE		DESCRIPTION	APPR
CHECKED	PEV					
CITY OF PALO ALTO CALIFORNIA			NTS	SR-TS-U-1008		1 of 1
			SCALE	STANDARD NO.		SHEET NO.

Original Signed  
and Approved  
by Engineering  
Manager





## NOTES:

1. STANDARD SECONDARY CONNECTION SHALL BE MADE WITH EXTRA FLEXIBLE CABLE AS SHOWN ON SHT 7 & 8 IN ACCORDANCE WITH CPAU DRAWING DT-SE-U-1032. ALTERNATIVELY, A BUSWAY ASSEMBLY AS SHOWN ON SHT. 5 MAY BE USED, WITH UTILITIES' APPROVAL, TO CONNECT THE TRANSFORMER SECONDARY TERMINALS TO THE BUSWAY INSIDE THE TRANSFORMER SECONDARY COMPARTMENT.
2. FOR SERVICE LARGER THAN 1600 AMPS, THE CUSTOMER MAY INSTALL BUSWAY FROM THE CUSTOMER'S SWITCHGEAR DIRECTLY TO UTILITY'S PADMOUNT TRANSFORMER, WITH UTILITIES' APPROVAL.
3. ANY ATTACHMENT TO THE TRANSFORMER SECONDARY TERMINALS SHALL BE PERFORMED BY UTILITIES.
4. ALL BUSWAY DESIGN AND CONFIGURATION SHALL BE SUBMITTED TO UTILITIES FOR REVIEW & APPROVAL PRIOR TO PROCUREMENT AND FABRICATION.
5. BUSWAY SHALL CONFORM TO ARTICLE 364 OF THE NATIONAL ELECTRICAL CODE.
6. BUSWAY SHALL BE RATED ACCORDING TO THE SERVICE ENTRANCE OVERCURRENT PROTECTION DEVICE AND FABRICATED PER ANSI 37.23.
7. THE DESIGNATED SERVICE POINT SHALL BE THE SECONDARY TERMINALS OF THE TRANSFORMER.
8. THE TRANSITION CABINET SHALL BE FABRICATED PER DRAWING # SR-XF-E-1020 SHT. 6 OR APPROVED EQUIVALENT.
9. UTILITIES (AT CUSTOMER'S EXPENSE) WILL PROVIDE LUGS ON THE TRANSFORMER SECONDARY TERMINALS. CUSTOMER SHALL PROVIDE/INSTALL LUGS AND TERMINATE CABLES AT SWITCHGEAR OR TRANSITION CABINET.

### TRANSITION CABINET FOR 1000-2500 KVA TRANSFORMERS

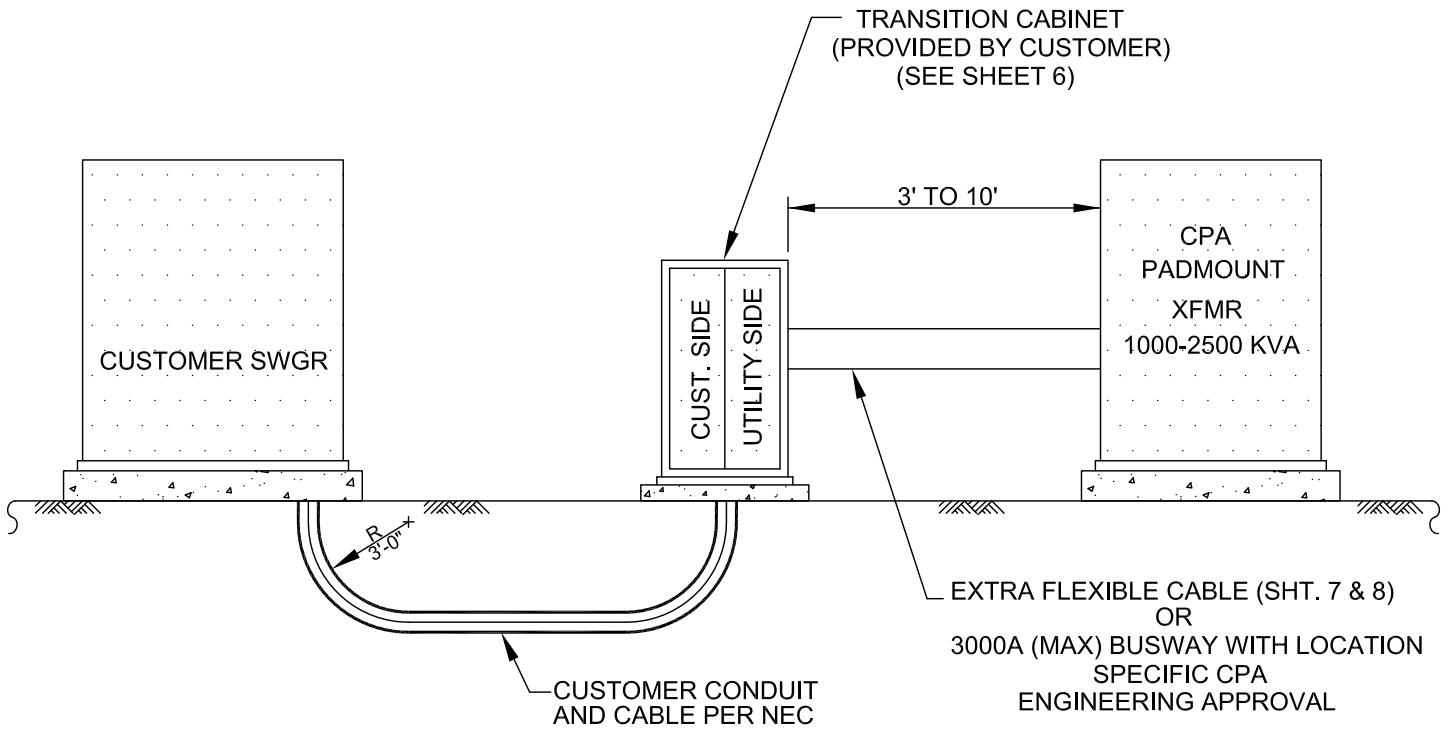
APPROVED	<i>M. J. Ganpath</i> <i>Original Signed</i> <i>and Approved by Manager</i>
ENGR.	G. J. Ganpath
DRVWN	M. Namshid
CHKD.	P. Valath



### TRANSITION CABINET

City of Palo Alto  
California  
UTILITIES, ELECTRIC ENGINEERING

MAP #	CKT #	SCALE	S.O.# / DRAWING #
3	02/06	BUJTOR	CONVERTED TO A'CAD, REV'D. NOTES & ADDED DWG. NO.
2	06/99	FINCH	REVISED NOTES
1	3/94	APPR.	DRAWING RENAMED
REV.	DATE	APPR.	DESCRIPTION
XX	XX	NTS	SR-XF-E-1020
			SHEET 1 OF 8



## NOTES:

1. STANDARD SECONDARY CONNECTION SHALL BE MADE WITH EXTRA FLEXIBLE CABLE AS SHOWN ON SHT. 7 & 8 IN ACCORDANCE WITH CPAU DRAWING DT-SE-U-1032. ALTERNATIVELY, A BUSWAY ASSEMBLY AS SHOWN ON SHT. 5 MAY BE USED, WITH UTILITIES' APPROVAL, TO CONNECT THE TRANSFORMER SECONDARY TERMINALS TO THE BUSWAY INSIDE THE TRANSFORMER SECONDARY COMPARTMENT.
2. THE CUSTOMER MAY, WITH UTILITIES' APPROVAL, INSTALL BUSWAY FROM TRANSFORMER TO TRANSITION CABINET AND CABLES FROM TRANSITION CABINET TO CUSTOMER SWITCHGEAR FOR TRANSFORMERS RATED 1000 KVA TO 2500 KVA.
3. ANY ATTACHMENT TO THE TRANSFORMER SECONDARY TERMINALS SHALL BE PERFORMED BY UTILITIES.
4. ALL BUSWAY DESIGN AND CONFIGURATION SHALL BE SUBMITTED TO UTILITIES FOR REVIEW & APPROVAL PRIOR TO PROCUREMENT AND FABRICATION.
5. BUSWAY SHALL CONFORM TO ARTICLE 364 OF THE NATIONAL ELECTRICAL CODE.
6. BUSWAY SHALL BE RATED ACCORDING TO THE SERVICE ENTRANCE OVERCURRENT PROTECTION DEVICE AND FABRICATED PER ANSI 37.23.
7. THE DESIGNATED SERVICE POINT SHALL BE THE SECONDARY TERMINALS OF THE TRANSFORMER.
8. THE TRANSITION CABINET SHALL BE FABRICATED PER DRAWING # SR-XF-E-1020 SHT. 6 OR APPROVED EQUIVALENT.
9. UTILITIES (AT CUSTOMER'S EXPENSE) WILL PROVIDE LUGS ON THE TRANSFORMER SECONDARY TERMINALS. CUSTOMER SHALL PROVIDE/INSTALL LUGS AND TERMINATE CABLES AT SWITCHGEAR OR TRANSITION CABINET.

### TRANSITION CABINET FOR 1000-2500 KVA TRANSFORMERS

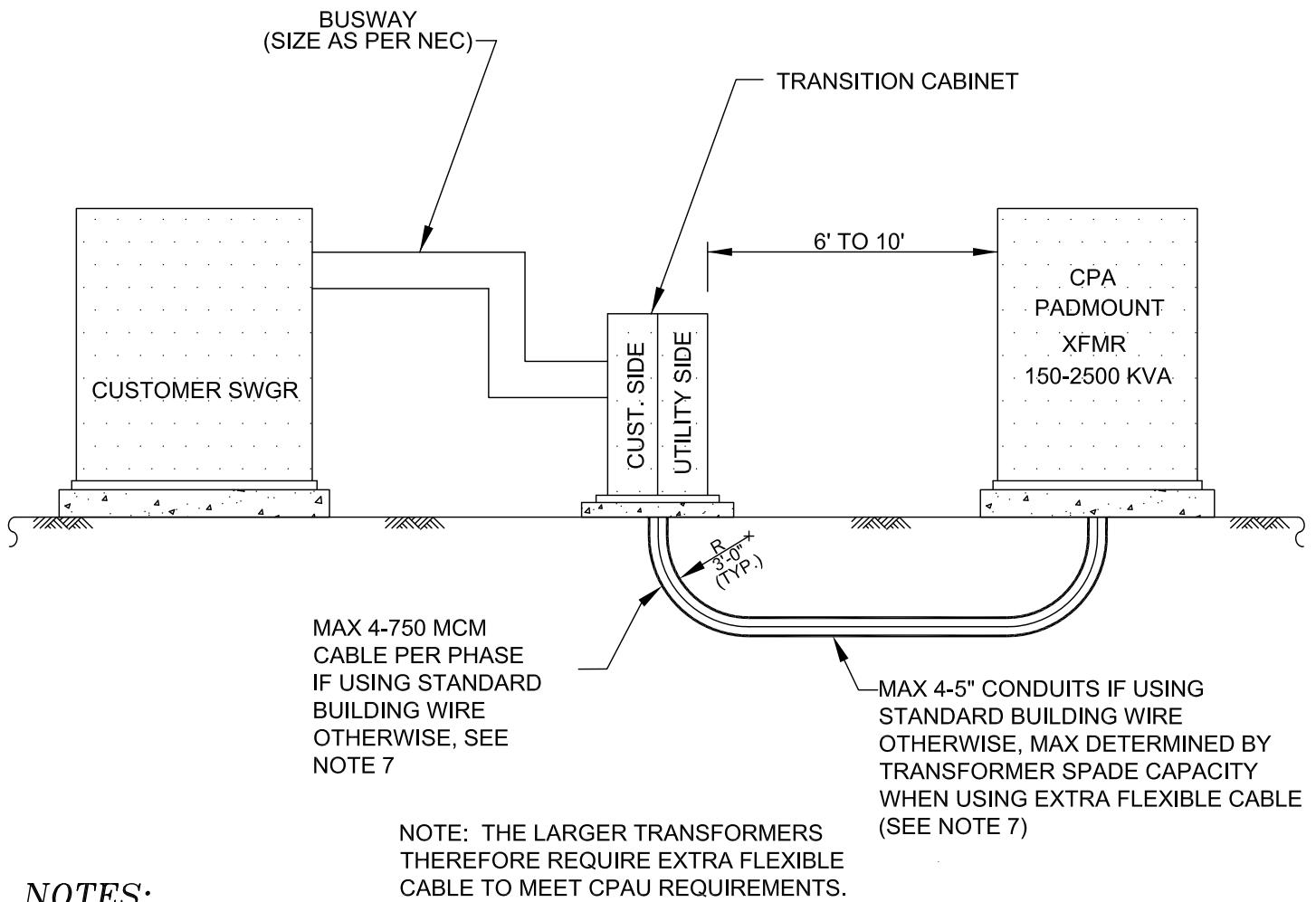
APPROVED	<i>M. J. Jaganath</i> <i>Signed</i> <i>Original and Approved</i> <i>by Engineer Manager</i>
ENGR.	G. Jaganath
DRVN	M. Namshid
CHKD.	P. Valath



### TRANSITION CABINET

City of Palo Alto  
California  
UTILITIES, ELECTRIC ENGINEERING

5	6/13	TING	ADDED NOTE 9 & OTHER MINOR REVISIONS
4	12/08	TING	REVISED NOTES
REV.	DATE	APPR.	DESCRIPTION
MAP #	CKT #	SCALE	S.O.# / DRAWING #
3	02/06	BUJTOR	CONVERTED TO A'CAD, REV'D. NOTES & ADDED DWG. NO.
2	06/99	FINCH	REVISED NOTES
1	3/94	APPR.	DRAWING RENAMED
XX	XX	NTS	SR-XF-E-1020
			SHEET 2 OF 8



### NOTES:

- UTILITIES SHALL FURNISH, INSTALL AND CONNECT THE SERVICE LATERAL CONDUCTORS BETWEEN THE TRANSITION CABINET AND TRANSFORMER SECONDARY TERMINALS IF STANDARD BUILDING WIRE IS USED. OTHERWISE THE CUSTOMER FURNISHES AND INSTALS EXTRA FLEXIBLE CABLE PER SHT. 7 & 8 IN ACCORDANCE WITH CPAU DRAWING # DT-SE-U-1032.
- CUSTOMER HAS THE OPTION TO INSTALL BUSWAY FROM THE CABINET TO THE SWITCHGEAR.
- ALL BUSWAY DESIGN AND CONFIGURATION SHALL BE SUBMITTED TO UTILITIES FOR REVIEW AND APPROVAL PRIOR TO PROCUREMENT AND FABRICATION.
- BUSWAY SHALL CONFORM TO ARTICLE 364 OF THE NATIONAL ELECTRICAL CODE.
- THE DESIGNATED SERVICE POINT SHALL BE THE CUSTOMER SUPPLIED TRANSITION CABINET IF USING STANDARD BUILDING CABLE, THE SECONDARY TERMINALS OF THE TRANSFORMER IF USING EXTRA FLEXIBLE CABLE.
- THE TRANSITION CABINET SHALL BE FABRICATED PER DRAWING # SR-XF-E-1020 SHT. 6 OR APPROVED EQUIVALENT.
- IF USING EXTRA FLEXIBLE CABLE WHERE CABLE AND CONDUITS PER PHASE CAN BE EXCEEDED, CONFIRM THAT TRANSFORMER SPADES HAVE ADEQUATE CONNECTOR HOLES AND HAVE VERTICAL STRUCTURAL SUPPORTS (REF. SHT. 7 & 8).
- UTILITIES (AT CUSTOMER'S EXPENSE) WILL PROVIDE LUGS ON THE TRANSFORMER SECONDARY TERMINALS. CUSTOMER SHALL PROVIDE/INSTALL LUGS AND TERMINATE CABLES AT SWITCHGEAR OR TRANSITION CABINET.

### TRANSITION CABINET FOR 150-2500 KVA TRANSFORMERS

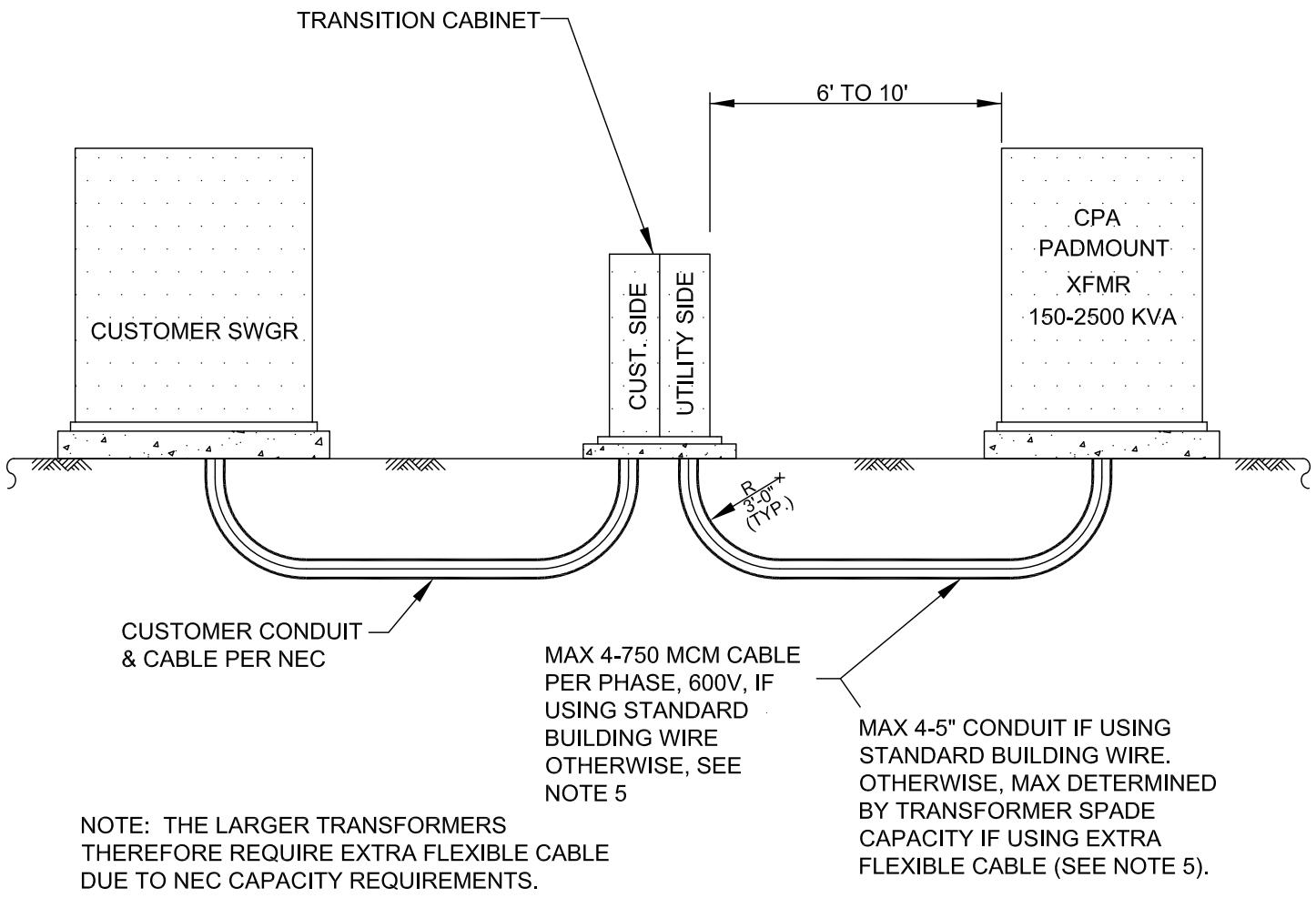
APPROVED	<i>M. J. Valath Signed</i>
SR. ENGINEER MANAGER	<i>M. J. Valath Approved</i>
ENGR.	G. Jagannath
DRVN	M. Namshid
CHKD.	P. Valath



### TRANSITION CABINET

City of Palo Alto  
California  
UTILITIES, ELECTRIC ENGINEERING

4	12/08	TING	REVISED NOTES
3	02/06	BUJTOR	CONVERTED TO A'CAD, REVISED NOTES & ADDED DWG. NO.
2	06/99	FINCH	REVISED NOTES
1	3/94	APPR.	DRAWING RENAMED
REV.	DATE	APPR.	DESCRIPTION
MAP #	CKT #	SCALE	S.O.# / DRAWING #
XX	XX	NTS	SR-XF-E-1020
			SHEET 3 OF 8



## NOTES:

1. THE CITY SHALL FURNISH, INSTALL AND CONNECT THE SERVICE LATERAL CONDUCTORS BETWEEN THE TRANSITION CABINET AND TRANSFORMER SECONDARY TERMINALS IF STANDARD BUILDING WIRE IS USED. OTHERWISE THE CUSTOMER FURNISHES AND INSTALS EXTRA FLEXIBLE CABLE PER SHT. 7 & 8 IN ACCORDANCE WITH CPAU DRAWING # DT-SE-U-1032.
2. CUSTOMER SHALL INSTALL CABLES FROM THE TRANSITION CABINET TO THE SWITCHGEAR.
3. THE DESIGNATED SERVICE POINT SHALL BE THE CUSTOMER SUPPLIED TRANSITION CABINET.
4. THE TRANSITION CABINET SHALL BE FABRICATED PER DRAWING # SR-XF-E-1020 SHT. 6 OR APPROVED EQUIVALENT.
5. IF USING EXTRA FLEXIBLE CABLE WHERE CABLE AND CONDUITS PER PHASE CAN BE EXCEEDED, CONFIRM THAT TRANSFORMER SPADES HAVE ADEQUATE CONNECTOR HOLES AND HAVE VERTICAL STRUCTURAL SUPPORTS (REF. SHT. 7 & 8).
6. UTILITIES (AT CUSTOMER'S EXPENSE) WILL PROVIDE LUGS ON THE TRANSFORMER SECONDARY TERMINALS. CUSTOMER SHALL PROVIDE/INSTALL LUGS AND TERMINATE CABLES AT SWITCHGEAR OR TRANSITION CABINET.

## TRANSITION CABINET FOR 150-2500 KVA TRANSFORMERS

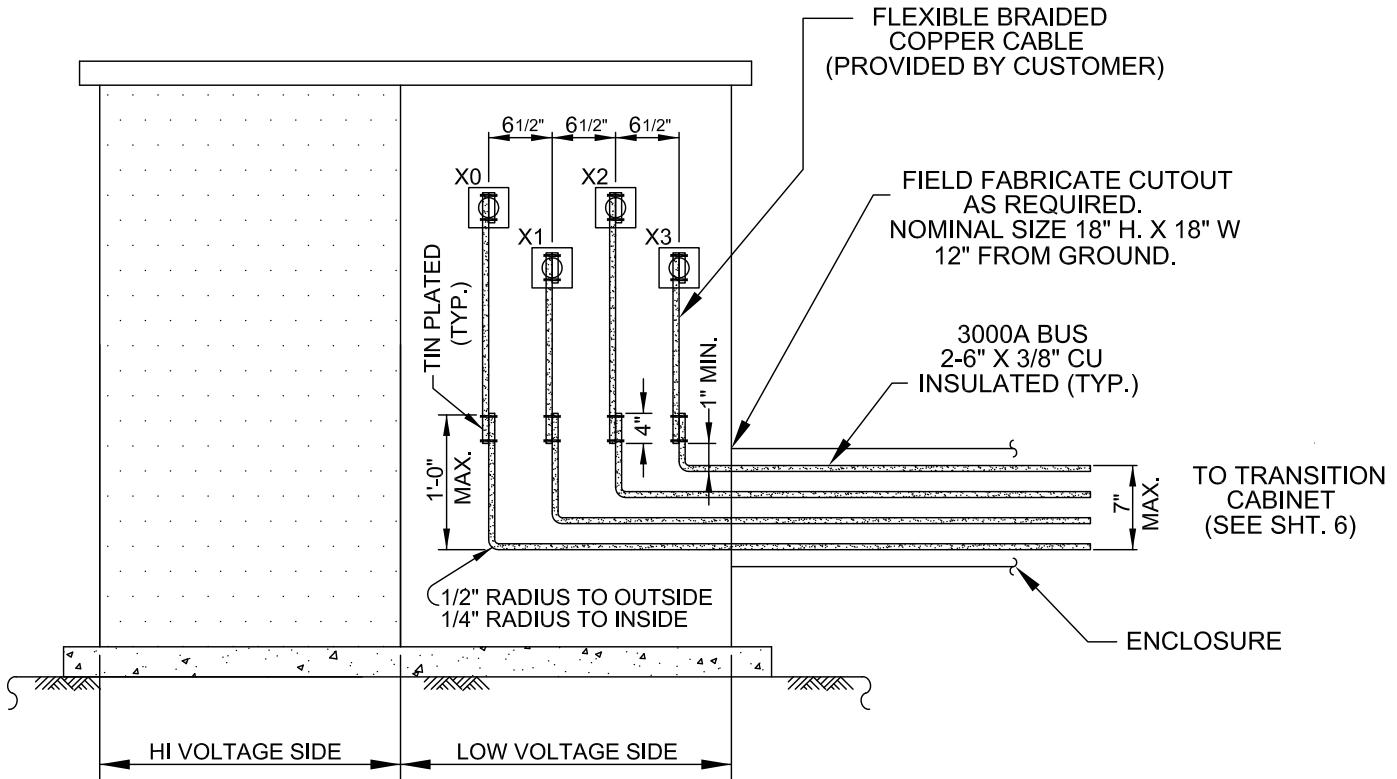
APPROVED	<i>M. J. Gangath</i> <i>Signed</i> <i>Original Approved</i> <i>by Engineering Manager</i>
ENGR.	G. J. Gangath
DRWN	M. Mamshid
CHKD.	P. Valath



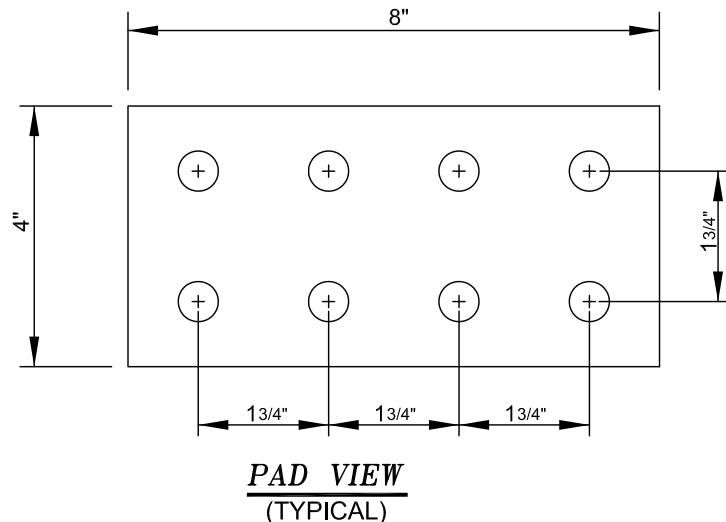
## TRANSITION CABINET

City of Palo Alto  
California  
UTILITIES, ELECTRIC ENGINEERING

4	12/08	TING	REVISED NOTES
3	02/06	BUJTOR	CONVERTED TO A'CAD, REV'D/SD. NOTES & ADDED DWG. NO.
2	06/99	FINCH	REVISED NOTES
1	3/94	APPR.	DRAWING RENAMED
REV.	DATE	APPR.	DESCRIPTION
MAP #	CKT #	SCALE	S.O.# / DRAWING #
XX	XX	NTS	SR-XF-E-1020
			SHEET 4 OF 8



PADMOUNT 3-PHASE DISTRIBUTION TRANSFORMER 1000-2500 KVA



NOTES:

- STANDARD SECONDARY CONNECTION WILL BE MADE WITH EXTRA FLEXIBLE CABLE AS SHOWN ON SHTS. 7 & 8. THIS BUSWAY ARRANGEMENT IS WITH LOCATION SPECIFIC CPA ENGINEERING APPROVAL ONLY. REFERENCE SHTS. 1 & 2.

3000 AMP BUSWAY ARRANGEMENT AT TRANSFORMER

APPROVED	<i>M. D. Signed</i>
SR. ENGINEER / MANAGER	<i>M. D. Signed</i>
ENGR.	J. Jayashri
DRVNW	J. Jayashri
CHKD.	M. Valath

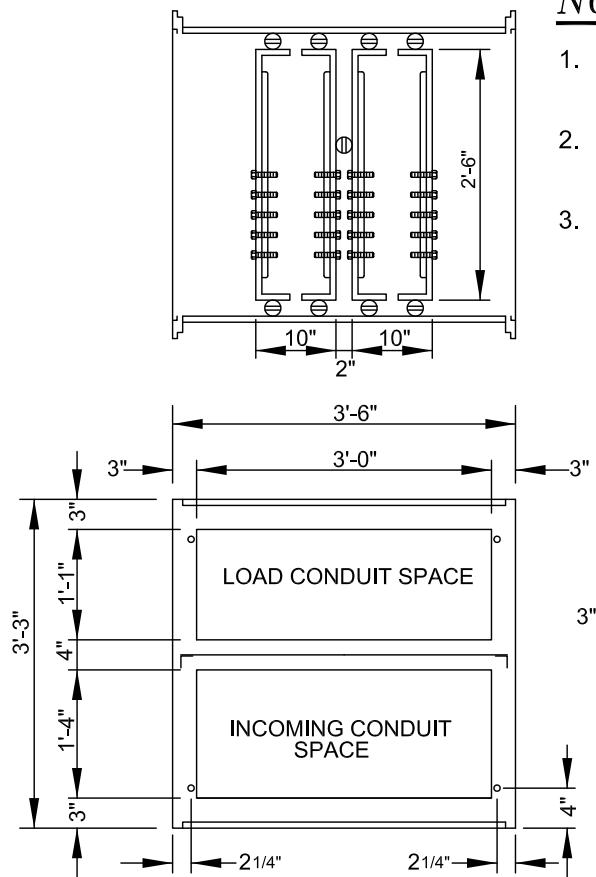
*Original Signed  
by Engineer Manager*



TRANSITION CABINET

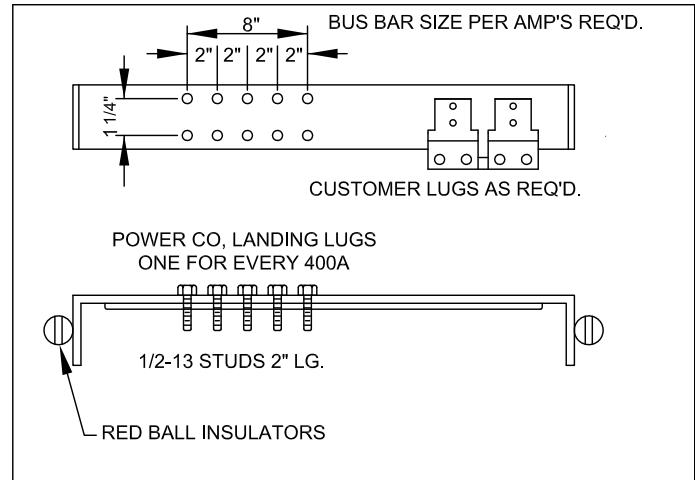
City of Palo Alto  
California  
UTILITIES, ELECTRIC ENGINEERING

6	3/16	TING	REV PAD DIAGRAM
REV.	DATE	APPR.	DESCRIPTION
1	3/94	APPR.	DRAWING RENAMED
2	06/99	FINCH	REVISED NOTES
3	02/06	BUJTOR	CONVERTED TO A'CAD, REV'SD. NOTES & ADDED DWG. NO.
MAP #	CKT #	SCALE	S.O.# / DRAWING #
XX	XX	NTS	SR-XF-E-1020
			SHEET 5 OF 8



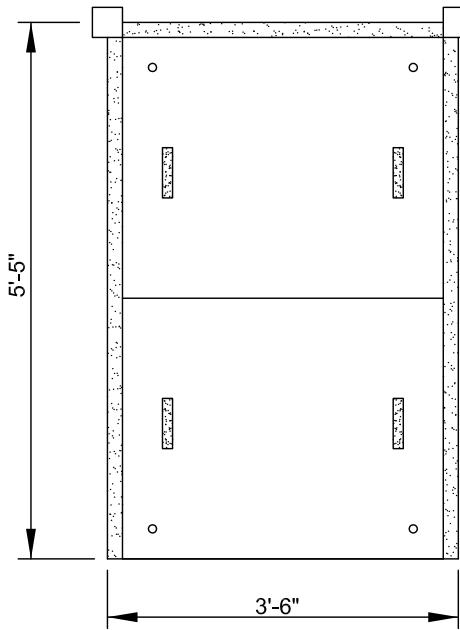
## NOTES:

- SCREWS SHALL BE PROVIDED FOR THE TRANSITION CABINET COVERS BY THE MANUFACTURER AS REQUIRED.
- TWO SEALABLE STUDS WITH WING NUTS SHALL BE PROVIDED FOR EACH TRANSITION CABINET COVER.
- TRANSITION CABINET WILL BE I.E.M. OR APPROVED EQUIVALENT.

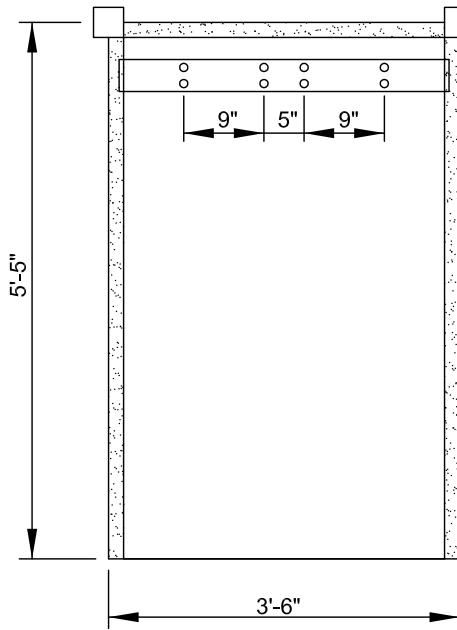


BASE DETAIL

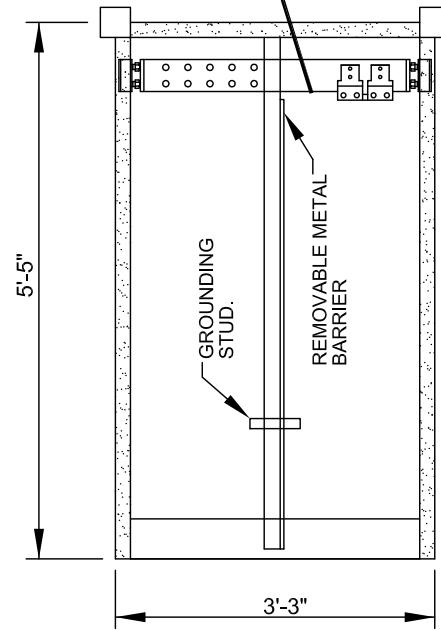
BLOW UP VIEW



FRONT VIEW



FRONT INTERIOR VIEW



SIDE VIEW

## TYPICAL TRANSITION CABINET FOR LARGER SERVICES

APPROVED	
<i>M. Jamshid</i>	
MANAGER / ENGINEER	
ENG'D.	G. M. Gannath
DRVR.	M. Jamshid
CHKD.	P. Valath

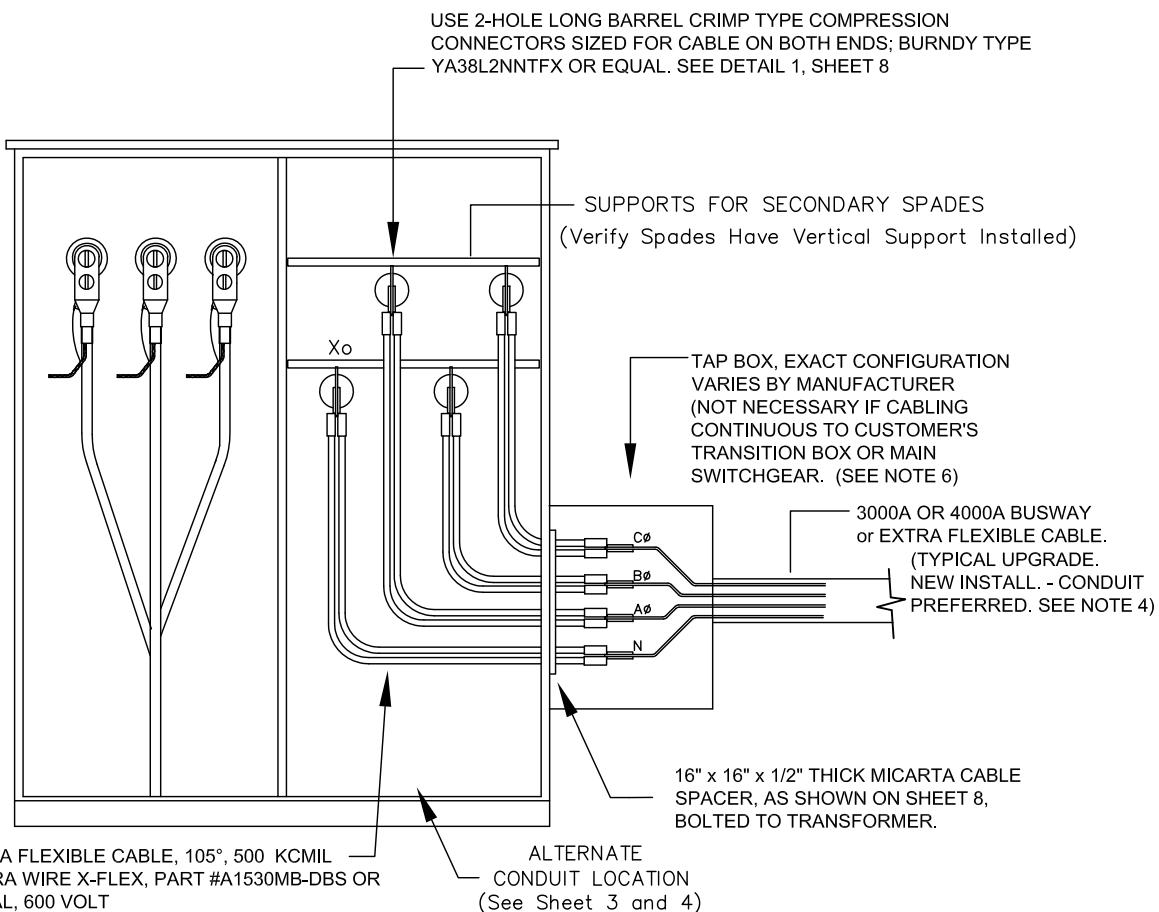
*Original Design  
and Approved  
by Engineering  
Manager*



## TRANSITION CABINET

City of Palo Alto  
California  
UTILITIES, ELECTRIC ENGINEERING

REV.	DATE	APPR.	DESCRIPTION
1	3/94	APPR.	DRAWING RENAMED
2	06/99	FINCH	REVISED NOTES
3	02/06	BUJTOR	CONVERTED TO A'CAD, REV'SD. NOTES & ADDED DWG. NO.
MAP #	CKT #	SCALE	S.O.# / DRAWING #
XX	XX	NTS	SR-XF-E-1020
			SHEET 6 OF 8



UTILITY GUIDE ONLY:

750 KVA: 4 (@ 480 V) OR 6 (@ 208 V) CONDUCTORS PER PHASE AND NEUTRAL  
 1000 KVA: 4 CONDUCTORS PER PHASE AND NEUTRAL  
 1500 KVA: 4 CONDUCTORS PER PHASE AND NEUTRAL  
 2000 KVA: 6 CONDUCTORS PER PHASE AND NEUTRAL  
 2500 KVA: 7 CONDUCTORS PER PHASE AND NEUTRAL

### NOTES:

- CABLE TO BE SIZED PER CPAU DWG # DT-SE-U-1032. IF USING ALTERNATE CONDUIT LOCATION, STANDARD CABLE MAY BE USED, NOT TO EXCEED 4-750 MCM PER PHASE AND IN ACCORDANCE WITH CPAU DWG # DT-SE-U-1032.
- THE DESIGNATED SERVICE POINT PER THE NATIONAL ELECTRIC CODE SHALL BE THE SECONDARY TERMINALS AT THE TRANSFORMER.
- THE CUSTOMER SHALL FURNISH ALL HARDWARE AND MATERIALS NEEDED FOR A COMPLETE INSTALLATION.
- IF GREATER THAN 3000A SERVICE, CALL CPA UTIL. ENGR. DEPT. AT 566-4500. USE OF 750KCMIL AND ELIMINATION OF TRANSITION CABINET MAY BE POSSIBLE.
- CABLING BETWEEN TRANSFORMER AND CUSTOMER'S SWITCHGEAR SHALL BE SIZED PER CPAU DWG # DT-SE-U-1032 IF NOT USING A TRANSITION CABINET.
- UTILITIES (AT CUSTOMER'S EXPENSE) WILL PROVIDE LUGS ON THE TRANSFORMER SECONDARY TERMINALS. CUSTOMER SHALL PROVIDE/INSTALL LUGS AND TERMINATE CABLES AT THE TAP BOX.

6	3/16	TING	ADDED NOTE 6
5	1/12	TING	REVISED UTL GUIDE
4	12/08	TING	REVISED NOTES
3	02/06	BUJTOR	CONVERTED TO ACAD, REV'D, NOTES & ADDED DWG. NO.
2	06/99	FINCH	REVISED NOTES
1	3/94	APPR.	DRAWING RENAMED
REV.	DATE	APPR.	DESCRIPTION
MAP #	CKT #	SCALE	S.O.# / DRAWING #
XX	XX	NTS	SR-XF-E-1020
			SHEET 7 OF 8

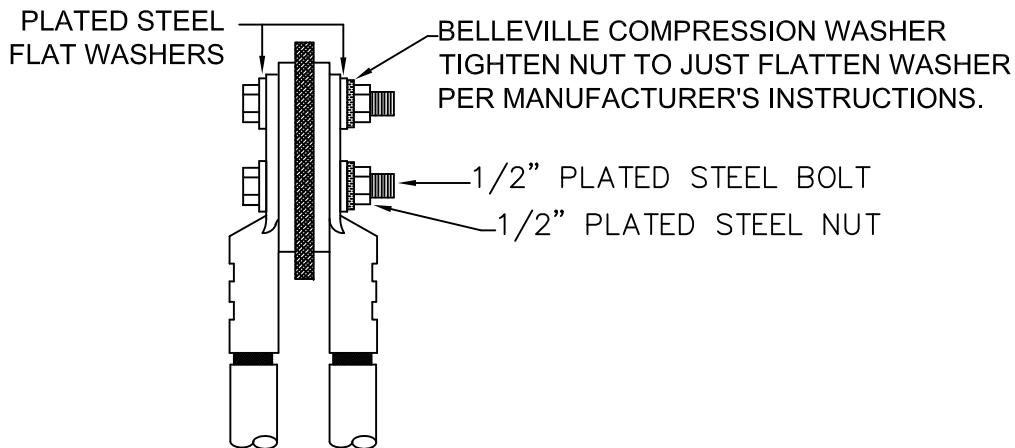
APPROVED _____	_____
SUPERVISOR / ENGINEER / MANAGER	_____
ENGR. _____	BUJTOR
DRWN. _____	T.OMAPPI
CHKD. _____	S.ZUCCARO

*Original Signed  
and Approved  
Manager*

### TRANSITION CABINET



**City of Palo Alto**  
**California**  
 UTILITIES, ELECTRIC ENGINEERING



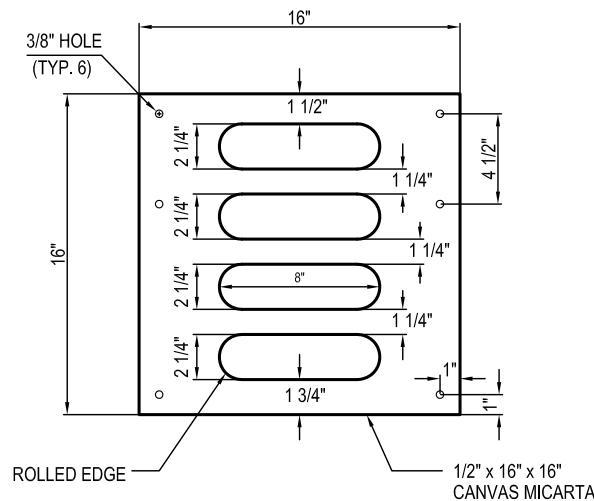
### DETAIL 1: SECONDARY CABLE CONNECTION

#### MATERIALS

COMPRESSION CONNECTORS: BURNDY YA38L2NNTFX (OR EQUIVALENT)  
CONNECTOR FOR 535.3 KCMIL CABLE WITH DIE (BURNDY L99)  
RECOMMENDED BY TOOL MANUFACTURER.

BELLEVILLE SPRING WASHERS: T&B STAINLESS STEEL, 1/2"; #50050BW

CANVAS MICARTA BOARD: RIDOUT PLASTICS, WWW.RIDOUTPLASTICS.COM,  
858.560.1551, ANGUS-CAMPBELL, INC. 323.587.1236, OR PORT PLASTICS,  
408.571.2231



### BUSWAY CONNECTION FOR TRANSFORMER SECONDARY

APPROVED	<i>Original signed and Approved by Engineering Manager</i>
MBU TOR	
SENGEREE MANAGER	
EGR J. P. TUTOR	
DRW T. M. TIPPI	
CHKD S. ZUCCARO	

### TRANSITION CABINET



City of Palo Alto  
California  
UTILITIES, ELECTRIC ENGINEERING

5	6/13	TING	REVISED MATERIAL NOTE
4	12/08	TING	REVISED BOARD
3	02/06	BUJTOR	CONVERTED TO A'CAD, REV'D SD. NOTES & ADDED DWG. NO.
2	06/99	FINCH	REVISED NOTES
1	3/94	APPR.	DRAWING RENAMED
REV.	DATE	APPR.	DESCRIPTION
XX	XX	NTS	SR-XF-E-1020
			SHEET 8 OF 8



## Electric Utility Service Equipment Requirements Committee

Utility: Palo Alto, City of  
Contact Name: Jeff Wickstrom  
Phone Number: 650-496-6987

Place an X in the appropriate box for each drawing: A = Acceptable, C = Consult, U = Unacceptable, N/A = Not Applicable

Drwg	A	C	U	N/A	Explain all "C's"
301	x				
301A	x				
302	x				
302A		x			See notes below
302B	x				
303			x		
304	x				
305	x				
305A	x				
306	x				
307	x				
308	x				
309	x				
311	x				
312	x				
313	x				
314	x				
315	x				
316	x				
317		x			1 phase only
318	x				
319	x				
320	x				
321			x		
322	x				
323			x		
324	x				
325	x				
326	x				
327	x				
328A	x				
328B	x				
329A	x				
329B	x				
330	x				
331	x				
332	x				
333			x		
336			x		
338			x		
339			x		
342	x				
343			x		
343A			x		

## NOTES

Drwg

302A	Bypasses on 400 Amp services	353	Clearances will be enforced
		418	CPA does not use this configuration

**ELECTRIC APPLICATION  
TEMPORARY ELECTRIC SERVICE**

**THIS FORM MUST BE FILLED OUT COMPLETELY BEFORE IT CAN BE PROCESSED. SHADED AREAS ARE FOR CPAU USE ONLY.**

*This form will be sent back to the applicant after review.*

- THIS APPLICATION IS FOR TEMPORARY SERVICE ONLY. A SEPARATE "UTILTIY APPLICATION" MUST BE COMPLETED FOR THE PERMANENT SERVICE.
- SUBMIT THIS FORM TO THE BUILDING DEPARTMENT 285 HAMILTON, PALO ALTO, CA 94301 OR FAX TO (650) 566-4536 OR DELIVER IT TO 1007 ELWELL CT., PALO ALTO, CA 94303
- FOR QUESTIONS CALL THE ELECTRIC ENGINEERING MAIN LINE AT (650) 566-4500.

Building Department Permit Number:	Utilities Engineering Permit Number:		
Project Address:	Date:		
Name of Applicant / Company:	Tel:		
Address:	City / State:	Zip:	Email:
<b><u>**BILLING INFORMATION**</u></b>			
Name:	Tel:		
Address:	City / State:	Zip:	Email:

<b>SERVICE TYPE (check appropriate boxes)</b> <input type="checkbox"/> Overhead <input type="checkbox"/> Underground <input type="checkbox"/> Commercial <input type="checkbox"/> Residential				
<b><u>**Attach a site plan (and a photograph of proposed service location) showing the outline of the dwelling, property lines, existing and proposed service locations. **</u></b>				

SERVICE INFORMATION		REQUESTED (circle appropriate information)		
Service Voltage		120/240V 1 phase	120/208V 1 phase	120/208V 3 phase
Service Location		Temp Post		Portable Building
Main Switch Size (Amps)		100 Amp	200 Amp	Other (specify): _____

Electric Service Information <i>(CPAU Use ONLY)</i>		Service Order Number		
Estimated Demand	kVA	Transformer kVA and Type		
Map Number		Transformer Number(s)		Pole #
Fees	\$	Minimum AIC rating of Electric Panel for requested service:	,000 A Sym at ,000 A Sym at	V for 1 phase, 3 wire V for 3 phase, 4 wire

- ALL work per NEC and CPA Standards.
- CALL the Electric Engineering Main Line 566-4500 to have the TEMP POST or PORTABLE BUILDING location marked prior to installation.
- All work must be inspected and approved by the CPAU Inspector (650-496-6977) and Building Department (650-329-2496) prior to final connection by Electric Operations.
- Call Electric Operations (650-496-6914) for a service Disconnect / Reconnect.
- AIC Rating for the electric panel proposed for the above project must be at least ,000amps (line to neutral)
- Installation will be granted 1 -2 business days after all fees are paid.

Approved by:	Tel:	Date:
--------------	------	-------



# City of Palo Alto, Utilities

Electric Engineering Division



CITY OF PALO ALTO  
UTILITIES

## OVERHEAD TEMPORARY ELECTRIC SERVICE CHECKLIST

Dear Palo Alto Resident/Contractor,

The objective of this informational sheet is to help complete your project in a smooth and efficient manner, thus avoiding unnecessary delays, corrections and additional inspections.

Please remember that it is your responsibility to insure that projects conform to Palo Alto Electric Service Requirements. Electric Operations Crews will not connect non-compliant services.

We invite you to visit our website to consult our Electric Service Requirements Manual. Feel free to download it and print it in part or in its entirety. It is advisable to do so at the designing stage of your project. You can find us at: [www.cityofpaloalto.org/ElectricServiceRequirements](http://www.cityofpaloalto.org/ElectricServiceRequirements)

Any new or upgraded overhead electric service requires inspection and approval from a Building Department inspector prior to energizing. Electric Operations Crews will connect an electric service only if it was inspected, passed and received a yellow sticker of approval.

Please go over the checklist below before calling to schedule an inspection. Check each item as you verify that your project complies. Keep in mind that this is just an aid to you and in no way or manner excludes other parts of your project that are not listed here from having to meet our standards and to be in compliance with applicable requirements. Also, you'll find a sample of typical service requirements in the back of this page.

- Building Permit application
- Utility Service Application
- Pay fees
- Call customer service for Account set-up & appointment for disconnecting old service
- Consult CPAU Dwg. SR-TS-O-1006 and SR-TS-O-1007 for details.
- Correct placement of electric meter, electric panel and clearances with respect to other utilities. (Gas)
- Correct clearances between conductors and structures (see back of page)
- Correct lengths of wire for splicing/connecting the service (24" min. extending from weather head)
- Call Building inspections for Final – issues a meter "set tag" and yellow sticker
- Call Utilities Customer Service to arrange "Temp Service" connection
- Contact Customer Service for disconnect / removal of "Temp Service"

For your convenience, we are including a list of telephone numbers to call when in need of additional information or to schedule inspections.

- Building Department (Inspections).....(650) 329 2496
- Electric Meter Shop.....(650) 496 6978
- Dispatch .....(650) 496 6914
- Utilities Customer Service .....(650) 329 2161

(Please make sure to have both, the "Green" and "Yellow" Stickers on your inspected service)

PLEASE REMEMBER: Only qualified CPA electric personnel can enter vaults and boxes, connect, disconnect or reconnect electric services, and/or remove/install electric meters. Illegally connected services are subject to prosecution, will be disconnected, and reconnected only after ensuing investigations are completed.

# City of Palo Alto, Utilities

Electric Engineering Division



CITY OF PALO ALTO  
UTILITIES

## UNDERGROUND TEMPORARY ELECTRIC SERVICE CHECKLIST

Dear Palo Alto Resident/Contractor,

The objective of this informational sheet is to help complete your project in a smooth and efficient manner, thus avoiding unnecessary delays, corrections and additional inspections.

Please remember that it is your responsibility to insure that projects conform to Palo Alto Electric Service Requirements. Electric Operations Crews will not connect non-compliant services.

We invite you to visit our website to consult our Electric Service Requirements Manual. Feel free to download it and print it in part or in its entirety. It is advisable to do so at the designing stage of your project. You can find us at: [www.cityofpaloalto.org/ElectricServiceRequirements](http://www.cityofpaloalto.org/ElectricServiceRequirements)

Please go over each item of the checklist below to verify that your project complies. Keep in mind that this is just an aid to you and in no way or manner excludes other parts of your project that are not listed here from having to meet our standards and to be in compliance with applicable requirements. Also, you'll find a sample of typical service requirements in the back of this page. Electric Operations Crews will connect an electric service only after it was inspected and received: a green sticker of approval from underground inspection AND a yellow sticker of approval from Building inspection.

- Building Permit application
- Electric Service application
- Pay fees
- Call Underground Service Alert (USA -1 800 227 2600) before you dig
- Call Customer Service for Account set-up / appt for disconnect old service
- Contact Electric Underground Inspector:
  - ✓ 48 hrs+ before digging to confirm routing
  - ✓ Correct placement of electric meter, electric panel and correct clearances with respect to other utilities (Gas)
    - a. No more than three 90 degree bends, (270 degrees total) between pull boxes in a conduit run
    - b. Trenches for residential services: 24" cover in non-traffic areas. 30" cover in traffic areas
    - c. For conduit below ground, use schedule 40 or DB-120 PVC only
  - ✓ Pulling of appropriate size mandrel throughout the entire conduit system (No blockage test)
  - ✓ Pulling conductors (see CPAU Dwg. SR-TS-U-1008) from pull box to service. (Slack at the box= 2 X box length)
  - ✓ Conduit installation must be approved by CPA Underground Inspector prior to backfilling for green sticker.
- Call Building inspections for Final – issues a meter "set tag" and yellow sticker
- Call Utilities Customer Service to arrange "Temp Service" connection
- Contact Utilities Customer Service for disconnect / removal of "Temp Service"

Telephone numbers to call when in need of additional information or to schedule inspections:

(All service requests and inspections are completed in the order received. There is no need to call repeatedly.)

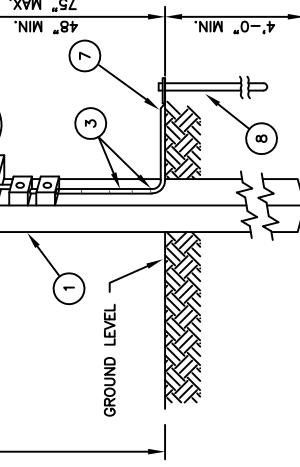
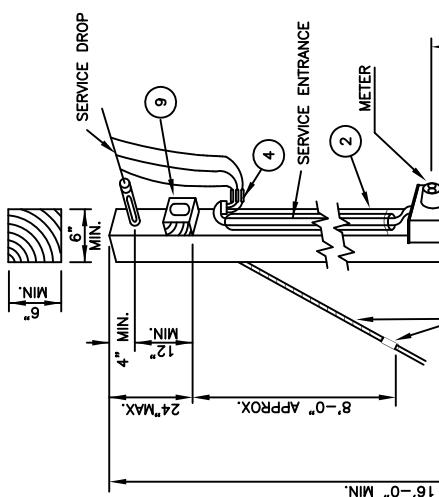
- Building Department (Inspections).....(650) 329 2496
- Utility Underground Inspector .....(650) 496 5934
- Electric Meter Shop .....(650) 496 6978
- Dispatch .....(650) 496 6914
- Utilities Customer Service .....(650) 329 2161

(Please make sure to have both, the "Green" and "Yellow" Stickers on your inspected service)

PLEASE REMEMBER: Only qualified CPA electric personnel can enter vaults and boxes, connect, disconnect or reconnect electric services, and/or remove/install electric meters. Illegally connected services are subject to prosecution, will be disconnected, and reconnected only after ensuing investigations are completed.

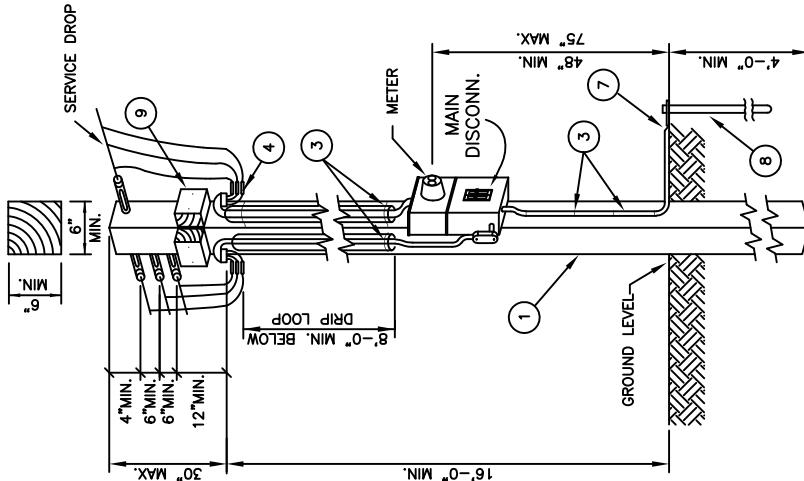
SERVICE DROP CABLE TO RECEPTACLES

SERVICE DROP CABLE TO OVERHEAD LINE



NOTES:

- POLE - 6"X 6"X 20'-0" (MIN. LENGTH)
- CONDUIT - GALV. RIGID STEEL, EMT, OR PVC SCH 40
- CONDUIT - GALV. RIGID STEEL WITH PIPE STRAP
- WIRE, INSULATED, SIZE AS REQ'D. (24" MIN. EXTENSION FROM WEATHERHEAD FOR Drip LOOP)
- GUY CABLE - 1/4" MIN. GALV. STEEL WITH GUY STRAIN INSULATOR (10,000 LB. MIN.), ANCHOR AND FITTINGS.
- PUSH BRACE - TWO 2" X 4" MIN. TIMBER (BOLTED TO POLE) WITH CROSS BRACE.
- CONDUIT GROUNDING HUB AND CLAMP
- GROUND - 5/8" X 8' ROD
- WOOD BLOCK - 4" X 4" X 6"



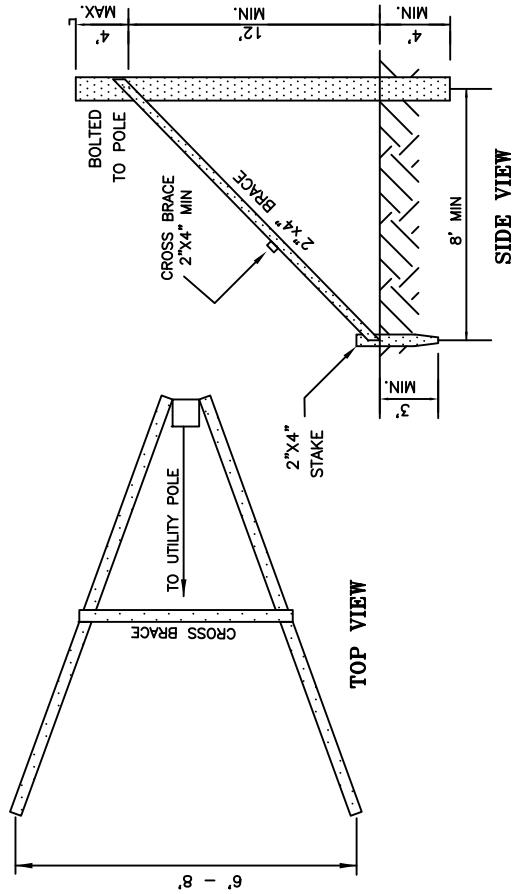
LOCATE SERVICE POLES SUCH THAT:

- IT IS ON PRIVATE PROPERTY ONLY.
- IT IS AT LEAST 10' BUT NO MORE THAN 100' FROM THE UTILITY POLE.
- THERE IS A CLEAR UNOBSTRUCTED PATH TO THE UTILITY POLE FOR THE SERVICE DROP.
- IT DOES NOT REQUIRE THE SERVICE DROP TO CROSS OVER ANY BUILDINGS OR OTHER PROPERTY.
- CONTACT UTILITIES ELECTRIC ENGINEERING AT (650) 566-4500 IF THERE ARE QUESTIONS ON PLACEMENT.

Service Voltage (Volts)	Main Service (Amps)	Customer's Minimum Conduit Size	CPAU Approved Conductor Size	
			AL	CU
120/240	125	2"	1/0	2
1-phase	200	2"	4/0	2/0
3 wire	400*	4"	750	500
120/208	200	2"	4/0	2/0
1-phase 3 wire				

\* Note: Class 320 (Residential only)

WOOD BRACE



RECOMMENDED SERVICE ENTRANCE CONDUCTOR

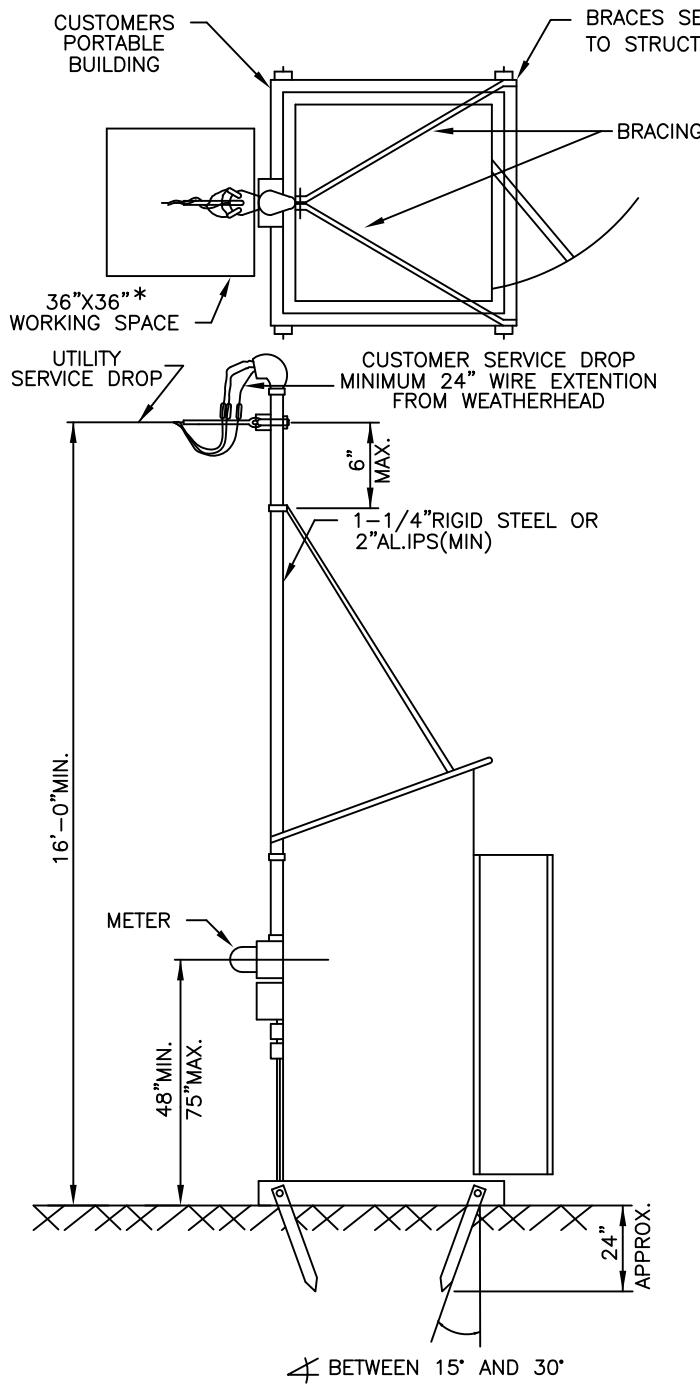
Service Voltage (Volts)	Main Service (Amps)	Customer's Minimum Conduit Size	CPAU Approved Conductor Size
120/240	125	2"	1/0
1-phase	200	2"	4/0
3 wire	400*	4"	750
120/208	200	2"	4/0
1-phase 3 wire			

\* Note: Class 320 (Residential only)

NTS	SR-TS-O-1006	1 of 1
SCALE	STANDARD NO.	SHEET NO.

APPR	REV DATE	DESCRIPTION
4	6/13	REVISED NOTES, 2 BRACES
3	11/08	REVISED
2	12/06	REVISED
1	6/99	REVISED
REV	DATE	

Engineering Standard	Overhead Temporary Service
Approved 12/2006 <i>Signature</i> FBI APPROVING ENGINEER DRAFTED BY CHECKED BY	CITY OF PALO ALTO CALIFORNIA



#### \* FOOTNOTE:

WORKING SPACE IN FRONT OF METER SHALL NOT BE OBSTRUCTED.

APPROVED _____ Original Signed and Approved by Engineering Manager	199	ENGINEERING STANDARD TEMPORARY SERVICE STRUCTURES				
ENGR. _____ MANAGER	PEV		2	1/12	RENAMED & REVISED	TT
DRAWN _____ DESIGNER	PEV		1	8/08	REVISED	TT
CHECKED _____ MANAGER	PEV		REV	DATE	DESCRIPTION	APPR
CITY OF PALO ALTO CALIFORNIA		NTS	SR-TS-0-1007	1 of 1		
		SCALE	STANDARD NO.	SHEET NO.		

## TEMPORARY SERVICE ATTACHMENT

TEMPORARY SERVICES SHALL NOT ATTACH TO ANY STRUCTURE CONSIDERED TO BE OF INADEQUATE STRENGTH. THE STRUCTURE SHALL BE WELL-FIXED AND CAPABLE OF SUPPORTING THE SERVICE SPAN.

## PORTABLE BUILDINGS

SMALL SHEDS, OFFICES, TOILETS, ETC. ARE NOT CONSIDERED WELL-FIXED UNLESS STAKED IN PLACE AS SHOWN.

## ANCHORING:

THE STRUCTURE SHOULD BE SECURELY ANCHORED IN PLACE BY ONE OF THE FOLLOWING:

1. FOUR 2"X4" MIN. WOOD STAKES DRIVEN AT LEAST 2' INTO THE GROUND AND ATTACHED TO THE STRUCTURE'S FRAMEWORK.
2. FOUR STEEL STAKES, WITH STRENGTH EQUIVALENT TO 3/4" RIGID STEEL PIPE, DRIVEN AT LEAST 2' INTO THE GROUND AND ATTACHED TO THE STRUCTURE'S FRAMEWORK BY 1/4" MIN. BOLTS OR LAG SCREWS. STEEL STAKES MAY ALSO BE SECURED BY CROSMEMBERS FIRMLY CONTACTING THE UPPER SURFACE OF THE BASE OF THE STRUCTURE.

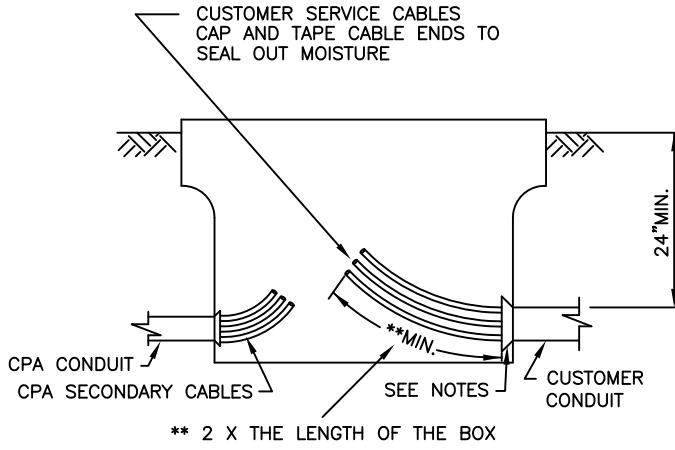
CONTACT UNDERGROUND SERVICE ALERT AT 1-800-227-2600 TO LOCATE UNDERGROUND FACILITIES PRIOR TO INSTALLING ANCHORS.

## PERISCOPE MAST BRACING

TWO GALVANIZED STEEL BRACES (3/4" GALV. RIGID STEEL PIPE OR 1-1/4"X1-1/4"X1/8" GALV. STEEL ANGLE IRON MIN.) SECURELY BOLTED OR LAGGED TO THE FRAMEWORK WITH 3/8"X3" LAG SCREWS WITH A 90° SPREAD SECURED TO THE PERISCOPE NO MORE THAN 6" BELOW THE POINT OF ATTACHMENT.

## LOCATE TEMPORARY SERVICE STRUCTURES SO THAT:

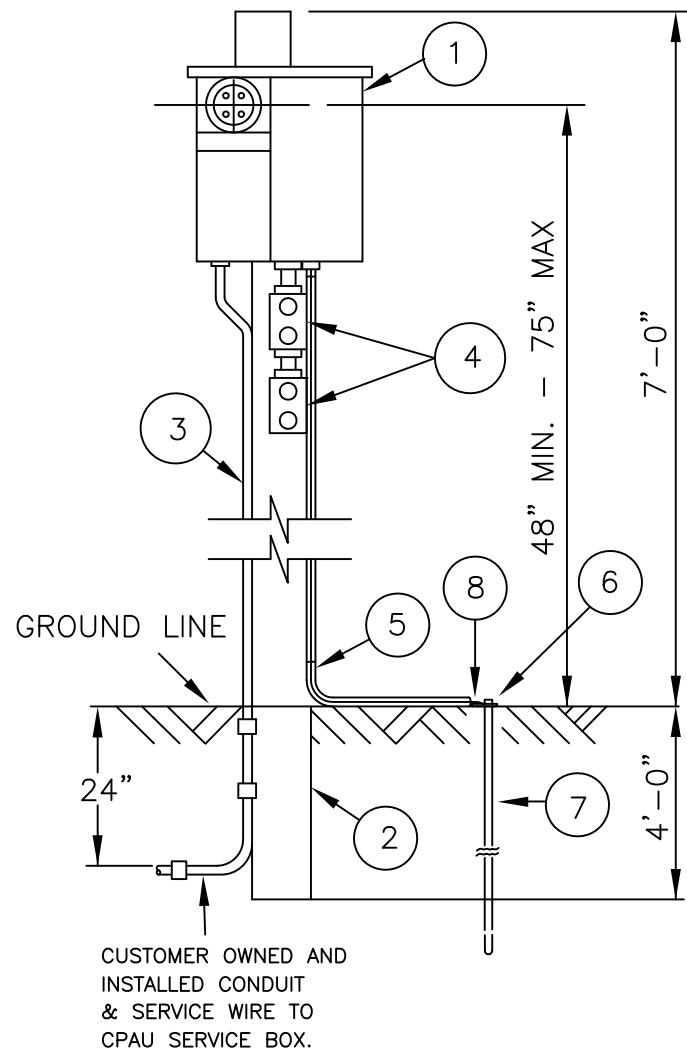
- IT IS ON PRIVATE PROPERTY ONLY.
- SERVICE ATTACHMENT POINT IS AT LEAST 10' BUT NO MORE THAN 100' FROM THE UTILITY POLE.
- THERE IS A CLEAR UNOBSTRUCTED PATH TO THE UTILITY POLE FOR THE SERVICE DROP.
- IT DOES NOT REQUIRE THE SERVICE DROP TO CROSS OVER ANY BUILDINGS OR OTHER PROPERTY.
- CONTACT UTILITIES ELECTRIC ENGINEERING AT (650) 566-4500 IF THERE ARE QUESTIONS ON PLACEMENT.



ONLY CPA ELECTRIC OPERATIONS CREWS  
SHALL MAKE CONNECTIONS IN THE BOX

#### NOTES:

1. TRENCH TO BE INSPECTED BY THE ELECTRIC UNDERGROUND INSPECTOR PRIOR TO BACKFILLING. INSPECTOR MUST BE PRESENT WHEN INSTALLING CONDUIT OR PULLING CABLE INTO CPAU BOX.
2. STEEL CONDUITS SHALL EXTEND 2" MAX. INTO BOX AND SHALL TERMINATE WITH INSULATED BUSHINGS. PLASTIC CONDUITS SHOULD BE TERMINATED WITH BELL ENDS FLUSH WITH THE WALL OF THE BOX. ALL CONDUIT ENTRANCES SHALL BE GROUTED.



#### SERVICE LATERAL CONDUIT AND CABLE SIZE

Service Voltage (Volts)	Main Service (Amps)	Customer's Minimum Conduit Size	CPAU Approved Conductor Size **	
			AL	CU
120/240 1-phase 3 wire	125	2"	1/0	2
	200	3"	4/0	2/0
	400*	4"	350	4/0
120/208 1-phase 3 wire	200	3"	4/0	2/0

\* CLASS 320 (UNDERGROUND RESIDENTIAL ONLY)

\*\* CONDUCTOR SIZE IS PER PHASE AND A FULL SIZE NEUTRAL IS REQUIRED.

#### MATERIALS:

1. SERVICE TERMINATION ENCLOSURE, COMBINATION METER SOCKET PANEL AND MAIN DISCONNECT
2. POST, MIN. DIM. 4" X 4" X 11'-0".
3. CONDUIT, GALVANIZED RIGID STEEL OR PVC SCH 40, MIN. SIZE 2".
4. WEATHERPROOF OUTLETS.
5. CONDUIT, GALVANIZED RIGID STEEL WITH PIPE STRAP.
6. HUB AND CLAMP GROUNDING.
7. GROUND ROD, 5/8" X 8'
8. GROUND WIRE, BARE COPPER (SIZE IN ACCORDANCE WITH ELECT. CODES & LOCAL REQ.)

APPROVED 11/2006	ENGINEERING STANDARD		3	7/16	REVISED CONDUIT TABLE	TT
MANAGER	UNDERGROUND TEMPORARY SERVICE		2	1/12	REVISED MATERIAL ITEM 3, 5	TT
ENGR	PEV		1	8/08	REVISED	TT
DRAWN	PEVS		REV	DATE	DESCRIPTION	APPR
CHECKED	PEV					
<b>CITY OF PALO ALTO CALIFORNIA</b>			NTS	SR-TS-U-1008		1 of 1
			SCALE	STANDARD NO.		SHEET NO.

Original Signed  
and Approved  
by Engineering  
Manager



# UTILITY SERVICE APPLICATION FOR PERMANENT SINGLE FAMILY RESIDENTIAL ELECTRIC, WATER, GAS, AND WASTEWATER SERVICE

**THIS FORM MUST BE FILLED OUT COMPLETELY BEFORE THIS APPLICATION CAN BE PROCESSED.**

*Applicants requesting electric service will receive a copy of this form with City of Palo Alto Utilities (CPAU) comments upon completion of review and approval.*

Project Address:		Building Permit Number:
Name of Applicant/ Company		<input type="checkbox"/> Owner <input type="checkbox"/> Contractor <input type="checkbox"/> Consultant
Address	Email:	
City / State / Zip		Phone #
<b><u>CONNECTION / INSTALLATION FEE BILLING INFORMATION</u></b>		
Name		Email:
Address		
City / State / Zip		Phone #
Services Requested and desired date:		<input type="checkbox"/> Electric _____ <input type="checkbox"/> Water _____ <input type="checkbox"/> Gas _____ <input type="checkbox"/> Wastewater _____
<b>Project Type (check all boxes that apply)</b>		<input type="checkbox"/> New Construction/New Service <input type="checkbox"/> Addition/Rebuild   Total building area _____ SQ FT
<b>Description of Work (pertaining to Utilities)</b>		

**Please attach a site plan and floor plans showing existing & proposed water, gas, and electric service locations; street side sanitary sewer cleanout; backflow preventers; window schedule; and elevation pages. NO FULL SET SUBMITTALS REQUIRED**

<b>WATER LOADS (PER METER)</b>		<b>GAS (PER METER) &amp; ELECTRIC LOADS</b>		
DESCRIPTION	QTY	DESCRIPTION	LOADS (EXISTING + NEW)	UNIT
NUMBER OF FULL BATHROOMS		WATER HEATER/TANKLESS		BTUH
NUMBER OF HALF BATHROOMS		POOL/SPA HEATER		BTUH
ADDITIONAL SHOWERS TO A BATHROOM		SPACE HEATING/HEAT PUMP		BTUH
NUMBER OF KITCHENS (1 SINK & 1 DISHWASHER)		COOKING EQUIPMENT		BTUH
NUMBER OF LAUNDRY (1 SINK & 1 WASHING MACHINE)		CLOTHES DRYER		BTUH
NUMBER OF HOSE BIBS		FIRE LOG/FIREPLACE		BTUH
NUMBER OF SINKS/WETBARS (NOT KITCHEN SINK)		AIR CONDITIONING		kW
FIRE SPRINKLER LOAD IN GPM		ELECTRIC VEHICLE CHARGER		kW
<b>TYPICAL GAS APPLIANCES</b>		PHOTOVOLTAIC/GENERATOR		kW
APPLIANCES	BTUH	APPLIANCES	BTUH	OTHERS
BARBEQUE	75,000	RECESSED OVEN	25,000	
CLOTHES DRYER	35,000	FIREPLACE/LOG	50,000	
GAS RANGE	65,000	TOP BURNER	40,000	

## **ELECTRIC (Include Electric Single Line Diagram of Proposed Installation)**

SERVICE INFORMATION	Existing		Requested	
Main Switch Size (Amps)				
Service Type (Check One)	<input type="checkbox"/> Overhead	<input type="checkbox"/> Underground	<input type="checkbox"/> Overhead	<input type="checkbox"/> Underground
Number of Meters and Location (NOTE: Only one service per parcel)				

I understand and acknowledge that the City of Palo Alto Utilities will design and install its facilities based on the load and usage information I provide on this Service Application. Should this information change at a later date and require the redesign, replacement, or reinstallation of the Electric, Water, Gas, or Wastewater service(s) requested, I may incur additional costs. Initial Here

Applicant Name	Signature	Date:
----------------	-----------	-------

Utility Service Applications involving electric utility work will be reviewed and returned to the applicant with comments. You should be sure your application is approved by Electric Engineering before proceeding with your project to avoid any delays or changes. Comments from Engineering back to the applicant will be provided on page 2 of this application and the applicant must comply with City of Palo Alto requirements before final electrical connection is performed by Utilities.

**SEE NEXT PAGE FOR REMARKS RETURNED FROM CPAU**



# FOR CPAU USE ONLY

## NOTES FOR APPLICANT

1. All work per CEC and CPA standards. For more details, visit [www.cityofpaloalto.org/ElectricServiceRequirements](http://www.cityofpaloalto.org/ElectricServiceRequirements)
2. Payment of the final invoice must be received by the City of Palo Alto before any work will be scheduled.
3. Call electric operations (650-496-6914) for service disconnect and reconnect, if required.
4. All work must be inspected and approved by CPAU (650-496-5934) & CPA Building (650-329-2496) prior to connection by Utilities.
5. AIC rating is based on the proposed meter location. CPAU must be notified of any changes as this may affect the available short circuit current at the panel and the required AIC rating of the panel.

Additional Sheets are Attached:  Yes  No

<b>Electric Service Information</b> <i>(CPAU use ONLY)</i>		Service Order Number
Estimated Demand	kVA	Transformer kVA and Type
Map Number		Transformer Number(s)
Fees	\$	<b>Unless otherwise noted below *</b> Standard <u>Min</u> AIC rating for panel ≤ 200 – 10,000 amps Standard <u>Min</u> AIC rating for panel > 200 – 27,300 amps *
Electric Application Approved by:		Phone #: Date:

\*Alternatively, per CPAU Engineering, the following AIC rating might be used for the requested electric panel:

A Sym at \_\_\_\_\_ V with a minimum \_\_\_\_\_ ft. service cable length (assuming that CPAU's standard cables are used)

# A GUIDE TO THE CITY OF PALO ALTO UTILITIES DEPARTMENT ELECTRIC SERVICE APPLICATION PROCESS

*The following procedure is intended to help you understand how your Utility Service Application for an electric service connection at your electric panel is normally processed.*

1. Customer presents to **BUILDING DEPARTMENT (BD) (Development Center - 285 Hamilton Ave.)** a completed "UTILITY SERVICE APPLICATION" for Commercial or Residential Electric Service including all service demands and **SITE and ELEVATION PLANS SHOWING THE ELECTRIC PANEL AND THE PROPOSED SERVICE LOCATION. NO FULL-SET SUBMITTALS PLEASE.** BD forwards the plans and application to UTILITIES ELECTRIC ENGINEERING ("UEE") for Utilities' review and approval.
2. UEE reviews plans and application. **INCOMPLETE APPLICATIONS WILL NOT BE PROCESSED AND WILL BE RETURNED TO THE APPLICANT.** UEE assesses the work required to furnish service to meet customer's needs, as specified in the application, within **30 BUSINESS DAYS.** UEE will either send an invoice for Advance Engineering Fees, to cover cost of preparing project estimate, or for standard connection fees, for simpler projects. **You must have an approved electric application on file in UEE to schedule a disconnect / reconnect request.**
3. For **TEMPORARY ELECTRIC SERVICE APPLICATIONS**, present the "TEMPORARY ELECTRIC SERVICE" application to BD. Application will be approved within 1 BUSINESS DAY and an invoice will be sent to the customer. **TEMPORARY SERVICE WILL BE INSTALLED BY ELECTRIC UTILITY FIELD OPERATIONS WITHIN 1 – 2 BUSINESS DAYS FOLLOWING RECEIPT OF FULL PAYMENT AND PANEL APPROVAL, EVIDENCED BY INSPECTION METER RELEASE TAG.** Customer is responsible for contacting BD for panel inspection.
4. After plans are approved, UEE prepares the utility connection charges (if applicable) for the installation of the service and meter(s). The utility connection charges will either be attached to the Building Permit Plans or mailed to the customer. **It is the customer's responsibility to be aware of this billing and to make prompt payment.** Utility connection charges must be paid prior to the scheduling of any work performed by the City of Palo Alto. **PERMANENT UTILITY SERVICES WILL BE INSTALLED BY ELECTRIC UTILITY FIELD OPERATIONS BETWEEN 30 AND 40 DAYS FOLLOWING RECEIPT OF FULL PAYMENT AND COMPLETION BY ANY WORK REQUIRED OF APPLICANT.**
5. After the electric panel or TEMP POST/TEMP SERVICE STRUCTURE passes inspection, the BD will "yellow tag" the electric meter and send an electric meter set release tag to UTILITIES CUSTOMER SERVICE CENTER (SECOND FLOOR - CITY HALL BUILDING) which will establish an account for billing purposes. **Underground Trench inspection must have a "green tag" before final building inspection.** The Utilities Customer Service Center will check that all fees are paid before sending the electric meter installation tag to ELECTRIC OPERATIONS DISPATCH for meter installation. **ELECTRIC METER(S) WILL ONLY BE INSTALLED WITH FINAL INSPECTION TAGS IN PLACE. The Customer is responsible for coordinating ALL inspections with either the Building Department AND / OR Electric Operations Dispatch.**
6. YOUR UTILITY SERVICE IS NOW COMPLETE - THANK YOU FOR YOUR APPLICATION.

*The following directory will assist you if you have any questions throughout the installation process.*

## ASSISTANCE

- **BUILDING DEPARTMENT** (Development Center - 285 Hamilton Ave.)  
Development Center General Number ..... 329-2496
- **BUILDING INSPECTION** (Development Center - 285 Hamilton Ave.)  
Inspection Scheduling ..... 329-2496
- **UTILITIES ELECTRIC ENGINEERING**  
Contact - Electric Engineering, 1007 Elwell Ct. Office ..... 566-4500
- **UTILITIES CUSTOMER SERVICE CENTER (2<sup>nd</sup> Floor, City Hall)**  
Customer Service Representatives ..... 329-2161
- **ELECTRIC OPERATIONS DISPATCH** (Municipal Service Center, MSC)  
For Disconnect / Reconnect and Meter Installation ..... 496-6914
- **UNDERGROUND TRENCH INSPECTION** (Municipal Service Center, MSC)  
Contact - Inspection Supervisor ..... 496-6977



# City of Palo Alto, Utilities

Electric Engineering Division



CITY OF PALO ALTO  
UTILITIES

## OVERHEAD ELECTRIC SERVICE CHECKLIST

Dear Palo Alto Resident/Contractor,

The objective of this informational sheet is to help complete your project in a smooth and efficient manner, thus avoiding unnecessary delays, corrections and additional inspections.

Please remember that it is your responsibility to insure that projects conform to Palo Alto Electric Service Requirements. Electric Operations Crews will not connect non-compliant services.

We invite you to visit our website to consult our Electric Service Requirements Manual. Feel free to download it and print it in part or in its entirety. It is advisable to do so at the designing stage of your project. You can find us at: [www.cityofpaloalto.org/ElectricServiceRequirements](http://www.cityofpaloalto.org/ElectricServiceRequirements)

Any new or upgraded overhead electric service requires inspection and approval from a Building Department inspector prior to energizing. Electric Operations will connect an electric service only if it was inspected, passed and received a yellow sticker of approval.

Please go over the checklist below before calling to schedule an inspection. Check each item as you verify that your project complies. Keep in mind that this is just an aid to you and in no way or manner excludes other parts of your project that are not listed here from having to meet our standards and to be in compliance with applicable requirements. Also, you'll find a sample of typical service requirements in the back of this page.

- Building Permit application
- Electric Service application
- Pay fees
- Call customer service for Account set-up & appointment for disconnecting old service
- See CPAU Dwg. SR-CN-O-1009 for installation details
- Correct placement of electric meter, electric panel and clearances with respect to other utilities. (Gas)
- Correct clearances between conductors and structures (see back of page)
- Correct lengths of wire for splicing/connecting the service (24" min. extending from weather head)
- Call Building inspections for Final – issues a meter "set tag" and yellow sticker
- Call Utilities Customer Service to arrange for service connection

For your convenience, we are including a list of telephone numbers to call when in need of additional information or to schedule inspections. All service requests and inspections are completed in the order received. There is no need to call repeatedly.

- Building Department (Inspections).....(650) 329 2496
- Electric Meter Shop .....(650) 496 6978
- Dispatch .....(650) 496 6914
- Utilities Customer Service .....(650) 329 2161

(Please make sure to have both, the "Green" and "Yellow" Stickers on your inspected service)

PLEASE REMEMBER: Only qualified CPA electric personnel can enter vaults and boxes, connect, disconnect or reconnect electric services, and/or remove/install electric meters. Illegally connected services are subject to prosecution, will be disconnected, and reconnected only after ensuing investigations are completed.

# City of Palo Alto, Utilities

Electric Engineering Division



CITY OF PALO ALTO  
UTILITIES

## UNDERGROUND ELECTRIC SERVICE CHECKLIST

Dear Palo Alto Resident/Contractor,

The objective of this informational sheet is to help complete your project in a smooth and efficient manner, thus avoiding unnecessary delays, corrections and additional inspections.

Please remember that it is your responsibility to insure that projects conform to Palo Alto Electric Service Requirements. Electric Operations Crews will not connect non-compliant services.

We invite you to visit our website to consult our Electric Service Requirements Manual. Feel free to download it and print it in part or in its entirety. It is advisable to do so at the designing stage of your project. You can find us at: [www.cityofpaloalto.org/ElectricServiceRequirements](http://www.cityofpaloalto.org/ElectricServiceRequirements)

Please go over each item of the checklist below to verify that your project complies. Keep in mind that this is just an aid to you and in no way or manner excludes other parts of your project that are not listed here from having to meet our standards and to be in compliance with applicable requirements. Also, you'll find a sample of typical service requirements in the back of this page. Electric Operations Crews will connect an electric service only after it was inspected and received: a green sticker of approval from underground inspection AND a yellow sticker of approval from Building inspection.

- Building Permit application
- Electric Service application
- Pay fees
- Call Underground Service Alert (USA -1 800 227 2600) before you dig
- Call Customer Service for Account set-up / appt for disconnect old service
- See CPAU Dwg SR-CN-U-1010 for installation details
- Contact Electric Underground Inspector:
  - ✓ 48 hrs+ before digging to confirm routing
  - ✓ Correct placement of electric meter, electric panel and correct clearances with respect to other utilities (Gas)
    - a. No more than three 90 degree bends, (270 degrees total) between pull boxes in a conduit run
    - b. Trenches for residential services: 24" cover in non-traffic areas. 30" cover in traffic areas
    - c. For conduit below ground, use schedule 40 or DB-120 PVC only
  - ✓ Conduit installation must be approved by CPA Underground Inspector prior to backfilling for green sticker.
  - ✓ Pulling of appropriate size mandrel throughout the entire conduit system (No blockage test)
  - ✓ Pulling of conductors from pull box to service. (Slack at the box= 2 X box length)
- Call Building inspections for Final – issues a meter "set tag" and yellow sticker
- Call Utilities Customer Service to arrange service connection

Telephone numbers to call when in need of additional information or to schedule inspections:

**(All service requests and inspections are completed in the order received. There is no need to call repeatedly.)**

- Building Department (Inspections).....(650) 329 2496
- Utility Underground Inspector .....(650) 496 5934
- Electric Meter Shop .....(650) 496 6978
- Dispatch .....(650) 496 6914
- Utilities Customer Service .....(650) 329 2161

(Please make sure to have both, the "Green" and "Yellow" Stickers on your inspected service)

**PLEASE REMEMBER:** Only qualified CPA electric personnel can enter vaults and boxes, connect, disconnect or reconnect electric services, and/or remove/install electric meters. Illegally connected services are subject to prosecution, will be disconnected, and reconnected only after ensuing investigations are completed.



# City of Palo Alto Summary of Installation Requirements

## Residential Electric Service

This document contains a summary of the City of Palo Alto Utilities (CPAU) requirements. The Applicant has the responsibility to ensure that their final design and installation complies with ALL City of Palo Alto standards. *CPAU standards are detailed in the Electric Service Requirements manual, available on the internet at: [www.cityofpaloalto.org/ElectricServiceRequirements](http://www.cityofpaloalto.org/ElectricServiceRequirements)*

## SUMMARY OF GENERAL REQUIREMENTS

The Applicant (includes customer, customer's contractor, customer's consultant, developer, or others working on behalf the owner) is responsible for ALL costs associated with the provision of electric service for their project, excluding the material cost of the transformer and electric meter.

- Applicant must provide a completed Utility Service Application and site and elevation plan submittal. The site plan will include at a minimum, an outline of the property lines showing streets; an outline of buildings on the property; a proposed meter location; location of pools or spas; identification of any other significant features on the property that will impact either overhead or underground service wires; and a description of work. The elevation shall show the location of the meter and its relation to other utility or building equipment/windows. **FULL-SET SUBMITTALS NOT REQUIRED.**
- If a project requires preparation of a project design and estimate, CPAU will charge the Applicant a non-refundable Advance Engineering fee prior to the start of engineering design, plan review, and development of the cost estimate. To initiate engineering design, the Applicant must submit payment at Revenue Collections, 1<sup>st</sup> Floor, City Hall, City of Palo Alto. If the project is cancelled by the Applicant, the fee is forfeited.
- Service upgrades requiring 400 Amperes or larger may require a padmount transformer and Easement grant.

## SUMMARY OF TECHNICAL REQUIREMENTS

1. The Applicant will provide and install service cables and conduit from main panel to the CPAU utility pull box or service point (as determined by CPAU).
2. If underground service cables are connecting to an overhead secondary line, the Applicant will install a box at the base of the pole and a 4 inch riser conduit from the box to the pole.
3. The meter location is subject to CPAU's approval.
4. The Property title-holder will retain ownership of underground service lateral conduits and substructures and are fully responsible for any maintenance or replacement, as necessary.
5. The owner/developer will provide, at no charge to CPAU, easements and access to all electrical utility facilities that are located on private property. At a minimum, a draft easement shall be submitted before any service is energized.
6. Sockets with Test Bypass Facilities are required for panel greater than 200A and are not allowed for panels rated 200A or less.



# City of Palo Alto Summary of Installation Requirements

## Residential Electric Service

### **Underground Service from an Underground Electric System**

**Applicant will install as required:**

- Service box as required by CPAU
- Panel, meter socket enclosure, service riser
- Conduit from panel to utility service box
- Service cable from panel to utility service point

**Property title-holder will own and maintain:**

Panel, meter socket, service riser and conduit

**CPAU will install as required:**

- Transformer
- Meter
- Connectors at utility service point

**CPAU will own and maintain:**

Meter, service cable, transformer, service box

### **Underground Service from an Overhead Electric System**

**Applicant will install as required:**

- Service box at the base of the CPAU pole
- Panel, meter socket enclosure, service riser
- Conduit from panel to utility service box, 4" riser stub, and enough cable to reach from the meter to the secondary level on the service pole via the service box, including excess cable in the box equal to twice the length of the box.

Panel, meter socket, service riser and conduit

**CPAU will install as required:**

- Transformer
- Customer provided cable up CPAU utility pole and cover
- Meter
- Connectors at utility service point

**CPAU will own and maintain:**

Meter, service cable, transformer, service box

**Property title-holder will own and maintain:**

### **Overhead Service from an Overhead Electric System**

**Applicant/Property title-holder will install, own, and maintain, as required:**

- Panel and meter socket enclosure
- Service Entrance riser and cable
- Weatherhead and insulated service drop attachment

**CPAU will install as required:**

- Transformer
- Service drop wire (maximum length 100 feet)
- Meter
- Connectors at weather head



## City of Palo Alto Summary of Installation Requirements

### Frequently Asked Questions

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#### **Other than the work I am proposing for my building, is there anything else I am required to install?**

You are responsible for installing all substructures (boxes, conduits, etc.) and service cable as determined to be required by CPAU to provide electric service.

#### **Can you recommend a Electrical Contractor?**

Unfortunately, CPAU is unable to recommend one private contractor over another.

#### **Where do I submit by Utility Service Application and plans?**

Utilities has a representative at the City of Palo Alto Development Center, 285 Hamilton Avenue, who can accept your application or answer questions about your project or the process. If necessary, a time can be set up to meet with staff in Engineering to discuss details of your project.

#### **Is Electric Engineering located at the Development Center downtown?**

No, Electric Engineering is located at 1007 Elwell Court off of East Bayshore Road near San Antonio exit off Highway 101. Our hours are Monday through Friday, 9:00 am to 4:00 pm.

#### **I am preparing to submit plans for a permit on a new Commercial Development, but before I do, I would like to discuss what can be expected to provide electric service?**

CPAU would be more than willing to meet to do a preliminary review of your electric service needs. We can layout your service options and determine a service location relevant to the available source. We can provide a clear understanding of the utilities standards and policies regarding your service request. A Utilities representative is available at the Development Center for consultation.

#### **I now live in the main house and I have a rental cottage located at the rear of my property, I would like to have a separate meter for the cottage, can that be done?**

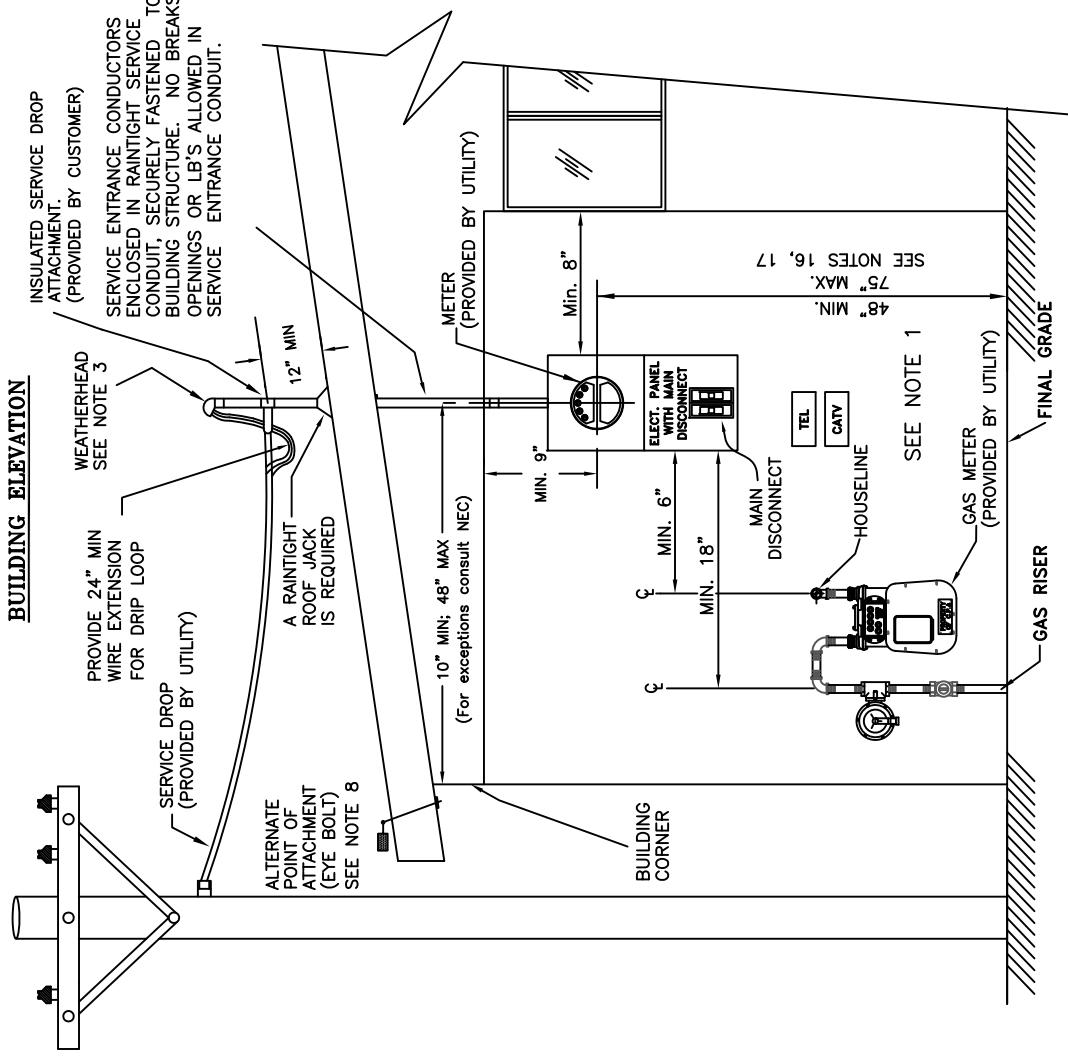
Our rules only allow one service per lot. To meter the cottage you will need to hire a licensed electrician to change out your existing single meter panel with a dual meter panel. You will also need to contact our customer service department to set up an account for the new meter.

#### **I have lines installed on poles that run behind my house. Can I get them placed underground?**

You would be responsible for all costs associated with this work. This includes, but is not limited to, the cost for undergrounding the lines for all utilities (electric, phone, CATV) on the pole, undergrounding the services of any customer affected with this request, and the cost of any easements, permits, and inspections, required for this work.



### BUILDING ELEVATION



### NOTES:

- NO OBSTRUCTIONS ARE PERMITTED WITHIN THE AREA AROUND THE METER, SEE DWG SR-MT-E-1012 FOR DETAILS.
- MANTAIN A 30" WIDE X 36" DEEP CLEAR AND LEVEL WORKING SPACE IN FRONT OF THE ELECTRIC METER.
- THE WEATHERHEAD SHALL BE LOCATED NO MORE THAN 24" FROM THE SERVICE ATTACHMENT POINT AND BETWEEN 18" AND 48" ABOVE THE ROOF, 24" TO 30" RECOMMENDED. IF THE PERISCOPE EXTENDS MORE THAN 30" ABOVE THE ROOF IT SHALL BE BRACED AGAINST THE SERVICE CONDUCTOR PULL.
- THE POINT OF ATTACHMENT MAY BE EITHER ON THE BUILDING WALL NEAR THE UTILITY LINE OR ON A PERISCOPE FIXED TO THE BUILDING'S ROOF NOT MORE THAN 18 INCHES BACK OF THE ROOFLINE.
- THE POINT OF ATTACHMENT SHALL BE BETWEEN 12 AND 18 FEET ABOVE GRADE AND SAFELY ACCESSIBLE BY LADDER. WORKING SPACE FOR A LADDER EQUAL TO A DEPTH OF 1/4 THE HEIGHT OF THE LADDER TOP SUPPORT IS REQUIRED.
- BRACING SHALL BE TWO GALVANIZED STEEL BRACES (3/4" RIGID STEEL PIPE OR 1-1/4" X 1-1/4" X 1/8" STEEL ANGLE IRON MINIMUM) SECURELY BOLTED OR LAGGED TO THE FRAMEWORK WITH 3/8" X 3" LAG SCREWS WITH A 90° SPREAD AND SECURED TO THE PERISCOPE NO MORE THAN 6" BELOW THE SERVICE POINT OF ATTACHMENT.
- ROOF CLEARANCES FOR THE SERVICE DROP MUST MEET THE REQUIREMENTS OF CEC ARTICLE 230.24.
- ONLY ELECTRICAL FACILITIES MAY BE ATTACHED TO THE ELECTRICAL WEATHERHEAD.
- ONLY THREADED PIPE COUPLINGS ARE ALLOWED (NO COMPRESSION COUPLINGS) AND BRACING IS REQUIRED BOTH ABOVE AND BELOW THE COUPLING.
- METER SOCKET CLEARANCE FROM THE GROUND SHALL BE MEASURED FROM THE FINAL GRADE.
- WHERE LOAD REQUIRES HEAVY SERVICE DROP CONDUCTORS, THE SERVICE DROP WILL BE 3 SINGLE CONDUCTORS INSTEAD OF CABLE AND 3 EYEBOLTS OR INSULATED CLEVISSES WILL BE REQUIRED.
- METER MOUNTING DEVICE SHALL HAVE A MAIN DISCONNECT IN THE SAME CABINET.
- FOR MORE DETAILED INFORMATION CONSULT CPA ELECTRIC SERVICE REQUIREMENTS MANUAL.
- UNLESS OTHERWISE NOTED, ALL SERVICE FACILITIES ARE THE RESPONSIBILITY OF THE CUSTOMER.
- SERVICE ENTRANCE CONDUIT AND CABLE MUST MEET CEC REQUIREMENTS.
- PER CEC ARTICLE 404.8(A) THE HIGHEST POINT OF THE BREAKER HANDLE CANNOT BE MORE THAN 79" ABOVE GRADE/FLOOR.
- SEE CPAU ENG STD DWG SR-MT-3-1035 FOR METER DETAILS ON METER INSTALLATIONS IN DRIVEWAYS.

### RECOMMENDED SERVICE ENTRANCE CONDUCTOR

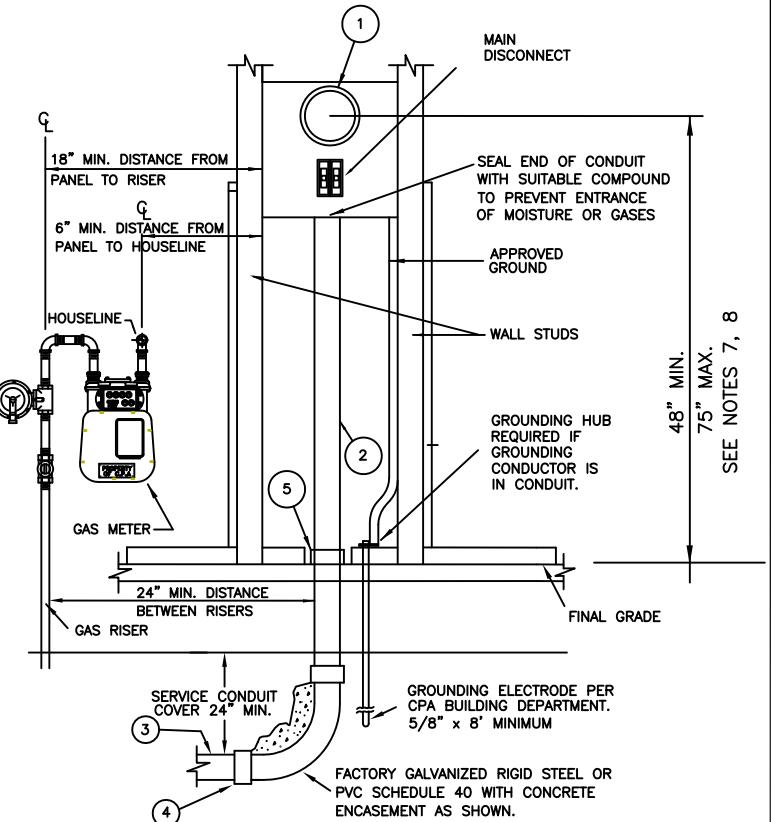
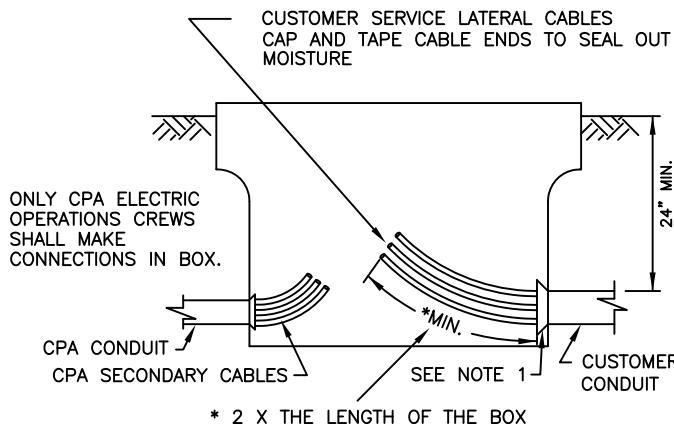
Service Voltage (Volts)	Main Service (Amps)	Customer's Minimum Conduit Size	Recommended Conductor Size
120/240	100/125	1 1/4" - 2"	1/0
1-phase 3 wire	200	2"	4/0
	400 *	4"	750
120/208	200	2"	4/0
1-phase 3 wire	200	2"	2/0

\* Note: Class 320 (Residential only)

APPROVED 12/2/2006	ENGINEERING STANDARD	3	3/16	REV NOTES, ADDED 16,17	TT
<i>Approved</i> <i>Engineering Standard</i>	TYPICAL OVERHEAD SERVICE INSTALLATION	4	6/13	REVISED NOTES	TT
<i>Approved</i> <i>Engineering Standard</i>	CITY OF PALO ALTO	2	12/06	REVISED	TOPETE
<i>Approved</i> <i>Engineering Standard</i>	CALIFORNIA	1	9/99	REVISED	FINCH
<i>Approved</i> <i>Engineering Standard</i>	PEV	REV	DATE	DESCRIPTION	APPR
		SCALE	STANDARD NO.	SHEET NO.	

## MATERIALS:

1. METER MOUNTING DEVICE WITH MAIN DISCONNECT BUILT INTO THE SAME CABINET.
2. UNDERGROUND SERVICE ENTRANCE CONDUIT SHALL BE CONTINUOUS; NO BREAKS, OPENINGS, OR LB'S ARE ALLOWED. CONDUIT SHALL BE GALVANIZED RIGID STEEL OR PVC SCH 40.
3. UNDERGROUND CONDUIT SHALL BE PVC SCHEDULE 40, TYPE DB-120, OR HOT DIPPED GALVANIZED RIGID STEEL.
4. PLASTIC TO STEEL ADAPTOR, IF PLASTIC CONDUIT IS USED FOR 3.
5. MAY REDUCE TO CEC REQUIREMENTS.



## NOTES:

1. STEEL CONDUITS SHALL EXTEND 2" MAX. INTO BOX AND SHALL TERMINATE WITH INSULATED BUSHINGS. PLASTIC CONDUITS SHOULD BE TERMINATED WITH BELL ENDS FLUSH WITH THE WALL OF THE BOX. ALL CONDUIT ENTRANCES SHALL BE GROUTED. SEE CPA STANDARD DRAWING DT-SS-U-1002.
2. IF THE GRADE OF THE TOP OF THE UTILITY SERVICE BOX IS MORE THAN ONE FOOT ABOVE THE END OF THE CONDUIT THAT TERMINATES AT THE BUILDING, BOTH ENDS OF THE SERVICE CONDUIT SHALL BE SEALED BY CUSTOMER WITH APPROVED PLUGS. SUFFICIENT MEASURES SHALL BE PROVIDED TO ENSURE WATER DOES NOT ENTER METER.
3. IF THE GRADE OF THE METER IS BELOW THE GRADE OF THE UTILITY BOX, AN ADDITIONAL BOX MUST BE PLACED IN THE GROUND JUST BEFORE THE METER FOR DETAILS PLEASE CONTACT ELECTRIC ENGINEERING
4. CPAU INSPECTOR MUST BE PRESENT WHEN INSTALLING CONDUIT OR PULLING CABLES INTO CPAU BOX.
5. A SPLICE BOX MAY BE REQUIRED IF ALLOWABLE CABLE PULLING TENSION WILL BE EXCEEDED.
6. EXISTING 1½" OR 2" CONDUIT MAY BE ALLOWED FOR PANEL UPGRADES IN THE SAME LOCATION IF THEY MEET AMPACITY AND CONDUIT FILL REQUIREMENTS, AND IS APPROVED BY CPAU ENGINEERING.

7. SEE CPAU ENG STD DWG SR-MT-E-1012 FOR MINIMUM CLEARANCE REQUIREMENTS AROUND METER PANELS AND SR-MT-E-1035 FOR REQUIREMENTS ON METERS INSTALLED IN DRIVEWAYS.

8. PER CEC ARTICLE 404.8(A) THE HIGHEST POSITION OF THE BREAKER HANDLE MUST BE LESS THAN 79" ABOVE GRADE/FLOOR.

9. PRESS ON LUGS ARE REQUIRED FOR CABLE TERMINATIONS ON SERVICE PANELS 400A OR LARGER, SEE PANEL MANUFACTURER FOR APPROVED LUGS.

## SERVICE LATERAL CONDUIT AND CABLE SIZE

Service Voltage (Volts)	Main Service (Amps)	Customer's Minimum Conduit Size	CPAU Approved Conductor Size **	
			AL	CU
120/240 1-phase 3 wire	125	2"	1/0	2
	200	3"	4/0	2/0
	400*	4"	350	4/0
120/208 1-phase 3 wire	200	3"	4/0	2/0

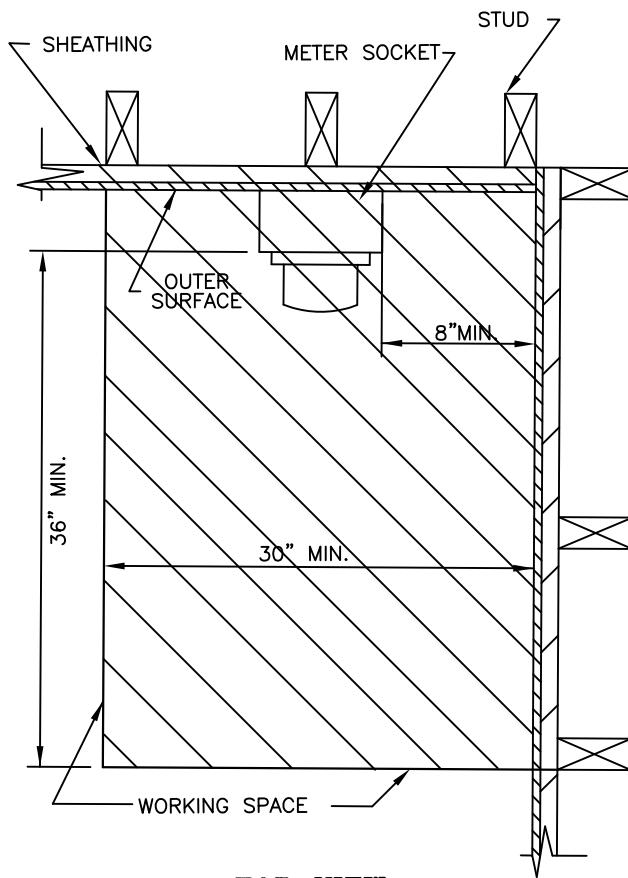
\* CLASS 320 (UNDERGROUND RESIDENTIAL ONLY)

\*\* CONDUCTOR SIZE IS PER PHASE AND A FULL SIZE NEUTRAL IS REQUIRED.

5	9-16	ADDED 2" CONDUIT EXCEPTION	TT
4	3-16	REV NOTES, TABLE, & DWG	TT
3	5-13	ADDED GAS METER CLEARANCES	TT
2	1-12	REVISED MATERIALS & NOTES	TT
1	10-08	REVISED NOTE 2	TT
REV	DATE	DESCRIPTION	APPR

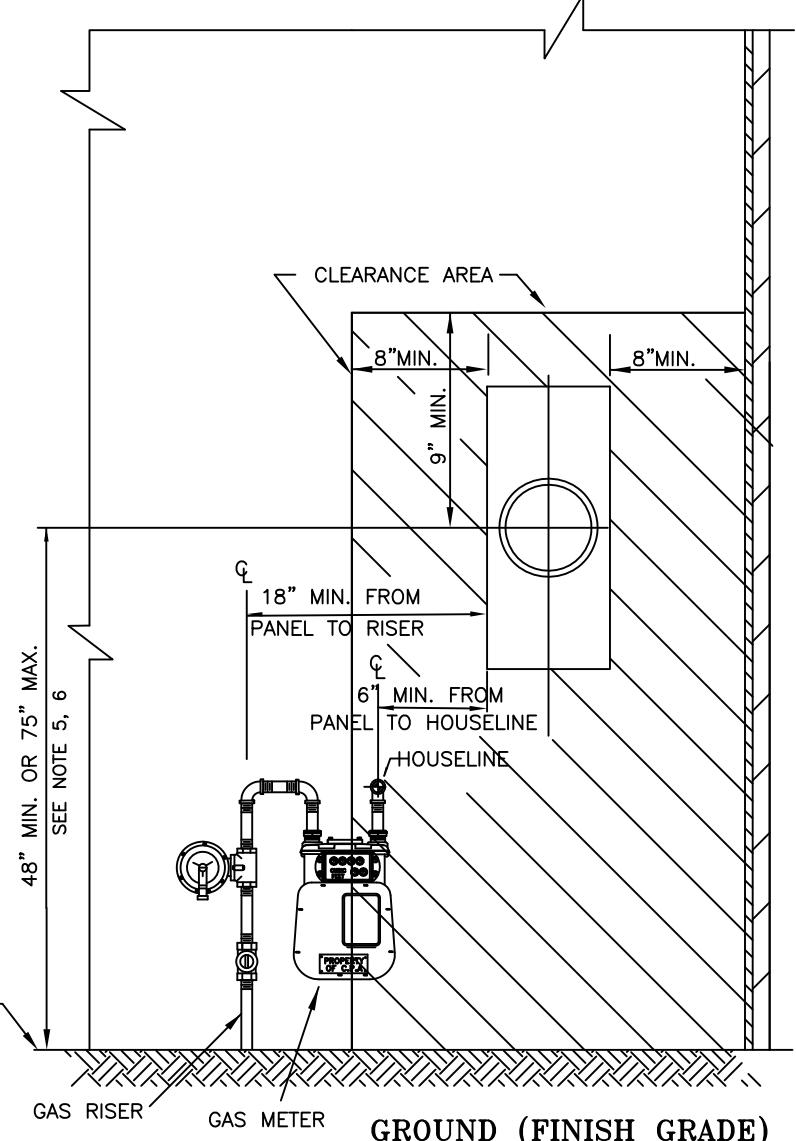
APPROVED 11/2006		ENGINEERING STANDARD	
ENGR. NAME		RESIDENTIAL UNDERGROUND SERVICE REQUIREMENTS	
BEGR	PEV		
DRAWN	U/MJ	MJ	
CHECKED	PEV		
CITY OF PALO ALTO CALIFORNIA		NTS	SR-CN-U-1010
		SCALE	STANDARD NO.
			SHEET NO.

Original Signed  
and Approved  
by Engineering  
Manager



TOP VIEW

NO OBSTRUCTIONS ALLOWED  
IN SHADED AREA.



GROUND (FINISH GRADE)

NOTES:

1. THERE MUST BE AN 8 INCH MINIMUM CLEARANCE BETWEEN THE NEAREST EDGE OF THE METER PANEL AND ANY OBSTRUCTION OR WINDOW.
2. SUITABLE WORKING SPACE, AT LEAST 30 INCHES WIDE X 36 INCHES DEEP, SHALL BE PROVIDED IN FRONT OF THE METER SOCKET TO ALLOW FOR INSTALLATION, TESTING AND READING.
3. METERS SHALL BE LOCATED SO THAT THEY WILL NOT BE DAMAGED BY A SWINGING WINDOW OR DOOR.
4. THE WALL SURFACES ON EITHER SIDE OF A DOOR, FOR A DISTANCE EQUAL TO THE WIDTH OF THE DOOR, IS UNACCEPTABLE AS A METER LOCATION.
5. PER CEC ARTICLE 404.8(A) THE HIGHEST POSITION OF THE BREAKER HANDLE MUST BE LESS THAN 79" ABOVE GRADE/FLOOR.
6. SEE CPAU ENG STD SR-MT-E-1035 FOR REQUIREMENTS ON METERS INSTALLED IN DRIVEWAYS.

7	3-16	REVISED NOTES	TT
6	6-14	ADDED GUARD POST NOTE	TT
5	7-13	REVISED GAS METER	TT

APPROVED 3/1994

M. O. Bland

ENGR. MANAGER

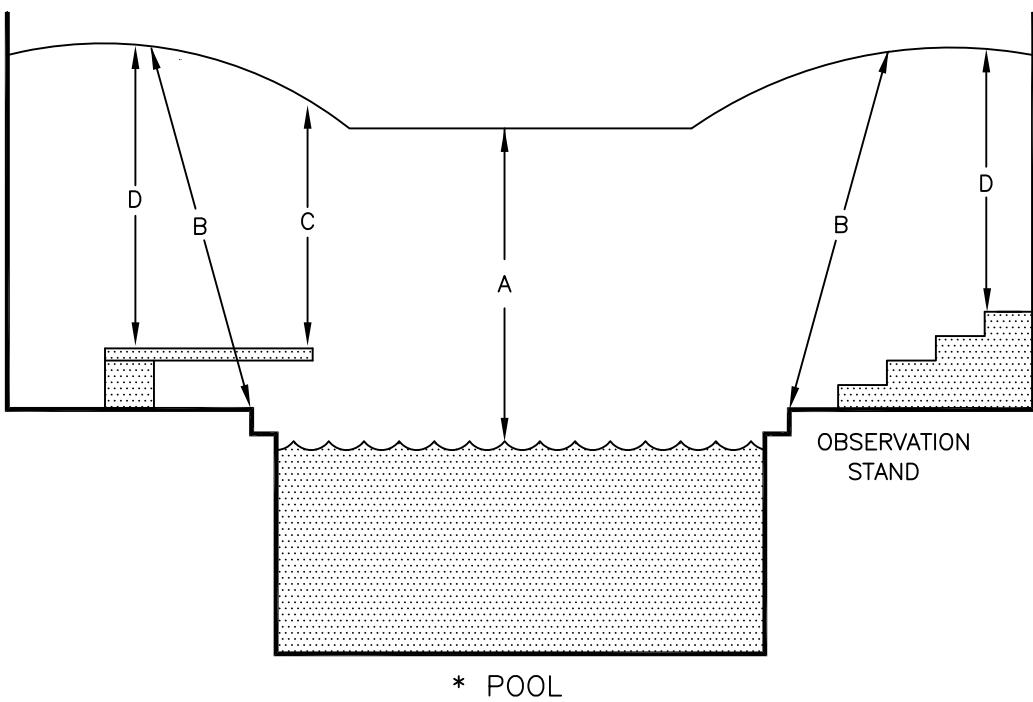
ENGINEERING STANDARD  
REQUIRED MINIMUM CLEARANCES OF  
METER SOCKET FROM OBSTRUCTIONS

4	1-11	REVISED CLEARANCES AND NOTES	TT
3	8-08	REVISED CLEARANCES AND NOTES	JT
2	6-06	REVISED CLEARANCES	TF
REV	DATE	DESCRIPTION	APPR

ENGR	PEV	
DRAWN	UES /MJ	
CHECKED	PEV	

CITY OF PALO ALTO  
CALIFORNIA

NTS	SR-MT-E-1012	1 OF 1
SCALE	STANDARD NO.	SHEET NO.



NOTES

1. REQUIRED CLEARANCES APPLY TO PUBLIC, COMMERCIALY OPERATED, AND RESIDENTIAL POOLS.

DIMENSION

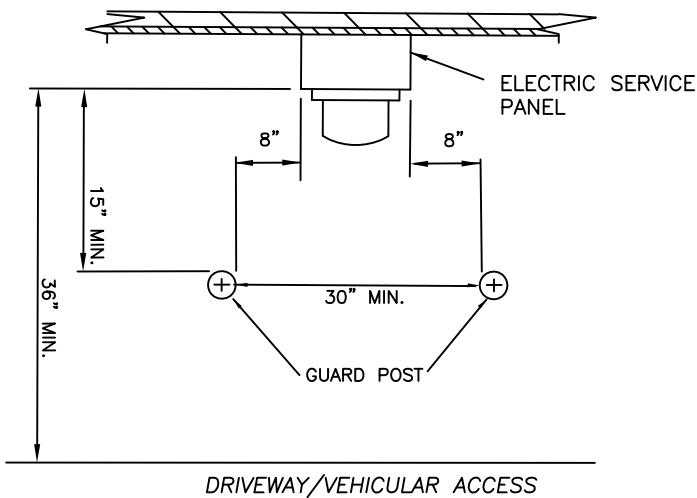
A. VERTICAL CLEARANCE FROM HIGHEST WATER LEVEL:	22.5 FEET
B. RADIAL CLEARANCE FROM TOP EDGE OF POOL WALL	22.5 FEET
C. VERTICAL CLEARANCE FROM DIVING BOARD OR PLATFORM THAT IS OVER THE WATER SURFACE OF THE POOL:	14.5 FEET
D. VERTICAL CLEARANCE ABOVE DIVING BOARD OR PLATFORM THAT IS <u>NOT</u> OVER THE WATER SURFACE OF THE POOL:	14.5 FEET

2. HORIZONTAL LIMIT OF CLEARANCES ARE TO THE OUTER EDGE OF ANY ITEMS IDENTIFIED IN ITEMS A TO D, BUT NO LESS THAN 10 FEET OUT FROM THE INSIDE WALL OF POOL.
3. INSTALLATION OF SERVICE DROPS ABOVE SWIMMING POOLS, HOT TUBS, AND SPAS SHALL BE AVOIDED.
4. IF IN THE OPINION OF CITY OF PALO ALTO UTILITIES ENGINEERING AND OPERATIONS PERSONNEL AN OVERHEAD SERVICE INSTALLATION DESIGNED TO MEET THE STIPULATED CLEARANCE REQUIREMENTS CREATES AN UNSAFE WORKING CONDITION FOR UTILITY WORKERS, THE SERVICE WILL BE REQUIRED TO BE UNDERGROUND.

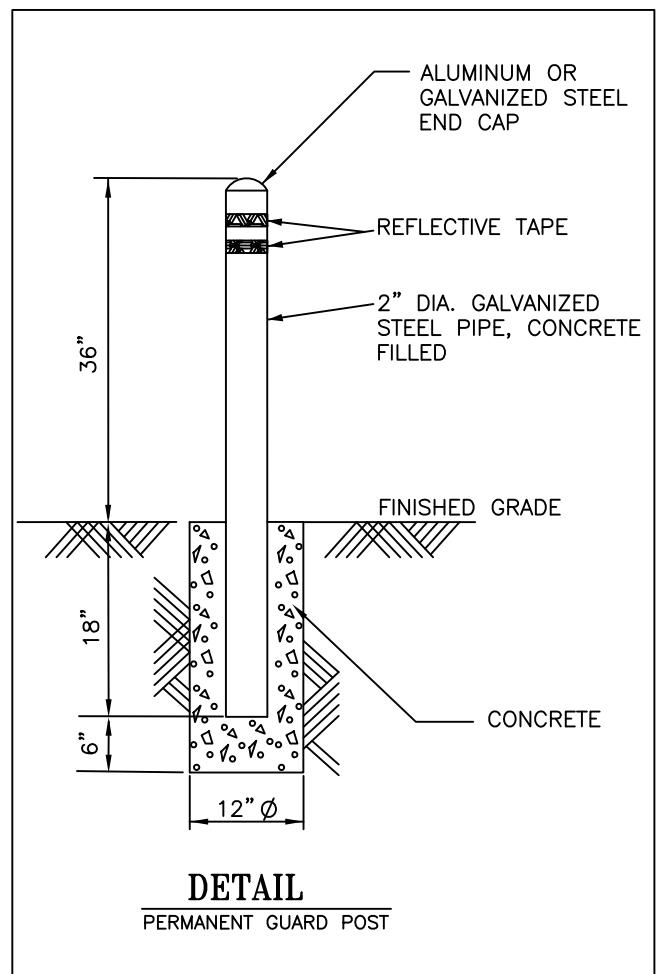
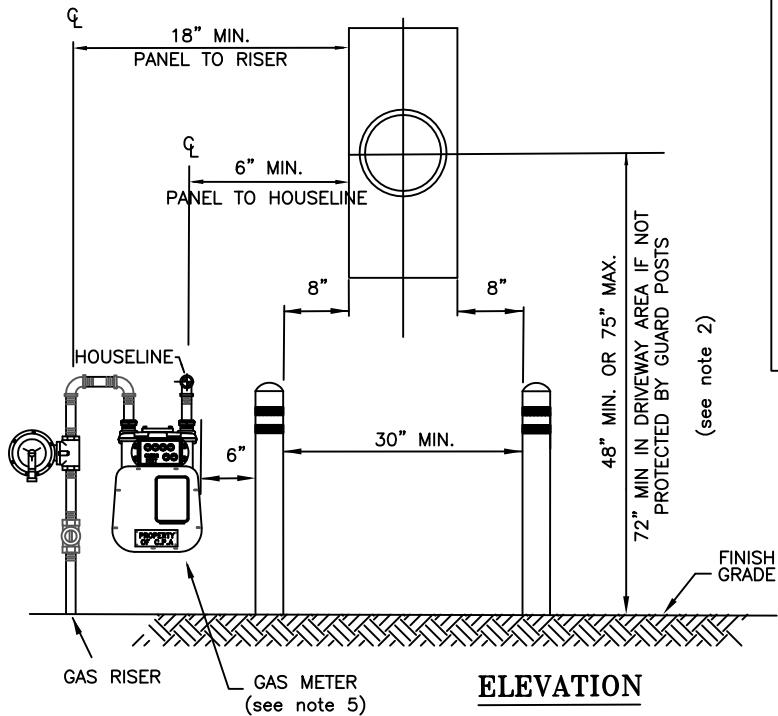
**REFERENCE:**  
CALIFORNIA ELECTRICAL CODE, ARTICLE 680.8

APPROVED <u>3/1994</u>  <u>MDB</u> ENGR. MANAGER	ENGINEERING STANDARD CLEARANCES FROM SERVICE DROPS 0-750 VOLTS SWIMMING POOLS, HOT TUBS & SPAS		
2	10/09	REV CLEARANCES/NOTES – CEC	
1	6/99	REVISED	
REV	DATE	DESCRIPTION	
ENGR	PEV	NTS	SR-CL-O-1018
DRAWN	MJ	1 OF 1	
CHECKED	PEV	SCALE	STANDARD NO.
			SHEET NO.

**CITY OF PALO ALTO  
CALIFORNIA**



PLAN VIEW



NOTES:

1. METERS INSTALLED IN LOCATIONS SUSCEPTIBLE TO VEHICULAR DAMAGE SHALL BE PROTECTED BY GUARD POSTS OR INSTALLED AT A SUITABLE HEIGHT TO PREVENT CONTACT.
2. PER CEC ARTICLE 404.8(A), THE HIGHEST POSITION OF THE BREAKER HANDLE MUST NOT BE MORE THAN 79" ABOVE GRADE/FLOOR.
3. THIS STANDARD IS FOR RESIDENTIAL INSTALLATIONS ONLY, NOT FOR MULTIFAMILY DWELLINGS.
4. PERMANENT FIXED POSTS ARE REQUIRED.
5. REFER TO CPAU STD. DWG. WG-W-06 FOR GUARD POST REQUIREMENTS AROUND GAS METERS.

APPROVED _____		ENGINEERING STANDARD					
ENGR. MANAGER		METER INSTALLATION IN RESIDENTIAL DRIVEWAY		1 3-16		ADDED NOTE 2	
ENGR.	MANAGER	REV	DATE	DESCRIPTION		BY	
DRAWN	JT			NTS	SR-MT-E-1035	1 OF 1	
CHECKED				SCALE	STANDARD NO.	SHEET NO.	
<i>Original Signed and Approved by Engineering Manager</i>		CITY OF PALO ALTO CALIFORNIA					



**UTILITY SERVICE APPLICATION**  
**PERMANENT COMMERCIAL/MULTI-FAMILY**  
**ELECTRIC, WATER, GAS, AND WASTEWATER FACILITIES INSTALLATION**

**THIS FORM MUST BE FILLED OUT COMPLETELY BEFORE THIS APPLICATION CAN BE PROCESSED.**  
*Upon Completion of review and approval a copy of this form will be sent back to applicants requesting Electric Service.*

Building Department Permit Application Number:	Utilities Department Permit Application Number:		
Project Address:		Date:	
Name of Applicant / Company		Phone #:	
Address	City / State	Zip	E-mail
<b><u>CONNECTION FEE BILLING INFORMATION</u></b>			
Name		Phone:	
Address	City / State	Zip	E-mail:

Service Type Requested:	<input type="checkbox"/> Electric	<input type="checkbox"/> Water	<input type="checkbox"/> Gas	<input type="checkbox"/> Wastewater
Desired Service Date:				
Project Status	<input type="checkbox"/> Planning		<input type="checkbox"/> Bidding	<input type="checkbox"/> Construction

(Depending on Utility Service Requested, Complete Appropriate Portions of this Application)

Project Type <b>(check all boxes that apply)</b>	<input type="checkbox"/> New Construction/New Service **		<input type="checkbox"/> Addition **	<input type="checkbox"/> Remodel
	What will be the total building area upon completion?			SQ FT
	<input type="checkbox"/> Service Upgrade	<input type="checkbox"/> Service Relocation **	<input type="checkbox"/> Spa or Pool **	<input type="checkbox"/> Other (explain in Description of Work)
Brief Description of Work				
<b>**</b> Please attach a site plan showing the property lines including elevations, a window schedule, site improvements with existing & proposed service locations, AND a front view photograph of the gas and electric meter locations existing & proposed. Photograph MUST contain a ground to roof line view with meters at the center of the picture. Email photograph to <a href="mailto:utilities.engineering@cityofpaloalto.org">utilities.engineering@cityofpaloalto.org</a> <b>NO FULL SET SUBMITTALS.</b>				

### Gas/Electric Load Information      (INDICATE PEAK OR MAXIMUM RATES OF USE OR FLOW)

**Separate load information is required for each gas meter requested.**

*Attach adequate Electric Load information verifying National Electric Code Article 220 (Branch Circuit and Feeder Calculations) requirements are met.*

Description	Gas	Electric	Existing	New (Additional)	Total (Existing + New)	Units (circle one)
SPACE HEATING	<input type="checkbox"/>	<input type="checkbox"/>				BTUH    kW    kVA
HVAC (1 Phase electric)	<input type="checkbox"/>	<input type="checkbox"/>				BTUH
HVAC (3 Phase electric)	<input type="checkbox"/>	<input type="checkbox"/>				kW    kVA
WATER HEATING	<input type="checkbox"/>	<input type="checkbox"/>				BTUH    kW    kVA
COOKING EQUIPMENT	<input type="checkbox"/>	<input type="checkbox"/>				BTUH    kW    kVA
CLOTHES DRYER	<input type="checkbox"/>	<input type="checkbox"/>				BTUH    kW    kVA
FIRE LOG LIGHTER	<input type="checkbox"/>					BTUH
POOL/SPA HEATER	<input type="checkbox"/>	<input type="checkbox"/>				BTUH    kW    kVA
POOL/SPA PUMP		<input type="checkbox"/>				hp
LIGHTING		<input type="checkbox"/>				kW    kVA
RECEPTACLE, OTHER		<input type="checkbox"/>				kW    kVA
PROCESS POWER		<input type="checkbox"/>				kW    kVA
ELEVATORS		<input type="checkbox"/>				kW    kVA
LARGEST MOTOR		<input type="checkbox"/>				kW    kVA
OTHER MOTORS (1 PH)		<input type="checkbox"/>				kW    kVA
OTHER MOTORS (3 PH)		<input type="checkbox"/>				kW    kVA

BTUH: BTU (British Thermal Unit) PER HOUR

kW: kilowatts (=1000 Watts)

kVA: kilovoltamps (=1000 Voltamps)

hp: Horsepower

Continued on page 2

Description	Gas	Electric	Existing	New (Additional)	Total (Existing + New)	Units (circle one)
PHOTOVOLTAIC SYSTEM		<input type="checkbox"/>				kW kVA
ELECTRIC VEHICLE CHARGING SYSTEM (Load per Charging Station)	Number of Charging stations:		Number of electric vehicles:		per charger	kW kVA
OTHER	<input type="checkbox"/>	<input type="checkbox"/>				BTUH kW kVA hp
OTHER	<input type="checkbox"/>	<input type="checkbox"/>				BTUH kW kVA hp

BTUH: BTU (British Thermal Unit) PER HOUR

kW: kilowatts (=1000 Watts)

kVA: kilovoltamps (=1000 Voltamps)

hp: Horsepower

## Water

WATER LOADS: SEE WATER CUSTOMER DEMAND DATA TABLE FOR CALCULATING FIXTURE UNITS AND GALLONS PER MINUTE.

Complete a separate LOAD CALCULATION SHEET for each domestic water meter, fill in all applicable areas below, and submit completed Calculation Sheets with Service Application.

	EXISTING	NEW (ADDITIONAL)	TOTAL (EXISTING + NEW)	CPAU USE ONLY
DOMESTIC USE	F.U.	F.U.	G.P.M.	
FIRE SPRINKLER	G.P.M.	G.P.M.	G.P.M.	
IRRIGATION USE MAX VALVE	G.P.M.	G.P.M.	G.P.M.	

F.U.: Fixture Units

G.P.M.: Gallons per Minute

## Wastewater

WASTEWATER LOADS: REFER TO SECTION 2730 IN THE CURRENT "UTILITY STANDARDS" FOR WASTEWATER DESIGN STANDARDS.

Complete LOAD CALCULATION SHEET, fill in all applicable areas below, and submit completed Calculation Sheet with Service Application.

	EXISTING Fixture Units	NEW Fixture Units	EXISTING # Dwelling Units/S.F.	NEW # Dwelling Units/S.F.	TOTAL (EXISTING + NEW)
MULTI-FAMILY	F.U.	F.U.	D.U.	D.U.	D.U.
COMMERCIAL	F.U.	F.U.	S.F.	S.F.	S.F.
RESEARCH/OFFICE	F.U.	F.U.	S.F.	S.F.	S.F.

F.U.: Fixture Units

D.U.: Dwelling Units

S.F.: Square-Feet

### BACKFLOW PREVENTER REQUIREMENTS

To comply with requirements of the California Administrative Code, Title 17, Sections 7583 through 7605 inclusive and City of Palo Alto Utility Rule and Regulation 21; the City of Palo Alto requires that all commercial or multifamily water connections have an RP backflow preventer installed on the owner's property directly behind the water meter within 5 feet of the property line. **Show the location of all RP backflow preventers on the plans.** An approved reduced pressure principle assembly (RPPA backflow preventer device) is required for all existing and new irrigation or domestic water connections from Palo Alto Utilities. An approved reduced pressure detector assembly is required for the existing or new fire water connections.

## ELECTRIC (INCLUDE ELECTRIC SINGLE LINE DIAGRAM OF PROPOSED INSTALLATION)

SERVICE INFORMATION		Existing	Requested
Service Voltage			
Main Switch Size (Amps)			
Type & Number of Meters			

Electric Service Information (CPAU Use ONLY)		Service Order Number	
Estimated Demand	kVA	Transformer kVA and Type	
Map Number		Transformer Number(s)	
Fees	\$	Minimum AIC rating of Electric Panel for requested service:	,000 A Sym at V
Remarks	<ul style="list-style-type: none"> <li>• ALL work per NEC and CPA Standards.</li> <li>• Additional fees may apply after permit approval</li> <li>• Electric service panel must meet the AIC rating indicated above for the requested service voltage.</li> <li>• Service Panels 400 A or greater – submit factory drawings for approval. Otherwise catalog cutsheets are acceptable.</li> <li>• Only socket type meters are allowed.</li> <li>• Call Electric Operations (650-496-6914) for service Disconnect and Reconnect, if required.</li> <li>• All work must be inspected and approved by the CPAU Inspector (650-496-5934) and CPA Building Department (650-329-2663) prior to final connection by Utilities.</li> </ul>		
Additional Sheets are Attached: Yes No			
Approved by:		Phone #:	Date:

# A GUIDE TO THE CITY OF PALO ALTO UTILITIES DEPARTMENT ELECTRIC SERVICE APPLICATION PROCESS

*The following procedure is intended to help you understand how your Utility Service Application for an electric service connection at your electric panel is normally processed.*

1. Customer presents to **BUILDING DEPARTMENT (BD) (Development Center - 285 Hamilton Ave.)** a completed "UTILITY SERVICE APPLICATION" for Commercial or Residential Electric Service including all service demands and **SITE and ELEVATION PLANS SHOWING THE ELECTRIC PANEL AND THE PROPOSED SERVICE LOCATION. NO FULL-SET SUBMITTALS PLEASE.** BD forwards the plans and application to UTILITIES ELECTRIC ENGINEERING ("UEE") for Utilities' review and approval.
2. UEE reviews plans and application. **INCOMPLETE APPLICATIONS WILL NOT BE PROCESSED AND WILL BE RETURNED TO THE APPLICANT.** UEE assesses the work required to furnish service to meet customer's needs, as specified in the application, within **30 BUSINESS DAYS.** UEE will either send an invoice for Advance Engineering Fees, to cover cost of preparing project estimate, or for standard connection fees, for simpler projects. **You must have an approved electric application on file in UEE to schedule a disconnect / reconnect request.**
3. For **TEMPORARY ELECTRIC SERVICE APPLICATIONS**, present the "TEMPORARY ELECTRIC SERVICE" application to BD. Application will be approved within 1 BUSINESS DAY and an invoice will be sent to the customer. **TEMPORARY SERVICE WILL BE INSTALLED BY ELECTRIC UTILITY FIELD OPERATIONS WITHIN 1 – 2 BUSINESS DAYS FOLLOWING RECEIPT OF FULL PAYMENT AND PANEL APPROVAL, EVIDENCED BY INSPECTION METER RELEASE TAG.** Customer is responsible for contacting BD for panel inspection.
4. After plans are approved, UEE prepares the utility connection charges (if applicable) for the installation of the service and meter(s). The utility connection charges will either be attached to the Building Permit Plans or mailed to the customer. **It is the customer's responsibility to be aware of this billing and to make prompt payment.** Utility connection charges must be paid prior to the scheduling of any work performed by the City of Palo Alto. **PERMANENT UTILITY SERVICES WILL BE INSTALLED BY ELECTRIC UTILITY FIELD OPERATIONS BETWEEN 30 AND 40 DAYS FOLLOWING RECEIPT OF FULL PAYMENT AND COMPLETION BY ANY WORK REQUIRED OF APPLICANT.**
5. After the electric panel or TEMP POST/TEMP SERVICE STRUCTURE passes inspection, the BD will "yellow tag" the electric meter and send an electric meter set release tag to UTILITIES CUSTOMER SERVICE CENTER (SECOND FLOOR - CITY HALL BUILDING) which will establish an account for billing purposes. **Underground Trench inspection must have a "green tag" before final building inspection.** The Utilities Customer Service Center will check that all fees are paid before sending the electric meter installation tag to ELECTRIC OPERATIONS DISPATCH for meter installation. **ELECTRIC METER(S) WILL ONLY BE INSTALLED WITH FINAL INSPECTION TAGS IN PLACE. The Customer is responsible for coordinating ALL inspections with either the Building Department AND / OR Electric Operations Dispatch.**
6. YOUR UTILITY SERVICE IS NOW COMPLETE - THANK YOU FOR YOUR APPLICATION.

*The following directory will assist you if you have any questions throughout the installation process.*

## ASSISTANCE

- **BUILDING DEPARTMENT** (Development Center - 285 Hamilton Ave.)  
Development Center General Number ..... 329-2496
- **BUILDING INSPECTION** (Development Center - 285 Hamilton Ave.)  
Inspection Scheduling ..... 329-2496
- **UTILITIES ELECTRIC ENGINEERING**  
Contact - Electric Engineering, 1007 Elwell Ct. Office ..... 566-4500
- **UTILITIES CUSTOMER SERVICE CENTER (2<sup>nd</sup> Floor, City Hall)**  
Customer Service Representatives ..... 329-2161
- **ELECTRIC OPERATIONS DISPATCH** (Municipal Service Center, MSC)  
For Disconnect / Reconnect and Meter Installation ..... 496-6914
- **UNDERGROUND TRENCH INSPECTION** (Municipal Service Center, MSC)  
Contact - Inspection Supervisor ..... 496-6977





# City of Palo Alto Summary of Installation Requirements

## Commercial or Multifamily Electric Service

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This document contains a summary of the City of Palo Alto Utilities (CPAU) requirements for the project. The Applicant has the responsibility to ensure that their final design and installation complies with ALL City of Palo Alto standards. *CPAU standards are detailed in the Electric Service Requirements manual, available on the internet at: [www.cityofpaloalto.org/ElectricServiceRequirements](http://www.cityofpaloalto.org/ElectricServiceRequirements)*

### SUMMARY OF GENERAL REQUIREMENTS

The Applicant (includes customer, customer's contractor, customer's consultant, developer, or others working on behalf the owner) is responsible ALL costs associated with the provision of electric service as required for their project, excluding the material cost of the transformer and electric meter.

- Applicant must provide a completed Utility Service Application and site plan submittal. The site plan will include at a minimum, an outline of the property lines showing streets; an outline of buildings on the property; a proposed meter location; location of pools or spas; identification of any other significant features on the property that will impact either overhead or underground service wires; and a description of work. FULL-SET SUBMITTALS NOT REQUIRED.
- CPAU may charge the Applicant a non-refundable Advance Engineering Fee prior to the start of engineering design, plan review, and development of the cost estimate. To initiate engineering design, the Applicant must submit payment at Revenue Collections, 1<sup>st</sup> Floor, City Hall, City of Palo Alto. If the project is cancelled by the Applicant, the fee is forfeited.
- CPAU will only provide a maximum service size of 1,600 Amperes at 208Y/120V, three-phase, 4-wire. Any service larger than 1,600 Amperes will be served at 480 Volts. Primary metering is also available.
- Service upgrades requiring 400 Amperes or larger will be underground and will require a padmount transformer and Easement grant.
- CPAU provides Fiber Optic service to City of Palo Alto customers. Please contact CPAU Fiber Optic Marketing Coordinator at (650) 329-2275 for inquiries.



# City of Palo Alto Summary of Installation Requirements

## Commercial or Multifamily Electric Service

### SUMMARY OF TECHNICAL REQUIREMENTS

*Applicant is responsible for ensuring that final installations meet all City of Palo Alto requirements. Every project is different, contact CPAU Engineering for specific design requirements for your project.*

1. To provide electric service to the proposed development, the following may be required:
  - Underground primary distribution line extension
  - Underground secondary line extension
  - Transformer installation or replacement
  - Other primary equipment or replacement
2. Applicant shall provide all necessary underground substructures which may include the following:

<ul style="list-style-type: none"><li>• Transformer Pad(s)</li><li>• Primary Vault(s)</li><li>• Secondary Pull Box(es)</li></ul>	<ul style="list-style-type: none"><li>• Guard Posts</li><li>• Primary Pull Box(es)</li><li>• Secondary Conduits</li></ul>	<ul style="list-style-type: none"><li>• Loadbreak Junction Pad</li><li>• Primary Feeder Conduits</li><li>• Service Conduit &amp; Cable</li></ul>
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3. CPAU will furnish and install (at customer's expense) all required:

<ul style="list-style-type: none"><li>• Switch(es)</li><li>• Secondary cables</li></ul>	<ul style="list-style-type: none"><li>• Transformer(s)</li><li>• Overhead Service Wire</li></ul>	<ul style="list-style-type: none"><li>• Primary cables</li></ul>
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4. The Applicant shall furnish and install service cables and conduit from each building to the CPAU utility pull box or service point (as determined by CPAU).
5. The Applicant shall furnish and install EUSERC compliant service equipment for each building. Meter locations shall be subject to CPAU's approval.
6. All 480 Volt services and all other services 400 Amperes or larger shall have a single main disconnect. Service equipment shop drawing submittal will be required for CPAU approval BEFORE equipment is manufactured. A copy of the same drawing shall be submitted to the City's Development Services Center for approval by the Building Inspector.
7. CPAU will take ownership and will be responsible for maintaining the new underground primary and secondary distribution systems, and service cables.
8. The Property title-holder will retain ownership of service conduits and substructures and are fully responsible for any maintenance or replacement, as necessary.
9. The owner/developer shall provide, at no charge to CPAU, easements and access to all electrical utility facilities that are in the private property. At a minimum, a draft easement shall be submitted before any service can be energized.
10. Sockets with Test Bypass Facilities are required for all commercial and multifamily services/panel.



# City of Palo Alto Summary of Service Equipment Requirements

**Commercial or Multifamily Electric Service**

**THIS SHEET OUTLINES SOME OF THE REQUIREMENTS FOR SERVICES 400 AMPS OR GREATER.**

## **SUMMARY OF SERVICE EQUIPMENT REQUIREMENTS**

*Applicant is responsible for ensuring that final installations meet all City of Palo Alto and City of Palo Alto Utilities (CPAU) requirements.*

CPAU will furnish and install the necessary metering CT's, PT's, and test switch. For service equipment approval, applicant's equipment must comply with all CPAU and City of Palo Alto requirements including those summarized below. All service equipment will have provisions for sealing the meter per EUSERC requirements. Applicant shall provide service equipment shop drawings to CPAU for review, prior to manufacture, to avoid delays due to field modifications. Drawings should be sent to CPAU Electrical Engineering, 1007 Elwell Court, Palo Alto, 94303. The phone number for CPAU Electrical Engineering is 650-566-4500.

Final service equipment submittals must be provided to, and approved by CPAU prior to installation. Installation shall be inspected and approved by City of Palo Alto Building Department and CPAU before connection to CPAU's electrical system. The following information (where applicable) shall be shown on submittals:

1. Service Equipment: Indoor (NEMA 1 or better) or Outdoor (NEMA 3R or better)
2. Service Rating: \_\_\_\_\_ Amperes \_\_\_\_\_ Volts \_\_\_\_\_ Phase \_\_\_\_\_ Wires
3. Main Disconnect: Circuit Breaker or Fused Switch
4. Minimum Interrupting or Short Circuit Rating of Panel: \_\_\_\_\_ A, RMS Sym. @ : \_\_\_\_\_ V L-L
5. CT Compartment (per EUSERC #320 or #322, whichever is applicable)
6. Meter Plate (per EUSERC #332)
7. Pull Section (per EUSERC #345)
8. Line Termination (per EUSERC #347)
9. Residential 400A (Class 320), 120/240 V meter panel (per EUSERC #302B)
10. Factory-installed bolt-type test by-pass/disconnect block (for self contained meters only)
11. CPAU installs only socket type meters. Meter socket require the following number of jaws:

120/240 V, single phase, 3 wire service	4
120/208V, single phase, 3 wire service	5
120/208 V, three phase, 4 wire service	7 or 13
277/480 V, three phase, 4 wire service	7 or 13

(with jaw at 9 o-clock position)  
(7 up to 200A, 13 greater than 200A)
12. Space for installing potential transformers shall be provided inside the electric panel per CPAU Drawing # SR-MT-M-1019, as required.

**NOTE:** Please contact the Electric Meter Shop, at (650) 496-6978 as soon as the equipment arrives at the job site to schedule the inspection of the equipment and installation of CPAU-furnished instrument transformers and other metering devices.

The service equipment will also have to be inspected and approved by the City of Palo Alto's Building Department Electrical Inspector, (650) 329-2496, before it can be energized.



## City of Palo Alto Frequently Asked Questions

### Commercial or Multifamily Electric Service

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#### **How long will it take to review our submittal?**

Providing all the information is available at the time of submittal, you can expect a 10 business days turn around for initial response.

#### **What kind of costs can I expect for an electric service?**

An estimated service order inclusive of labor and materials costs to provide the requested service will be required to determine the cost of providing electric service. The Applicant is responsible for ALL costs associated with the provision of electric service as required for their project, excluding the material cost of the utility transformer, switches, and electric meter.

#### **Other than the work I am proposing for my building, is there anything else I am required to install?**

You are responsible for installing all substructures (boxes, conduits, etc.) and service cable as determined to be required by CPAU to provide electric service.

#### **Where do I submit by Utility Service Application and plans?**

Utilities has a representative at the City of Palo Alto Development Center, 285 Hamilton Avenue, who can accept your application or answer questions about your project or the process. If necessary, a time can be set up to meet with staff in Engineering to discuss details of your project.

#### **Prior to submitting plans for permit on a new Commercial Development may I discuss what can be expected to provide electric service?**

CPAU would be more than willing to meet to do a preliminary review of your electric service needs. We can layout your service options and determine a service location relevant to the available source. We can provide a clear understanding of the utilities standards and policies regarding your service request. A Utilities representative is available at the Development Center for consultation.

#### **Is Electric Engineering located at the Development Center downtown?**

No, Utilities Engineering is located at 1007 Elwell Court off of East Bayshore Road near San Antonio exit off Highway 101. Our hours are Monday through Friday, 9:00am to 4:00pm.

#### **How do I get temporary power for construction?**

Complete an Electric Application for Temporary Commercial Electric service and submit to Utilities Engineering. This is a separate application form in addition to the Permanent Electric Application.

**THIS DOCUMENT PROVIDES INFORMATION FOR NEW EVSE INSTALLATIONS. IF THE ELECTRIC SERVICE MAIN PANEL WILL BE UPGRADED, PLEASE COMPLETE THE UTILITY SERVICE APPLICATION AND SUBMIT WITH THIS DOCUMENT.**

**Installing an Electric Vehicle Supply Equipment (EVSE)** will require changes to building wiring and may also require upgrading the electric service main panel to meet the needs of this specialized equipment. Before installing an EVSE and associated infrastructure, talk to your EV manufacturer for information about what you need to charge your vehicle and what regulatory requirements there might be.

**When installing your EVSE,** be sure to use a licensed electrical contractor whose license is current for electrical work. The contractor should also follow the guidelines of the manufacturer and the requirements of City of Palo Alto Building Codes.

**A permit from the City is required before installing EVSE.** Submit building and electrical plans for the planned installation with your permit application to the City of Palo Alto Development Center.

**Why is the Electric Utility concerned about your EVSE installation?**

Though an individual EVSE may have a negligible impact on the utility electric system, the combined effect of several chargers in the same service area could result in overloading the utility lines and transformers. It is crucial that the City of Palo Alto Utilities is notified of any EVSE installations to ensure that the utility electrical system remains adequately sized to serve our customers and maintain high levels of service reliability. The Utilities department needs information on location (address), number of EVSE being installed, EVSE current rating, and number of electric vehicles.

**UTILITIES' REVIEW AND APPROVAL IS REQUIRED BEFORE THE BUILDING DEPARTMENT WILL ISSUE PERMITS FOR INSTALLATION OF EVSE RATED GREATER THAN 40 AMP, OR THAT REQUIRES AN OVERCURRENT PROTECTION DEVICE (CIRCUIT BREAKER) GREATER THAN 50 AMP. FAILURE TO DO SO COULD DAMAGE UTILITY SYSTEM FACILITIES, WITH THE OFFENDER RESPONSIBLE FOR THE COST OF REPAIRS.**

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**Please provide the following information and submit with copies of any documentation from the charger manufacturer (cut sheets, installation instructions, specifications, etc.).**

Project Address:	Building Department Permit #
Contact Person:	Phone:
	E-mail:

Number of EVSE being installed:	Number of Electric Vehicles:
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**EVSE Rating(s):**

Quantity			
Voltage (V)			
Current (A)			
Power (kVA)			

**CPAU Engineering Review (required for EVSE > 40 Amp (50 Amp circuit breaker) - A copy of this approved form must be submitted to the City of Palo Alto Building department before a permit will be issued**

Approved By:	Date:
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# GLOSSARY OF COMMON TERMS

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Accessible	A location in which all of the service equipment is installed. This shall encompass the termination section(s), metering appurtenances, and all main disconnect devices. There shall be 24-hour access to this equipment as required by CPAU.
Access Opening	The minimum opening of a pull or termination section or enclosure for utility work access. This opening is measured from the edge of flange-to-edge of flange; not from sidewall-to-sidewall.
Adequate Ventilation	Ventilation necessary to allow air flow, by convection, sufficient to keep the temperature of all electrical equipment (bus bars, connections, switches, circuit breakers, and so on) within an enclosure at or below the manufacturers rated temperature rise.
Agent	One who is authorized to act for another under a contract or relation of agency, either for CPAU or the customer.
Ampere (Amps, A)	The unit of measurement for electrical current.
ANSI	American National Standards Institute
Approved	Acceptable and in conformance with CPAU's rules, policies, and the governing codes, laws, and ordinances.
AWG	American Wire Gage
Backfilling	The process of packing dirt into an open trench after conduits or pipes are installed. CPAU must inspect conduit installations before the trench is backfilled.
BIL	Basic (Impulse) Insulation Level
Building	A structure that normally stands alone and is used for supporting or sheltering any use or occupancy.
Bondable	Capable of the permanent joining of metallic parts to form an electrically conductive path that will assure electrical continuity and the capacity to conduct safely any current likely to be imposed.
Breaker	Customer's circuit breaker.
Bus, Live	Bus bars that are normally energized.
Bus, Laminated	More than one bus bar per phase, connected in parallel.
Bus, Removable Link	Used in the current-transformer compartment to link the line and load bus together.
Bus Stubs	The part of a bus bar reserved for the termination of conductors.

# GLOSSARY OF COMMON TERMS

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Bus Duct (or Busway)	A bus duct is considered to be a grounded metal enclosure containing factory-mounted, bare or insulated conductors that are usually copper or aluminum bars, rods, or tubes. In the City of Palo Alto, bus duct is normally used for high capacity services rated over 1600 Amps.
CAL-OSHA	California Occupational Safety and Health Act
Captive Screws	Screws used to attach removable panel covers on switchboards or enclosures and designed to stay attached to the panel cover when the cover is removed.
Catalog Cut Sheets	A photocopy of a catalog page giving basic information about electric service equipment or a switchboard. A catalog cut sheet usually does not provide detailed construction information about the product.
Class	The ampacity of a meter socket. Class 100 meter sockets are rated 100 Amps; Class 200 are rated 200 Amps. Class 320 meter sockets are rated for 320 Amps continuous current.  Class 10 or 20 meter sockets are used for commercial and industrial electric service installations. Current transformers are used to reduce the actual current flow, which may range from 300 to 3000 amps or more, to no more than 10 or 20 amps through the electric meter.
Clearance, Barrel of Proximity	The clearance described by an imaginary barrel around a termination facility measured from the sides, top, bottom, front, and back of the termination surface to a grounded surface or other termination facility. Includes the studs or bolts when in place.
Clearance, Radial	The clearance required around a termination facility measured from the sides, top, and bottom of the termination surface area. CPAU requires minimum clearances for overhead service drop wires. Wherever a wire connects from a pole to a building or other structure, CPAU requires minimum clearances from wire to streets, driveways, and sidewalks to protect people and vehicles.
Cogeneration	A customer-owned generation facility that is intended to operate in parallel with CPAU's distribution system for the purpose of selling excess power to CPAU.
Commercial Developments	Enterprises engaged in trade or furnishing services such as shopping centers, sales enterprises, business offices, professional offices, educational complexes, governmental complexes, or multi-family residential occupancies served by one meter.
Conductors, Load Side	Conductors transmitting electrical energy that has been previously recorded by CPAU's billing metering.
Conductors, Line Side	Conductors transmitting electrical energy that has not been recorded by CPAU's billing metering.

# GLOSSARY OF COMMON TERMS

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Conductors, Metered	Conductors transmitting electrical energy that has been previously recorded by CPAU's billing metering.
Conductors, Unmetered	Conductors transmitting electrical energy that has not been recorded by CPAU's billing metering.
Conductor Entry	The point in service equipment where conductors enter the service equipment box.
Connector, Pressure	A device that establishes a connection between one or more conductors and a terminal by means of mechanical pressure.
Core Drilling	A special drilling process which creates large diameter, circular holes through concrete structures such as electrical vaults or concrete walls.
CPA	City of Palo Alto
CPAU	City of Palo Alto Utilities – Division of the City of Palo Alto responsible for the provision of electric, water, gas, wastewater services to the residents of Palo Alto.
Current Rating	The ampacity or current carrying capability of a conductor, wire, or other electrical equipment.
Current-Transformer Compartment	A designated area provided within a switchboard for CPAU's exclusive use to install its instrument transformers.
Customer	Any person, persons, corporation, and so forth, or their designated representative, for whom the electrical service and meter installation is provided.
Die-Cast Meter Socket	A single meter socket in a cast aluminum case. The City of Palo Alto prohibits wiring for multiple metes to run through a single die-cast meter socket.
Easement	Land reserved for use by another party. Often, the term refers to a public utilities easement where CPAU reserves access to a section of private property for the purpose of providing utility service.
Electrolier	A complete assembly consisting of a lighting standard, luminaire, ballast, and lamp.
Enclosure	Box-like structure designed to enclose and protect Company service conductors or equipment.
Energize	To connect service and turn the electricity on.
EUSERC	Electric Utility Service Equipment Requirements Committee – sets uniform standards for all electric service equipment.
EUSE	Electric Utility Service Equipment

# GLOSSARY OF COMMON TERMS

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EUSER	Electric Utility Service Equipment Requirements
EVSE	Electric Vehicle Supply Equipment -
Factory Drawing	A manufacturer's drawing of service equipment switchgear, or service panels, which provides detailed information on interior construction and dimensions of equipment. CPAU requires factory drawings before approving service equipment over 400 Amps.
Filler Panel	The panel used on a switchboard, in conjunction with a meter panel, to affect a cover over an extra-wide instrument-transformer compartment.
Final Grade	The grade after paving or improvements have been completed.
First Floor	As defined for the purposes of this manual, is the floor that is closest to the elevation of ground level and above ground level.
GFCI	Ground Fault Circuit Interrupter – A device that helps protect against electric shock hazards.
Ground Hub or Clamp	A special fitting designed to connect a ground wire to a ground rod. It is also used to ground metal conduits in splice boxes.
Ground Rod	Usually a 5/8 inch by 8 foot (or 10 foot) copper clad rod driven into the ground. The ground rod provides a safety ground for the electrical service to the building.
Harmonic Current	Electric current drawn in a non-sinusoidal manner. The normal alternating current flow is sinusoidal, 60 Hz (60 cycles per second). While CPAU supplies sinusoidal 60 Hz voltage, some customer equipment, particularly electronic devices, draws harmonic current. High quantities of harmonic current can increase the heat generated in equipment.
Housekeeping Pad	A concrete slab used to elevate the service equipment above the ground level.
IAEI	International Association of Electrical Inspectors
IEEE	Institute of Electrical and Electronic Engineers
Inspection Authority	These authorities include City, County, State, and Federal Agencies authorized to make electrical inspections; and appropriate sections of School, Port, Water, and Transit Districts, and other entities with legal jurisdiction over wiring on their premises. These agencies are responsible for making inspections of the customer's electrical wiring system and notifying CPAU if such system meets all applicable codes/ordinances and is ready for service.
Instrument-Transformer Compartment	A designated area provided within a switchboard for CPAU's exclusive use to install its instrument transformers.

# GLOSSARY OF COMMON TERMS

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Insulating Barrier	A barrier of non-conductive material within an enclosure, compartment, switchboard, and so forth that effectively prevents electricity from accidentally contacting a neutral, ground, or phase-to-phase in an uncontrolled manner.
Internally Removable Covers	Covers for unused electric meter sockets. Meter panels often come equipped with 6 or more meter sockets, which may not all be in use at a given time.
kVA	Kilo (1000) Volt Amperes; a measure of transformer capacity. In residential electric service common transformer sizes are 25 to 75 kVA. Transformers serving commercial and industrial customers can range from 75 to 2500 kVA.
kcmil (or MCM)	1000 circular mils; the standard for measuring the size of electrical wire larger than 4/0 AWG. The greater the kcmil, the greater the diameter and ampacity of the wire.
Landing Lugs	Used to terminate cable conductors on termination facilities.
Lighting Standard	The pole and mast arm that supports the luminaire (housing, reflector, diffuser or globe, ballast, and lamp).
Load Wires	The wires connected to the load (customer) side of service equipment, separate from the service wires. For example, meter socket or circuit breaker load wires connect towards the customer's load. Service wires connect from the meter socket or circuit breaker towards the point-of-service.
Lugs	Used to terminate cable conductors on termination facilities.
Meter	The equipment required, including mounting facilities, instrument transformers, protective devices, and meters to measure the electric consumption and/or demand requirements of the customer.
Metered Circuits	Those conductors extending from the meter and other service equipment to the loads or outlets connected to such circuits. Metered circuits are not permitted to serve one premise from another.
Meter Closet	A small room enclosed with full-length door or doors that extend from ground level to the ceiling of the enclosure. A meter closet is not a walk-in type enclosure. Sufficient clearance and depth shall be provided to allow for proper clearance for the meter. All meter closets, regardless of voltage, phase, or residential or commercial application, must allow 11 inches minimum clearance measured from the face of the meter panel, to the inside of the closet door. The maximum clearance shall be 12 inches.
Meter Height	Meter height is the distance measured from the center axis of the installed meter and the standing and working surface.

# GLOSSARY OF COMMON TERMS

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Meter Panel	Panel used exclusively for mounting meter sockets and associated equipment.
Meter Pedestal	Free-standing meter enclosure, typically used for residential or commercial applications. Installed by bolting to a concrete slab.
Meter Post	Free-standing meter enclosure, typically used for residential mobile home service and installed by burying in the earth.
Meter Room	A meter room is an illuminated room located inside a building provided by the customer and approved by CPAU for the location of the metering and service equipment.
Meter Set Tag	The Building Department permit that allows the Utilities Department to install the electric meter and energize the service. CPAU cannot energize an electric service until the installation meets all <u>National Electric Code</u> requirements.
Meter Socket	Socket designed to receive socket-type meter and sealing/lock ring.
Meter, Socket Type	Designed for use with self-contained or instrument-transformer type meters to be inserted into a compatible socket.
Meter Test Switch	An arrangement of small knife switches connected in the secondary instrument-transformer circuit between the instrument transformers and associated meters and metering devices. The test switch is used by CPAU to isolate the metering from the instrument transformers. Also referred to as a test switch.
Multiple Metering	Prefabricated service equipment consisting of a service termination section and two or more meter sockets.
NEC	National Electrical Code (NFPA No. 70). Outlines the safety requirements for all non-utility electrical installations.
NECA	National Electrical Contractors Association
NEMA	National Electrical Manufacturers Association
NESC	National Electrical Safety Code
Neutral Tap	Any connection or splice point between wires and the neutral conductor. The City of Palo Alto <u>does not</u> permit neutral taps of any kind.
NFPA	National Fire Protection Association
OSHA	Occupational Safety and Health Act
Overload Device	A fuse, circuit breaker, or combined relay-circuit breaker that protects equipment and conductors from excessive current flow.

# GLOSSARY OF COMMON TERMS

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Oxidation Inhibitor	Oxidation Inhibitor is typically applied to aluminum cable to prevent aluminum conductor from developing an oxide film which can cause connectors to overheat and fail prematurely.
Panel, Removable	All removable access panels shall be limited to nine (9) square feet. All panels shall be provided with a lifting handle. Those panels in excess of sixteen (16) inches shall be provided with two (2) lifting handles.
Phase	The type of electric service provided by the Utility. A three phase service normally uses four wires (three phase wires and one neutral wire) while single phase service consists of three wires (two phase wires and one neutral wire).
Point of Attachment	The point where CPAU's service drop is attached to a building or structure.
Point of Common Coupling	Metering equipment that measures energy delivered through CPAU's distribution system.
Point of Delivery	The point where CPAU's facilities are connected to the premises wiring of the customer.
Premises Identification	Approved numbers or addresses to be placed for all new buildings or structures in such a position as to be plainly visible and legible from the street or road fronting the property.
Primary	CPAU's 12kV or 4kV electric distribution system.
Primary Metered	Customer's who take electric service at CPAU's primary voltage level.
Public Way	A street, road, alley, walkway, or similar dedicated thoroughfare.
Pull Box	An enclosure for joining conductors and the necessary facilities for pulling conductors into place. Included in this classification are concrete subway-type pull boxes, manholes, and wall-mounted pull boxes, all of which are used as terminating enclosures.
Pull Can	A wall-mounted enclosure used for pulling, routing, or connecting CPAU's service conductors to the customer's service equipment.
Pull Section	A section generally attached to the customer's switchboard where CPAU's service conductors are terminated.
Push Brace	A wood brace attached to a wood pole supporting overhead service. The push brace is attached to the same side of the pole as the service drop cable to prevent tension on the cable from pulling the pole over.
Raceway	An enclosed channel designed expressly for holding wires, cables, or bus bars. If designated for line conductors, it must be sealable. The intermixing of line and load conductors in the same raceway is not permitted.

# GLOSSARY OF COMMON TERMS

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Riser	A set of cables that run from an underground box up the side of a pole to connect with overhead wires. The riser cables are enclosed in conduit or a U-shaped molding to provide physical protection.
Readily Accessible	Capable of being reached quickly and conveniently 24 hours a day for construction, operation, maintenance, inspection, testing, or reading, without requiring those seeking access to climb over or remove obstacles; or to obtain keys, special permission, or security clearances.
Recognized Testing Laboratory	An electrical component testing laboratory, nationally recognized: Example UL, ETL, CSA, and so forth.
Return Flange	A flange inside and around an opening. Typically used in or around pull boxes or pull-section openings. The flange surface is in the plane of, and used for attachment of the cover.
Safety Socket Box	Commercial-rated self-contained meter panels, usually provided with test bypass blocks.
Sealable	Normally, the provision for the installation of CPAU's sealing devices. Other devices such as padlocks may be specified as sealing apparatus.
Sealable Gutter	A wiring gutter installed on the Utility side of the electric meter. The gutter is sealed by the Utility to prevent unauthorized access to unmetered conductors.
Sealing Ring	Device used to hold socket-type meters in place with provisions for installing CPAU's sealing device(s).
Sealing Stud Assembly	Combination of sealing stud and sealing wing nut.
Sealing Stud	A 1/4" x 20 (minimum) stud drilled with a 0.0635-inch drill. This stud is used for sealing purposes.
Sealing Wing Nut	A 1/4" x 20 (minimum) wing nut with one wing drilled with a 0.0635-inch drill. This wing nut is used for sealing purposes.
Secondary	Low voltage side of a transformer, typically providing electric service to customers.
Secondary Conductor	Network of low voltage conductors used by CPAU to provide service to customers. Customer's Service Laterals or Service Drops will connect to the CPAU secondary system.
Service	One service drop or one service lateral to a building or structure.
Service Box	The box from which service is taken. Normally a service box is located either underground near the base of a pole or in the sidewalk at the street side property line.

# GLOSSARY OF COMMON TERMS

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Service Drop	CPAU's overhead conductors extending from its pole line to the point of attachment on the building or structure.
Service Entrance Conductors — Overhead	The conductors extending from the service equipment to the point of connection to CPAU's service-drop conductors, typically the weatherhead.
Service Entrance Conductors — Underground	Conductors (including bus or cable) installed by the customer from the service equipment to the Service point. Also called the Service Lateral.
Service Lateral	Conductors (including bus or cable) installed by the customer from the service equipment to the Service point.
Service Mast	The service mast consists of conduit running through a building and roof to a weatherhead. At the weatherhead the service conductors connect to the service drop.
Service Neutral Conductor	The neutral, or common wire, usually grounded at both the distribution transformer and the service entrance equipment.
Service Point	The point of connection between the facilities of CPAU and the customer's wiring.
Shall, Should, Will, and May	Throughout this manual the words SHALL and WILL are used to indicate mandatory requirements of CPAU or local inspection authority. The terms SHOULD and MAY are used to indicate recommendations, or that which is advised but not necessarily required.
Street Opening Permit	A permit from the Public Works Department required whenever a contractor or agency excavates in the City right of way, which includes streets, sidewalks, or easements.
Stub, Service Termination	A conducting element of an equipment or circuit intended for connection to an external conductor.
Stud	A threaded machine-type bolt or screw used for attachment of wire or cable connectors.
Stud, Secured in Place	A stud attached so that it will not turn, back-out, or loosen in any manner when tightening or loosening terminal nuts, including cross-thread situations.
Substructures	Any conduit, subway-type pull box, manhole, vault, or other underground-type enclosure in which cables, transformers, and similar equipment are installed.
Sweep	A bend in an electrical conduit where conductors enter a box. In the City of Palo Alto, a sweep can be 22, 45, or 90 degrees. A sweep's allowable radius depends on the diameter of the conduit.

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Switchboard Service Section	That part of the switchboard provided specifically for the termination of CPAU's service conductors and instrument transformers, when required. The revenue meters, test facilities, and service switch or breaker may also be located in this area. The instrument-transformer compartment of this section shall be isolated from the customer's switch or breakers. That part reserved for CPAU's use shall be sealable.
Switchboard, Specially Engineered	A switchboard design that does not conform to the standard switchboard design and includes one or more of the following: (1) service is rated over 3,000 A or 600 V; (2) where the service breaker ampacity rating exceeds that of the standard service section; (3) where multiple-metering sections are used; (4) where recessed meter panels are used.
Switchboard, Standard	An electrical switchboard of minimum dimensions of height, width, and depth with hinged meter panels and standard size instrument-transformer compartment, when required.
Terminal	A conducting element of an equipment or circuit intended for connection to an external conductor.
Terminating Enclosure	A Company-approved type of enclosure installed at the point-of-service delivery for the load-end termination of CPAU's service cables, in which they join the customer's service-entrance conductors. Included in this classification are concrete subway-type pull boxes, manholes, wall-mounted pull boxes, and switchboard pull sections.
Terminating Facilities	Bolt-type pads, bus-stubs, or range-taking lugs provided by the customer for the sole purpose of attaching CPAU's unmetered service conductors to the customer's service equipment.
Test Bypass Disconnect Facilities (Test Blocks)	An assembly used in conjunction with a self-contained meter socket. They are designed to allow CPAU to de-energize the meter socket without disconnecting service to the customer.
Test Switch	An arrangement of small knife switches connected in the secondary instrument-transformer circuit between the instrument transformers and associated meters and metering devices. The test switch is used by CPAU to isolate the metering from the instrument transformers. Also referred to as a meter test switch.
Test Perch	A bracket designed for the mounting of CPAU's meter test switch.
Transformer Compartment	A designated area provided within a switchboard for CPAU's exclusive use to install its instrument transformers.
Transformer, Instrument (IT)	A transformer that reproduces in its secondary circuit, a definite and known proportion of the current or voltage of its primary circuit, with the phase relation substantially preserved.
Transformer, Current (CT)	An instrument transformer designed for use in the measurement of electrical current.

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Transformer, Voltage (VT)	An instrument transformer designed for use in the measurement of voltage.
UL®	Underwriters Laboratories, Inc
Utility Meters	Company furnished, installed, owned, and maintained meters used to measure electrical consumption for billing purposes.
Utility's Operating Convenience	This term refers to the utilization, under certain circumstances, of facilities or practices not ordinarily employed, that contribute to the overall efficiency of CPAU's operation.
Underground Distribution System	An underground supply system employing underground structures, cables, and other equipment located in a designated area on public ways or utility easements and not including service cables in the customer's service conduit.
Underground Service Alert (USA)	An agency serving all utilities in California that coordinates the notification of utilities for locating underground facilities. Once notified by USA of the proposed work, Utilities will mark the site of the planned excavation to make everyone aware of the location of existing underground utilities.
Underground Service Conduit	Those underground conduits that connect from the service point to the electric service equipment.
Underground Structure	Any conduit, subway-type pull box, manhole, vault, or other underground-type enclosure in which cables, transformers, and similar equipment are installed.
Volt	The unit of measurement for electrical potential. Typical residential service is 120/240 Volts. Primary distribution lines are 4,160 or 12,470 Volts.
Voltage Flicker	The visual result of a sudden dip in the voltage serving a lighting source.
Weatherhead	A device resembling a periscope attached to the top of the service mast. The weatherhead provides a seal where the wires from the service drop enter the conduit of the service mast.
Watt-Hour Meter, Instrument Transformer Rated	An electrical meter used in conjunction with instrument transformers to accurately measure and register all the electrical energy, consumed in the circuit in which it is connected. The unit of measurement is the kilowatt hour.
Watt-Hour Meter, Self-contained	An electrical meter that measures and registers all the electrical energy consumed in the circuit in which it is connected and does not require additional instrument transformers. The unit of measurement is the kilowatt hour.

## **GLOSSARY OF COMMON TERMS**

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Wire Nuts	The small connectors screwed onto the wires to make connections for outlets and electric switches in homes. Wires nuts are <u>not</u> acceptable for electric service equipment.
Wiring Gutter	A box with a removable face for electrical wires to connect through. Wiring gutters are used when a single, large cable entering a facility serves several electric meters.
Working Space	The area provided and maintained by the customer, necessary for CPAU to install, remove, or maintain its conductors or equipment. This space is required in front of all devices or equipment required in providing service to the customer.