A. ELECTRIC SERVICE - GENERAL

1. The type of service available at any particular location should be determined by inquiry at Redding Electric Utility (REU).
2. Alternating current service will be regularly supplied at a frequency of approximately 60 hertz (cycles per second).
3. In areas where a certain standard secondary voltage is presently being served to one or more existing customers, new customers applying for service in such areas may be required to receive the same standard voltage supplied to existing customers.
4. Service to a customer is normally established at one service point, through one meter, and at one voltage class. Other arrangements for service at multiple points, or for services at more than one voltage class, are permitted only where feasible; with the approval of REU and any other authority having jurisdiction.
5. REU will not allow the electric meter to be installed in a hazardous area. In hazardous-type areas, as determined by REU, the customer will be required to provide and install metering facilities and master control equipment away from the hazardous area.

B. SERVICE DELIVERY VOLTAGES

1. Following are the standard service voltages normally available (in volts), although not all of them are or can be made available at each service delivery point.

<table>
<thead>
<tr>
<th>DISTRIBUTION VOLTAGES</th>
<th>TRANSMISSION VOLTAGES</th>
</tr>
</thead>
<tbody>
<tr>
<td>SINGLE-PHASE SECONDARY</td>
<td>THREE-PHASE SECONDARY</td>
</tr>
<tr>
<td>120/240, 3-WIRE (600 AMPS MAX)</td>
<td>240/120, 4-WIRE **</td>
</tr>
<tr>
<td>120/208, 3-WIRE (200 AMPS MAX)</td>
<td>208/120, 4-WIRE (2,000 AMPS MAX)</td>
</tr>
<tr>
<td>480/277, 4-WIRE (3,000 AMPS MAX)</td>
<td></td>
</tr>
</tbody>
</table>

* REU will no longer supply 120/208 V, single-phase service to residential structures or buildings unless an existing 120/208 V secondary system is established near the location where the requested service would be supplied and has sufficient kVA capacity.
** Utilized only for existing installation and subject to REU approval.

2. All voltages referred to in this section are nominal service voltages at the delivery point. REU facilities are designed and operated to provide sustained service voltage at the service delivery point, but the voltage at a particular service delivery point, at a particular time, will vary within the operating range limits established in Section C.
3. The point of delivery and point of metering will normally be at the same voltage and within close proximity to each other.

C. VOLTAGE AND FREQUENCY CONTROL

1. CUSTOMER SERVICE VOLTAGE

   a. Under all normal load/operating conditions, REU's distribution circuits will be operated in accordance with American National Standard C84.1 so as to maintain secondary service voltage levels to customers within the service voltage ranges specified below:
b. Exceptions to Voltage Limits

Voltage may be outside the limits specified when the variations:

1. Arise from the temporary action of the elements.
2. Are infrequent momentary fluctuations of a short duration.
3. Arise from service interruptions and system emergencies.
4. Arise from temporary separation of parts of the system from the main system.
5. Are from causes beyond the control of REU.

c. It must be recognized that, because of conditions beyond the control of REU, the customer, or both, there will be infrequent and limited periods when sustained voltages outside of the service voltage range will occur. Utilization equipment may not operate satisfactorily under these conditions, and protective devices may operate to protect the equipment.

d. The sustained service delivery voltages are subject to minor momentary and transient voltage excursions which may occur in the normal operation of REU's system. Subject to the limitations of C.1.a. above, the voltage balance between phases will normally be maintained by REU as close as practicable to 3 percent maximum deviation from the average voltage between the three phases.

e. When the operation of the customer's equipment requires unusually stable voltage regulation or other stringent voltage control beyond that supplied by REU in the normal operation of its system, the applicant, at his own expense, is responsible for installation, owning, operating, and maintaining any special or auxiliary equipment on the load side of the service delivery point as deemed necessary by the applicant.

f. The customer shall be responsible for designing and operating his service facilities between the service delivery point and the utilization equipment to maintain proper utilization voltage at the line terminals of the utilization equipment.

2. CUSTOMER UTILIZATION VOLTAGES

a. All customer-owned utilization equipment must be designed and rated in accordance with the following utilization voltages specified by the American National Standard C84.1 if customer equipment is to give fully satisfactory performance.

<table>
<thead>
<tr>
<th>NOMINAL UTILIZATION VOLTAGE</th>
<th>MINIMUM UTILIZATION VOLTAGE</th>
<th>MAXIMUM UTILIZATION VOLTAGE</th>
</tr>
</thead>
<tbody>
<tr>
<td>120</td>
<td>110</td>
<td>125</td>
</tr>
<tr>
<td>208</td>
<td>191</td>
<td>216</td>
</tr>
<tr>
<td>240</td>
<td>220</td>
<td>250</td>
</tr>
<tr>
<td>277</td>
<td>254</td>
<td>289</td>
</tr>
<tr>
<td>480</td>
<td>440</td>
<td>500</td>
</tr>
</tbody>
</table>
b. The difference between service and utilization voltages are allowances for voltage drop in customer wiring.

c. Minimum utilization voltages from American National Standard C84.1 are shown for customer information only as REU has no control over voltage drop in customer's wiring.

d. The minimum utilization voltages shown in 2.a. above, apply for circuits supplying lighting loads. The minimum secondary utilization voltages specified by American National Standard C84.1 for circuits not supplying lighting loads are 90 percent of nominal voltages (108 volts on 120-volt base) for normal service.

e. Motors used on 208 volt systems should be rated 200 volts or (for small single-phase motors) 115 volts. Motors rated 230 volts will not perform satisfactorily on these systems and should not be used. Motors rated 220 volts are no longer standard, but many of them were installed on existing 208 volt systems on the assumption that the utilization voltage would not be less than 187 volts (90 percent of 208 volts).

3. FREQUENCY

a. REU will exercise reasonable diligence and care to regulate and maintain its frequency within reasonable limits but does not guarantee same.

D. GENERAL LOAD LIMITATIONS

1. SINGLE-PHASE SERVICE

a. Single-phase service normally will be three-wire 120/240 volts where the size of any single motor does not exceed 7.5 horsepower. For any single-phase service, the maximum demand as determined by REU is limited to the capability of a 100kVA transformer unless otherwise approved by REU. If the load requires a transformer installation in excess of 100kVA, the service will normally be three-phase.

b. In locations where REU maintains a 120/208 volt secondary system, 3-wire, single-phase service normally shall be limited to that which can be supplied by a main switch or service entrance rating of 200 amperes. Single-phase loads in these locations in excess of that which can be supplied by a 200 ampere main switch or service entrance rating normally will be supplied with a 208Y/120 volt, three-phase, 4-wire service.

2. THREE-PHASE SERVICE (1,000 VOLTS OR LESS)

All three-phase services in this voltage range will be four (4) wire. The service conductor neutral must be connected to the main panel neutral lug.

a. Secondary service normally available from overhead primary distribution systems (this may require the installation of underground primary to supply a transformer at ground level).

<table>
<thead>
<tr>
<th>NOMINAL VOLTAGE</th>
<th>MINIMUM LOAD NORMALLY REQUIRED</th>
<th>MAXIMUM DEMAND LOAD NORMALLY PERMITTED</th>
</tr>
</thead>
<tbody>
<tr>
<td>208Y/120</td>
<td>DEMAND LOAD JUSTIFIES A 75KVA TRANSFORMER</td>
<td>1,000KVA</td>
</tr>
<tr>
<td>240/120 (DELTA)</td>
<td>7.5HP, 3-PHASE CONNECTED</td>
<td>500KVA</td>
</tr>
<tr>
<td>480Y/277</td>
<td>DEMAND LOAD JUSTIFIES A 75KVA TRANSFORMER</td>
<td>1,500KVA</td>
</tr>
</tbody>
</table>
b. Secondary service from underground primary distribution system:

<table>
<thead>
<tr>
<th>NOMINAL VOLTAGE</th>
<th>MINIMUM LOAD NORMALLY REQUIRED</th>
<th>MAXIMUM DEMAND LOAD NORMALLY PERMITTED</th>
</tr>
</thead>
<tbody>
<tr>
<td>208Y/120</td>
<td>DEMAND LOAD JUSTIFIES 75KVA TRANSFORMER</td>
<td>1,000KVA</td>
</tr>
<tr>
<td>480Y/277</td>
<td>DEMAND LOAD JUSTIFIES 75KVA TRANSFORMER</td>
<td>1,500KVA</td>
</tr>
</tbody>
</table>

c. Where three-phase service is supplied, REU reserves the right to use single-phase transformers connected open-delta or closed-delta, or three-phase transformers.

d. A four-wire delta circuit as used in this section is defined to mean a four-wire, three-phase circuit and a three-wire, single-phase circuit are combined and served through a single electric service meter. The customer or his contractor must verify the availability of this type of service in advance of commencement of electrical work preparatory to such an installation.

e. Three-phase service will be supplied on request for installations aggregating less than the minimums listed where existing three-phase transformer capacity exists and is available. Single motors larger than 7.5 hp must be served three-phase.

f. The maximum allowable size for any one motor served at 208 volts, three-phase is thirty (30) hp. The maximum size allowable for any one motor served at 240 volts, three-phase is fifty (50) hp.

g. For metering requirements, see CORCS 550-552.

3. THREE-PHASE SERVICE (OVER 1,000 VOLTS)

a. Applicants with demand loads in excess of 1,500 kVA may be required to take delivery at 12,000 volts. 12,000 volts is the standard primary distribution voltage which may be available without transformation from existing primary distribution lines.

b. Applicants with demand loads of 3,000 kVA may be required to take delivery at the 115,000 volt transmission voltage and provide their own substation facilities. The availability of transmission voltage shall be determined by REU.

4. LOAD BALANCE

a. The applicant must balance his demand load as nearly as practicable between the two sides of a three-wire, single-phase service and between all phases of a three-phase service. The difference in amperes between any two phases at the customer’s peak load should not be greater than 10 percent or 50 amperes (at the service delivery voltage), whichever is greater; except that the difference between the load on the lighting phase of a four-wire delta service and the load on the power phase may be more these limits. It will be the responsibility of the customer to keep his demand load balanced within these limits.

E. PROTECTIVE DEVICES

1. It shall be the applicant’s responsibility to equip his three-phase motor installations with appropriate protective devices, or use motors with inherent features, to completely disconnect each such motor from its power supply, giving particular consideration to the following:
a. Protection in each set of phase conductors to prevent damage due to overheating in the event of overload.
b. Protection to prevent automatic restarting of motors or motor-driven machinery which has been subjected to a service interruption and, because of the nature of the machinery itself or the product it handles, cannot safely resume operation automatically.
c. Open-phase protection to prevent damage due to overheating in the event of loss of voltage on one phase.
d. Reverse-phase protection where appropriate to prevent uncontrolled reversal of motor rotation in the event of accidental phase reversal. (Appropriate installations would include, but are not limited to, motors driving elevators, hoists, tramways, cranes, pumps, conveyors, etc.)

2. The available short-circuit current varies from one location to another, and also depends on the ultimate design characteristics of REU's supply and service facilities. The customer shall consult REU for the ultimate maximum short-circuit current at each service termination point.

3. Any customer-owned emergency standby or other generation equipment that can be operated to supply power to facilities that are also designed to be supplied from REU's system shall be controlled with suitable protective devices by the applicant to prevent parallel operation with REU's system in a fail-safe manner, such as the use of a double-throw switch to disconnect all conductors, except where there is a written agreement or service contract with REU permitting such parallel operation.

F. INTERFERENCE WITH SERVICE

1. GENERAL

a. REU reserves the right to refuse to serve new loads or to continue to supply existing loads of a size or character that may be detrimental to REU's electric operations or to the service of its customers. Any customer who operates or plans to operate any equipment such as, but not limited to, pumps, welders, saw mill apparatus, furnaces, compressors or other equipment where the use of electricity is intermittent, causes intolerable voltage fluctuations, or otherwise causes intolerable service interference, must reasonably limit such interference or restrict the use of such equipment upon request by REU. The customer is required either to provide and pay for whatever corrective measures are necessary to limit the interference to a level established by REU as reasonable, or avoid the use of such equipment, whether or not the equipment has previously caused interference.

2. HARMFUL WAVE FORM

a. Customers shall not operate equipment that superimposes a current of any frequency or wave form upon REU's electric system, or draws current from REU's electric system of a harmful wave form, which causes interference with REU's operations, or the service to other customers, or inductive interference to communication facilities.

3. CUSTOMER'S RESPONSIBILITY

a. Any customer causing service interference to others must diligently pursue and take timely corrective action after being given notice and a reasonable time to do so by REU. If the customer does not take timely corrective action, or continues to operate the equipment causing
the interference without restriction or limit, REU may, without liability, after giving written notice
to the customer, discontinue electric service until a suitable permanent solution is provided by
the customer and it is operational.

4. MOTOR STARTING CURRENT LIMITATIONS

a. All electric motors operated within REU shall have adequate running over-current protection.
   Three-phase motors shall have over-current protection on all three phases.

b. The starting of motors shall be controlled by the customer as necessary to avoid causing voltage
   fluctuations that will be detrimental to the operation of REU's distribution or transmission system,
   or to the service of any of REU's customers.

c. If the starting current for a single motor installation exceeds the value listed in Table 1, and the
   resulting voltage disturbance causes or is expected to cause detrimental service to others,
   reduced voltage starters or other suitable means must be employed, at the customer's expense,
   to limit the voltage fluctuations to a tolerable level.

d. The starting current shall be considered to be the current defined in Note 2 of Table 1. At its
   option, REU may determine the starting current of a motor by test, using a stop ammeter with not
   more than 15 percent overswing, or an oscillograph, disregarding the value shown for the first
   ten cycles after energizing the motor.

e. In the case of room and unitary air conditioners, heat pumps or other complete unit equipment
   on which the nameplate rating is expressed in kVA input and not in hp output, the nameplate
   kVA input rating shall be considered to be the hp rating for use of Table 1. If the nameplate does
   not show kVA input, then it may be determined for single-phase motors by taking the product of
   the running input line current in amperes times the input voltage rating divided by 1000. For
   three-phase-motors, multiply this product by the square root of three (1.73).

f. The starting current values in Table 1 apply only to the installation of a single motor. Starters
   may be omitted on the smaller motors of a group installation when their omission will not result in
   a starting current in excess of the allowable starting current of the largest motor of the group.
   Where motors start simultaneously, they will be treated as a single unit equal to the sum of their
   individual starting current.

g. REU may limit the maximum size and type of any motor that may be operated at any specific
   location on its electric system to that which will not be detrimental to REU's electric system
   operations or to the service of its customers, as determined by REU.

h. Where the design or operation of the customer's motor is such that unequal starting currents
   flow in REU's service conductors, the largest starting current in any one set of phase conductors
   shall be considered the motor starting current.

i. For installations of a motors where the equipment is started automatically by means of float,
   pressure, or thermostat devices, such as with pumps or wind machines for frost protection,
   irrigation pumps or other similar installations, REU may require the customer to install, at his own
   expense and in accordance with REU's operating requirements, suitable present time-delay
   devices to stagger the automatic connection of load to the supply system and to prevent
   simultaneous start-up for any reason.

j. REU reserves the right to refuse to supply electrical loads of a character that, in the sole opinion
   of REU, may seriously impair service to any Customer. In case of hoists or elevator motors,
   welders, furnaces, compressors and other installations of like character where the use of
   electricity is intermittent or subject to violent fluctuations, REU may require the Customer to
   provide, at his own expense, suitable equipment to reasonably limit such fluctuations.
### TABLE 1

**NORMAL MAXIMUM ALLOWABLE MOTOR STARTING CURRENTS**

**ALTERNATING CURRENT MOTORS**

<table>
<thead>
<tr>
<th>RATED HP OUTPUT</th>
<th>SINGLE-PHASE VOLTAGE</th>
<th>THREE-PHASE VOLTAGE</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>MOTOR RATING (SERVICE VOLTAGE)</td>
<td>MOTOR RATING (SERVICE VOLTAGE)</td>
</tr>
<tr>
<td></td>
<td>230V (240)AMPS</td>
<td>200V (208)AMPS</td>
</tr>
<tr>
<td>1/2</td>
<td>20</td>
<td>--</td>
</tr>
<tr>
<td>3/4 or 1</td>
<td>27</td>
<td>--</td>
</tr>
<tr>
<td>1 1/2</td>
<td>30</td>
<td>--</td>
</tr>
<tr>
<td>2</td>
<td>40</td>
<td>--</td>
</tr>
<tr>
<td>3</td>
<td>60</td>
<td>69</td>
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<tr>
<td>5</td>
<td>100</td>
<td>101</td>
</tr>
<tr>
<td>7.5</td>
<td>110</td>
<td>133</td>
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<tr>
<td>10</td>
<td>--</td>
<td>162</td>
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<tr>
<td>15</td>
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<td>227</td>
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<td>20</td>
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<td>288</td>
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<tr>
<td>25</td>
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<td>350</td>
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<td>30</td>
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<td>415</td>
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<td>60</td>
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<td>100</td>
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<td>125</td>
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<td>--</td>
</tr>
<tr>
<td>150</td>
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</tr>
<tr>
<td>200 AND ABOVE</td>
<td>--</td>
<td>--</td>
</tr>
</tbody>
</table>

**TABLE 1 NOTES:**

1. See Section F.4 for details on the use of this table.
2. Motor starting current is defined as the steady state current taken from the supply line with the motor rotor or rotors locked, with all other power consuming components, including a current-reducing starter, if used, connected in the starting position, and with rated voltage and frequency applied.
3. The normal operating capacity rating of any motor or other device may be determined from the nameplate rating. Where the original nameplate has not been removed or altered, the manufacturer's published rating may be used or the rating determined by test at the expense of the customer.
The Developer/Customer shall perform all trenching and backfill per City of Redding Public Works Construction Standards pages 507, 521, and 620 through 624.20.

2. The Developer/Customer shall furnish and install (unless otherwise shown) all conduits for services, secondary, and 4" primary conduits. Below grade conduits shall meet the requirements of Standard 521. For new primary express feeders, REU will normally furnish any required 6" conduit (executing secondary or service) for the Developer/Customer's installation. The Developer/Customer shall be required to transport the 6" conduit to the job site from the REU storage location. The developer/customer shall be responsible for 6" conduit required for relocations and undergrounding of existing REU facilities.

3. Bell ends shall be placed on all conduit terminations. Bell ends shall be of the same type material as conduit to which they are attached (i.e., D.B., Sch. 40, Sch. 80).

4. All conduits installed by the Developer/Customer shall be cleaned by using brushes and/or swabs.

5. All 4" conduit runs less than 600' long without conductors shall have a minimum 1250lb polyester MULETAPE®, or equal (especially designed for that purpose) pull line provided and installed by the customer/developer. All 6" conduit and 4" conduit runs greater than 600' without conductors shall have a minimum 2500lb polyester MULETAPE® or equal pull line provided and installed by customer/developer.

6. Conduit system is for future use as well as initial cable installation; therefore, Developer/Customer shall use all care required during pulling cable to ensure that conduit is not damaged.

7. All conduit sweeps or bends shall be PVC Schedule 40. All conduit terraced bends shall be PVC Schedule 80, or equal, per Standard 547. Conduit sweeps or bends shall not be cut or otherwise modified. All joints shall be glued per manufacturer's specification and provide a water tight fit.

8. Developer/Customer shall furnish and install all low voltage (0-600V) cable. Cable shall be XLPE insulated, NEC type "U.S.E.-2" Aluminum per Standard 510, unless otherwise specified.

9. Developer/Customer shall coil 3' of cable in each splice enclosure with ends protected by plastic caps taped secure to the cable. All cable will be spliced by REU except at the service entrance (locate item 18 below).

10. The Developer/Customer shall furnish and install all substructures, 3' x 5' boxes and smaller. REU will normally furnish for the Developer/Customer's installation any required 6" conduit runs less than 600' long without conductors shall have a minimum 1250lb polyester MULETAPE®, or equal pull line provided and installed by customer/developer.

11. Conduit runs shall be limited to no more than 3 90° bends, or a combination of angles with no more than 270° deflection throughout the conduit run. All conduits shall be set at the same elevation and slope of the adjacent sidewalk, curb or pavement. All secondary boxes shall be set at the same elevation and slope of the adjacent sidewalk, curb or pavement.

12. All conduit and wire sizing will be by the Electric Utility Engineering staff.

13. There shall be no splices in low voltage (600V) wire and conduit due to relocation or increased load shall be the responsibility of the Developer/Customer.

14. REU will determine all points of service. Service points normally shall provide minimum cable lengths and provide accessibility for operations and maintenance.

15. The neutral conductor of low voltage (600V) tri-plex cable shall be insulated with a yellow pigmented XLP compound for easy identification. Single conductor cable used as neutral without yellow marking (pigmented) shall be identified at each splicing point by approved white electrical tape.

16. The Developer/Customer shall provide all necessary easements for electric supply facilities as required by REU.

17. Developer/Customer shall be responsible to locate and properly place electric utility facilities within utility easements and public right of way.

18. Developer/Customer shall furnish and install street light base, conduit, standard, arm, luminaire, and conductor per Standards 551, 555, and 566.

19. It is the responsibility of the Developer/Customer to set all primary boxes so that the box lid is at the same elevation as the lowest final elevation of the adjacent sidewalk, top of curb or pavement edge (existing, proposed, or future). All secondary boxes will be set at the same elevation and slope of the adjacent sidewalk, curb or pavement.

20. All conduit and substructures to be used by REU must be inspected prior to backfilling. Failure to obtain an inspection will require the installer to expose any or all of the buried facilities for an inspection. Call 224-4390, 48 hrs prior to backfilling, to schedule an inspection by the Electric Utility Inspector.

21. All underground transformers and switchgear equipment shall be located within 8' of a paved driveable access.

22. Groundwater/stormwater intrusion and migration in any trench is the responsibility of the customer and/or his trenching agent for the life of facilities placed in the trench.

23. All 4" conduit runs less than 600' long without conductors shall have a minimum 1250lb polyester MULETAPE®, or equal pull line provided and installed by customer/developer.

24. The Developer/Customer shall furnish, install, own and maintain conduit 2 feet from his outer building line to his terminating facility.

25. All service conductors shall be terminated by the Developer/Customer at his service entrance panel. All terminations will be by the Electric Utility Engineering staff.

26. Developer/Customer shall furnish and install street light base, conduit, standard, arm, luminaire, and conductor per Standards 551, 555, and 566.

27. All electric service panels must meet Electric Utility Service Equipment Requirements Committee (EUSERC) standards accepted by REU.
GENERAL NOTES:

1.) The information provided on this drawing is intended to advise customers of the minimum requirements for customer-owned service poles for temporary overhead electric service.

2.) Inspection and approval of the installed pole by the city building department is required before service can be connected.

3.) When single phase service larger than 100 amp or three phase service is desired, consult Redding Electric Utility (REU).

4.) The use of temporary service poles shall be restricted to installation of a temporary nature such as building construction, temporary sales locations, or other uses requiring electric services for one year or less.

5.) Address numbers shall be provided and attached to the meter enclosure as shown. The numbers shall be a minimum of 2" in height and posted in a manner that will be visible from the street.

6.) Service lengths greater than 50' or crossing a road must first be engineered. Consult with REU.

SERVICE POLE INSTALLATION

7.) Temporary service poles shall be furnished and installed by the customer. The minimum length shall be 22', with 4' embedded in the ground. A longer pole may be necessary to provide the required clearance from ground.

8.) A temporary wood service pole may be rectangular or circular in cross section and shall be solid (not laminated). Rectangular poles shall have a minimum cross section of 6"x6" nominal. Circular poles shall be class 6. Preservative treated wood poles.

9.) The butt of the temporary wood service pole shall be at a minimum, painted with creosote or any other approved preservatives where in contact with the earth.

VERTICAL CLEARANCE FOR SERVICE POLES

10.) Conductors to service poles shall have a minimum vertical clearance to ground of 16' (when crossing utility lines, roads, railroad tracks, buildings or other obstructions, consult REU).

SERVICE ENTRANCE CONDUCTORS

11.) The customer shall furnish, install and maintain the service entrance wiring and service equipment beyond the point of attachment to REU service wires.

12.) The neutral conductor of 2 wire 120 volt and 3 wire 120/240 volt (or 120/208v) services shall be securely connected to the neutral terminal of the meter socket and extended through to the service entrance disconnect. It shall be continuous (without splice) from the service head to the service entrance switch.

13.) At least 18" of the service entrance conductors shall be provided outside the service head.

SERVICE ENTRANCE AND LOAD SIDE CONDUIT

14.) All conduit installed on the pole shall be 1.5" - 2.5" diameter schedule 80 PVC. PVC plastic conduit is not to be covered. The conduit shall be fastened to the pole at intervals not greater than 3' on centers.

GROUNDING

15.) The path to ground from circuits, equipment and conductor enclosures shall be permanent and continuous. All metallic enclosures and conduit enclosing service entrance conductors shall be connected to the common ground.

16.) A continuous grounding conductor shall be extended from the neutral terminal of the disconnect to a grounding electrode. The ground conductor shall be No. 8 AWG copper for No. 2 copper (1/0 AL) or smaller service entrance conductors and No. 6 AWG for No. 1 or 1/0 copper (2/0 or 3/0 AL) service entrance conductors. The ground conductor shall be protected against mechanical damage by rigid steel conduit, flexible cable or armor cladding connected to the grounding by means of an approved conduit grounding hub and clamp. The grounding electrode must be above finish grade or otherwise readily accessible for inspections.

17.) Acceptable materials for the grounding electrode for the service pole shall be either a 1/2" diameter copper clad rod, 5/8" diameter steel rod or a 3/4" diameter galvanized iron pipe. The electrode shall be installed such that a minimum of 8' is in contact with the soil.
GENERAL NOTES:
1. The information provided on this drawing is intended to advise customers of the minimum requirements for customer owned service poles for permanent overhead service.
2. Since permanent customer owned service poles may have to be climbed by REU lineman they are subject to compliance with the requirements of General Order 95 “Rules for Overhead Electric Line Construction” of the California Public Utilities Commission.
3. Inspection and approval of the installed pole by the City Building Department is required before service can be connected.
4. When single phase service larger than 100 amps or 3 phase service is desired, consult with REU.
5. Permanent service poles shall be used when it is estimated that the installation will remain for a period of more than one year and no substantial building exists for the mounting of the meter enclosure.
6. Address numbers shall be provided and attached to the meter enclosure as shown. The numbers shall be a minimum of 2” in height and posted in a manner that will be visible from the street.
7. Lighting, signs ropes and any similar equipment shall not be attached to the service pole.
8. Service lengths greater than 100’ or crossing a road must be engineered. Consult with REU.

SERVICE POLE INSTALLATION:
9. Permanent service poles shall be furnished and installed by the customer.
10. The minimum length shall be 25’ with 4’-6” embedded in the ground. A longer pole may be necessary to provide the required clearance from the ground or other obstructions whether on the customer's property or not.
11. Permanent service poles must be circular in cross section. A minimum class 6 (class 5 if phone or CATV attached) and full length preservative treated. See Table 2 for approved preservative treatments.
12. Permanent service pole shall be located so that vertical clearances as shown on sheet 3 can be obtained.
13. The service pole shall not be located less than 10’ nor more than 100’ from the surface of the REU pole, or within 1’ of the vertical plane of a REU overhead line conductor.
14. Customer’s service pole must be guyed against the pull of the service drop by one of the anchor guy methods shown on sheet 3.

VERTICAL CLEARANCE FOR SERVICE POLE:
15. Conductors to the service poles shall maintain vertical clearances as specified on sheet 3. If service drop must cross utility lines, roads, railroads tracks or other obstructions consult with REU.

SERVICE ENTRANCE CONDUCTORS AND CONDUIT:
16. The customer shall furnish, install and maintain the service entrance wiring and service equipment beyond the point of attachment to REU service wires.
17. A minimum of 18” of service entrance conductors shall be provided outside the service head.
18. Service riser conduit shall be 1.5” - 2.5” diameter schedule 80 PVC. PVC plastic conduit is not to be covered and shall be fastened to the pole at intervals not to exceed 3’.
CUSTOMER'S LINE

SERVICE CONDUCTOR BY REU, 10' MIN., MAX. SPAN 100'

SERVICE HEAD, PVC

CONDUCTORS SHALL BE SIZED PER NATIONAL ELECTRIC CODE.

Drip Loops

Straps Min. 3' apart

1 1/2" - 2 1/2" Schedule 80 PVC Conduit

Pole - Min. Class 6

6 Round Pole at least 25' in length.

Combination Meter Socket Panel Meter by REU

Address Number 2" High Min.

Grounding Consult REU Inspection Authorities

Climbing Space - See Note 1 below

SERVICE DROP

Cable to Overhead Line

Table 1: Pole Setting Depths

<table>
<thead>
<tr>
<th>Pole Length (FT.)</th>
<th>Depth (FT.) in Firm Soil</th>
</tr>
</thead>
<tbody>
<tr>
<td>25</td>
<td>4 1/2</td>
</tr>
<tr>
<td>30</td>
<td>5</td>
</tr>
<tr>
<td>35</td>
<td>5</td>
</tr>
<tr>
<td>40</td>
<td>5 1/2</td>
</tr>
</tbody>
</table>

Notes:
1. Customer's equipment shall not be installed in climbing space.

SERVICE DROP

Cable to Underground Line

Table 2: Approved Service Pole Treatments

<table>
<thead>
<tr>
<th>Species</th>
<th>Oil Penta</th>
<th>CCA</th>
<th>Cu Nap</th>
</tr>
</thead>
<tbody>
<tr>
<td>Western Red Cedar</td>
<td>X</td>
<td>X</td>
<td>X</td>
</tr>
<tr>
<td>Douglas Fir</td>
<td>X</td>
<td>-</td>
<td>X</td>
</tr>
</tbody>
</table>

Oil Penta = Pentachlorophenol
CCA = Chromated Copper Arsenate
Cu NAP = Copper Napthenate

All poles shall be full length treated except that Western Red Cedar may be butt treated with oil Pentachlorophenol.

All poles shall be treated in accordance with the American Wood Preserver's Association (AWPA) and American National Standards Institute (ANSI) requirements.

Redrawn

Permanently Overhead Electric Service
Customer-Owned Service Pole

Redding Electric Utility
1. The minimum anchor depth in the soil is 4 feet.
NOTES:
1. Overhead electric service termination facility and meter shall be attached to the wall facing and nearest the point of service as determined by REU.
2. The meter location shall be accessible for inspection, reading, and testing.
3. If a preferred location is not practicable, consult REU.
4. If there is any doubt as to point of service contact REU.
5. All services over 100' requires REU approval.
6. If building side wall is less than 5' from property line this area cannot be used for a meter location.
7. For underground services see drawing CS101.
SERVICE DROP CLEARANCES

These service clearances apply to new installations and reconstruction work.

1) Above building roofs, platforms or projections accessible to pedestrian traffic (access to the roof gained by doors to the roof or attached ladders, and by not having to climb over or remove obstacles) maintain:

   A. A 10 foot radial clearance on conductors that do not exceed 150 volts to ground
   B. A 12 foot radial clearance on conductors more than 150 volts but does not exceed 300 volts to ground
   C. A 15 foot clearance on conductors more than 300 volts to ground

Clearances in all the cases above shall be from the closest point between the roof, platform, or projection and the service conductor, including the drip loop and shall extend 3' past the edge of the roof, platform or projection. There shall be no exceptions to this rule.

2) Above building roofs, platform or projection not accessible to pedestrian traffic. An 8 foot vertical clearance must be maintained between the closest point of the service and the roof including the drip loop. The 8 foot vertical clearance must also be maintained 3 feet past the edge of roof.

   Exceptions - where the voltage between conductors does not exceed 300 volts and;

   A. When the roof has a slope of 4" in 12" (4 to 12) or greater, the 8' clearance may be reduced to 3 feet.
   B. Over the overhanging portion of the roof only, the 8' (or 3') clearance may be reduced to 18" as long as the service conductor crosses no more than 4' of any portion of the roof, platform or projection. The service conductor must also be terminated on a periscope type service entrance.

3) From signs, chimneys, radio and television antennas, tanks and other nonbuilding or nonbridge structures maintain 3' radial clearance.

4) Swimming pools;

   A. Above the water level and the ground level within 10' of the pool or equipment (diving boards, grand stands, etc.); maintain at least 22.5' radial clearance (25' for open wire services).
   B. Above any elevation higher than ground level of diving boards, grand stands, etc.; maintain at least 16' radial clearance, for all service types.

REFERENCES: National Electric Code or CPUC GO.95, which ever is more restrictive.
SERVICE DROP CLEARANCES

PERISCOPE TYPE ATTACHMENT (PREFERRED)

- Conduit must be securely fastened to building structure.
- Flashing.

PERISCOPE TYPE ATTACHMENT WITH BRACING

- Either push or pull bracing may be used.
- Consult utility when service mast exceeds 6'

PERISCOPE TYPE ATTACHMENT (ALTERNATIVE)

- Wall nearest and facing REU lines.
- Flashing.

SERVICE DROP CLEARANCES (0-600V) & ATTACHMENTS

Redding Electric Utility

ELECTRIC CONSTRUCTION STANDARD

DES/REV DATE ELECTRIC MANAGER ENGINEERING REVISED DWG. NO.
JCR 10/24/17

CS2008
BACKGROUND
The National Electric Code, Section 230-28, states, "Where a service mast is used for the support of service drop conductors, it shall be of adequate strength or be supported by braces or guys to withstand safely the strain imposed by the service drop".

The code does not specify at what height bracing or guys are to be required. In the past, there has been confusion as to when bracing or guys are required.

POLICY
All service masts will be rigid metal conduit. Bracing shall be as per the following:

1. 100 amp service: #2 aluminum, 1-1/4" conduit, supported when mast exceeds 24" in height. #4 copper, 1-1/4" conduit, supported when mast exceeds 24" in height.

2. 125 amp service: #1/0 aluminum, 1-1/2" conduit, supported when mast exceeds 36" in height. #2 copper, 1-1/4" conduit supported when mast exceeds 24" in height.

3. 150 amp service: #2/0 aluminum, 1-1/2" conduit, supported when mast exceeds 36" in height. #1 copper, 1-1/2" conduit, supported when mast exceeds 36" in height.

4. 200 amp service: #4/0 aluminum, 2" conduit, supported when mast exceeds 54" in height. #2/0 copper, 1-1/2" conduit, supported when mast exceeds 36" in height.

Couplings shall not be allowed above roof lines. On un-braced masts, couplings shall not be allowed below roof lines for a distance equal to the unsupported height.

For surface-mounted services, the mast shall be supported at the roof line by approved mechanical means or by the hole in the sheathing, if tight fitting.
METER WORKING SPACE:
Working space in front of the meter permits access to the metering installation and provides working safety for personnel. A working space entirely on the property of the customer is required in front of all meters.

1. The working space is to be kept clear and unobstructed at all times. Landscaping, structures or stored material shall not intrude into the working space.
2. When meters or metering equipment are placed in cabinet enclosures, the clear working space shall extend from the outer face of the cabinet.
3. If the working space is exposed to vehicles or other hazards, barrier posts are required. See sheet 2 of 2 for barrier post placement and installation details.
4. The depth of the clear working space shall be 36" minimum for services rated 150 Volts or less to ground. When the service is rated in excess of 150 Volts to ground, the depth shall be as required by applicable electrical codes or as dictated by the physical design and arrangement of the metering cubicles.
5. When meter projects into a walkway, additional space, barrier posts or other means may be required to minimize the possibility of someone running into or bumping the meter.

**NOTES:**
To allow cabinet door to open fully (90° or more), the 30" minimum width dimension of the meter working space shall be increased as necessary.

*If the working space is indoors.
NOTES:
1. Caution must be taken when installing barrier posts so that they do not make contact with any underground utilities.
2. A welded cap may be used in lieu of concrete cap.
3. Use 4" steel pipe, (not galvanized) with a minimum wall thickness of 0.188". The pipe shall be primed and painted white.
4. Distance maybe increased to accommodate larger services.
5. Barrier posts to be supplied and installed by customer.
GENERAL NOTES:

1. The information shown on this drawing is intended to advise customers of the minimum requirements for customer owned service poles for temporary underground electric service. These requirements have been established by the State of California and REU in the interest of safety to the public and workers. REU can not establish service to poles which do not meet these minimum requirements. Maintenance of customer service poles in conformity with these requirements is the sole responsibility of the customer.

2. Inspection and approval is required before service can be connected.

3. When single phase service larger than 100 amps or three phase service is desired, consult REU.

4. The use of temporary service poles shall be restricted to installation of a temporary nature such as building construction, temporary sales locations, or other uses requiring electric service for one year or less. Temporary service poles shall be furnished and installed by the customer. If the temporary service is to be established at the permanent meter location, consult REU.

5. Temporary power poles will not be located in the shaded area of FIGURE 1. In no case shall the pole be located closer than 3’ from the box.

6. Address number shall be attached to meter pedestal as shown. Minimum 2" numbers are required.

GROUNDING:

The grounding system shall conform to the minimum grounding requirements of the Electrical Safety Orders as follows:

1. The path to ground from circuits, equipment and conductor enclosures shall be permanent and continuous. All metallic enclosures and conduit enclosing service entrance conductors shall be connected to the common ground.

2. A continuous grounding conductor shall be extended from the neutral terminal of the service switch to a grounding electrode. The ground conductor shall be No. 8 AWG copper minimum for No. 2 AWG copper (or aluminum equivalent) or smaller service entrance conductors and No. 6 AWG copper for No. 1 or 1/0 AWG copper (or aluminum equivalent) service entrance conductors. The ground conductor shall be protected against mechanical injury by rigid steel conduit or armor cladding connected to the grounding electrode by means of an approved conduit grounding hub and clamp or approved armor grounding hub and clamp. The connection to the grounding electrode must be above ground or otherwise readily accessible for inspections.

3. A metallic underground water piping system, either local or supplying a community, shall always be used as a grounding electrode where such piping system is available. If the buried portions of the metallic piping system is less than 10 feet in length (including well castings bonded to the piping system) or there is a probability that the piping system may be disconnected, it shall be supplemented by one or more of the following electrodes driven 8 ft. into the ground: (1) Galvanized pipe not smaller than 3/4” inside diameter; (2) Copper clad steel or non-ferrous rod not smaller than 1/2” diameter; (3) Iron (or steel) rod not smaller than 5/8” diameter.
TEMPORARY UNDERGROUND ELECTRIC SERVICE

NO TEMPORARY POLES WITHIN THIS AREA

BACK OF SIDEWALK

FIGURE 1

CAUTION: NON-METALIC WATER PIPE IS NOT SUITABLE FOR USE AS A GROUNDING ELECTRODE.

REU SECONDARY PULL BOX LOCATED BY REU

CUSTOMER/CONTRACTOR SHALL PROVIDE A MINIMUM OF 48" OF CONDUCTOR BEYOND END OF CONDUIT SO REU CAN COMPLETE CONNECTIONS.

CONDUIT SWEEP SCH.40

CUSTOMER SHALL INSTALL CONDUIT AND CABLE AS REQ'D BY CODE. (FOR EASE IN TRANSPORTING, FLEX CONDUIT MAY BE USED)

FIGURE 2

SEALABLE CONDUIT
ADDRESS NO.
WEATHER-PROOF COMBINATION METER AND CIRCUIT BREAKER OR SWITCH-FUSE ENCLOSURE
RIGID CONDUIT STEEL OR SCH.80

IF TEMPORARY OVERHEAD POLE, SHALL CONFORM TO G.O.95 REQUIREMENTS

SEALABLE CONDUIT
ADDRESS NO.
WEATHER-PROOF COMBINATION METER AND CIRCUIT BREAKER OR SWITCH-FUSE ENCLOSURE
RIGID CONDUIT STEEL OR SCH.80

GROUND ROD
4x6 POST

GROUND WIRE

WEATHER-PROOF OUTLETS

48" MIN. - 75" MAX.

5' MIN.

6'3" MAX.

CUSTOMER/CONTRACTOR SHALL PROVIDE A MINIMUM OF 48" OF CONDUCTOR BEYOND END OF CONDUIT SO REU CAN COMPLETE CONNECTIONS.

REDRAWN
NOTES:

1. Underground electric service termination facility and meter shall be attached to the wall facing and nearest the point of service as determined by REU when subdivision was developed.
2. The meter location shall be accessible for inspection, reading, and testing.
3. If a preferred location is not practicable, consult REU.
4. If there is any doubt as to point of service contact REU.
5. Refer to Std. 526.00 (CS1112) for utility trench layout across front of lot.
6. There shall be no splices in the service wire except at point of service. All services over 100' require REU approval.
7. For underground service the customer shall coil 3' of wire in the pullbox at the point of service for future splicing by REU. If pole is point of service, consult REU for length of wire to be coiled on pole future splicing by REU. See Std. 547.00 (CS1210).
8. If building side wall is less than 5' from property line this area cannot be used for a meter location.
9. For overhead services see Std. 504.00 (CS2007).
IF THE BOTTOM OF THE CUSTOMER'S MAIN SWITCH IS BELOW THE LEVEL OF THE GROUND AROUND REU'S SERVICE BOX (SEE NOTE 5 AND STD. 507.10 (CS0120))

BUILDING WALL
CUSTOMER'S MAIN SWITCH
FINIAL GRADE
NOTE 3 & 4
NOTE 3 & 4
BACK OF WALK
PROPERTY/EASEMENT
REU'S SECONDARY SERVICE BOX
DEPTH OF BOX
SIDEWALK
SCH.40 SWEEP
INSTALL CONDUIT ON EVEN SLOPING GRADE

FIGURE 1
(NOTES, SEE SHEET 3 OF 5)

FIGURE 2A
SEE NOTES 2 & 3
WIDTH AS REQUIRED
SAND SHADE
6" MIN.
12" MIN.
2" MIN.
24" MIN.

FIGURE 2
TYPICAL SERVICE TRENCH DESIGN
(NOTES, SEE SHEET 3 OF 5)

S - Electric Services in Conduit
G - Gas Pipe
T - Telephone Service
C - Cable Television Service

FIGURE 2B
SEE NOTES 2 & 3
SAND SHADE
6" MIN.
12" MIN.
S - Gas Pipe
T - Telephone Service
C - Cable Television Service
4" SAND BEDDING
4" SAND BEDDING
2" MIN.
12" MIN.
2" MIN.

REVISED FIGURES
ELECTRIC CONSTRUCTION STANDARD
UNDERGROUND SINGLE FAMILY RESIDENTIAL SERVICE TRENCH DETAIL

REDDING ELECTRIC UTILITY
DESI/REV DATE ELECTRIC MANAGER - ENGINEERING REVISED DWG. NO.
/JCR 01/01/85 01/05/18 6 CS0101
CUSTOMER SHALL FURNISH AND INSTALL AT HIS/HER EXPENSE:

1. Service lateral conduit and sweeps from point of service to terminating facility. Conduit size shall be based on ampere capacity of bus or service equipment, whichever is greater. See Sheet 4.
2. Backfill and compaction to meet REU requirements. Shade all utilities with 6" of sand cover.
3. Depth and separation shown are minimums. Variances may be required if larger diameter facilities are to be installed. Gas facilities shall conform to provisions of C.P.U.C. G.O. 112C and electric facilities to provisions of C.P.U.C. G.O. 128.
4. Electric service conduit shall meet the requirements of Std. 521.00 (CS1010). All sweeps shall be PVC schedule 40, all riser sweeps and/or conduit installed above 24" in depth shall be PVC schedule 80.
5. If the bottom of the customer's main switch is at a lower elevation than the ground around the service splice box, water migration towards customer termination facilities will exist. It shall be the customer's responsibility to install duct seal and a customer owned intermediate splice box to prevent water intrusion. REU assumes no responsibility for water intrusion, see Std. 507.10 (CS0120).
6. A water service is not allowed in a joint trench with a gas service. If gas is not in the service trench, contact all other occupants of the trench to establish the allowance of a water service in the joint service trench.
7. Ground water/storm water intrusion and migration in any trench is the responsibility of the customer and/or his/her trenching agent for the life of the facilities placed in the trench.
**TABLE 1:**

<table>
<thead>
<tr>
<th>CUSTOMER INSTALLED SERVICE EQUIPMENT OR BUS CAPACITY</th>
<th>CUSTOMER FURNISHED &amp; INSTALLED SERVICE LATERAL CONDUIT (NOTE 3)</th>
<th>CUSTOMER FURNISHED &amp; INSTALLED SERVICE WIRE FOR 3 WIRE SERVICE (NOTE 6 &amp; 7)</th>
</tr>
</thead>
<tbody>
<tr>
<td>0-100 AMPS</td>
<td>3&quot; PREFERRED - 2&quot; MIN</td>
<td>* 1/0 TRIPLEX</td>
</tr>
<tr>
<td>101-300 AMPS</td>
<td>3&quot; PREFERRED - 2&quot; MIN</td>
<td>* 4/0 TRIPLEX</td>
</tr>
<tr>
<td>301-320 AMPS</td>
<td>3&quot; MIN</td>
<td>* 350 TRIPLEX</td>
</tr>
</tbody>
</table>

**NOTES:**

1. All conduit installed shall meet the requirements of Std. 521.00 (CS1010).
2. All sweeps shall be PVC schedule 80 or equal.
3. Verify meter and service location with REU before installation.
4. Customer shall furnish, install own and maintain conduit 2' from their outer building line to their terminating facility.
5. Service lateral conduit specified in Table 1 is limited to not more than 3-90° bends, or a combination of angles with not more than 270° deflection through the service run unless shown otherwise on REU approved plans.
6. All service wire shall be XLP insulated N.E.C. type "U.S.E." Aluminum, Std. 510.00 (CS0200). All exposed cable ends shall be protected by plastic caps and taped secure to the cable.
7. Verify with REU for wire size on 120/208V single phase service.
8. All service lateral conduits installed in subdivisions, constructed after December 1, 2017, shall be 3" minimum.
TABLE 2:

<table>
<thead>
<tr>
<th>MAXIMUM CAPACITY</th>
<th>&quot;W&quot; MIN. DIM.</th>
<th>&quot;X&quot; MIN. DIM.</th>
<th>&quot;Y&quot; MIN. DIM.</th>
</tr>
</thead>
<tbody>
<tr>
<td>125A</td>
<td>7&quot;</td>
<td>8&quot;</td>
<td>4&quot;</td>
</tr>
<tr>
<td>200A</td>
<td>7&quot;</td>
<td>11&quot;</td>
<td>5 1/2&quot;</td>
</tr>
</tbody>
</table>

FIGURE 5
TYPICAL UG SERVICE TERMINATION ENCLOSURE COMBINATION METER SOCKET PANEL
(Residential 0-200 Amp.)

FIGURE 6
TYPICAL SERVICE TERMINATION ENCLOSURE COMBINATION METER SOCKET PANEL FOR CLASS 320 METER
(Residential 120/240v, 201-320 Amp. Service)
4-Jaw Meter Socket Only. No Bolt on Panel Accepted.

FIGURE 7
METER POST FOR SERVICE TO A MOBLE HOME
(0 through 200 amps)

NOTES:
1. Conductors to class 320 meter panels shall be terminated with compression lugs with Nema pads shown in Figure 6. See Sheet 3 for wire sizes applicable to subject panels.
2. Replacement or enlargement of service lateral conduits and conductors due to relocation or increased load will be accomplished by the customer. The conduit that is on, within or under the building, will be owned, maintained, and replaced by the applicant.
3. Where the applicant's terminating facilities are appreciably lower in elevation than at the street end, both ends of the conduit will be sealed in order to avoid the possibility of a static head of water against the Duxseal at the lower end of the conduit run.
SEALING INSTRUCTIONS:

1. Clean cables and duct with Type CD cleaning wipe (Polywater Cat. #CD-1).
2. Create a foam dam by wrapping foam strip around cable so that it fills the space between the cable and duct. Foam strips will also slow any existing water flow. Cut foam to size as necessary. Using the positioning rod, push foam (5 to 7 inches) into duct (FIGURE 1).
3. Using the same method, wrap second foam strip around cable. Push second foam strip into the duct until the edge is flush with the duct entrance (FIGURE 1).
4. Remove foam base cartridge from pouch. Note: Do not remove cartridge from protective foil until ready to use.
5. Put on impermeable gloves and eye protection. Holding cartridge upright, slide off metal clip and remove nut and plug (plug can be saved for re-use cartridge). Attach mixing nozzle and tighten nut back into place.

FIGURE 1

A CUSTOMER FURNISHED AND INSTALLED 2E BOX (13’x17”) AND LID PLACED OVER THE SERVICE CONDUIT AT THE LOCATION LOWEST IN CONDUIT RUN. THE SPLICE BOX AND ITS MAINTENANCE WILL BE THE PROPERTY OWNER’S RESPONSIBILITY. CUSTOMER MAY WISH TO PERFORM ADDITIONAL MITIGATION WORK IN ADDITION TO THAT SHOWN. REU ASSUMES NO RESPONSIBILITY FOR WATER INTRUSION.
SEALING INSTRUCTIONS: (continued)

6. Position cartridge in Ratchet Application Tool (Polywater Cat. #FST-TOOL). Dispense and discard the first liquid to run through the nozzle (about 1 squirt with the application tool). This initial material will not be well mixed.
7. Insert mixing nozzle into top of foam dam so that tip extends into space between foam strips (FIGURE 1). Inject desired amount of foam sealant (See Table 1). Rapid injection will produce better mixing. Sealant will expand fully in 2 to 5 minutes.
8. Secure foam dam to the edge of duct for 1 minute as sealant expands.
9. Remove cartridge with the static mixer attached. Sealant may seep between the crevices of the foam dam as it expands.
10. Sealant will harden (set) in 10 to 15 minutes.
11. After sealant has set, the top of the foam dam may be pulled down slightly to see whether the sealant has expanded enough to fill the entire void. There should be no air pockets visible. If the foam sealant has not completely filled the duct, attach a new mixing nozzle and inject sealant directly into the void area.
12. Clean up: Cartridge can be re-used for several weeks after initial use. Remove mixing nozzle and visually ensure that orifices are not blocked. Seal with replacement plug and nut. When ready to use, remove end cap assembly and check to make sure orifices are void of any hardened sealant. Attach a new, un-used mixing nozzle, tighten nut and insert used cartridge into ratchet application tool.
13. Dispose of material in accordance with local, state and federal regulations.

<table>
<thead>
<tr>
<th>DUCT SIZE O.D. INCHES</th>
<th>APPROXIMATE QUANTITY LIQUID FOAM SEALANT</th>
</tr>
</thead>
<tbody>
<tr>
<td>2</td>
<td>2 SQUIRTS</td>
</tr>
<tr>
<td>3</td>
<td>4 SQUIRTS</td>
</tr>
<tr>
<td>4</td>
<td>7 SQUIRTS</td>
</tr>
<tr>
<td>5</td>
<td>10 SQUIRTS</td>
</tr>
</tbody>
</table>

* Each squirt is a full compression with the application tool. There are approximately 10 squirts per cartridge. These quantities are a starting point only. Actual required quantity will vary.

** Polywater Sealing System is an approved method. Other manufacturers may be used with prior approval of REU's inspector.

<table>
<thead>
<tr>
<th>POLYWATER CATALOG INFORMATION **</th>
</tr>
</thead>
<tbody>
<tr>
<td>CATALOG NO.</td>
</tr>
<tr>
<td>-------------</td>
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<tr>
<td>FST-180-KIT</td>
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<td></td>
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<td>FST-180</td>
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<tr>
<td>FST-TOOL</td>
</tr>
<tr>
<td>FST-DAM</td>
</tr>
<tr>
<td>CD-1</td>
</tr>
</tbody>
</table>
GENERAL NOTES:
1. This standard applies to 100 amp and 200 amp underground service distribution pedestals utilized for commercial services such as, but not limited to, stoplights, irrigation systems, and streetlights.
2. Pedestals mounted directly atop a concrete foundation are preferred over those buried directly into the ground with a concrete slab poured around them. The latter have direct contact with the earth resulting in corrosion and shortened life.
3. Test bypass facilities are required in all non residential services except signboards, irrigation contacts, and general service panels for apartments.
4. Lever bypass are not acceptable on commercial pedestals.
5. All commercial pedestals require a single main disconnect on the load side of the meter.
6. See Sheet 2 for placement of pedestal and conduit notes.
PLACEMENT OF PEDESTAL:

1. Electric meter pedestals placed behind or in front of sidewalks shall in all instances be placed so that no portion of the pedestal including the electric meter, when installed, is closer than 2' from a vertical plane extending up from the closest edge of the sidewalk.

2. Electric meter pedestals placed behind curbs shall in all instances be placed so that no portion of the pedestal including the electric meter, when installed, is closer than 3' from a vertical plane extending up from the backside of the curb when located along a straight road section and 6' from a vertical plane extending up from the backside of the curb when located along a curved road section.

3. A 30" wide by 36" deep area must remain clear of all vegetation and obstructions directly in front of the meter pedestal to provide adequate working space.

CONDUITS:

1. Service conduits entering the underground service pedestal shall not be visible externally or exposed to sunlight. All service conduits shall enter the pedestal directly and internally at or below the ground level of the pedestal.

2. Where the applicant's terminating facilities are appreciably lower in elevation than the opposite end of the conduit run, both ends of the conduit will be sealed in order to avoid the possibility of a static head of water against the Duxseal at the lower end of the conduit run.
I. CONNECTING NON-UTILITY POWER SOURCES TO UTILITY SERVICES:

A. The legislature of the state of California intended, by enacting the California Health and Safety Code, Chapter 415, to prevent electricity generated by permanent or portable electric generators from back feeding into a utility’s electrical distribution system and also to protect the customer's generator from substantial damage due to out of synchronization closing. In addition, CCR Title 8, Section 2320.9 states:

B. "No electrical power source, permanent or temporary, shall be connected to a premises wiring system, or parts of such a system, unless positive means are used to prevent the transmission of electricity beyond the premises wiring system, or beyond any intentionally segregated parts of such a system.” Exception: When an interconnection has been authorized by the servicing utility.

C. A “positive means” is interpreted as a device which, by its use or operation, interrupts or prevents the flow of current to or from the electrical system and which provides the device operator or user a visual or other definite indication of the existing condition or state of the electrical system.

II. GENERATORS NOT PERMANENTLY CONNECTED (Temporary Connections):

A. Any portable electric generator shall be connected as described in the California Health and Safety Code, Section 119075(b), which states:

B. "Any portable electric generator that is capable of being connected temporarily to a customer's electrical system, that is normally supplied by an electrical corporation or state or public agency, shall be connected only after opening the customer's electrical system from that of the electrical corporation or state or local agency."

C. This applies to any generator connected as a temporary (i.e. non-routine, non-scheduled) or emergency source of power. Any portable electric generator used periodically as a source of power on an as needed or scheduled basis, for example to provide backup for equipment maintenance, shall be connected as described below.

III. GENERATORS CONNECTED PERMANENTLY OR PERIODICALLY:

A. Generators connected permanently or periodically to an electrical service and used on a planned, routine, or scheduled basis, but not operating in parallel with REU's system are to be connected as described in the California Health and Safety Code, Section 119075(c), which states:

B. "Any electrical generator, other than a generator designed to run in parallel with the system of the servicing utility and approved by that utility, that is capable of being permanently connected to a customer's electrical system shall be connected only by means of a double throw "break-before-make" switch so as to isolate the customer's electrical system from that of the electrical corporation or state or local agency."

C. The switch may be either a manual or automatic transfer switch that is listed for the application by any nationally recognized testing laboratory (see UL Standard 1008 or UL Standard 98). The switch may be an integral part of either the generator assembly or service facilities. UL rating shall apply to the entire switch and not individual components.

IV. PROTECTIVE DEVICES:

A. Any non REU owned emergency standby or other generation equipment that can be operated to supply power to facilities that are also designed to be supplied from REU’s system shall be controlled with suitable protective devices by the applicant to prevent parallel operation with REU's system in a failsafe manner, such as the use of a double throw switch (see FIGURE 1) to disconnect all conductors, except where there is a written agreement of service contract with REU permitting such parallel operation.
V. WARNING STATEMENT AND LABELS FOR INTERCONNECTED SERVICES:

A. California Health and Safety Code, Section 119080(a) requires:
   “Every manufacturer of a portable or permanent electrical generator that is capable of being connected
either permanently or temporarily to a commercial, industrial or residential structure’s electrical system
shall include a warning statement in the generator’s instruction manual and a legible warning label on
the generator which states the requirement of Section 119075 and explains the electrical hazards of
backfeed into a utility’s distribution system. The same warning information shall be included in all
advertisements offering portable electrical generators.”

B. California Health and Safety Code, Section 119080(b), requires:
   “No person or public agency shall sell or rent to another person or public agency, or offer for sale or
rent to another person or public agency, a portable electrical generator unless the legible warning label
is on a visible surface of the generator.”

VI. VIOLATION:

A. California Health and Safety Code, Section 119090, provides that violation of the requirements of
Sections 119075 to 119085, inclusive, “Electrical Hazards,” is a misdemeanor offense, subject to a
fine of not more than five hundred dollars ($500) or not more than six (6) months imprisonment.

---

FIGURE 1

CUSTOMER EMERGENCY STANDBY GENERATION
OPERATED SEPARATE FROM THE UTILITY SYSTEM

NOTES:

1. At no time during customer generation shall critical loads be connected to non-critical loads.
PURPOSE AND SCOPE:
This drawing shows REU’s acceptable methods to be used by residential and non-residential (200 amp or less main service switch) customers when converting existing 2 wire or 3 wire overhead services to underground.

GENERAL INFORMATION:
A typical overhead service conversion is illustrated in Figure 1, Sheet 2. It is the customer’s responsibility to provide all trenching, furnish, supply and install all conduit and service conductors. Various surface mount and semi flush meter socket installations (illustrated in Figure 2, Sheet 3 thru Figure 6, Sheet 4) are for use when converting an overhead service to underground. The service option selected by the customer shall comply with all City of Redding building codes and ordinances. The customer shall furnish, install, own and maintain termination facilities on or within the building being served.
Local ordinances may include requirements in addition to those shown on this drawing. Consult the City of Redding inspection authorities for these requirements. Permits and final inspections must be obtained and completed before REU will establish service and set the meter.
When a service larger than 200 amps is desired, the customer shall consult with REU.

SERVICE CONDUIT AND TERMINATION REQUIREMENTS:
1. The customer shall contact REU for service arrangements and service location. The customer shall provide and install, in addition to termination facilities, all equipment required to modify the service entrance when changing from overhead to underground.
2. The customer shall perform all trenching and backfill per City of Redding Construction Standard Drawing (Page 620) and REU Drawing CS0101, Sheet 2 applicable and CS0200. If the trench is used jointly with other utilities increased electric cable depth may be required.
3. The customer shall furnish and install all conduits and service conductors as shown in Figure 1, Sheet 2. Consult REU for conduit size and service conductor size. Conduit shall meet the requirements of CS1010. Service cable (low voltage 600V) shall be XPL insulated N.E.C. type “U.S.E.” Aluminum.
4. Bell ends shall be placed on all conduit terminations. Bell ends shall be of the same type material as conduit to which they are attached (i.e., D.B., Sch. 40, Sch. 80).
5. All conduits installed by the customer shall be cleaned by using brushes and/or swabs.
6. All conduits without conductors shall have a minimum 1250lb. polyester MULETAPE®, or an equal (especially designed for that purpose) pull line provided and installed by the customer.
7. All conduit sweeps shall be PVC Schedule 40. All conduit riser bends shall be PVC Schedule 80, or equal, per REU Drawing CS1210. Conduit sweeps or bends shall not be cut or otherwise modified. All joints shall be glued per manufacturer’s specification and provide a water tight fit.
8. Customer shall coil 3’ of cable in each splice enclosure with ends protected by plastic caps taped securely to the cable. All cable will be spliced by REU except at the service entrance (see note 12 below).
9. Conduit runs shall be limited to not more than 3 - 90° bends, or a combination of angles with not more than 270° deflection throughout the conduit run unless shown otherwise on REU approved plans.
10. There shall be no splices in low voltage (600V) wire except in REU approved splice enclosures.
11. Customer shall furnish, install own and maintain conduit 2’ from their outer building line to their terminating facility.
12. All service conductors shall be terminated by the customer at their service termination point and entrance panel. All terminations will be by NEMA pad compression lugs except for 200 amp and smaller residential panels. Service conductors larger than 4/0 must use NEMA pad compression lugs. All connections will be properly torqued and installed to manufacturer’s specifications. Approved corrosion inhibitor will be applied on wire ends at all connections.
13. The neutral conductors of low voltage (600V) triplex cable shall be insulated with a yellow pigmented XLP compound for easy identification. Single conductor cable used as neutral without yellow marking (pigmented) shall be identified at each splicing point by approved white electrical tape.
SERVICE CONDUIT AND TERMINATION REQUIREMENTS (contind)

14. All conduit and substructures to be used by REU must be inspected prior to backfilling. Failure to obtain an inspection will require the installer to expose any or all of the buried facilities for an inspection. Call 224-4390, 48 hrs prior to backfilling, to schedule an inspection by a REU inspector.

15. Groundwater/stormwater intrusion and migration in any trench is the responsibility of the customer and/or his/her trenching agent for the life of the facilities placed in the trench.

16. Pull termination box as specified in Table 1, item 6, is for service conductors up to 4/0 kcmil cable. For larger cable contact REU.

17. The customer's service termination point is identified in Figures 1 thru 7, Sheets 2 thru 4.

18. Item 3 in Figure 3, Sheet 3 and Figure 4, Sheet 4, may be used only if the service conductor is 1/0 AL XLP insulated N.E.C. type "U.S.E." or smaller.

19. In accordance with the National Electric Code and the City of Redding building codes the customer shall be responsible for bonding and grounding all exposed non current carrying metal parts.

20. The electric meter will be furnished and installed by REU.

REFERENCES:

REU Construction Standards:
CS0101 - Underground Single Family Residential Service Meter Location
CS0200 - 600V Secondary and Service Conductors
CS1010 - Underground Conduit Without Concrete Encasement

City of Redding Public Works Construction Standards:
Page 620 - Joint Utility Trench Details

TYPICAL SERVICE CONVERSION

FIGURE 1
TYPICAL SERVICE CONVERSION
## TABLE 1: DESCRIPTION OF ITEMS TO BE FURNISHED AND INSTALLED BY CUSTOMER

<table>
<thead>
<tr>
<th>ITEM</th>
<th>DESCRIPTION</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>METER ADAPTER, BYPASS SERVICE TYPE, EKSTROM INDUSTRIES NO. 722-B (175A). SPECIFY LEFT, RIGHT OR BOTTOM HUB.</td>
</tr>
<tr>
<td>2</td>
<td>COMBINATION SERVICE METER AND BREAKER PANEL, RATING AS REQUIRED.</td>
</tr>
<tr>
<td>3</td>
<td>PULL TERMINATION BOX, 8&quot;X 12&quot;X 4&quot;, RAIN-TIGHT, CIRCLE A-W NO. R-9007A OR EQUIV.</td>
</tr>
<tr>
<td>4</td>
<td>CONDUIT, SIZE AND TYPE SUBJECT TO LOCAL CODES.</td>
</tr>
<tr>
<td>5</td>
<td>HUB TO BE CLOSED AND MADE TAMPER PROOF.</td>
</tr>
<tr>
<td>6</td>
<td>PULL TERMINATION BOX, 12&quot;X 26&quot;X 6&quot;, RAIN-TIGHT, CIRCLE A-W CAT. #R-90008, OR EQUIV.</td>
</tr>
</tbody>
</table>

**NOTE A**
- Size and type subject to REU requirements. See CS0101, Sheet 4.
NOTE:
A. Size and type subject to REU requirements. See CS0101, Sht 4.

FIGURE 4
SEMI-FLUSH METER SOCKET

FIGURE 5
SEMI-FLUSH METER SOCKET

FIGURE 6
2-WIRE OR A-BASE METER CONNECTION

NOTE A
(This SHT.)

EXISTING SEMI-FLUSH METER SOCKET
TO GROUNDING ELECTRODE
CONDUIT SUPPORT
GROUND LINE

EXISTING SEMI-FLUSH METER SOCKET
TO GROUNDING ELECTRODE
CONDUIT SUPPORT
GROUND LINE

EXISTING METER SOCKET OR A-BASE METER
TERMINATION BOX

EXISTING SERVICE SWITCH

TO GROUNDING ELECTRODE
CONDUIT SUPPORT
GROUND LINE

REDRAWN
MINIMUM SPECIFICATIONS FOR UNDERGROUND SECONDARY AND SERVICE CONDUCTORS

TABLE 1

<table>
<thead>
<tr>
<th>MAXIMUM NORMAL OPERATING TEMPERATURE</th>
<th>90°C DRY</th>
<th>90°C WET</th>
</tr>
</thead>
<tbody>
<tr>
<td>INSULATION TYPE</td>
<td>XLPE</td>
<td>XLPE</td>
</tr>
<tr>
<td>CONDUCTOR SIZE AWG OR KCMIL</td>
<td>MILS</td>
<td>MILS</td>
</tr>
<tr>
<td>12-10</td>
<td>45</td>
<td></td>
</tr>
<tr>
<td>8-2</td>
<td>60</td>
<td></td>
</tr>
<tr>
<td>1-4/0</td>
<td>80</td>
<td></td>
</tr>
<tr>
<td>2-13-500</td>
<td>95</td>
<td></td>
</tr>
<tr>
<td>501-1000</td>
<td>110</td>
<td></td>
</tr>
<tr>
<td>OUTER COVER MOISTURE RESISTANT NONMETALLIC APPLICATION</td>
<td>DRY AND WET LOCATIONS</td>
<td></td>
</tr>
</tbody>
</table>

NOTES:

1. All 600 volt secondary and service conductors supplied by customer/contractor shall be stranded aluminum Type USE-2/RHW-2 with XLPE insulated, unless otherwise noted on the Work Order Drawing(s).
2. All cable shall be stamped with both terms "USE-2" and "RHW-2" and meet all specifications of TABLE 1 above.
3. Cables stamped with the following markings are acceptable:
   "AL USE-2 / RHW-2"
   "AL USE-2 or RHW-2"

   In addition, cable may contain markings "XLP" or "XLPE". If "XLP" or "XLPE" is not marked on the cable, XLPE insulation must be verified via manufacturer's product data sheet and purchase invoices.
4. All requirements above shall be met in order to be connected REU's electrical system.
## TERMINAL CONNECTORS

### TABLE 1 TERMINAL CONNECTORS (ALUMINUM CABLE-TO-FLAT BAR) (FOR CIRCUITS 600V OR LOWER)

<table>
<thead>
<tr>
<th>Cable Size or KCMIL</th>
<th>Dimensions (inches)</th>
<th>Approved for Purchase</th>
<th>MFG &amp; CAT. NO.</th>
<th>C.O.R. Stock Code</th>
</tr>
</thead>
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<tr>
<td></td>
<td>B</td>
<td>C ** L ** T **</td>
<td>O.D.</td>
<td>Blackburn</td>
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<tr>
<td>4</td>
<td>1.24</td>
<td>1.25</td>
<td>4.92</td>
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<tr>
<td>2</td>
<td>1.10</td>
<td>.91</td>
<td>5.62</td>
<td>.25</td>
</tr>
<tr>
<td>1/0</td>
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<td>5.62</td>
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</tr>
<tr>
<td>2/0</td>
<td>1.60</td>
<td>1.25</td>
<td>5.43</td>
<td>.25</td>
</tr>
<tr>
<td>4/0</td>
<td>1.60</td>
<td>1.25</td>
<td>5.75</td>
<td>.30</td>
</tr>
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<td>250</td>
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<td>5.88</td>
<td>.25</td>
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<tr>
<td>350</td>
<td>1.91</td>
<td>1.62</td>
<td>6.84</td>
<td>.38</td>
</tr>
<tr>
<td>500</td>
<td>2.62</td>
<td>1.62</td>
<td>6.78</td>
<td>.38</td>
</tr>
<tr>
<td>700/750</td>
<td>2.65</td>
<td>1.62</td>
<td>8.22</td>
<td>.62</td>
</tr>
<tr>
<td>1000</td>
<td>2.97</td>
<td>1.62</td>
<td>8.88</td>
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<td>350</td>
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<td>500</td>
<td>2.62</td>
<td>1.62</td>
<td>6.78</td>
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</tr>
<tr>
<td>700/750</td>
<td>2.65</td>
<td>1.62</td>
<td>8.22</td>
<td>.62</td>
</tr>
<tr>
<td>1000</td>
<td>2.97</td>
<td>1.62</td>
<td>8.88</td>
<td>.62</td>
</tr>
</tbody>
</table>

**Type 1 Straight Terminal**

**Type 2 Stacking Terminal**

**Notes:**
- All connectors are designed to fit side-by-side on a standard NEMA spade terminal.
- These connectors shall be capable of being stacked on any straight terminal of equal or larger size. (Up to and including 1000 KCMIL).
- **Type 2** dimensions may vary slightly among the various suppliers.

**Material:** Alumimum Alloy, Tubular or Cast.

**Finish:** Tinned.
I. SCOPE: HIGH VOLTAGE METERING AND SERVICE EQUIPMENT (12,000 VOLTS)

The following specifications and requirements apply to revenue metering compartments and protective device equipment of indoor and outdoor metal-clad switchgear in 12,000 volt installations.

II. SWITCHGEAR:

A. GENERAL

1. DRAWING APPROVAL - The manufacturer shall submit copies of their design drawings to Redding Electric Utility (REU) as required for high-voltage metering and protection equipment prior to fabrication. Such drawings shall indicate the customer's name, the job address, and the telephone number of the manufacturer's representative.

2. WORKING SPACE - Switchboards shall in every case be installed with at least 6 feet of clear and level working space in front, rear and side of any section that supports or provides access to metering or testing equipment, or to a service cable termination. Because access is required to both the front and rear of the switchgear, a walkway at least 2 feet wide shall be provided around at least one end of the switchgear. If the switchgear is mounted on an elevated pad, the maximum meter height must be maintained from the clear and level working space.

3. UTILITY COMPARTMENT LABELING - Compartments of the metering enclosure shall be permanently labeled with machine engraved laminated phenolic (or equal) tags. Quarter-inch white letters and numbers on red colored material which is readily visible and mechanically attached to the face of the following designated compartments:
   a. Utility voltage transformer compartment.
   b. Utility voltage transformer fuse compartment.
   c. Utility current transformer compartment.
   d. Utility service termination compartment.
   e. Utility metering panel.

4. SAFETY GROUNDING PROVISIONS - Bare ground bus 4 inches above and below the current transformers shall be provided to permit application of serving agency safety grounds. As an alternate, a grounding knob may be provided on the line and load side of the bus at each current transformer location.

5. METERING PANEL - Meter panel and hinges are to be designed to adequately support a 25 pound load applied at the unsupported end with 1/8 inch maximum sag when open. A #4 AWG flexible braided bond wire shall be installed across the hinges.

6. BASIC IMPULSE LEVEL - Basic Impulse Level (B.I.L.) for the metering enclosure shall not be less than 95kV. The metering cubicle shall be labeled with B.I.L. rating.

7. VENTILATION OPENING - A ventilation opening (slot or louver), shall be protected by one or more baffles, barriers, or other obstructions with dimensions and locations so that any wire, or similar material, will be deflected twice after it is inserted at any possible angle, through the ventilation hold or mesh. One deflection shall be at least 90 degrees from the direction of travel. In addition, if the minor dimension of a ventilation opening is larger than 1/4 inch, it shall be protected by a screen having a minor dimension no larger than 1/4 inch.

UPDATED VENTILATION OPENINGS AND CAD STANDARDS

ELECTRIC CONSTRUCTION STANDARD

UNDERGROUND PRIMARY SERVICE 12000 VOLTS

Redding Electric Utility

DES/REV DATE ASST. DIRECTOR - UTILITY OPERATIONS REVISED Dwg. No.
TGS/CBG 09/02/98 12/11/99 CS0160

PAGE 511.00
8. REAR DOOR ACCESS TO METERING CUBICLE - Working clearances at the customer's job site may determine if the manufacturer is to furnish either a single or double full height hinged rear door access. In addition to provisions for a three point locking mechanism with hardware for attachment of utility furnished padlock, each door shall, when closed, be secured in place with the standard "stud and wing-nut assembly" for sealing. All external doors shall, when open, be equipped with a device to hold doors 90 degrees or more.

9. WEATHERPROOFING AND LOCKING - Enclosure sketches shall show equipment with weatherproof doors. The meter panel shall be hinged on the side opposite that of the outer door on weatherproof units to permit 90 degree opening with the meters and test facilities in place. The weatherproof doors may be omitted if the equipment is located indoors. If the outer door is omitted, the meter panel must be lockable. The front weatherproof door shall be a single door equipped with a latch-type handle to accommodate the REU padlock.

10. CT AND VT INSTALLATIONS - Current transformers and voltage transformers, meter testing facilities, and all normal secondary wiring from the transformers to the meters will normally be furnished and installed by REU except as noted otherwise.

B. BUS BARS AND CONDUCTORS

1. APPROVED BUS MATERIAL - Only copper or EUSERC approved plated aluminum bus shall used in the metering enclosure. Aluminum bus shall be identified with the plating process where the service cables are terminated and the current transformers are mounted. Note: At any time, REU may require certification and supporting documentation of manufacturing process to meet electroplating thickness requirements.

2. BUS DIMENSIONS AND SPACING - Maximum bus size shall be 3/8 inch by 4 inches. Minimum bus size shall be 1/4 inch by 2 inches. Bus sizes outside of these limits require special engineering and consultation with REU.

3. PASSING THROUGH COMPARTMENTS WALLS - Where cable buses pass through compartment walls, through-the-wall bushings with full voltage rating of the switchboard must be used.

4. PHASE AND NEUTRAL TAPS - Bused through-wall insulators for phase and neutral voltage transformer taps are to be furnished with lugs on the voltage transformer side. Cable or bus conductor may be furnished for the tap to the fuse carriage and to the voltage transformer compartment maintaining bare bus clearance.

C. TERMINATIONS

SERVICE CABLE TERMINATIONS - For service cable terminations, one landing position (*) shall be provided for each phase. All bolts shall be secured in place and provided with nuts, flat washers, and pressure maintaining spring washers. All parts must be plated to prevent corrosion. REU will make termination connections.  

(*) Two 1/2 inch steel bolts on 1 3/4 inch vertical centers extending 2 inches minimum to 2 inches maximum from mounting surface.
D. INSTRUMENT TRANSFORMER MOUNTING BASES AND BUS LINKS

Voltage transformer and current transformer mounting bases are to be provided by the manufacturer.

1. VOLTAGE TRANSFORMERS - Locate the front or leading set of voltage transformer mounting holes 9 inches from the voltage transformer compartment door.

2. CURRENT TRANSFORMER AND BUS LINK - Bus drilling and spacing shall accommodate up to 800 ampere current transformers of the proper voltage insulation class. Current transformer center phase position shall be bused straight through for three phase, three wire service voltage installations. This bus shall consist of a removable link dimensioned the same as the current transformer bars on the metered phases.

3. PHASE AND NEUTRAL TAPS FOR FUSES AND VT'S - Lugs for voltage transformer phase and neutral connections shall be provided in the voltage transformer compartment.

4. FUSE SPECIFICATIONS - Voltage transformer fuses will normally be furnished and installed by REU. The manufacturer shall provide mounting clips for indoor current limiting fuses with mounting clip separation and fuse ferrule diameter appropriate for the voltage rating of the equipment provided.

III. METERING COMPARTMENT WITH DISCONNECT FOR VT:

A. VOLTAGE TRANSFORMER DISCONNECT REQUIREMENTS

1. Kirk Key interlocking is required between the voltage transformer disconnect and the voltage transformer compartment door so that, for personal safety, the voltage transformer compartment cannot be entered until all of the following conditions are met:
   a. The disconnect is fully and visibly open.
   b. When the voltage transformer disconnect is fully open, the disconnect blades must ground automatically.
   c. The disconnect is locked open with a key interlock system.

2. The interlock system must prevent closing of the disconnect without first closing and locking the voltage transformer compartment.

3. Primary contacts for the voltage disconnect shall be of the blade and jaw design or equivalent to assure continued adequate contact. Wiping contact pressure contact is not acceptable.

4. Operating handle or lever of the voltage transformer disconnect switch shall be pad lockable in the open and closed position.

B. ALTERNATE METER PANEL LOCATION

As an alternate, the meter panel may be mounted in front of the CT/termination compartment provided that when the meter panel is opened the compartment is fully isolated by a removable or hinged barrier.
IV. PROTECTION:

A. The customer shall provide a protection system of adequate fault interrupting capability which coordinates electrically with existing REU protection. The customer shall provide REU a one-line diagram of the high voltage service equipment showing all relay and metering equipment.

B. A main breaker with phase and ground relays is required if the customer demand is 2000 KVA or above. At REU’s option, a breaker may be required for lesser demands to ensure coordination with REU’s protective devices.

C. When breaker protection is provided, the customer shall inform REU of: the breaker manufacturer, type, size, the breaker current transformer ratio, and the relay manufacturer, types and settings. The relay settings information should include the tap, time dial, instantaneous trip current values, etc. The relay setting and breaker rating must be approved by REU before service is energized.

D. When a service disconnect with fused protection is allowed by REU, the customer will inform REU of the fuse manufacturer, type and size. The fuse size and rating must be approved by REU before the customer's service is energized.

V. AUXILIARY EQUIPMENT (CUSTOMER OWNED):

A. Current transformers used exclusively for tripping the service and meter main breaker may be installed on the supply side of service breaker.

B. Voltage transformers used exclusively for voltage indication and relaying may be installed on the supply side of the service breaker.

C. When an electrically operated main service breaker is operated by alternating current, a control transformer for such power and for heating, lighting and other incidental use within the switchboard may be installed in the switchboard, connected to the service breaker. AC power may be used only for manual breaker control. Tripping power must be available from an independent service such as DC or capacitor trip.

For additional requirements, see the following REU references:

CS5035 - Transformer Rated Meters - Diagram of Connections
DS0160 - Primary Service Guidelines
CS2060 - Overhead Primary Service - 12,000 Volt Service
Resolution 97-83 - Electric Utility Service Policy
12,000 VOLT METER ENCLOSURE

FRONT VIEW

NO-LOAD VOLTAGE TRANSFORMER DISCONNECT

1-1/4" VT & CT SECONDARY CONDUITS SHALL BE LOCATED ON THE SAME SIDE AS METER PANEL HINGES

8" MIN. 10" MAX.

NO-LOAD VOLTAGE TRANSFORMER DISCONNECT

1-1/4" CONDUIT FOR VT AND CT SECONDARIES

1-5/8" DIA. FUSE FERRULE

SIDE VIEW

UPDATED CAD STANDARDS

UNDERGROUND PRIMARY SERVICE 12000 VOLTS
SERVICE CABLE TERMINATION PULL SECTION

MINIMUM BARE BUS CLEARANCES 15kV CLASS; 6" PHASE TO GROUND & 7-1/2" PHASE TO PHASE.

NOTES:
1. Consult REU for number, size and location of service conduits required.
2. REU will make termination connections.
3. Metering sequence shall be metering-main.
4. Required clear working space in front of the removable enclosing panels shall be 6 feet.
5. The removable enclosing panels shall each be sealable, provided with two lifting handles and limited to a maximum size of 9 square feet.
6. Furnish and install one piece of unistrut p1000 (or equivalent) channel as shown, for each set of cables.
7. B.I.L. for the pull section shall be not less than 95kV.
SINGLE SOCKET HINGED METER PANEL

NOTES:
1. The panel shall be constructed of 12 gauge (min.) steel and furnished with meter sockets, sealing rings, slotted openings, a removable plate for installation of a secondary test switch and a cover plate. Slotted openings and removable plate edges shall be smooth to prevent damage to meter wiring.
2. The removable plate shall be attached to the rear of the panel with screws that do not protrude through the face of the panel.
3. Meter sockets shall be designed for back connection.
4. Hinges shall be readily interchangeable, right or left, on the panel and permit the panel to open to 90-degrees with meter and test facilities in place. Clevis or removable pin type hinges shall be removable from top.

The panel shall support 25-pound load applied at the unsupported end when fully opened with a maximum sag of 1/8 inch.

The panel shall have a handle attached to both sides.

All securing and sealing screws on panel shall be captive. Stud and wing nuts shall be sealable when used.

UPDATED CAD STANDARDS

UNDERGROUND PRIMARY SERVICE 12000 VOLTS
ALL HOLES 10-32 TAP, EXCEPT AS NOTED

CURRENT TRANSFORMER MOUNTING BASE

P1008 3/8-16 NUT, 6 PER CHANNEL (TYP.)

P1000 UNISTRUT CHANNEL, OR EQUIVALENT. (TYP.)

SIDE VIEW

TOP VIEW OF CABINET (Ref.)

VOLTAGE TRANSFORMER MOUNTING RAIL DETAIL

UPDATED CAD STANDARDS

UNDERGROUND PRIMARY SERVICE 12000 VOLTS
NOTE:
External 1 amp fuse shall be used to protect PT.
(Equivalent to GE Type EJ-1 Size 1E Cat.#9F608HH001).

INDOOR UNFUSED 15KV CLASS PT's

ALL DIMENSIONS SHOWN ARE IN INCHES

<table>
<thead>
<tr>
<th>INSULATION CLASS KV</th>
<th>DIMENSIONS -- INCHES *</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>A</td>
</tr>
<tr>
<td>15.0</td>
<td>9.5</td>
</tr>
</tbody>
</table>

*Unless otherwise indicated tolerance, plus or minus 1/16 inch.

MANUFACTURER  | CAT. NUMBER | TYPE |
--------------|-------------|------|
ABB           | 7525A66G05  | VIZ-11 |
GE            | 765X121001  | JVM-5C |

INSULATION, RATIO, VOLTAGE, AND BIL DATA

<table>
<thead>
<tr>
<th>INSULATION CLASS, KV</th>
<th>MARKED RATIO</th>
<th>PRIMARY VOLTAGE RATING, VOLTS</th>
<th>kV BIL</th>
</tr>
</thead>
<tbody>
<tr>
<td>15.0 INDOOR ONLY</td>
<td>60:1</td>
<td>7200</td>
<td>110</td>
</tr>
</tbody>
</table>
### INDOOR FUSED 15KV CLASS PT's

All dimensions shown are in inches.

<table>
<thead>
<tr>
<th>INSULATION CLASS KV</th>
<th>DIMENSIONS -- INCHES †</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>FUSED (2)</td>
</tr>
<tr>
<td></td>
<td>A</td>
</tr>
<tr>
<td>15.0</td>
<td>9.5</td>
</tr>
</tbody>
</table>

† Unless otherwise indicated tolerance, plus or minus 1/16 inch.

**Table: Insulation, Ratio, Voltage, and Bil Data**

<table>
<thead>
<tr>
<th>INSULATION CLASS KV</th>
<th>MARKED RATIO</th>
<th>PRIMARY VOLTAGE RATING, VOLTS</th>
<th>KV BIL</th>
</tr>
</thead>
<tbody>
<tr>
<td>15.0 INDOOR ONLY</td>
<td>60:1</td>
<td>7200</td>
<td>110</td>
</tr>
</tbody>
</table>

**Diagram:**

- VIEW FROM TOP
- VIEW FROM SIDE
- VIEW FROM BOTTOM

**Legend:**

- **A**
- **B**
- **C**
- **N**
- **M**
- **O**
- 7/16
- CL OF TERMINALS
- MOUNTING BASE

**Manufacturers:**

- ABB: 7525A67G05 VIZ-11
- GE: 765X121047 JVM-5C
STREETLIGHT STANDARDS, UTILITY POLES, GUY WIRES, UTILITY BOXES, AND PAD MOUNT EQUIPMENT SHALL BE LOCATED NO CLOSER THAN 5' FROM A DRIVEWAY.

FIGURE 2 - PADMOUNT CLEARANCE FROM BUILDINGS

NOTES:
1. Non-combustible material includes brick, clay, concrete, steel, and stone having a one hour fire resistive rating. Stucco is excluded.
2. Vertical clearance space above pad and clear zone must remain unobstructed for hoisting equipment on and off pad.
3. If roof overhang does not meet minimum clearances as specified in above, the minimum horizontal clearance from end of roof overhang to the nearest edge of the pad shall not be less than 3'. If the overhang clearances are met, the pad-mounted equipment may be placed under the overhang and clearance will be measured from building wall.
4. Customer is responsible for protection of equipment by suitable barriers per REU Dwg. CS0011, if deemed necessary by REDDING ELECTRIC UTILITY.
5. Drainage of the area surrounding the transformer must be away from any building.
6. Clearances to building surfaces meet or exceed G.O.128 clearance requirements.

REFERENCE: G.O.128
FIGURE 3 - PADMOUNT WORK AREA CLEARANCE

If transformer is installed in alcove side clearance must be increased to 5’ minimum.

Doors of transformers or switchgear must face away from building walls or other barriers to allow for safe working practices. If doors must face wall, allow 8’ minimum clearance for working area.

FIGURE 4 - WORK AREA CLEARANCE FOR DUAL 30 PADS

NOTES:
1) Doors of transformers or switchgear must face away from building walls or other barriers to allow for safe working practices. If doors must face wall, allow 8’ minimum clearance for the working area.
2) The gate of a fence or enclosure may be within the 8’ working clearance while the gates are closed (must maintain the 3’ min. clearance), but while the gates are open the 8’ min. working clearance must remain unobstructed.

EQUIPMENT CLEARANCES
FIGURE 5 - SUBSURFACE EQUIPMENT WORK AREA CLEARANCE

FIGURE 6 - SUBSURFACE EQUIPMENT ON SLOPED TERRAIN

NOTES:
1. If the subsurface equipment is exposed to vehicular traffic, bollards shall be installed to protect it from such vehicular traffic.
2. Retaining walls shall be provided when REU determines it is necessary to protect equipment against landslides, drainage wash, drifting sands, etc. The applicant is responsible for the installation and maintenance of the retaining walls. The retaining wall shall be designed to provide a barrier of sufficient strength and of suitable construction as to provide adequate protection and working space around the equipment. The retaining wall shall meet all local building codes and have adequate compaction. (See CS-0020 for details)
WHERE ELECTRIC EQUIPMENT IS TO BE LOCATED IN AN AREA SUBJECT TO VEHICULAR TRAFFIC, BOLLARDS SHALL BE FURNISHED AND INSTALLED BY THE CUSTOMER IN ACCORDANCE WITH THIS STANDARD.

NOTES:
1. "D" and the distance between bollard posts shall be not exceed 42". When exposed area exceeds this distance, an intermediate post shall be added.
2. "M" shall be a minimum of 2 feet.
3. "C" is listed below per specific transformer sizes (kva): 25 to 1000kva = 42" minimum 1000 to 2500kva = 47" minimum
The installer shall contact Underground Service Alert (USA) at (811) at least two days prior to planned excavation.

A welded cap may be used in lieu of concrete cap.

The bollard shall be primed and painted white (not galvanized).
NOTES:
1. Above pad may be precast or in place. If poured in place omit Item 3.
2. See drawing CS0010 for pad clearances.
3. See drawing CS0011 for pad barrier protection.
4. All soil will be compacted under and around the pad by jetting and/or wacker to a minimum of 90% relative density.
5. Customer installed.

ITEM | QUANTITY | DESCRIPTION |
--- | --- | --- |
1 | 6 CU. FT. | CONCRETE, CLASS "A", 5 1/2 SACK MIX |
2 | 13.4 LBS | REINFORCING RODS, SEE TABLE ABOVE |
3 | 3 | THREADED INSERTS FOR 1/2" LIFTING BOLTS. |
4 | 1 | TRANSFORMER PAD |
5 | 1 | 2E BOX EXTENSION |
6 | 1 | 3/4"X 12' GROUND ROD |

REINFORCING IRON

<table>
<thead>
<tr>
<th>TYPE NO.</th>
<th>REQ'D</th>
<th>DESCRIPTION</th>
</tr>
</thead>
<tbody>
<tr>
<td>R1</td>
<td>4</td>
<td>1/2 X 3'-6&quot;</td>
</tr>
<tr>
<td>R2</td>
<td>2</td>
<td>1/2 X 4'-0&quot;</td>
</tr>
<tr>
<td>R3</td>
<td>2</td>
<td>1/2 X 2'-7&quot;</td>
</tr>
</tbody>
</table>

WEIGHT 893# 3/4" X 12' GROUND ROD (AT LEAST 8" IN CONTACT WITH EARTH)
NOTES:

1. All soil will be compacted under and around the pad by jetting and/or wacker to a minimum of 90% relative density.
2. See drawing CS0330 for pad detail.
3. See drawing CS0010 for pad clearances.
4. See drawing CS0011 for pad barrier protection.
5. Cook 2E box extension (17"x 30") or equal/approved by REU.
6. Appropriate excavation depth shall be provided such that standard 36" radius 90° bends may be installed as shown. Conduit bends shall be cut or otherwise modified.
7. Customer installed.
3/4" X 12' GRND. ROD TO BE FLUSH WITH THE TRANSFORMER PAD. (AT LEAST 8" IN CONTACT WITH EARTH)

NOTES:
1. Above pad may be precast or poured in place. If poured in place omit item 3.
2. Prior to pouring pad, have REU inspect conduit location.
3. See drawing CS0010 for pad clearances.
4. See drawing CS0011 for pad barrier protection.
5. All soil will be compacted under and around the pad by jetting and/or wacker to a minimum of 90% relative density.
6. Boxes may be required remote from pad to accommodate additional services; difficult pulls; or, as specified by a REU distribution planner and/or inspector.
7. Customer installed.

REINFORCING IRON

<table>
<thead>
<tr>
<th>ITEM</th>
<th>QUANTITY</th>
<th>DESCRIPTION UPD-3P</th>
<th>COR CODE</th>
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<tbody>
<tr>
<td>1</td>
<td>17 CU. FT.</td>
<td>CONCRETE, CLASS &quot;A&quot;, 5 1/2 SACK MIX</td>
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</tr>
<tr>
<td>2</td>
<td>27.5 LBS</td>
<td>REINFORCING RODS, SEE TABLE ABOVE</td>
<td></td>
</tr>
<tr>
<td>3</td>
<td>1</td>
<td>THREADED COIL OR FERRULE INSERTS BY DAYTON, RISS, SUPERIOR OR EQUAL</td>
<td></td>
</tr>
<tr>
<td>4</td>
<td>1</td>
<td>TRANSFORMER / CAPACITOR PAD</td>
<td>E8.06</td>
</tr>
<tr>
<td>5</td>
<td>1</td>
<td>3/4&quot; X 12' GROUND ROD</td>
<td>E384.01</td>
</tr>
<tr>
<td>6</td>
<td>1</td>
<td>4E SECONDARY BOX</td>
<td>E8.04</td>
</tr>
</tbody>
</table>
NOTES:

1. All soil will be compacted under and around the pad by jetting and/or wacker to a minimum of 90% relative density.
2. See drawing CS0331 for pad detail.
3. See drawing CS0010 for pad clearances.
4. See drawing CS0011 for pad barrier protection.
5. Concrete 4E boxes shall be per Drawing CS1110 or as approved by REU.
6. Appropriate excavation depth shall be provided such that standard 36" radius 90° bends may be installed as shown. Conduit bends shall be cut or otherwise modified.
7. Customer installed.
3/4" X 12' GROUND ROD
(AT LEAST 8' IN CONTACT
WITH EARTH)

POWER

LIGHTING

4" PRIMARY

1-24" OR
2-12" EXTENSIONS

4" PRIMARY CONDUIT
BY DEVELOPER

NOTES:
1. See DWG. CS0330 for pad details.
2. See DWG. CS1110 for pull box details.
3. Ground rod to be flush with the top of the
transformer pad.
4. See DWG. CS0373 for cable routing.
5. Size and number as specified.

<table>
<thead>
<tr>
<th>ITEM</th>
<th>QUANTITY</th>
<th>DESCRIPTION</th>
<th>UPD-1P</th>
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<tr>
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<tr>
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<td>E8.01</td>
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<tr>
<td>3</td>
<td>2</td>
<td>3/4&quot; X 12' GROUND ROD</td>
<td>E384.01</td>
<td></td>
</tr>
</tbody>
</table>
GENERAL NOTES:

1. The purpose of this drawing is to provide a guide for determining space requirements and illustrate recommended layouts to accommodate padmounted transformer and associated equipment when installed in a dry vault located inside or adjacent to a customer's building. The vault is provided by the Developer/Customer.

2. A dry vault in one which:
   A. Is located at ground level, or
   B. Is located below ground level, and,
       1. Is completely contained within the building’s foundation.
       2. Is so designed that flood water entry is prevented.
       3. Has sufficient gravity drainage to prevent water retention.

3. When designing a new vault, consideration should be given to providing adequate room for possible future requirements. Enlarging a vault is very costly and sometimes impractical.

4. Eight feet of clear level space must be provided in front of the transformer cabinet, in order that the transformer can be safely operated and maintained with live line tools.

5. Ventilation design must conform to the requirements set forth in REU Drawing DS450. The location of the vent shafts may be adjusted to meet local conditions. Cross ventilation must always be maintained.


7. The enclosure itself shall conform to all applicable State and Local codes.

8. It is required to have access to a vault via an entrance which would be accessible to authorized REU personnel at all times (i.e. from parking lot, loading ramp, street, etc.). The vault shall also be accessible to standard REU equipment.

9. All customer vaults shall be designed with adequate security to permit entrance only to REU personnel.

10. All walls, ceiling and floors shall be constructed of non-combustable material.

11. Transformer pad (REU Drawing CS0330 or CS0331) shall be an integral part of the vault floor.

12. Lighting and outlet circuits shall be supplied from the customers side of metering (load side).
PLAN VIEW

ELEVATION

DIMENSIONS
A & B = REFER TO CS0330 OR CS0331 AND USE PAD SIZE
C = 42"
D = 96"
E = DIMENSION "A" PLUS 12" MINIMUM
F = 12’ MINIMUM
G = 10’ MINIMUM

LEGEND

PULLING EYE CAPABLE OF PULLING 20,000 LBS.
LIFTING EYE CAPABLE OF LIFTING 40,000 LBS.
Φ$ 120 VOLT OUTLET AND SWITCH
• LIGHTING
200A/600A SIDE

WEIGHT
1375#

600A SIDE

R1
R2
R3
R4
R5

WORKING CLEARANCE

NOTES:
1. Customer Installed.

ITEM | QUANTITY | DESCRIPTION PSPD-72 | COR CODE
--- | --- | --- | ---
1 | 10 CU. FT. | CONCRETE, CLASS "A", 5 1/2 SACK MIX | E8.07
2 | 21 LBS. | REINFORCING RODS, SEE TABLE ABOVE | |
3 | 1 | THREADED COIL OR FERRULE INSERTS BY DAYTON, RISS, SUPERIOR OR EQUAL | |
4 | 1 | 2E BOX EXTENSION | E8.01
5 | 1 | 3E BOX EXTENSION | E8.02
6 | 1 | 3/4"x 12' GROUND ROD | E384.01

REINFORCING IRON SCHEDULE

<table>
<thead>
<tr>
<th>TYPE</th>
<th>No. REQ'D</th>
<th>DESCRIPTION</th>
</tr>
</thead>
<tbody>
<tr>
<td>R1</td>
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<td>1/2&quot; x 1'-11&quot;</td>
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<tr>
<td>R2</td>
<td>7</td>
<td>1/2&quot; x 3'-6&quot;</td>
</tr>
<tr>
<td>R3</td>
<td>2</td>
<td>1/2&quot; x 3'-11&quot;</td>
</tr>
<tr>
<td>R4</td>
<td>2</td>
<td>1/2&quot; x 2'-1&quot;</td>
</tr>
<tr>
<td>R5</td>
<td>2</td>
<td>1/2&quot; x 0'-8&quot;</td>
</tr>
</tbody>
</table>

REDRAWN

ELECTRIC CONSTRUCTION STANDARD

200/600AMP PADMOUNTED SWITCHGEAR INSTALLATION (PAD DETAILS)

DES/REV | DATE | ASSISTANT DIRECTOR - DISTRIBUTION | REVISED | DWG. NO.
--- | --- | --- | --- | ---
TMS/RLH | 08/01/86 | | 03/21/12 | CS0430
NOTES:
1. All soil will be compacted under and around the pad by jetting and/or wacker to a minimum of 90% relative density.
2. Cook 3E box extension (24"x36") or equal/approved by REU.
3. Cook 2E box extension (17"x30") or equal/approved by REU.
4. Excavation for boxes shall be prepared with 3" to 6" compacted 3/4" gravel road base.
5. S&C PME 5 switchgear or equal, or AB Chance 3 switchgear or equal.
6. Appropriate excavation depth shall be provided such that standard 4"x36" or 6"x48" radius 90° bends may be installed as shown. Conduit bends shall not be cut or otherwise modified.
7. Customer installed.
DIAMOND PLATE COVER
Labeled "R.E.U. HIGH VOLTAGE"
See Note 4 Sht. 4
(2 PIECE)

FACE OF ACCESS
OPENING TO BE FLUSH
WITH INSIDE OF BOX

60" x 67" ACCESS
OPENING

HOLD DOWN
ASSEMBLY,
COURSE THREAD
PENTAHEAD BOLTS

1/2" x 2" SLOT FOR
LID REMOVAL
(2 PER PLATE)

2" x 2" x 1/4"
ANGLE FRAME
(GALVANIZED
STEEL)

64"
TOTAL
ASSEMBLY
HEIGHT

GROUNDS (BOTH WALLS)
PER CS428 SH. 2 & NOTE
#9 SH. 4 & SEE DETAIL "A"
SHT. 2

RECESSED
PULLING IRON
(4 TOTAL)

SEE SHEET 2 OF 4 FOR KNOCK
OUT & TERMINATORS ON SIDE
WALLS

12' DROP SUMP

SEE SHEET 2 OF 4 FOR KNOCK
OUT & TERMINATORS ON SIDE
WALLS

12' DROP SUMP

600 AMP PADMOUNT SWITCHGEAR
SWITCH VAULT DETAILS
6" THICK CONC. WALLS

INWESCO 5/8" COPPER GROUND INSERT WITH 1" SQUARE BRASS BAR

6" MIN. CONTINUOUS WELDS BOTH SIDES

1/2" REBAR, WELD SOLID TO CAGE AT A MIN. OF TWO INTERSECTIONS

DETAIL "A"

SEE DETAIL "A"

CONCRETE SWITCH VAULT DIMENSIONS

NOTES:
1. All sections of a splice box must be permanently marked with the delivery date.
ALLOWABLE CONDUIT ENTRANCE AREA, CONTACT REU INSPECTOR FOR EXACT LOCATION.

CLEARANCE AREA

SIDE PARALLEL WITH SIDEWALK

3' MIN.

3' MIN.

SWITCH SIDE

FUSE SIDE

VAULT COVER

BACK EDGE OF SIDEWALK

PLAN VIEW

SET SWITCH VAULT 2" ABOVE FINAL GRADE

FINAL GRADE

ELEVATION

REDDING ELECTRIC UTILITY

600 AMP PADMOUNT SWITCHGEAR
SWITCH VAULT DETAILS

UPDATE CAD STANDARDS

ELECTRIC CONSTRUCTION STANDARD

600 AMP PADMOUNT SWITCHGEAR
SWITCH VAULT DETAILS

DEB/REV DATE ASST. DIRECTOR - UTILITY OPERATIONS REVISED DWG.NO.
CEP/JCR 09/27/07 10/07/19 CS0428
NOTES:

1. See drawing CS1114 for lid bolt down details. (Detail "A" and "E").
2. Designed for pedestrian traffic loading.
3. Manufacturer shall paint/stencil correct weight and catalog number on each box.
4. Cover shall be labeled "R.E.U. HIGH VOLTAGE".
5. The excavation shall allow for the overall height of vault to be set two inches above final grade, and 3 - 6 inches of compacted 3/4" gravel.
6. The bedding materials shall consist of 3/4" gravel under vault.
7. Backfill shall consist of good compactible material such as pea gravel, sand, or clean earth fill so that no voids remain between vault and native soil around excavation. Backfill shall be compacted in lifts from the bottom to the top to attain 90% relative compaction.
8. All excavation, installation, and backfill is the responsibility of the customer and/or contractor.
9. Both ground rods shall be welded into one continuous run of bare or zinc galvanized or other electrically conductive coated steel reinforced bars or rods of not less than twenty (20) feet in length and 1/2" (12.7mm) in diameter which is encased by at least 2" (50.8mm) of concrete. This continuous run may be part of the reinforcing cage except the 20' must be within the floor area only.
5 - 3/4" X 12' GRND. ROD TO BE FLUSH WITH THE CAPACITOR PAD. (AT LEAST 8" IN CONTACT WITH EARTH)

LOCATION OF 4" CONDUIT SEE NOTE 2

4E SECONDARY BOX W/10" EXTENSION
(INSTALL BOX ON TOP OF EXTENSION)

NOTES:
1. Above pad may be precast or poured in place. If poured in place omit item 3.
2. Prior to pouring pad, have REU inspect conduit location.
3. See sheet 3 for pad clearances.
4. See drawing CS0011 for pad barrier protection.
5. All soil will be compacted under and around the pad by jetting and/or wacker to a minimum of 90% relative density.

<table>
<thead>
<tr>
<th>ITEM</th>
<th>QUANTITY</th>
<th>DESCRIPTION UPD-CAP</th>
<th>COR CODE</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>17 CU. FT.</td>
<td>CONCRETE, CLASS &quot;A&quot;, 5 1/2 SACK MIX</td>
<td></td>
</tr>
<tr>
<td>2</td>
<td>27.5 LBS</td>
<td>REINFORCING RODS, SEE TABLE ABOVE</td>
<td></td>
</tr>
<tr>
<td>3</td>
<td>1</td>
<td>THREADED COIL OR FERRULE INSERTS BY DAYTON, RISS, SUPERIOR OR EQUAL</td>
<td></td>
</tr>
<tr>
<td>4</td>
<td>1</td>
<td>TRANSFORMER / CAPACITOR PAD</td>
<td>E8.06</td>
</tr>
<tr>
<td>5</td>
<td>2</td>
<td>3/4&quot;X 12' GROUND ROD</td>
<td>E384.01</td>
</tr>
<tr>
<td>6</td>
<td>1</td>
<td>4E SECONDARY BOX</td>
<td>E8.04</td>
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REINFORCING IRON

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<tr>
<th>TYPE NO.</th>
<th>REQ'D</th>
<th>DESCRIPTION</th>
</tr>
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<tbody>
<tr>
<td>R1</td>
<td>5</td>
<td>1/2&quot; X 5'-10&quot;</td>
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<tr>
<td>R2</td>
<td>2</td>
<td>1/2&quot; X 5'-10&quot;</td>
</tr>
<tr>
<td>R3</td>
<td>4</td>
<td>1/2&quot; X 3'-11&quot;</td>
</tr>
<tr>
<td>R4</td>
<td>1</td>
<td>1/2&quot; X 2'- 5&quot;</td>
</tr>
</tbody>
</table>
NOTES:
1. All soil will be compacted under and around the pad by jetting and/or wacker to a minimum of 90% relative density.
2. See drawing CS0500 for pad detail.
3. See drawing CS0500 for pad clearances.
4. See drawing CS0011 for pad barrier protection.
5. Concrete 4E boxes shall be per Drawing CS1110 or as approved by REU.
6. Appropriate excavation depth shall be provided such that standard 36" radius 90° bends may be installed as shown. Conduit bends shall be cut or otherwise modified.
SAND REQUIREMENTS FOR BACKFILL IN ELECTRIC UTILITY TRENCHING

The following is Redding Electric Utility’s standard for sand used in electric utility trenching.

1. All electric conduits shall have a minimum of 4” sand bedding after compaction to 95%.
2. All electric conduits shall have a minimum of 6” sand covering or shading after compaction to 95%.

Sand bedding and covering for electric conduits shall consist of natural sand, manufactured sand, or a combination of both, and shall conform to the physical properties listed below.

<table>
<thead>
<tr>
<th>PROPERTY</th>
<th>TEST METHOD</th>
<th>SPECIFICATION REQUIREMENT</th>
</tr>
</thead>
<tbody>
<tr>
<td>Organic Impurities</td>
<td>ASTM C-40</td>
<td>Supernatant shall not be darker than Plate 3 when compared to standard Gardinar Color Series</td>
</tr>
<tr>
<td>Sand Equivalent</td>
<td>ASTM D-2419</td>
<td>Equal to or greater than 20</td>
</tr>
<tr>
<td>Compaction Characteristics</td>
<td>ASTM D-1557</td>
<td>Relative compaction of 95% or greater</td>
</tr>
<tr>
<td>Gradation</td>
<td>ASTM C-136 &amp; ASTC C-117</td>
<td>Sieve Size</td>
</tr>
<tr>
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</tr>
<tr>
<td>No. 4 (4.75mm)</td>
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<td>90-100</td>
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<tr>
<td>No. 8 (2.36mm)</td>
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<tr>
<td>No. 16 (1.18mm)</td>
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</tr>
<tr>
<td>No. 30 (600um)</td>
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<td>40-70</td>
</tr>
<tr>
<td>No.50 (300um)</td>
<td>0-30</td>
<td>0-30</td>
</tr>
<tr>
<td>No.100 (150um)</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Optimum water content shall provide 95% compaction or greater prior to placement into a trench.
GENERAL NOTES:

1) This standard covers underground distribution conduits without concrete encasement. In some cases exposure to "Dig-ins" and other hazards will require concrete encasement of conduit.

2) When conduit is installed by the Developer / Customer (including service conduits) the following conduit and fittings are acceptable alternatives meeting the NEMA Std. for direct burial or concrete encasement.

3)  
   a) TC2: PVC Schedule 40 OR Schedule 80 UL approved 90°C conduit and so marked.
   b) TC6/TC8: PVC Type DB-120 approved 90°C conduit and so marked.
   c) TC3: PVC Schedule 40 UL approved fittings and accessories.

CAUTION:

1) Because these conduits have different inside diameters, the percent fill for the same size cable will vary with conduit type.

2) It is the conduit installers responsibility to provide the proper fitting to make acceptable transitions from conduits being installed to any other conduit to which they are to be joined. NOTE: This transition may involve changes in both conduit type and size. If equal diameters conduits of different wall thickness are to be joined, the inside edge of the spigot end must be chamfered.

3) All conduits not terminated in enclosures shall have rigid caps. All conduits terminated in boxes shall have end bell fittings and be fitted with a properly sized temporary poly plug.

4) 4" and 6" conduits are to be used for Primary Distribution circuits. 5" conduit is limited to large commercial services with REU prior approval. 4" conduit is to be used for Secondary and Services. 3" conduit is limited to single phase residential services with service equipment or bus capacity of 201 to 400 amps only. The use of 2" conduit is limited to Street Light circuits and Services.

5) The following method shall be used in vulnerable locations or where unprotected PVC conduit is not permitted:
   a) Protect non-metallic conduit with a 3 inch minimum concrete encasement.
   b) Use galvanized rigid steel conduit.

6) Every effort should be made to construct a straight, water tight conduit line.

7) All conduits shall be proven free and clear of dirt, rocks, etc., by means of mandrel, wire brush, etc. A 1250lb. polyester MULTAPE®, or equivalent pull line shall be installed in all 4" conduit runs less than 600' in length. All 6" conduit and 4" conduit runs greater than 600' shall have minimum 2500lb. MULETAPE®, or equivalent installed.

8) Ground water / storm water intrusion and migration in any trench is the responsibility of the customer and/or his trenching agent for the life of the facilities placed in the trench.
INSTALLATION NOTES:
(a) Field conditions may require a minimum depth greater than shown.
(b) Substation feeders and other primary circuits require special consideration and generally require additional separation and backfill. Contact Electric Utility Engineering.
(c) Sharp turns, bends, and other irregularities in the conduit shall be avoided.
(d) Before tamping in area of plastic conduit, apply at least six inches of backfill over top of sand shading to avoid breakage of conduits. Final backfill may then be placed and compacted to finish grade.
(e) Refer to State of California, Department of Industrial Relations "Trench Construction Safety Orders" for trench construction requirements. These orders are issued by the Department of Occupational Safety and Health.
(f) The use of a joint trench containing power conduits, telephone conduits, gas, etc., is usually less costly than use of a separate trench for each. Gas company, Cable TV, and telephone company representatives should be consulted to determine if a joint trench is feasible prior to making final layout of the conduit system. The installation of a street light system should be considered at the same time as the power and telephone, since installation at a later date would be much more costly. For joint trench, refer to page 620.00 and do not use this standard.
### TABLE 1. RIGID STEEL CONDUIT

<table>
<thead>
<tr>
<th>CONDUIT SIZE (IN.)</th>
<th>DIMENSIONS (IN.)</th>
<th>WEIGHT (LBS.)</th>
<th>C.O.R. STOCK CODE</th>
</tr>
</thead>
<tbody>
<tr>
<td>2</td>
<td>2.375 x 2.083</td>
<td>0.146</td>
<td>33</td>
</tr>
<tr>
<td>4</td>
<td>4.500 x 4.050</td>
<td>0.225</td>
<td>96</td>
</tr>
<tr>
<td>5</td>
<td>5.563 x 5.073</td>
<td>0.245</td>
<td>134</td>
</tr>
<tr>
<td>6</td>
<td>6.625 x 6.093</td>
<td>0.266</td>
<td>177</td>
</tr>
</tbody>
</table>

- Weight for one 10ft length including one standard coupling furnished with each length.

### TABLE 2. STANDARD STEEL COUPLING

<table>
<thead>
<tr>
<th>CONDUIT SIZE (IN.)</th>
<th>DIM. (IN.)</th>
<th>C.O.R. STOCK CODE</th>
</tr>
</thead>
<tbody>
<tr>
<td>2</td>
<td>2.73 x 2.18</td>
<td></td>
</tr>
<tr>
<td>4</td>
<td>5.00 x 3.50</td>
<td></td>
</tr>
<tr>
<td>5</td>
<td>6.29 x 3.75</td>
<td></td>
</tr>
<tr>
<td>6</td>
<td>7.39 x 4.00</td>
<td></td>
</tr>
</tbody>
</table>

### TABLE 3. 90° STEEL CONDUIT BENDS

<table>
<thead>
<tr>
<th>CONDUIT SIZE (IN.)</th>
<th>DEGREES</th>
<th>DIMENSIONS (IN.)</th>
<th>C.O.R. STOCK CODE</th>
</tr>
</thead>
<tbody>
<tr>
<td>2</td>
<td>90°</td>
<td>18 6.25 x 40</td>
<td></td>
</tr>
<tr>
<td>4</td>
<td>36</td>
<td>11.00 x 76</td>
<td></td>
</tr>
<tr>
<td>5</td>
<td>36</td>
<td>11.25 x 79</td>
<td></td>
</tr>
<tr>
<td>6</td>
<td>36</td>
<td>15.25 x 87</td>
<td>48 13.25 x 102</td>
</tr>
</tbody>
</table>

▲ Both ends threaded.

### NOTES:

A) Rigid steel conduit shall be saw-cut only. Welding or flame-cutting shall not be permitted.

B) Inside edges of saw cuts shall be reamed to remove all sharp edges and burrs.

C) Repairs made to damaged galvanizing due to conduit bending shall be made in accordance with ASTM A780 - Practice for Repair of Damage and Uncoated Areas of Hot-Dip Galvanized Coatings.
PLASTIC CONDUIT AND FITTINGS

TABLE 4. RIGID PVC
CONDUIT APPROVED FOR PURCHASE
Conduit shall be rated for direct burial or concrete encasement

<table>
<thead>
<tr>
<th>APPROVED MANUFACTURERS</th>
</tr>
</thead>
<tbody>
<tr>
<td>CARLON</td>
</tr>
<tr>
<td>ALLIED</td>
</tr>
<tr>
<td>WESTERN PLASTICS</td>
</tr>
<tr>
<td>PW PIPE</td>
</tr>
</tbody>
</table>

TABLE 5. CONDUIT DIMENSIONS (IN.)

<table>
<thead>
<tr>
<th>CONDUIT SIZE (INCHES)</th>
<th>APPROX. O.D.</th>
<th>C.O.R. STOCK CODE</th>
</tr>
</thead>
<tbody>
<tr>
<td>2</td>
<td>2.375</td>
<td>E381.02</td>
</tr>
<tr>
<td>3</td>
<td>3.500</td>
<td>E381.03</td>
</tr>
<tr>
<td>4</td>
<td>4.500</td>
<td>E381.08</td>
</tr>
<tr>
<td>5</td>
<td>5.563</td>
<td>E381.05</td>
</tr>
<tr>
<td>6</td>
<td>6.625</td>
<td>E381.10</td>
</tr>
</tbody>
</table>

TABLE 6. COUPLINGS
See sheet 7 for special application of 5° coupling

<table>
<thead>
<tr>
<th>CONDUIT SIZE (IN.)</th>
<th>STANDARD COUPLING C.O.R.</th>
<th>5° ANGLE COUPLING C.O.R.</th>
</tr>
</thead>
<tbody>
<tr>
<td>2</td>
<td></td>
<td></td>
</tr>
<tr>
<td>3</td>
<td></td>
<td></td>
</tr>
<tr>
<td>4</td>
<td>E381.52</td>
<td>E381.53</td>
</tr>
<tr>
<td>5</td>
<td></td>
<td>E381.50</td>
</tr>
<tr>
<td>6</td>
<td>E381.51</td>
<td>E381.50</td>
</tr>
</tbody>
</table>

TABLE 7. ADAPTER (PLASTIC TO STEEL CONDUIT)

<table>
<thead>
<tr>
<th>CONDUIT SIZE (IN.)</th>
<th>C.O.R. STOCK CODE</th>
</tr>
</thead>
<tbody>
<tr>
<td>2</td>
<td></td>
</tr>
<tr>
<td>3</td>
<td></td>
</tr>
<tr>
<td>4</td>
<td></td>
</tr>
<tr>
<td>5</td>
<td></td>
</tr>
<tr>
<td>6</td>
<td></td>
</tr>
</tbody>
</table>

TABLE 8. SWEDGE REDUCER
Requires a standard coupling at each end to install.

<table>
<thead>
<tr>
<th>REDUCER SIZE (INCHES)</th>
<th>DIMENSIONS (INCHES)</th>
<th>C.O.R. STOCK CODE</th>
</tr>
</thead>
<tbody>
<tr>
<td>5 x 4</td>
<td>5.563 A 4.500 B</td>
<td></td>
</tr>
<tr>
<td>8 x 5</td>
<td>6.625 A 5.563 B</td>
<td></td>
</tr>
</tbody>
</table>

NOTE:
For exact dimensions of various conduit types, refer to the manufacturer's data sheets or the NEC-Chapter 9 Table 5.
### TABLE 9. CONDUIT CAPS

<table>
<thead>
<tr>
<th>CONDUIT SIZE (IN.)</th>
<th>RIGID CAP ▼ C.O.R. STOCK CODE</th>
<th>TEMP. POLY ▲ C.O.R. STOCK CODE</th>
</tr>
</thead>
<tbody>
<tr>
<td>2</td>
<td></td>
<td></td>
</tr>
<tr>
<td>3</td>
<td></td>
<td></td>
</tr>
<tr>
<td>4</td>
<td></td>
<td></td>
</tr>
<tr>
<td>5</td>
<td></td>
<td></td>
</tr>
<tr>
<td>6</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

▼ Rigid Cap for semi-permanent use.
▲ Temporary Cap will fit conduit, coupling, or bell end.

Table 10. END BELL

<table>
<thead>
<tr>
<th>CONDUIT SIZE (IN.)</th>
<th>C.O.R. STOCK CODE</th>
</tr>
</thead>
<tbody>
<tr>
<td>2</td>
<td></td>
</tr>
<tr>
<td>3</td>
<td></td>
</tr>
<tr>
<td>4</td>
<td>E380.04</td>
</tr>
<tr>
<td>5</td>
<td></td>
</tr>
<tr>
<td>6</td>
<td>E380.05</td>
</tr>
</tbody>
</table>

Table 11. CONDUIT BENDS

<table>
<thead>
<tr>
<th>CONDUIT SIZE (IN.)</th>
<th>DEGREE BEND</th>
<th>DIMENSIONS (IN.)</th>
<th>C.O.R. STOCK CODE</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>R</td>
<td>G</td>
</tr>
<tr>
<td>2</td>
<td>90°</td>
<td>24</td>
<td>2.25</td>
</tr>
<tr>
<td></td>
<td>45°</td>
<td>24</td>
<td></td>
</tr>
<tr>
<td>3</td>
<td>90°</td>
<td>48</td>
<td>3.25</td>
</tr>
<tr>
<td></td>
<td>90°</td>
<td>36</td>
<td></td>
</tr>
<tr>
<td></td>
<td>90°</td>
<td>24</td>
<td></td>
</tr>
<tr>
<td></td>
<td>45°</td>
<td>13</td>
<td></td>
</tr>
<tr>
<td></td>
<td>22.5°</td>
<td>13</td>
<td></td>
</tr>
<tr>
<td>4</td>
<td>90°</td>
<td>48</td>
<td>3.875</td>
</tr>
<tr>
<td></td>
<td>45°</td>
<td>36</td>
<td></td>
</tr>
<tr>
<td></td>
<td>22.5°</td>
<td>36</td>
<td></td>
</tr>
<tr>
<td>5</td>
<td>90°</td>
<td>48</td>
<td>3.875</td>
</tr>
<tr>
<td></td>
<td>90°</td>
<td>36</td>
<td></td>
</tr>
<tr>
<td></td>
<td>45°</td>
<td>24</td>
<td></td>
</tr>
<tr>
<td></td>
<td>22.5°</td>
<td>24</td>
<td></td>
</tr>
<tr>
<td>6</td>
<td>90°</td>
<td>48</td>
<td>5.5</td>
</tr>
<tr>
<td></td>
<td>45°</td>
<td>36</td>
<td></td>
</tr>
<tr>
<td></td>
<td>22.5°</td>
<td>36</td>
<td></td>
</tr>
</tbody>
</table>

Updated End Bell
PLASTIC CONDUIT AND FITTINGS (Cont'd)

APPLICATION:

1) Plastic conduit shall be sawcut with a fine-toothed blade resulting in square cut ends. All burrs shall be removed and inside edges of sawcut ends shall be chamfered.

2) Apply a thin, uniform coating of cement to the outside spigot end of the conduit to the depth setting mark. Avoid excess use of cement to prevent the formation of a bead of cement on the interior shoulder of the joint since, when hardened, the bead can cause cable damage during installation. Immediately after applying the coat of cement to the conduit, insert the conduit into the fitting socket until it bottoms at the fitting shoulder. Turn the conduit 1/4 turn during insertion to distribute the cement evenly. Hold the conduit in place for about one minute to prevent backing out. Wipe excess cement away from the outside of the joint. Weather conditions may vary the time of curing. When using adhesive in confined areas, adequate ventilation must be provided.

3) Backfill containing large rock, paving material, cinders, large or sharp angular substance or corrosive material shall not be placed in excavation where such material may damage conduit, prevent adequate compaction, or contribute to corrosion of the conduit.

<table>
<thead>
<tr>
<th>TABLE 11. SOLVENT CEMENT FOR USE WITH PLASTIC CONDUITS</th>
</tr>
</thead>
<tbody>
<tr>
<td>APPLICATION</td>
</tr>
<tr>
<td>PVC TO PVC</td>
</tr>
<tr>
<td>PVC TO PVC</td>
</tr>
</tbody>
</table>
APPLICATION OF 5° COUPLING FOR LONG RADIUS BENDS

EXAMPLE:
Radius of Bend (R) = 60 Ft.
Angle of Bend (θ) = 45°

From Table 13, the nearest value to 60 ft. radius is 57'-6"
Length of Conduit = 5 ft.

From Table 14, for 45° angle,
No. of Couplings Required = 9
No. of Conduit Lengths Required = 8

TABLE 13.

<table>
<thead>
<tr>
<th>APPROX. RADIUS OF BEND</th>
<th>LENGTH OF EACH CONDUIT (Ft.) (Using 5° Bend at Coupling)</th>
</tr>
</thead>
<tbody>
<tr>
<td>11'-6&quot;</td>
<td>1</td>
</tr>
<tr>
<td>17'-3&quot;</td>
<td>1.5</td>
</tr>
<tr>
<td>23'-0&quot;</td>
<td>2</td>
</tr>
<tr>
<td>28'-9&quot;</td>
<td>2.5</td>
</tr>
<tr>
<td>34'-9&quot;</td>
<td>3</td>
</tr>
<tr>
<td>40'-3&quot;</td>
<td>3.5</td>
</tr>
<tr>
<td>46'-0&quot;</td>
<td>4</td>
</tr>
<tr>
<td>51'-9&quot;</td>
<td>4.5</td>
</tr>
<tr>
<td>57'-6&quot;</td>
<td>5</td>
</tr>
<tr>
<td>69'-0&quot;</td>
<td>6</td>
</tr>
<tr>
<td>80'-6&quot;</td>
<td>7</td>
</tr>
<tr>
<td>92'-0&quot;</td>
<td>8</td>
</tr>
</tbody>
</table>

TABLE 14.

<table>
<thead>
<tr>
<th>ANGLE OF BEND</th>
<th>NUMBER OF COUPLINGS AND CONDUIT LENGTHS REQUIRED</th>
</tr>
</thead>
<tbody>
<tr>
<td>15°</td>
<td>COUPLING</td>
</tr>
<tr>
<td>15°</td>
<td>3</td>
</tr>
<tr>
<td>30°</td>
<td>6</td>
</tr>
<tr>
<td>45°</td>
<td>9</td>
</tr>
<tr>
<td>60°</td>
<td>12</td>
</tr>
<tr>
<td>75°</td>
<td>15</td>
</tr>
<tr>
<td>90°</td>
<td>18</td>
</tr>
</tbody>
</table>

* See Table 6, Sheet 4.
MINIMUM ALLOWABLE DISTANCE FOR TRANSITION (in feet)

CONDUIT

MINIMUM ALLOWABLE CONDUIT DEVIATIONS

NATURAL BEND - SEE CS1010; TABLE 4

<table>
<thead>
<tr>
<th>CONDUIT SIZE</th>
<th>A</th>
<th>B</th>
<th>C</th>
<th>D</th>
<th>E</th>
</tr>
</thead>
<tbody>
<tr>
<td>2&quot;</td>
<td>4.7</td>
<td>6.7</td>
<td>7.8</td>
<td>8.9</td>
<td>9.7</td>
</tr>
<tr>
<td>4&quot;</td>
<td>8.2</td>
<td>11.7</td>
<td>14.2</td>
<td>16.0</td>
<td>17.9</td>
</tr>
<tr>
<td>6&quot;</td>
<td>15.6</td>
<td>22.0</td>
<td>27.0</td>
<td>30.6</td>
<td>35.0</td>
</tr>
</tbody>
</table>

45° BENDS - SEE CS1010; TABLE 11

<table>
<thead>
<tr>
<th>CONDUIT SIZE</th>
<th>A</th>
<th>B</th>
<th>C</th>
<th>D</th>
<th>E</th>
</tr>
</thead>
<tbody>
<tr>
<td>2&quot;</td>
<td>----</td>
<td>3.7</td>
<td>4.7</td>
<td>5.7</td>
<td>6.7</td>
</tr>
<tr>
<td>4&quot;</td>
<td>----</td>
<td>4.5</td>
<td>5.5</td>
<td>6.5</td>
<td>7.5</td>
</tr>
<tr>
<td>6&quot;</td>
<td>----</td>
<td>4.5</td>
<td>5.5</td>
<td>6.5</td>
<td>7.5</td>
</tr>
</tbody>
</table>

22.5° BENDS - SEE CS1010; TABLE 11

<table>
<thead>
<tr>
<th>CONDUIT SIZE</th>
<th>A</th>
<th>B</th>
<th>C</th>
<th>D</th>
<th>E</th>
</tr>
</thead>
<tbody>
<tr>
<td>4&quot;</td>
<td>3.6</td>
<td>6.0</td>
<td>8.4</td>
<td>10.9</td>
<td>13.3</td>
</tr>
<tr>
<td>6&quot;</td>
<td>3.6</td>
<td>6.0</td>
<td>8.4</td>
<td>10.9</td>
<td>13.3</td>
</tr>
</tbody>
</table>
INSTALLATION OF BOXES IN SPECIAL FINISH SIDEWALKS:

Frequently special surface sidewalks (brick, tile, terrazzo, etc.) are installed. For boxes 3'x5' and smaller the box and standard cover shall be installed 2" below final grade and the customer shall furnish and install the special finish cover as illustrated in Figure A.

The requirements for this cover are as follows:
1. No single section cover shall exceed 125lbs.
2. Provisions for removal shall be provided as shown in Detail A.
3. The special finish cover shall be identified by the letter "E" to indicate the location of the splice box.
4. This type of installation should be avoided in full traffic locations.
5. CAUTION: Cover design allows for maximum of 1/2" deflection under 8000lb. wheel load.
**TABLE 1:**

<table>
<thead>
<tr>
<th>BOX SIZE</th>
<th>A</th>
<th>B</th>
<th>C</th>
<th>D</th>
<th>E</th>
<th>F</th>
<th>G</th>
<th>H</th>
<th>I</th>
<th>J</th>
</tr>
</thead>
<tbody>
<tr>
<td>2E</td>
<td>33 1/4</td>
<td>36 3/4</td>
<td>13 1/4</td>
<td>6 3/4</td>
<td>30 3/4</td>
<td>17 3/4</td>
<td>1 1/2</td>
<td>20 1/4</td>
<td>23 3/4</td>
<td>4 5/8</td>
</tr>
<tr>
<td>3E</td>
<td>39 1/8</td>
<td>42 1/8</td>
<td>15 9/16</td>
<td>9 3/4</td>
<td>35 7/8</td>
<td>24 1/4</td>
<td>5 1/8</td>
<td>27 1/2</td>
<td>30 1/2</td>
<td>8 3/4</td>
</tr>
<tr>
<td>ALL</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**NOTES:**

1. All lids and covers shall be furnished with hold-down bolts.
2. Non-concrete boxes and lids shall not be placed in any area subject to vehicular traffic.
3. d2E and 3E lids and cover shall be imprinted with "R.E.U.". 4E lids and covers shall imprint with "R.E.U. HIGH VOLTAGE".
4. Non-concrete boxes shall be from suppliers whose boxes meet the dimension and requirements of Note 5. Prior to acceptance of a box, REU must have received an independent consultants report by a licensed state of California civil or structural engineer showing the box and lid design meets the required specifications and standards. The report shall bare the stamp of the registered engineer.
5. Boxes and lids shall meet or exceed the requirements of the latest issue of the Western Underground Committee Guide 3.6/02/0588. Strength requirements based on 10,400lbs. (8,000lbs. plus 30% for impact) per wheel, 10”x10” wheel load area.
6. Knockouts are not required for REU boxes.
TABLE 3: DIMENSIONS (INCHES)

<table>
<thead>
<tr>
<th>BOX SIZE</th>
<th>K</th>
<th>L</th>
<th>M</th>
<th>N</th>
<th>P</th>
<th>Q</th>
<th>R</th>
<th>S</th>
<th>T</th>
<th>LID WEIGHT CHART</th>
</tr>
</thead>
<tbody>
<tr>
<td>2E</td>
<td>30 1/2</td>
<td>30 1/4</td>
<td>17 1/2</td>
<td>17 1/4</td>
<td>13 1/4</td>
<td>6 3/4</td>
<td>1 3/8</td>
<td>2</td>
<td>8</td>
<td>90lbs.</td>
</tr>
</tbody>
</table>

TABLE 4: APPROVED NON-CONCRETE BOX SUPPLIERS

<table>
<thead>
<tr>
<th>MANUFACTURER</th>
<th>CAT. NO.</th>
<th>BOX</th>
<th>LID</th>
<th>2E</th>
<th>3E</th>
<th>4E</th>
</tr>
</thead>
<tbody>
<tr>
<td>QUAZITE CORP.</td>
<td>PG1730CA00</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>PG1730BA18</td>
<td>X</td>
<td>X</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>PG2436CA00</td>
<td>X</td>
<td>X</td>
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**TABLE 2:**

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<tr>
<th>BOX SIZE</th>
<th>DIMENSIONS (INCHES)</th>
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<tr>
<td></td>
<td>A</td>
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<tr>
<td>2E</td>
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<tr>
<td>3E</td>
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</tr>
<tr>
<td>4E</td>
<td>53</td>
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</table>

**SECTION X-X**

**SECTION Y-Y**

**PLAN VIEW**

**ALL KNOCKOUTS ARE OPTIONAL**

SEE NOTE 6, SHT 1

**DETAIL B**

**TYPICAL MOUNTING DETAIL**

SEE DETAIL B

**8" EXTENSION**

**EXTENSION**

**BOX**

**REDRAWN**

**ELECTRIC CONSTRUCTION STANDARD**

**NON CONCRETE ELECTRIC PULL BOXES**

**2E, 3E & 4E**

**REDWOOD CITY ELECTRIC UTILITY**

**DES/REV DATE ASSISTANT DIRECTOR DISTRIBUTION REVISED DWG. NO.**

**RO/RLH 05/11/92**

**06/05/12 CS1109**
Approved Concrete Box/Lid Suppliers

<table>
<thead>
<tr>
<th>Manufacturer</th>
<th>CAT. NO.</th>
<th>BOX</th>
<th>LID</th>
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<th>3E</th>
<th>4E</th>
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Notes:
1. Lids shall be one-piece and be furnished with hold-down bolts.
2. 2E and 3E lids shall be imprinted with "REU". 4E lids shall be imprinted with "REU HIGH VOLTAGE"
3. Boxes and lids shall be concrete and be constructed to the approximate dimensions listed below.
4. Pull boxes in locations subject to vehicular traffic shall be traffic rated per sheet 2.

### Dimensions (in Inches)

<table>
<thead>
<tr>
<th>BOX NO.</th>
<th>A</th>
<th>B</th>
<th>C</th>
<th>D</th>
<th>E</th>
<th>F</th>
<th>G</th>
<th>H</th>
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<td>--</td>
<td>2</td>
<td>17.5</td>
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<tr>
<td>3E</td>
<td>24</td>
<td>36</td>
<td>21</td>
<td>32.5</td>
<td>24</td>
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<td>10</td>
<td>40</td>
<td>28.5</td>
<td>35</td>
<td>--</td>
<td>3</td>
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<tr>
<td>4E</td>
<td>30</td>
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<td>27</td>
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<td>34</td>
<td>24</td>
<td>--</td>
<td>3</td>
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</table>
NOTES:

1. Provide CHRISTY B2436 box, B2436-52JH cover, and B2436x12 extension manufactured by Oldcastle Enclosures unless prior written approval has been obtained from the engineering division of REU.

2. Where box extensions are used, concrete shall extend to the full depth of the excavation.

3. Builder shall obtain inspection by REU prior to placing concrete.

4. Lids shall be hot-dipped galvanized or have an epoxy-coated non-skid sand finish.

5. Concrete for collar shall comply with greenbook class 560-B-3250.

6. Reinforcing steel for collar shall comply with ASTM A615 GR 40 or 60.
CONDUIT TERMINATION AREA SHALL BE WITHIN 12" MAX. FROM END OF SUBSTRUCTURE.

NOTES:

1.) All conduits shall be grouped within 12" of the street side of the secondary box. (See Detail "A")

2.) Service conduit stubs shall be installed by the developer and shall extend at least (3') three feet into parcel being served. The end of the service conduit stub must clear all equipment pads by at least (2') two feet. The builder shall complete the service conduit run from the conduit stub to the service panel.

3.) Prior to the date of this construction standard, service conduits were not stubbed to parcels as a practice, therefore stubs may not always be present on all existing parcels. Where stubs are not present the builder shall complete the service conduit run from a secondary box to the service panel.

4.) For conduit sizes see plans, specification or other applicable construction standards.

5.) All conduits shall be extended a minimum of 3" and a maximum of 5" above the bottom of the box.

6.) Service conduits installed by the owner/builder shall rise in the secondary box immediately adjacent to secondary conduits as shown.

7.) Conduit sweeps shall not be cut or otherwise modified.
EXTEND THRU 2" KNOCK-OUT TO EXISTING GUTTER & DAYLIGHT.

2-20 AMP 1P CIRCUIT BREAKERS AND DUPLEX GROUNDING TYPE RECEPTACLE. SEE SPECIAL CONDITIONS OF SPECIFICATION FOR MORE INFORMATION.

CHECK VALVE HYDROMATIC #HCV-125 NON-SLAM.

LIGHT FIXTURE FOR VAULT.

2" P.V.C. SCHEDULE 40 PIPING FOR PUMP DISCHARGE.

6" COMPACTED 1/2" TO 3/4" RIVER RUN GRAVEL BEDDING.

24" CONCRETE T&G TILE, 30" LONG WITH 4" SLAB IN BOTTOM AND GALV. GRATING COVER WITH CENTER HOLE FOR POWER CONNECTION AND DISCHARGE PIPING.

SUMP PUMP ALL BRONZE 40 G.P.M. @ 15' HEAD, 1/3 H.P. 120 VOLT, WITH BUILT IN LEVEL SWITCH. HYDROMATIC SP-33AB.
GROUND ROD DETAIL
5/8"Ø x 16" COPPER COATED STEEL

NOTE:
Both ground rods shall be welded to one continuous run of bare or zinc galvanized or other electrically conductive coated steel reinforcing bars or rods of not less than twenty (20) feet in length and 1/2" (12.7mm) in diameter which is encased by at least 2" (50.8) of concrete. This continuous run may be part of the reinforcing cage within the floor area only.
NOTES:

1. The splice box shall be precast with dimensions as shown. Design strength shall meet or exceed the latest edition of ASTM C857 designation A-16 for (AASHTO DESIGNATION HS 20-44) based on 16,000 lbs per wheel, 10"x20" wheel load area and increased 30% for an impact factor. Proof of specification compliance shall be the responsibility of the contractor and/or vendor.

2. Two 5/8" ground rods shall be provided in the splice box per REU Drawing CS1115.

3. The excavation shall allow for the overall assembled height of the splice box plus added height of risers, manhole casting, frames, covers, and bedding materials. A minimum clearance of 6" around the side walls of the splice box is required for ease of installation. It shall be the contractors responsibility to verify excavation requirement with the vendor supplying the vault for each specific location.

4. The bedding materials shall consist of 3" to 6" of mechanically compacted Caltrans 3/4" Class 2 aggregate per City of Redding Construction Standard Page 100.00.

5. The precast splice box shall be assembled by lowering each section into the excavation. The base section is lowered first, set level, firmly positioned and mastic sealant installed before placing intermediate and top sections. Care shall be taken to insure that the seal surfaces are clean and that the gasket material is properly placed.

6. Backfill shall consist of 3/4" Caltrans Class 2 aggregate. Backfilling shall not commence until splice box is completely assembled. Backfilling shall be installed in 12" maximum lifts and mechanically compacted to 90% relative compaction. Alternatively, slurry backfill per Page 611.00 may be used with no compaction required.

7. All grouting of risers, covers, conduits or specified sections of splice boxes shall be the responsibility of the customer and/or contractor.

8. See REU Drawing CS1114 for splice box construction and installation details.

9. Pull irons shall be designed for 20,000 lbs. Ultimate, with a safety factor of two. (40,000 lbs.)

10. All extensions shall be provided with four lifting eyes or other approved lifting means. Each lifting attachment point shall be capable of lifting the total extension weight plus 150%.

11. All sections of a splice box shall be permanently marked with delivery date.
1. This cover shall only be used with REU approval in a full traffic area.
2. The frame and cover assembly shall meet dimension requirements as shown and design strength shall meet or exceed the latest edition of ASTM C 857 designation A-16 (AASHTO DESIGNATION HS 20-40) based on 16,000lbs. per wheel, 10"x20" wheel load area and increased 30% for an impact factor. Proof of specification compliance shall be the responsibility of the contractor and/or vendor.
3. Covers shall be installed within an adjustable frame which shall have a minimum of three inches of adjustment. All steel shall be galvanized as per the latest revision of ASTM Spec. A-123, or shall be an epoxy non-skid sand finish.
4. Identification plate (one) shall be supplied and state "HIGH VOLTAGE" "R.E.U.". See Detail "C" on Drawing CS1114.
5. All grouting of risers, covers, conduits or specific sections of splice box shall be the responsibility of the customer and/or contractor. Grout used between frame and splice box shall be suitable for full traffic loads and consistent with ASTM C 857 designation A-16 loading and shall be allowed to cure 24 hours before any load is applied. See Drawing CS1116 for 3'x5' splice box.
6. See Drawing CS1114 for construction and installation details.
7. All sections of a splice box must be permanently marked with the delivery date.
8. Removable beams shall have a 1" diameter hole in each end for lifting.

SECTION X-X
FRAME ASSEMBLY

NOTES:
NOTES:

1. The splice box shall be poured in place or precast with dimensions as shown. Design strength shall meet or exceed the latest edition of ASTM C357 designation A-16 for (AASHTO DESIGNATION HS 20-44) based on 16,000lbs per wheel, 10"x20" wheel load area and increased 30% for an impact factor. Proof of specification compliance shall be the responsibility of the contractor and/or vendor.

2. Two 5/8" ground rods shall be provided in the splice box per REU Drawing CS1115.

3. The excavation shall allow for the overall assembled height of the splice box plus added height of risers, manhole casting, frames, covers, and bedding materials. A minimum clearance of 6" around the side walls of the splice box is required for ease of installation. It shall be the contractors responsibility to verify excavation requirement with the vendor supplying the vault for each specific location.

4. The bedding materials shall consist of 3" to 6" of mechanically compacted Caltrans 3/4" Class 2 aggregate per City of Redding Construction Standard Page 100.00.

5. The precast splice box shall be assembled by lowering each section into the excavation. The base section is lowered first, set level, firmly positioned and mastic sealant installed before placing intermediate and top sections. Care shall be taken to insure that the seal surfaces are clean and that the gasket material is properly placed.

6. Backfill shall consist of 3/4" Caltrans Class 2 aggregate. Backfilling shall not commence until splice box is completely assembled. Backfilling shall be installed in 12" maximum lifts and mechanically compacted to 90% relative compaction. Alternatively, slurry backfill per Page 611.00 may be used with no compaction required.

7. All grouting of risers, covers, conduits or specified sections of splice boxes shall be the responsibility of the customer and/or contractor.

8. See REU Drawing CS1114 for splice box construction and installation details.

9. Pull irons shall be designed for 20,000 lbs. Ultimate, with a safety factor of two. (40,000 lbs.)

10. All extensions shall be provided with four lifting eyes or other approved lifting means. Each lifting attachment point shall be capable of lifting the total extension weight plus 150%.

11. All sections of a splice box shall be permanently marked with delivery date.
NOTES:

1. The frame and cover assembly shall meet dimension requirements as shown and design strength shall meet or exceed the latest edition of ASTM C 857 designation A-16 (AASHTO DESIGNATION HS 20-40) based on 16,000lbs. per wheel, 10"x20" wheel load area and increased 30% for an impact factor. Proof of specification compliance shall be the responsibility of the contractor and/or vendor.

2. Covers shall be installed within an adjustable frame which shall have a minimum of three inches of adjustment. All steel shall be galvanized as per the latest revision of ASTM Spec. A-123, or shall be an epoxy non-skid sand finish.

3. Identification plate (one) shall be supplied and state "HIGH VOLTAGE" "R.E.U.". See Detail "C" on Drawing CS1114.

4. All grouting of risers, covers, conduits or specific sections of splice box shall be the responsibility of the customer and/or contractor. Grout used between frame and splice box shall be suitable for full traffic loads and consistent with ASTM C 857 designation A-16 loading and shall be allowed to cure 24 hours before any load is applied. See Drawing CS1114 for 4'-0" x 6'-6" electrical vault.

5. See Drawing CS1114 for construction and installation details.

6. All sections of a splice box must be permanently marked with the delivery date.

7. Removable beams shall have a 1" diameter hole in each end for lifting.
1. The splice box shall be poured in place or precast with dimensions as shown. Design strength shall meet or exceed the latest edition of ASTM C857 designation A-16 for (AASHTO DESIGNATION HS 20-44) based on 16,000lbs per wheel, 10"x20" wheel load area and increased 30% for an impact factor. Proof of specification compliance shall be the responsibility of the contractor and/or vendor.

2. Two 5/8" ground rods shall be provided in the splice box per REU Drawing CS1115.

3. The excavation shall allow for the overall assembled height of the splice box plus added height of risers, manhole casting, frames, covers, and bedding materials. A minimum clearance of 6" around the side walls of the splice box is required for ease of installation. It shall be the contractors responsibility to verify excavation requirement with the vendor supplying the vault for each specific location.

4. The bedding materials shall consist of 3" to 6" of mechanically compacted Caltrans 3/4" Class 2 aggregate per City of Redding Construction Standard Page 100.00.

5. The precast splice box shall be assembled by lowering each section into the excavation. The base section is lowered first, set level, firmly positioned and mastic sealant installed before placing intermediate and top sections. Care shall be taken to insure that the seal surfaces are clean and that the gasket material is properly placed.

6. Backfill shall consist of 3/4" Caltrans Class 2 aggregate. Backfilling shall not commence until splice box is completely assembled. Backfilling shall be installed in 12" maximum lifts and mechanically compacted to 90% relative compaction. Alternatively, slurry backfill per Page 611.00 may be used with no compaction required.

7. All grouting of risers, covers, conduits or specified sections of splice boxes shall be the responsibility of the customer and/or contractor.

8. See REU Drawing CS1114 for splice box construction and installation details.

9. Pull irons shall be designed for 20,000 lbs. Ultimate, with a safety factor of two. (40,000 lbs.)

10. All extensions shall be provided with four lifting eyes or other approved lifting means. Each lifting attachment point shall be capable of lifting the total extension weight plus 150%.

11. All sections of a splice box shall be permanently marked with delivery date.
NOTES:

1. This cover shall be used with REU approval in a traffic area.

2. The frame and cover assembly shall meet dimension requirements as shown and design strength shall meet or exceed the latest edition of ASTM C 857 designation A-16 (AASHTO DESIGNATION HS 20-40) based on 16,000 lbs. per wheel, 10"x20" wheel load area and increased 30% for an impact factor. Proof of specification compliance shall be the responsibility of the contractor and/or vendor.

3. Covers shall be installed within an adjustable frame which shall have a minimum of three inches of adjustment. All steel shall be galvanized as per the latest revision of ASTM Spec. A-123, or shall be an epoxy non-skid sand finish.

4. Identification plate (one) shall be supplied and state "HIGH VOLTAGE" "R.E.U.". See Detail "C" on Drawing CS1114.

5. All grouting of risers, covers, conduits or specific sections of splice box shall be the responsibility of the customer and/or contractor. Grout used between frame and splice box shall be suitable for full traffic loads and consistent with ASTM C 857 designation A-16 loading and shall be allowed to cure 24 hours before any load is applied. See Drawing CS1120 and CS1122 for primary electric vaults.

6. See Drawing CS1114 for construction and installation details.

7. All sections of a splice box must be permanently marked with the delivery date.

8. Removable beams shall have a 1" diameter hole in each end for lifting.
1. The splice box shall be poured in place or precast with dimensions as shown. Design strength shall meet or exceed the latest edition of ASTM C857 designation A-16 for (AASHTO DESIGNATION HS 20-44) based on 16,000 lbs per wheel, 10"x20" wheel load area and increased 30% for an impact factor. Proof of specification compliance shall be the responsibility of the contractor and/or vendor.

2. Two 5/8" ground rods shall be provided in the splice box per REU Drawing CS1115.

3. The excavation shall allow for the overall assembled height of the splice box plus added height of risers, manhole casting, frames, covers, and bedding materials. A minimum clearance of 6" around the side walls of the splice box is required for ease of installation. It shall be the contractors responsibility to verify excavation requirement with the vendor supplying the vault for each specific location.

4. The bedding materials shall consist of 3" to 6" of mechanically compacted Caltrans 3/4" Class 2 aggregate per City of Redding Construction Standard Page 100.00.

5. The precast splice box shall be assembled by lowering each section into the excavation. The base section is lowered first, set level, firmly positioned and mastic sealant installed before placing intermediate and top sections. Care shall be taken to insure that the seal surfaces are clean and that the gasket material is properly placed.

6. Backfill shall consist of 3/4" Caltrans Class 2 aggregate. Backfilling shall not commence until splice box is completely assembled. Backfilling shall be installed in 12" maximum lifts and mechanically compacted to 90% relative compaction. Alternatively, slurry backfill per Page 611.00 may be used with no compaction required.

7. All grouting of risers, covers, conduits or specified sections of splice boxes shall be the responsibility of the customer and/or contractor.

8. See REU Drawing CS1114 for splice box construction and installation details.

9. Pull irons shall be designed for 20,000 lbs. Ultimate, with a safety factor of two. (40,000 lbs.)

10. All extensions shall be provided with four lifting eyes or other approved lifting means. Each lifting attachment point shall be capable of lifting the total extension weight plus 150%.

11. All sections of a splice box shall be permanently marked with delivery date.
NOTES:

1. The splice box shall be poured in place or precast with dimensions as shown. Design strength shall meet or exceed the latest edition of ASTM C657 designation A-16 for (AASHTO DESIGNATION HS 20-44) based on 16,000lbs per wheel, 10"x20" wheel load area and increased 30% for an impact factor. Proof of specification compliance shall be the responsibility of the contractor and/or vendor.

2. Two 5/8" ground rods shall be provided in the splice box per REU Drawing CS1115.

3. The excavation shall allow for the overall assembled height of the splice box plus added height of risers, manhole casting, frames, covers, and bedding materials. A minimum clearance of 6" around the side walls of the splice box is required for ease of installation. It shall be the contractor's responsibility to verify excavation requirement with the vendor supplying the vault for each specific location.

4. The bedding materials shall consist of 3" to 6" of mechanically compacted Caltrans 3/4" Class 2 aggregate per City of Redding Construction Standard Page 100.00.

5. The precast splice box shall be assembled by lowering each section into the excavation. The base section is lowered first, set level, firmly positioned and mastic sealant installed before placing intermediate and top sections. Care shall be taken to insure that the seal surfaces are clean and that the gasket material is properly placed.

6. Backfill shall consist of 3/4" Caltrans Class 2 aggregate. Backfilling shall not commence until splice box is completely assembled. Backfilling shall be installed in 12" maximum lifts and mechanically compacted to 90% relative compaction. Alternatively, slurry backfill per Page 611.00 may be used with no compaction required.

7. All grouting of risers, covers, conduits or specified sections of splice boxes shall be the responsibility of the customer and/or contractor.

8. Pull irons shall be designed for 20,000 lbs. Ultimate, with a safety factor of two. (40,000 lbs.)

9. All extensions shall be provided with four lifting eyes or other approved lifting means. Each lifting attachment point shall be capable of lifting the total extension weight plus 150%.

10. All sections of a splice box shall be permanently marked with delivery date.
NOTES:

1. The frame and cover assembly shall meet dimension requirements as shown and design strength shall meet or exceed the latest edition of ASTM C 857 designation A-16 (AASHTO DESIGNATION HS 20-40) based on 16,000lbs. per wheel, 10”x20” wheel load area and increased 30% for an impact factor. Proof of specification compliance shall be the responsibility of the contractor and/or vendor.

2. Cover shall be labeled “R.E.U.” "HIGH VOLTAGE”.

3. All grouting shall be the responsibility of the customer and/or contractor. Grout used between frame and vault, grade rings, or cone shall be suitable for full traffic loads and consistent with ASTM C 857 designation A-16 loading and shall be allowed to cure 24 hours before any load is applied. Adjustable studs shall be wrapped with felt paper to grouting for easy future use.

4. Adjustable studs shall have slotted heads for installing into inserts.

5. Plastic mastic sealant shall be installed in all joints. Care shall be taken to insure that the seal surfaces are clean and that the gasket material is in place properly.

6. See Drawing CS1120 for 4-6”x8’-6” and CS1122 for 6’-0”x12’-0” electrical vault details.
1. The frame and cover assembly shall meet dimension requirements as shown and design strength shall meet or exceed the latest edition of ASTM C-857 (AASHTO H10 Standards) based on 8000 lbs. per wheel, 10"x10" wheel load area. Proof of specification compliance shall be responsibility of the contractor and/or vendor.

2. Covers shall be installed within an adjustable frame which shall have a minimum of three inches of adjustment. All steel shall be galvanized as per the latest revision of ASTM Spec. A-123, or shall be an epoxy non-skid sand finish.

3. All covers shall have four locations for nameplates. One shall be supplied and state: "HIGH VOLTAGE" "R.E.U."

4. All grouting of risers, covers, conduits or specific sections of splice box shall be the responsibility of the customer and/or contractor. Grout used between frame and splice box shall be suitable for full traffic loads and consistent with ASTM C-857 designation A-16 loading and shall be allowed to cure 24 hours before any load is applied. See drawing CS1116 for 3x5 splice box.

5. All sections of a splice box must be permanently marked with the delivery date.

6. For use in sidewalks, paved and unpaved pedestrian areas, and any other area subject to occasional vehicie traffic.

7. All covers shall be torsion assist and have a R.E.U. approved skid resistant surface, hold open latches, Camlock bolt-down, and clear opening.
1. The frame and cover assembly shall meet dimension requirements as shown and design strength shall meet or exceed the latest edition of ASTM C-857 (AASHTO H10 Standards) based on 8000 lbs. per wheel, 10"x10" wheel load area. Proof of specification compliance shall be responsibility of the contractor and/or vendor.

2. Covers shall be installed within an adjustable frame which shall have a minimum of three inches of adjustment. All steel shall be galvanized as per the latest revision of ASTM Spec. A-123, or shall be an epoxy non-skid sand finish.

3. All covers shall have four locations for nameplates. One shall be supplied and state; "HIGH VOLTAGE" "R.E.U."

4. All grouting of risers, covers, conduits or specific sections of splice box shall be the responsibility of the customer and/or contractor. Grout used between frame and splice box shall be suitable for full traffic loads and consistent with ASTM C-857 designation A-16 loading and shall be allowed to cure 24 hours before any load is applied. See drawing CS1120 for 4'-6"x8'-6" primary electrical vault.

5. All sections of a splice box must be permanently marked with the delivery date.

6. For use in sidewalks, paved and unpaved pedestrian areas, and any other area subject to occasional vehicle traffic.

7. All covers shall be torsion assist and have a R.E.U. approved skid resistant surface, hold open latches, Camlock bolt-down, and clear opening.
SKID RESISTANT SURFACE

CAM LOCK BOLT-DOWN

HOLD OPEN LATCH AND TORSION ASSIST.

ISOMETRIC VIEW

INSIDE LEVELING BOLTS (4-PLACES)

2 1/2" 6"

12-GUAGE METAL 1" RADIUS

SEE DETAIL "B" THIS PAGE

DETIAL A
GRADE ADJUSTING FEATURE

DETAIL B
ADJUSTMENT BOLT SUPPORT BRACKET

ADDED LABELS TO ISOMETRIC VIEW AND UPDATED CAD STANDARDS

ELECTRIC CONSTRUCTION STANDARD

ALUMINUM QUICK RELEASE COVER ASSEMBLY
INCIDENTAL TRAFFIC 4'-6"x8'-6" ELECTRICAL PRIMARY VAULT

REU
Redding Electric Utility

DES/REV DATE ELECTRIC MANAGER - ENGINEERING REVISED DWG. NO.
RLH/JCR 09/27/07 10/16/17 CS1120
HOLD DOWN ASSEMBLY.
COURSE THREAD PENTA-HEAD BOLTS (TOTAL OF 4)

22" x 64" x 1/4"
DIAMOND PLATE COVER
(COVER TO BE FLUSH WITH TOP
OF CONCRETE PAD)
LABELED "R.E.U. HIGH VOLTAGE"

PAD WILL OVERHANG
3X5 VAULT BY 3 1/2" ON THE
BACK, 1 1/2" ON THE SIDES AND
1 1/2" ON THE FRONT

2" x 2" x 1/4" ANGLE FRAME
(GALVANIZED STEEL)

52" x 12" ACCESS OPENING

8"

10"

50"

18" x 60" ACCESS OPENING

* FACES OF ACCESS OPENING TO BE
FLUSH WITH INSIDE OF BOX.

PAD FOR 200A SECTIONALIZING ENCLOSURE
(TO BE PLACED ON TOP OF A STANDARD 3'X5' VAULT - SEE CS1116)
<table>
<thead>
<tr>
<th>ITEM</th>
<th>QTY</th>
<th>DESCRIPTION</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>1</td>
<td>BODY WELDMENT</td>
</tr>
<tr>
<td>2</td>
<td>1</td>
<td>COVER WELDMENT</td>
</tr>
<tr>
<td>3</td>
<td>3</td>
<td>MOUNTING BAR</td>
</tr>
<tr>
<td>4</td>
<td>1</td>
<td>WIND STOP</td>
</tr>
<tr>
<td>5</td>
<td>1</td>
<td>PENTA BOLT</td>
</tr>
<tr>
<td>6</td>
<td>6</td>
<td>5/16 - 18x1,125 HHCS</td>
</tr>
<tr>
<td>7</td>
<td>2</td>
<td>1/2 FLAT WASHER</td>
</tr>
<tr>
<td>8</td>
<td>1</td>
<td>1/2 - 13x1 HEX HD CAP</td>
</tr>
<tr>
<td>9</td>
<td>1</td>
<td>1/2 SPRING</td>
</tr>
<tr>
<td>10</td>
<td>1</td>
<td>1/2 ONE WAY WASHER</td>
</tr>
<tr>
<td>11</td>
<td>1</td>
<td>NEOPRENE GASKET</td>
</tr>
<tr>
<td>12</td>
<td></td>
<td>NOT USED</td>
</tr>
<tr>
<td>13</td>
<td></td>
<td>NOT USED</td>
</tr>
<tr>
<td>14</td>
<td>1</td>
<td>HANDLE WELD'MT</td>
</tr>
<tr>
<td>15</td>
<td>2</td>
<td>CARRIAGE BOLT 1/4 - 20</td>
</tr>
<tr>
<td>16</td>
<td>2</td>
<td>WHIZ LOCK NUT 1/4 - 20</td>
</tr>
</tbody>
</table>

**SECTIONALIZING CABINET**

**MANUFACTURER**

**PART NO.**

* TO GET 3 - 4 WAY J-BARS INSTALLED BY MAYSTEEL ADD 3 COOPER POWER SYTEM PART #LJ215C4U TO THE ORDER.

**NOTE:**

1. ENCLOSURE SHALL BE FABRICATED FROM 12 GAUGE STEEL. MUNSELL GREEN POWDER COAT.
SECTIONALIZING ENCLOSURE

PAD WITH STANDARD 3'x5' VAULT BELOW (NOT SHOWN)

SECTIONALIZING ENCLOSURE

PLACE FRONT OF PAD PARALLEL WITH SIDEWALK

CLEARANCE AREA

VAULT ACCESS COVER

3' MIN.

8' MIN.

BACK EDGE OF SIDEWALK

3' MIN.

3' MIN.

FINAL GRADE

SET PAD 2" ABOVE FINAL GRADE

30' TYP
NOTES:

1. All conduits entering or exiting a vault shall have a straight section that is perpendicular to the outside wall of the vault. Preferably the straight section of conduit will be 10’ in length. If the location prohibits a full 10’, the length maybe reduced - But under no circumstances shall the straight section of conduit be less than 1’ in length as measured from the outside wall of the vault.

2. Conduits shall not cross or switch positions in the trench between vaults.

SECTION "A"
The technical requirements for interconnecting DG to REU’s electric grid are guided by the following overriding principles:

1. SAFETY. The system shall be designed, tested, and operated to both minimize the potential hazard to life and property and protect the health and safety of REU employees; the public at large; and, the environment. In cases where the reliability of REU’s System is jeopardized or where compliance with national or regional, reliability standards is mandatory, certain technical standards outlined in this appendix may apply irrespective of REU’s authority to impose the interconnection requirements.

2. DG may not island within REU’s System under any circumstance (“Unintended Island”). A DG facility must automatically detect and rapidly cease generation or disconnect from the System if the System is faulted or becomes de-energized.

3. All steady-state and transient operating limits for voltage, flicker voltage, frequency, harmonic content, etc. must comply all applicable NEC, IEEE, ANSI codes and standards. No DG facility may cause effects that are detrimental; undesirable; cause either the Distribution System nominal ratings or operating bandwidths to be exceeded; or, degrade any of the existing REU protection and control schemes.

4. A positive means to disconnect AC is required. Positive means is defined as: manually operated; accessible; visible; properly rated; and, lockable disconnect device for all interconnecting DG.

5. Neither REU nor the customer should depend on the other for the protection of their respective equipment. REU’s protection requirements are designed and intended to protect the REU electric system only.

6. All interconnections must comply with all local, state, federal, and REU building codes; safety rules; and, regulations as applicable.

REFERENCES

The following power and energy standards shall be used in conjunction with these technical requirements in this Construction Standard. When the stated version of the following standards is superseded by an approved revision, then that revision shall apply. The applicability of the following standards is determined by the specific requirements stated in this Construction Standard, such as requiring certain sections.

ANSI C84.1-2016, Electric Power Systems and Equipment—Voltage Ratings (60 Hz).


IEEE/ANSI C50.10™-1990, Rotating Electrical Machinery - Synchronous Machines.


IEEE Std 1547.6™-2011, IEEE Recommended Practice for Interconnecting Distributed Resources with Electric Power Systems Distribution Secondary Networks.

NEMA MG 1-2016, Motors and Generators.

NFPA 70, National Electric Code.

UL 1741 Standard for Inverters, Converters, Controllers and Interconnection System Equipment for Use With Distributed Energy Resources.

OVERVIEW

REU will permit any Customer to operate their generating equipment in parallel with its system whenever this can be done without adverse effects on the REU System, its operations, or existing customers. To ensure successful operation, certain equipment and protective devices (relays, circuit breakers, disconnect switches, etc.) as specified by REU must be installed as a part of the Customer's Generating Facility. The purpose of these devices is to promptly disconnect the Customer's Generating Facility from REU's System during those conditions which may adversely affect either REU or the Customer.
The Customer may elect to use any of a variety of energy sources including solar, hydroelectric, wind, geothermal, biomass, or some other type of renewable source, in addition to conventional fossil fuels. The end conversion for connection to REU's System must produce 60 Hz AC, at voltage and quality levels acceptable to the REU. The Customer may elect to run the generator either in parallel with REU System or as a separate system with the capability of nonparallel load transfer between the two independent systems.

In general, the Customer's Generating Facilities operating in parallel with REU's Distribution System shall be equipped with the following protective features:

1. Over/under voltage and over/under frequency trip functions.

2. A voltage and frequency sensing and time-delay function to prevent the Generating Facility from energizing a de-energized Distribution System circuit and to prevent the Generating Facility from prematurely reconnecting with the System.

3. A function to prevent the Generating Facility from contributing to the formation of an Unintended Island, and cease to energize the Distribution System within two seconds of the formation of an Unintended Island.

4. A disconnecting device or switch with rated load- and/or fault-interrupting capability, as needed, at the point of interconnection.

Please note that this Construction Standard only refers to REU's technical requirements for interconnected grid operations. Depending on the energy source, other jurisdictional state and federal agencies may have more restrictive requirements for the development of a Generating Facility.

Customers proposing Generation Facilities are responsible for designing, installing, operating, and maintaining interconnection equipment they own. All protective devices necessary to protect the interconnected entity's facilities are the responsibility of the interconnected entity. REU's requirements specified in this Construction Standard are designed to protect REU facilities and maintain grid reliability; they are not designed to protect the facilities of any other interconnected entity.

A Customer's Generating Facility must satisfy the requirements in this Construction Standard, applicable rules and tariffs of the Federal Energy Regulatory Commission; Western Electricity Coordinating Council; the North American Electric Reliability Corporation; and, any project-specific requirements of REU. REU's review and written acceptance of the interconnected entity's equipment specifications and detailed plans shall not be construed as confirming or endorsing the interconnected entity's design, as warranting the equipment's safety, durability, or reliability, or in any way relieving the interconnecting entity from its responsibility to meet the above requirements. REU shall not, by reason of such review or lack of review, be responsible for strength, details of design, adequacy or capacity of equipment built to such specifications, nor shall REU's acceptance be deemed an endorsement of such equipment.

1. SEPARATE OPERATION

A separate system is defined as one in which there is either no (a.k.a. "Open-transition" or "Break-before-Make") or a momentary (a.k.a. "Closed-transition" or "Make-before-Break") possibility of connecting the Customer's generating equipment in parallel with REU's System.
Separate operation is common for backup emergency generation and backup emergency generation is often legally required by the California Building Code for certain applications (i.e., hospitals). REU specifies the interconnection technical requirements for the generating installation, but the recurrent periodic testing is handled by the authority having jurisdiction (City of Redding Fire Marshall) per NFPA-70 and NFPA-110. This criteria is true even for Generating Facilities that are not legally required.

2. PARALLEL OPERATION

A parallel system is defined as one in which the Customer's Generating Facility's generation can be connected to the REU's System where a transfer of power between the two systems is a direct consequence. A result of such parallel operation is that the generator becomes a part of the electric system which must be considered in the electrical protection scheme of REU's System.

Utility lines are subject to a variety of natural and man-made hazards. Among these are lightning, wind, animals, automobiles, malicious mischief, and human error. Residential and commercial/industrial internal electric systems are subject to these same hazards but not to nearly the same degree because of the limited extent and protected environment of such systems.

The electric problems which can result from these hazards are principally short circuits, grounded conductors, and broken conductors. These fault conditions require that the damaged equipment be de-energized as soon as possible because of the hazards they pose to the public and the operation of the system. A parallel generator connected to a REU power line represents a source of power to energize the line and must have adequate protective devices installed to sense abnormal or fault conditions on the REU system.

Parallel generation can also cause a condition known as "islanding". This is a situation in which a portion of REU's load becomes isolated from a REU source but is still connected to the parallel generation. In this condition, the voltage may collapse or the isolated system may continue to operate independent of the REU System (but probably with abnormal voltage or frequency). The probability of an isolated system continuing to operate becomes greater as the size of the parallel generator increases as compared to the amount of potentially isolated load. If there is a possibility of this occurring, a transfer trip relay protection scheme must be applied. This transfer trip scheme will send a trip signal from the REU Substation to the Customer's Generating Facility's generator breaker.

The protective devices and other requirements detailed in the following sections are intended to provide protection against the hazards noted above by disconnecting the parallel generator when trouble occurs. These requirements are fewer for small installations but increase as the size of the generation increases. For generator installations, the basic philosophy is to ensure that the generator is small compared with the magnitude of any load with which it might be isolated (aggregate generator size is less than half the REU interconnected utility circuit minimum load). Thus, for any fault, the COR's protective relays will operate and isolate the generation with a large amount of load, causing voltage collapse and automatic shutdown of the generator. This approach is particularly appropriate for the induction generator or inverter systems commonly proposed for small parallel generators since these systems do not normally contribute sustained overcurrents which could be used to detect faults directly. The use of voltage and frequency measuring relays are required to detect isolation.
Since REU's System is constantly being re-configured for operational and maintenance issues, the possibility exists that an interconnected Generating Facility could be placed on another circuit (or circuits) with existing interconnected generation. The cause and effect of islanding due to operational flexibility resulted in the limitation of maximum aggregate of all generation is limited to 25% of the interconnected minimum utility circuit load, without the prior approval of REU's Engineering Department. Using this value streamlines the interconnection application process for initial review.

For larger installations, additional protective devices may be required in addition to the voltage and frequency relays. These additional devices will sense all types of faults on the REU transmission or distribution circuit and may include a transfer trip scheme.

The requirements vary according to the nameplate rating of the generator, unless otherwise indicated. Additional requirements not found in this guideline may be necessary as a result of the findings of the Interconnection Study for a specific project. The Customer’s Generating Facility may be required to hire a qualified electrical consultant to work under REU direction to perform needed design and system studies (short circuit, stability, coordination, etc.), required for the interconnection. The consultant must be a registered electrical engineer in the State of California and must stamp the study/design.

The Customer is responsible for the design, installation, operation and maintenance of all necessary equipment for connection to the REU System, unless otherwise stated in a contractual agreement. It is also the Customer's responsibility to submit specifications and detailed plans for the installation of the control and protective devices to REU for review and obtain written approval prior to parallel operation. However, written approval by REU Electric Utility does not indicate or ensure acceptance by local code authorities. It is the Customer's responsibility to conform to local codes.

In 2009, California Assembly Bill 920 was signed into law amending the California Public Utilities Code to provide a program to encourage private investment in renewable energy resources while reducing interconnection and administrative costs for electric suppliers. This law created a new class of energy suppliers, known as Eligible Customer-Generators. Originally, AB920 specifically targeted wind and solar installations. Subsequently, in 2011, California Senate Bill 489 expanded the qualifying energy sources to include all forms of renewable energy.

An Eligible Customer-Generator is defined as a residential, commercial, industrial, or agricultural customer of an electric utility, who uses a renewable electric generation facility or a combination of those facilities, with a capacity of not more than one megawatt that is located on the customer's owned, leased, or rented premises, and is interconnected and operates in parallel with the electric grid, and is intended primarily to offset part or all of the customer's own electrical requirements.

These series of laws also instituted certain billing periods; billing practices; and, technical and administrative standards. TYPE I DG is for Eligible Customer-Generators and TYPE II DG is for all others. The technical requirements contained herein reflect these classifications.
general, a protection study is not required for these types of generation arrangements if the Applicant
meets the requirements outlined in this section and submits the required reports and drawings for review
and approval.

The customer must notify REU regarding all emergency generator installations, regardless of method of
interconnection or transfer. This is done in the building permit application which is transmitted by the
Development Services Division of the City of Redding.

Complete documentation is required. All documentation must be approved by REU as a pre-condition to
issuance of the building permit. Information should include but not limited to: a description of generator and
control system operation, single line diagrams, identification of all interlocks, sequence of events
description for transfer operation and specifications for any REU required protective devices. Relay test
reports must be reviewed and approved by REU fifteen (15) working days prior to scheduling pre-parallel
inspections.

1. **BREAK-BEFORE-MAKE**

This method can be accomplished via a double throw transfer switch or an interlock scheme that
prevents the two systems from operating in parallel. The transfer switch must be of a design, or have
an interlock, that prevents the transfer switch from closing and connecting the customer's system
with REU unless the emergency generator is already removed from service. The transfer switch
must meet NFPA-70, sections §700; §701; and, §702, as appropriate.

This open transition method does not require any additional protection equipment to grid
Interconnection since parallel operation is prevented; however, it does cause the Customer's load to
experience an outage while transferring back to REU. The length of this transfer depends on the
transfer equipment.

2. **MAKE-BEFORE-BREAK**

This method is used when the Customer wants to minimize any loss of power or disturbance to the
electric load. With this scheme, the Customer's generator and the REU System are in parallel for a
very brief interval during which the Customer's load is being transferred between the REU source
and the emergency generator. Both the transfer from REU to the emergency source and the transfer
back can be accomplished without an outage. All equipment must meet NFPA-70, sections §700;
§701; and, §702, as appropriate.

a. **Transfer Switch**

1. A transfer switch is required and must be rated for the maximum available fault duty in
the event that the transfer switch closes into a fault condition.

2. There must be a control function that will trip the main breaker or generator in the event
of a failure of the transfer switch so that the generator will not remain paralleled to the
REU System.

3. There must be a control function to prevent a parallel condition of the customer
generator and the REU System to exist for greater than 0.5 seconds (30 cycles) on the REU's System at voltage above 12,470V nominal and 1 second (60 cycles) for 12,470V nominal and less.

b. Disconnect Switch
1. The Customer must provide a manual disconnect, located at the point of interconnection, which is used to establish a visually open safety clearance point for personnel working on the REU System.
2. The disconnect must be lockable in either the open or closed position and operated only by REU.
3. The disconnect must be easily accessible, visible, and, preferably located adjacent to the electric meter.
4. The disconnect must have full load break capability.

c. Synchronizing Function
The transfer scheme must have adequate control and protection functions to ensure the REU and customer electric sources are synchronized prior to making the parallel. This is essential to ensure a safe and smooth transition. Synchronization is accomplished through the use of an auto-synchronizer or synchronizing relay. The major requirements that these devices should possess are:
1. Slip frequency matching of 0.1 Hz or less.
2. Voltage matching of ± 10 percent or less.
3. Phase angle acceptance of ± 10 degrees or less.
4. Breaker closure time compensation.

d. Protection
Protective devices must be installed which will prevent the customer's generator from remaining connected in the event of a fault occurring on the REU System during the transition. In most installations, the protection requirement may be satisfied through the installation of the reverse power relay. This relay should be installed on the Customer's side of the service transformer that is connected to the REU System. The relay should trip the Customer's main breaker and must be able to detect transformer core magnetizing power. Reverse power flow is detected before it actually enters the REU System by setting the current level pick up equivalent to 60 percent of the transformer bank magnetizing current. Because this current value will be small, the current transformers associated with the relay must be capable of sensing these small currents.
When transferring the Customer's load back to the REU System, it is possible to have incidental power flow back to REU's system. By properly setting the synchronizing and/or generator control, this reverse flow can be avoided. However, a short time delay may be required on the reverse power relay to prevent it from tripping the generator unnecessarily each time a transfer is attempted. At no time should this time delay exceed one second.

e. Dedicated Transformer

All transfer schemes of this type must have a dedicated transformer. This is necessary to allow the installation of the reverse power relay scheme and will lessen the possibility that any transfer activities will affect other REU customers.

f. Power Control Notification

Customers utilizing this transfer scheme are required to notify the REU Power Control Center at 530-245-7200 after transfer to their emergency generator and then again before any transfer back to REU source.

g. Pre-Parallel Inspection

Prior to operation and as a condition of service, REU requires a pre-parallel inspection to demonstrate that the installation meets the requirements herein. Relay test reports must be reviewed and approved by REU fifteen (15) working days prior to scheduling pre-parallel inspections.

**TYPE I DISTRIBUTED GENERATION**

TYPE I DG technical requirements only apply to an Eligible Customer-Generator as defined in the California Public Utilities Code Sections §2827 to §2827.10. To meet IEEE Std 1547TM, TYPE I DG systems cannot be connected directly to a bulk power transmission systems. REU's 115kV transmission lines are presently considered bulk electric system under FERC Orders. TYPE I DG systems are connected exclusively at the REU primary level (12.470V AC nominal), either directly or indirectly at a lower voltage though a distribution service transformer/connection.

1. **ELIGIBILITY**

To be considered for interconnection as a TYPE I DG, the Customer:

a. Must be either a residential, commercial, industrial, or agricultural customer of REU, who uses a renewable electric generation facility or a combination of those facilities, with a capacity of not more than one megawatt that is located on the Customer's owned, leased, or rented premises, and is interconnected and operates in parallel with the electric grid, and is intended primarily to offset part or all of the Customer's own electrical requirements (California Public Utilities Code Sections §2827, bullet (b)(4)).

b. All Customer Generating Facilities must generate electricity from a renewable source(s) listed in paragraph (1) of subdivision (a) of Section 25741 of the Public Resources Code. Small hydroelectric generation facilities are not considered eligible renewable electrical generation if it will cause an adverse impact on in-stream beneficial uses or cause a change in the volume...
or timing of streamflow [California Public Utilities Code Sections §2827, bullet (b)(11)].

c. All Customer Generating Facilities shall meet all applicable safety and performance standards established by the National Electrical Code, the Institute of Electrical and Electronics Engineers, and accredited testing laboratories, including Underwriters Laboratories Incorporated. A Customer whose renewable electrical generation facility meets those standards and rules shall not be required to install additional controls, perform or pay for additional tests, or purchase additional liability insurance [California Public Utilities Code Sections §2827, bullet (j)]. Presently all wind-powered DG with a nameplate rating over 100kW does not meet the National Electrical Code and is not eligible for a simplified interconnection process and will require an interconnection study.

2. OPERATING REQUIREMENTS AND GENERATING FACILITY DESIGN

There are approximately 2,200 standards listed by the Institute of Electrical and Electronics Engineers as active in either an approved or unapproved draft form. The most germane to the interconnection of Eligible Customer-Generators to the REU Distribution System are the six (6) IEEE standards of the 1547 series.

The IEEE series 1547TM standards are consensus requirements to provide minimum functional requirements for the interconnection of distributed resources (“DR”) at the point of common coupling. IEEE Std 1547TM includes requirements relevant to the operation of the interconnection. It generally defines limitations and set points for various parameters that must be satisfied prior to the connection of a DR unit to the electrical power system, at the instant of connection, and for the separation of such resources from the electrical power system for abnormal conditions. However, not only does the IEEE specifically state that it does not warrant or represent the accuracy or content of the material contained therein, they also state that the standards do not address the local electrical power system technical needs nor load requirements for the facility or premises where the point of DR connection is made.

This section has been adopted to meet two goals: (1) Be consistent with the performance requirements of IEEE Std 1547TM-2003, Standard for Interconnecting Distributed Resources with Electric Power Systems and, (2) establish a streamlined interconnection limits that will have negligible or no impact on REU’s Distribution System. This section lists the requirements to address the local electrical power system technical needs in order to meet the stated goals.

The requirements are designed to protect REU’s Distribution System, not the Generating Facility. The Customer shall be solely responsible for providing adequate protection for the Generating Facility and Interconnection Equipment. The Customer’s Generating Facilities shall not impact the operation of REU’s Distribution System in a manner that would affect REU’s capability of providing reliable service to its Customers.

The Customer is responsible for the costs of REU’s installation of any protective equipment necessary to ensure safe and reliable operation of both REU’s and the Customer’s facilities. The need for protective equipment will vary, depending on the facility’s location within a REU circuit.

3. SIZING

a. To be considered as a TYPE I, Eligible Customer-Generator, the Customer’s
Generating Facility must not exceed the size limitations established in Section Type I Distributed Generation (1)(a).

b. With the addition of the proposed Eligible Customer-Generator, the aggregate generation on the Customer's feeder/circuit shall not exceed 25% of the feeder/circuit minimum load, without the prior approval of REU's Engineering Department.

c. No interconnection is approved if the combined and aggregate generator nameplate rating of all DG is greater or equal to one-third of the feeder/circuit minimum local load (sectionalized load that Eligible Customer-Generator is still connected to after that portion of the Customer's feeder/circuit is de-energized). This condition can be waived by the use of dedicated transfer trip protection. (IEEE Std 1547TM-2003 bullet, 4.4.1, footnote 12, bullets 1 and 4).

4. LOCATION

a. The interconnection must be connected exclusively at the REU primary level (12,470V AC nominal), either directly or indirectly at a lower voltage through a distribution service transformer/connection.

5. SUMMARY OF TECHNICAL REQUIREMENTS.

a. Voltage (IEEE Std 1547TM-2003 bullet, 4.1.1, 4.2.3, 4.3.2):

   1. The operating voltage range for DG devices shall be 88% to 110% of nominal voltage. The DG shall trip for utility service voltages outside of these ranges. The voltage trip setting and maximum clearing times are:

<table>
<thead>
<tr>
<th>Voltage Range (%) of 120V base</th>
<th>Maximum Clearing Times</th>
</tr>
</thead>
<tbody>
<tr>
<td>&lt; 50%</td>
<td>10 cycles</td>
</tr>
<tr>
<td>50% ≤ V &lt; 88%</td>
<td>12 cycles</td>
</tr>
<tr>
<td>88% ≤ V ≤ 110%</td>
<td>Normal Operating Range*</td>
</tr>
<tr>
<td>110% &lt; V &lt; 120%</td>
<td>60 cycles</td>
</tr>
<tr>
<td>V ≥ 120%</td>
<td>10 cycles</td>
</tr>
</tbody>
</table>

   When any voltage is in the given ranges, the DG shall cease to energize REU's Distribution System within the clearing time as indicated. Clearing time is the time between the start of the abnormal condition and the DG de-energizing. Protective monitoring equipment and circuits may remain connected to the Distribution System to allow sensing of electrical conditions for use by the restoration feature. The purpose of clearing times in excess of 10 cycles is to allow the Generating Facility to minimize nuisance tripping during short-term disturbances (low and high voltage ride-through). Set points for voltage ranges and clearing times shall be field adjustable by qualified personnel.
REU may have specific operating voltage ranges for Generating Facilities with gross nameplate ratings greater than 30 kVA. This will require adjustable operating voltage settings. In the absence of such requirements, the Generating Facility shall operate in accordance with the table above. Voltage detection is preferred to be at the PCC, however, the voltage may be detected at the Point of Interconnection, with settings compensated to account for the voltage at the PCC.

**REU Voltage Practices and Design Considerations**

REU has designed and operates the Distribution System to control service voltage from 114-126V at the Customer meter in accordance with ANSI C84.1-2016, Table 1, Range A, Section §5.1.1, 120V nominal voltage. For short time emergencies REU controls service voltage from 110-127V at the Customer meter in accordance with ANSI C84.1-2016, Table 1, Range B, Section §5.1.3, 120V nominal voltage.

The design of Customer equipment should be coordinated with respect to these voltages throughout the range of actual utilization voltages that will be encountered. The difference between minimum service and minimum utilization voltages is intended to allow for voltage drop (3%-6%) in the customer's wiring system. This results in a maximum utilization range of 108-127V.

DG devices shall cease to energize the Distribution System when the voltage goes out of range, as specified in IEEE Std 1547TM-2003 bullet, 4.2.3. This specifies out-of-range voltage set points and clearing times. However, by default, it also specifies the operating voltage range for DG devices as 88% to 110% of nominal voltage.

These set points result in trip settings that are either lower or higher than the ANSI C84.1-2016, Table ranges, respectively. Unfortunately, the introduction of real power and leading (or lagging) reactive flow from the DG with trips points above (or below) the high or low limits of ANSI C84.1-2016 may raise or lower the local system voltage. In accordance with IEEE Std 1547TM-2003 4.1.1, DG devices cannot actively regulate voltage at the PCC, and DG devices cannot cause the Distribution System service voltage to go outside the requirements of ANSI C84.1-2016 Range A. Therefore, if the DG operation causes the local Distribution System to go out-of-range, REU may instruct the Customer to change the operating voltage range for DG device to prevent the DG device from driving the voltage beyond the limits. The set points must be field adjustable.

2. The DG shall not reconnect until the system voltage is restored to, and remain in the range for 300 seconds of, the service voltage levels indicated in ANSI C84.1-2016, Table 1, Range B, Section §5.1.3, 120V nominal voltage.

3. All synchronous generators, 100kW and above, shall be equipped with an AVR.

4. Induction generators, 40kW and above, shall be provide their own power factor correction.
b. **Disconnect Switch (IEEE Std 1547TM-2003 bullet, 4.1.7):**

A manual disconnect switch is required for all Generating Facilities. This disconnect device shall electrically isolate the REU System from the Customer's Generating Facilities. The manufacturer and model number of the disconnect device must be among those approved for use by REU. REU does not accept or approve the pull-out switches commonly used in air-conditioning units and spas.

1. This disconnect device may be located on either side of the main switch and will be used to establish a visually open, working clearance boundary when performing maintenance and repair work (this requirement may be met by opening the enclosure to observe contact separation).

2. The switch be visible and in close proximity (10 feet or less) to the main utility meter panel. The disconnect device must be capable of being reached quickly and conveniently 24 hours a day by REU personnel for construction, operation, maintenance, inspection, testing or reading, without obstacles or requiring those seeking access to obtain keys, special permission, or security clearances.

3. The disconnect switch must be a blade-type switch ("knife switch") and capable of being locked in the open position.

4. The disconnect switch shall include markings or signage that clearly indicates open and closed positions.

5. The Customer is solely responsible for the maintenance of all fuses in fused, blade-type disconnect switches.

c. **Paralleling Device (IEEE Std 1547TM-2003 bullet, 4.1.8.3):**

Circuit breakers or other interrupting equipment located at the PCC must be certified or "Listed" (Article 100, the Definitions Section of the NEC) as suitable for their intended application. This includes being capable of interrupting the maximum available fault current expected at their location. The Customer's Generating and Interconnection Facilities shall be designed so that the failure of any single device or component shall not potentially compromise the safety and reliability of REU's Distribution System. The Generating Facility paralleling-device shall be capable of withstanding 220% of the Interconnection Equipment rated voltage. The Interconnection Facility shall have the capability to withstand voltage and current surges in accordance with the environments defined in IEEE Std C62.41.2TM-2002 or IEEE Std C37.90.1TM-2012 as applicable and as described in this Service Policy for certification and testing (IEEE Std 1547TM, bullet 4.1.8.2).

d. **Flicker (IEEE Std 1547TM-2003 bullet, 4.3.2):**

The Generating Facility shall not create objectionable flicker for other customers on REU's Distribution System. Flicker at the PCC caused by the Generating Facility should not exceed the Border Lines (sic) of Irritation in Section 10.5.1 in IEEE Std 519TM-1992. In no event can the voltage exceed 6V (on 120V base) fluctuation at the Customer's meter (exceptions may be allowed by REU provided the deviation affects only the Eligible Customer Generator).
Generators may be connected and brought up to synchronous speed (as an induction motor) provided these flicker limits are not exceeded.

e. **Integration with Distribution System Grounding (IEEE Std 1547TM-2003 bullet 4.1.2):**
   The grounding scheme of the Generating Facility interconnection shall not cause over voltages that exceed the rating of the equipment connected to REU and shall not disrupt the coordination of the ground fault protection on REU's Distribution System.

f. **Synchronization (IEEE Std 1547TM-2003 bullet 4.1.3):**
   The DG unit shall parallel with the Distribution System without causing a voltage fluctuation at the PCC greater than ±5% of the prevailing voltage level of the Distribution System at the PCC, and meet the flicker requirements of IEEE Std 1547TM-2003, bullet 4.3.2.

The practical limitation is that REU flicker limits will be exceeded if the DG causes a ±5% voltage fluctuation for any prevailing system voltage greater than 120V base. Since the greatest deviation should only be ±0.3V or ±5%, this is allowable if it affects only the Eligible Customer Generator. If the operation of the DG causes the flicker limits to be exceeded at another Customer meter, the Eligible Customer Generator shall be responsible, at their sole expense, for correcting the issue. This may mean adjusting the synchronization settings; re-conductoring; installing a dedicated transformer; decommissioning; or, some other technique or combination of solutions.

IEEE Std 1547TM-2003, bullet 5.1.2 states the test results that are acceptable to indicate compliance with IEEE Std 1547TM-2003, bullet 4.1.3 general use [IEEE Std 1547.2TM-2008] requirements. For interconnection system/specific technologies, the specified ranges may not meet the performance requirements. For REU's Distribution System, the following settings for the synchronizing protective device have been found to usually facilitate a safe and smooth paralleling operation:

1. Slip frequency matching of 0.1 Hz or less.
2. Voltage matching of ±10% or less.
3. A phase-angle acceptance of ±10° or less.

Bullets 1 to 3 must all be in range before a parallel operation is attempted. The Interconnection Equipment must be able to be field adjustable to accommodate these settings.

g. **Frequency (IEEE Std 1547TM-2003 bullet 4.2.4):**
   The interconnected-western electric grid (generally encompassed by WECC, of which REU is a part) controls system frequency and any parallel Generating Facility shall operate in synchronism. The Federal Energy Act of 2005 gave FERC the authority to enforce reliability standards on all interconnected electric utilities, including REU. FERC publishes various mandatory reliability standards through NERC, a subordinate organization.
NERC Standard PRC-006-3, "Automatic Underfrequency Load Shedding." Section B Requirement R8 states: "Each UFLS entity (REU) shall provide data to its Planning Coordinator according to the format and schedule specified by the Planning Coordinator to support maintenance of each planning Coordinator’s UFLS database. Section B Requirement R9 states: "Each UFLS entity shall provide automatic tripping of Load in accordance with teh RFLS program design and schedule for implementation, including any Corrective Action Plan, as determined by its Planning Coordinators in each Planning Coordinators area in which its own assets."

The UFLS program being followed is the WECC Off-Nominal Underfrequency Load Shedding Program as part of MORC. IEEE Std 1547TM-2003, bullet 4.2.4 for DG sizes does not meet the intent of the WECC Off-Nominal Underfrequency Load Shedding Program requirements.

All REU distribution circuits are assigned to protect for off-nominal frequency operation. By default, any generation connected to those circuits must be consistent with the program section §Coordinated Plan, bullet 5A. If an Eligible Customer Generator ceases operations, the PCC is immediately seen as an equal load. This addition of "new" load during an off-nominal event is, in most cases, just the opposite effect that is required. Load reduction as allowed by §Coordinated Plan, bullet 5B is a detrimental effect to other Customers caused by the installation of DG.

IEEE Std 1547TM-2003, bullet 4.2.4, Table 2, gives two different setting types based on generator size. When the system frequency is in a range, the DG shall cease to energize the Distribution System within the clearing time indicated. For DG less than or equal to 30 kW in peak capacity, the frequency set points and clearing times shall be either fixed or field adjustable. For DG greater than 30 kW, the frequency set points shall be field adjustable.

IEEE Std 1547TM-2003, bullet 4.2.4, does require that adjustable underfrequency trip settings shall be coordinated with the Distribution System.

To be consistent between the WECC Off-Nominal Underfrequency Load Shedding Program and IEEE Std 1547TM-2003, bullet 4.2.4, REU requires the following under-frequency trip setting coordination:

1. All Interconnection Equipment shall have adjustable clearing times and both adjustable trip and restore frequency set points.

2. Only solid state and/or microprocessor frequency relays shall be used on generators to provide frequency protection in the range of 57.9-61.0 Hz. Electro-mechanical frequency relays can be used only for settings outside the 57.9-61.0 Hz range.

3. All frequency relays shall use the definite time characteristic and should not be disabled for voltages 80% of nominal or higher but can be disabled for voltages below 80% of nominal.

4. Interconnection Equipment shall accommodate, as a minimum, underfrequency and overfrequency operation for the specified time frames:
DG Size | Frequency Range (Hz) | Minimum Clearing Times
--- | --- | ---
Up to 1000 kW |  |  
> 61.7 | Instantaneous |  
58.0 | Not Enabled |  
(adjustable 59.4-56.5) |  |  
< 56.4 | Instantaneous |  

The off-nominal program is developed using dynamic models employing projected peak loads. Although such models are quite good, the complex dynamics of equipment interactions and the current operating conditions sometimes do not fully describe the system during real event disturbances. The two basic rules of thumb are: generation is the last to trip; and, match load to available generation. The above chart is a reflection of this strategy.

5. The DG shall not reconnect until the system voltage is restored to, and remain in the range for 300 seconds of, the service voltage levels indicated in ANSI C84.1-2016, Table 1, Range B, Section §5.1.3, 120V nominal voltage and frequency range of 59.3 to 60.5Hz.

6. The Interconnection Equipment shall have a continuous operating range of 59.5 to 60.5 Hz without any remedial action.


Each DG unit of 250 kVA or more, or DG aggregate of 250 kVA or greater at a single PCC shall have provisions for monitoring its connection status, real power output, reactive power output, and voltage at the point of DG connection.

The guidelines for monitoring and information exchange shall be determined by REU using, to the extent practical and applicable, IEEE Std 1547.3TM-2007.

**TYPE II DISTRIBUTED GENERATION**

TYPE II Distributed Generation are those systems that do not meet the requirements for TYPE I. The requirements for these Generating Facilities are generally will be more restrictive in terms of economic; environmental; and, regulatory issues rather than for technical reasons.

This type of generation is designed and constructed for the commercial sale of electrical energy either for local or remote Customers. If the Generating Facilities are constructed within REU franchise area, the power must be sold either to REU for sale to local City of Redding Customers or to the wholesale market outside of the City of Redding for remote customers. Since REU plans its resource portfolio many years in advance in order to achieve a fixed lowest available pricing structure, any potential project that contemplates energy sales to REU must consult with REU.

Beside the issues of commonly associated with constructing a new power plant (an adequate site; a reliable fuel [energy] source; permitting, etc.), to sell into the wholesale market for a project sited in the City
of Redding is highly problematic. The potential project will require the acquisition of transmission access to the market; participating with one or more balancing areas; registration and compliance with mandatory national regulatory standards; participation in the WECC planning process, to name a few.

The major technical concern is that the Redding area is surrounded by large generation resources with their associated transmission lines fully allocated. Additionally, power will not readily flow south-to-north without phase-shifting transformation. To accommodate any new generation will require that some other entity will need to reduce their generation output; retire some generation facilities; have significant load growth; require ancillary service; or, some fortuitous combination of these events.

1. **INTERCONNECTION PROCESS**

The Interconnection process begins by contacting the REU Director. REU has no formal interconnection process because of the unique nature of each applicant. To the extent practical and applicable, REU will follow the process issued by FERC for procedures for small (<20MW-SGIP, Small Generator Interconnection Process) or large (>20MW-LGIP, Large Generator Interconnection Process) generation.

This may entail contacting the Western Area Power Administration ("WAPA") and submitting an application for transmission service. The WAPA application generally takes two years to complete the system impact study (part 2 of 8 steps).

The applicant shall be expected to comply with all technical and operating requirements imposed by all authorities having jurisdiction. This will include REU; WECC; NERC, and FERC.

The applicant should plan the technical requirements to include: fully rated, utility-grade equipment; advanced relaying, including pilot wire; continuous two-way monitoring and control; manned operating staff; and, revenue metering equipment.

The applicant shall be responsible for all costs associated with the project.
This section shall be used for interconnection of inverter-based technologies by mutual agreement of Redding Electric Utility and the Applicant.

The inverter requirements are intended to be consistent with ANSI/IEEE 1547-2018 and P1547a Standard for Interconnecting and Interoperability of Distributed Energy Resources with Associated Electric Power Systems (IEEE 1547 including amendment P1547a). In the event of conflict between this Rule and IEEE 1547-2018, this Rule shall take precedence.

- Exceptions are taken to IEEE 1547 Clauses 9.3 Distribution Secondary Spot Networks and Clause 4.11.1, which address Protection from Electromagnetic Interference.
- See IEEE 1547-2018 for requirements not covered in this standard.

Redding Electric utilities IEEE 1547-2018 Annex B - “Guidelines for DER performance category assignment” regarding the assignment of performance categories to Generating Facilities based on attributes such as technology, application, purpose, power generation, variability, and the specified characteristics of the point of common coupling with Redding Electric. Smart Inverters are Category III as a default, but Redding Electric shall designate performance category at time of application review.

1. GENERAL INTERCONNECTION AND PROTECTIVE FUNCTION REQUIREMENTS

The Protective Functions and requirements of this Rule are designed to protect Redding Electric's Distribution and Transmission System and not the Generating Facility. A Producer shall be solely responsible for providing adequate protection for its Generating Facility (GF) and interconnection Facilities. Producer's Protective Functions shall be coordinated with and not impact the operation of other Protective Functions on Redding Electric's Distribution and Transmission System in a manner that would affect Redding Electric's capability of providing reliable service to all of its customers.

A. Protective Functions Required

Smart Inverters operating in parallel with Redding Electric's Distribution or Transmission System shall be equipped with the following Protective Functions to sense abnormal conditions on Redding Electric's Distribution or Transmission System and cause the Smart Inverter to be automatically disconnected from Redding Electric's Distribution or Transmission System or to prevent the Smart Inverter from being connected to Redding Electric's Distribution or Transmission System inappropriately:

(i) Over/under voltage trip functions and over/under frequency trip functions;

(ii) A voltage and frequency sensing and time-delay function to prevent the Smart Inverter from energizing a de-energized Distribution or Transmission System circuit and to prevent the Smart Inverter from reconnecting with Redding Electric's Distribution or Transmission System unless Redding Electric's Distribution System service voltage and frequency is within the ANSI C84.1-2016, Table 1, Range B voltage Range of 110 volts to 127 volts (on a 120 volt basis), inclusive, and a frequency range of 59.5 Hz to 60.1 Hz, inclusive, and are stable for at least 15 seconds; and

(iii) A function to prevent the Smart Inverter from contributing to the formation of an Unintended Island, and cease to energize Redding Electric's Distribution System within two seconds of the formation of an Unintended Island.
The Smart Inverter shall cease to energize Redding Electric’s Distribution System for faults on Redding Electric’s Distribution System circuit to which it is connected (IEEE 1547-6.2.1). The Smart Inverter shall cease to energize Redding Electric’s Distribution circuit prior to re-closure by Redding Electric’s Distribution System equipment (IEEE 1547-6.3).

B. Momentary Paralleling Generating Facilities

With Redding Electric’s approval, the transfer switch or scheme used to transfer Producer’s loads from Redding Electric’s Distribution or Transmission System to Producer’s Generating Facility may be used in lieu of the Protective Functions required for Parallel Operation.

C. Visible Disconnect Required

When required by Redding Electric’s operating practices, Producer shall furnish and install a ganged, manually-operated isolating switch (or a comparable device mutually agreed upon by Redding Electric and Producer) near the Point of Interconnection to Isolate the Smart Inverter from Redding Electric’s Distribution or Transmission System. The device does not have to be rated for load break nor provide over-current protection.

The device must:

(i) Allow visible verification that separation has been accomplished. (This requirement may be met by opening the enclosure to observe contact separation.)

(ii) Include markings or signage that clearly indicates open and closed positions.

(iii) Be capable of being reached:

a) For Emergency purposes quickly and conveniently 24-hours a day by Redding Electric personnel for construction, operation, maintenance, inspection, testing or to Isolate the Smart Inverter from Redding Electric’s Distribution or Transmission System without obstacles or requiring those seeking access to obtain keys, special permission, or security clearances.

b) For Non-Emergency purposes during normal business hours. Redding Electric, where possible, will provide notice to Customer for gaining access to Customer’s premises.

(iv) Be capable of being locked in the open position.

(v) Be clearly marked on the submitted single line diagram and its type and location approved by Redding Electric prior to installation. If the device is not adjacent to the PCC, permanent signage must be installed at a Redding Electric approved location providing a clear description of the location of the device. If the switch is not accessible outside the locked premises, signage with contact information and a Redding Electric approved locking device for the premises shall be installed.

Generating Facilities with Non-Islanding inverters totaling one (1) kilovolt-ampere (kVA) or less are exempt from this requirement.
D. Suitable Equipment Required

(i) Discuss UL 1741 SA stamping on nameplate or listed on Calif web site

Circuit breakers or other interrupting equipment located at the Point of Common Coupling (PCC) must be Certified or "Listed" (as defined in Article 100, the Definitions Section of the National Electrical Code) as suitable for their intended application. This includes being capable of interrupting the maximum available fault current expected at their location. Producer's Smart Inverter and Interconnection Facilities shall be designed so that the failure of any single device or component shall not potentially compromise the safety and reliability of Redding Electric's Distribution and Transmission System. The Smart Inverter paralleling device shall be capable of withstanding 220% of the Interconnection Facility rated voltage (IEEE 1547-4.11.3). The Interconnection Facility shall have the capability to withstand voltage and current surges as described in IEEE 1547-4.11.2.

E. Drawings Required

Prior to Parallel Operation or Momentary Parallel Operation of the Smart Inverter, Redding Electric shall approve Producer's Protective Function and control diagrams. Generating Facilities equipped with Protective Functions and a control scheme previously approved by Redding Electric for system-wide application or only Certified Equipment may satisfy this requirement by reference to previously approved drawings and diagrams.

F. Generating Facility Conditions Not Identified

In the event this Rule does not address the Interconnection conditions for a particular Smart Inverter, Redding Electric and Producer may agree upon other arrangements.

2. PREVENTION OF INTERFERENCE

Producer shall not operate Smart Inverters that superimpose a voltage or current upon Redding Electric's Distribution or Transmission System that interferes with Redding Electric operations, service to Redding Electric Customers, or communication facilities. If such interference occurs, Producer must diligently pursue and take corrective action at its own expense after being given notice and reasonable time to do so by Redding Electric. If Producer does not take corrective action in a timely manner, or continues to operate the facilities causing interference without restriction or limit, Redding Electric may, without liability, disconnect Producer's facilities from Redding Electric's Distribution or Transmission System. To eliminate undesirable interference caused by its operation, each Smart Inverter shall meet the following criteria:

A. Voltage Regulation

If approved by the Redding Electric, the Smart Inverter may actively regulate the voltage at the PCC while in parallel with Redding Electric's Distribution System. The Smart Inverter shall not cause at any time the service voltage at other customers to go outside the requirements of ANSI C84.1-2016, Range A (IEEE 1547-5: +/-5% of nominal).

B. Voltage Trip and Ride-Through Settings

The voltage ranges in Table B.1, B.2, B.3, B.4, B.5 and B.6 define protective trip limits for the
Protective Function and are not intended to define or imply a voltage regulation Function. Generating Facilities shall cease to energize Redding Electric's Distribution System within the prescribed trip time whenever the voltage at the PCC deviates from the allowable voltage operating range. The Protection Function shall detect and respond to voltage on all phases to which the Generating Facility is connected.

(i) Smart Inverters

Smart Inverters shall be capable of operating within the voltage range normally experienced on Redding Electric's Distribution System from plus to minus 5% of the nominal voltage (e.g. 114 volts to 126 volts, on a 120 volt base), at the service panel or PCC. The trip settings at the generator terminals may be selected in a manner that minimizes nuisance tripping in accordance with Applicable Table B.1, B.2, B.3, B.4, B.5 or B.6 to compensate for voltage drop between the generator terminals and the PCC. Voltage may be detected at either the PCC or the Point of Interconnection. However, the voltage range at the PCC, with the generator on-line, shall stay within +/-5% of nominal.

(ii) Voltage Disturbances

Whenever Redding Electric's Distribution System voltage at the PCC varies from and remains outside near Nominal voltage for the predetermined parameters set forth in Applicable Table B.1, B.2, B.3, B.4, B.5 or B.6, the Smart Inverter's Protective Functions shall cause the Smart Inverter(s) to become isolated from Redding Electric's Distribution System:

a) The Smart Inverter shall stay connected to the Redding Electric's Transmission or Distribution System while the grid remains within the "Ride-Through Until" voltage-time range and must stay connected in the corresponding "Operating Mode/Response".

b) Different voltage-time settings could be permitted by the Redding Electric for allowable setting range.

c) See IEEE 1547-2018 Section 6.4 for additional information, exceptions and restoration times.
### Table B.1 - GF response (shall trip) to abnormal voltages for GF of abnormal operating performance Category I

<table>
<thead>
<tr>
<th>Shall Trip Function</th>
<th>Default Settings&lt;sup&gt;a&lt;/sup&gt;</th>
<th>Ranges of Allowable Settings&lt;sup&gt;b&lt;/sup&gt;</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Voltage (p.u. of nominal voltage)</td>
<td>Clearing time (s)</td>
</tr>
<tr>
<td>OV2</td>
<td>1.20</td>
<td>0.16</td>
</tr>
<tr>
<td>OV1</td>
<td>1.10</td>
<td>2.00</td>
</tr>
<tr>
<td>UV1</td>
<td>0.70</td>
<td>2.00</td>
</tr>
<tr>
<td>UV2</td>
<td>0.45</td>
<td>0.16</td>
</tr>
</tbody>
</table>

### Table B.2 - GF response (shall trip) to abnormal voltages for GF of abnormal operating performance Category II

<table>
<thead>
<tr>
<th>Shall Trip Function</th>
<th>Default Settings&lt;sup&gt;a&lt;/sup&gt;</th>
<th>Ranges of Allowable Settings&lt;sup&gt;b&lt;/sup&gt;</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Voltage (p.u. of nominal voltage)</td>
<td>Clearing time (s)</td>
</tr>
<tr>
<td>OV2</td>
<td>1.20</td>
<td>0.16</td>
</tr>
<tr>
<td>OV1</td>
<td>1.10</td>
<td>2.00</td>
</tr>
<tr>
<td>UV1</td>
<td>0.70</td>
<td>10.0</td>
</tr>
<tr>
<td>UV2</td>
<td>0.45</td>
<td>0.16</td>
</tr>
</tbody>
</table>

### Table B.3 - GF response (shall trip) to abnormal voltages for GF of abnormal operating performance Category III

<table>
<thead>
<tr>
<th>Shall Trip Function</th>
<th>Default Settings&lt;sup&gt;a&lt;/sup&gt;</th>
<th>Ranges of Allowable Settings&lt;sup&gt;b&lt;/sup&gt;</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Voltage (p.u. of nominal voltage)</td>
<td>Clearing time (s)</td>
</tr>
<tr>
<td>OV2</td>
<td>1.20</td>
<td>0.16</td>
</tr>
<tr>
<td>OV1</td>
<td>1.10</td>
<td>13.0</td>
</tr>
<tr>
<td>UV1</td>
<td>0.88</td>
<td>21.0</td>
</tr>
<tr>
<td>UV2</td>
<td>0.50</td>
<td>2.0</td>
</tr>
</tbody>
</table>

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NEW DRAWING
SMART INVERTER INTERCONNECTION

Redding Electric Utility
DES/REV DATE ASST. DIRECTOR - UTILITY OPERATIONS REVISIONS DWG. NO.
CBG 01/15/20
aRedding Electric may specify other voltage and clearing time trip settings within the range of allowable settings, e.g., to consider Redding Electric protection coordination.

bNominal system voltages stated in ANSI C84.1, Table 1 or as otherwise defined by Redding Electric. The ranges of allowable settings do not mandate a requirement for the GF to ride through this magnitude and duration of abnormal voltage condition. Redding Electric may specify the voltage thresholds and maximum clearing times within the ranges of allowable settings; settings outside of these ranges shall only be allowable as necessary for GF equipment protection and shall not conflict with the voltage disturbance ride through requirements specified in IEEE 1547-2018 Section 6.4.2. For the overvoltage (OV) and undervoltage (UV) trip functions clearing time ranges and for the OV trip functions voltage ranges, the lower value is a limiting requirement (the setting shall not be set to lower values) and the upper value is a minimum requirement (the setting may be set above this value). For the UV trip functions voltage ranges, the upper value is a limiting requirement (the setting shall not be set to greater values) and the lower value is a minimum requirement (the setting may be set to lower values).

Table B.4 - Voltage ride-through requirements for GF for abnormal operating performance Category I

<table>
<thead>
<tr>
<th>Voltage Range (p.u.)</th>
<th>Operating mode/response</th>
<th>Minimum ride-through time (s) (design criteria)</th>
<th>Maximum response time (s) (design criteria)</th>
</tr>
</thead>
<tbody>
<tr>
<td>V &gt; 1.20</td>
<td>Cease to Energize</td>
<td>N/A</td>
<td>0.16</td>
</tr>
<tr>
<td>1.175 &lt; V ≤ 1.20</td>
<td>Permissive Operation</td>
<td>0.2</td>
<td>N/A</td>
</tr>
<tr>
<td>1.15 &lt; V ≤ 1.175</td>
<td>Permissive Operation</td>
<td>0.5</td>
<td>N/A</td>
</tr>
<tr>
<td>1.10 &lt; V ≤ 1.15</td>
<td>Permissive Operation</td>
<td>1</td>
<td>N/A</td>
</tr>
<tr>
<td>0.88 ≤ V ≤ 1.10</td>
<td>Continuous Operation</td>
<td>Infinite</td>
<td>N/A</td>
</tr>
<tr>
<td>0.70 ≤ V ≤ 0.88</td>
<td>Mandatory Operation</td>
<td>Linear slope of 4 s/p.u. voltage starting at 0.7 s @ 0.7 p.u.: $T_{VRT} = 0.7 \text{ s} + \frac{4\text{ s}}{1 \text{ p.u.}} (V-0.7 \text{ p.u.})$</td>
<td>N/A</td>
</tr>
<tr>
<td>0.50 ≤ V &lt; 0.70</td>
<td>Permissive Operation</td>
<td>0.16</td>
<td>N/A</td>
</tr>
<tr>
<td>V &lt; 0.50</td>
<td>Cease to Energize</td>
<td>N/A</td>
<td>0.16</td>
</tr>
</tbody>
</table>
### Table B.5 - Voltage ride-through requirements for GF for abnormal operating performance Category II

<table>
<thead>
<tr>
<th>Voltage Range (p.u.)</th>
<th>Operating mode/response</th>
<th>Minimum ride-through time (s) (design criteria)</th>
<th>Maximum response time (s) (design criteria)</th>
</tr>
</thead>
<tbody>
<tr>
<td>V &gt; 1.20</td>
<td>Cease to Energize(a)</td>
<td>N/A</td>
<td>0.16</td>
</tr>
<tr>
<td>1.175 &lt; V ≤ 1.20</td>
<td>Permissive Operation</td>
<td>0.2</td>
<td>N/A</td>
</tr>
<tr>
<td>1.15 &lt; V ≤ 1.175</td>
<td>Permissive Operation</td>
<td>0.5</td>
<td>N/A</td>
</tr>
<tr>
<td>1.10 &lt; V ≤ 1.15</td>
<td>Permissive Operation</td>
<td>1</td>
<td>N/A</td>
</tr>
<tr>
<td>0.88 ≤ V ≤ 1.10</td>
<td>Continuous Operation</td>
<td>Infinite</td>
<td>N/A</td>
</tr>
<tr>
<td>0.65 ≤ V ≤ 0.88</td>
<td>Mandatory Operation</td>
<td>Linear slope of 8.7 s/1 p.u. voltage starting at 3 s @ 0.65 p.u.: (T_{VRT} = 3 \text{s} + \frac{8.7 \text{s}}{1 \text{p.u.}} (V - 0.65 \text{p.u.}))</td>
<td>N/A</td>
</tr>
<tr>
<td>0.45 ≤ V &lt; 0.65</td>
<td>Permissive Operation</td>
<td>0.32</td>
<td>N/A</td>
</tr>
<tr>
<td>0.30 ≤ V &lt; 0.45</td>
<td>Permissive Operation</td>
<td>0.16</td>
<td>N/A</td>
</tr>
<tr>
<td>V &lt; 0.30</td>
<td>Cease to Energize(a)</td>
<td>N/A</td>
<td>0.16</td>
</tr>
</tbody>
</table>

### Table B.6 - Voltage ride-through requirements for GF for abnormal operating performance Category III

<table>
<thead>
<tr>
<th>Voltage Range (p.u.)</th>
<th>Operating mode/response</th>
<th>Minimum ride-through time (s) (design criteria)</th>
<th>Maximum response time (s) (design criteria)</th>
</tr>
</thead>
<tbody>
<tr>
<td>V &gt; 1.20</td>
<td>Cease to Energize(a)</td>
<td>N/A</td>
<td>0.16</td>
</tr>
<tr>
<td>1.10 &lt; V ≤ 1.20</td>
<td>Momentary Cessation(b)</td>
<td>12</td>
<td>0.083</td>
</tr>
<tr>
<td>0.88 ≤ V ≤ 1.10</td>
<td>Continuous Operation</td>
<td>Infinite</td>
<td>N/A</td>
</tr>
<tr>
<td>0.70 &lt; V &lt; 0.88</td>
<td>Mandatory Operation</td>
<td>20</td>
<td>N/A</td>
</tr>
<tr>
<td>0.50° ≤ V &lt; 0.70</td>
<td>Mandatory Operation</td>
<td>10</td>
<td>N/A</td>
</tr>
<tr>
<td>V &lt; 0.50°</td>
<td>Momentary Cessation(b)</td>
<td>1</td>
<td>0.083</td>
</tr>
</tbody>
</table>
aCessation of current exchange of GF with Redding Electric in not more than the maximum specified time and with no intentional delay. This does not necessarily imply disconnection, isolation, or trip of the GF. This may include momentary cessation or trip.

bTemporarily cease to energize a Distribution or Transmission System, while connected to Redding Electric Distribution or Transmission System, in response to a disturbance of the applicable voltages or the system frequency, with the capability of immediate restore output of operation when the applicable voltages and the system frequency return to within defined ranges.

cThe voltage threshold between mandatory operation and momentary operation may be changed by mutual agreement between Redding Electric and GF operator, for example to allow the GF to provide Dynamic Voltage Support below 0.5 p.u.

C. Paralleling

The Generating Facility shall parallel with Redding Electric’s Distribution or Transmission System without causing a voltage fluctuation at the PCC greater than plus/minus 3% of nominal at medium voltage or 5% of nominal at low voltage of the prevailing voltage level of Redding Electric’s Distribution or Transmission System at the PCC, and meet the flicker requirements of Section: Flicker, below, Certification and Testing Criteria, provides technology-specific tests for evaluating the paralleling Function. (IEEE 1547-4.10.4)

D. Flicker

The GF contribution to the flicker, measured at the PCC, shall not exceed the greater of the limits listed in Table D.1 and the individual emission limits defined by IEC/TR 61000-3-7. Any exception to the limits shall be approved by Redding Electric with consideration of other sources of flicker within the Redding Electric Distribution and Transmission system.

To minimize the adverse voltage effects experienced by other customers (IEEE 1547-4.3.2), flicker at the PCC caused by the Generating Facility should not exceed the limits defined by the “Maximum Borderline of irritation Curve” identified in IEEE 519-2014 (IEEE Recommended Practices and Requirements for Harmonic Control in Electric Power Systems, IEEE STD 519-2014). This requirement is necessary to minimize the adverse voltage affects experienced by other Customers on Redding Electric’s Distribution or Transmission System. Generators may be connected and brought up to synchronous speed (as an induction motor) provided these flicker limits are not exceeded.
Table D.1 - Minimum Individual DER flicker emission limits

<table>
<thead>
<tr>
<th>$E_{P_{st}}$</th>
<th>$E_{P_{lt}}$</th>
</tr>
</thead>
<tbody>
<tr>
<td>0.35</td>
<td>0.25</td>
</tr>
</tbody>
</table>

*95% probability value should not exceed the emission limit based on a one week measurement period.

Assessment and measurement methods for flicker are defined in IEEE Std 1453 and IEC/TR 61000-3-7. In addition, the following shall apply:

- Equipment other than a GF shall be allowed to mitigate the flicker induced by a GF.
- $E_{P_{st}}$ is the emission limit for the short-term flicker severity, $P_{st}$
  - If not specified differently, the $P_{st}$ evaluation time is 600 s.
- $E_{P_{lt}}$ is the emission limit for long-term flicker severity, $P_{lt}$
  - If not specified differently, the $P_{lt}$ evaluation time is 2 h.
- $P_{lt}$ can be calculated by using Equation (1).

$$P_{lt} = 3 \sqrt{\frac{1}{12} \sum_{i} P_{st}^3}$$

where $(i = 1, 2, 3, ...) $ are consecutive readings of the short-term severity $P_{st}$

E. Integration with Redding Electric's Distribution System Grounding

The grounding scheme of the Generating Facility shall not cause over-voltages that exceed the rating of the equipment connected to Redding Electric's Distribution System and shall not disrupt the coordination of the ground fault protection on Redding Electric's Distribution System (IEEE 1547-4.12)

F. Frequency

Redding Electric controls system frequency, and the Generating Facility shall operate in synchronism with Redding Electric's Distribution or Transmission System. Whenever Redding Electric's Distribution or Transmission System frequency at the PCC varies from and remains outside normal (nominally 60 Hz) by the predetermined amounts set forth in Table F.1, the Generating Facility's Protective Functions shall cease to energize Redding Electric's Distribution or Transmission System within the stated maximum trip time.

(i) Frequency Ride-Through Requirements

Smart Inverter based systems shall remain connected to the Redding Electric's Distribution or Transmission System while the grid is within the frequency-time range indicated in Table F.2, and shall disconnect from the electric grid during a high or low frequency event that is outside that frequency-time range.
The frequency values are shown in Table F.1 and F.2. These values provide default interconnection system response to abnormal frequencies. The inverter shall disconnect by the default clearing times. Islands and microgrids may need different default frequency settings.

Table F.1 - GF response (shall trip) to abnormal frequencies for GF of abnormal operating performance Category I, Category II, and Category III

<table>
<thead>
<tr>
<th>Shall Trip Function</th>
<th>Default Settings(^a)</th>
<th>Ranges of Allowable Settings(^b)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Frequency (Hz)</td>
<td>Clearing time (s)</td>
</tr>
<tr>
<td>OF2</td>
<td>62.0</td>
<td>0.16</td>
</tr>
<tr>
<td>OF1</td>
<td>61.2</td>
<td>300.0</td>
</tr>
<tr>
<td>UF1</td>
<td>58.5</td>
<td>300.0c</td>
</tr>
<tr>
<td>UF2</td>
<td>56.5</td>
<td>0.16</td>
</tr>
</tbody>
</table>

\(^a\)The frequency and clearing time set points shall be field adjustable. The actual applied underfrequency (UF) and overfrequency (OF) trip settings shall be specified by Redding Electric in coordination with the requirements of the regional reliability coordinator. If Redding Electric does not specify any settings, the default settings shall be used.

\(^b\)The ranges of allowable settings do not mandate a requirement for the GF to ride through this magnitude and duration of abnormal frequency condition. Redding Electric may specify the frequency thresholds and maximum clearing times within the ranges of allowable settings; settings outside of these ranges shall only be allowable as necessary for GF equipment protection and shall not conflict with the frequency disturbance ride through requirements specified in IEEE 1547-2018 Section 6.5.2. For the overfrequency (OF) and underfrequency (UF) trip functions clearing time ranges and for the OF trip functions frequency ranges, the lower value is a limiting requirement (the setting shall not be set to lower values) and the upper value is a minimum requirement (the setting may be set above this value). For the UF trip functions frequency ranges, the upper value is a limiting requirement (the setting shall not be set to greater values) and the lower value is a minimum requirement (the setting may be set to lower values).

\(^c\)This time shall be chosen to coordinate with typical regional underfrequency load shedding programs and expected frequency restoration time.
Table F.2 - Frequency ride-through requirements for GF for abnormal operating performance Category I, Category II, and Category III

<table>
<thead>
<tr>
<th>Frequency Range (Hz)</th>
<th>Operating Mode</th>
<th>Minimum Time (s) (design criteria)</th>
</tr>
</thead>
<tbody>
<tr>
<td>( f &gt; 62.0 )</td>
<td>No ride-through requirements apply to this range</td>
<td></td>
</tr>
<tr>
<td>( 61.2 &lt; f \leq 61.8 )</td>
<td>Mandatory Operation(^a)</td>
<td>299</td>
</tr>
<tr>
<td>( 58.8 &lt; f \leq 61.2 )</td>
<td>Continuous Operation(^ab)</td>
<td>Infinite(^c)</td>
</tr>
<tr>
<td>( 57.0 &lt; f \leq 58.8 )</td>
<td>Mandatory Operation(^b)</td>
<td>299</td>
</tr>
<tr>
<td>( f &lt; 57.0 )</td>
<td>No ride-through requirements apply to this range</td>
<td></td>
</tr>
</tbody>
</table>

\(^a\) Any GF shall provide the frequency-droop (frequency-power) operation for high-frequency conditions specified in IEEE 1547-2018 Section 6.5.2.7.

\(^b\) GF of Category I may provide the frequency-droop (frequency-power) operation for low-frequency conditions specified in IEEE 1547-2018 Section 6.5.2.7. GF of Category II or Category III shall provide the frequency-droop (frequency-power) operation for low-frequency conditions specified in IEEE 1547-2018 Section 6.5.2.7.

\(^c\) For a per-unit ratio of Voltage/frequency limit of \( V/f \leq 1.1 \).

G. Harmonics

When the Smart Inverter is serving balanced linear loads, harmonic current injection into Redding Electric's Distribution or Transmission System at the PCC shall not exceed the limits stated in Table G.1 and G.2. The harmonic current injections shall be exclusive of any harmonic currents due to harmonic voltage distortion present in Redding Electric's Distribution or Transmission System without the Smart Inverter connected (IEEE 1547-7.3). The harmonic distortion of a Smart Inverter shall be evaluated using the same criteria as for the Host Loads.

Upon mutual agreement between Redding Electric and the GF operator the GF may inject current distortion in excess of these tables, such as when it is used as an active filtering device.
Table G.1 - Maximum odd harmonic current distortion in percent of rated current \((\text{TRD}^a)\)

<table>
<thead>
<tr>
<th>Individual odd harmonic order (h)</th>
<th>(h = 11)</th>
<th>(11 \leq h &lt; 17)</th>
<th>(17 \leq h &lt; 23)</th>
<th>(23 \leq h &lt; 35)</th>
<th>(35 \leq h &lt; 50)</th>
<th>Total rated current distortion (TRD)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Percent (%)</td>
<td>4.0</td>
<td>2.0</td>
<td>1.5</td>
<td>0.6</td>
<td>0.3</td>
<td>5.0</td>
</tr>
</tbody>
</table>

Table G.2 - Maximum even harmonic current distortion in percent of rated current \((\text{TRD}^a)\)

<table>
<thead>
<tr>
<th>Individual odd harmonic order (h)</th>
<th>(h = 2)</th>
<th>(h = 4)</th>
<th>(h = 6)</th>
<th>(8 \leq h &lt; 50)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Percent (%)</td>
<td>1.0</td>
<td>2.0</td>
<td>3.0</td>
<td>Associated range specified in Table G.1</td>
</tr>
</tbody>
</table>

\(^a\)(\text{TRD}) = \text{the GF unit rated current capacity (transformed to the RPA when a transformer exists between the GF unit and the RPA).}

H. **Direct Current Injection**

Smart Inverter should not inject direct current greater than 0.5% of rated output current into Redding Electric's Distribution or Transmission System. (IEEE 1547-7.1)

Producer shall provide adequate reactive power compensation on site to maintain the Smart Inverter power factor near unity at rated output or a Redding Electric specified power factor in accordance with the following requirements:

I. **Power Factor**

(i) Default Power Factor setting: 1.0 +/- 0.01 (0.99 Lagging to 0.99 Leading).

(ii) Aggregate generating facility is greater than 15 kW: 1.0 +/- 0.15 (0.85 Lagging to 0.85 Leading) down to 20% rated power based on available reactive power.

(iii) Aggregate generating facility is less than or equal to 15 kW: 1.0 +/- 0.10 (0.90 Lagging to 0.90 Leading) down to 20% rated power based on available reactive power.
J. Dynamic Volt/VAR Operations

The Smart Inverter shall be capable of operating dynamically within a power factor range of +/- 0.85 PF for larger (> 15 kW) systems, down to 20% of rated power, and +/- 0.9 PF for smaller systems (≤ 15 kW), down to 20% of rated power, based on available reactive power. This dynamic Volt/VAR capability shall be able to be activated or deactivated in accordance with Redding Electric requirements.

The Redding Electric may permit or require the Smart Inverter systems to operate in larger power factor ranges, including in 4-quadrant operations for storage systems with the implementation of additional anti-islanding protection as determined by Redding Electric. The Smart Inverter shall be capable of providing dynamic reactive power compensation (dynamic Volt/VAR operation) within the following constraints:

The Smart Inverter shall not cause the line voltage at the point of common coupling to go outside the requirements of the latest version of ANSI C84.1, Range A, +/- 5% of nominal.

The Smart Inverter shall be able to consume reactive power in response to an increase in line voltage, and produce reactive power in response to a decrease in line voltage.

The reactive power provided shall be based on available reactive power, but the maximum reactive power provided to the system shall be as directed by Redding Electric.
K. Ramp Rate Requirements

The Smart Inverter is required to have the following ramp controls for at least the following two conditions. These functions can be established by multiple control functions or by one general ramp rate control function. Ramp rates are contingent upon sufficient energy available from the Smart Inverter.

Normal ramp-up rate: For transitions between energy output levels over the normal course of operation. The default value is 100% of maximum current output per second with a range of adjustment between 1% to 100%, with specific settings as mutually agreed by the Distributor Provider and the Producer.
Connect/Reconnect Ramp-up rate: Upon starting to inject power into the grid, following a period of inactivity or a disconnection, the inverter shall be able to control its rate of increase of power from 1 to 100% maximum current per second, with specific settings as mutually agreed upon by the Redding Electric and the Producer. Default set at 2% of maximum current output per second.

L. Default Activation States for Phase 1 Functions

Unless otherwise provided by Redding Electric, pursuant to Redding Electric's Distribution Generation Interconnection handbook Rule21, the default settings will be as follows:

- Anti-islanding – activated
- Low/High Voltage Ride-Through – activated
- Low/High Frequency Ride-Through – activated
- Dynamic Volt/VAR operations – <15KW= deactivated, >15KW= activated
- Ramp rates – activated
- Fixed power factor – >15KW= deactivated, <15KW= activated
- Reconnect by "soft-start" methods – activated
- These default activation states may be modified by mutual agreement between Redding Electric and Producer.

M. Automatic Transfer (Load Shedding or Transfer)

The voltage and frequency ride-through requirements of A.2.b.(ii) and A.2.f.(i) shall not apply if either: a) The real power across the Point of Common Coupling is continuously maintained at a value less than 10% of the aggregate rating of the Smart Inverters connected to the Generation Facility prior to any voltage disturbance, and the Generation Facility disconnects from the Redding Electric's T&D system, along with Generation Facility load, such that the net change in real power flow from or to the Redding Electric is less than 10% of the aggregate Smart Inverter capacity; or b) Generation Facility load real power demand equal to 90% to 120% of the pre-disturbance aggregate Smart Inverter real power output is shed within 0.1 seconds of Smart Inverter disconnection.

N. The GF shall specify its abnormal operating performance category within the nameplate information.
3. TECHNOLOGY SPECIFIC REQUIREMENTS

Grid-interactive inverters certified to UL-1741 SA do not require separate synchronizing equipment. Non grid-interactive or "stand-alone" inverters shall not be used for Parallel Operation with Redding Electric's Distribution or Transmission System.

4. SUPPLEMENTAL SMART INVERTER REQUIREMENTS

A. Fault Detection

A Smart Inverter with an SCCR exceeding 0.1 or one that does not cease to energize Redding Electric's Distribution or Transmission System within two seconds of the formation of an Unintended Island shall be equipped with supplemental Protective Functions designed to detect Distribution or Transmission System faults, both line-to-line and line-to-ground, and cease to energize Redding Electric's Distribution or Transmission System within two seconds of the initiation of a fault.

B. Transfer Trip

For a Generating Facility, larger than 50 KW or as determined by Redding Electric, that cannot detect Distribution or Transmission System faults (both line-to-line and line-to-ground) or the formation of an Unintended Island, and cease to energize Redding Electric's Distribution or Transmission System within two seconds, Redding Electric may require a Transfer Trip system or an equivalent Protective Function.

For generation installed after Sept 30, 2017 the cost for Transfer Trip interfaces will be the responsibility of the producer.

C. Reclose Blocking

Where the aggregate Generating Facility capacity exceeds 15% of the peak load on any Redding Electric automatic reclosing device, Redding Electric may require additional Protective Functions, including, but not limited to reclose blocking on some of the automatic reclosing devices.

5. CURTAILMENT AND DISCONNECTION

Redding Electric may limit the operation or disconnect or require the disconnection of a Producer's Generating Facility from Redding Electric's Distribution at any time, with or without notice, in the event of an Emergency, or to correct Unsafe Operating Conditions. Redding Electric may also limit the operation or disconnect or require the disconnection of a Producer's Generating Facility from Redding Electric's Distribution or System upon the provision of reasonable written notice:
A. To allow for routine maintenance, repairs or modifications to Distribution Provider's Distribution or Transmission System;

B. Upon Distribution Provider's determination that a Producer's Generating Facility is not in compliance with this Rule; or

C. Upon termination of the Generator Interconnection Agreement. Upon Producer's written request, Distribution Provider shall provide a written explanation of the reason for such curtailment or disconnection.
<table>
<thead>
<tr>
<th>PRIME MOVER SOURCE</th>
<th>AVAILABILITY FACTOR</th>
</tr>
</thead>
<tbody>
<tr>
<td>Solar(^1) - Fixed Tilt</td>
<td>0.20</td>
</tr>
<tr>
<td>Solar(^1) - 1-Axis Tracking</td>
<td>0.26</td>
</tr>
<tr>
<td>Solar(^1) - 2-Axis Tracking</td>
<td>0.28</td>
</tr>
<tr>
<td>Natural Gas</td>
<td>0.98</td>
</tr>
<tr>
<td>Wind</td>
<td>0.35</td>
</tr>
<tr>
<td>Geothermal(^2)</td>
<td>0.98</td>
</tr>
<tr>
<td>Digester/Landfill Gas</td>
<td>0.98</td>
</tr>
<tr>
<td>Fuel Cells</td>
<td>0.98</td>
</tr>
</tbody>
</table>

(1) = Solar panel DC rating. Availability Factor based on real-time monitoring of all solar Performance Based Incentive customers within the REU Service Territory. 25-year aggregate data period.

(2) = No known sources in Redding.

Example calculation for a fixed-tilt, solar DG installation:

\[
\text{Customer's Annual Energy Usage in kWh} = \frac{\text{Max. DC Rating Size of Type I System in kW}}{0.20 \times 24 \times 365}
\]
FASTENER
1/4" WASHER HEAD LAG SCREW
BACKUP PLATE
PVC MOULDING

TOP VIEW

CONDUCTORS
BACKUP PLATE
PVC U-SHAPED MOULDING WITH FLANGE, 10' LENGTH.

DUCT TO RISER FITTING

STRAP CONDUIT TO POLE
FINAL GRADE 2" MAX

FURNISHED AND INSTALLED BY REU

FURNISHED AND INSTALLED BY CONTRACTOR

SCHEDULE 80 RISER BEND SERVICE, 24°R (2°C)
36°R (4°C)
SECONDARY, 36°R (4°C)
PRIMARY, 36°R (4°C)
48°R (6°C)

ELEVATION VIEW

STANDARD DUTY SCH. 40 PVC
(Use 8' Above Ground)

<table>
<thead>
<tr>
<th>STOCK CODE</th>
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<td>59011N</td>
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<tr>
<td>E381.93</td>
<td>59213N</td>
<td>3&quot;</td>
</tr>
<tr>
<td>E381.94</td>
<td>59215N*</td>
<td>4&quot;</td>
</tr>
<tr>
<td>E381.96</td>
<td>59216N*</td>
<td>5&quot;</td>
</tr>
</tbody>
</table>

HEAVY DUTY SCH. 80 PVC
(Use Below 8' on Pole)

<table>
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<tr>
<th>STOCK CODE</th>
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<th>SIZE</th>
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<td>E381.12</td>
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<tr>
<td>E381.14</td>
<td>59413N</td>
<td>3&quot;</td>
</tr>
</tbody>
</table>

BACKUP PLATE
(Use First Section on Pole)

<table>
<thead>
<tr>
<th>STOCK CODE</th>
<th>CARLON NO.</th>
<th>SIZE</th>
</tr>
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<tbody>
<tr>
<td>E381.99</td>
<td>59111</td>
<td>2&quot;</td>
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<tr>
<td>E381.95</td>
<td>59113</td>
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<td>E381.97</td>
<td>59115</td>
<td>4&quot;</td>
</tr>
<tr>
<td>E381.98</td>
<td>59116</td>
<td>5&quot;</td>
</tr>
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</table>

DUCT TO RISER FITTING/ADAPTER

<table>
<thead>
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<th>CARLON NO.</th>
<th>SIZE</th>
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<tr>
<td>___</td>
<td>E939JL</td>
<td>3x2</td>
</tr>
<tr>
<td>___</td>
<td>E939NLX</td>
<td>4x3</td>
</tr>
<tr>
<td>___</td>
<td>E939PN</td>
<td>5x4</td>
</tr>
<tr>
<td>E380.02</td>
<td>E939RP</td>
<td>6x5</td>
</tr>
<tr>
<td>E380.03</td>
<td>E939N (4x3)</td>
<td>4x4</td>
</tr>
</tbody>
</table>

STRAP SUPPLIERS

<table>
<thead>
<tr>
<th>STOCK CODE</th>
<th>KINLINE NO.</th>
<th>SIZE</th>
</tr>
</thead>
<tbody>
<tr>
<td>___</td>
<td>477-2</td>
<td>2&quot;</td>
</tr>
<tr>
<td>___</td>
<td>477-4</td>
<td>4&quot;</td>
</tr>
<tr>
<td>___</td>
<td>477-6</td>
<td>6&quot;</td>
</tr>
</tbody>
</table>

* NOTE: ADEQUATE STRENGTH FOR USE BELOW 8' ON POLE

POLE RISER DETAIL

REDRAWN

ELECTRIC CONSTRUCTION STANDARD

DESV: REV: DATE: ASSISTANT DIRECTOR - DISTRIBUTION: REVISED: DWG. NO:
/RLH 02/01/85 05/22/12 CS1210
CONCRETE GRAVITY WALL - (CGW)
FOR USE IN LANDSCAPED AREAS ONLY. SEE SHEET 3 FOR DETAILED REQUIREMENTS AND NOTES.

SEGMENTAL RETAINING WALL - (SRW)
FOR USE IN LANDSCAPED OR NATIVE SITE MATERIAL AREAS. SEE SHEETS 6 AND 7 FOR GENERAL DESCRIPTION, REQUIREMENTS AND NOTES.

CONCRETE MASONRY RETAINING WALL - (CMW)
FOR USE WHERE SURROUNDED BY NATIVE SITE MATERIAL. SEE SHEETS 4 AND 5 FOR DETAILED REQUIREMENTS AND NOTES.

NOTES:
1. The walls depicted by this standard are to be used for Redding Electric Utility (REU) facilities only! These walls may only be used in areas which will have no temporary or permanent surcharge loads within 5' of the wall resulting from vehicles, equipment or structures. There must also be no geological or water/drainage condition which would present a hazard to the wall or its backfill.
2. Should any permanent safety barrier, i.e. railing, fence, etc., be necessary for protection of the public, such barriers shall be the responsibility of the developer.
CLEARANCE REQUIREMENTS

EARTIl RETAINING WALL.

ELECTRICAL EQUIPMENT, PAD, BOX OR VAULT. SEE KEY FOR CLEARANCE DIMENSIONS.

X

W

Y

Z

SIDEWALK

CURB/GUTTER

STREET

PLAN VIEW

TYPICAL RETAINING WALL STRUCTURE

CLEARANCE DIMENSIONS

<table>
<thead>
<tr>
<th>ELECTRICAL FEATURE</th>
<th>SEE REU STANDARD</th>
<th>W APPROX.</th>
<th>X MIN.</th>
<th>Y MIN.</th>
<th>Z MIN.</th>
</tr>
</thead>
<tbody>
<tr>
<td>100 PAD MOUNTED TRANSFORMER</td>
<td>CS330</td>
<td>4'-0&quot;</td>
<td>5'</td>
<td>3'</td>
<td>14'-0&quot;</td>
</tr>
<tr>
<td>300 PAD MOUNTED TRANSFORMER</td>
<td>CS331</td>
<td>6'-4&quot;</td>
<td>5'</td>
<td>3'</td>
<td>16'-4&quot;</td>
</tr>
<tr>
<td>600A-200A PAD MOUNTED SWITCH, PME-5</td>
<td>CS430</td>
<td>6'-0&quot;</td>
<td>8'</td>
<td>3'</td>
<td>22'-0&quot;</td>
</tr>
<tr>
<td>600A-200A VAULT MOUNTED SWITCH, PME-9 and PME-11</td>
<td>CS431</td>
<td>5'-7&quot;</td>
<td>8'</td>
<td>3'</td>
<td>21'-7&quot;</td>
</tr>
<tr>
<td>PAD MOUNTED CAPACITOR BANK</td>
<td>CS500</td>
<td>6'-4&quot;</td>
<td>3'</td>
<td>8'</td>
<td>12'-4&quot;</td>
</tr>
<tr>
<td>3'x5' PRIMARY SPLICE BOX</td>
<td>CS1116</td>
<td>6'-0&quot;</td>
<td>3'</td>
<td>3'</td>
<td>12'-0&quot;</td>
</tr>
<tr>
<td>4'x6'-6&quot; ELECTRICAL VAULT</td>
<td>CS1118</td>
<td>7'-6&quot;</td>
<td>3'</td>
<td>3'</td>
<td>13'-6&quot;</td>
</tr>
<tr>
<td>4'x8'-6&quot; ELECTRICAL VAULT</td>
<td>CS1121</td>
<td>9'-6&quot;</td>
<td>3'</td>
<td>3'</td>
<td>15'-6&quot;</td>
</tr>
<tr>
<td>6'x12' ELECTRICAL VAULT</td>
<td>CS1122</td>
<td>13'-0&quot;</td>
<td>3'</td>
<td>3'</td>
<td>19'-0&quot;</td>
</tr>
</tbody>
</table>

NOTES:

1. Obtain approval from a REU Distribution Planner prior to any retaining structure work, for wall type, location, operation or special clearance requirement.
2. Also, check with a REU Distribution Planner for different or additional dimensions if one of the following conditions exists:
   A. Multiple electrical features to be placed at one location.
   B. Different directional layout to that indicated in plan view above.

SHEET 2 OF 7

EARTH RETAINING STRUCTURES
3/4" CHAMFER BOTH SIDES, (TYP.)

LEVEL BACKFILL FOR 5 FEET BEHIND WALL, (TYP.). NO OTHER STRUCTURE OR VEHICLE ALLOWED IN THIS AREA.

TYPE 1

CONCRETE GRAVITY WALL (CGW)
TYPICAL CROSS SECTIONS

WALL DIMENSIONS

<table>
<thead>
<tr>
<th>TYPE</th>
<th>A HEIGHT</th>
<th>B MIN.</th>
<th>C MIN.</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>18&quot;</td>
<td>12&quot;</td>
<td>15&quot;</td>
</tr>
<tr>
<td>1</td>
<td>21&quot;</td>
<td>13&quot;</td>
<td>16-1/2&quot;</td>
</tr>
<tr>
<td>2</td>
<td>24&quot;</td>
<td>14&quot;</td>
<td>18&quot;</td>
</tr>
<tr>
<td>3</td>
<td>27&quot;</td>
<td>15&quot;</td>
<td>19-1/2&quot;</td>
</tr>
<tr>
<td>3</td>
<td>30&quot;</td>
<td>16&quot;</td>
<td>21&quot;</td>
</tr>
</tbody>
</table>

NOTES:
1. Reinforcement to be continuous through corners at sidewalls.
2. All reinforcement laps to be 24 inches minimum.
3. Furnish back wall drain all walls where natural or irrigation water accumulations would occur. Typical for all wall sections.
4. Concrete shall be class 560-C-3250, and shall be placed against undisturbed earth.
5. All materials/contraction processes shall conform to the applicable sections of the latest edition of the "Standards Specifications for Public Works Construction".
CONCRETE MASONRY RETAINING WALL (CMW)

TYPICAL CROSS SECTION

NOTES:
1. See Sheet 5 for notes.
NOTES:

1. Remove all debris, rocks, roots, etc. by rake and contour/finish grade area to blend into surrounding land form and to also provide a good seed bed. Plant (between September 15 and October 30) all disturbed areas exterior to the retaining structure with the following seed mix blend using an application rate of 0.10lbs./100 square feet:
   - 30% Blando Brome
   - 25% Wimmera Rye Grass
   - 30% Hikon Rose Clover
   - 15% Cebtral California Wildflower Mix

   Fertilize seeded area with 16-20-0 fertilizer at the rate of 1lb./100 square feet. Cover planted area with a 2 to 3 inch thick layer of hand-strewn hay or straw.

2. Dowel bars to match 24 inch on center positions of vertical reinforcing steel and have a lap of at least 24 inches. Alternately, vertical reinforcement may be continuous from footing to wall top and avoid lap entirely but only if accurately placed in footing.

3. Place vertical steel 2 inches from backfill face of block.

4. Vertical steel to be in each corner cell and end cell of a return wall.

5. Furnish bond beam units for bottom course block and cut 3 inch deep notch for horizontal bar in top course.

6. All horizontal bars to be continuous or lapped 24 inches minimum.

7. All block cells to be 100% consolidated, grout-filled. Use pencil vibrator to achieve consolidation.

8. CMU to be "Basalite" split faced, color D390, Dixon Plant or other approved color.

9. Course aggregate for drainage pocket shall be clean crushed rock ranging in size from 3/8" to 1 1/2".

10. Concrete for footing/key shall be Class 560-C-3250.

11. All wall materials/construction processes shall conform to the applicable sections of the latest edition of the "Standards Specifications for Public Works Construction".
SEGMENTAL RETAINING WALL (SRW)
TYPICAL CROSS SECTION

NOTES:
1. No installation may exceed the maximum height recommended by the wall manufacturer. In addition, any wall proposed to exceed 48 inches in height will be required to demonstrate that capability with an engineered design and other supporting documentation.
2. Segmental retaining walls (SRW), which exceed the limits described in note 1, shall have their drawings, details, specifications and calculations submitted and approved by the Development Services Department prior to construction.
3. The dimensions and details for this type of wall are the responsibility of the wall manufacturer and/or the developers engineer.
DESCRIPTION:
Segmental Retaining Walls (SRW) are retaining walls that rely primarily on mass (weight) for stability. The system consists of concrete masonry units placed without the use of mortar (dry stacked), and relies on a combination of mechanical interlock and mass to prevent overturning and sliding. The units may also be used in combination with horizontal layers of soil reinforcement which extend into the backfill to increase the effective weight of the gravity mass and allow for taller wall construction. Reinforced soil is typically a compacted structure fill behind the SRW which contains a horizontal soil reinforcement material and engineered backfill. A variety of geosynthetic and steel soil reinforcement systems are available.

DESIGN FLEXIBILITY:
The SRW system is composed of units whose size and weight make it possible to construct walls in difficult locations. Curves and other unique layouts can often be easily accommodated. SRWs have the ability to function equally well in large-scale applications as well as smaller landscape projects. Since SRW units are available in a variety of sizes, shapes, textures and colors, SRWs can provide developers and contractors with both an attractive and a structurally sound wall.

SPECIAL REQUIREMENTS:
SRW systems shall be designed by a California licensed Architect, Civil Engineer or Structural Engineer when:

1. Wall height exceeds 48 inches.
2. Structures will be surcharged.
3. Walls will be subject to loads.
4. Walls will be founded on weak soils or other poor foundation material.
5. The nature of the site or other design conditions requires special considerations.

CONSTRUCTION:
The success of any SRW installation depends on complete and accurate information, careful planning and scheduling, the use of specific materials, proper construction procedures and inspection. It is essential to have the retaining wall location approved by a REU Distribution Planner to assure adequate clearance to the electrical equipment for the REU field operations staff. The proposed finish grades shown on the drawings shall be verified to ensure the planned heights are in agreement with the topographic information from the project grading plan. The developer/contractor shall coordinate the delivery and storage of materials, at the site, to ensure access to the work site and availability of materials, during the project. Materials delivered to the project shall be accompanied by the manufacturer’s certification that the materials meet or exceed the product’s specified minimum requirements.

SRW construction often occurs in the following sequence:

1. Excavation and leveling of the pad area for construction.
2. Setting, leveling, backfilling and compacting a stable base for the SRW.
3. Placement and backfilling of SRW units in succeeding courses.
4. Placement, tensioning and backfilling of soil reinforcements, when required.
5. Compaction of backfill to the specified density.
6. Capping the SRW and finish grade.

As with any structure used to retain soil, careful attention must be paid to the materials, compaction equipment and procedures used during construction. When compacting soil within 4 feet of the front face of a wall, compaction tools shall be limited to hand operated equipment (preferably a gasoline powered plate compactor). A reinforced soil mass can typically be compacted with walk behind, self propelled soil compaction equipment.
METER SELECTION TABLE:

<table>
<thead>
<tr>
<th>PHASE</th>
<th>TYPE SERVICE</th>
<th>PANEL SIZE</th>
<th>VOLTAGE</th>
<th>METER NO. OF CLIPS</th>
<th>METER CLASS</th>
<th>FIGURE</th>
</tr>
</thead>
<tbody>
<tr>
<td>1Ø</td>
<td>✓</td>
<td>100-200</td>
<td>120/240</td>
<td>4</td>
<td>200</td>
<td>2</td>
</tr>
<tr>
<td>1Ø</td>
<td>✓</td>
<td>100</td>
<td>120</td>
<td>4</td>
<td>100</td>
<td>1</td>
</tr>
<tr>
<td>1Ø</td>
<td>✓</td>
<td>400</td>
<td>120/240</td>
<td>4</td>
<td>320</td>
<td>2</td>
</tr>
<tr>
<td>1Ø</td>
<td>✓</td>
<td>100-200</td>
<td>120/208</td>
<td>5</td>
<td>200</td>
<td>3</td>
</tr>
<tr>
<td>3Ø</td>
<td>✓</td>
<td>100-200</td>
<td>120/240</td>
<td>7</td>
<td>200</td>
<td>4</td>
</tr>
<tr>
<td>3Ø</td>
<td>✓</td>
<td>100-200</td>
<td>120/208</td>
<td>7</td>
<td>200</td>
<td>5</td>
</tr>
<tr>
<td>3Ø</td>
<td>✓</td>
<td>100-200</td>
<td>277/480</td>
<td>7</td>
<td>200</td>
<td>5</td>
</tr>
</tbody>
</table>

NOTES:

1. Bolt-on residential meters are not accepted for new services.
2. All new three phase services shall be grounded - 4 wire.
3. Clamped or bolted connectors in metering equipment enclosures shall be permitted, including the neutral connection.
4. Test bypass facilities are required in all nonresidential services except sign boards, temporary services, irrigation controls, general, service panels for apartments, and other non-critical low usage loads at REU's discretion.
5. Lever bypasses are not acceptable on commercial panels.
6. Split bus main breakers are acceptable for residential use provided that the main breakers are installed in close proximity to each other and are clearly labeled.
7. All commercial panels require a single main disconnect on the load side of each meter.
GENERAL METERING REQUIREMENTS:

1. EUSERC, Electric Utility Service Equipment Requirements Committee, is an organization comprised of utility representatives from the western section of the United States that work to promote the standardization of electric service requirements and the design and engineering of metering and service equipment. All metering and service equipment approved for use in the areas served by Redding Electric Utility (REU) shall be built to the requirements developed by EUSERC. Approved metering and service equipment is available to customers and contractors through electrical wholesale distributors.

2. All electric service panels shall meet EUSERC requirements. Purchase or installation of any equipment that does not conform to EUSERC requirements is done at the developer's risk. Any electrical service panels that do not comply with EUSERC will be required to have field modifications completed or be replaced at the developer's expense.

3. REU shall not approve an electric meter installation within a hazardous area, as defined in the latest edition of the California Electric Code adopted by the City of Redding.

4. REU electric meters shall be accessible to REU employees 24 hours a day. Meter sockets shall be installed on an exterior wall of the building to be served. The meter socket may be installed in a recess on the exterior wall; but in such case, it shall be installed in the center of a space not less than fourteen inches square. In all cases, the meter socket rim shall project out from the exterior wall surface not less than three-fourths inch. Reference the Residential or Commercial Section of this standard for additional specifications.

5. If the Service Entrance Panel is rated in excess of 200 amperes the electrical energy provided shall be measured by a CT. The CT shall be connected ahead of the Disconnecting Means in a metal cabinet approved by REU, which is free of all incidental wiring. The only exception to this requirement will be for single residential or small commercial units where a class 320 meter will be allowed.

RESIDENTIAL METER REQUIREMENTS

SERVICE VOLTAGES

1. The following table outlines the residential service voltages that Redding Electric Utility can serve and the corresponding meter socket requirements for each. See Standard 550.00 for meter connection diagrams for 320 amps or less.

<table>
<thead>
<tr>
<th>TYPE OF SERVICE</th>
<th>NUMBER OF CLIPS</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>SELF CONTAINED</td>
</tr>
<tr>
<td></td>
<td>TRANSFORMER</td>
</tr>
<tr>
<td></td>
<td>METER SOCKETS</td>
</tr>
<tr>
<td></td>
<td>&lt;=320 AMPS</td>
</tr>
<tr>
<td>1 PHASE, 3 WIRE, 120/240 VOLT</td>
<td>4</td>
</tr>
</tbody>
</table>

*Consult utility when installing service >320 amps
SERVICES 320 AMPS AND BELOW

(For Residential Service >320amps, reference the Commercial Meter Requirements)

1. Electric meters and service disconnects shall be directly outside and accessible at all times. Refer to Standard 504.00 (OH) or 507.00(UG) for preferred electric meter locations. Main Disconnects, (main breakers) shall be installed on the load side and in close proximity to the electric service meter.

2. All electrical service meters installed without current transformers shall be located no more than 75 inches, and not less than 48 inches, above the ground on exterior installations. 3' of clear level working space shall be provided for all meter installations. See Standard 505.50 for additional meter panel clearance requirements.

3. A self-contained meter is capable of carrying the total current and voltage of the electric service supplied to the customer. This type of meter is connected directly to the service entrance conductors when it is plugged into the meter sockets.

4. Sockets for use with self-contained meters are available in two pre-approved ratings. When connected to properly sized service entrance conductors, the approved standard-duty socket has a nominal capacity of 100 amperes, and the approved heavy-duty sockets have a nominal capacity of 200. For extra heavy-duty sockets rated at 320 amperes, contact the utility for approval before installation.

5. All self-contained meter sockets shall be supplied by the contractor and connected to the service entrance conductors by the contractor.

6. Meter sockets shall be equipped with terminals of sufficient size to permit the connection of service entrance conductors without removing any strands of wire. Service panels greater than 200 amps will require 2-hole NEMA pad compression lugs.

7. Test bypass facilities are not required on residential services or other non-critical low usage loads at REU's discretion.

8. The self-contained meter is furnished and installed by Redding Electric Utility. The customer is responsible to provide and install a EUSERC approved enclosure.
COMMERCIAL METERING REQUIREMENTS (0-600 VOLTS)

Consult Redding Electric Utility for services greater than 480 volts.

SERVICE VOLTAGES

The following table outlines the service voltages that Redding Electric can serve and the corresponding meter socket requirements for each.

<table>
<thead>
<tr>
<th>TYPE OF SERVICE</th>
<th>NUMBER OF CLIPS</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>SELF CONTAINED</td>
</tr>
<tr>
<td></td>
<td>METER SOCKETS</td>
</tr>
<tr>
<td>1 PHASE, 3 WIRE, 120/240 VOLT &lt;321 Amps</td>
<td>4</td>
</tr>
<tr>
<td>1 PHASE, 3 WIRE, 120/240 VOLT &gt;320 Amps</td>
<td>N/A</td>
</tr>
<tr>
<td>1 PHASE, 3 WIRE, 120/208 VOLT &lt;201 Amps</td>
<td>5</td>
</tr>
<tr>
<td>3 PHASE, 4 WIRE, 120/208 VOLT WYE</td>
<td>7</td>
</tr>
<tr>
<td>3 PHASE, 4 WIRE, 120/240 VOLT DELTA*</td>
<td>7</td>
</tr>
<tr>
<td>3 PHASE, 4 WIRE, 277/480 VOLT WYE</td>
<td>7</td>
</tr>
</tbody>
</table>

*Non-standard voltage. Contact Redding Electric for availability.

GENERAL METERING REQUIREMENTS

1. All electric service panels shall meet the Redding Electric Utility approved sections of the EUSERC requirements. The list of acceptable panels can be found at www.euserc.com under “Acceptability Pages” on the “Redding Electric, City of” page. Purchase or installation of any equipment that does not conform to EUSERC requirements is done at the developer’s risk. Any electrical service panels that do not comply with EUSERC will be required to have field modifications completed or be replaced at the developer’s expense.

Electric service panel drawings are recommended to be submitted for review prior to purchase and installation. The project developer can submit two (2) copies of the panel manufacturer’s drawings to REU. One copy will be returned to the sender with approval or corrections as needed.

Send submittals to:
Service Planning
Redding Electric Utility
3611 Avtech Pkwy.
Redding, Ca 96049-6071
Telephone: (530) 339-7300

2. All electric meters and Main Disconnects shall be accessible by the utility 24 hours a day, 7 days a week. Fences, gates, alarms, security guards or other means that prohibit direct accessibility are a violation of this requirement. Meeting of this requirement can be accomplished by one of the following means:

a. Locate the metering service panel on the outside of the building. If the metering service panel is located behind a lockable gate, the developer will be required to provide a key to the gate.

b. Locate meter Remote to an outside wall location acceptable to REU. Maximum length of run for meter
wiring is limited to 50 feet. Refer to Standard 552.00 for details on remote metering installation.

c. Locate the metering service panel inside of an un-alarmed electrical service room with an un-alarmed
doors that opens directly to the outside. The developer will be required to provide a key to the electric
service room for meter reading and inspections. If this room is located behind a lockable gate, item 2a
will apply. The words "ELECTRIC/Mechanical EQUIPMENT ROOM - NO STORAGE ALLOWED" shall be
clearly marked on the outside face of the equipment room door.

d. If the equipment room has an access door for entering into any other part of the building, the metering
shall be remote as stated in item 2b above and all doors shall be marked as stated in item 2c above.

e. Equipment rooms that contain multi-meters shall conform to item 2c above.

f. A hard surface pathway must be provided to all metering equipment. This can be accomplished by a
concrete or asphalt path or by firmly placed stepping-stones. All landscaping near the pathway shall be
designed and installed to not inhibit this pathway at maturity.

3. In all multiple-occupancy structures and in commercial or industrial electrical service installations, the service
disconnects shall be installed on the load side of each meter at the meter location, in a common, Readily
Accessible location with all other service disconnects. When over six meters are present, a master
disconnect, which connects all meters, shall be installed on the source side of the meters. This
requirement for the master disconnect is in addition to the individual disconnects on the load side of each
meter.

4. Meters shall be located not more than 75 inches and not less than 48 inches above the ground or standing
surface when installed outdoors. When installed in a cabinet or indoors in a meter room, the minimum
height may be reduced to 36 inches. The meter height is measured to the meter axis (centerline).

3' of clear level working space shall be provided from the face of the meter panel in all meter
configurations. If doors are used to provide the 3' working space clearance, they must be able to be secured
in the open position.

5. Marking of all meters and disconnects shall be required as follows:

a. Where the installation requires more than one meter for service to the premises, each meter panel and
service disconnect it feeds shall be permanently marked (NOT PAINTED) by the customer to properly
identify the portion of the premises being served. This includes, but is not limited to: residences, offices,
retail stores, or any combination of the above.

b. When adding a new meter to an existing service location, all meters and service disconnect(s) they feed
shall be identified to properly indicate the portion of the premises being served.

c. Each main service disconnect shall be permanently marked (NOT PAINTED) by the customer to properly
identify the street address and the building number (if applicable).

D. If there is more than one main service disconnect for a building, each main service disconnect shall have
a tag that clearly references the location of the other main disconnect(s) for that building.

E. The identifying marking for meters and disconnects shall be impressed into or raised from a tag of
plastic laminate, aluminum, brass or other approved non-ferrous metal with 1/4 inch minimum letters.
The impressions shall be deep or raised enough to prevent it from being obscured by subsequent
painting of the service sections. The tag shall be attached to a non-removable area of the panel with a
high strength, epoxy adhesive, rated with a drying time of not less than five (5) minutes. Other types of
adhesives WILL NOT be acceptable. The tag shall not be able to be removed without the use of hand
tools. If the main breakers are NOT installed directly adjacent to the meters, BOTH the meter and the
main breaker shall be identified with individual tags.
f. Additional markings are required when two or more suites are occupied by one tenant. An example would be if suites 101 and 102 were occupied by one tenant, "tags", as described above, would be required at the meter and at the disconnects indicating suites 101 and 102 are served by both meters and disconnects for suites 101 and 102.

EXAMPLE:

SERVICES 200 AMPS AND BELOW

1. A self-contained meter is capable of carrying the total current and voltage of the electric service supplied to the customer. This type of meter is connected directly to the service entrance conductors when it is plugged into the meter sockets.

2. Sockets for use with self-contained meters are available in two approved ratings. When connected to properly sized service entrance conductors, the approved standard-duty socket has a nominal capacity of 100 amperes, and the approved heavy-duty socket has a nominal capacity of 200 amperes.

3. All self-contained meter sockets shall be supplied by the contractor and connected to the service entrance conductors by the contractor. See Standard 550.00 meter diagrams for self-contained sockets.

4. Meter sockets shall be equipped with terminals of sufficient size to permit the connection of service entrance conductors without removing any strands of wire.

5. Test bypass facilities are required on all non-residential services except for sign boards, temporary services, irrigation controls, and other non-critical low usage loads at REU's discretion.

6. The self-contained meter is furnished and installed by Redding Electric Utility. The customer is responsible to provide and install an EUSRC approved enclosure.
SERVICES GREATER THAN 320 AMPS

1. When the electrical supply needs of the customer exceed the 320 ampere capacity of the self-contained
meter and its heavy duty socket, current transformers (C.T.) which are connected to the service entrance
conductors must be used. A transformer rated meter is installed to measure the energy delivered to the
customer. A current transformer capacity multiplier is applied to the billing register on the meter. The
current transformers and the meters are furnished and installed by REU.

2. The transformer rated meter, when inserted into its socket, is wired to the current transformer. The current
transformers are located in the enclosure behind the meter and test switch panel cover(s).

3. An approved C.T. rated meter socket and enclosure are used with transformer rated meters. The meter
sockets and enclosures are furnished and installed by the customer.

4. The current transformers, test switches, wiring, and meter are furnished, installed, and connected by
Redding Electric Utility.

MULTI-METERS TO THE SAME PREMISE

Purpose: To establish specific policies and procedures for customers who wish to combine two or more
existing spaces for a single customer use without the requirement to remove multiple meters
and install a single meter to serve a single customer facilities.

1. Customers requesting combination of suites or units, using more than one meter, must take out the
appropriate building permits with the City of Redding Building Building Department and are subject to all
applicable codes, regulations, etc. The review of plans will be the same as any other tenant improvement.

2. Customers who have taken over space(s) that were originally designed to be occupied by multiple separately
metered Customers will be allowed to utilize two or more meters as long as the configuration of the Service
Entrance Panel is not being modified. Allowing this type of installation does not preclude REU from
combining the usages from the multiple meters into one electrical bill. Network access charges will still
apply to each of the meters.

3. Building Inspectors will require the assistance of the customer and/or his contractor to open the apartments
or suites at the time of inspection in order to verify that each meter socket actually serves the apartment or
suites indicated by the marking tag.

4. Identification of the meters and disconnect serving each suite or unit must be in accordance with item 5
under General Metering Requirements, Sheet 3.
I. PURPOSE

This Standard provides the minimum standards for locating residential and commercial remote meters.

II. DEFINITIONS:

A. REMOTE METER - Metering equipment physically separated from it's associated loadcenter(s). In the case of current transformer (C.T.) rated equipment, the remote meter distance shall be a minimum of 10 inches, and a maximum of 50 feet away from the C.T. compartment. The Customer shall supply and install 1-1/4" inch minimum diameter conduit with a maximum of three 90 degree bends utilizing no condulets between the remote meter location and the C.T. compartment.

B. SAFETY SOCKET - Meter Sockets with test by-pass facilities for self contained meters or test switch for transformer rated meters.

III. GENERAL:

When requiring remote meters, all locations shall conform to Construction Standard CS101 for acceptable locations. The following figures show typical remote meter applications. See CS5075 for remote metering requirements for equipment rooms.

FIGURE 1
(RESIDENTIAL REMOTE APPLICATION)

FIGURE 2
(COMMERCIAL REMOTE APPLICATION)
REU will accept the following combinations of Meter - Mains, Termination Cabinets, and Bypass Devices when used in remote commercial applications:

**FIGURE 3**
BUSED SAFETY SOCKET METER BOX FOR SELF-CONTAINED METERING (0-200 AMPERES)

**FIGURE 4**
SEPARATE CURRENT TRANSFORMER CABINET AND METER BOX WITH U.G. SERVICE TERMINATION PULLBOX (201-400 AMPERES)

**FIGURE 5**
SEPARATE BUSED CURRENT TRANSFORMER CABINET AND METER BOX WITH U.G. SERVICE TERMINATION PULLBOX (401-800 AMPERES)

**FIGURE 6**
OVERHEAD FED SEPARATE CURRENT TRANSFORMER CABINET AND METER BOX (201-400 AMPERES)
TABLE 1:

<table>
<thead>
<tr>
<th>FIGURE NO.</th>
<th>EUSERC DWG. NO.</th>
<th>REU CS DWG. NO.</th>
</tr>
</thead>
<tbody>
<tr>
<td>3</td>
<td>304 &amp; 305</td>
<td>5010</td>
</tr>
<tr>
<td>4</td>
<td>316, 339 &amp; 343</td>
<td>5031, 5040 &amp; 5044</td>
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<tr>
<td>5</td>
<td>317, 339 &amp; 343</td>
<td>5021, 5040 &amp; 5044</td>
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<tr>
<td>6</td>
<td>316 &amp; 339</td>
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</tr>
<tr>
<td>7</td>
<td>317 &amp; 339</td>
<td>5031, 5040, 5044 &amp; 5045</td>
</tr>
</tbody>
</table>

REFERS TO APPLICABLE EUSERC DRAWINGS FOR REMOTE METERING

NOTES:

1. Test/By-pass facilities that are bused or wired to the meter socket jaws or terminals permit REU to By-pass the customers load while de-energizing the socket.
2. The power leg of a 120/240V, 3 phase, 4 wire delta service shall be identified (Orange).
3. The customer shall furnish compression lugs and connect his service entrance conductors to the line and load sides of the current transformer mounting base.
SINGLE ARM POLE

**LIGHT STANDARD:**
Tapered aluminum standard shall be designed to withstand 85 m.p.h. wind speed, and exposure Category C in accordance with AASHTO Standard Specifications for Structural Supports for Highway Signs, Luminaires, and Traffic Signs. Each light standard shall include: 2" tubular support arm 6' reach, 25' or 35' fixture height, anchor bolts covers, shaft cap, and a 4" x 6.5" hand hole with flush mount cover located 90° from arm centerline. (See sketch).

**APPROVED FOR PURCHASE:**

<table>
<thead>
<tr>
<th>POLE HT.</th>
<th>DESCRIPTION</th>
<th>HAPCO</th>
<th>LEXINGTON (SEE NOTE 6)</th>
<th>HUBBELL</th>
<th>UNION METAL</th>
<th>REU STOCK #</th>
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</thead>
<tbody>
<tr>
<td>25'</td>
<td>SINGLE ARM POLE (25')</td>
<td>21-295</td>
<td>2208 - 40705T4 W/1MA0632B40 ARMS</td>
<td>RTA04-100</td>
<td>E690.19</td>
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<tr>
<td></td>
<td></td>
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<tr>
<td>25'</td>
<td>DOUBLE ARM POLE (25')</td>
<td>22-295</td>
<td>2208 - 45805T4 W/2MA0632B45 ARMS</td>
<td>RTA16-100</td>
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<td>21-865</td>
<td>3208 - 45805T4 W/1MA0632B45 ARMS</td>
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<td>RTA22-100</td>
<td>150-Y27</td>
<td>E690.35</td>
</tr>
</tbody>
</table>

**NOTE:** Associated material i.e., arm, bolts covers, anchor bolts, etc., may be specified separately.

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**NOTES:**
1. Wire from luminaire to base shall be nonmetallic sheathed cable type UF-B, 3 #14 (2 #14 + #14G) copper, 600 volt insulated.
2. Wire from base to point of service shall be 2 #6 + #6G, aluminum type USE-2 (See Public Works Standard Page 510), or as indicated on the drawings.
3. REU will make connections at base of light pole and any applicable supply-side splicing locations.
4. Must state single or double arms on order.
5. Customer shall furnish and install mechanical ground lug and make connection of ground wire from luminaire.

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**ALUMINUM STREET LIGHT STANDARD POLE AND ARM DETAILS**

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([Image of electrical components and diagrams])
1/4" X 20 STUD FOR GROUNDING CONTINUITY POINT (LOCATED OPPOSITE AND LINED UP WITH HANDHOLE MID-POINT)

HANDHOLE COVER

BOLT COVER

HEAVY HEX NUT/WASHER

HEAVY HEX NUT WASHER

NON-SHRINK, HIGH STRENGTH, NON-METALLIC GROUT (1" MIN., 2" MAX.)

ANCHOR BOLT

FOOTING PER PUBLIC WORKS STANDARD PAGE 556.00

BASE ASSEMBLY

SLOTS OR HOLES IN BASE PLATE SHALL ACCOMMODATE BOLT SIZE AND PLACEMENT SHOWN ON PUBLIC WORKS STANDARD PAGE 556.00

NOTES:

1. Bottom surface of aluminum base plate shall be painted with one coat of TT-P-6458 zinc-molybdate primer or bituminous paint and allow to dry prior to installation.

2. Anchor bolts, nuts, and washers shall comply with REU drawing ES2499.
COBRAHEAD LUMINAIRES FOR 25' POLES

REQUIRED FEATURES:
- LED CORRELATED COLOR TEMPERATURE OF 3000K.
- TYPICAL COLOR RENDERING INDEX (CRI) OF 75.
- PASSIVE THERMAL MANAGEMENT.
- AMBIENT OPERATING TEMPERATURE RANGE OF -40 DEGREES C TO +50 DEGREES C.
- SINGLE LATCH, TOOL-LESS ACCESS TO ELECTRICAL COMPARTMENT WITH REMOVABLE DOOR (SECURED) AND INTEGRAL BUBBLE LEVEL.
- VIBRATION MEETS ANSI 136.31-2018 (3G, 100K CYCLES).
- 1 ⅛" TO 2" SLIPFITTER.
- MAXIMUM EFFECTIVE PROJECTED AREA OF .52 SQUARE FEET.
- MAXIMUM WEIGHT OF 9.5 LBS.
- 7 PIN ANSI 136.41 PHOTO ELECTRIC RECEPTACLE.
- VOLTAGE RANGE OF 120-277.
- 0-10V DIMMABLE LED DRIVER.
- FIELD ADJUSTABLE WATTAGE SELECTOR (FAWS) WITH 10 DISCRETE STEPS.
- PREWIRED TO INTERNAL TERMINAL BLOCK CONNECTOR.
- MINIMUM WARRANTY OF 10 YEARS.
- BUG RATING OF B1-U6-G1

TABLE 1:

<table>
<thead>
<tr>
<th>SIZE</th>
<th>FAWS SELECTOR SETTING</th>
<th>LUMEC</th>
<th>REU STOCK NO.</th>
<th>L.E.D. WATTAGE</th>
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<tbody>
<tr>
<td>S3</td>
<td>3</td>
<td>RFS-60W32LED3K-G2-R2M-UNV-DMG-FAWS-RC07-GY3 (BK FOR BLACK) (NOTE 4)</td>
<td>E-690.02</td>
<td>37</td>
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<tr>
<td>S10</td>
<td>10</td>
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NOTES:

1. Catalog numbers listed in Table 1, 2, 3, and 4 are intended to assist in ordering, but do not relieve the customer/contractor/developer of responsibility to supply luminaires and photocells which comply with the features listed.
2. The photocell shall be installed with sensor facing north.
3. See Sheet 4, Table 4, for approved photocells & features for L.E.D. lights.
4. Grey finish (GY3) standard; black finish (BK) for projects requiring decorative luminaires.

REVISED FOR L.E.D. LIGHTS
COBRAHEAD LUMINAIRE FOR 35' POLES

REQUIRED FEATURES:

- LED CORRELATED COLOR TEMPERATURE OF 3000K.
- TYPICAL COLOR RENDERING INDEX (CRI) OF 75.
- PASSIVE THERMAL MANAGEMENT.
- AMBIENT OPERATING TEMPERATURE RANGE OF -40 DEGREES C TO +50 DEGREES C.
- SINGLE LATCH, TOOL-LESS ACCESS TO ELECTRICAL COMPARTMENT WITH REMOVABLE DOOR (SECURED) AND INTEGRAL BUBBLE LEVEL.
- VIBRATION MEETS ANSI 136.31-2018 (3G, 100K CYCLES).
- 1 ½” TO 2” SLIPFITTER.
- MAXIMUM EFFECTIVE PROJECTED AREA OF .92 SQUARE FEET.
- MAXIMUM WEIGHT OF 28 LBS.
- 7 PIN ANSI 136.41 PHOTO ELECTRIC RECEPTACLE.
- VOLTAGE RANGE OF 120-277.
- 0-10V DIMMABLE LED DRIVER.
- FIELD ADJUSTABLE WATTAGE SECTOR (FAWS) WITH 10 DISCRETE STEPS.
- PREWIRED TO INTERNAL TERMINAL BLOCK CONNECTOR.
- MINIMUM WARRANTY OF 10 YEARS.
- BUG RATING OF B3-U0-G2 (OR LESS)

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<th>SIZE</th>
<th>FAWS SELECTOR SETTING</th>
<th>LUMEC</th>
<th>REU STOCK NO.</th>
<th>L.E.D. WATTAGE</th>
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</thead>
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<td>L2</td>
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<td>RFL-105W100LED3K-G2-R2M-UNV-DMG-FAWS-RCD7-GY3 (BK FOR BLACK)</td>
<td>E-690.06</td>
<td>56</td>
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<td>L5</td>
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NOTES:

1. Catalog numbers listed in Table 1, 2, 3, and 4 are intended to assist in ordering, but do not relieve the customer/contractor/developer of responsibility to supply luminaires and photocells which comply with the features listed.
2. The photocell shall be installed with sensor facing north.
3. See Sheet 4, Table 4, for approved photocells & features for L.E.D. lights.
4. Grey finish (GY3) standard; black finish (BK) for projects requiring decorative luminaires.
TABLE 3:

<table>
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<tr>
<th>REU STOCK NO.</th>
<th>RIPLEY</th>
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<tr>
<td>E-690.84</td>
<td>6390TF</td>
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NOTES:

1. This photocell is for high pressure sodium and mercury vapor lights only. It should not be used on L.E.D. lights.
2. All Redding Electric Utility (REU) maintained street and night lights will be individually controlled by means of an electric control device (photocell).
3. All photocell covers will be ultraviolet resistant.
4. All photocells will have an eight (8) year warranty against manufacturing defects.
5. All photocells will have a voltage rating of 105 through 305 volts.
6. All photocells will be a three prong twist lock type.
7. Photo control power consumption shall not exceed one watt.
TABLE 4:

PHOTOCELLS APPROVED FOR PURCHASE

<table>
<thead>
<tr>
<th>REU STOCK NO.</th>
<th>RIPLEY</th>
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<tr>
<td>E-690.80</td>
<td>6390LL-BK</td>
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</table>

NOTES:

1. This photocell is for L.E.D. lights only. It should not be used on high pressure sodium or mercury vapor lights.
2. All Redding Electric Utility (REU) maintained street and night lights will be individually controlled by means of an electric control device (photocell).
3. All photocell covers shall have double-wall thickness and be a longlife polymer with extra UV inhibitor.
4. All photocells will have a twelve (12) year warranty against manufacturing defects.
5. All photocells will have a voltage rating of 105 through 305 volts.
6. All photocells will be a three prong twist lock type capable of fitting all "approved for purchase" luminaires listed on sheet one (1) of this drawing.
7. Photo control power consumption shall not exceed one watt.
8. Manufacturers wishing to be placed on the "approved for purchase" list must meet all the above requirements. A REU engineer must also approve the proposed photocell as being equal to or better than the already approved units.

LONG LIFE PHOTOCELL FOR L.E.D. LIGHTS

CHANGED FROM SHEET 3 TO SHEET 4
FACE OF CURB

BACK OF CURB

11" DIA. BOLT CIRCLE (TYP.)

2" DIA. CONDUIT, PVC-D6-TC-6, OR EQUAL

ALIGN ANCHOR BOLTS WITH BACK OF CURB (TYP.)

SIDEWALK (CASE 1)
ADD SIDEWALK THICKNESS TO BOLT PROJECTION

1" DIA. X 36" LONG ANCHOR BOLTS (TYP. OF 4)

4" BOLT PROJECTION (CASE 2)

EXPOSED FOOTING TOP (CASE 2) PROVIDE RADIUS ED EDGE

24" DIA. CONC. FOUNDATION BELOW SIDEWALK

CASE 1
SIDEWALKS 6 FEET AND WIDER NTS

2" DIA. CONDUIT, PER PAGE
24" DIA. CONC. FOUNDATION

CASE 2
BEHIND SIDEWALK AND IN GREENWAY NTS

TOP OF FOOTING = TOP OF SIDEWALK ELEVATION

24" DIA. CONC. FOUNDATION

SIDEWALK

BACK OF SIDEWALK

NOTES:
1. Concrete shall comply with greenbook class 560-C-3250.
2. Reinforcing shall comply with ASTM A615 GR 40.
4. Foundations shall be formed unless cast in a 24" diameter drilled hole. Form shall be removed prior to backfilling.
5. Backfill shall be Class 2 base mechanically compacted to 90%.
6. Where deco base is used, increase top of footing diameter as required.

TYPICAL STREET LIGHT FOOTING

REMOVED GROUND WIRE FROM FOUNDATION

ELECTRIC CONSTRUCTION STANDARD

CMH/CAM 03/01/85
NOTES:

1. The contractor shall be responsible for properly locating the conduit sweep such that the bolt placement will allow proper street light placement at installation.
2. Use of this footing option requires placement of 2E pull box within 20' of footing.
3. See Sheet 1 for material and compaction requirements.

PRE-CAST OPTION

3/4" = 1'-0"
SCOPE:
This Construction Standard provides for the installation of decorative street light standards in existing developments that initially used Option 1 in the obsolete Standard CS5129.

APPLICATION:
This Construction Standard is not available for system wide application. This standard addresses the following specific subdivisions which have already utilized this type of pole, arm and luminaire.

1.) The Villages at Shasta View Gardens
2.) Bel Air Estates
3.) Hope Lane Subdivision

Only these subdivisions may utilize this type of pole, arm and luminaire for new construction. For all other subdivisions appropriate options can be found in Construction Standard CS5128.

PROJECT REQUIREMENTS:
REPLACEMENT PARTS - With any project, the developer shall provide a minimum of replacement parts in the form of two fixtures and one pole and arm for every 40 standards in the project with a minimum of two fixtures and one pole and arm per project.

WARRANTY - All decorative lighting components and workmanship are to be warranted for one year.
LUMEC CATALOG #
CN1-1A-RNA-OV-RC-SC1TXPC20210

LUMINAIRE:
LUMEC CATALOG #
RN20-70-HPSTHB3-GL-QTA/240-HS-SC1TX/PC20210

3 1/2" SCH. 40 PIPE
(4" O.D.) ALLOY 6063-T6

CAST TENON ADAPTER
(78395)

POLE:
HAPCO CATALOG #B15882
5" DIA. FLUTED EXTRUDED ALUM. TUBE .188" WALL
ALLOY 6063-T6
FINISH: SPECIAL TEXTURED COLOR TO BE: (SC1TX),
APPLICATION OF A POLYESTER POWDER COAT PAINT
(4 MILS/100 MICRONS). THE CHEMICAL COMPOSITION
PROVIDES A HIGHLY DURABLE UV AND SALT SPRAY
RESISTANT FINISH IN ACCORDANCE TO THE ASTM-B117-73
STANDARD AND HUMIDITY PROOF IN ACCORDANCE TO
THE ASTM-D2247-68 STANDARD.
COLOR: PROTECH # 20210 CITY OF REDDING GREEN
(Z SERIES TEXTURE) OR APPROVED EQUAL.

CAST ALUMINUM DECORATIVE BASE (12500)
ALLOY 356-T6 WITH DOOR AND STAINLESS
STEEL SCREWS.

GROUND LUG SHALL BE INSIDE
BASE OPPOSITE DOOR.

OPTION A:
OPTION A IS AVAILABLE ONLY FOR
STREETS CLASSIFIED AS RESIDENTIAL-
LOCAL OR COMMERCIAL-LOCAL.

BASE:
SEE REU CONSTRUCTION STANDARD CS5112.
(4) 1"- 8NC GALVANIZED STEEL ANCHOR BOLTS,
AASHTO M314-90 GRADE 55, 10" OF
THREADED END GALVANIZED PER ASTM A153.
(8) 1"- 8NC GALVANIZED STEEL HEX NUTS
(4) 1" GALVANIZED STEEL LOCK WASHERS
(8) 1" GALVANIZED STEEL FLAT WASHERS

REDRAWN

ELECTRIC CONSTRUCTION STANDARD
RETROFIT DECORATIVE STANDARDS & LUMINAIRES
( FOR USE IN SPECIFIED EXISTING SUBDIVISIONS ONLY )

REDDING ELECTRIC UTILITY
POLE:
HAPCO CATALOG #B15882
5" DIA. FLUTED EXTRUDED ALUM. TUBE .188" WALL
ALLOY 6063-T6
FINISH: SPECIAL TEXTURED COLOR TO BE: (SC1TX),
APPLICATION OF A POLYESTER POWDER COAT PAINT
(4 MILS/100 MICRONS). THE CHEMICAL COMPOSITION
PROVIDES A HIGHLY DURABLE UV AND SALT SPRAY
RESISTANT FINISH IN ACCORDANCE TO THE ASTM-B117-73
STANDARD AND HUMIDITY PROOF IN ACCORDANCE TO
THE ASTM-D2247-68 STANDARD.
COLOR: PROTECH # 20210 CITY OF REDDING GREEN
(Z SERIES TEXTURE ) OR APPROVED EQUAL.

CAST ALUMINUM DECORATIVE BASE (12500)
ALLOY 356-T6 WITH DOOR AND STAINLESS
STEEL SCREWS.
GROUND LUG SHALL BE INSIDE BASE OPPOSITE DOOR.

ARM:
LUMEC CATALOG #
CN1-2-RNA-OV-RC-SC1TXPC20210

LUMINAIRE:
LUMEC CATALOG #
RN20-70-HPSTHB3-GL-QTA/240-HS-SC1TX/PC20210

3 1/2" SCH. 40 PIPE
(4" O.D.) ALLOY 6063-T6

CAST TENON ADAPTER
(78395)

BASE:
SEE REU CONSTRUCTION STANDARD CS5112.
(4) 1"- 8NC GALVANIZED STEEL ANCHOR BOLTS,
AASHTO M314-90 GRADE 55, 10" OF
THREADED END GALVANIZED PER ASTM A153.
(8) 1"- 8NC GALVANIZED STEEL HEX NUTS
(4) 1" GALVANIZED STEEL LOCK WASHERS
(8) 1" GALVANIZED STEEL FLAT WASHERS

OPTION B:
OPTION B IS AVAILABLE ONLY FOR
STREETS CLASSIFIED AS RESIDENTIAL-
LOCAL OR COMMERCIAL-LOCAL.

REDRAWN
ELECTRIC CONSTRUCTION STANDARD
RETROFIT DECORATIVE STANDARDS & LUMINAIRES
FOR USE IN SPECIFIED EXISTING SUBDIVISIONS ONLY
I. SCOPE:
This construction standard provides for the installation of Decorative Street Light Standards as an option to the Cobra Head Standard most often installed in the City of Redding. This standard outlines various construction criteria considered in order to provide a safe, efficient, dependable and maintainable street light system which is aesthetically pleasing.

II. APPLICATION:
New projects typically go through a Planning Review Process where the City of Redding Planning and Street Divisions will define the need for roadway lighting along streets adjacent to and within new subdivisions and/or developments through "Conditions of Approval". Some projects do not go through this formal Planning process. In these cases if the Customer/Developer desires decorative lighting for their project they shall contact the Redding Electric Utility (REU) Distribution Planner early in the project's development to review whether the use of decorative roadway lighting is appropriate and feasible. This contact should be made early on in the project's planning stages. Discussions with the Planning and Streets divisions will most likely be required as well.

Once it has been determined that decorative lighting will be utilized the REU Distribution Planner will determine the layout and electrical service requirements for roadway lighting by utilizing the design criteria in this standard.

III. SELECTION PROCESS:
Following this Selection Process, which should take place early in the project design process, will aid in appropriate product selection for the specific project. This process will provide identification of catalog numbers for ordering the material required for the option chosen.

A. Once Road Classifications have been defined, contact an REU Distribution Planner to assist in defining which Decorative Lighting Options are available for the project.

B. The REU Distribution Planner will assist in identifying spacing requirements for each road classification and the option chosen.

C. The Customer/Developer can investigate and evaluate costs and make their final choice as to which option they choose to use. The Planning Department may have requirements as to which option shall be used.

D. Once the choice has been made, the appropriate REU Distribution Planner will prepare the design for the overall project. This process is generally completed with the Electric Utility Design which defines electric service to the project. If a different option is chosen after this design has been completed there will be additional charges for the re-engineering.

IV. PROJECT REQUIREMENTS:
A. REPLACEMENT PARTS - The developer shall provide a replacement parts in the form of two fixtures and one pole and arm for every 40 light standards in the project with a minimum of two fixtures and one pole and arm per project.

B. WARRANTY - All decorative lighting components and workmanship are to be warranted for one year.
3 1/2" SCH. 40 PIPE
(4" O.D.) ALLOY 6063-T6

CAST TENON ADAPTER
(78395)

POLE:
5" DIA. FLUTED EXTRUDED ALUM. TUBE .125" WALL
ALLOY 6063-T6
FINISH: SPECIAL TEXTURED COLOR TO BE: (SC1TX).
APPLICATION OF A POLYESTER POWDER COAT PAINT
(4 MILS/100 MICRONS). THE CHEMICAL COMPOSITION
PROVIDES A HIGHLY DURABLE UV AND SALT SPRAY
RESISTANT FINISH IN ACCORDANCE TO THE ASTM-B117-73
STANDARD AND HUMIDITY PROOF IN ACCORDANCE TO
THE ASTM-D2247-68 STANDARD.
COLOR: PROTECH # 20210 CITY OF REDDING GREEN
(Z SERIES TEXTURE ) OR APPROVED EQUAL.

NOTE:
See REU Construction Standard CS5112
for street light footing details.

CAST ALUMINUM DECORATIVE BASE (12500)
ALLOY 356-T6 WITH DOOR AND STAINLESS
STEEL SCREWS.

GROUND LUG SHALL BE INSIDE
BASE OPPOSITE DOOR.

OPTION A:
OPTION A IS AVAILABLE ONLY FOR
STREETS CLASSIFIED AS RESIDENTIAL-
LOCAL OR COMMERCIAL-LOCAL.

11" DIA.
BOLT CIRCLE
POLE:
5" DIA. FLUTED EXTRUDED ALUM. TUBE .188" WALL ALLOY 6063-T6
FINISH: SPECIAL TEXTURED COLOR TO BE: (SC1TX). APPLICATION OF A POLYESTER POWDER COAT PAINT (4 MILS/100 MICRONS). THE CHEMICAL COMPOSITION PROVIDES A HIGHLY DURABLE UV AND SALT SPRAY RESISTANT FINISH IN ACCORDANCE TO THE ASTM-B117-73 STANDARD AND HUMIDITY PROOF IN ACCORDANCE TO THE ASTM-D2247-68 STANDARD.
COLOR: PROTECH # 20210 CITY OF REDDING GREEN (Z SERIES TEXTURE) OR APPROVED EQUAL.

NOTE:
See REU Construction Standard CS5112 for street light footing details.

CAST ALUMINUM DECORATIVE BASE (12500) ALLOY 356-T6 WITH DOOR AND STAINLESS STEEL SCREWS. GROUND LUG SHALL BE INSIDE BASE OPPOSITE DOOR.

OPTION B:
OPTION B IS AVAILABLE ONLY FOR STREETS CLASSIFIED AS RESIDENTIAL-LOCAL OR COMMERCIAL-LOCAL.
ARM:
Shall be made from 6061-T6 aluminum tubing, 2 3/8 in. (60mm) outside diameter, mechanically assembled.

DECORATIVE ELEMENT:
Made of cast 356 aluminum, welded.

ADAPTER:
Made of cast 356 aluminum, mechanically assembled.

CENTRAL ADAPTER:
Made of a 4" schedule 40 aluminum tubing, 4 1/2" (114mm) outside diameter having a 0.237" wall thickness, mechanically fastened to the pole by the means of two 1/2" thru-bolts and two sets of two set-screws at 120°.

BRACKET OPTIONS:
RC twist lock type photocell receptacle.

WIRING:
Gauge (#14) TEW wires, 6" (152mm) minimum exceeding the bracket.

POLE:
Shaft heat treated to - T6 Temper. Pole assemblies are designed per 1994 AASHTO criteria (excluding section 7) for an 80 mph wind area with a 1.3 gust factor and a maximum luminaire size and arm size of 11.0 sq. ft. E.P.A. & 140lbs. and an equivalent banner size of 7 sq. ft. centered at 16.5 ft. above grade.

BANNER:
Banner size of 2'-6" x 5'-0" equivalent to 7 ft.2 EPA each w/ Bannerflex arms.

FINISH:
Special textured color to be - (SC1TX). Application of a polyester powder coat paint. (4 mil/100 microns). The chemical composition provides a highly durable UV and salt spray resistant finish in accordance to the ASTM-B117-73 standard and humidity proof in accordance to the ASTM-D2247-68 standard.

COLOR:
Protech #20210 City of Redding Green (Z series texture) or approved equal.
POLE:
Shaft heat treated to - T6 Temper. Pole assemblies are designed per 1994 AASHTO criteria (excluding section 7) for an 80 mph wind area with a 1.3 gust factor and a maximum luminaire size and arm size of 11.0 sq. ft. E.P.A. & 140lbs. and an equivalent banner size of 7 sq. ft. centered at 16.5 ft. above grade.

BANNER:
Twin banner sizes of 2'-6" x 5'-0" equivalent to 7 ft.2 EPA each w/ Bannerflex arms.

FINISH:
Special textured color to be - (SC1TX). Application of a polyester powder coat paint. (4 mil/100 microns). The chemical composition provides a highly durable UV and salt spray resistant finish in accordance to the ASTM-B117-73 standard and humidity proof in accordance to the ASTM-D2247-68 standard.

COLOR:
Protech #20210 City of Redding Green (Z series texture) or approved equal.

NOTE:
See REU Construction Standard CS5112 for street light footing details.

OPTION D:
OPTION D IS AVAILABLE ONLY FOR STREETS CLASSIFIED AS MAJOR ARTERIAL EXPRESSWAY

OPTION E:
OPTION E IS AVAILABLE ONLY FOR STREETS CLASSIFIED AS RESIDENTIAL/COMMERCIAL COLLECTOR, MINOR ARTERIAL INTERMEDIATE ARTERIAL AND MAJOR ARTERIAL/EXPRESSWAY
DESCRIPTION OF COMPONENTS:

FINIAL - Decorative cast 356 aluminum, mechanically assembled.

HOOD - (GL). One-piece, seamless, pressure-molded colorless borosilicate glass globe having internal prisms with smooth external self-cleaning surface, permanently assembled to the globe.

GUARD - In a round shape, this guard is made of four cast aluminum 356 decorative arms and one decorative ring. The guard is welded to the fitter.

GLOBE - (GL). One-piece, seamless, pressure molded colorless borosilicate glass globe having internal glare softening vertical ribs with smooth external self-cleaning surface. The globe is permanently sealed onto the access-mechanism.

LAMP - 70 Watt High Pressure Sodium (ANSI Code S62), 55 Volt, ED 23 1/2 bulb, mogul base.

LAMP - 100 Watt High Pressure Sodium (ANSI Code S54), 55 Volt, ED 18 bulb, mogul base.

OPTICAL SYSTEM - (DSH3). Type III, (asymmetrical), non-cutoff distribution with less than 2.5% total upright. Smartseal Optical System, composed of bright-anodized aluminum hydroformed reflector, permanently assembled on vertical ribbed glass globe. Weatherproof IP66 rating, complete with internal (HS) house side shield.

BALLAST - High power factor of 90%, primary voltage 120/208/240/277 volts, connected to 240 volts. Lamp starting capacity - 40F (-40C) degrees. Assembled on a unitized removable with quick disconnect plug.

ACCESS-MECHANISM - A cast A360.1 aluminum technical ring with latch and hinge. The mechanism shall offer tool free access to the inside of the luminaire. The photoelectric cell can be independently oriented from the optical system. An embedded memory-retentive gasket shall ensure weather tight seal.

FITTER - Cast aluminum A360.1 c/w 4 set screws 3/8-16 UNC. Fits on a 4” (102mm) outside diameter by 4” (102mm) long tenon.

LUMINAIRE OPTIONS - (RC). Receptacle for a twist lock photoelectric cell of shorting cap.

WIRING - Gauge (#14) TEW wires, 6” (152mm) minimum exceeding from luminaire.

HARDWARE - All exposed screws will be in stainless steel. All seals and sealing devices are made and/or lined with EDPM and/or silicone.

FINISH - Special textured color to be - (SC1TX), application of a powder coat paint. (4 mils/100 microns). The chemical composition provides a highly durable UV and salt spray resistant finish in accordance to the ASTM-B117-73 standard and humidity proof in accordance to the ASTM-D2247-68 standards.

COLOR - Protech #20210 City of Redding Green (Z series textured) or approved equal.

CAST COMPONENTS - All cast components contain 0.2% copper or less.
DESCRIPTION OF COMPONENTS:

HOOD - Die cast A360.1 aluminum dome, mechanically assembled on the luminaire.

LENS - Clear tempered glass curved lens, mechanically assembled on the lower part of the technical ring with brackets.

HOUSING - In a cylindrical shape, this housing is made of cast 356 aluminum, complete with a weatherproof door giving a tool free access to the ballast, mechanically assembled.

LAMP - 100 Watt High Pressure Sodium (ANSI Code S54), 55 Volt, ED 18 bulb, mogul base.

LAMP - 150 Watt High Pressure Sodium (ANSI Code S55), 55 Volt, ED 23 1/2 bulb, mogul base.


BALLAST - High power factor of 90%, primary voltage 120/208/240/277 volts, connected to 240 volts. Lamp starting capacity - 40F (-40C) degrees. Assembled on a unitized removable with quick disconnect plug.

ACCESS-MECHANISM - A cast A360.1 aluminum technical ring with latch and hinge c/w a cast-in reflector. The mechanism shall offer tool free access to the inside of the luminaire. An embedded memory-retentive gasket shall ensure weatherproofing.

WIRING - Gauge (#14) TEW wires, 6” (152mm) minimum exceeding from luminaire.

HARDWARE - All exposed screws will be in stainless steel. All seals and sealing devices are made and/or lined with EDPM and/or silicone.

FINISH - Special textured color to be - (SC1TX), application of a polyester powder coat paint. (4 mils/100 microns). The chemical composition provides a highly durable UV and salt spray resistant finish in accordance to the ASTM-B117-73 standard and humidity proof in accordance to the ASTM-D2247-68 standards.

COLOR - Protech #20210 City of Redding Green (Z series textured) or approved equal.
DESCRIPTION OF COMPONENTS:

HOOD - Die cast A360.1 aluminum dome, mechanically assembled on the luminaire.

GLOBE - One-piece, seamless, injected-molded borosilicate glass globe having an inner prismatic surface complete with a semi-prismatic house side shield and external glare softening prisms. The globe is mechanically assembled on the access-mechanism.

HOUSING - In a round shape, this housing is made of gravity die cast 356 aluminum, complete with a weatherproof door giving a tool free access to the ballast, mechanically assembled.

LAMP - 70 Watt High Pressure Sodium (ANSI Code S62), 55 Volt, ED 23 1/2 bulb, mogul base.

LAMP - 100 Watt High Pressure Sodium (ANSI Code S54), 55 Volt, ED 23 1/2 bulb, mogul base.


LAMP - 250 Watt High Pressure Sodium (ANSI Code S50), 55 Volt, ED 18 bulb, mogul base.

OPTICAL SYSTEM - I.E.S. Type III hyper-extensive (asymmetrical) lamp in a vertical position. Smartsell System, composed of bright-anodized aluminum hydroformed reflector, permanently assembled on a refractor globe. This system shall a Watertightness IP66 rating. This tool free assembly is removable from the technical ring, complete with a house side shield.

BALLAST - High power factor of 90%, primary voltage 120/208/240/277 volts, connected to 240 volts. Lamp starting capacity - 40F (-40C) degrees. Assembled on a unitized removable with quick disconnect plug.

ACCESS-MECHANISM - A gravity die cast 356 aluminum frame with latch and hinge. The mechanism shall offer tool free access to the inside of the luminaire. An embedded memory-retentive gasket shall ensure weatherproofing.

ADAPTER - Made of cast 356 aluminum, mechanically assembled to the bracket. This adapter shall fit on a 1.66” (42mm) to 2.38” (60mm) outside diameter bracket arm tubing that slip fits 6.5” 165mm) long inside the adapter.

LUMINAIRE OPTIONS - Photoelectric Cell, Twistlock Type c/w receptacle.

WIRING - Luminaire wiring is done using a terminal block located inside the housing.

HARDWARE - All exposed screws will be in stainless steel. All seals and sealing devices are made and/or lined with EDPM and/or silicone.

FINISH - Special textured color to be - (SC1TX), application of a polyester powder coat paint. (4 mils/100 microns). The chemical composition provides a highly durable UV and salt spray resistant finish in accordance to the ASTM-B117-73 standard and humidity proof in accordance to the ASTM-D2247-68 standards.

COLOR - Protech #20210 City of Redding Green (Z series textured) or approved equal.
MATERIAL: CAST ALUMINUM ALLOY 356
EST. WEIGHT: 22.1 LBS
MATERIAL THICKNESS: 0.2"

TWO PIECE DECORATIVE BASE COVER

DOOR OPENING

HANDHOLE

LEVELING NUT

GROUTING PLATE

ELEVATION

1 1/8" DIA.

11" DIA.

19 3/4" DIA.

1/4" X 1 1/2" ALUM. BAR

SEE DETAIL "A"

8" DIA.

1/2"

45°

1/8"

MATERIAL: 1/4" THICK ALUMINUM PLATE

PLATE

THIS DECORATIVE BASE AND GROUTING PLATE IS USED FOR OPTIONS C, D & E

DETAIL "A"
### POLES ARMS AND BASES

<table>
<thead>
<tr>
<th>OPTION</th>
<th>STYLE</th>
<th>MANUFACTURER</th>
<th>POLE &amp; ARM</th>
<th>GROUTING PLATE</th>
</tr>
</thead>
<tbody>
<tr>
<td>A</td>
<td>ACORN</td>
<td>HAPCO</td>
<td>Pole</td>
<td>B15883</td>
</tr>
<tr>
<td></td>
<td></td>
<td>HAPCO</td>
<td>Arm</td>
<td>N/A</td>
</tr>
<tr>
<td>B</td>
<td>TEARDROP</td>
<td>HAPCO</td>
<td>Pole</td>
<td>B15882</td>
</tr>
<tr>
<td></td>
<td></td>
<td>LUMEC</td>
<td>Arm</td>
<td>Y4-1A-WDE-SCITX/PC20210</td>
</tr>
<tr>
<td>C</td>
<td>DOMUS</td>
<td>HAPCO</td>
<td>Pole</td>
<td>B13506</td>
</tr>
<tr>
<td></td>
<td></td>
<td>LUMEC</td>
<td>Arm</td>
<td>CN5-1A-RC-LMS49050</td>
</tr>
<tr>
<td>D</td>
<td>TEARDROP</td>
<td>HAPCO</td>
<td>Pole</td>
<td>B13507</td>
</tr>
<tr>
<td></td>
<td></td>
<td>HAPCO</td>
<td>Arm</td>
<td>Included with pole</td>
</tr>
<tr>
<td>E</td>
<td>TEARDROP</td>
<td>HAPCO</td>
<td>Pole</td>
<td>B13508</td>
</tr>
<tr>
<td></td>
<td></td>
<td>HAPCO</td>
<td>Arm</td>
<td>Included with pole</td>
</tr>
</tbody>
</table>

### LUMINAIRES

<table>
<thead>
<tr>
<th>OPTION</th>
<th>STYLE</th>
<th>MANUFACTURER</th>
<th>WATTAGE</th>
<th>CATALOG NUMBER</th>
</tr>
</thead>
<tbody>
<tr>
<td>A</td>
<td>ACORN</td>
<td>LUMEC</td>
<td>70</td>
<td>S56C2-70HPS-GL-DSH3-QTA/240-SFX-FN2-HS-RC-SC1TX/PC20210</td>
</tr>
<tr>
<td></td>
<td></td>
<td>LUMEC</td>
<td>100</td>
<td>S56C2-100HPS-GL-DSH3-QTA/240-SFX-FN2-HS-RC-SC1TX/PC20210</td>
</tr>
<tr>
<td>C</td>
<td>DOMUS</td>
<td>LUMEC</td>
<td>100</td>
<td>DMS55-100HPS-SCB3M-QTA/240-SC1TX/PC20210-LMS49050G</td>
</tr>
<tr>
<td></td>
<td></td>
<td>LUMEC</td>
<td>150</td>
<td>DMS55-150HPS-SCB3M-QTA/240-SC1TX/PC20210-LMS49050A</td>
</tr>
<tr>
<td>B, D &amp; E</td>
<td>TEARDROP</td>
<td>LUMEC</td>
<td>70</td>
<td>RN20-70HPS-THB3-GL-QTA/240-SMA-HS-RC-SC1TX/PC20210</td>
</tr>
<tr>
<td></td>
<td></td>
<td>LUMEC</td>
<td>100</td>
<td>RN20-100HPS-THB3-GL-QTA/240-SMA-HS-RC-SC1TX/PC20210</td>
</tr>
<tr>
<td></td>
<td></td>
<td>LUMEC</td>
<td>200</td>
<td>RN20-200HPS-THB3-GL-QTA/240-SMA-HS-RC-SC1TX/PC20210</td>
</tr>
<tr>
<td></td>
<td></td>
<td>LUMEC</td>
<td>250</td>
<td>RN20-250HPS-THB3-GL-QTA/240-SMA-HS-RC-SC1TX/PC20210</td>
</tr>
</tbody>
</table>

### HIGH PRESSURE SODIUM LAMP TABLE

All HPS Lamps supplied shall be Clear and meet or exceed the values in this Lamp Table.

<table>
<thead>
<tr>
<th>WATTAGE</th>
<th>INITIAL LAMP LUMANS</th>
<th>AVERAGE RATED LIFE</th>
<th>LAMP LUMEN DEPRECIATION</th>
</tr>
</thead>
<tbody>
<tr>
<td>70</td>
<td>6,300</td>
<td>24,000 Hrs.</td>
<td>.88</td>
</tr>
<tr>
<td>100</td>
<td>9,500</td>
<td>24,000 Hrs.</td>
<td>.88</td>
</tr>
<tr>
<td>150</td>
<td>15,800</td>
<td>24,000 Hrs.</td>
<td>.88</td>
</tr>
<tr>
<td>200</td>
<td>22,000</td>
<td>24,000 Hrs.</td>
<td>.90</td>
</tr>
<tr>
<td>250</td>
<td>28,000</td>
<td>24,000 Hrs.</td>
<td>.91</td>
</tr>
<tr>
<td>400</td>
<td>50,000</td>
<td>24,000 Hrs.</td>
<td>.89</td>
</tr>
</tbody>
</table>
NOTES:

1. A permit from the Development Services Director must be issued prior to any banner being installed on a decorative pole. Banners will only be installed at the approved locations indicated on the plan submitted with the banner application.

2. All banners should be delivered to Redding Electric Utility, 20055 Viking Way, Building No. 2, Redding CA 96003 five (5) business days prior to installation of the banner pursuant to the permit.

3. One single banner may be hung on decorative streetlight poles with one luminaire. Banners will not be allowed on any decorative streetlight poles with two luminaires.

4. Banners may be installed on decorative streetlight poles at the following locations:
   - Parkview Avenue between State Route 273 and State Street.
   - Bechelli Lane north of South Bonnyview Road.
   - Cypress Avenue between Athens Avenue and State Route 273.
   - Churn Creek Road south of Arizona Street.
   - Hilltop Drive between Hwy 44 on-ramp and E. Cypress Avenue.
   - North Market Street, Miracle Mile (Cal-Trans Right of Way)

5. Banners must be two and a half (2.5) feet wide and five (5) feet long.

6. The banner will be mounted on the back side of the decorative streetlight pole with the top of the banner at a height of approximately eighteen (18) feet.

7. All banner brackets shall be Kalamazoo Banner Works BannerFlex Metro with Airow 30" Primium Arms or approved equal.

8. All banner brackets on decorative streetlight poles will be installed using stainless band clamps.

9. All banner brackets and band clamps shall be powder coated to match the decorative streetlight pole.

10. When banner brackets are not being utilized to display a banner, the arm casting shall be removed with the pole main casting and band clamps left on the pole.

11. Banners shall be removed within thirty (30) days after the date of installation unless an extension of time specifically approved the Development Services Director.
NOTE:

= STREETLIGHT

BANNERS ARE NOT ALLOWED ON SIGNAL POLES.
PARKS DEPARTMENT

NOTE:

BANNERS ARE NOT ALLOWED ON SIGNAL POLES.

= STREETLIGHT

UPDATED CAD STANDARDS AND PAGE NUMBERING

DECORATIVE STREETLIGHT BANNER SPECIFICATIONS

Redding Electric Utility
BANNERS ARE NOT ALLOWED ON SIGNAL POLES.

NOTE:

= STREETLIGHT

BANNERS ARE NOT ALLOWED ON DECORATIVE STREETLIGHTS IN MEDIAN OF CYPRESS AVENUE DUE TO WIND LOADING CONSTRAINTS.
NOTE:

= STREETLIGHT
BANNERS ARE NOT ALLOWED ON SIGNAL POLES.

NOTE:

= STREETLIGHT

ELECTRIC CONSTRUCTION STANDARD

DECORATIVE STREETLIGHT BANNER SPECIFICATIONS

Redding Electric Utility

UPDATED CAD STANDARDS & PAGE NUMBERING
BANNERS ARE NOT ALLOWED ON SIGNAL POLES.

NOTE:

Fn - STREETLIGHT

DECORATIVE STREETLIGHT BANNER SPECIFICATIONS
NOTES:

1. Redding Electric Utility (REU) will make connections at fuses and any applicable source side splicing location.

2. Contractor shall make all other splicing within lighting pole and fixture.

3. Wire from photo cell receptacle and arm to base of pole shall be nonmetallic-sheathed cable (Romex) type NM or NMC, number 14-2 or 14-3 copper 600 volt insulated.

4. All wire within nonmetallic-sheath (Romex) shall be 600 volt THW, THHN or equal.

5. Wire from base to point of service will be 2-#6 aluminum 600 volt XLP insulated NEC type use, or as specified.

6. #14 copper stranded wire shall be 600 volt insulated SFF-2 150°C fixture.
NOTES:

1. This application is to be used for electronic metering measuring KILOWATT & KVAR's.
2. P.T.'s shall have a 60:1 ratio (i.e. 7200V-120V) 0.3% accuracy at 200 voltamp burden and shall be fused on the high voltage side.
3. C.T.'s shall have a ratio to be specified by REU engineering with a 1.5 thermal rating factor and a 0.3% accuracy at B=0.5 OHMS (i.e. 3 B0.5).
I. PURPOSE:

The purpose of this drawing is to provide information necessary for design, manufacture, and construction of a high voltage service of 12,000 volts to Redding Electric Utility (REU) customers.

II. APPLICATION:

The following specifications and requirements are geared towards a new installation. This guideline may, however, be applied to an existing service rebuild or upgrade in which case some specifications or requirements may change as determined by REU staff.

III. ENGINEERING SPECIFICATIONS:

A. Each switchboard for a high voltage service will be considered as being specifically engineered for each location. Service will be supplied at 12,000 volts, three phase, three wire, from a solidly grounded wye source.

B. REU staff will complete job specific engineering specifications and drawings for each high voltage service installation. These specifications will be based on the Application for Service, load date, plans and other information as submitted by the customer.

C. The customer installation shall comply with all applicable rules of the National Electric Code, Utility Service Entrance Requirements (USERC), REU standards, and other governing codes and ordinances.

IV. PROTECTIVE DEVICES:

A. It shall be the customer's responsibility to furnish and install such protective devices with ratings that are necessary to interrupt the available fault current at the service location and that coordinate properly with REU protective devices to avoid exposing other REU customers to unnecessary service interruptions. The customer shall also keep in good and safe condition, at the customers own risk and expense, all appropriate protective devices of any kind or character which may be required to properly protect the customer's facilities. REU shall not be responsible for any loss or damage occasioned or caused by the negligence, or wrongful act of the customer or of any his agents, employees or licensees in omitting, installing, maintaining, using, operating or interfering with any such protective devices.

B. It shall be the customer's responsibility to complete a relay coordination and fault study and submit this study to the REU staff for review and approval prior to the purchase of relays and/or other pertinent protective gear. The available short circuit current varies from one location to another and will, therefore, be provided by REU along with other engineering specifications as discussed in Item III - B.

C. Customer relay settings or protective device curves shall coordinate with the settings at the appropriate REU source side protective device. The REU source side protection device will be a circuit breaker or a REU line protective device (recloser, fuse, etc.).

D. When the customer provides a circuit breaker or recloser as the interrupting device, then phase and ground overcurrent protection shall consist of a microprocessor based multifunctional protective relay with a minimum of three single phase overcurrent elements and one ground overcurrent element. A second, back-up, microprocessor based relay is also required. Both relays shall have time and instantaneous trips with targets and have provisions for injecting current for testing. All relays shall have 5 amp continuous current rating. All relays shall be utility grade and will typically be required to be of an extremely inverse characteristic. Automatic reclosing of the customer's interrupting device will not normally be permitted, but will be reviewed on a case by case basis. The instantaneous overcurrent settings shall typically be set as low as possible but above transformer inrush and cold load pickup.
IV. PROTECTIVE DEVICES: (Continued)

E. The service switch, breaker, or protective device shall be located on the load side of the metering equipment.

F. The circuit breaker or recloser shall be tripped by an external trip signal supplied through a DC battery (shunt trip), and the protective relays shall be powered by the same DC battery. The battery voltage shall be monitored and provide a customer monitored alarm when a low voltage condition exists. The battery shall be sized to provide a minimum of 24-hours of back-up power upon the loss of utility power. If the facility has a back-up generator, and the battery charger is connected to a circuit fed by the generator during power outages, then the back-up battery power can be reduced to an 8-hour capacity.

G. Any non-utility owned emergency standby generation equipment that can be operated to supply power to the customer's facilities that are also designated to be supplied from the utility's system shall be controlled with suitable protective devices by the applicant to prevent parallel operation with the utility's system in a fail safe manner, such as the use of a double throw switch to disconnect all conductors except where there is a written agreement of service contract with the utility permitting such parallel operation.

V. UTILITY CABLE TERMINATION SECTION:

A. Every switchboard to which high voltage (12,000 volts) service is to be supplied by REU shall be equipped with a fully enclosed service cable terminating pull section. Space shall be provided for the support and connection of the service cables to a bussed section which has standard NEMA drillings for termination lugs with two holed tongues. REU will specify the number of cables which will be pulled and terminated. REU will furnish the termination lugs.

B. REU will normally install the cable from its facilities to the cable terminating pull section. When REU installs the cables, stress cones will be made up by REU on the high voltage cables in the termination pull section.

C. The height of the cable terminating lugs shall be 48" minimum to 72" maximum such as to permit the make up of stress cones, cable forming and connection.

D. The service cable terminating pull section shall be equipped with hinged, full opening, sealable, access door with padlock provisions, and when opened shall provide full access for REU crews to install, repair, or maintain cable terminations.

VI. METERING:

A. The customer shall be responsible to supply and install an approved metering panel or cubicle which shall have appropriate ventilation, must be lockable, and weatherproof.

B. Current transformers, voltage transformers, meters, test switches, phase shifting devices, and normal wiring from transformers to the meters will normally be furnished and installed by REU except as noted otherwise.

VII. TESTING:

A. Current transformers shall be ratio tested by Primary Injection.

B. Individual relays shall be secondary panel tested by applying the appropriate currents. The relays shall be tested prior to energization and every three years thereafter. The test reports shall be submitted to REU every three years. REU shall be notified of the date and time of the tests so the tests can be witnessed if desired. The relays must be tested at their specified settings to verify the following:

1. Minimum pickup or the minimum operating point at which the relay picks up for the time delay and instantaneous units.

2. Time delays at two, five, and ten times pickup.
VII. TESTING: (Continued)

3. The relays must be tested to meet the following tolerances:
   - Current/Voltage Pickup: +/- 10%
   - Time: +/- 10%

4. Trip test to see if the relays actually trip the proper breaker.

C. Megger at 2500VDC all primary equipment:

1. Transformers connected to primary bus winding-to-winding and each winding-to-ground.
2. Circuit breakers in the following manner:
   - Breaker open - each pole-to-ground, pole 1-2, pole 3-4 and pole 5-6.
   - Breaker closed - pole 1 - ground, pole 3 - ground, pole 5 - ground, pole 1-2, pole 3-4, pole 5-6.
   All busses and cables phase-to-phase and phase-to-ground.

D. Circuit Breakers: Test shall be performed on site according to manufacturer's recommendations prior to energization. Copies of these test reports shall be sent to REU. These same tests shall be performed every six years. Breaker shall also be exercised every year.

E. Post Energized Tests: When first energized, confirm all secondary currents and voltages are what they should be and verify proper phase rotation.

VIII. MANUFACTURER'S DRAWINGS FOR APPROVAL:

The designer or manufacturer of the high voltage switchboard for the customer's service, shall submit four copies of a drawing of the service cable terminating section, the main breaker or switch, and the metering cubicle to REU prior to fabrication. One copy will be returned to the sender with approval or corrections as needed.

NOTE: Until approval is achieved, re-submittal incorporating any corrections or comments shall be required.

For additional requirement, see the following REU references:
- CS5036 - Transformer Rated Meters - Diagram of Connections
- CS0160 - Underground Primary Service - 12,000 Volts
- CS2060 - Overhead Primary Service - 12,000 Volts
- Resolution 97-83 - Electric Utility Service Policy
I. SCOPE:
A. This drawing specifies the construction standards necessary to provide Primary Service to customers utilizing a pole metering installation of outdoor type instrument transformers mounted on a prefabricated aluminum bracket.
B. The pole shall be supplied, installed, owned, and maintained by the customer.
C. Redding Electric Utility (REU) will furnish and install the overhead conductor feed, deadend crossarm assembly, all pole top primary metering outdoor type instrument transformers, and meters as required.
D. REU source side disconnect to be placed at the closest REU owned pole at customer expense.

II. LOCATION OF PRIMARY METERING INSTALLATION:
A. Metering transformers will be located on a REU approved 45' Class 2 treated pole. This pole shall be provided and maintained by the customer.
B. Orient current and voltage transformers on bracket so that polarized primary terminal leads can be connected to incoming line without interference.

III. METER ENCLOSURES:
The customer shall furnish a suitable location for the REU meters. It may be installed on metering pole located on the customer's property. It should be located so that lead wires from the instrument transformers to the meter will be as short as practicable and under no circumstances longer than 50 feet in order to avoid impairment of meter accuracy.

IV. GROUNDING:
A. The customer shall furnish and install a meter enclosure ground in accordance with the California Electric Code and with City and County Ordinances.
B. Minimum size ground wire for the meter enclosure shall be No. 6 AWG copper and shall be fastened securely to an approved grounding electrode. When installed on a pole, the meter enclosure ground wire shall be protected against mechanical injury by rigid steel conduit, or connected to the ground electrode by means of an approved conduit grounding clamp.
C. The connection of the meter enclosure ground wire to the grounding electrode must be above ground or otherwise readily accessible for inspection.

V. COVERING FOR METER WIRING ON POLE:
The customer shall furnish and install a 1 1/4" PVC conduit for meter wiring from the meter enclosure to the 8 ft. level on the metering pole. The customer shall furnish and REU will install the necessary materials to cover the meter wiring above the 8 ft. level on the metering pole.

VI. POTENTIAL TRANSFORMER FUSING:
A. Fusing of the potential transformers for outdoor primary metering shall be in accordance with the following:
   1. Service from distribution feeder - When customer tap is fused, consideration may be given to deleting potential transformer fuses.
   2. Service from substation buses - Fuse potential transformers.

VII. CURRENT TRANSFORMER SIZING:
CT Ratio is dependent upon customer's present and future loads, consult with engineer for ratio determination.
VIII. PRIMARY PROTECTION DEVICES:
A. Refer to Primary Service Guidelines Drawing DS0160 for engineering and protective device specifications.
B. The customer’s primary protective device shall be located within 50 feet of the primary metering pole.

IX. TESTING & COMMISSIONING:
Refer to Primary Service Guidelines Drawing DS0160.

X. ADDITIONAL REQUIREMENTS:
A. Use CS5036 Transformer Rated Meters - Diagrams of Connections.
C. DS0160 Primary Service Guidelines.

CURRENT TRANSFORMER (OUTDOOR TYPE)
60 HZ, THERMAL RATING FACTOR = 1.5

<table>
<thead>
<tr>
<th>RATED VOLTAGE</th>
<th>FULL WAVE IMPULSE</th>
<th>MANUFACTURER / CAT NO.</th>
</tr>
</thead>
<tbody>
<tr>
<td>15KV</td>
<td>110KV</td>
<td>ASSOC. ENGR. / BB-15-829</td>
</tr>
</tbody>
</table>

ELECTRO-MAG / CO3-110
G.E. / JKW - 5
SANGAMO / M10 - 1505
ABB CORP / KOR - 11

*110KV BIL; 60 Hertz;
Thermal Rating Factor = 1.5
Accuracy = 0.3% @ B0.5 Burden

VOLTAGE TRANSFORMERS (OUTDOOR TYPE)
60 HZ, THERMAL RATING 1500 VA @ 30°C

<table>
<thead>
<tr>
<th>RATED VOLTAG</th>
<th>PRIMARY VOLTAGE RATING L-N</th>
<th>FULL WAVE IMPULSE</th>
<th>MANUFACTURER / CAT NO.</th>
</tr>
</thead>
<tbody>
<tr>
<td>12KV</td>
<td>7.2KV</td>
<td>110KV</td>
<td>ELECTRO-MAG / PO5-110</td>
</tr>
</tbody>
</table>

G.E. / JVW - 5
ABB / VOG - 11

**110KV BIL; 60 Hertz;
Primary Voltage = 7.2kv;
Ratio = 60:1
Thermal Rating 1500VA @30 C
Accuracy = 0.3% @ 200VA

REU
Redding Electric Utility

OVERHEAD PRIMARY SERVICE METERING

DES/REV ASSISTANT DIRECTOR - DISTRIBUTION REVISED DWG. NO.
JVE/JHY 10/27/95 02/13/13 CS2060
### MATERIAL TO BE FURNISHED AND INSTALLED BY REU

<table>
<thead>
<tr>
<th>ITEM</th>
<th>DESCRIPTION</th>
<th>OH FEED QTY.</th>
<th>UG FEED QTY.</th>
<th>REU STOCK #</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Transformer, current, outdoor type, rating as required</td>
<td>3</td>
<td>3</td>
<td></td>
</tr>
<tr>
<td>2</td>
<td>Transformer, potential, outdoor type, rating as required</td>
<td>3</td>
<td>3</td>
<td></td>
</tr>
<tr>
<td>3</td>
<td>Double DE arm assembly (assembly No. 12DD3H3H or 12DD3H3L)</td>
<td>1</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>4</td>
<td>Single tangent arm assembly (assembly No. 12B3H3L)</td>
<td>1</td>
<td>0</td>
<td></td>
</tr>
<tr>
<td>5</td>
<td>Bushing mounted fuses (bail clips) for potential transformers</td>
<td>3</td>
<td>3</td>
<td>E240.01</td>
</tr>
<tr>
<td>6</td>
<td>Fuse, bushing mounted, 15KV, 1 Amp, as required</td>
<td>3</td>
<td>3</td>
<td>E240.03</td>
</tr>
<tr>
<td>7</td>
<td>Lead wire, connectors, as required (15KV class, 1 Amp per CS5035)</td>
<td>(as required)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>8</td>
<td>Wire, metering, No. 10, 600V</td>
<td>240' x 240'</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>9</td>
<td>Junction box, type LR, PVC, 1-1/4&quot;, female, slip fit</td>
<td>1</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>10</td>
<td>REU disconnected to be placed on REU pole at customer's expense</td>
<td>1</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>11</td>
<td>Tubing, flexible from J-box to elbows to CT's &amp; PT's</td>
<td>30' x 30'</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>12</td>
<td>Sign, High Voltage</td>
<td>3</td>
<td>3</td>
<td>E313.13</td>
</tr>
<tr>
<td>13</td>
<td>Meter, as required</td>
<td>1</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>14</td>
<td>Test switch</td>
<td>1</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>15</td>
<td>Bracket, for instrument transformers (Aluma-Form cat. #PMM-6)</td>
<td>1</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>16</td>
<td>Bolt, 3/4&quot; x length as required, with sq. washer, spring washer, nut</td>
<td>2</td>
<td>2</td>
<td></td>
</tr>
<tr>
<td>17</td>
<td>Cover, insulating bolt</td>
<td>2</td>
<td>2</td>
<td>E541.11</td>
</tr>
<tr>
<td>18</td>
<td>Parallel groove clamp, (size as required)</td>
<td>3</td>
<td>3</td>
<td>E20.48</td>
</tr>
<tr>
<td>19</td>
<td>Eye nut, dead end insulator &amp; wire deadend (size as required)</td>
<td>3</td>
<td>0</td>
<td></td>
</tr>
</tbody>
</table>

### MATERIAL TO BE FURNISHED AND INSTALLED BY CUSTOMER

<table>
<thead>
<tr>
<th>ITEM</th>
<th>DESCRIPTION</th>
<th>OH FEED QTY.</th>
<th>UG FEED QTY.</th>
<th>REU STOCK #</th>
</tr>
</thead>
<tbody>
<tr>
<td>20</td>
<td>Parallel groove clamp equivalent to REU item #18 (size as required)</td>
<td>3</td>
<td>0</td>
<td>E 20.48</td>
</tr>
<tr>
<td>21</td>
<td>Pole, wood, fully treated, and REU inspected, 45° class 2</td>
<td>1</td>
<td>1</td>
<td>E540.45</td>
</tr>
<tr>
<td>22</td>
<td>Guy material, (as required)</td>
<td>(as required)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>23</td>
<td>Termination, pothead 3M Quick Term II #2/0, (use if riser is 200A)</td>
<td>0</td>
<td>3</td>
<td>E806.19</td>
</tr>
<tr>
<td>24</td>
<td>Riser assembly (see CS1222)</td>
<td>0</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>25</td>
<td>Moulding, 4&quot; Sch. 40, (use if riser is 200A)</td>
<td>0</td>
<td>1</td>
<td>E381.94</td>
</tr>
<tr>
<td>26</td>
<td>Backup plate, 4&quot; Sch. 40, (use if riser is 200A)</td>
<td>0</td>
<td>1</td>
<td>E381.97</td>
</tr>
<tr>
<td>27</td>
<td>Moulding, hardwood 1&quot;</td>
<td>0</td>
<td>1</td>
<td>E382.10</td>
</tr>
<tr>
<td>28</td>
<td>Weatherproof meter enclosure</td>
<td>1</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>29</td>
<td>Conduit, PVC, 1-1/4&quot; Sch. 80, gray</td>
<td>30</td>
<td>30</td>
<td></td>
</tr>
<tr>
<td>30</td>
<td>Bend, PVC, 1-1/4&quot;, 22.5 deg., slip fit, Sch. 80, gray (as needed)</td>
<td>2</td>
<td>2</td>
<td></td>
</tr>
<tr>
<td>31</td>
<td>Coupling, PVC, 1-1/4&quot;, slip fit</td>
<td>4</td>
<td>4</td>
<td></td>
</tr>
<tr>
<td>32</td>
<td>Adaptor, female, PVC, 1-1/4&quot;, thread to slip fit</td>
<td>2</td>
<td>2</td>
<td></td>
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<tr>
<td>33</td>
<td>Clamp, PVC, 1-1/4&quot;</td>
<td>4</td>
<td>4</td>
<td></td>
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<tr>
<td>34</td>
<td>Strap, pipe, galvanized, or hanger iron, galvanized</td>
<td>14</td>
<td>14</td>
<td></td>
</tr>
<tr>
<td>35</td>
<td>Wire, ground, PT neutral, #6 min. bare copper</td>
<td>16</td>
<td>16</td>
<td></td>
</tr>
<tr>
<td>36</td>
<td>Conduit, rigid steel, 1/2&quot;, galvanized</td>
<td>5</td>
<td>5</td>
<td></td>
</tr>
<tr>
<td>37</td>
<td>Conduit fitting, threaded, 1/2&quot;</td>
<td>2</td>
<td>2</td>
<td></td>
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<tr>
<td>38</td>
<td>Ground rod clamp</td>
<td>1</td>
<td>2</td>
<td></td>
</tr>
<tr>
<td>39</td>
<td>Conduit grounding hub</td>
<td>1</td>
<td>2</td>
<td></td>
</tr>
<tr>
<td>40</td>
<td>Rod, ground, 3/4&quot; X 10'-0&quot; copper covered steel rod</td>
<td>1</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>41</td>
<td>Pole mounted equipment grounding (CS2900)</td>
<td>0</td>
<td>1</td>
<td></td>
</tr>
</tbody>
</table>
**PROPOSED OVERHEAD LINES:**

- OVERHEAD (PRIMARY)
- OVERHEAD (SECONDARY)
- SPAN GUY

**PROPOSED CONDUITS:**

- 4" OR 6" CONDUIT (PRIMARY)
- 4" CONDUIT (SECONDARY)
- 2" CONDUIT (SECONDARY)

**PROPOSED TRANSFORMERS:**

- OVERHEAD TRANS. (1Ø)
- OVERHEAD TRANS. (3Ø)
- PADMOUNT TRANS. (1Ø)
- PADMOUNT TRANS. (3Ø)
- SUBSURFACE TRANS. (1Ø)
- SUBSURFACE TRANS. (DUPLEX)
- PADMOUNT TRANS. (DELTA)

**PROPOSED SWITCHES:**

- GROUP OPERATED (AIR)
- CUTOUT (FUSE/SOLID)
- SUBSURFACE

**PROPOSED MISCELLANEOUS:**

- POLE W/RISER
- LIGHT W/STANDARD
- DOWN GUY
- SIDEWALK GUY
- SERVICE STUB W/CAP
- SERVICE
- CAPACITOR
- CAPACITOR CONTROLLER
- PRIMARY METER
- ELECTRONIC MARKER
- REGULATOR
- CONDUIT CAP

**PROPOSED VAULTS / SPLICE BOXES:**

- PADMOUNT SWITCH VAULT (TYPE PME-9 AND PME-11)
- PADMOUNT SWITCH PAD (TYPE PME-3 AND PME-5)
- PADMOUNT CAPACITOR PAD
- VAULT (6'X12'/4'X8'/4'X6')
- SPLICE BOX (3'X5')
- SPLICE BOX (3'X5') W/ PAD MOUNTED ENCLOSURE
- SPLICE BOX (5E/4E/3E)
- SPLICE BOX (2E)
- PEDESTAL (MOBIL HOME)
- CABINET (TRAFFIC SIGNAL)

**NEW CONSTRUCTION DRAWINGS**

(SYMBOLS FOR PROPOSED FACILITIES)

**REMOVED SHEET 4**
NO COMMERCIAL OR POLITICAL ADVERTISING WILL BE PERMITTED ON BANNERS

DELIVER BANNERS TO:
CITY OF REDDING ELECTRIC UTILITY
20055 VIKING WAY, BUILDING NO. 2

NYLON WEBBING OR ROPE:
Standard 1" (25mm) nylon webbing strap Min. tensile strength 600 lbs. approximately 6' (1829mm) extending from all four corners.
Minimum - Standard 1/4" (6mm) twisted polypropylene Min. tensile strength 600 lbs. (no knots). Extend rope a minimum of 6' (1829mm) all four corners.

CONSTRUCTION:
Top, bottom and sides to have sewn hems.
Nylon webbing to be encased in hem.
Corners to be reinforced.
Water-base paint recommended for canvas.

AIR HOLES:
Spaced at 36" (914mm) intervals.
To be staggered as shown on drawing.
Air holes to be no less than 6" (152mm) from edge of banner.
To be cut along dotted line (see Detail "B")

BANNER:
Required length: 30' (9144mm).
Required height: 36" (914mm).
Construction material: 10 oz. white duck canvas or 16 oz. reinforced vinyl.
Must not exceed 35 pounds when painted.
Lettering to be 8" (203mm) minimum height.
Message to consist of no more than 90 letters, numbers, punctuation and spaces.
Banners shall not contain private advertising whether in text or logo format. However, brief text, and/or logos identifying the applicant's local agency (city or county) are allowed.
The telephone number of the nonprofit organizations may be included.

NYLON WEBBING OR ROPE:
Standard 1" (25mm) nylon webbing strap Min. tensile strength 600 lbs. approximately 6’ (1829mm) extending from all four corners.
Minimum - Standard 1/4" (6mm) twisted polypropylene Min. tensile strength 600 lbs. (no knots). Extend rope a minimum of 6’ (1829mm) all four corners.

CONSTRUCTION:
Top, bottom and sides to have sewn hems.
Nylon webbing to be encased in hem.
Corners to be reinforced.
Water-base paint recommended for canvas.

NO COMMERCIAL OR POLITICAL ADVERTISING WILL BE PERMITTED ON BANNERS

DELIVER BANNERS TO:
CITY OF REDDING ELECTRIC UTILITY
20055 VIKING WAY, BUILDING NO. 2

UPDATED CAD STANDARDS
ELECTRIC CONSTRUCTION STANDARD
STREET BANNER SPECIFICATIONS
1 - A563 GRADE A HEX JAM NUT GALV.

2 - A563 GRADE DH OR A194 GRADE 2H HEAVY HEX NUT, GALV.

WHERE BASE-PLATE HOLE DIAMETER EXCEEDS BOLT DIAMETER PLUS 1/16" INCH, PROVIDE F436 WASHER AT BOTH SIDES OF BASE PLATE

THREADS - 6" MIN. OR 2 X DIA. +2" (WHICHERVER IS GREATER) THREADS SHALL BE CUT, NOT ROLLED OR UP-SET

NOTES:
1. Template for anchor bolts to have holes that are 1/16" diameter larger than diameter of anchor bolts.
2. Template to be made out of 3/16" inch thick (minimum) steel plate.
3. Acceptable anchor bolt material:  ASTM F1554 Grade 36
   ASTM F1554 Grade 55
   ASTM A307 Grade A or B
4. Anchor bolts and nuts shall be hot-dipped galvanized after fabrication in accordance with ASTM A153.
5. Threads of nuts shall be chased after galvanizing and be lubricated with blue-colored lubricant prior to assembly.
### MATERIAL LIST

<table>
<thead>
<tr>
<th>ITEM</th>
<th>DESCRIPTION</th>
<th>QUANTITY</th>
<th>CODE No.</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>GROUND ROD, 5/8&quot; X 8' COPPERWELD</td>
<td>2</td>
<td>E384.02</td>
</tr>
<tr>
<td>2</td>
<td>GROUND ROD CLAMP</td>
<td>2</td>
<td>E383.01</td>
</tr>
<tr>
<td>3</td>
<td>OAK MOULDING 1&quot; X 8'</td>
<td>1</td>
<td>E382.10</td>
</tr>
<tr>
<td>4</td>
<td>GALVANIZED STAPE WITH DRIVE STOP PROTECTIVE PAD</td>
<td>30</td>
<td>E312.26</td>
</tr>
<tr>
<td>5</td>
<td>MOULDING STAPLE</td>
<td>5</td>
<td>E312.28</td>
</tr>
<tr>
<td>6</td>
<td>SOUTHWIRE #4 PPC-PGW (PROOF POSITIVE COPPER PROTECTED GROUND WIRE)</td>
<td>60 FT.</td>
<td>E175.26</td>
</tr>
</tbody>
</table>

**NOTE:**

1. Method A is for REFERENCE ONLY. Method A was used where 25 ohms or less ground resistance was achieved by measurement. See G.O. 95-21.2.
2. Ground rods shall be separated by 6 ft. minimum in any direction.
3. Rods can be driven at an angle of 45° outward if the 6 ft distance is unattainable. However, the top of the ground rods still need to be separated by approximately 2 feet.
4. All grounding devices have to be driven in native soil.
5. Install moulding to 8 feet above the finished grade.
NOTES:

1. CAUTION: DETAILED RELAY SETTING/COORDINATION STUDY REQUIRED TO DETERMINE TAP LENGTH. LENGTH TYPICALLY VARIES FROM .2 TO 2 MILES DEPENDING ON LOCATION.

LEGEND

C.O.R. CITY OF REDDING

METERING

115KV STATION CLASS SWITCH

115KV CIRCUIT BREAKER

CIRCUIT SWITCHER (OR CIRCUIT BREAKER)

METAL CLAD CIRCUIT BREAKER (TYP)

115KV LINE SWITCH

SHEET 1 OF 1

Redding Electric Utility

TYPICAL 115KV TRANSMISSION SERVICE (3 WIRE)
CONCEPTUAL ONE LINE

DES/REV DATE ASST. DIRECTOR - UTILITY OPERATIONS REVISION
BRR/JCR 09/13/93 11/05/93 11/05/93 ES6200