Roseville Electric

SPECIFICATIONS

FOR

COMMERCIAL CONSTRUCTION

REVISED
07/12/23

Commercial Construction Specifications
Revision List

REVISION

Date	Page No.	Description
03/01/00	4.2-4.3	Changed leveling system & removed knockout window.
03/20/00	3.1	Added note for trenches to be in accordance to Cal OSHA.
	8.1-8.2	Added Armorcast to approved manufacturer list for boxes.
05/15/00	5.1.2	New grounding specifications for Above Ground 3 phase J-Boxes.
06/19/00	4.3.1	Revised bare copper ground from 37 strand to 19 strand.
06/19/00	9.2.1	Correct spelling errors and renumbered from 9.1.1 to 9.2.1.
08/15/00	9.1, 9.2, 9.3	Added alternative grounding for hard soil conditions.
10/17/00	7.1-7.1.6	Revised entire Metering requirements section.
11/21/00	2.1	Revised concrete slump from 7" to 5" and added ¾" polyester tape.
02/20/01	9.6	Added burn in period for street light circuits.
04/17/01	2.1	Removed Kevlar from approved pull tape.
04/17/01	9.1, 9.2, 9.3, 9.4	Added Shorting Cap & Photo Eye made of UV protected material.
06/19/01	7.1-7.1.7	Revised entire Metering requirements section.
08/27/01	6.1.1,6.2.1,6.3.1 & 6.4.1	Added new specifications on Pre-cast Transformer Pads.
11/20/01	5.1 & 10.3	Added note "For Special Conditions Use Only".
11/20/01	5.1.1,5.1.2	Installation & Grounding Details for Above Ground J-box.
11/20/01	10.1.1	Added clearances for Above Ground J-box.
11/20/01	10.3.2	Removed from Specifications.
12/18/01	2.1-2.1.1	Added Approved Measuring Pull Tape List.
12/18/01	7.1-7.1.5	Revised to make meters and main disconnects directly outside accessible at all times.
12/18/01	9.1, 9.2, 9.3, 9.3.1	Added notes for approval of equipment to be installed.
01/15/02	11.1	New Clearance Requirements for Overhead conductors to Bldgs.
02/13/02	7.1-7.1.6	Corrected to specify 2-pair phone conductor and page 7.1.6.
04/18/02	6.1-6.4.1	Clarify notes for grounding in hard soil conditions.
05/15/02	5.1.2	Revise installation of J-box, set vault 12" below grade & forward.
09/30/02	2.1.1	Added testing standards and another approved manufacturer of pull tape.
10/24/02	7.1-7.1.10	Added verbiage for one handle disconnect, labeling street addresses, and photovoltaic metering.
12/18/02	8.1-8.2	Added one approved manufacturer for #30 box.
02/20/03	9.3	Added Valmont DS32 pole 800A.
03/20/03	10.1.1 & 10.3.1	Revised working clearances for sides and back of Above Ground J-box to 3 feet.
07/23/03	7.1-7.1.10	Added verbiage for marking meter panel and the service disconnects it feeds.
08/28/03	6.1-6.4	Removed poured in-place pads and made grammatical corrections.
12/18/03	7.1-7.1.10	Added verbiage to clarify accessibility by utility.
01/21/04	10.1 & 10.6	Added notes and Table of approved trees for planting under power lines.
02/11/04	12.1	New Capacitor Bank Pad taken from Construction Standards.
10/27/04	7.1-7.4.2	Revised section 7 to add clearance to meters and pathway to meters. Renumbered the appendices to 7.2 thru 7.4.2
11/19/04	4.8	New Concrete Pad specification for DF5 Switch.

Continued …
Commercial Construction Specifications
Revision List

REVISION

Date	Page No.	Description
03/23/05	6.3	Correction to Low Voltage Compartment dimension reference point.
	6.1-6.1.1	Removed details on page 6.1 and removed page 6.1.1
	10.4	Revised notes and added non-removable post to detail.
10/26/05	7.1.6-7.1.7	Clarification and clean up of wording.
	5.3-5.4	Use Note added to 12kV Splice Pull Box.
12/6/05	7.1.3	Meter Requirements, item 5 Service Disconnects revised.
12/28/05	1.1-1.1.1	Revised dry utility contacts information.
01/18/06	4.3.1, 5.1.1 & 5.1.2	Clarification of alternative ground wire placement in special conditions.
	9.1.1-9.3.1	Added page 9.1.1 100W decorative street light and update approved models for 150w and 250w decorative lighting.
04/19/06	8.1 &8.2	Added New Basis to the list of approved secondary boxes.
07/24/06	8.1 &8.2	Removed New Basis from the list of approved secondary boxes.
10/17/06	9.2.1, 9.3.1	Update to approved vendor list for light poles and clarify conduit note.
	9.5	Note added for wire size, color, and grounding of equipment.
02/05/07	9.2	Add manufacturer and part number to spec.
02/20/07	9.1.1,9.2.1,9.3.1	Corrected manufacturer part number.
04/23/07	10.1.1,10.2,12.1	Revised door orientation for switchgears and capacitor banks
08/30/07	12.1	Approved poured in place with Pre-cast pad for use with capacitor banks.
02/20/08	2.1	Revised conduit sweeps and bends.
02/20/08	7.1-7.1.8	Revised notes for 3 Phase, 4 wire, 120/240V Delta and 277/480V Wye.
08/12/08	7.4	Added note #7 for additional Photovoltaic metering requirements.
04/23/09	5.3,5.4	Change Pullbox lid material from steel to aluminum.
08/18/09	7.1-7.1.8 & 7.4-7.4.13	Revised the specifications for Solar Electric metering and tagging.
09/17/10	2.1.0-2.2.0	Revised the Conduit Requirement and Specifications & General Conduit Details to include 6" conduit requirements.
10/21/10	5.4	Modified pullbox detail to include both 4" & 6" conduit terminations.
02/17/11	9.1.1	Modified the 100w HPS Decorative Streetlight Specification to specify a concrete foundation.
07/21/11	7.1 & 7.4	Revised the drawings to better reflect the PV Disconnect locations and rearranged and updated the specification text for PV metering and information on the Roseville Electric Solar Electric Program.
01/19/12	7.4	Revised the drawings to call out line and load side of devices and specify the main and customer breakers. Added statement to specification text requiring visible air gap on disconnect devices.
03/16/12	10.3.1	Revised note for working clearances for sides and back of Above Ground J-box to 3 feet (originally missed in 03/20/03 revision).
05/17/12	7.1	Revised service disconnects to exclude using the switchgear or panel door as the locking provision, more specific information for acceptable panels in the EUSERC requirements, telephone conductor updates for automated meters.
06/21/12	7.4	Added references to panel requirements listed in 7.1, cleaned up out-of-date references on all connection diagrams
06/21/12	4.8 & 4.9	Updated to 4.8 with door side and bell end references and added new spec 4.9 for DF20 standard pad
07/19/12	9.1, 9.2, 9.3	Updated Armeron part number, arm note to include required rise, added baseplate detail with bolt pattern, general updates

REVISION

Date	Page No.	Description
06/20/13	4.2.0, 4.3.0, 4.3.1, 4.4.0	Added 6” conduit to mainline excavation vault
09/03/14	9.7.0, 9.7.1, 9.7.2, 9.7.3, 9.7.4, 9.7.5	New Cobrahead LED luminaire section for streetlights
12/16/15	9.7.0, 9.7.1 9.7.2, 9.7.3 9.7.4, 9.7.5	COBRAHEAD revisions, added URL for DLC (Design Lights Consortium)
04/13/16	7.4, 7.4.1, 7.4.2 7.4.3, 7.4.4, 7.4.5 7.4.6, 7.4.7, 7.4.8 7.4.9, 7.4.10, 7.4.11 7.4.12, 7.4.13, 7.4.14	Commercial customer owned interconnected generation requirements
05/03/16	9.8, 9.8.1, 9.8.2 9.8.3, 9.8.4, 9.8.5	Decorative Post Top LED Luminaire Specs
07/01/16	7.1	Commercial Low Voltage Meter and Service
07/16/16	9.1.1, 9.2, 9.2.1, 9.3, 9.3.1	Decorative street lights/luminaires
10/05/16	2.1	6” sweeps, 4.3.1 – Pad vault ground clamp part # change
05/30/17	7.4	Removed all references to commercial PBI metering programs – no longer offered
08/24/17	9.7	Cobrahead LED Luminaire specs.
06/15/18	1.2, 2.1.1, 2.2	Title block changes only
09/04/18	4.1	Vault Notes
01/24/19	4.10	Concrete Pad Interceptor Vault, 4.5, 4.6, 4.7, 5.1 Title blocks only
02/28/19	9.1	100W HPS LED EQUIVALENT ST. LIGHT STANDARD
06/27/19	3.1, 3.2	Mainline Trench and backfill.
	5.1.1, 5.1.2, 5.2	Junction Boxes and grounding.
09/26/19	5.3, 5.4	12kV Pullbox (Mainline, Splice)
02/06/20	6.1, 6.1.1, 6.2, 6.3, 6.4, 7.2	Transformer pad
	9.1, 9.1.1, 9.2, 9.2.1, 9.3, 9.3.1, 9.4	Streetlight extra conduits for 5G
08/16/22	7.4.7.4	Added additional no line side tap language for solar generation
05/18/23	7.4	Added multifamily dwelling PV requirements and modified existing commercial PV interconnection requirements
07/12/23	7.4	Removal of PV visible AC disconnect and production meter requirements

ROSEVILLE ELECTRIC SPECIFICATIONS
FOR COMMERCIAL CONSTRUCTION

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CITY OF ROSEVILLE CALIFORNIA
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ADOPTED: 9/07/93

POLICY FOR COMMERCIAL ELECTRIC UTILITY INSTALLATIONS THIS POLICY COVERS ALL COMMERCIAL ELECTRIC INSTALLATIONS AND INCLUDES APARTMENTS, CONDOMINIUMS, TOWN HOMES, AND MOBILE HOME PARKS (See Notes 1 and 2)

DEVELOPER RESPONSIBILITY (See Note 2)

1. Land rights.

2. Trenching, excavation, backfill, grading, and compaction.

3. Furnish and install all materials not installed by Roseville Electric crews which shall include, but not be limited to, transformer vaults or pads, primary junction boxes and covers, conduits for primary conductors and riser poles. These items to be installed per Roseville Electric Specifications for Commercial Construction.

4. Furnish and install all street lighting materials per Roseville Electric Department design and Specifications on public roadways. Developer is responsible for design, installation, and maintenance of the entire street lighting system on private roadways.

5. Furnish and install secondary service conduits and conductors to transformer. No more than 8 service conductors per phase are allowed with a maximum wire size of 1000 MCM (copper or aluminum).

6. Pay for all material attributed to the development as determined by the Electric Utility Director, installed by Roseville Electric Department crews, which shall include, but not be limited to, conductor, transformers, switch enclosures, and meters and applicable electrical fittings.

7. Pay for installation of materials in Item 6 as determined by Roseville Electric.

8. Coordination with other utilities (SureWest, Pacific Gas & Electric, Comcast Cable Communications Inc., and City water/sewer/refuse, etc.), and any extra costs assessed by these other utilities.

9. The Electric Utility Director will require Items 6 and 7 to be paid before the Electric Department will purchase non-stock items or inspect any premises for acceptance and installation of electric facilities.

ROSEVILLE ELECTRIC RESPONSIBILITY

1. Design of electrical system for providing service to the development.

2. Installation of all primary (12kV) conductors and transformers.

3. Installation of meters and current transformers as required.

4. Roseville Electric shall construct the necessary facilities to deliver power to the developers area of responsibility as determined by the Electric Utility Director and outlined in City Ordinance 2407 dated March 20, 1991.

NOTE:

(1) This policy shall be subject to change by the City Council at any time in accordance with procedure established by the laws of the State of California and the provisions of the City of Roseville Municipal Code.

(2) All work to be performed by the Developer shall be subject to the approval of the Roseville Electric Utility Director.

POLICY NOTES:

1. The Engineer shall mean the Director of the City of Roseville Electric Department or any of his/her appointed representatives.

2. The Engineer has sole authority and reserves the right to make on-site inspections and observe the construction of its facilities at any time.

3. The Engineer reserves the right to make minor changes at any phase of the project to insure the proper installation of its facilities.

4. The Engineer has sole authority on the approval of any design or material changes requested by the owner or contractor.

5. Any material or design change made without prior approval by the Engineer is done so at the owners or contractors own risk.

6. Any unapproved material or design change or improperly installed system not meeting set City of Roseville Electric Specifications shall be replaced and properly installed by the contractor or owner at the contractor's or owner's own expense.

7. It is the responsibility of the developer's contractor to provide all the necessary field surveying and staking for the proper location and grade of all utilities. The Electric Department assumes no responsibility for placement of its facilities in or on improperly marked locations.

8. Installation of Electric Department facilities to be done according to Electric Department designed job print and City of Roseville Electric Department Specifications for Commercial Construction.

9. All construction of electrical facilities shall conform to State of California General Order no. 128, "construction of underground electric supply and communication systems" as well as applicable OSHA regulations.

10. Trench details in these specifications and on Electric Department job prints are typical for Electric only. If other utilities request joint occupation, it is the responsibility of the Developer to co-ordinate with the other utilities for their requirements.

POWER CONDUIT RUNS:
The number and size of all conduits to be installed on any project is determined solely by the Roseville Electric Job Print.

CONDUIT TYPES:
All 3", 4" and 6" Conduits shall PVC - Power and Communications, type D.B., Rated for 90°C., TC-8, DB-120 ASTM F512, Heavy Wall, . Conduits up to 2" shall be minimum Schedule 40 PVC

COUPLINGS:
Shall be minimum Schedule 40 long type PVC (except for end bell couplings provided on a P&C Conduit)

SOLVENT AND GLUING OF CONDUIT:
Shall be in accordance with ASTM - 2564 for PVC.

CONDUIT TERMINATORS:
Conduits shall be terminated in all concrete Manholes, Pad Vaults, Pull Boxes and J-Boxes with precast termaduct terminators (See Detail C, Page 2.2). For existing structures without precast termaducts, conduits shall be installed with end bells grouted in place flush with interior walls. (See Detail B, Page 2.2)

CONDUIT SWEEPS AND BENDS:
All sweeps with a radius of less than 15' shall be of prefab construction and be a minimum schedule 40. No field bent sweeps with a radius of less than 15' are allowed. The minimum sweep radius shall be per the Roseville Electric job print or the chart below, whichever is greater:

- 6" Conduit = 60" Radius (VERTICAL), 120" (HORIZONTAL)
- 4" Conduit = 48" Radius
- 3" Conduit = 36" Radius
- 1-1/2" Conduit = 18" Radius

No conduit run shall have more than a total of 360 degrees of bend unless specified by the Roseville Electric job print.

CONCRETE ENCASEMENT:
Conduits requiring concrete encasement shall be a minimum of two-sack sand slurry per Caltrans Standard Spec 19-3.062. The conduit shall have a minimum of 3" surrounding all sides of the conduit. Concrete encasement may be approved by inspector for shallow trench sections.

CONDUIT PROVING:
All conduits shall be blown free of water and debris. All 3", 4" and 6" conduits shall be provided with an approved pull tape. All conduits shall be proven with a Roseville Electric Department personnel observing. Use a proving Mandrel equal to 80% of the conduits diameter (Mandrel supplied by Roseville Electric).

CONDUIT MEASURING PULL TAPE:
Pull tape shall:

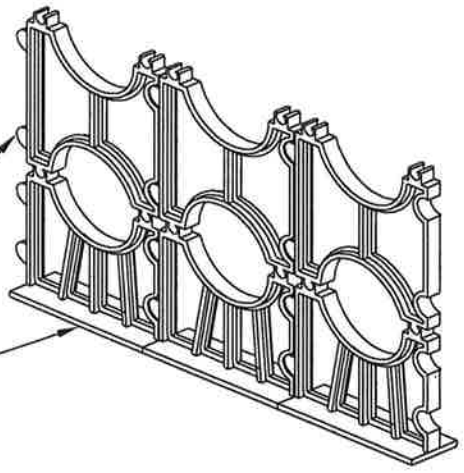
Be made from or 1/2" Polyester.
Have a minimum strength of 1800 lbs.
Be one continuous length (no splices)
Be pre-lubricated.
Be printed with footage markings.
Have a minimum of 22 Gauge Detectable Copper Conductor

The pull tap shall extend 10' past end of conduit.

CONDUIT BANKS:
Conduit Banks larger than 2 ducts shall be constructed with the use of pre fabricated spacers, (See Detail A, Page 2.2), placed at a minimum of 10'-0" O.C. to maintain spacing shown by details on Job Map.

DETAIL A

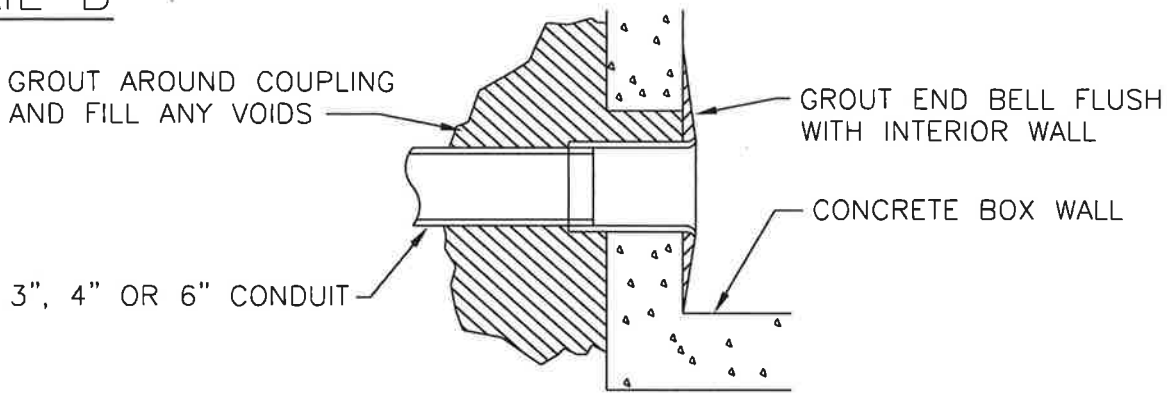
PRE-FAB PLASTIC SPACERS



DUCT SIZE	CONDUIT SEPARATION
3"	3"
4"	3"
6"	3"

NOTE:
MAXIMUM DISTANCE BETWEEN SPACERS = 10'-0"

DETAIL B

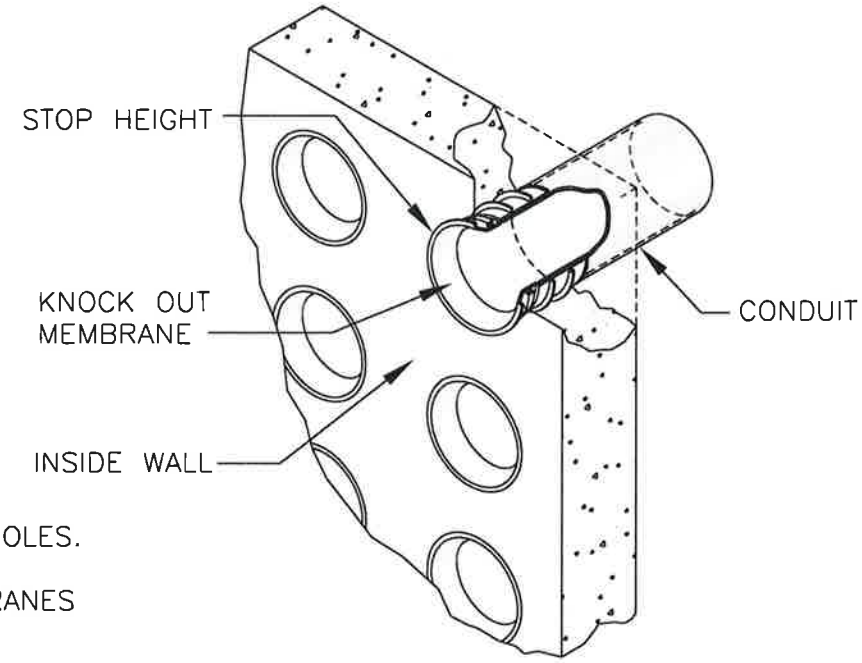


DETAIL C

TERMADUCT TERMINATORS

TERMADUCT TERMINATORS TO FIT O.D. OF FOLLOWING PIPES:

CONDUIT SIZE	O.D. OF CONDUIT
3"	3.500"
4"	4.500"
6"	6.625"



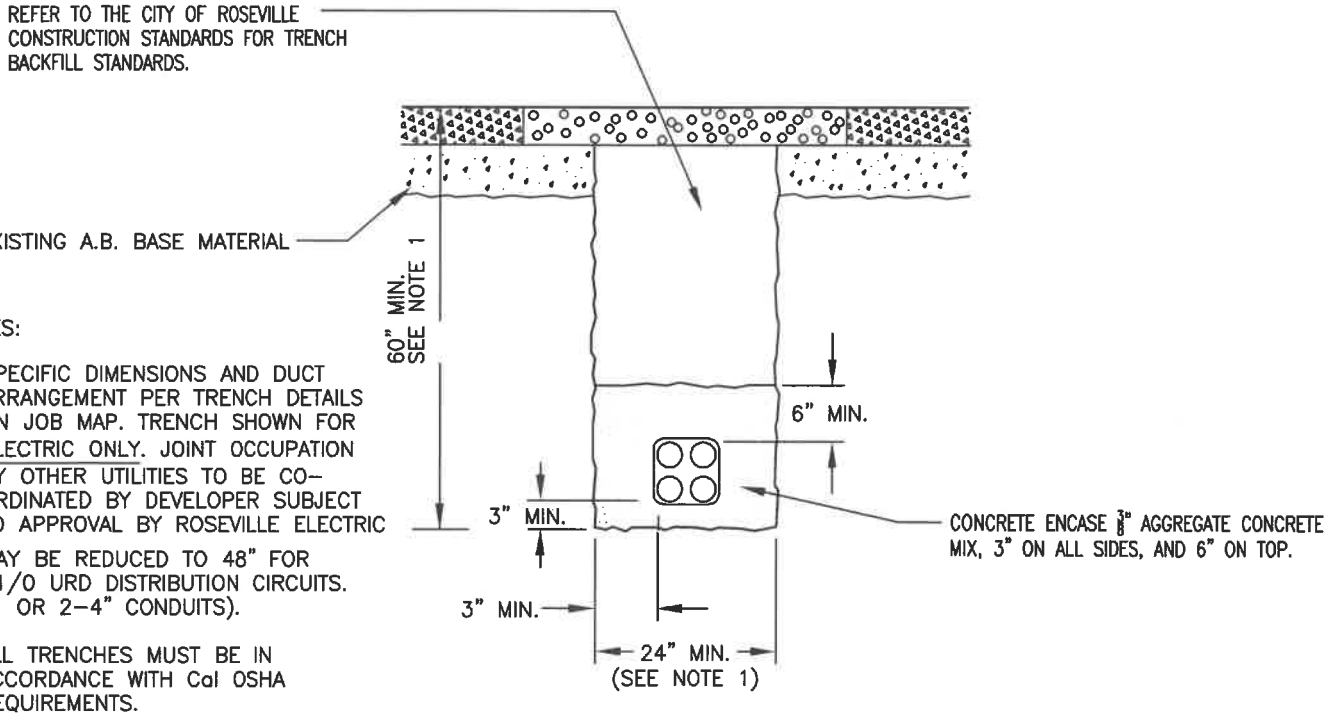
NOTE:
1. TERMADUCT TERMINATORS ARE PRECAST INTO VAULTS AND MANHOLES.

2. KNOCK OUT ONLY THOSE MEMBRANES NEEDED FOR DUCT TERMINATION.

ENGINEERING MANAGER	**GENERAL CONDUIT DETAILS & SPECIFICATIONS**	**CITY OF ROSEVILLE** ROSEVILLE ELECTRIC CONSTRUCTION STANDARD
OPERATIONS MANAGER		
ENG. TECH. SUPERVISOR	REVIEW COMMITTEE	DATE 06/15/18 — DR.NO. **PAGE 2.2**

DETAIL E

DUCT SYSTEM IN EXISTING STREET – MAINLINE

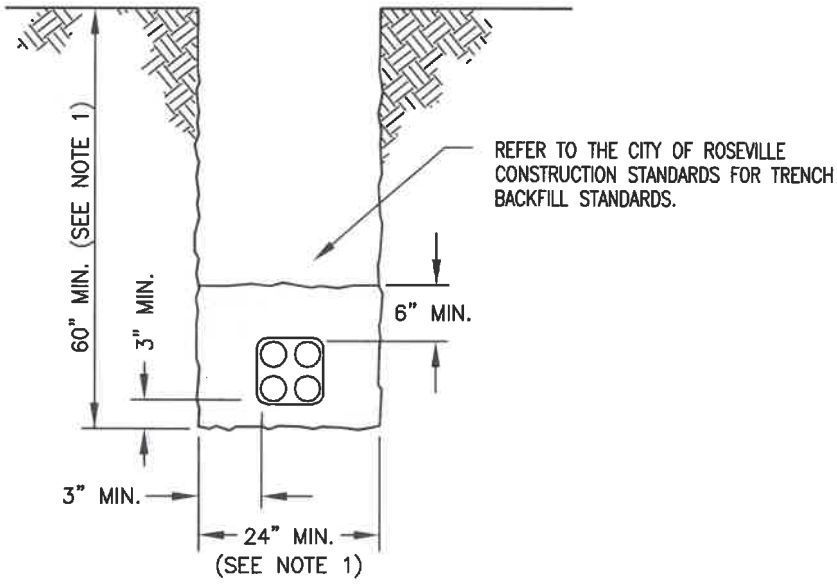


NOTES:

1. SPECIFIC DIMENSIONS AND DUCT ARRANGEMENT PER TRENCH DETAILS ON JOB MAP. TRENCH SHOWN FOR ELECTRIC ONLY. JOINT OCCUPATION BY OTHER UTILITIES TO BE CO-ORDINATED BY DEVELOPER SUBJECT TO APPROVAL BY ROSEVILLE ELECTRIC
2. MAY BE REDUCED TO 48" FOR #1/0 URD DISTRIBUTION CIRCUITS. (1 OR 2-4" CONDUITS).
3. ALL TRENCHES MUST BE IN ACCORDANCE WITH Cal OSHA REQUIREMENTS.

DETAIL F

GENERAL TRENCH DETAIL – MAINLINE OUTSIDE OF ROADWAY



ENGINEERING MANAGER 7/5/19	**GENERAL TRENCH DETAILS MAINLINE**		**CITY OF ROSEVILLE ROSEVILLE ELECTRIC CONSTRUCTION STANDARD**
OPERATIONS MANAGER			
ENG. TECH SUPERVISOR	REVIEW COMMITTEE	DATE 06/27/19	DR.NO. **PAGE 3.1**

TRENCH BACKFILL

DUCT BANK SANDING AND BACKFILL :

All conduits not encased in concrete shall be encased in sand to a minimum level of 6" ABOVE CONDUITS AFTER COMPACTION. Sand shall be screened with a #4 sieve and cleaned of all deleterious matter. (DECOMPOSED GRANITE WILL NOT BE APPROVED). Remainder of trench to be backfilled with native material (also free of all deleterious materials, rocks or boulders) compacted to minimums listed below.

COMPACTION

DUCT BANKS UNDER SIDEWALK OR ROADWAY:

Backfill shall be compacted to 90% to within 8 inches of sidewalk subgrade and 95% within the upper 8 inches of subgrade.

VAULTS

GENERAL

1. For size and type of vault to be used, see Electric Department Job Map.
2. All joints between sections of vaults shall be provided with pliable gasket seals and interior seams are to be filled with an exterior grade non-shrink latex caulk.
3. All areas around vaults shall be backfilled with either sand or A.B. base material compacted to insure all voids around vaults are filled.
4. There shall be a minimum 50'-0" transition area between vault entrance knock-out configurations and main line trench configurations (see Job Maps). The mainline trench shall be made wider and, when necessary, deeper in the transition area to insure that conduits are brought into the vault at 90 degrees with vault wall without the use of prefab elbows. All conduit sweeps and bends shall be concrete encased per Roseville Electric requirements (see page 2.1) and job print.
5. All vaults shall have galvanized pulling irons. For number and location see specific vault detail.
6. For special application vaults ordered without precast duct terminators , all ducts shall be terminated into vaults with duct end bell terminators grouted flush with inside face of vault.
7. Each vault section and extension shall be clearly marked with its gross weight (lbs.) in a highly visible place.

CONCRETE PAD VAULTS

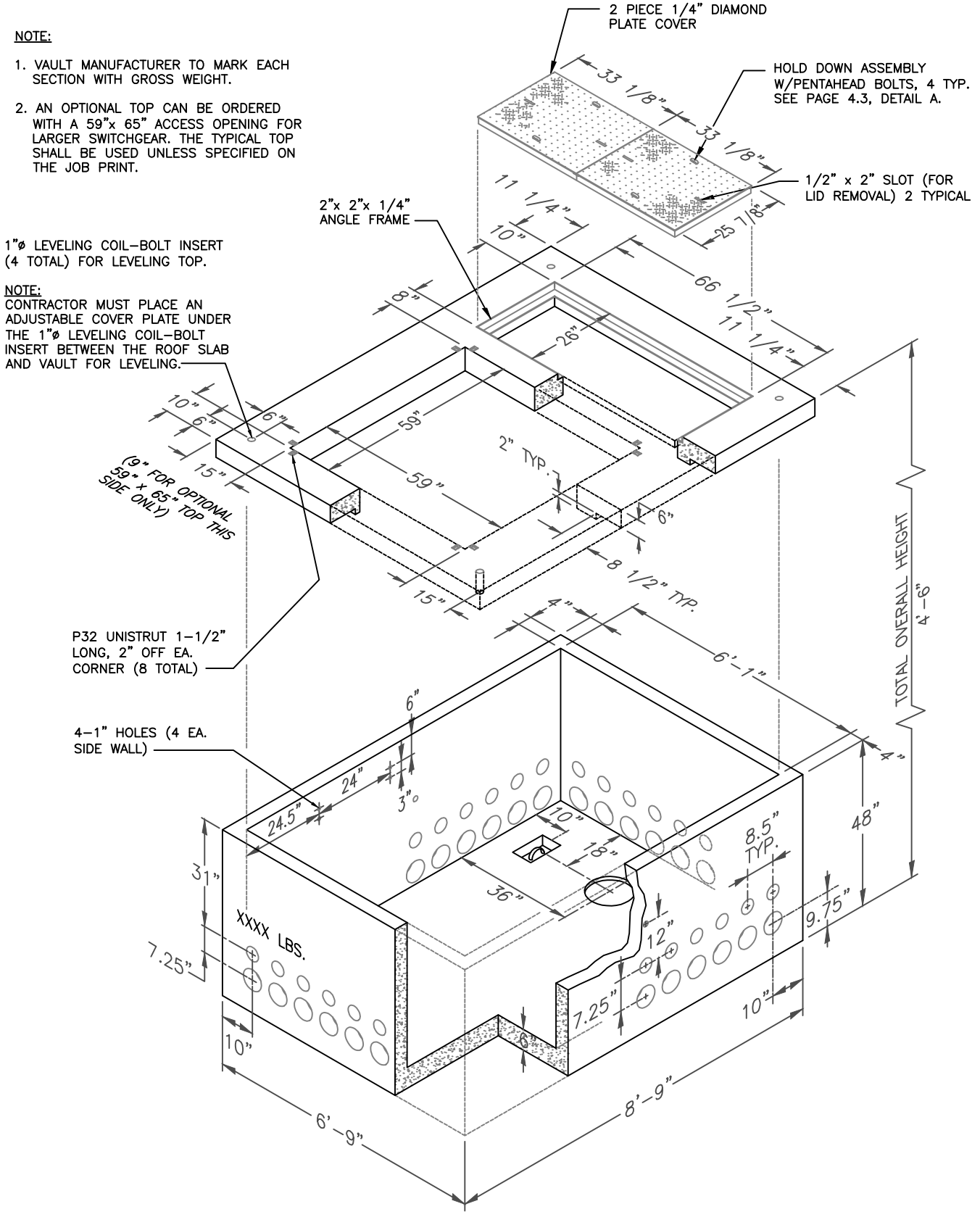
1. Vaults shall be set on undisturbed soil on a minimum base of 6" compacted A.B. material, or 6" of 3/4" crushed rock.
2. Vaults to be set flush with finish grade unless otherwise approved by the Electric Dept. Vaults placed in areas with slopes of 2% or less should be set flush with highest finish grade on vault perimeter. No slopes greater than 2% will be allowed within required clearance area around pad vaults. (See Page 4.4)

12KV CIRCUITS VAULTS (MANHOLES)

1. Vaults shall be set on undisturbed soil on a minimum base of 18" A.B. material compacted in 6" lifts to 95%.
2. Vaults, unless otherwise specified on Job Maps, shall be provided with Unistrut channel inserts on all 4 sides.
3. Vaults shall be provided with one 36" I.D. x 12" concrete riser and one 36" I.D. x 6" concrete riser. A 36" I.D. x 6" steel casting with steel traffic lid marked "Roseville Electric" and numbered per Roseville Electric job print and the ManHole Numbering Specification, 830-205, will be supplied by the City of Roseville for installation by the developer.
4. Concrete risers and steel casting shall be grouted in place with two galvanized ladder rungs inserted in place.
5. Vault riser section shall be encased in a minimum 9" wide concrete ring from the top of the vault to 2" below the top of the lid.
6. Steel lid of the vault riser section to be set flush with final grade. No slopes greater than 2% will be allowed within 4 feet of any portion of the steel lid.

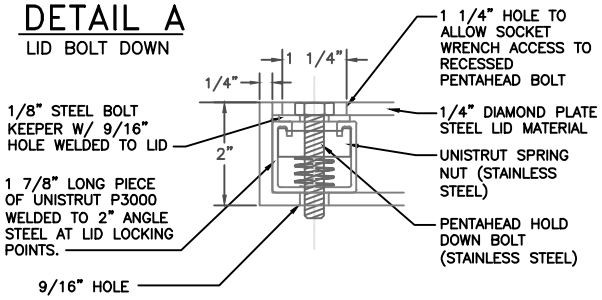
NOTE:

1. VAULT MANUFACTURER TO MARK EACH SECTION WITH GROSS WEIGHT.
2. AN OPTIONAL TOP CAN BE ORDERED WITH A 59"x 65" ACCESS OPENING FOR LARGER SWITCHGEAR. THE TYPICAL TOP SHALL BE USED UNLESS SPECIFIED ON THE JOB PRINT.

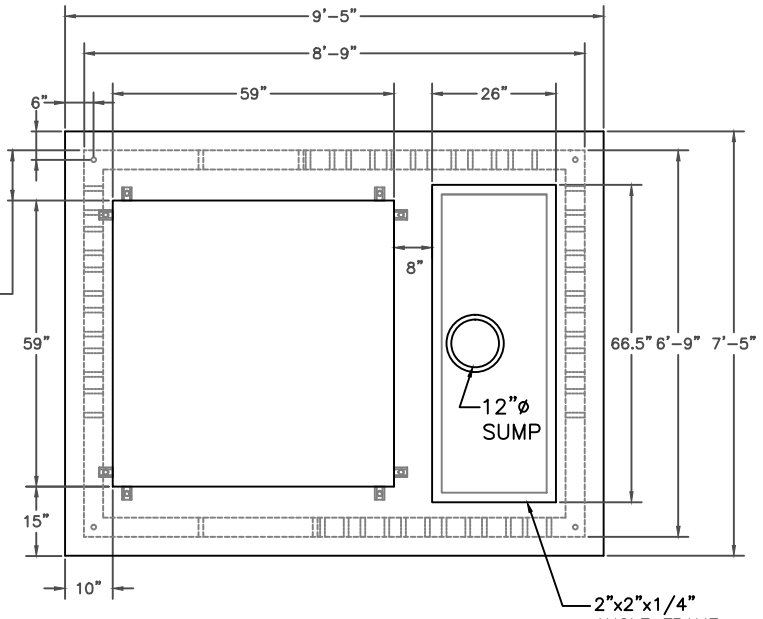


ENGINEERING MANAGER	**CONCRETE PAD VAULT FOR CITY OF ROSEVILLE**		**CITY OF ROSEVILLE** ROSEVILLE ELECTRIC CONSTRUCTION STANDARD
OPERATIONS MANAGER			
ENG. TECH. SUPERVISOR	REVIEW COMMITTEE: NEB, CP, Tm, Jon, MBL, RGL, mde	DATE 06/20/13	DR.NO. PAGE 4.2

DETAIL A
LID BOLT DOWN



PLAN VIEW



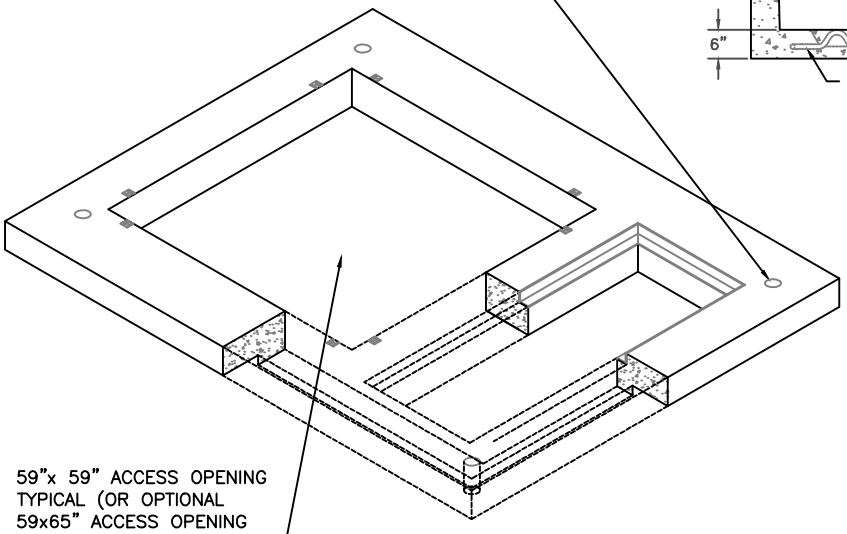
NOTE:

1. VAULT MANUFACTURER TO MARK EACH SECTION WITH GROSS WEIGHT.
2. AN OPTIONAL TOP CAN BE ORDERED WITH A 59" x 65" ACCESS OPENING FOR LARGER SWITCHGEAR. THE TYPICAL TOP SHALL BE USED UNLESS SPECIFIED ON THE JOB PRINT.

ISOMETRIC VIEW

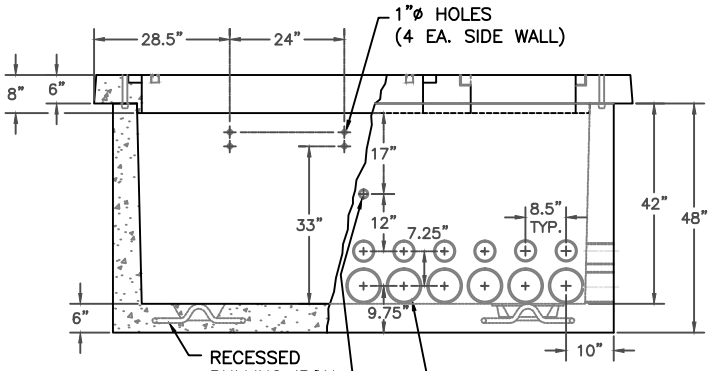
1"ø LEVELING COIL-BOLT INSERT (4 TOTAL) FOR LEVELING TOP.

NOTE:
CONTRACTOR MUST PLACE AN ADJUSTABLE COVER PLATE UNDER THE 1"ø LEVELING COIL-BOLT INSERT BETWEEN THE ROOF SLAB AND VAULT FOR LEVELING.

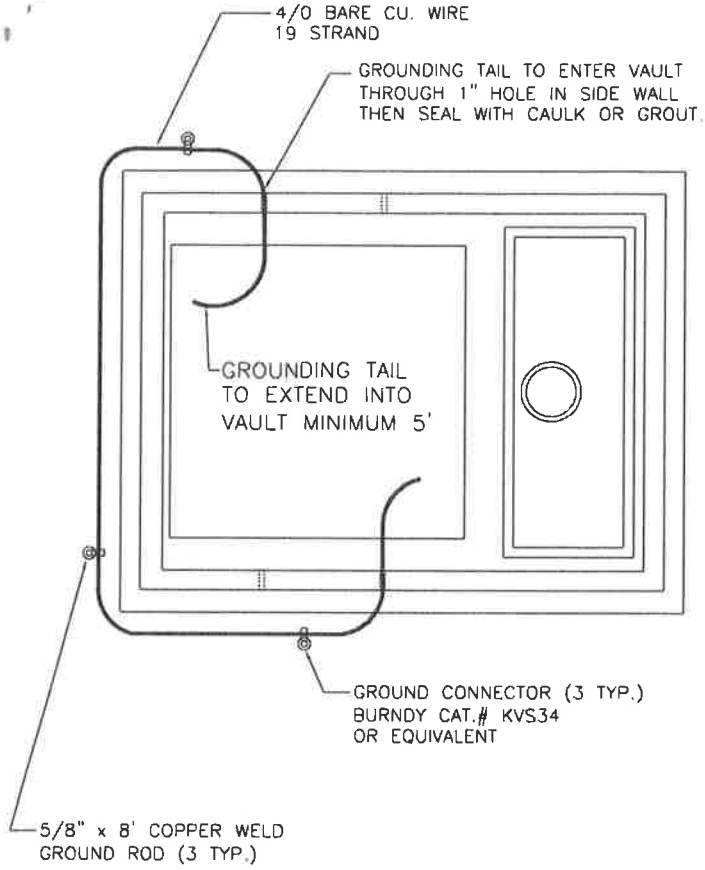


59"x 59" ACCESS OPENING TYPICAL (OR OPTIONAL 59x65" ACCESS OPENING FOR LARGE SWITCHGEAR) SEE NOTE 2.

ELEVATION
(CUTAWAY)

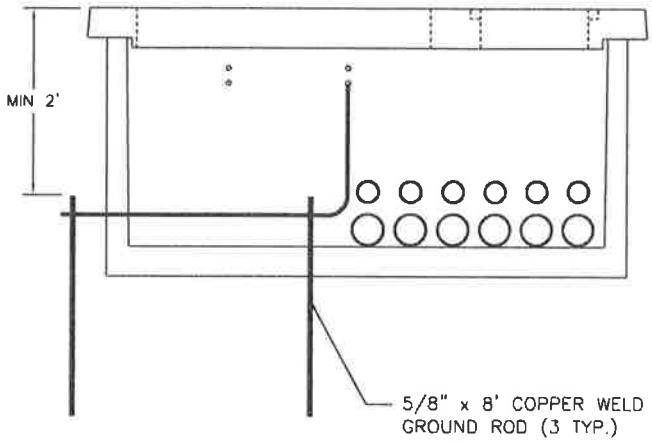


ENGINEERING MANAGER	**CONCRETE PAD VAULT FOR CITY OF ROSEVILLE**	**CITY OF ROSEVILLE** ROSEVILLE ELECTRIC CONSTRUCTION STANDARD	
OPERATIONS MANAGER			
ENG. TECH. SUPERVISOR	REVIEW COMMITTEE: NEB, CP, Tim, Jon, MBL, RWF, mae	DATE 06/20/13	DR.NO. PAGE 4.3



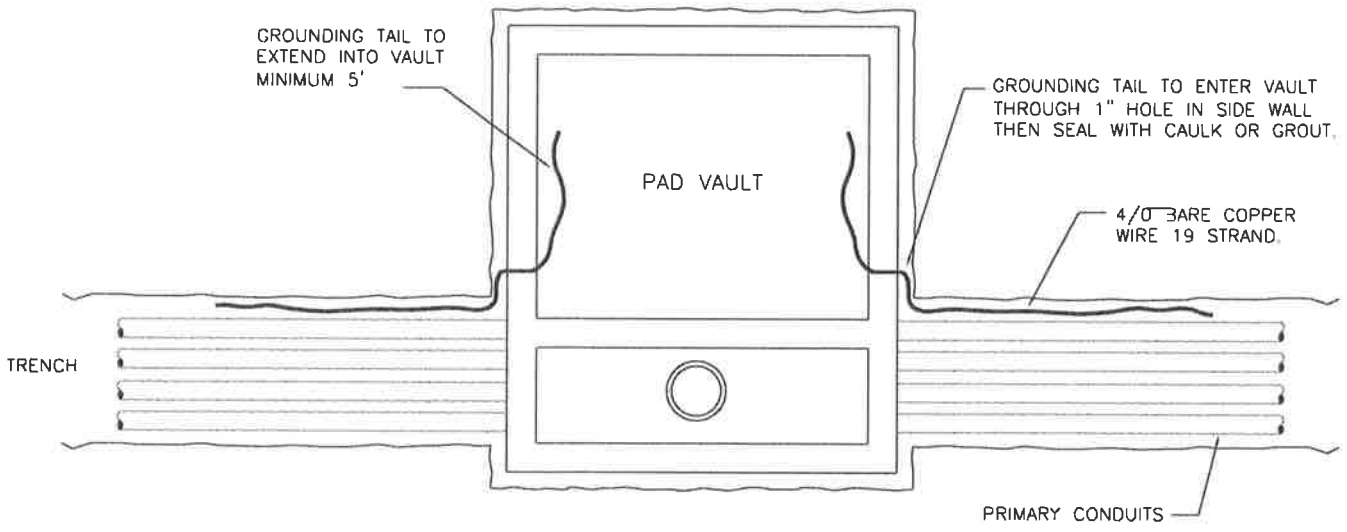
NOTE:

1. 4/0 COPPER WIRE AND GROUND RODS TO BE INSTALLED BY CONTRACTOR AND INSPECTED BY ROSEVILLE ELECTRIC INSPECTORS.



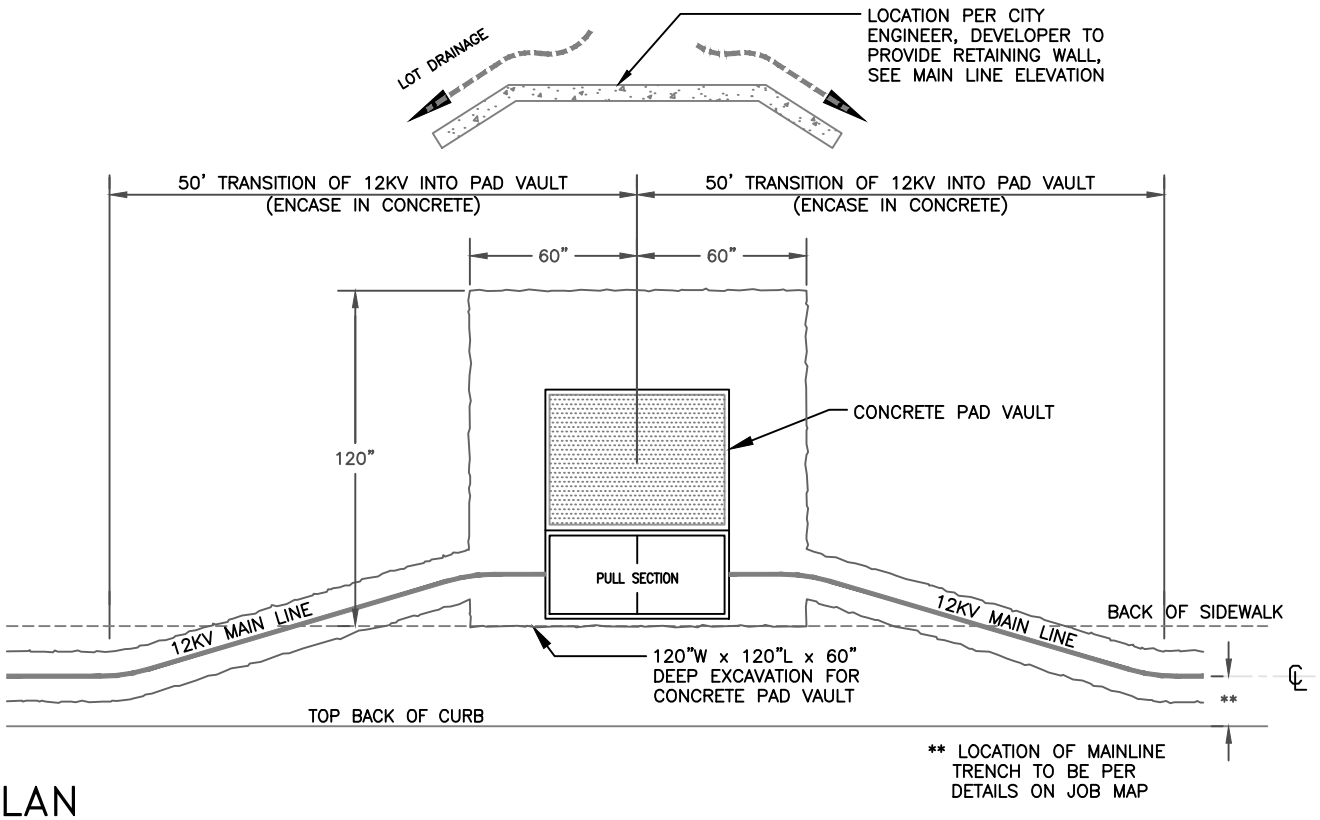
TYPICAL GROUND INSTALLATION

NOTE:
IN HARD SOIL CONDITIONS WHERE THE GROUND RODS CANNOT BE DRIVEN, THE DEVELOPER HAS THE OPTION OF PLACING TWO 35' LENGTHS OF 4/0, 19 STRAND, BARE COPPER WIRE. THE WIRE SHALL EXTEND INTO THE PAD VAULT 5' AND LAY IN THE BOTTOM OF THE TRENCH (MIN. 60" DEPTH) FOR A DISTANCE OF 25' IN DIFFERENT DIRECTIONS. THE WIRE SHALL BE ENCASED IN 3" OF CONCRETE.

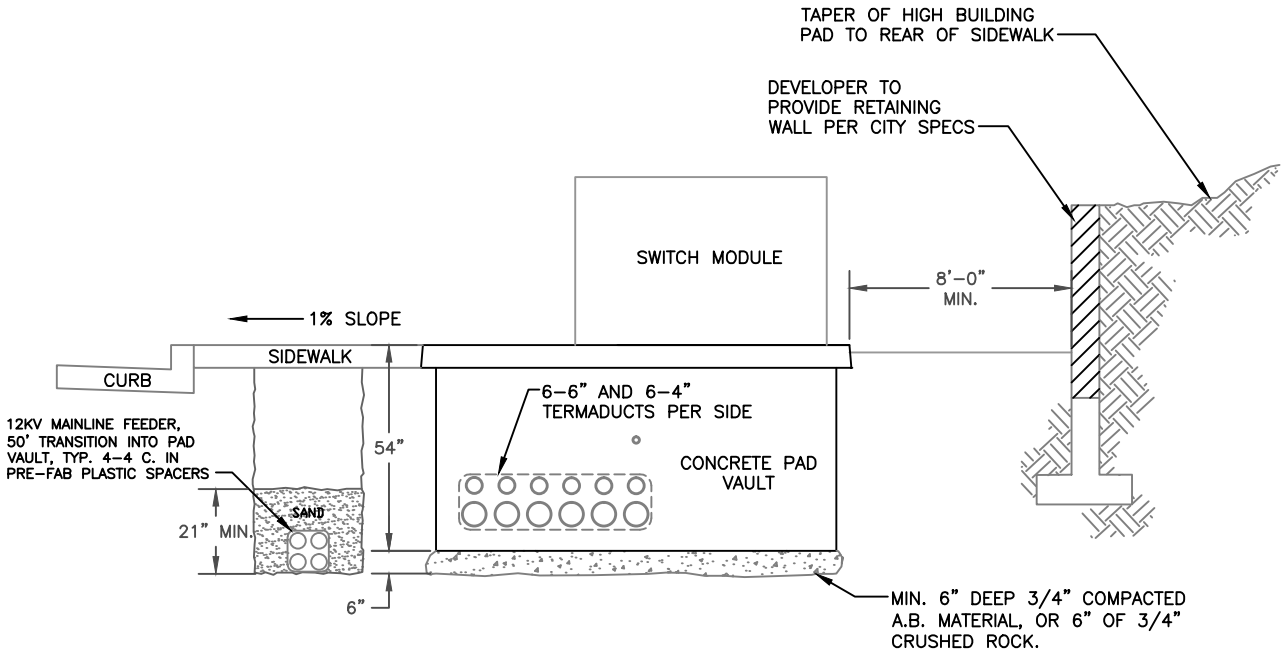


ALTERNATIVE GROUND INSTALLATION IN HARD SOIL CONDITIONS

ENGINEERING MANAGER	**PAD VAULT GROUNDING DETAIL**	**CITY OF ROSEVILLE**
OPERATIONS MANAGER		**ROSEVILLE ELECTRIC**
ENG. TECH. SUPERVISOR	REVIEW COMMITTEE	**CONSTRUCTION STANDARD**
	DATE **10/05/16**	DR.NO. **PAGE 4.3.1**



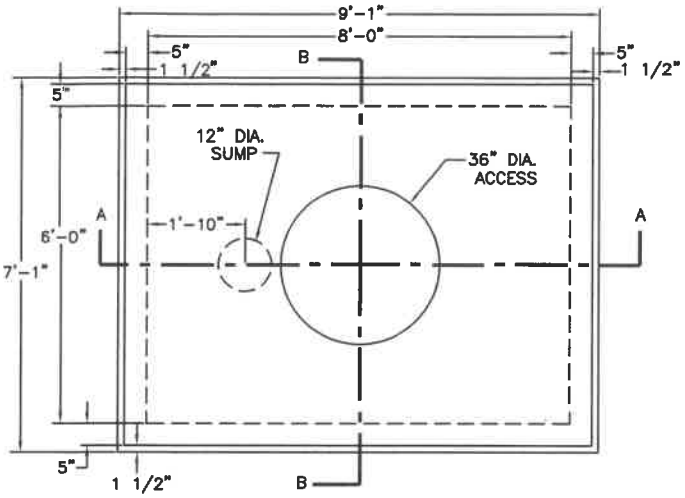
PLAN



* 8' MIN. CLEARANCE AT SWITCH MODULE DOORS, 4' MIN. CLEARANCE AT SIDES OF SWITCH MODULE FROM WALLS, BUILDINGS, PLANTERS, OR DIRT EMBANKMENTS. SLOPES TO BE 2% MAX. WITHIN THESE AREAS

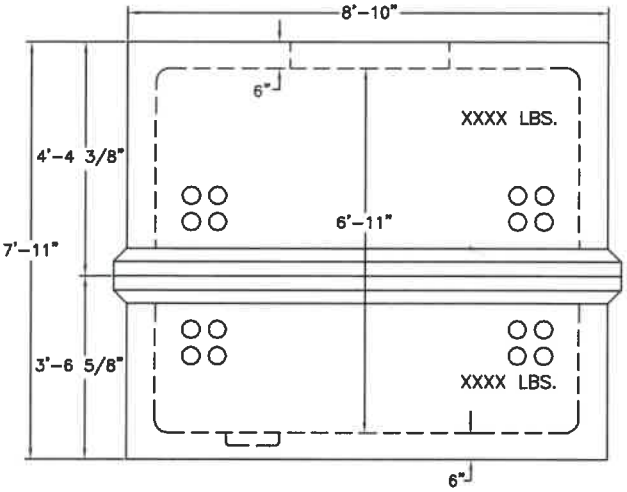
ELEVATION

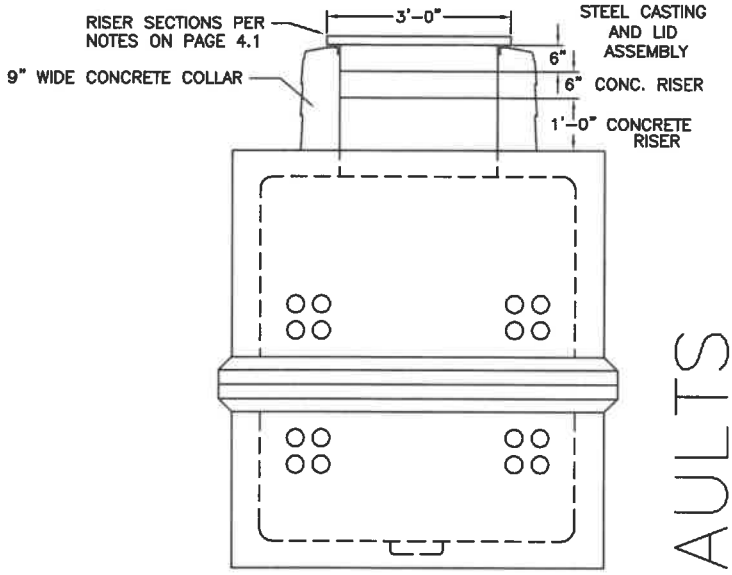
ENGINEERING MANAGER OPERATIONS MANAGER ENG. TECH. SUPERVISOR	**CONCRETE PAD VAULT PLACEMENT**	**CITY OF ROSEVILLE** **ROSEVILLE ELECTRIC** **CONSTRUCTION STANDARD**
NEB CP Tom Jon MAK RAS mae REVIEW COMMITTEE	DATE **06/20/13**	DR.NO. **PAGE 4.4**



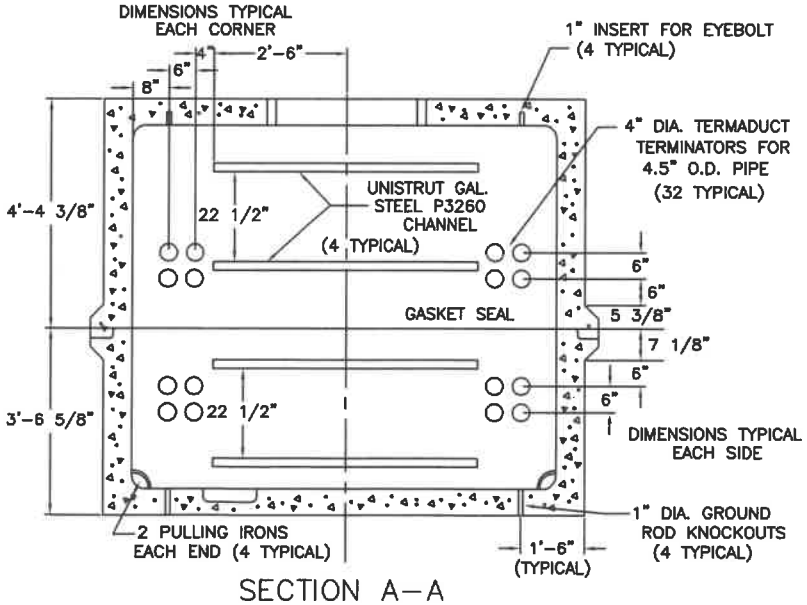
DESIGN NOTES:

1. THE VAULT SHALL BE DESIGNED USING THE FOLLOWING:
   A. OVERBURDEN: 2'-6" (SOIL WEIGHT 120 LBS. FT.^{3})
   B. H-20-44 BRIDGE LOADING
   C. 1 PIECE MONOLITHIC OR 2 PIECE W/ MID-SIDEWALL JOINT
   D. WATERPROOF JOINTS
   E. PULLING ANCHORS LOADING MAX. 20,000 LBS. (ONLY 2 ANCHORS IN A VERTICAL LINE BEING USED AT ANY TIME)
   F. HEAVY ENOUGH NOT TO FLOAT
2. ADMIXTURES- CALCIUM CHLORIDE OR ANY OTHER CHLORIDE ADMIXTURE SHALL NOT BE PERMITTED. A POTENTIALLY GOOD ADMIXTURE IS CALCIUM NITRITE WHICH NEUTRALIZES CL- IN A RATIO OF 2 TO 1
3. SURFACE SEALER- 2 COATS OF A PENETRATING EPOXY SEALER SHALL BE APPLIED TO THE EXTERIOR
   SEALER EXAMPLE: PEN SEAL 50 FROM AMERICAN METOSEAL CO., SUPER SEAL #35 FROM L & M CONST. CHEMICAL, OR EQUIVILANT
4. INTERIOR SHALL BE PAINTED WITH 2 COATS OF APPROVED WHITE MASONARY PAINT
5. PROVIDE LIFTING INSERTS AS REQUIRED
6. VAULT MANUFACTURER TO MARK EACH SECTION WITH GROSS WEIGHT

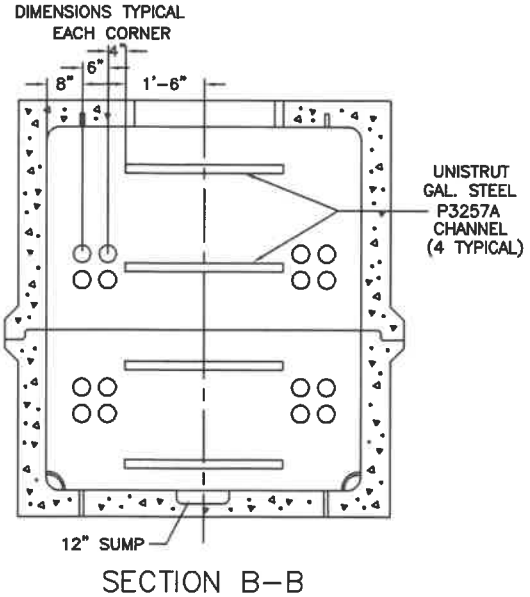




VAULTS

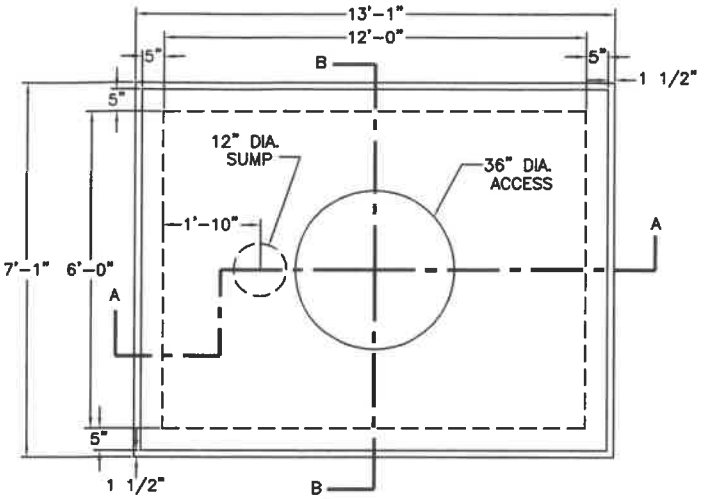


SECTION A-A



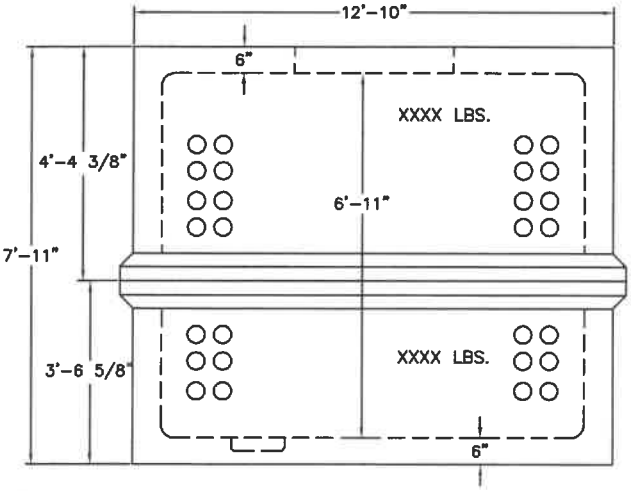
SECTION B-B

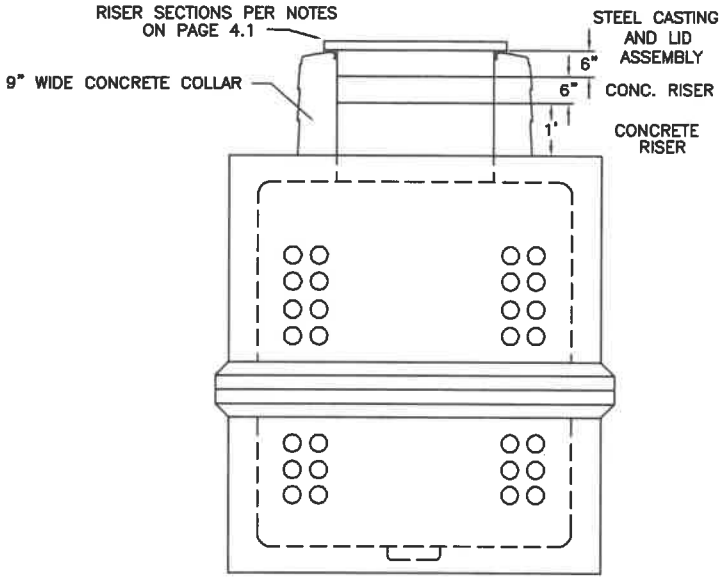
ENGINEERING MANAGER	**12kV SINGLE CIRCUIT VAULT (6'W x 8'L x 7'D)**		**CITY OF ROSEVILLE** ROSEVILLE ELECTRIC **CONSTRUCTION STANDARD**
OPERATIONS MANAGER			
ENG. TECH. SUPERVISOR	REVIEW COMMITTEE	DATE 01/24/19	DR.NO. 4.5

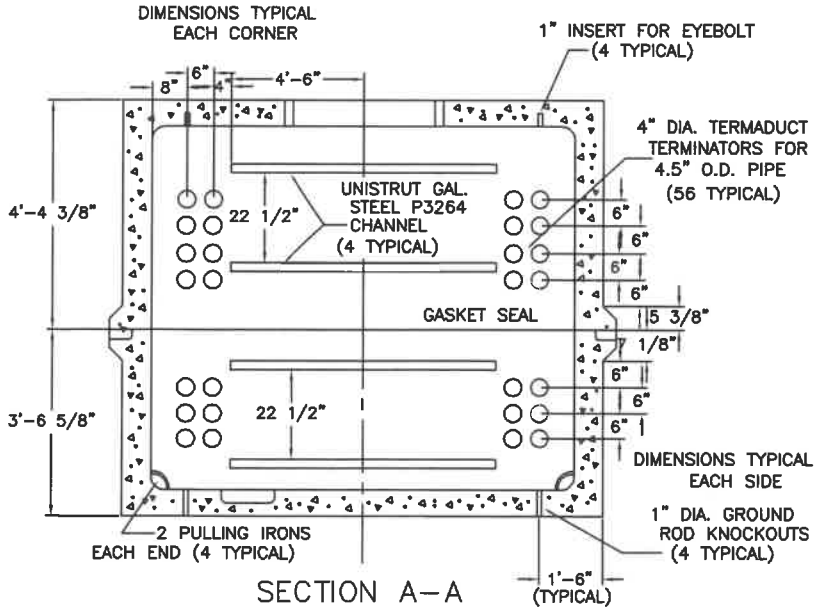


DESIGN NOTES:

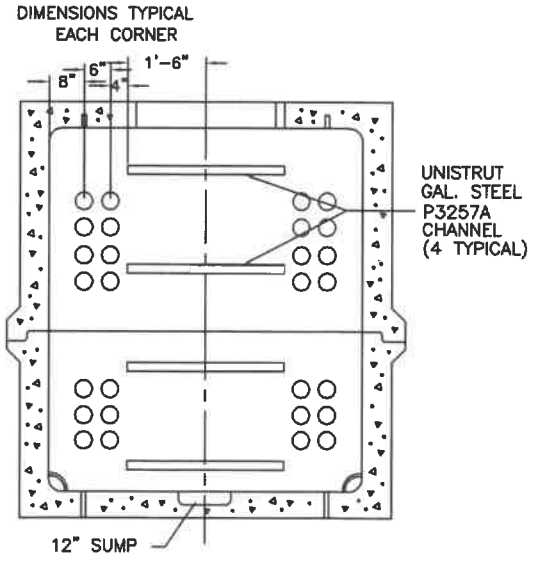
1. THE VAULT SHALL BE DESIGNED USING THE FOLLOWING:
   A. OVERBURDEN: 2'-6" (SOIL WEIGHT 120 LBS. FT.3)
   B. H-20-44 BRIDGE LOADING
   C. 1 PIECE MONOLITHIC OR 2 PIECE W/ MID-SIDEWALL JOINT
   D. WATERPROOF JOINTS
   E. PULLING ANCHORS LOADING MAX. 20,000 LBS. (ONLY 2 ANCHORS IN A VERTICAL LINE BEING USED AT ANY TIME)
   F. HEAVY ENOUGH NOT TO FLOAT
2. ADMIXTURES- CALCIUM CHLORIDE OR ANY OTHER CHLORIDE ADMIXTURE SHALL NOT BE PERMITTED. A POTENTIALLY GOOD ADMIXTURE IS CALCIUM NITRITE WHICH NEUTRALIZES CL- IN A RATIO OF 2 TO 1
3. SURFACE SEALER- 2 COATS OF A PENETRATING EPOXY SEALER SHALL BE APPLIED TO THE EXTERIOR
   SEALER EXAMPLE: PEN SEAL 50 FROM AMERICAN METOSEAL CO., SUPER SEAL #35 FROM L & M CONST. CHEMICAL, OR EQUIVILANT
4. INTERIOR SHALL BE PAINTED WITH 2 COATS OF APPROVED WHITE MASONARY PAINT
5. PROVIDE LIFTING INSERTS AS REQUIRED
6. VAULT MANUFACTURER TO MARK EACH SECTION WITH GROSS WEIGHT





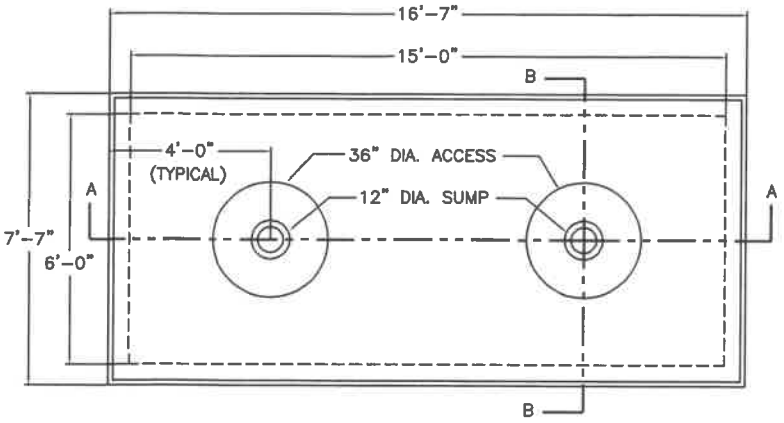


SECTION A-A



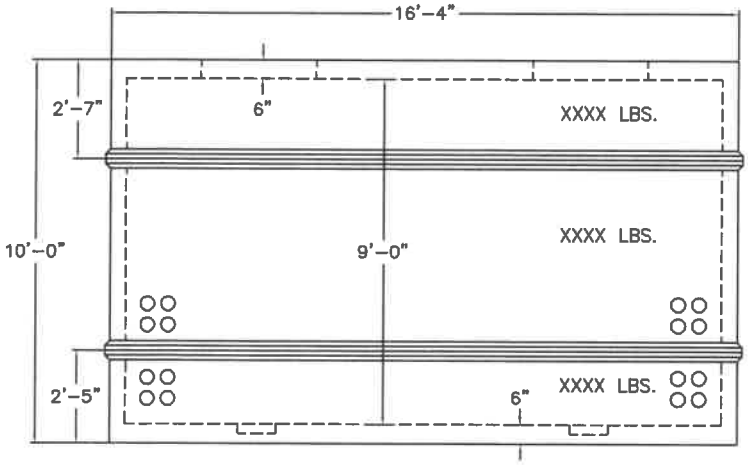
SECTION B-B

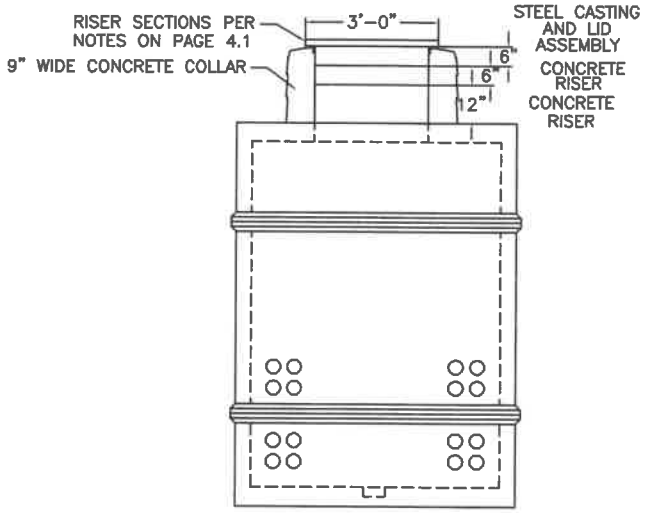
ENGINEERING MANAGER	**12kV MULTIPLE CIRCUIT VAULT (6'W x 12'L x 7'D)**		**CITY OF ROSEVILLE** ROSEVILLE ELECTRIC CONSTRUCTION STANDARD
OPERATIONS MANAGER			
ENG. TECH. SUPERVISOR	REVIEW COMMITTEE: HB JJC CM CS MJM WK PM	DATE 01/24/19	DR.NO. 4.6

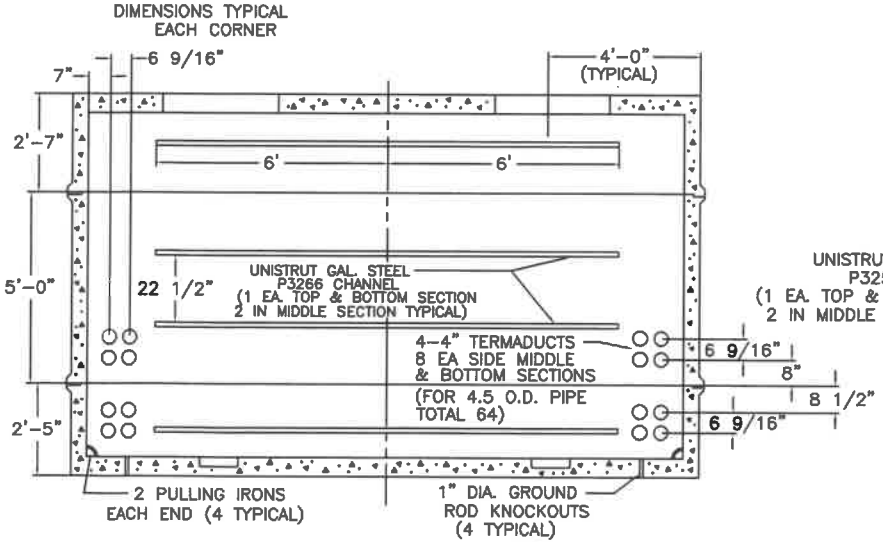


DESIGN NOTES:

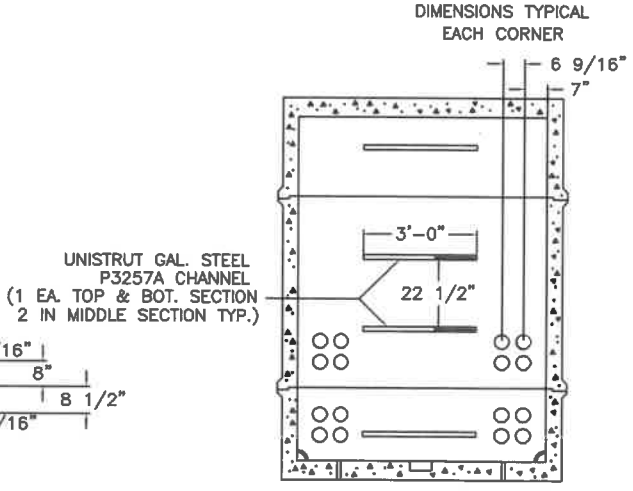
1. THE VAULT SHALL BE DESIGNED USING THE FOLLOWING:
   A. OVERBURDEN: 2'-6" (SOIL WEIGHT 120 LBS. FT.^{3})
   B. H-20-44 BRIDGE LOADING
   C. 1 PIECE MONOLITHIC OR 2 PIECE W/ MID-SIDEWALL JOINT
   D. WATERPROOF JOINTS
   E. PULLING ANCHORS LOADING MAX. 20,000 LBS. (ONLY 2 ANCHORS IN A VERTICAL LINE BEING USED AT ANY TIME)
   F. HEAVY ENOUGH NOT TO FLOAT
2. ADMIXTURES- CALCIUM CHLORIDE OR ANY OTHER CHLORIDE ADMIXTURE SHALL NOT BE PERMITTED. A POTENTIALLY GOOD ADMIXTURE IS CALCIUM NITRITE WHICH NEUTRALIZES CL- IN A RATIO OF 2 TO 1
3. SURFACE SEALER- 2 COATS OF A PENETRATING EPOXY SEALER SHALL BE APPLIED TO THE EXTERIOR
   SEALER EXAMPLE: PEN SEAL 50 FROM AMERICAN METOSEAL CO., SUPER SEAL #35 FROM L & M CONST. CHEMICAL, OR EQUIVALENT
4. INTERIOR SHALL BE PAINTED WITH 2 COATS OF APPROVED WHITE MASONARY PAINT
5. PROVIDE LIFTING INSERTS AS REQUIRED
6. VAULT MANUFACTURER TO MARK EACH SECTION WITH GROSS WEIGHT





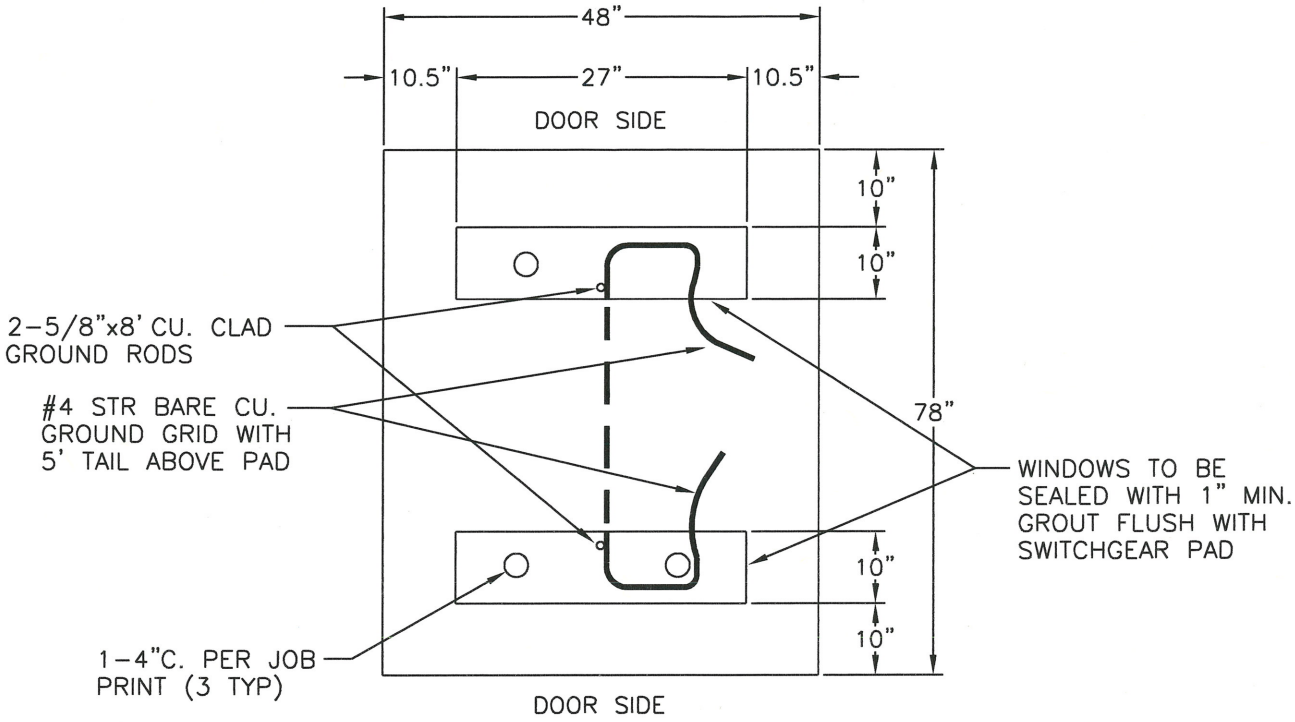


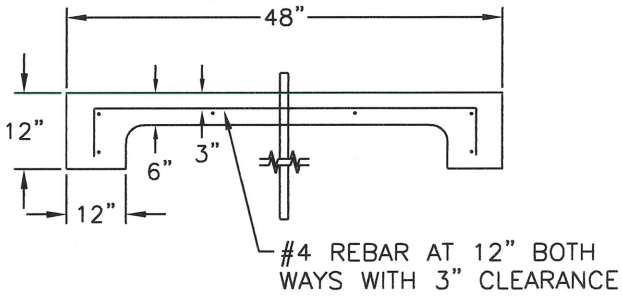
SECTION A-A



SECTION B-B

ENGINEERING MANAGER OPERATIONS MANAGER ENG. TECH SUPERVISOR	**12kV MULTIPLE CIRCUIT EXPANSION (6'W x 15'L x 9'D) SPLICE VAULT** REVIEW COMMITTEE	DATE **01/24/19**	**CITY OF ROSEVILLE** ROSEVILLE ELECTRIC CONSTRUCTION STANDARD DR.NO. **4.7**

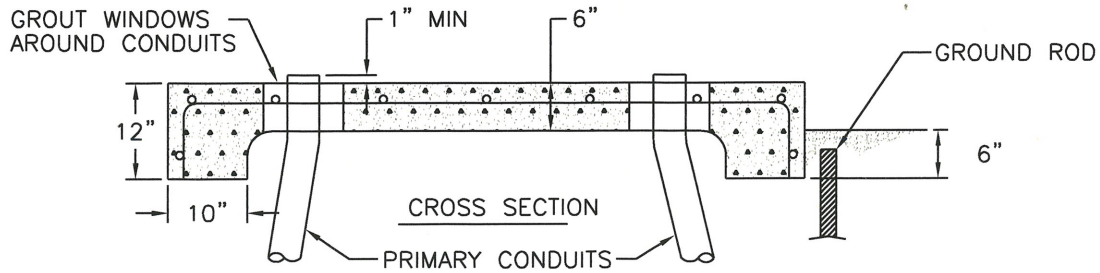


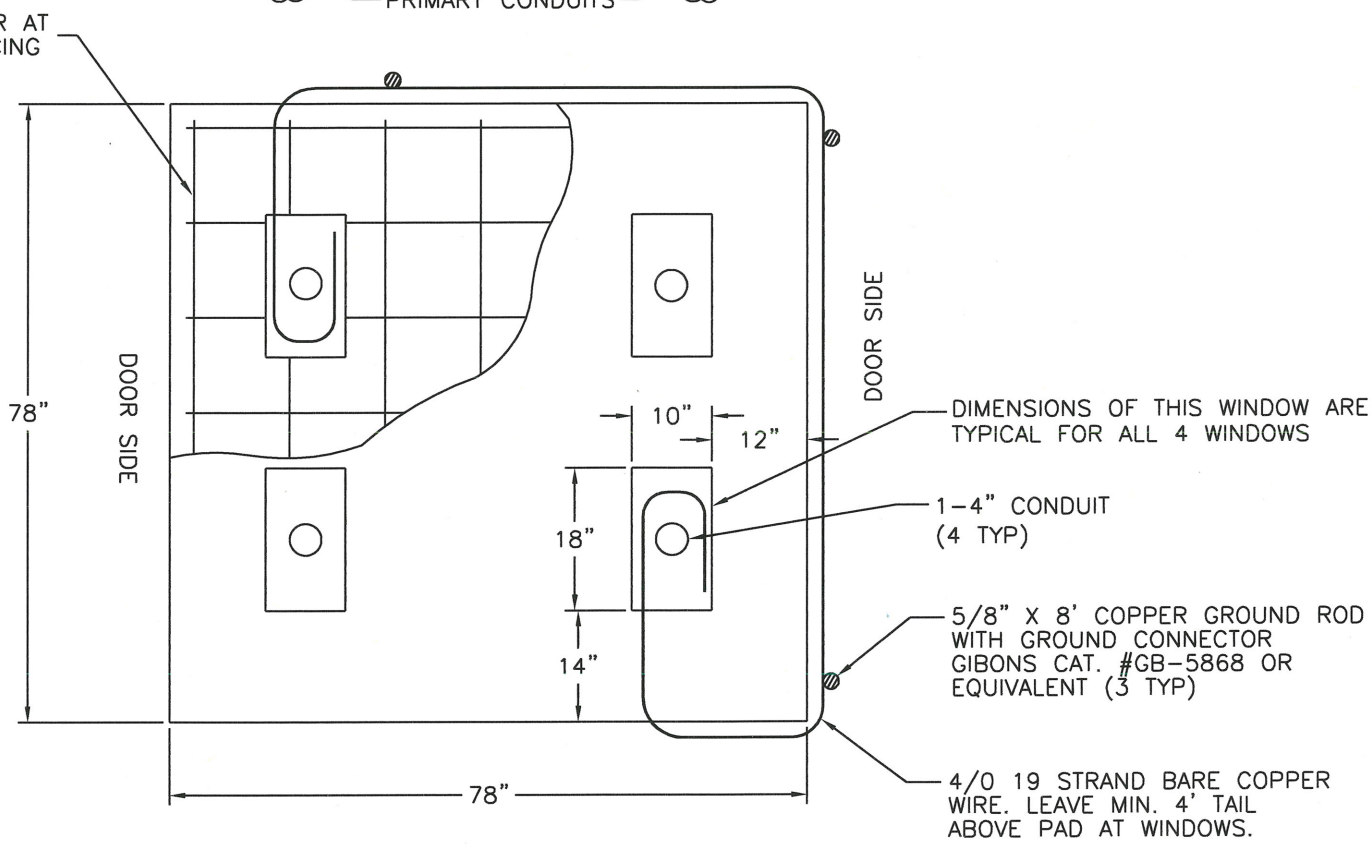


CONSTRUCTION NOTES:

1. Concrete shall be 5-sack mix, 2 1/2" to 4" slump. Wood float finish top. Finish all exposed edges with finishing tool. Chamfer vertical edges. Moist cure concrete for at least 3 days after placing. Do not install switch until 7 days after placing concrete.
2. Clearances between rebar and edge of concrete, horizontal = 6", vertical = 3".
3. A minimum of 8' clearance shall be maintained at the switch doors and 4' min clearance at sides of switch from walls, buildings, planters, or dirt embankments.
4. If the switch cannot be located away from vehicular traffic, a suitable barrier shall be provided for the protection of the switch.
5. Disturbed earth under pads shall be well tamped or shall be replaced by sand, or other suitable material to prevent settlement.
6. Bell ends to be installed on all primary conduits.
7. No. 4 stranded copper wire shall be used for ground connections.
8. In hard soil conditions where the ground rods cannot be driven, the developer has the option of placing two 35' lengths of #4 bare Cu. strand wire. The wire shall extend above the pad 5' and lay in the bottom of the trench (min. 48" depth) for a minimum distance of 25', in different directions. Wire shall be encased with a min. 3" of concrete.

ENGINEERING MANAGER OPERATIONS MANAGER ENG. TECH. SUPERVISOR	**CONCRETE PAD FOR DF5 SWITCH** REVIEW COMMITTEE	DATE **06/21/12**	**CITY OF ROSEVILLE** ROSEVILLE ELECTRIC CONSTRUCTION STANDARD DR.NO. **PAGE 4.8**





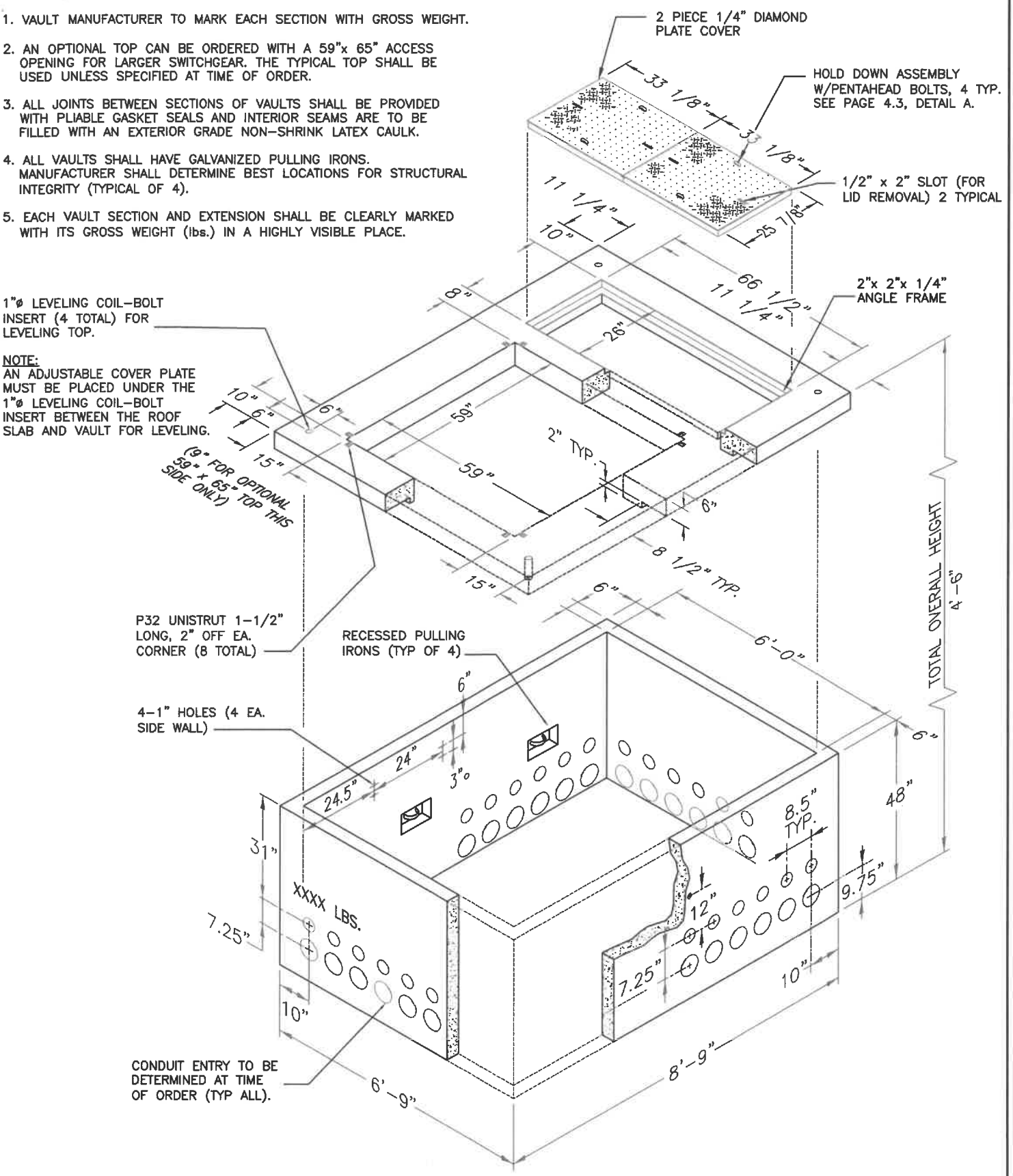
CONSTRUCTION NOTES:

1. Concrete shall be 5-sack mix, 2 1/2" to 4" slump. Wood float finish top. Finish all exposed edges with finishing tool. Chamfer vertical edges. Moist cure concrete for at least 3 days after placing. Do not install switch until 7 days after placing concrete.
2. Clearances between rebar and edge of concrete, horizontal = 6", vertical = 3".
3. A minimum of 8' clearance shall be maintained at the switch doors and 4' min clearance at sides of switch from walls, buildings, planters, or dirt embankments.
4. If the switch cannot be located away from vehicular traffic, a suitable barrier shall be provided for the protection of the switch.
5. Disturbed earth under pads shall be well tamped or shall be replaced by sand, or other suitable material to prevent settlement.
6. Bell ends to be installed on all primary conduits.
7. 4/0 19 strand bare copper wire shall be used for ground connections.
8. In hard soil conditions where the ground rods cannot be driven, the developer has the option of placing two 35' lengths of 4/0 19 strand bare copper wire. The wire shall extend above the pad 5' and lay in the bottom of the trench (min. 48" depth) for a minimum distance of 25', in different directions. Wire shall be encased with a min. 3" of concrete.

ENGINEERING MANAGER	**CONCRETE PAD FOR DF20 SWITCH**	**CITY OF ROSEVILLE** ROSEVILLE ELECTRIC CONSTRUCTION STANDARD
OPERATIONS MANAGER		
ENG. TECH SUPERVISOR	REVIEW COMMITTEE	DATE 06/21/12 / DR.NO. PAGE 4.9

NOTES:

1. VAULT MANUFACTURER TO MARK EACH SECTION WITH GROSS WEIGHT.
2. AN OPTIONAL TOP CAN BE ORDERED WITH A 59"x 65" ACCESS OPENING FOR LARGER SWITCHGEAR. THE TYPICAL TOP SHALL BE USED UNLESS SPECIFIED AT TIME OF ORDER.
3. ALL JOINTS BETWEEN SECTIONS OF VAULTS SHALL BE PROVIDED WITH PLIABLE GASKET SEALS AND INTERIOR SEAMS ARE TO BE FILLED WITH AN EXTERIOR GRADE NON-SHRINK LATEX CAULK.
4. ALL VAULTS SHALL HAVE GALVANIZED PULLING IRONS. MANUFACTURER SHALL DETERMINE BEST LOCATIONS FOR STRUCTURAL INTEGRITY (TYPICAL OF 4).
5. EACH VAULT SECTION AND EXTENSION SHALL BE CLEARLY MARKED WITH ITS GROSS WEIGHT (lbs.) IN A HIGHLY VISIBLE PLACE.

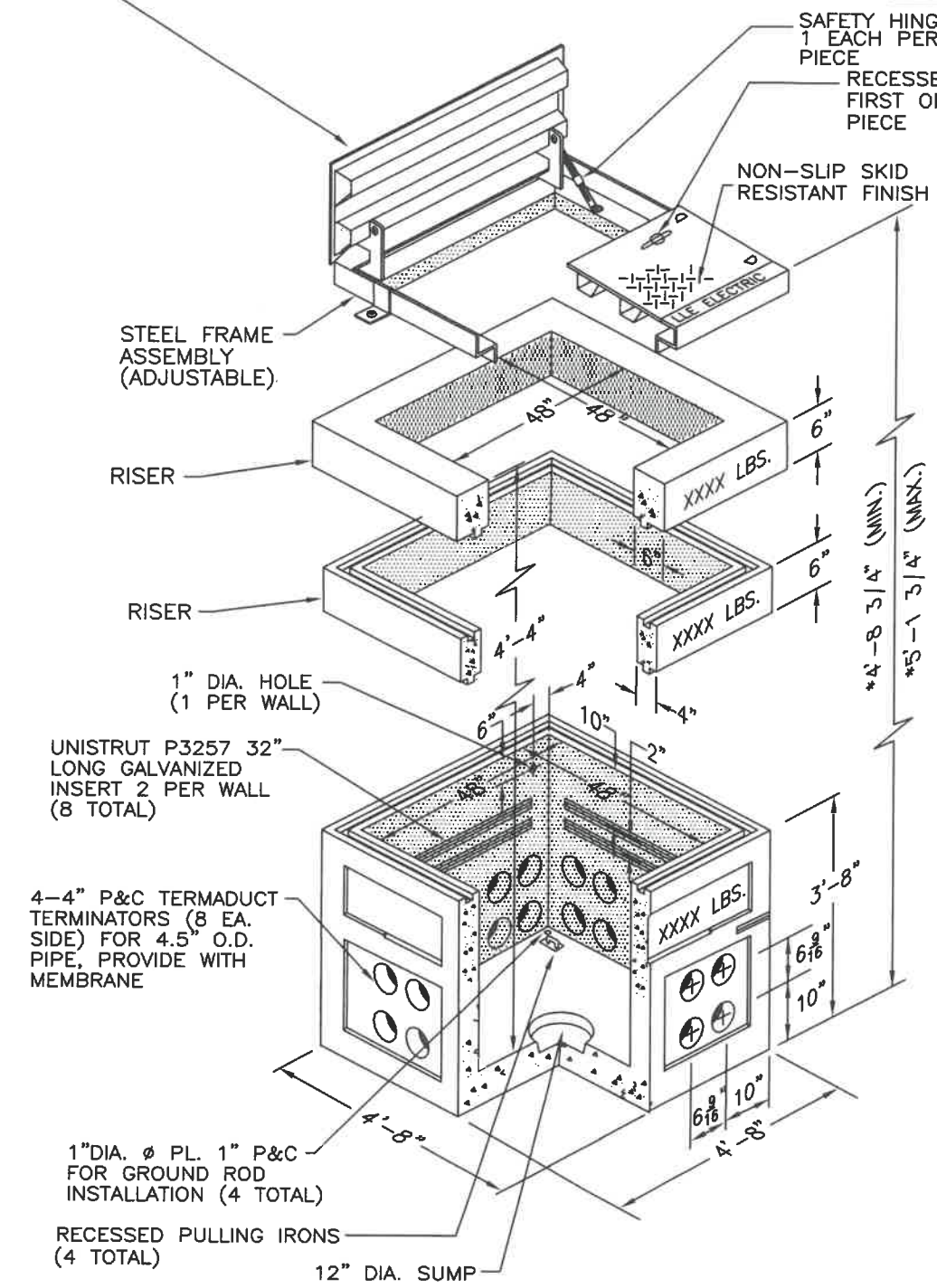


ENGINEERING MANAGER	**CONCRETE INTERCEPTOR PAD VAULT FOR CITY OF ROSEVILLE**	**CITY OF ROSEVILLE** ROSEVILLE ELECTRIC CONSTRUCTION STANDARD
OPERATIONS MANAGER		
ENG. TECH SUPERVISOR	REVIEW COMMITTEE	DATE 01/24/2019 / DR.NO. PAGE 4.10

FOR SPECIAL CONDITIONS USE ONLY:

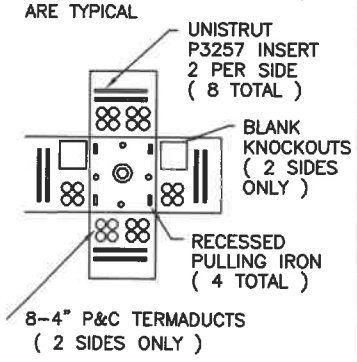
IN AREAS WHERE THERE IS NOT ENOUGH ROOM FOR AN ABOVE GROUND J-BOX

4'X4' (NOMINAL) 2 PIECE HINGED, SPRING OR TORSION ASSISTED, ALUMINUM LID, PENTAHEAD LOCKDOWN** AS PER (W.U.C.) WESTERN UNDERGROUND SPECIFICATIONS, ADJUSTABLE FRAME AND COVER AND 1 EA. HINGE LOCK. MARKED "ROSEVILLE ELECTRIC". (PEDESTRIAN TRAFFIC LOADING) COVER PIECE MUST HAVE THE CAPABILITY OF BEING OPENED TO 180°.



TYPICAL INTERCEPTER BOX

MODIFIED 12KV PRI. JUNCTION BOX (4'W x 4'L x 4'-2"D) AS NOTED BELOW, ALL OTHER DIMENSIONS & SPECIFICATIONS ARE TYPICAL



NOTE:

* Exact height dimension may vary between manufacturers. Verify prior to installations.

** Pentahead bolt and springnut to be stainless steel material.

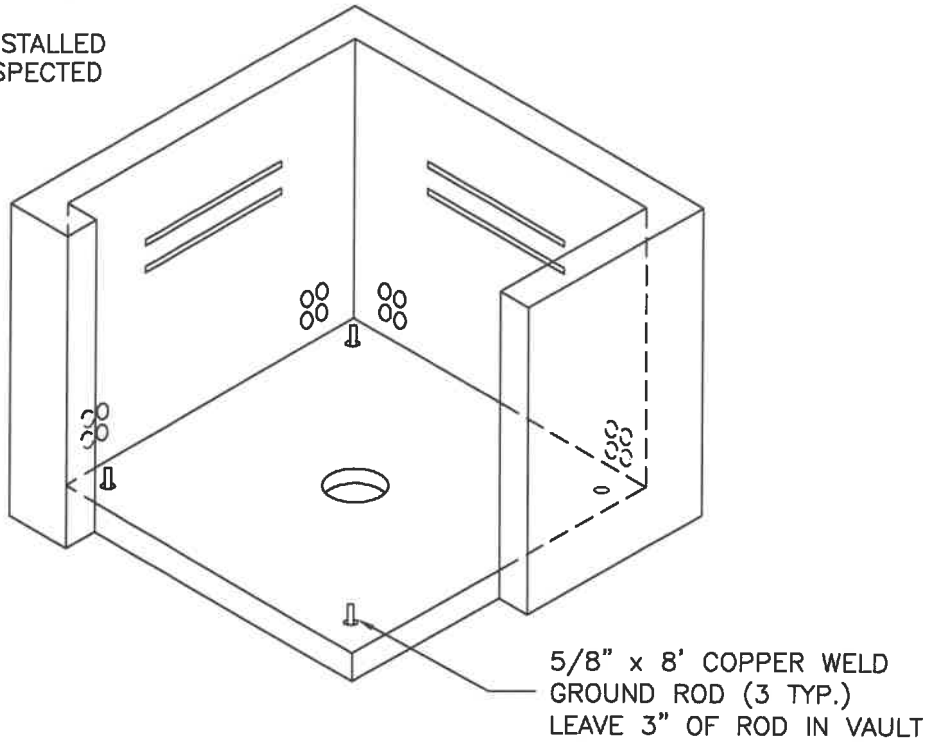
DESIGN NOTES:

1. Provide lifting inserts as required for box, lid & riser.
2. Grout all interior seams & lid section after final adjustment.
3. Provide gasket seal at each joint.
4. Vault manufacturer to mark each section with gross weight.

ENGINEERING MANAGER OPERATIONS MANAGER ENG. TECH SUPERVISOR	**12kV PRIMARY JUNCTION BOX(4'Wx4'Lx4'-4"D)**	**CITY OF ROSEVILLE** ROSEVILLE ELECTRIC CONSTRUCTION STANDARD
REVIEW COMMITTEE	DATE 01/24/19	DR.NO. **PAGE 5.1**

NOTES:

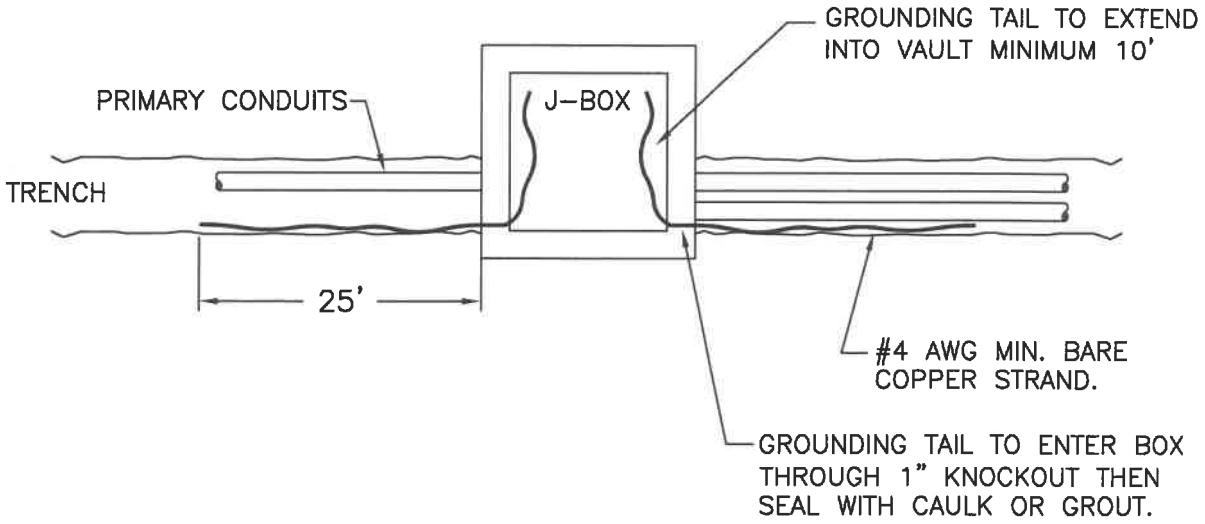
GROUND RODS TO BE INSTALLED BY CONTRACTOR AND INSPECTED BY ROSEVILLE ELECTRIC INSPECTORS.



TYPICAL GROUND INSTALLATION

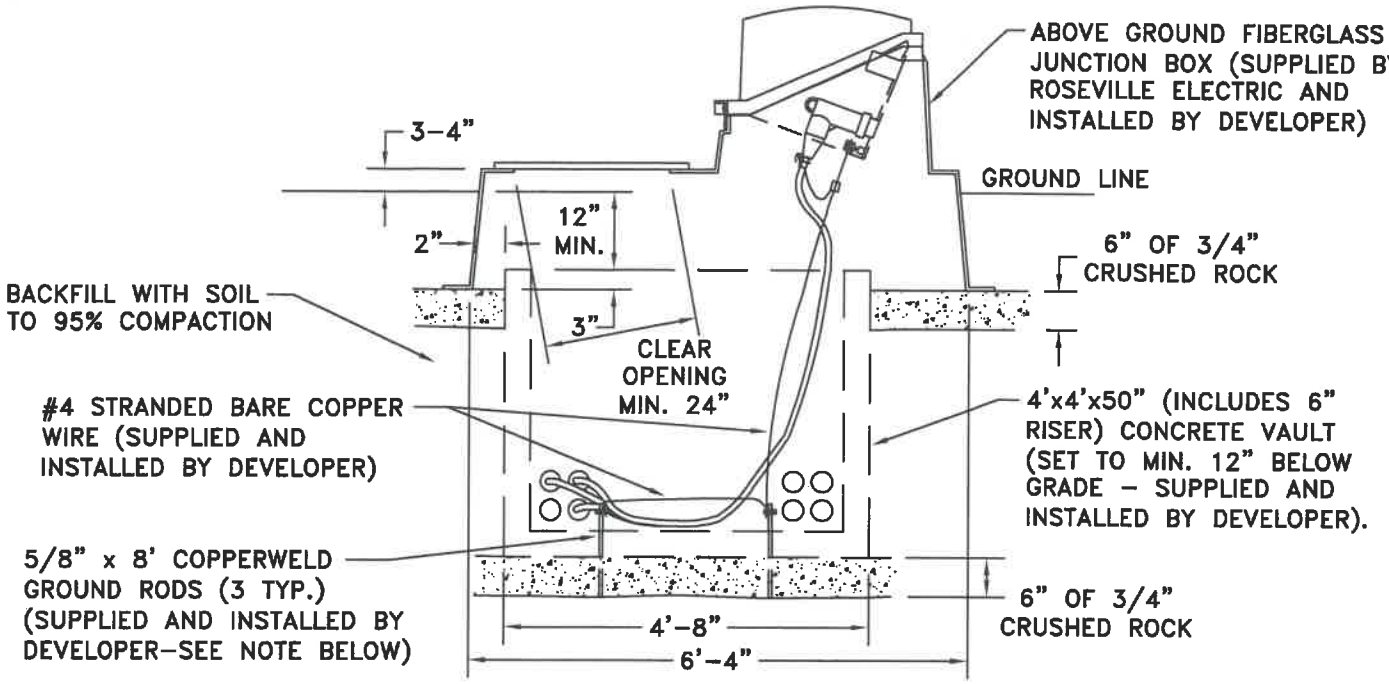
NOTES:

1. **In hard soil conditions where the ground rods cannot be driven, the developer has the option of placing two 35' lengths of #4 bare copper strand wire. The wire shall extend into the vault 10' and lay in the bottom of the trench (min. 48" depth) for a distance of 25' in different directions. The wire shall be encased in 3" of concrete.**



ALTERNATIVE GROUND INSTALLATION IN HARD SOIL CONDITIONS

ENGINEERING MANAGER 7/8/19 OPERATIONS MANAGER	**GROUNDING DETAIL FOR BELOW GROUND JUNCTION BOXES**	**CITY OF ROSEVILLE** ROSEVILLE ELECTRIC CONSTRUCTION STANDARD
ENG. TECH. SUPERVISOR REVIEW COMMITTEE	DATE **06/27/19**	DR.NO. **PAGE 5.1.1**

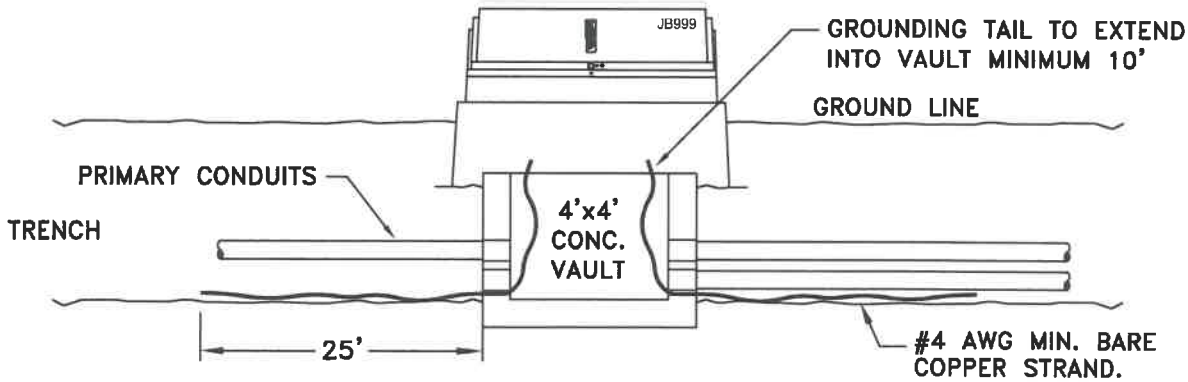


NOTE: IN HARD SOIL CONDITIONS WHERE THE GROUND RODS CANNOT BE DRIVEN, THE DEVELOPER HAS THE OPTION TO USE THE ALTERNATIVE GROUNDING METHOD AS SHOWN BELOW.

TYPICAL INSTALLATION

Notes:

1. In hard soil conditions where the ground rods cannot be driven, the developer has the option of placing two 35' lengths of #4 bare copper strand wire. The wire shall extend into the vault 10' and lay in the bottom of the trench (min. 48" depth) for a distance of 25' in different directions. The wire shall be encased in 3" of concrete.



ALTERNATIVE GROUND INSTALLATION IN HARD SOIL CONDITIONS

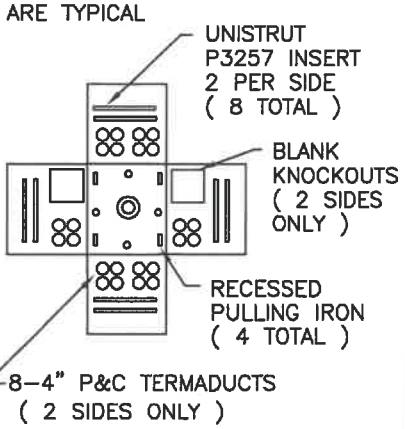
NOTES:

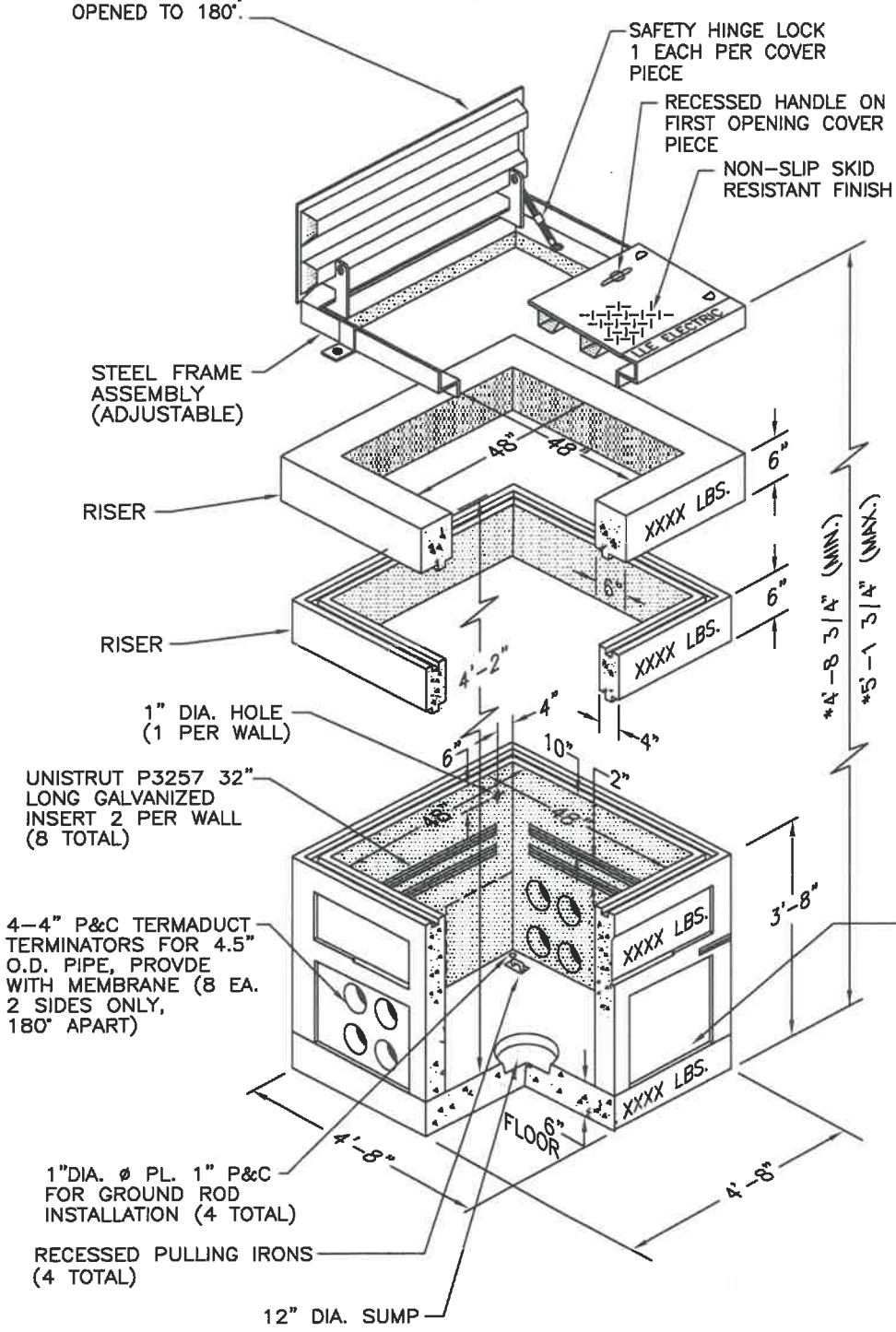
1. Developer to provide clear level pad and retaining wall if necessary around junction box.
2. Above ground fiberglass portion of Junction Box will be supplied by Roseville Electric and installed by the Developer's contractor.

ENGINEERING MANAGER 7/3/19	**INSTALLATION AND GROUNDING DETAIL FOR ABOVE GROUND 3 PHASE JUNCTION BOXES**	**CITY OF ROSEVILLE** ROSEVILLE ELECTRIC CONSTRUCTION STANDARD
OPERATIONS MANAGER		
ENG. TECH SUPERVISOR	REVIEW COMMITTEE	DATE 06/27/19
		DR.NO. **PAGE 5.1.2**

TYPICAL INTERCEPTER BOX

MODIFIED 12KV PRI. JUNCTION BOX (4'W x 4'L x 4'–2"D) AS NOTED BELOW, ALL OTHER DIMENSIONS & SPECIFICATIONS ARE TYPICAL





NOTE:

* Exact height dimension may vary between manufacturers. Verify prior to installations.

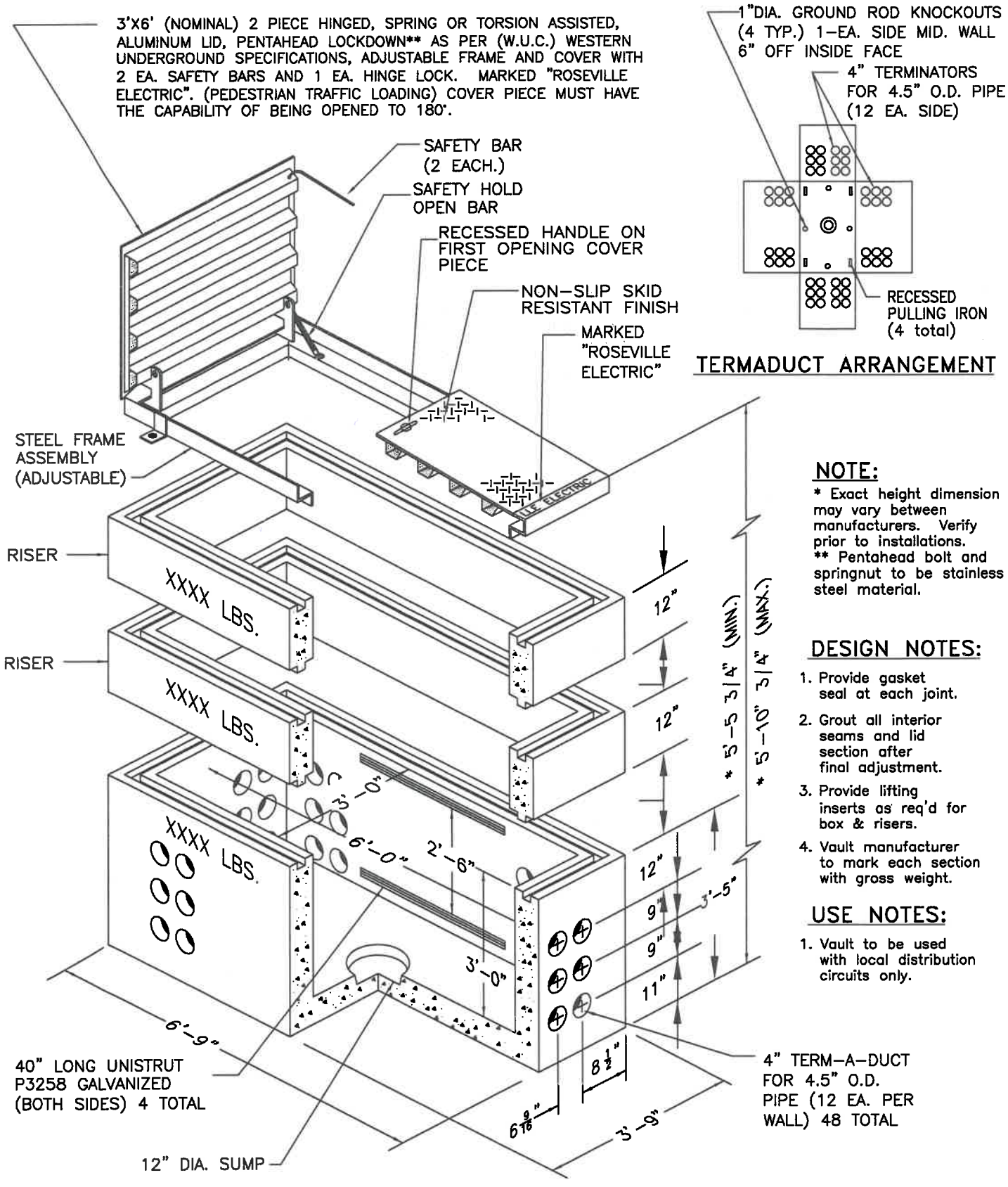
** Pentahead bolt and springnut to be stainless steel material.

2 BLANK KNOCKOUTS IN PLACE OF TERMADUCTS OFFSET TO ONE SIDE (TYPICAL) 2 SIDES ONLY 180° APART

DESIGN NOTES:

1. Provide lifting inserts as required for box, lid & riser.
2. Grout all interior seams & lid section after final adjustment.
3. Provide gasket seal at each joint.
4. Vault manufacturer to mark each section with gross weight.

ENGINEERING MANAGER 11/3/19	**12kV INTERCEPTOR BOX** -	**CITY OF ROSEVILLE** ROSEVILLE ELECTRIC CONSTRUCTION STANDARD
OPERATIONS MANAGER		
ENG. TECH SUPERVISOR	REVIEW COMMITTEE: JC, JO, CJ, DATE 06-27-19	DR.NO. PAGE 5.2



TERMADUCT ARRANGEMENT

NOTE:

* Exact height dimension may vary between manufacturers. Verify prior to installations.
** Pentahead bolt and springnut to be stainless steel material.

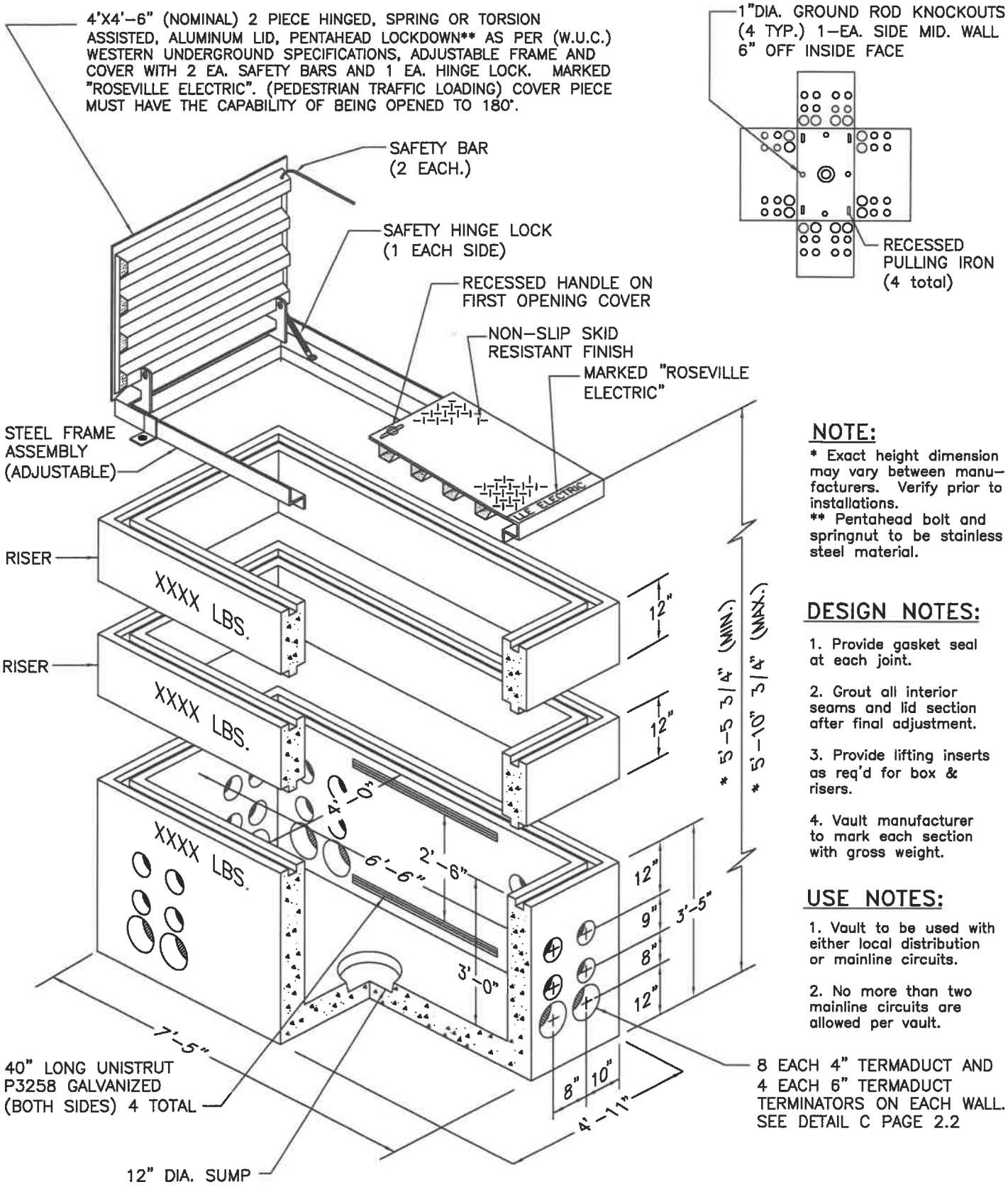
DESIGN NOTES:

1. Provide gasket seal at each joint.
2. Grout all interior seams and lid section after final adjustment.
3. Provide lifting inserts as req'd for box & risers.
4. Vault manufacturer to mark each section with gross weight.

USE NOTES:

1. Vault to be used with local distribution circuits only.

ENGINEERING MANAGER	**12kV LOCAL DISTRIBUTION SPLICE PULL BOX(3'Wx6'Lx5'D)**	**CITY OF ROSEVILLE** ROSEVILLE ELECTRIC CONSTRUCTION STANDARD
OPERATIONS MANAGER		
ENG. TECH. SUPERVISOR	REVIEW COMMITTEE	DATE 09/26/19 — DR.NO. **PAGE 5.3**



NOTE:

* Exact height dimension may vary between manufacturers. Verify prior to installations.
** Pentahead bolt and springnut to be stainless steel material.

DESIGN NOTES:

1. Provide gasket seal at each joint.
2. Grout all interior seams and lid section after final adjustment.
3. Provide lifting inserts as req'd for box & risers.
4. Vault manufacturer to mark each section with gross weight.

USE NOTES:

1. Vault to be used with either local distribution or mainline circuits.
2. No more than two mainline circuits are allowed per vault.

ENGINEERING MANAGER OPERATIONS MANAGER ENG. TECH. SUPERVISOR	**12kV MAINLINE SPLICE PULLBOX (4'Wx6'-6"Lx5'D)**	**CITY OF ROSEVILLE** ROSEVILLE ELECTRIC CONSTRUCTION STANDARD
REVIEW COMMITTEE	DATE 09/26/19	DR.NO. **PAGE 5.4**

1. GENERAL NOTES

(A) These standards include concrete transformer pad construction notes and location requirements for 1ø and 3ø, 12kV, pad–mounted transformers.
(B) Location and size of pad shall be per the Roseville Electric design for the project.
(C) Secondary terminal lugs for connection of service conductors at the transformer are provided by Roseville Electric.
(D) No more than 8 service conductors (maximum wire size of 1000 MCM CU. or AL.) per phase will be allowed to the transformer. Secondary Service conductors shall NOT be installed until Roseville Electric has set the high voltage transformer on the pad. If the secondary wire is installed prior to Roseville Electric setting the transformer, it will be required to be pulled out. Pull rope must be installed prior to transformer placement.
(E) Poured in–place concrete pads can be used only with prior Roseville Electric approval, using pre–cast pad specifications.

2. CONSTRUCTION NOTES

(A) Disturbed earth under transformer pads shall be replaced with 12" of 3/4" a.b. material compacted in 6" lifts to prevent settlement. The contractor may be required to provide compaction reports from a certified soils testing firm, if deemed necessary by a Roseville Electric inspector.
(B) Conduits shall be cut off and bell end terminators installed 8" below transformer pad surface.
(C) Pad manufacturer to mark pad with gross weight and provide lifting inserts as required.
(D) Smooth finish surface and sides. concrete shall be designed to attain a strength of 3000 pounds per square inch in 28 days.
(E) The surface of the transformer pad must be level to ± 1/16 inch in 4 feet when measured with a straight edge. Surfaces not meeting this requirement will be rejected.
(F) Temporarily plug conduits.
(G) A minimum distance of 6 feet shall be maintained between ground rods.
(H) In hard soil conditions where the ground rod cannot be driven, the developer has the option of placing 35' of #4 bare copper strand wire. The #4 wire shall extend 5' above the finish elevation of the transformer pad and lay in the bottom of the trench for a minimum distance of 25' with 3" of concrete encasement. For transformer sizes of 1500 kVA and above, #250 MCM bare copper strand wire shall be used.
(I) Developer shall have all pull ropes installed prior to Roseville Electric setting High Voltage Transformer.

3. APPLICATION NOTES

(A) The pad sizes were based on the maximum dimensions, including cooling radiators of the various manufacturers' transformers. A one foot apron (18" for trans. above 1000 kVA) is required in front of the compartment doors. If an oversize pad is used to allow for transformer size increase at a later time, it may be necessary to reduce LV dimension slightly in order to fit initial transformer.

(B) The concrete pad should be located so that its associated transformer will be three feet minimum from the side of any building wall. If the wall is fireproof, the minimum clearance can be reduced to two feet. At least eight feet of clear space shall be provided in front of pad to allow complete opening of transformer cabinet doors and allow city personel sufficient working room for hot stick work. Figure No. 1, shows the preferred location of a trans. pad with reference to other construction.

(C) If a pad-mounted tranformer can not be located away from vehicular traffic, the customer shall provide suitable barriers for the protection of the transformer. Roseville Electric shall determine the type, size and number of any such barriers required. A removable type post is shown in Figure No. 2.

(D) If a pad-mounted transformer is to be installed under a roof, at least 5 feet of head room shall be provided for lifting of the transformer. Contact Roseville Electric for each particular case.

(E) If a wall or enclosure is installed around the transformer, the wall shall meet the requirements of Note 3(B). Walls are only allowed on 3 sides of the transformer. No gates are allowed. Opening must meet the requirements for clear access as shown in Figure No. 1.

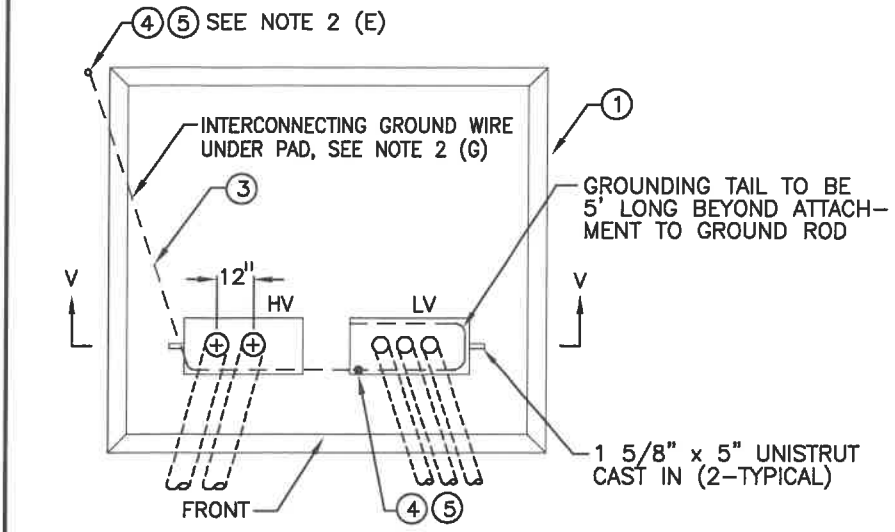
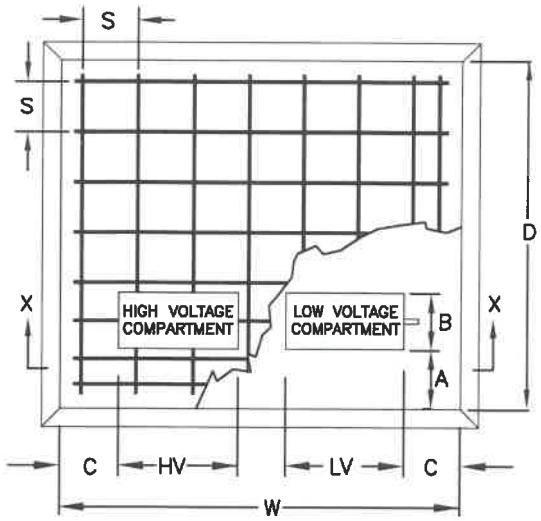


FIGURE NO. 3 – SECTION V – V

LOCATION FOR PRIMARY & SECONDARY CONDUITS



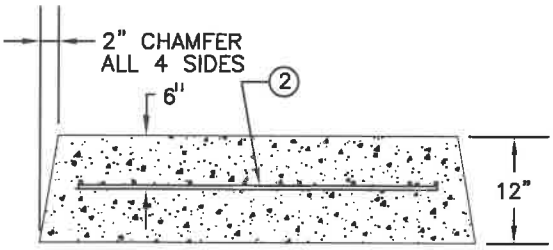


FIGURE NO. 4 – SECTION X – X

CONCRETE PAD DETAILS

ITEM	QUANTITY	DESCRIPTION
1	1	CONCRETE PAD
2	AS REQ.	REINFORCING STEEL, NO.4
3	13' MIN.	WIRE, NO.4 AWG MIN. BARE COPPER STRAND
* 4	2	GROUND ROD, 5/8" x 8'-0"
5	2	CLAMP, GROUND ROD, FOR ITEM 4
6	AS REQ.	CONDUIT, TYPE & SIZE AS REQUIRED FOR SECONDARY
7	AS REQ.	CONDUIT, PLASTIC 4" DIA. FOR PRIMARY

TABLE NO. 1 – TRANSFORMER PAD COMPONENTS

*** FOR HARD SOIL CONDITIONS SEE CONSTRUCTION NOTE 2 (H), PAGE 6.1**

TRANSFORMER (KVA)	MAX. TRANS WEIGHT (LBS)	PAD DIMENSIONS (INCHES)							
		A	B	C	D	HV	LV	W	S
45–500	8,000	15	20	13	78	20	20	78	12
750–1000	14,000	21	20	21	96	20	20	96	9

TABLE NO. 2 – CONCRETE PAD DIMENSIONS

ENGINEERING MANAGER	**PRE-CAST CONCRETE PAD FOR THREE PHASE 12kV PADMOUNTED TRANSFORMER - 1000kVA & BELOW**		**CITY OF ROSEVILLE** ROSEVILLE ELECTRIC CONSTRUCTION STANDARD
OPERATIONS MANAGER			
ENG. TECH SUPERVISOR	REVIEW COMMITTEE	DATE 02/06/20	DR.NO. **PAGE 6.2**

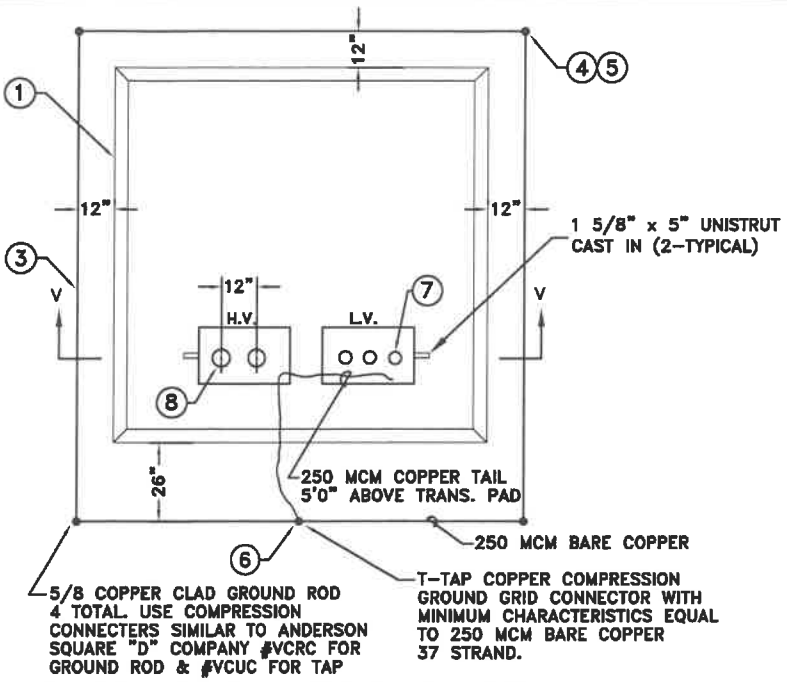
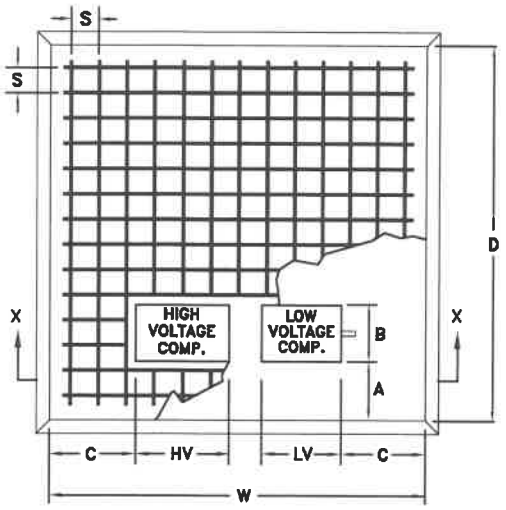


FIGURE NO. 5 – GROUNDING DETAIL

1500 kVA AND ABOVE



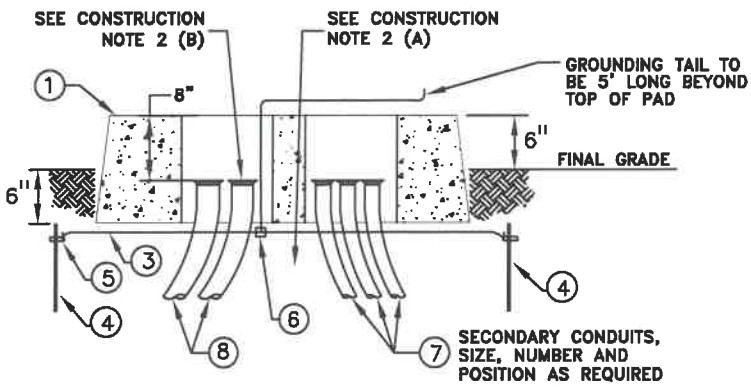


FIGURE NO. 7 – SECTION V – V

LOCATION FOR PRIMARY & SECONDARY CONDUITS

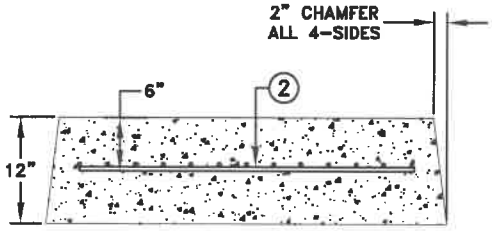


FIGURE NO. 6 – SECTION X – X

CONCRETE PAD DETAIL

ITEM	QUANTITY	DESCRIPTION
1	1	CONCRETE PAD
2	AS REQ.	REINFORCING STEEL, NO.4
3	57' MIN.	250 MCM BARE COPPER STRAND
* 4	4	GROUND ROD, 5/8" x 8'-0"
5	4	COMPRESSION CONNECTORS
6	1	T-TAP COPPER COMPRESSION CONNECTOR
7	AS REQ.	CONDUIT, SIZE & TYPE FOR SECONDARY
8	AS REQ.	CONDUIT, PLASTIC 4" DIA. FOR PRIMARY

TABLE NO. 3 – TRANSFORMER PAD COMPONENTS

1500 kVA AND ABOVE

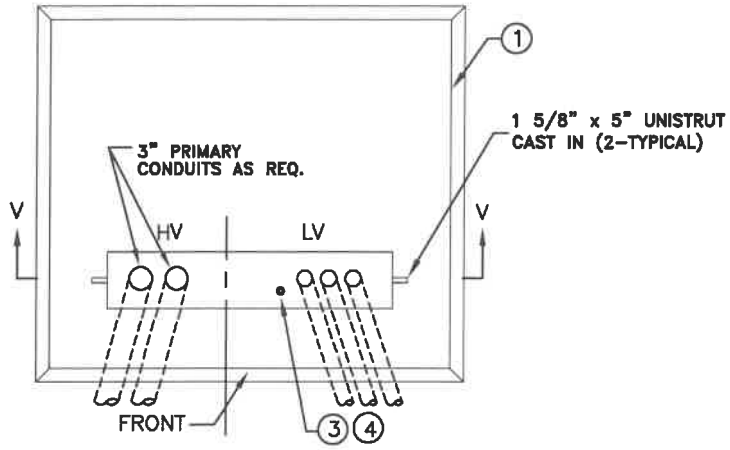
*** FOR HARD SOIL CONDITIONS SEE CONST. NOTE 2 (H), PAGE 6.1**

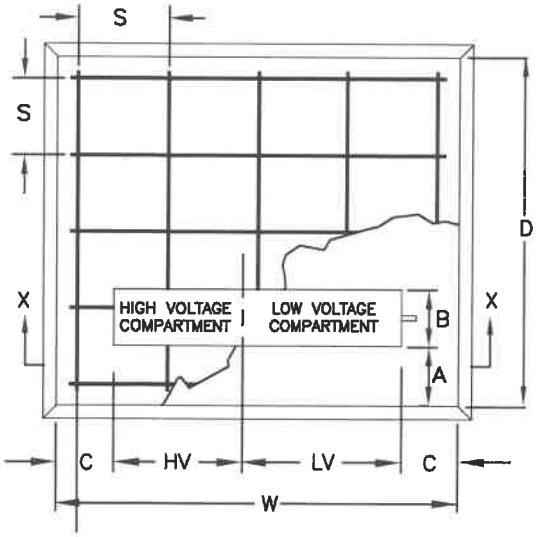
TRANSFORMER (KVA)	MAX. TRANS WEIGHT (LBS)	PAD DIMENSIONS (INCHES)							
		A	B	C	D	HV	LV	W	S
1500–2500	18,000	24	20	31.5	115	20	20	115	9

TABLE NO. 4 – CONCRETE PAD DIMENSIONS

FOR 3ø PADMOUNT TRANS 1500 kVA AND ABOVE

ENGINEERING MANAGER	**PRE-CAST CONCRETE PAD FOR THREE PHASE 12kV PADMOUNTED TRANSFORMER - 1500kVA & ABOVE**	**CITY OF ROSEVILLE** ROSEVILLE ELECTRIC CONSTRUCTION STANDARD
OPERATIONS MANAGER		
ENG. TECH. SUPERVISOR	REVIEW COMMITTEE: JR, [illegible], TB, CJ, MM, [illegible]	DATE 02/06/20
		DR.NO. **PAGE 6.3**





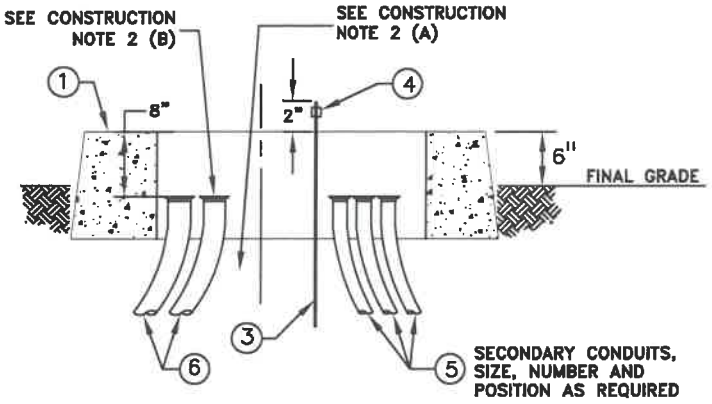


FIGURE NO. 8 – SECTION V – V
LOCATION FOR PRIMARY & SECONDARY CONDUITS

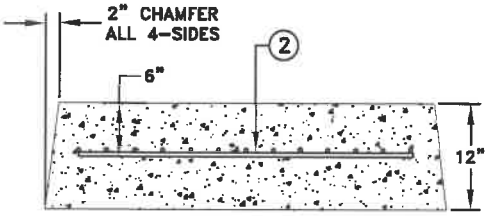


FIGURE NO. 9 – SECTION X – X
CONCRETE PAD DETAILS

ITEM	QUANTITY	DESCRIPTION
1	1	CONCRETE PAD
2	AS REQ.	REINFORCING STEEL, NO.4
* 3	1	GROUND ROD, 5/8" x 8'-0"
4	1	CLAMP, GROUND ROD, FOR ITEM 4
5	AS REQ.	CONDUIT, TYPE & SIZE AS REQUIRED FOR SECONDARY
6	AS REQ.	CONDUIT, PLASTIC 3" DIA. FOR PRIMARY

TABLE NO. 5 – TRANSFORMER PAD COMPONENTS

TRANSFORMER (KVA)	MAX. TRANS WEIGHT (LBS)	PAD DIMENSIONS (INCHES)							
		A	B	C	D	HV	LV	W	S
25 – 167	2,500	8	14	9	54	12	17	48	12

TABLE NO. 6 – CONCRETE PAD DIMENSIONS

ENGINEERING MANAGER	PRE-CAST CONCRETE PAD FOR SINGLE PHASE 12kV PADMOUNTED TRANSFORMER - 167kVA & BELOW	CITY OF ROSEVILLE ROSEVILLE ELECTRIC CONSTRUCTION STANDARD
OPERATIONS MANAGER		
ENG. TECH. SUPERVISOR	REVIEW COMMITTEE	DATE 02/06/20
		DR.NO. PAGE 6.4

COMMERCIAL
LOW VOLTAGE SERVICE AND METERING REQUIREMENTS (0-600 VOLTS)

ENGINEERING MANAGER	COMMERCIAL LOW VOLTAGE SERVICE AND METERING REQUIREMENTS (0-600 VOLTS)		CITY OF ROSEVILLE ROSEVILLE ELECTRIC CONSTRUCTION STANDARD
OPERATIONS MANAGER			
ENG. TECH. SUPERVISOR	REVIEW COMMITTEE	DATE 06/23/16	DR.NO. PAGE 7.1

COMMERCIAL
LOW VOLTAGE SERVICE AND METERING REQUIREMENTS
(0-600 VOLTS)

I SERVICE VOLTAGES

The following table outlines the service voltages that Roseville Electric can serve and the corresponding meter socket requirements for each. See Page 7.2 for meter connection diagrams.

TYPE OF SERVICE	NUMBER OF CLIPS	
	SELF CONTAINED METER SOCKETS	TRANSFORMER RATED SOCKETS
1 PHASE, 3 WIRE, 120/240 VOLT < 201 Amps	4	N/A
1 PHASE, 3 WIRE, 120/240 VOLT > 201 Amps	N/A	6
1 PHASE, 3 WIRE, 120/208 VOLT	5	N/A
3 PHASE, 4 WIRE, 120/208 VOLT WYE	7	13
3 PHASE, 4 WIRE, 120/240 VOLT DELTA [1]	7	13
3 PHASE, 4 WIRE, 277/480 VOLT WYE [2]	7	13

Notes:
1. Non-standard voltage. Contact Roseville Electric for availability.
2. Underground service from pad-mount transformers only.

For services greater than 480 volts, contact the New Services Section of Roseville Electric for special requirements.

II METERING REQUIREMENTS

GENERAL:

1. EUSERC - Electric Utility Service Equipment Requirements Committee

EUSERC 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 Roseville Electric 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. Approval of Manufacturer's Drawings

All electric service panels shall meet the Roseville Electric approved sections of the EUSERC requirements. The list of acceptable panels can be found at www.euserc.com under "Acceptability Pages" on the "Roseville 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 Roseville Electric. One copy will be returned to the sender with approval or corrections as needed. Send submittals to:

Sr. Electric Metering Tech.
Roseville Electric
2090 Hilltop Circle
Roseville, CA 95747
Telephone: (916) 774-5601

3. Electric Metering and Main Disconnect Directly Outside Accessible

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. Meters and disconnects originally installed outside the fence shall not be enclosed by a fence in the future. 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 one (1) key to the gate. A lock box will be supplied and installed by Roseville Electric on the outside of the gate.

B. Locate the metering service panel inside of an un-alarmed electrical service room with an un-alarmed door that opens directly to the outside. The developer will be required to provide one (1) key to the door for placement in a lock box. The lock box will be supplied and installed by Roseville Electric on the outside of the door. Roseville Electric suggests that any door leading from the electrical service room to other areas of the building be secured by the customer. If this room is located behind a lockable gate, item 3A will apply.

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.

4. Automated Meter Reading Provisions

One 3/4-inch conduit with a minimum Cat-5 telephone conductor shall be installed from the building telephone service panel to the electric meter panel. The conduit and conductor shall enter a metering

section within 2" of the corner of the panel. Leave 8' of telephone conductor at each end for termination. For special circumstances, questions or multiple meter panels, contact the Metering Crew Supervisor.

5. Service Disconnects

In multi service applications, there shall be only 1 handle to disconnect the entire switchgear. In addition, each service shall have a disconnect switch. Each individual service disconnect shall have a provision for locking in the OPEN/OFF position. The switchgear or panel door is not to be used as the service disconnect locking device. Service disconnects that are a combination main breaker / transfer switch are not allowed.

In a single service application, 200A or less, the panel door may be used as the OPEN/OFF locking device as long as it only prevents access to a single service main breaker while maintaining access to distribution breakers.

6. Panel Marking Policy

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

1. 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.

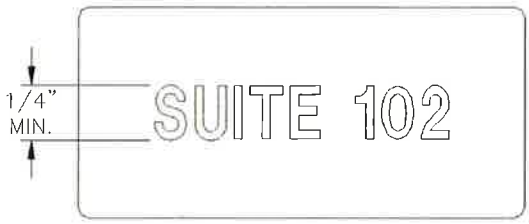
2. When adding a new meter to an existing service location, all meters and service disconnect(s) they feed shall be identified to properly indicate the portion of the premises being served.

3. 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).

4. 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.

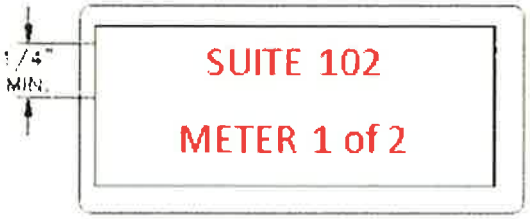
B. The identifying marking for meters and disconnects shall be engraved or raised from a tag of plastic laminate, aluminum, brass or other approved non-ferrous metal with 1/4 inch minimum letters. The impressions shall be deep or raised enough to prevent it from being obscured by subsequent painting 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 labels.

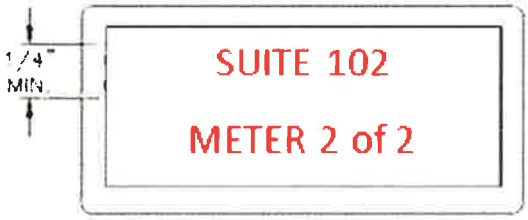
EXAMPLE:



C. Additional markings or labeling are required when two or more suites are combined/occupied by one tenant. An example: if suites 101 and 102 were combined by one tenant to make a single suite 102, then the "labels", as described below, would be required at the meter and at the disconnects indicating suite 102 is served by 2 meters and associated disconnects.

EXAMPLE:





7. Meter Heights, Clearances and Working Space

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.

For clearance and height diagram, see Pages 7.3 and 7.3.1.

III SERVICES 200 AMPS AND BELOW

1. Self-contained Meters Defined

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. Self-contained Meter Sockets

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. Meter Socket Connections

   All self-contained meter sockets shall be connected to the service entrance conductors by the contractor. Connection diagrams for the various types of services are shown on Page 7.2.

4. Wire Size Capacity of Self-contained Meter Sockets

   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. Meter Socket Closing Devices

   Meter sockets shall not be equipped with circuit closing or by-pass devices which automatically close when the meter is removed from the socket.

6. Self-Contained Metering Responsibilities

   The meter is furnished and installed by Roseville Electric.

Customer's Responsibility	Utility's Responsibility
Purchase and Install EUSERC Approved Enclosure	Purchase and Install Electric Meter *
Purchase and Install Panel Markings	Approve Meter Panel Location
Purchase and Install one 3/4-inch conduit for Automated Meter Reading. (See section II, item 4)	Purchase and Install Automated Meter Reading, if required
Provide one key for Lock Box, if required	Install Lock Box, if required *
Note: * indicates Utility provided items at customer's expense.	

IV SERVICES GREATER THAN 200 AMPS

1. Transformer Rated Meters

   When the electrical supply needs of the customer exceed the 200 ampere capacity of the self-contained meter and its heavy duty socket, current transformers 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 Roseville Electric.

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).

2. Transformer Rated Meter Sockets

An approved current transformer (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.

3. Dual Meter Socket Required

Panels rated at 1000 amps or above must have a second meter base installed to provide for reactive metering by Roseville Electric in addition to the standard revenue metering base.

4. Transformer Rated Metering Responsibilities

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

Customer's Responsibility	Utility's Responsibility
Purchase and Install EUSERC Approved Enclosure	Purchase and Install Current Transformers *
Purchase and Install Transformer Rated Meter Socket(s)	Purchase and Install Transformer Rated Meter(s) *
Purchase and Install Panel Markings	Purchase and Install Meter Test Block *
Purchase and Install one 3/4-inch conduit for Automated Meter Reading. (See section II, item 4)	Purchase and Install Automated Meter Reading, if required
Provide one key for Lock Box, if required	Install Lock Box, if required *
Note: * indicates Utility provided items at customer's expense.	

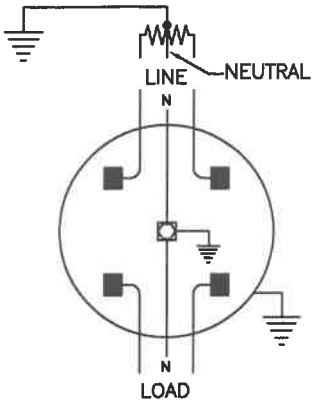
V METERING FOR INDIVIDUAL SUITES AND SINGLE (MASTER) METERED BUILDINGS

Each suite shall have a 1) single electric revenue meter with associated main breaker/disconnect or 2) the entire building can be metered with a single meter with associated main beaker/disconnect.
NOTE: Either the whole building is metered with a single meter or the whole building has a minimum of 1 meter for each suite.
Single meter capturing energy consumption of multiple suites shall not be permitted unless the entire building is Master Metered – NO EXCEPTIONS ALLOWED.

The existing meter infrastructure may be used to meter combined suites during a Tenant Improvement project with the following conditions:

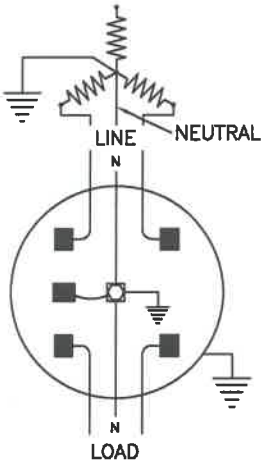
1. Developer shall provide and/or pay for all infrastructure and meter upgrade charges to change affected non-modem meters to modem meter.
2. Owner or Property Manager or Tenant shall pay for Phone line infrastructure and monthly phone charges for the duration of the combined suites.
3. The phone line shall be conditioned with no NAT and no LD carrier and must only be for dedicated use by RE for "Totalized" billing.
4. Owner or Property Manager or Tenant shall pay for cost to "Totalize" the energy consumption data for the combined suite meters.
5. Each meter and associated main breaker/disconnect shall be labeled using the following example: if 2 suites (101 and 102) are combined to create a single suite 101, then labels at the meters and associated main breakers/disconnects shall read: "Suite 101 1 of 2" and "2 of 2".
6. All associated main breaker/disconnects of a combined suite shall be adjacent to each other. (NOT separated by other breakers.)

SERVICES RATED 200 AMPS OR LESS – NOTE 2



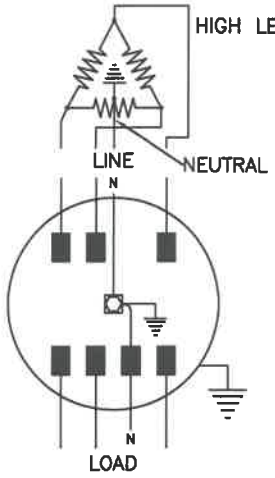
120/240V–1ø–3 WIRE
(FORM–2S)

FIG. 1
4 CLIP



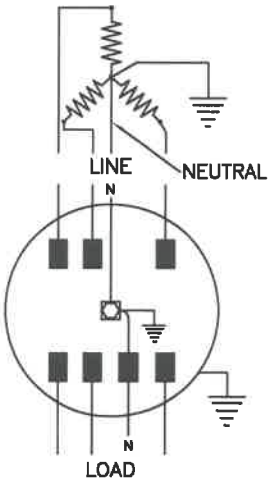
120/208V–1ø–3 WIRE WYE
NETWORK
(FORM 12S)

FIG. 2
5 CLIP



120/240V–3ø–4 WIRE △
(FORM–15S)

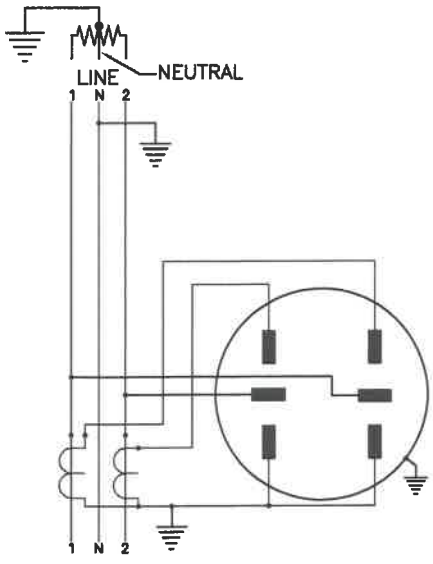
FIG. 3
7 CLIP



120/208V–3ø–4 WIRE WYE
277/480V–3ø–4 WIRE WYE
(FORM–14S OR 16S)

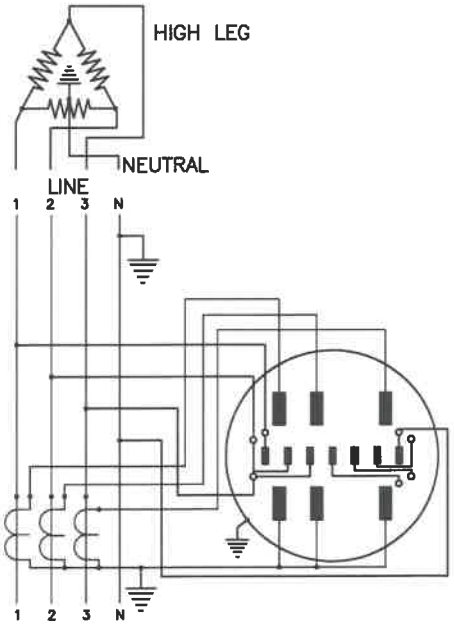
FIG. 4
7 CLIP

SERVICES RATING GREATER THAN 200 AMPS – NOTE 2



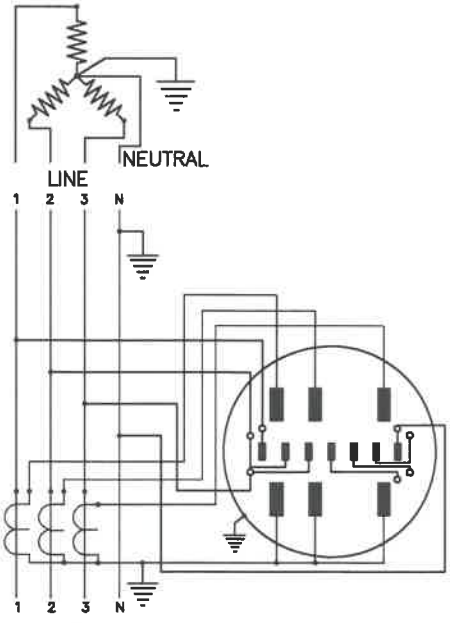
LOAD
120/240V–1ø–3 WIRE
(FORM 4S)

FIG. 5
6 CLIP



LOAD
120/240V–3ø–4 WIRE △
(FORM 8S)

FIG. 6
13 CLIP

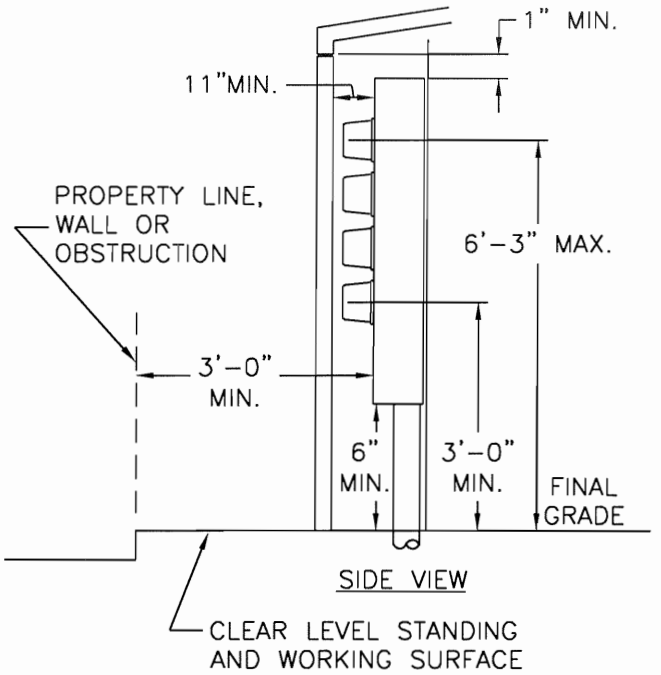


LOAD
120/208V–3ø–4 WIRE WYE
277/480V–3ø–4 WIRE WYE
(FORM 9S)

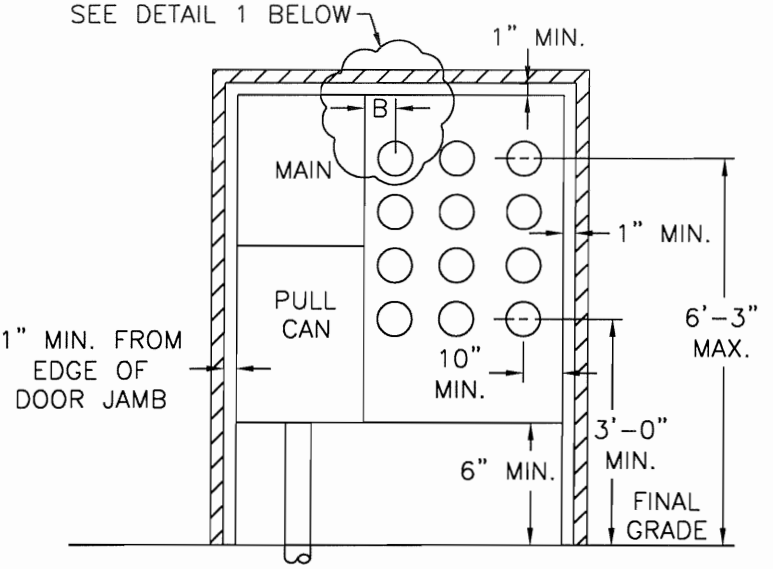
FIG. 7
13 CLIP

NOTE: 1. ALL COMMERCIAL AND CURRENT TRANSFORMER SERVICES WILL HAVE TEST/BYPASS OR TEST BLOCKS. (NOT SHOWN)
2. A SELF–CONTAINED 320 AMP SERVICE IS PERMITTED FOR RESIDENTIAL ONLY.
3. ALL VIEWS ARE SHOWN FROM THE FRONT.

ENGINEERING MANAGER OPERATIONS MANAGER ENG. TECH. SUPERVISOR	**CONNECTION DIAGRAM FOR METERED SERVICES** REVIEW COMMITTEE	**CITY OF ROSEVILLE** ROSEVILLE ELECTRIC CONSTRUCTION STANDARD
	DATE 02/06/20	DR.NO. **PAGE 7.2**

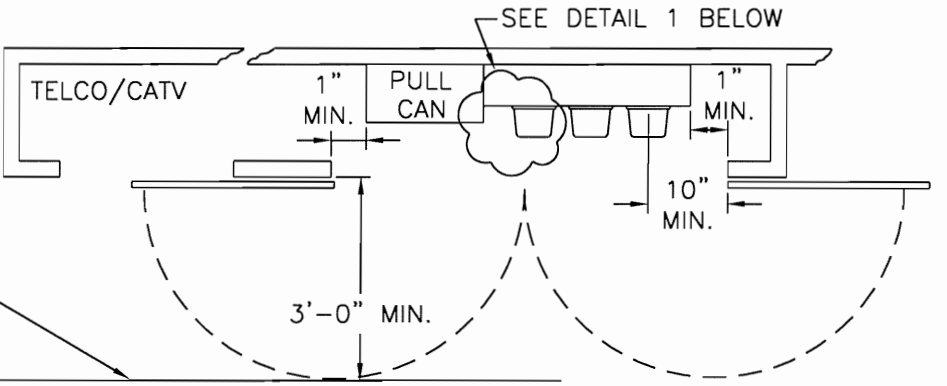


SIDE VIEW

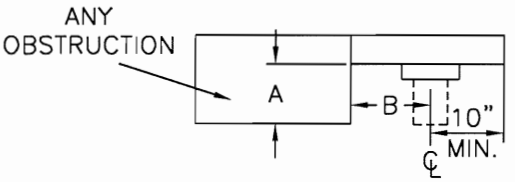


FRONT VIEW

NOTE:
HINGED DOORS WHEN OPENED MAY NOT BLOCK THE 24" EXIT ROUTE. DOORS MUST BE ABLE TO BE LOCKED IN THE OPEN POSITION.



TOP VIEW

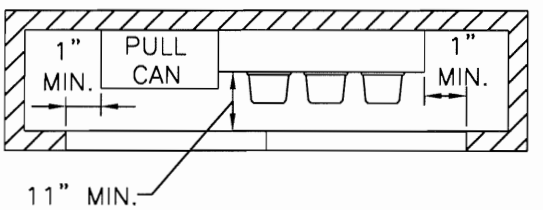


A	B
0" TO LESS THAN 2"	4-1/4" MIN.
2" TO LESS THAN 6"	6-1/4" MIN.
6" OR OVER	10" MIN.

A=DEPTH OF OBSTRUCTION EXTENDING BEYOND FACE OF PANEL

B=DISTANCE FROM ℄ OF SOCKET TO SIDE OBSTRUCTION

DETAIL 1



HINGED DOORS REQUIRED

TOP VIEW

Roseville Electric

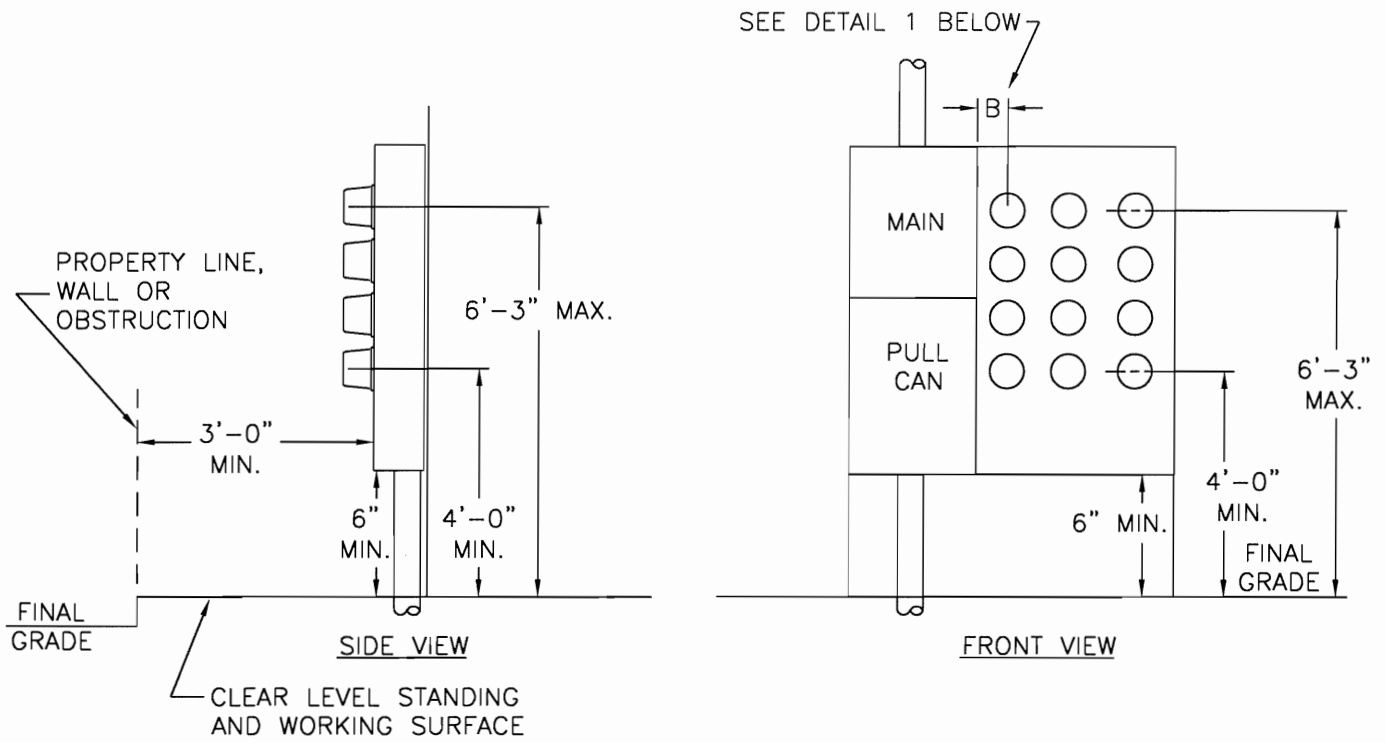
Reliable Energy • Dependable Service

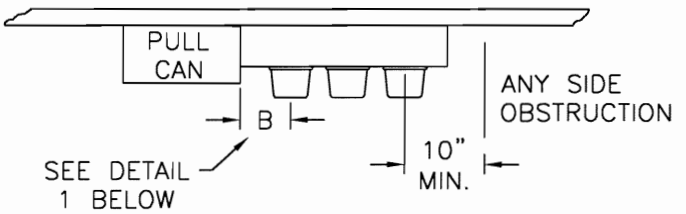
(916) 774-5601

ELECTRIC SUPERINTENDENT	REVIEW COMMITTEE
POWER ENG. MANAGER	DR. C. MAH
ELECTRONICS MANAGER	DATE 10-27-04
NEW SERVICES MANAGER	DR.NO.

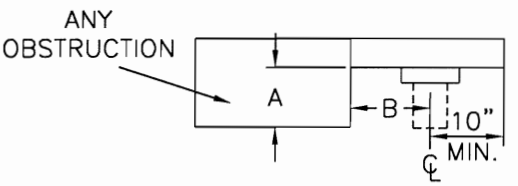
CONSTRUCTION STANDARD

ENCLOSED ELECTRIC COMMERCIAL MULTI-METER INSTALLATIONS





TOP VIEW



A	B
0" TO LESS THAN 2"	4-1/4" MIN.
2" TO LESS THAN 6"	6-1/4" MIN.
6" OR OVER	10" MIN.

A=DEPTH OF OBSTRUCTION EXTENDING BEYOND FACE OF PANEL

B=DISTANCE FROM ℄ OF SOCKET TO SIDE OBSTRUCTION

DETAIL 1

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ELECTRIC SUPERINTENDENT

POWER ENG. MANAGER

ELECTRONICS MANAGER

REVIEW COMMITTEE

DR. C. MAH

DATE 10-27-04

NEW SERVICES MANAGER

DR.NO.

PAGE 7.3.1

CONSTRUCTION STANDARD

OUTDOOR ELECTRIC COMMERCIAL MULTI-METER INSTALLATIONS

COMMERCIAL CUSTOMER OWNED INTERCONNECTED GENERATION REQUIREMENTS

ENGINEERING MANAGER Christopher Porter	**COMMERCIAL CUSTOMER OWNED INTERCONNECTED GENERATION REQUIREMENTS**	**CITY OF ROSEVILLE** ROSEVILLE ELECTRIC CONSTRUCTION STANDARD
OPERATIONS MANAGER Jason Grace (Aug 28, 2023 07:07 PDT)		
ENG. TECH. SUPERVISOR Joseph McKinley Joseph McKinley (Aug 28, 2023 06:51 PDT)	AK, wj, WK, KL, AM, VB — REVIEW COMMITTEE	DATE 7/12/23
		DR.NO. **PAGE 7.4**

ROSEVILLE ELECTRIC REQUIREMENTS FOR COMMERCIAL CUSTOMER OWNED INTERCONNECTED GENERATION (COIG)

DEFINITIONS AND ACRONYMS

- COIG — Customer Owned Interconnected Generation
- IA — Interconnection Agreement
- Customer-Generator — The owner/operator of generators interconnected with the electric utility
- COR — City of Roseville
- RE — "Roseville Electric" is the local public electric utility serving the COR
- BF — "Back Feed" which is the flow of electricity from the Customer to RE grid
- PV — Photovoltaic (Solar) which is the use of sunlight to generate electricity
- NEM — "NET Meter" is a meter that will spin in both directions and display a NET Value
- kWh-DEL — Power Delivered to the Customer by RE
- kWh-REC — Power Received from the customers COIG by RE
- MEMP — Main Electric Meter Panel
- BF Breaker — Back Feed Breaker is directly connected to the COIG system and is a dedicated AC breaker to only interrupt the COIG
- Sub Panel — Load Center
- Combiner Box — A junction box used to combine multiple sources of the customer's power production. No customer load shall be connected to the combiner box.
- NEC — National Electric Code
- CEC — California Electric Code, the City of Roseville uses the current CEC based on the applicable NEC
- IFC — International Fire Code

I. General COIG Requirements

1. COIG is customer owned grid connected electric generator(s) which can have the potential to back feed into the RE power system and can only run in parallel with the Utility if an "Interconnect Agreement" has been signed with RE.
2. All installations of COIG systems must comply, and must be constructed to meet the requirements, terms and conditions listed in the current National, State, RE Rule 21, and RE Construction Standards.
3. Where there is any conflict between the Standards and Rules stated above; the more stringent criteria shall apply.
4. All COIG systems shall be constructed, connected, and labeled as stated/shown below.
5. Examples of COIG are (but not limited to): PV, Wind, Diesel, Gas, Propane, or Biomass.
6. All COIG systems must be connected via BF breaker(s), inside the MEMP. If the MEMP only has room for a Main Breaker, then the generator(s) must be connected to a BF breaker inside a Load Center (sub panel). The AC BF breaker must NOT be connected to any customer load(s). It must be dedicated to the COIG system only.
7. Line side taps (any connection between utility incoming cables and the customer's main breaker) are not allowed. City of Roseville's Roseville Municipal Code Chapter 16.04.410 requires that there is no more than one disconnect per electrical service.
8. Bus taps (tap connections added to the load side of the main breaker) shall not compromise the Underwriters Laboratory (UL) certification of the existing switchgear, or the ratings and withstand

capabilities of the service panel. The customer and installer are fully responsible for any switchgear modifications and potential problems, hazards, or de-ratings that may occur in the future as a result of the modifications. RE may require the customer to provide verification of UL compliance for switchgear modifications by one of the following methods:

a. A document from the manufacturer of the existing panel indicating that the proposed modification or connection to the panel does not compromise the UL rating of the panel.
b. A Nationally Recognized Testing Laboratory certification of the proposed modification or connection to the switchgear's load side bus.

9. Customer should not lose any load if the BF breaker(s) are "opened" (turned off).
10. AC combiner boxes shall be dedicated to combining the generators output only and cannot be used as a load center to feed any customer load(s)
11. Maximum rating (amps) of the main breaker cannot exceed the maximum capacity of the Electric Meter on the MEMP.
12. COIG production shall not exceed 100% of the customer of records previous 12 month kWh consumption or peak kW demand usage.
13. All commercial panels must meet RE acceptability pages as shown at www.EUSERC.com.
14. The BF Breaker(s) shall be installed within a maximum of 10 feet from MEMP as close to each other as possible within these parameters); and all devices shall be within direct line of sight of the MEMP.
15. All devices shall be reasonably accessible at all times (24 hours a day, 365 days year) to appropriate City of Roseville personnel per the Roseville Municipal Code Chapter 14.24.200 Letter I.
16. Any deviation from these specifications shall be submitted to Roseville Electric and approved prior to construction or installation.
17. Discrepancies between the diagrams and the actual final installation, as built, may be cause for rejection during the final testing, inspection, and net meter installation. A rejection means making the necessary corrections, rescheduling the final testing, inspection, and net meter installation, and possibly resulting in a significant delay in activating the system.

II. Certified Components or Systems

1. All components of the COIG system must be certified by a nationally recognized testing laboratory(s). It is the responsibility of the owner/operator to provide evidence of such compliance.
2. The inverters must meet the requirements of UL 1741.

III. Metering:

1. **"Net" Meter (NEM):** A NEM shall be installed on all qualifying COIG systems. A NEM is able to measure in both directions and will display the "NET" value (kWh-DEL minus any kWh-REC). A NEM read greater than the previous billing cycle means the Customer is a net consumer of electricity from RE. A NEM read less than previous billing cycle means the Customer is a net generator of electricity and delivered more power to RE than they consumed. The NEM meter and NEM panel infrastructure cost is the responsibility of the owner/operator.

IV. Western Area Power Administration (WAPA)

RE receives 100% of its power transmission service from WAPA. As a result, RE is subject to specific regulations and conditions per RE's agreements with WAPA. Based upon these agreements, all owner/operator interconnection requests are subject to the stipulations and requirements of these existing

RE/WAPA agreements, and any future agreements. Such conditions may include (but are not limited to):

1. WAPA design and interconnection review of the owner/operator's project
2. WAPA metering standards
3. WAPA metering telemetry and communication standards

An assessment of WAPA oversight will be part of the RE interconnection process. It is highly recommended that owner/operators proposing interconnections in excess of 1 MW contact RE at the earliest possible convenience to begin assessment and discussion.

All systems may require an engineering study by RE as per Rule 21.

V. Back Feed (BF) Breaker(s)

The BF Breakers shall be dedicated to turn off and lock-out the COIG system only (without turning off any other customer loads).

VI. Labeling

All interconnected generation systems shall have special labels placed on the required panels and disconnects. All labeling requirements shall be based on the individual type of generation systems being installed. Example: A Solar Electric COIG system must have the labels "SOLAR ELECTRIC".

- All Labels must be made per UL 969 specifications with WHITE lettering on RED background. Letters shall be a minimum ¼" high.

NOTE: Per UL969, labels must be made of a type of material that is durable, adhesive, reflective, weather resistant, and is suitable for its environment. All hand written items on the labels must be as durable and long lasting as the preprinted items on the labels.

COIG Labels are derived from the following Codes and Standards.

The National Electrical Code (NEC), "Interconnected Electric Power Production Sources" has expanded, and contains some significant changes to NEC Articles 690 and 705. All latest codes adopted by the City of Roseville shall apply including the International Fire Code (IFC). These Code Articles apply to any power-production system connected to the utility through an inverter, regardless of the energy source - examples include generators, PV systems, wind turbines, and fuel cells. Some of the general requirements are that interactive systems shall be labeled. It is the responsibility of the owner/contractor to verify all codes, listed or not, are the most current codes applicable.

NEC 690.10: Stand-Alone systems and their labels.
NEC 690.14.C.2. and 690.1(C)(2) and IFC-605: Prefer the word "MAIN"
NEC 690.15 and 705.21: If equipment is energized from more than one source, the disconnecting means must be grouped and identified.
NEC 690.15.A and 705.70: Grid Tied invertors in non-readily accessible locations.
NEC 690.35.F: A power Source shall be labeled at each junction box, combiner box or disconnect, and device where energized circuits may be exposed during service.

NEC 690.53: Must provide system voltages and currents.
NEC 690.54: All Interactive points of interconnection with other sources shall be marked at an accessible location at the disconnecting means as the power source with the rated AC output current and the nominal AC operating voltage.
NEC 690.55: Systems employing energy storage shall also be marked with Maximum operating voltages including any equalization voltage and the polarity of the grounded circuit conductor (NEUTRAL).
NEC 690.64: Systems containing overcurrent devices in circuits supplying power to a buss bar or conductor supplied from multiple sources shall be marked to indicate presence of all sources (back-fed).
NEC 690.64 and 705.10 and 705.12.D.(3)(4): Equipment containing overcurrent devices in circuits supplying power to a buss bar or conductor supplied from multiple sources shall be marked to indicate the presence of all sources.
NEC 690.8 and 705.60: Circuit Sizing
NEC 690.9 and 705.65: Overcurrent protection
NEC 705.80: Interactive systems with energy storage.
NEC 705.12.D.7: Labels must be placed to warn against moving or replacing the overcurrent devices to another location or changing the overcurrent device size and/or type.

Other Codes
IFC 605.11.1.4: Caution Label to indicate Solar Circuit. Fire Dept. Requirement.
OSHA 1910.45 and ANSI Z535: The word "WARNING" must be at least 50% taller and the remainder of the letter must be a minimum of 00.12" tall on a warning label.
OSHA 1910.45 and ANSI Z535: The height of the characters must be readable at a safe distance. They also recommend use of safety alert symbols where applicable.
UL 969: Labels must be made of durable, adhesive, reflective, weather resistant, and suitable for the environment type material. All hand written items on the labels must be as durable and last as long the labels without fading.
COR City of Roseville: Requires minimum 1/4" high lettering Example: if the words "ELECTRIC SHOCK HAZARD" would be minimum 1/4" tall, and the word "WARNING" must be at least 1/2" tall.

VII. Equipment Placement and Connection Diagrams for MEMP, NEM, Load Center, ACD(s), PM(s)

1. For all systems the COIG generator will connect to the BF breaker either in the MEMP or the Load Center, if the MEMP has only room for the Main breaker.
2. All metering shall be done at the service voltage provided by RE to the customer.
3. For connection diagrams, refer to the pages below.

VIII. Primary Voltage Services (12kV or Greater)

Primary voltage services (12kV or greater) are typically utilized by large customers or by customers that have a campus-style electrical system. For these types of installations, the COIG is typically installed on a panel fed by a customer's stepdown transformer (see page 7.4.10). This becomes extremely difficult to comply with the "one single disconnect at the point of common coupling (PCC)" requirement. Roseville Electric's main intent is to have the ability to remove the generation from its distribution system safely. To this extent, RE and the customer shall agree to use the customer's **"rackable"** main circuit breaker to

provide the disconnecting means when it is necessary to remove the generation from RE's distribution system. The following are the requirements:

1. Facility shall have a main circuit breaker that can be opened and racked-out by the customer. RE's clearance policies allows a clearance to be taken at a customer's circuit breaker when RE can take control over that circuit breaker. Control by RE would be accomplished by RE witnessing that the circuit breaker was racked out and RE applying a lock and safety tag.

2. The customer shall agree, when required by RE, to disconnect the COIG by opening and racking out the circuit breaker. As a result, the customer may also experience an outage to their facility. The customer shall provide a letter, on their company letterhead, confirming agreement with these requirements.

Restrictions: For the facilities where the option of using the main breaker for purpose of disconnecting the generating facility COIG is not available or undesirable; therefore, the customer shall install a single visible open and lockable disconnect device as required by Rule 21, and this standard, near the point of common coupling and on a single disconnecting device.

The single-line diagrams shown on pages 7.4.9 & 7.4.10 are typical placement and connections for various types and sizes of the COIG systems approved by RE to be installed in its territory. If a proposed system is not shown in the typical single line diagram(s), contact Roseville Electric for pre-approval prior to submitting for permit or purchasing equipment.

ROSEVILLE ELECTRIC METERING REQUIREMENTS FOR COIG SPECIFIC TO:
COMMERCIAL SOLAR ELECTRIC GENERATION

1. GENERAL

Every Commercial Solar Electric installation that will be interconnected in parallel with RE, must meet all of the following requirements:

a. All the requirements as stated in the RE Construction Standards;
b. All the requirements as stated in the RE Rule 21;
c. Terms and conditions as listed in the current Standards, such as State and National standards;

Any conflict between the Standards and Rules stated above shall be resolved by Roseville Electric with their interpretation of the Standards and Rules. Where there is any conflict between the Standards and Rules stated above; the more stringent criteria shall apply.

The RE Solar Electric Program Coordinator shall be contacted regarding all proposed solar electric projects. Early and timely contact with the RE Program Coordinator helps facilitate a smooth interconnection process. Some RE distribution feeders have achieved high levels of solar electric system penetration, so early contact with the RE Solar Electric Program Coordinator may also prevent unnecessary solar electric system redesigns requested by RE of the applicant.

System ratings must be calculated through the California Energy Commissions' CSI Standard PVCalculator which can be found at: www.csi-epbb.com.
This calculator must be used to determine the proposed solar electric system's AC watt capacity size and kWh generation output whether or not an incentive is requested.
All systems must be designed, constructed and commissioned per RE Rule 21 and RE Construction Standards and Specifications. Failure to do so may result in RE prohibiting parallel interconnection.

2. Certified Components List for Systems Specific To SOLAR ELECTRIC

A nationally recognized testing laboratory must certify all flat plate solar electric modules and inverters. The modules must meet the requirements of the Underwriters Laboratory (UL) Standard 1703. The inverters must meet the requirements of UL 1741. The solar electric (PV) generation system must use components that are listed on the California Energy Commission's (CEC) list of "Eligible Equipment", as found on the CEC's website, to meet this requirement.

3. Net Energy Metering (NEM) Specific To SOLAR ELECTRIC

See requirements stated in Section III above and attached drawings.

4. Utility Required Dedicated Back-feed Breaker(s) Specific To SOLAR ELECTRIC

a. PV/Battery systems shall not be connected to the line side of a customer main breaker in any fashion.
b. See requirements stated in Section V above and attached drawings.

5. Labeling Specific To Solar Electric

All Solar Electric (PV) generation systems must have special labels specific to Solar Electric. See requirements stated above and the labels shown on page 7.4.8.

See codes listed in Section VI above for associated labels and verbiage. Examples of labels can be found at http://www.hellermanntyton.us/Literature.aspx Solar Capabilities Catalog; these examples can be adapted to all types of COIG.

6. Multi-Family COIG Interconnection Requirements

The following are requirements and regulations for PV systems installed on multi-family buildings:

a. Interconnections utilizing pedestals is not permitted.
b. Carport/canopy PV systems are acceptable provided they are physically on the same parcel and do not cross property lines.
c. Production meters for Roseville Electric use for these systems are not required
d. All PV/battery systems shall also comply with the N.E.C and California Building Code.
e. Roseville Electric does not have authority to provide a variance to building code requirements.
f. Virtual Net Metering is allowed along with similar metering services from third parties.

WARNING!
DUAL POWER SUPPLY
***SOLAR* ELECTRIC SYSTEM** L1

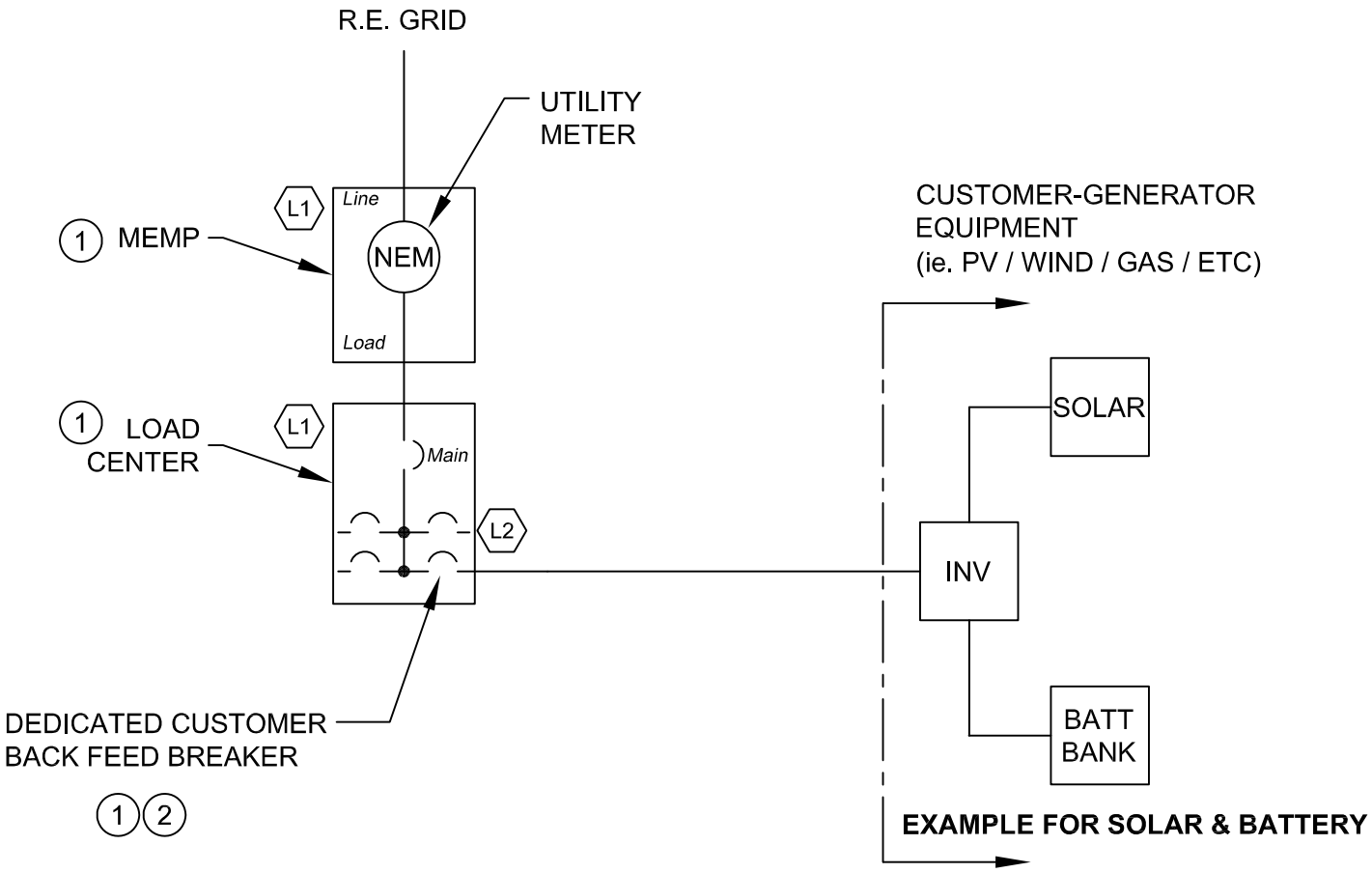
THIS TAG TO BE ATTACHED TO METER PANEL & OPTIONAL LOAD CENTER

CAUTION:
***SOLAR* ELECTRIC CIRCUIT** L2

THIS TAG TO BE ATTACHED TO AC & DC CIRCUIT EQUIPMENT

ALL LABELS:

- THE LABELS SHALL BE PERMANENTLY ATTACHED TO THE APPROPRIATE PANEL.
- AC & DC CONDUIT, RACEWAY, ENCLOSURES, CABLE ASSEMBLIES AND JUNCTION BOXES SHALL BE RED BACKGROUND MATERIAL WITH WHITE LETTERING MADE OF DURABLE ADHESIVE, REFLECTIVE, WEATHER RESISTANT MATERIAL SUITABLE FOR THE ENVIRONMENT PER UL 969; TO ALERT FIRE SERVICE TO AVOID CUTTING THEM OFF.
- LABELS SHALL LIST THE TYPE OF GENERATION INSTALLED, EXAMPLE ABOVE IS SHOWN FOR A SOLAR INSTALLATION. REFER TO TAGGING SPECIFICATION FOR MORE INFORMATION.
- OTHER LABELS REQUIRED SHALL MEET THE CEC/NEC REQUIREMENTS, SEE SECTION IV OF THIS SPECIFICATION.



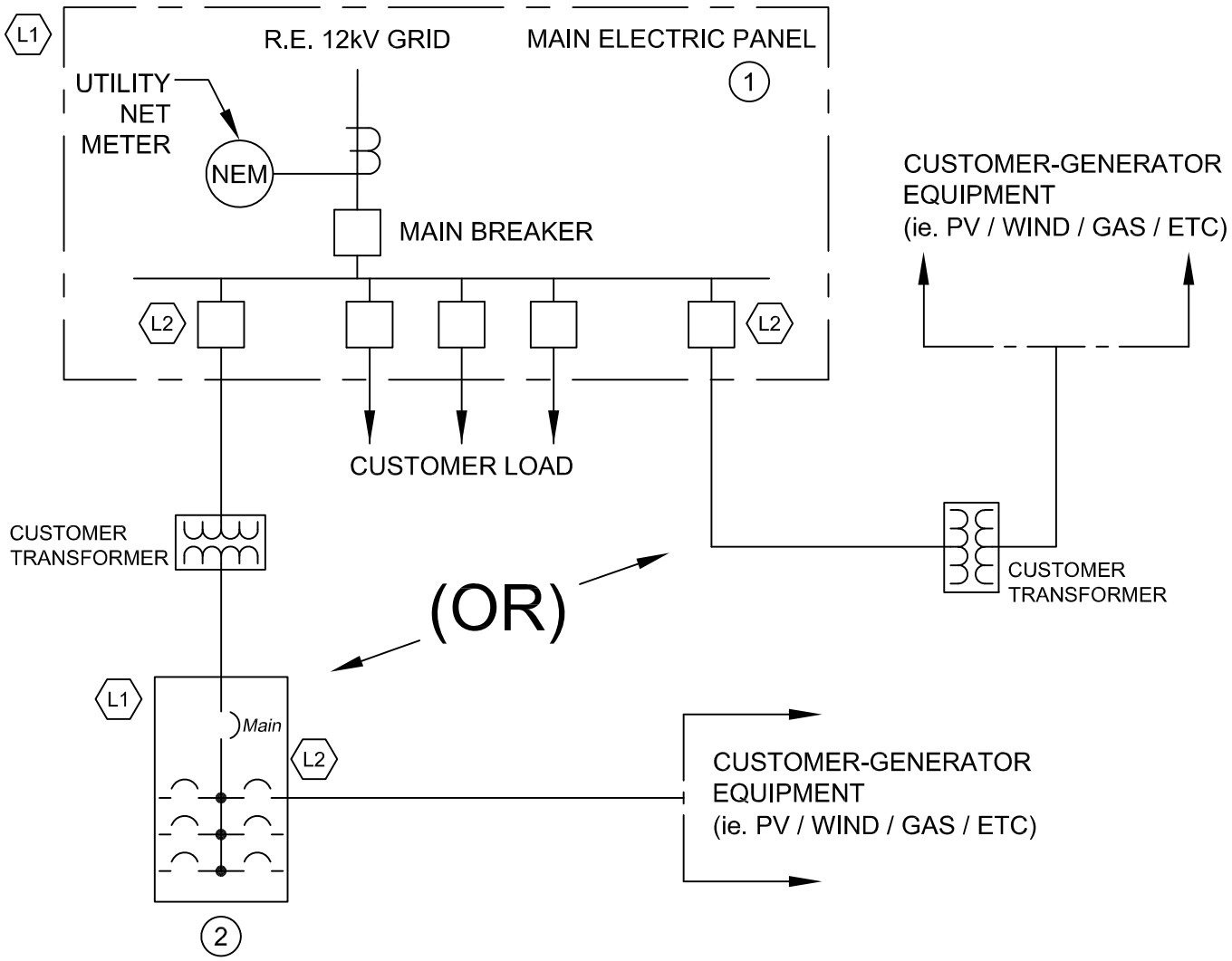
NOTES:

1. SERVICE ENTRANCE PANELS SHALL MEET CEC/NEC AND THE CITY OF ROSEVILLE ACCEPTABILITY PAGES AS PUBLISHED BY EUSERC AT WWW.EUSERC.COM.

2. ALL ELECTRICAL MUST MEET CITY OF ROSEVILLE BUILDING AND MUNICIPAL CODES.

3. SEE PAGE 7.4.8 FOR LABEL DESIGNATIONS (L1 & L2)

ENGINEERING MANAGER Christopher Porter	**TYPICAL INTERCONNECTION SINGLE LINE FOR COIG SYSTEMS**	**CITY OF ROSEVILLE** ROSEVILLE ELECTRIC CONSTRUCTION STANDARD
OPERATIONS MANAGER Jason Grace (Aug 28, 2023 07:07 PDT)		
ENG. TECH. SUPERVISOR Joseph McKinley Joseph McKinley (Aug 28, 2023 06:51 PDT)	AK, wj, WK, MJM, KL, AM, VB — REVIEW COMMITTEE	DATE 07/12/23 — DR.NO. PAGE 7.4.9



NOTES:

1. SERVICE ENTRANCE PANEL SHALL MEET CEC/NEC AND THE CITY OF ROSEVILLE ACCEPTABILITY PAGES AS PUBLISHED BY EUSERC AT WWW.EUSERC.COM.

2. ALL ELECTRICAL MUST MEET CITY OF ROSEVILLE BUILDING AND MUNICIPAL CODES.

3. SEE PAGE 7.4.8 FOR LABEL DESIGNATIONS (L1 & L2).

ENGINEERING MANAGER	**TYPICAL INTERCONNECTION SINGLE LINE FOR PRIMARY SERVICE VOLTAGE (12kV) CONNECTIONS**	**CITY OF ROSEVILLE** ROSEVILLE ELECTRIC CONSTRUCTION STANDARD
OPERATIONS MANAGER		
ENG. TECH. SUPERVISOR	REVIEW COMMITTEE: AK, WJ, WK, KL, AM, VB	DATE 07/12/23
		DR.NO. PAGE 7.4.10

SECONDARY BOX SPECIFICATIONS

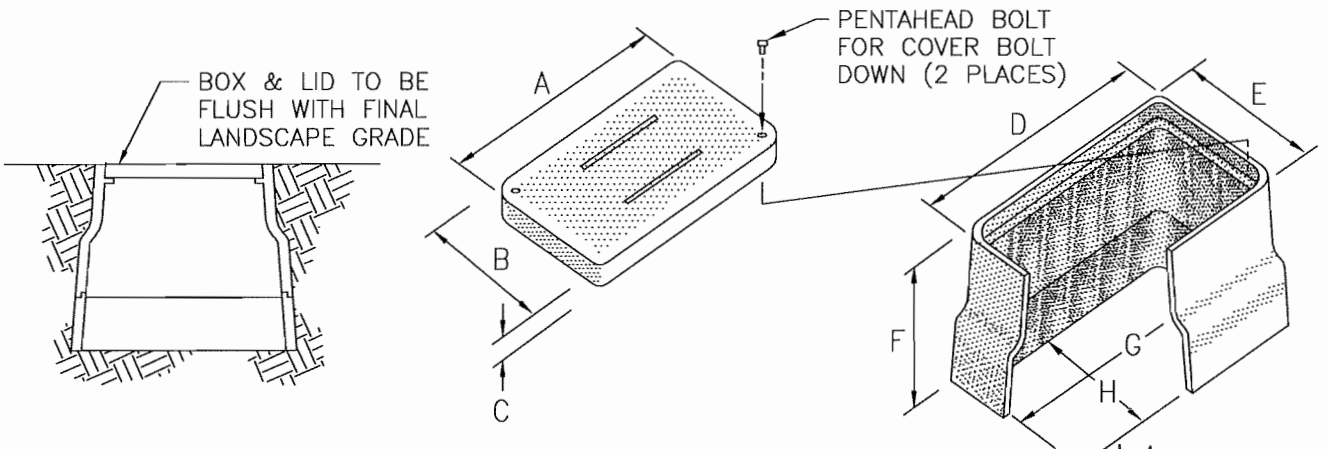
1. LID TO HAVE TWO (2) PENTAHEAD LOCK DOWN BOLTS. BOLTS ARE TO BE #16–3/8" x 2 1/4" x .834 HEAD INCHES OR CORROSION RESISTANT 1/2"–6 x 2 1/2" PENTA HEAD COIL BOLTS.
2. LID TO BE MARKED "ROSEVILLE ELECTRIC".
3. TRAFFIC LID RATED H–20 TO BE USED IN ALL TRAFFIC AREAS.
4. BOX AND LID TO BE FLUSH WITH FINAL GRADE.
5. ONLY THOSE BOXES LISTED IN THIS SPEC ARE APPROVED FOR INSTALLATION BY OR FOR THE CITY OF ROSEVILLE ELECTRIC DEPARTMENT.

13"Wx24"Lx18"D STANDARD #30 BOX AND LID DIMENSIONS

MANUFACTURER	CATALOG NO.	LID DIMENSIONS			BOX DIMENSIONS				
		A	B	C	D	E	F	G	H
CDR SYSTEMS	PB10–1324–18 BOX PC10–1324–02 ITC LID PC12–1324–02 FTC LID	23.25	13.75	2.00	25.25	15.75	18.00	29.50	20.00
REPLACON PRODUCTS	RP1324–18IT BOX RP1324 ITC LID RP1324 FTC LID	23.12	13.75	2.00	24.50	15.25	18.00	27.75	18.50
QUAZITE PRODUCTS	PE 1324 Z 505 BOX & LID ASSEMBLY INCIDENTIAL H–10	23.375	13.875	2.00	24.625	15.125	18.00	29.00	19.50
ARMORCAST PRODUCTS	A6001946X18 BOX A6001866 ITC LID A6001969 FTC LID	23.25	13.75	2.00	25.375	15.875	18.00	27.50	18.125

17"Wx30"Lx18"D LARGE #36 BOX AND LID DIMENSIONS

CDR SYSTEMS	PB10–1730–18 BOX PC10–1730–02 ITC LID PC12–1730–02 FTC LID	30.50	17.50	2.00	32.50	19.50	18.00	36.75	23.75
REPLACON PRODUCTS	RP1730–18IT BOX RP1730 ITC LID RP1730 FTC LID	30.37	17.50	2.00	32.50	19.50	18.00	36.50	23.50
QUAZITE PRODUCTS	PE 1730 Z 504 BOX & LID ASSEMBLY INCIDENTAL H–10	30.625	17.625	2.00	32.125	19.00	18.00	37.00	24.00
ARMORCAST PRODUCTS	A6001640X18 BOX A6001643 ITC LID A6001947T FTC LID	30.50	17.50	2.00	32.75	19.625	18.00	37.00	24.00



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ELECTRIC SUPERINTENDENT

POWER ENG. MANAGER

ELECTRONICS MANAGER

REVIEW COMMITTEE

DR. NEB | DATE 7/24/06 | DR.NO.

NEW SERVICES MANAGER

PAGE 8.1

CONSTRUCTION STANDARD

SECONDARY SERVICE BOX SPECIFICATIONS STANDARD AND LARGE BOX

STREET LIGHTING BOX SPECIFICATIONS

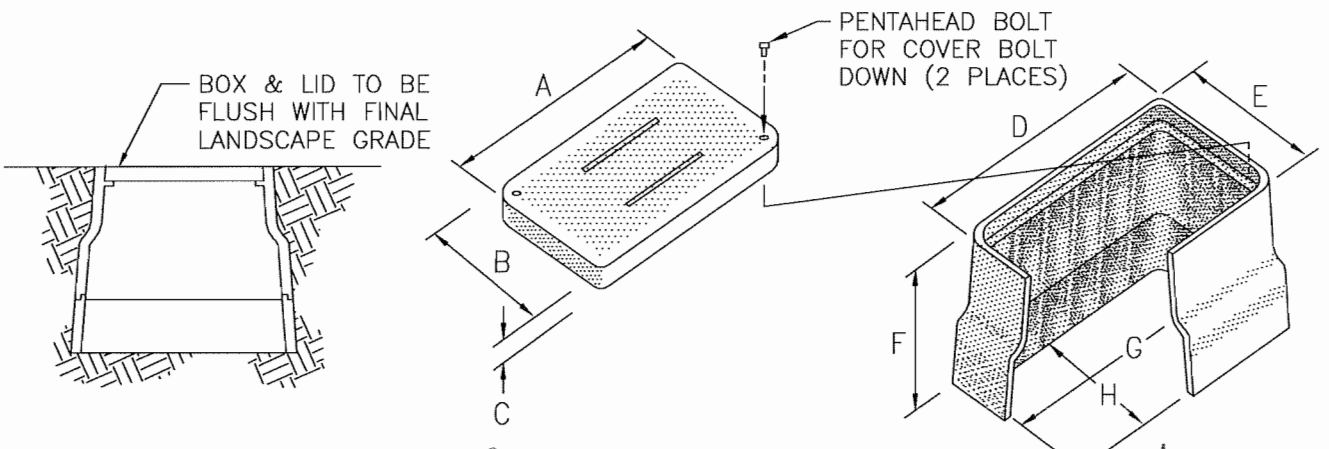
1. LID TO HAVE TWO (2) PENTAHEAD LOCK DOWN BOLTS. BOLTS ARE TO BE #16–3/8" x 2 1/4" x .834 HEAD INCHES OR CORROSION RESISTANT 1/2"–6 x 2 1/2" PENTA HEAD COIL BOLTS.
2. LID TO BE MARKED "STREET LIGHTING".
3. TRAFFIC LID RATED H–20 TO BE USED IN ALL TRAFFIC AREAS.
4. BOX AND LID TO BE FLUSH WITH FINAL GRADE.
5. ONLY THOSE BOXES LISTED IN THIS SPEC ARE APPROVED FOR INSTALLATION BY OR FOR THE CITY OF ROSEVILLE ELECTRIC DEPARTMENT.

10"Wx17"Lx12"D STANDARD #9 BOX AND LID DIMENSIONS

MANUFACTURER	CATALOG NO.	LID DIMENSIONS			BOX DIMENSIONS				
		A	B	C	D	E	F	G	H
CDR SYSTEMS	PB10–1015–12 BOX PC10–1015–02 ITC LID PC12–1015–02 FTC LID	15.36	10.12	1.75	17.06	11.81	12.00	21.25	16.00
REPLACON PRODUCTS	RP1017–12IT BOX RP1017 ITC LID RP1017 FTC LID	15.25	10.00	1.75	16.00	10.75	12.00	18.00	12.50
QUAZITE PRODUCTS	PC 1118 Z 506 BOX & LID ASSEMBLY INCIDENTIAL H–10	18.50	11.50	0.75	20.50	13.50	12.00	17.00	10.00
ARMORCAST PRODUCTS	A6001921X12 BOX A6001922 ITC LID A6001922T FTC LID	15.375	10.125	1.75	17.50	12.25	12.00	18.00	12.625

13"Wx24"Lx18"D LARGE #30 BOX AND LID DIMENSIONS

CDR SYSTEMS	PB10–1324–18 BOX PC10–1324–02 ITC LID PC12–1324–02 FTC LID	23.25	13.75	2.00	25.25	15.75	18.00	29.50	20.00
REPLACON PRODUCTS	RP1324–18IT BOX RP1324 ITC LID RP1324 FTC LID	23.12	13.75	2.00	24.50	15.25	18.00	27.75	18.50
QUAZITE PRODUCTS	PE 1324 Z 505 BOX & LID ASSEMBLY INCIDENTIAL H–10	23.375	13.875	2.00	24.625	15.125	18.00	29.00	19.50
ARMORCAST PRODUCTS	A6001946X18 BOX A6001866 ITC LID A6001969 FTC LID	23.25	13.75	2.00	25.375	15.875	18.00	27.50	18.125



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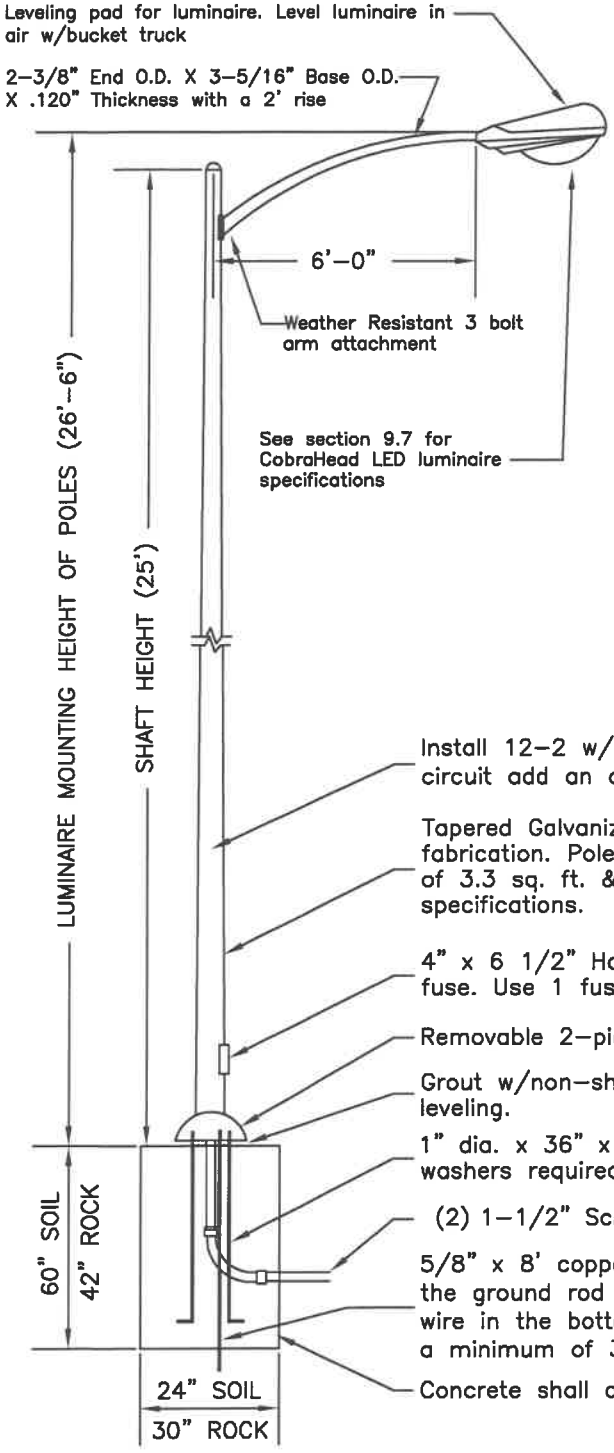
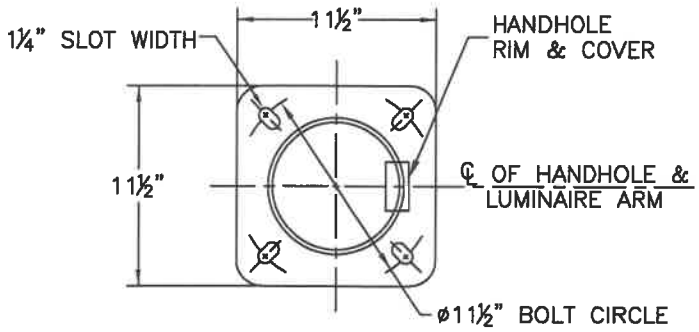
ELECTRIC SUPERINTENDENT
POWER ENG. MANAGER
ELECTRONICS MANAGER
REVIEW COMMITTEE
NEW SERVICES MANAGER
DR. NEB | DATE 7/24/06 | DR. NO.

CONSTRUCTION STANDARD
STREET LIGHTING BOX SPECIFICATIONS STANDARD AND LARGE BOX

DEVELOPER RESPONSIBILITY:

1. Developer to provide lamp to meet section 9.7 for each fixture installed. Luminaire is to be mounted on a galvanized steel pole similar to Ameron N–286–ROSVIL801.
2. Developer to provide 2 sets of submittals showing type of luminaire, pole, lamp, photo eye, or shorting cap to be used for approval by Roseville Electric.
3. Any developer or contractor installing non–approved equipment does so at his own risk and may face future expenses in correcting any non–approved materials to meet Roseville Electric standards.





BASEPLATE DETAIL

Install 12–2 w/Ground UF cable from base of pole to Luminaire. For controller type circuit add an additional 12–3 w/Ground UF cable at Photo–Eye pole location only.

Tapered Galvanized Steel Pole to have minimum yield strength of 40,000 PSI after fabrication. Pole to be designed to a minimum of A.A.S.H.T.O. 80 using an E.P.A. of 3.3 sq. ft. & 60 Lbs.. Luminaire welding and inspection to conform to A.W.S. specifications.

4" x 6 1/2" Handhole w/removable cover. Place 30A, 600V fuse holder w/20 Amp fuse. Use 1 fuse per hot leg.

Removable 2–piece base–cover.

Grout w/non–shrink grout between base of pole & concrete after erection and leveling.

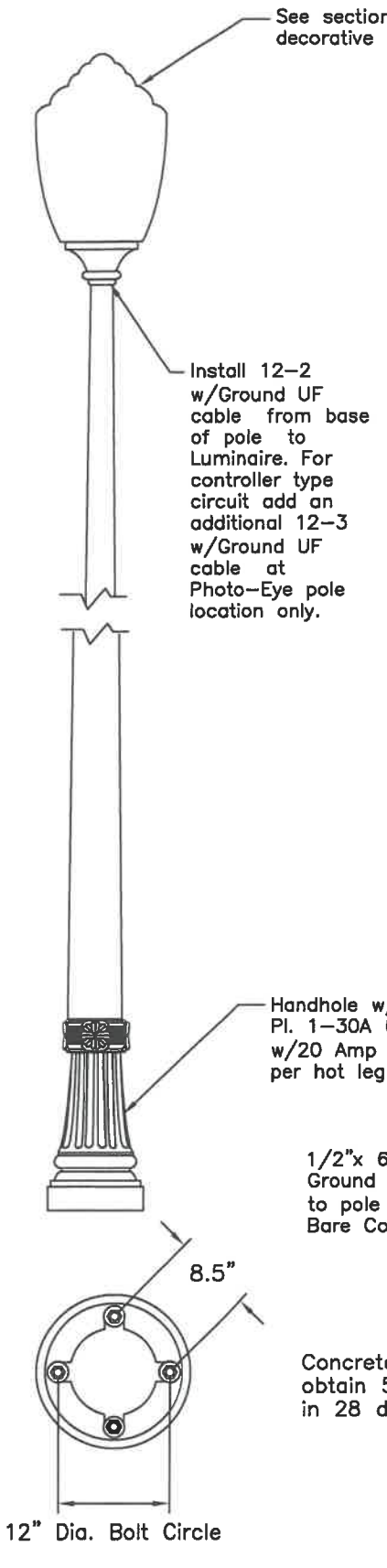
1" dia. x 36" x 4" galvanized anchor bolts w/2 galvanized hex nuts & 2 flat washers required per bolt.

(2) 1–1/2" Sch. 40 conduit(s) per job print. See page 9.5 for wire size and qty.

5/8" x 8' copper ground rod bonded to pole w/#6 solid bare copper wire. Where the ground rod cannot be driven, the developer may place 8' of #6 solid copper wire in the bottom of the trench (minimum 30" deep). The wire will be encased in a minimum of 3" of concrete and be of length to bond to the street light pole.

Concrete shall obtain 5000 P.S.I. in 28 days.

ENGINEERING MANAGER OPERATIONS MANAGER ENG. TECH SUPERVISOR	**STREET LIGHT AND STANDARD** **100 WATT HPS LED EQUIVALENT** REVIEW COMMITTEE	**CITY OF ROSEVILLE** ROSEVILLE ELECTRIC **CONSTRUCTION STANDARD**
	DATE **02/06/20**	DR.NO. **PAGE 9.1**



100W DECORATIVE STREET LIGHT POLE STANDARD:

1. Antique Street Lamp, Inc. model: PZNY1718ANBK, New York Series, 17'6" standard height with a 17" diameter base, Cast iron/steel, and Black in color.

OR

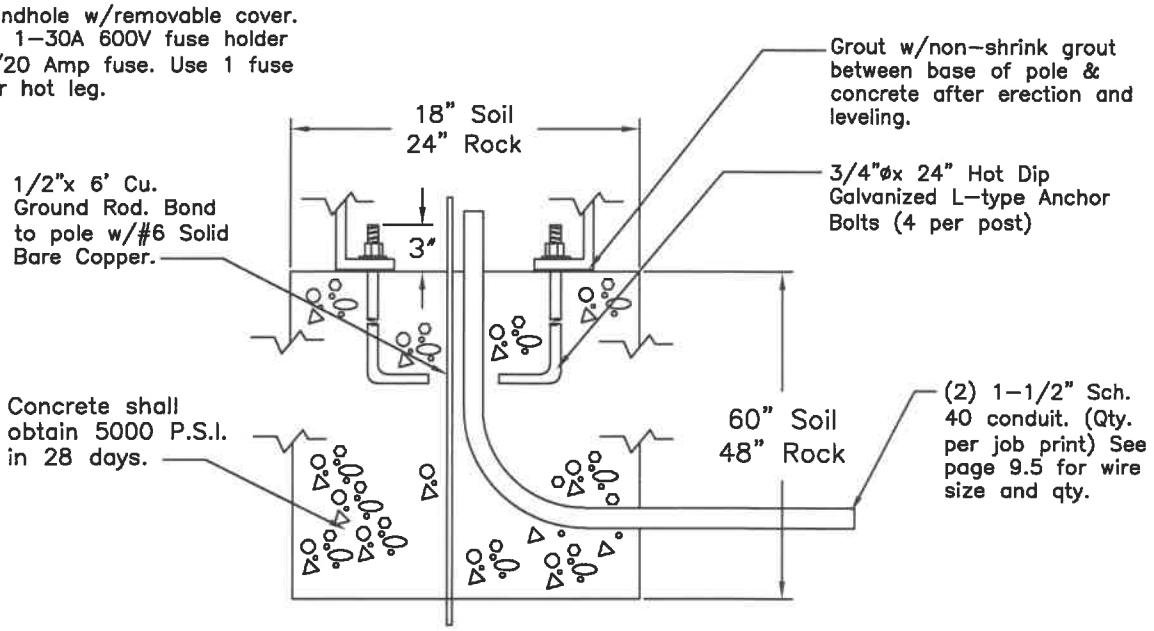
2. Spring City Electrical Mfg. Co. model: IWBNRT–16.6–TBD, North Hampton Iron/steel Post Series, 17'6" standard height with a 16.5" diameter base, Cast iron/steel, and Black in color.

OR

3. Union Metal Corporation model: P1571–70–B123–Y1, Ornamental Lighting Standard, Steel Pole with Cast Iron Base, 17'6" standard height with a 16.5" diameter base, Cast iron/steel, and Black in color.

DEVELOPER RESPONSIBILITY:

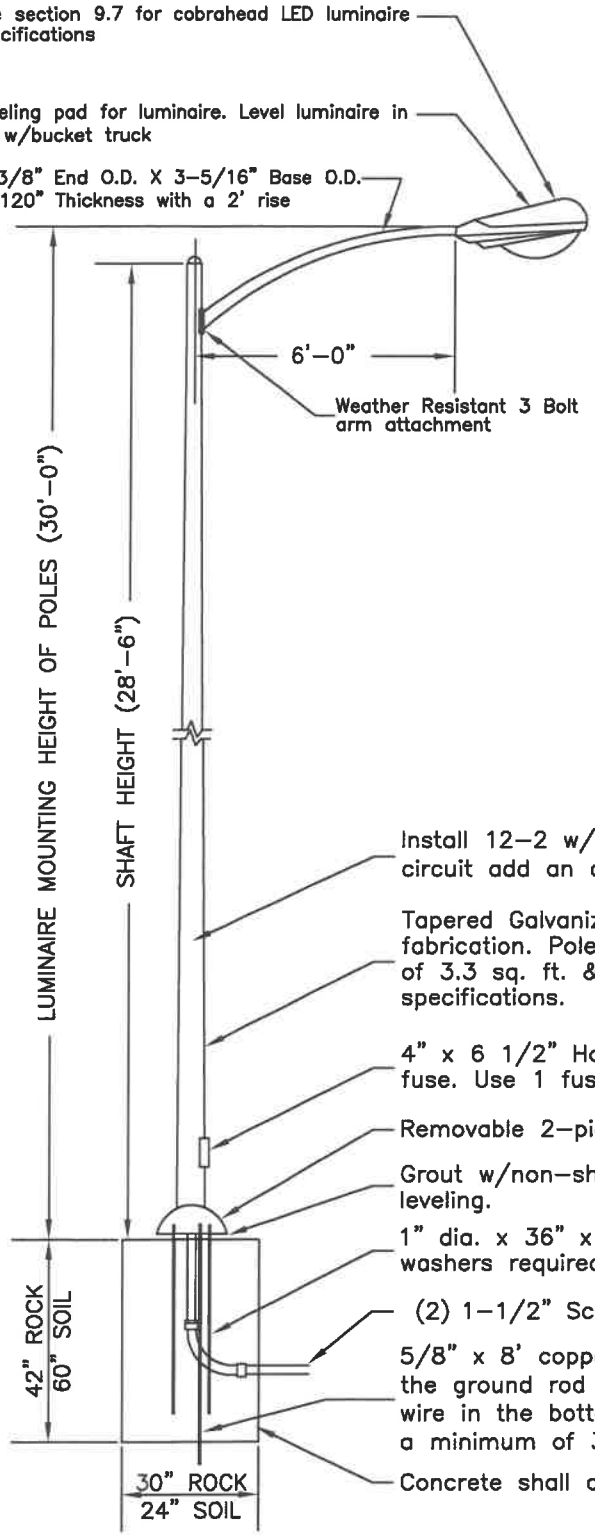
1. Developer to provide the approved 100W HPS equivalent LED fixture per section section 9.8 of these specifications.
2. Developer to provide the approved steel pole.
3. Lighting system shall be completely functional and tested by Roseville Electric.
4. Developer to provide 2 sets of submittals showing type of luminaire, pole, lamp, photo eye, or shorting cap to be used for approval by Roseville Electric. Any developer or contractor installing non–approved equipment does so at his own risk and may face future expenses in correcting any non–approved materials to meet City standards.
5. Developer shall install lighting system per the Roseville Electric job print.

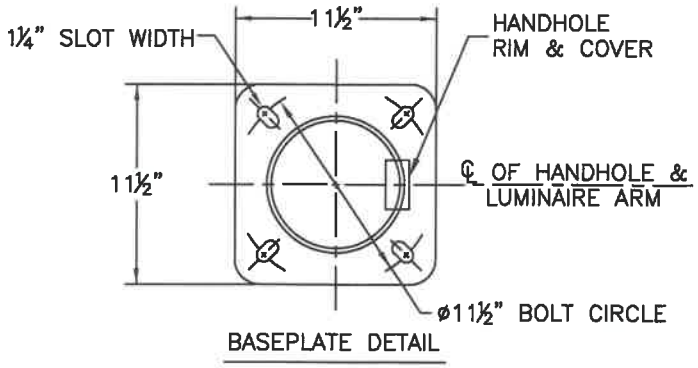


ENGINEERING MANAGER	100W HPS EQUIVALENT LED DECORATIVE STREET LIGHT	CITY OF ROSEVILLE ROSEVILLE ELECTRIC CONSTRUCTION STANDARD	
OPERATIONS MANAGER			
ENG. TECH SUPERVISOR	REVIEW COMMITTEE	DATE 02/06/20	DR.NO. PAGE 9.1.1

DEVELOPER RESPONSIBILITY:

1. Developer to provide lamp to meet section 9.7 for each fixture installed. Luminaire is to be mounted on a galvanized steel pole similar to Ameron N–286–ROSVIL801.
2. Developer to provide 2 sets of submittals showing type of luminaire, pole, lamp, photo eye, or shorting cap to be used for approval by Roseville Electric.
3. Any developer or contractor installing non–approved equipment does so at his own risk and may face future expenses in correcting any non–approved materials to meet Roseville Electric standards.





Install 12–2 w/Ground UF cable from base of pole to Luminaire. For controller type circuit add an additional 12–3 w/Ground UF cable at Photo–Eye pole location only.

Tapered Galvanized Steel Pole to have minimum yield strength of 40,000 PSI after fabrication. Pole to be designed to a minimum of A.A.S.H.T.O. 80 using an E.P.A. of 3.3 sq. ft. & 60 Lbs.. Luminaire welding and inspection to conform to A.W.S. specifications.

4" x 6 1/2" Handhole w/removable cover. Place 30A, 600V fuse holder w/20 Amp fuse. Use 1 fuse per hot leg.

Removable 2–piece base–cover.

Grout w/non–shrink grout between base of pole & concrete after erection and leveling.

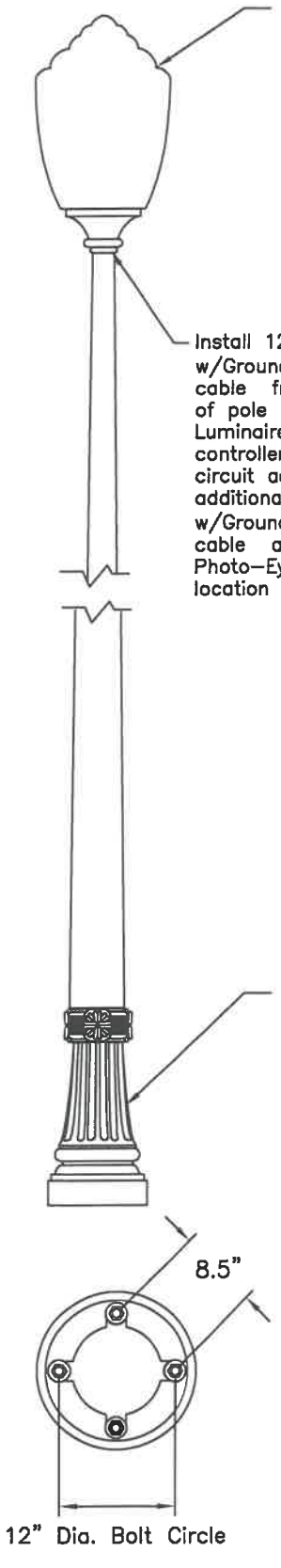
1" dia. x 36" x 4" galvanized anchor bolts w/2 galvanized hex nuts & 2 flat washers required per bolt.

(2) 1–1/2" Sch. 40 conduit(s) per job print. See page 9.5 for wire size and qty.

5/8" x 8' copper ground rod bonded to pole w/#6 solid bare copper wire. Where the ground rod cannot be driven, the developer may place 8' of #6 solid copper wire in the bottom of the trench (minimum 30" deep). The wire will be encased in a minimum of 3" of concrete and be of length to bond to the street light pole.

Concrete shall obtain 5000 P.S.I. in 28 days.

ENGINEERING MANAGER OPERATIONS MANAGER ENG. TECH SUPERVISOR	**150 WATT HPS EQUIVALENT LED STREET LIGHT AND STANDARD**	**CITY OF ROSEVILLE** ROSEVILLE ELECTRIC **CONSTRUCTION STANDARD**
REVIEW COMMITTEE	DATE **02/06/20**	DR.NO. **PAGE 9.2**



150W DECORATIVE STREET LIGHT POLE STANDARD:

1. Pole shall be Antique Street Lamp, Inc. model: PZNY1718ANBK, New York Series, 17'6" standard height with a 17" diameter base, Cast iron/steel, and Black in color.

OR

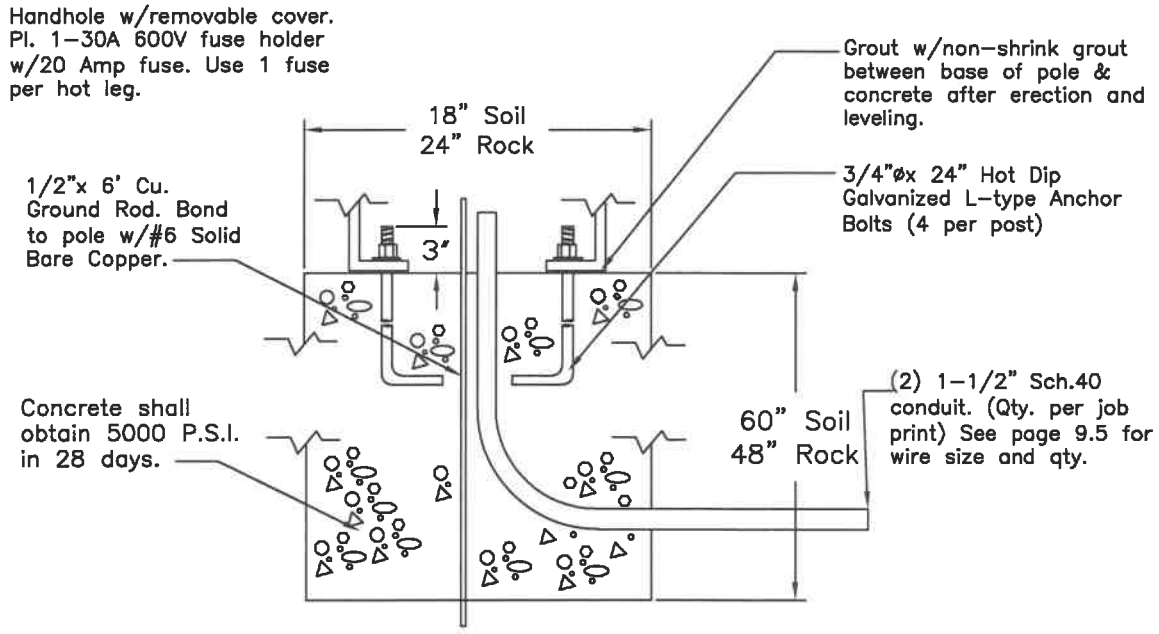
2. Pole shall be Spring City Electrical Mfg. Co. model: IWBNRT–16.6–TBD, North Hampton Iron/steel Post Series, 17'6" standard height with a 16.5" diameter base, Cast iron/steel, and Black in color.

OR

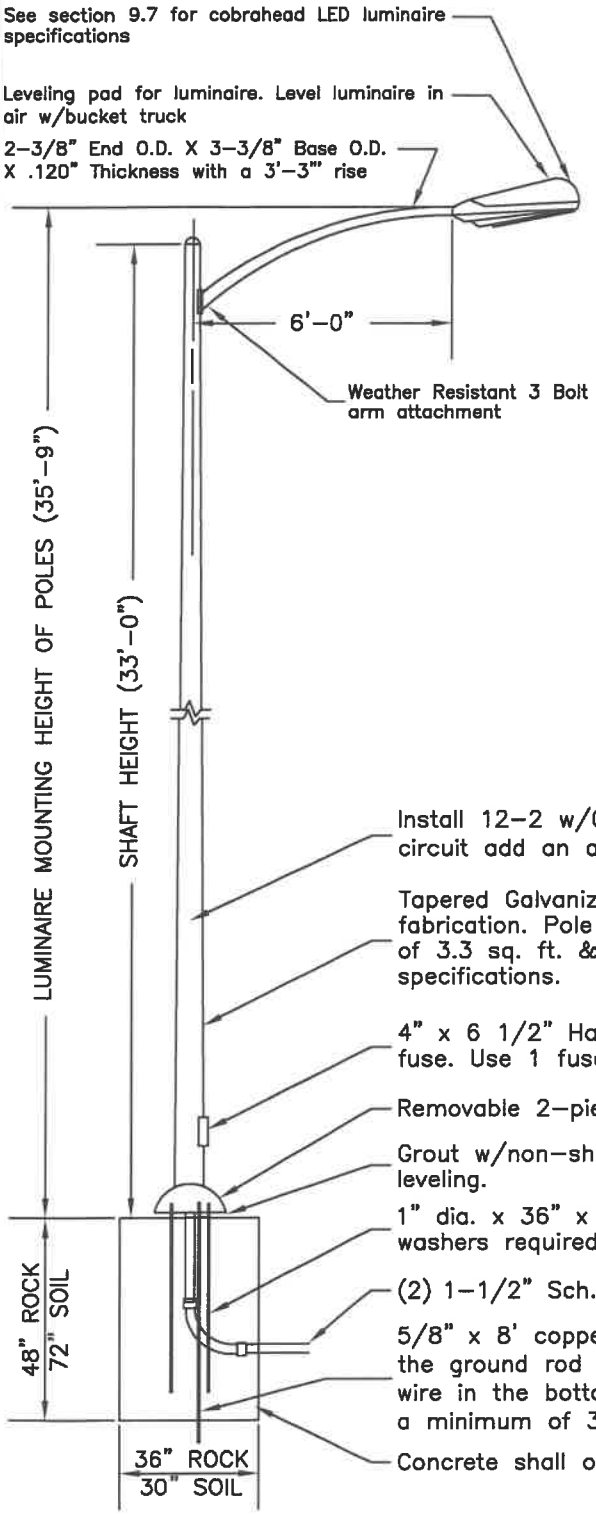
3. Pole shall be Union Metal Corporation model: P1571–70–B123–Y1, Ornamental Lighting Standard, Steel Pole with Cast Iron Base, 17'6" standard height with a 16.5" diameter base, Cast iron/steel, and Black in color.

DEVELOPER RESPONSIBILITY:

1. Developer to provide the approved 150W HPS equivalent LED fixture per section 9.8 of these specifications.
2. Developer to provide the approved steel pole.
3. Lighting system shall be completely functional and tested by Roseville Electric.
4. Developer to provide 2 sets of submittals showing type of luminaire, pole, lamp, photo eye, or shorting cap to be used for approval by Roseville Electric. Any developer or contractor installing non–approved equipment does so at his own risk and may face future expenses in correcting any non–approved materials to meet City standards.
5. Developer shall install lighting system per the Roseville Electric job print.

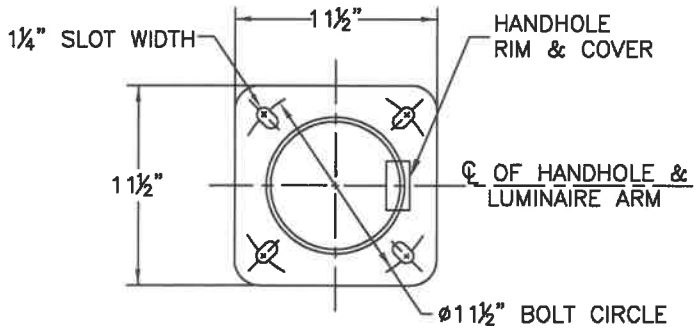


ENGINEERING MANAGER / OPERATIONS MANAGER / ENG. TECH. SUPERVISOR	150W HPS EQUIVALENT LED DECORATIVE STREET LIGHT	CITY OF ROSEVILLE ROSEVILLE ELECTRIC CONSTRUCTION STANDARD	
REVIEW COMMITTEE	DATE 02/06/20	DR.NO. PAGE 9.2.1	



DEVELOPER RESPONSIBILITY:

1. Developer to provide lamp to meet section 9.7 for each fixture installed. Luminaire is to be mounted on a 33' galvanized steel pole similar to Ameron N-336-ROSVIL801 or Valmont DS32 pole 800A.
2. Developer to provide 2 sets of submittals showing type of luminaire, pole, lamp, photo eye, or shorting cap to be used for approval by Roseville Electric.
3. Any developer or contractor installing non-approved equipment does so at his own risk and may face future expenses in correcting any non-approved materials to meet Roseville Electric standards.



BASEPLATE DETAIL

Install 12-2 w/Ground UF cable from base of pole to Luminaire. For controller type circuit add an additional 12-3 w/Ground UF cable at Photo-Eye pole location only.

Tapered Galvanized Steel Pole to have minimum yield strength of 40,000 PSI after fabrication. Pole to be designed to a minimum of A.A.S.H.T.O. 80 using an E.P.A. of 3.3 sq. ft. & 60 Lbs.. Luminaire welding and inspection to conform to A.W.S. specifications.

4" x 6 1/2" Handhole w/removable cover. Place 30A, 600V fuse holder w/20 Amp fuse. Use 1 fuse per hot leg.

Removable 2-piece base-cover.

Grout w/non-shrink grout between base of pole & concrete after erection and leveling.

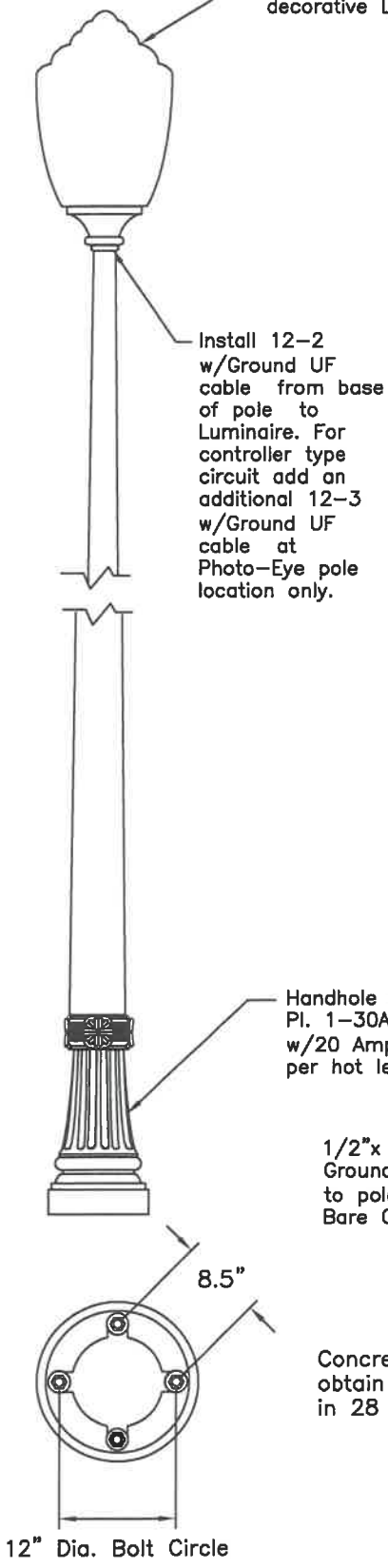
1" dia. x 36" x 4" galvanized anchor bolts w/2 galvanized hex nuts & 2 flat washers required per bolt.

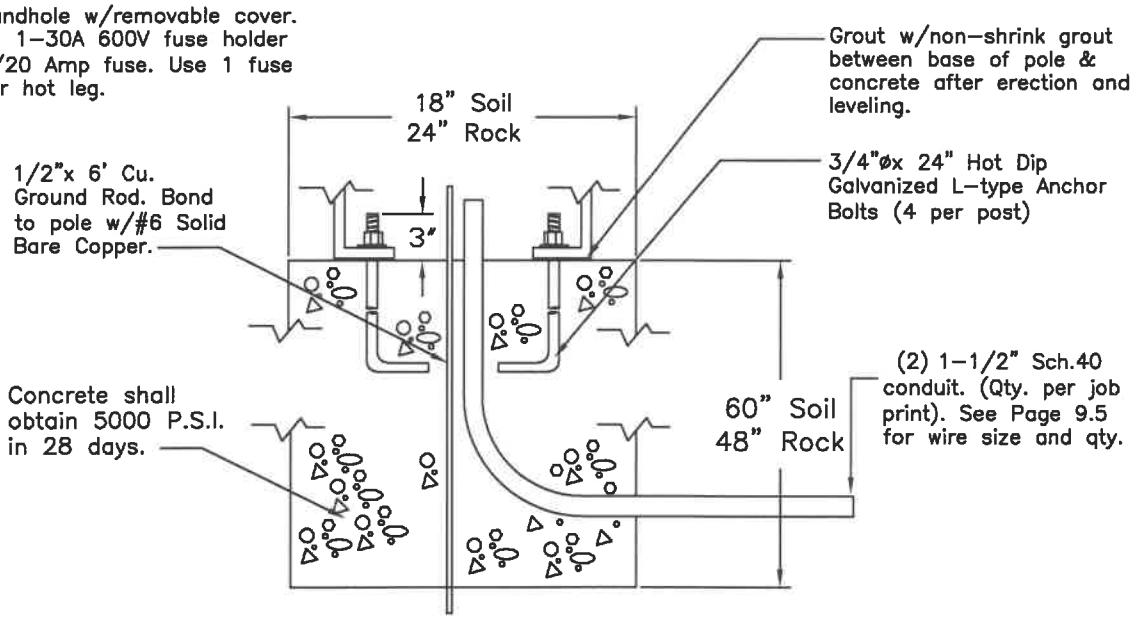
(2) 1-1/2" Sch. 40 conduit(s) per job print. See page 9.5 for wire size and qty.

5/8" x 8' copper ground rod bonded to pole w/#6 solid bare copper wire. Where the ground rod cannot be driven, the developer may place 8' of #6 solid copper wire in the bottom of the trench (minimum 30" deep). The wire will be encased in a minimum of 3" of concrete and be of length to bond to the street light pole.

Concrete shall obtain 5000 P.S.I. in 28 days.

ENGINEERING MANAGER OPERATIONS MANAGER ENG. TECH SUPERVISOR	**250 WATT HPS EQUIVALENT LED STREET LIGHT AND STANDARD** REVIEW COMMITTEE: JR, GD, MJM	**CITY OF ROSEVILLE** ROSEVILLE ELECTRIC **CONSTRUCTION STANDARD** DATE 02/06/20 DR.NO. **PAGE 9.3**





<u>250W DECORATIVE STREET LIGHT POLE STANDARD:</u>

1. Pole shall be Antique Street Lamp, Inc. model: PZNY1718ANBK, New York Series, 17'6" standard height with a 17" diameter base, Cast iron/steel, and Black in color.

OR

2. Pole shall be Spring City Electrical Mfg. Co. model: IWBNRT–16.6–TBD, North Hampton Iron/steel Post Series, 17'6" standard height with a 16.5" diameter base, Cast iron/steel, and Black in color.

OR

3. Pole shall be Union Metal Corporation model: P1571–70–B123–Y1, Ornamental Lighting Standard, Steel Pole with Cast Iron Base, 17'6" standard height with a 16.5" diameter base, Cast iron/steel, and Black in color

<u>DEVELOPER RESPONSIBILITY:</u>

1. Developer to provide the approved 250W HPS equivalent LED fixture per section 9.8 of these specifications.
2. Developer to provide the approved steel pole.
3. Lighting system shall be completely functional and tested by Roseville Electric.
4. Developer to provide 2 sets of submittals showing type of luminaire, pole, lamp, photo eye, or shorting cap to be used for approval by Roseville Electric. Any developer or contractor installing non–approved equipment does so at his own risk and may face future expenses in correcting any non–approved materials to meet City standards.
5. Developer shall install lighting system per the Roseville Electric job print.

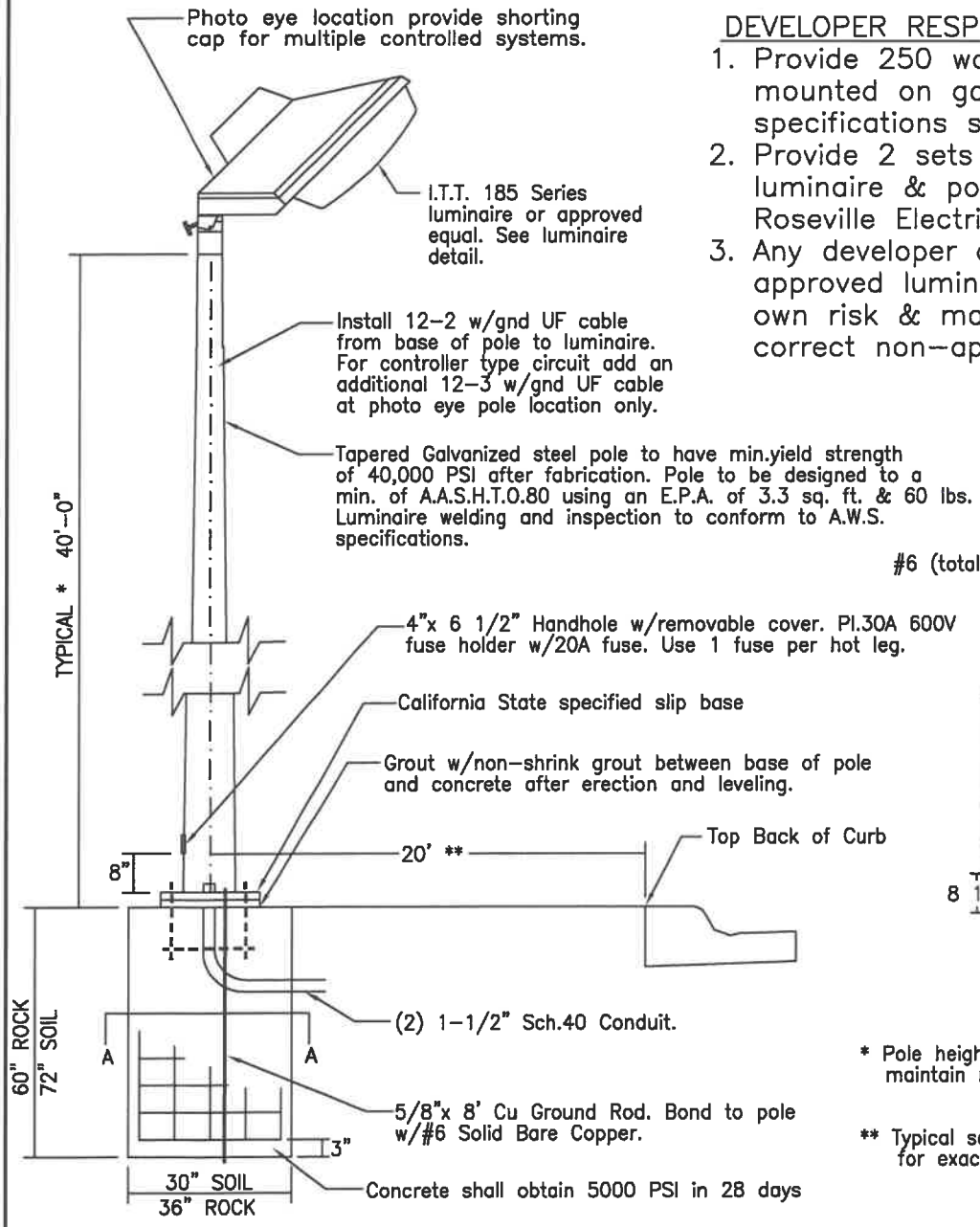
ENGINEERING MANAGER	**250W HPS EQUIVALENT LED DECORATIVE STREET LIGHT STANDARD**		**CITY OF ROSEVILLE** ROSEVILLE ELECTRIC **CONSTRUCTION STANDARD**
OPERATIONS MANAGER			
ENG. TECH SUPERVISOR	REVIEW COMMITTEE	DATE 02/06/20	DR.NO. **PAGE 9.3.1**

STREET LIGHT LUMINAIRE: All 250 watt HPS I.T.T. 185 series Interstate Luminaires (or approved equals) shall have the following:

1. Regulated Ballast, Multi-Volt (120/208/240/277)
2. Power Pad for quick and easy ballast replacement & plug in Starter.
3. Photo eye receptacle with shorting cap. Shorting cap and/or photo eye shall be constructed out of a UV protected material.
4. Polyester Fibergasket breathing seal.
5. External leveling both horizontal and vertical adjustments.

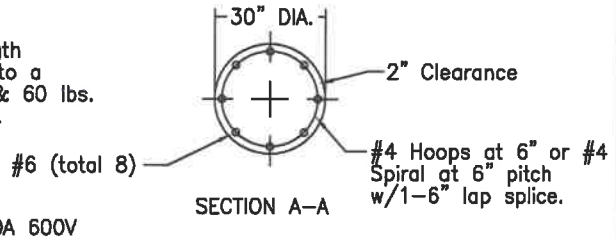
STREET LIGHT POLE: Height as shown below.

1. Tapered Steel (Maximum taper .14" per foot)
2. Top to be 2 3/8" min. to a 3" max O.D.
3. Minimum wall thickness .1345".
4. See below for additional pole specifications.

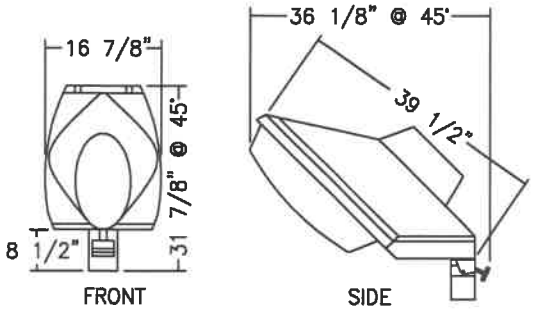


DEVELOPER RESPONSIBILITY:

1. Provide 250 watt clear lamp luminaire to be mounted on galvanized steel pole to meet specifications shown.
2. Provide 2 sets of submittals showing type of luminaire & pole to be used for approval by Roseville Electric.
3. Any developer or contractor installing non-approved luminaires or poles does so at his own risk & may face future expenses to correct non-approved materials.



SECTION A-A

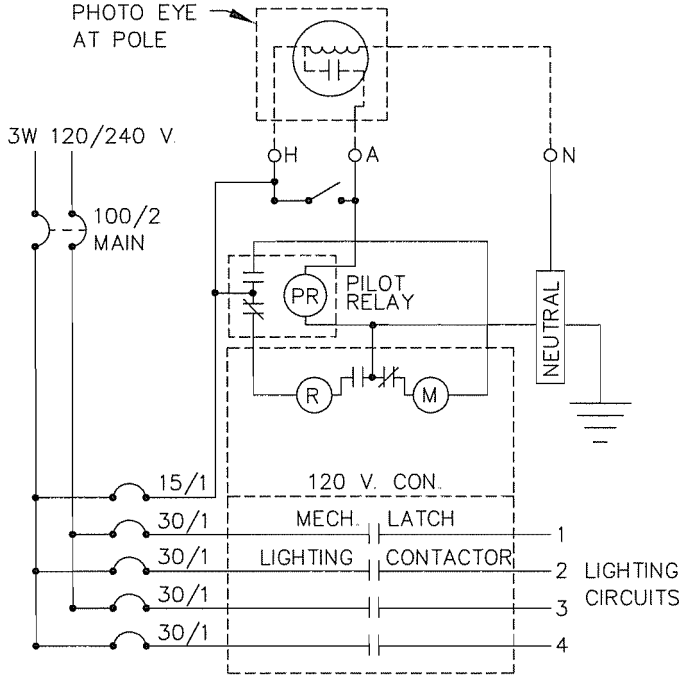


LUMINAIRE DETAIL

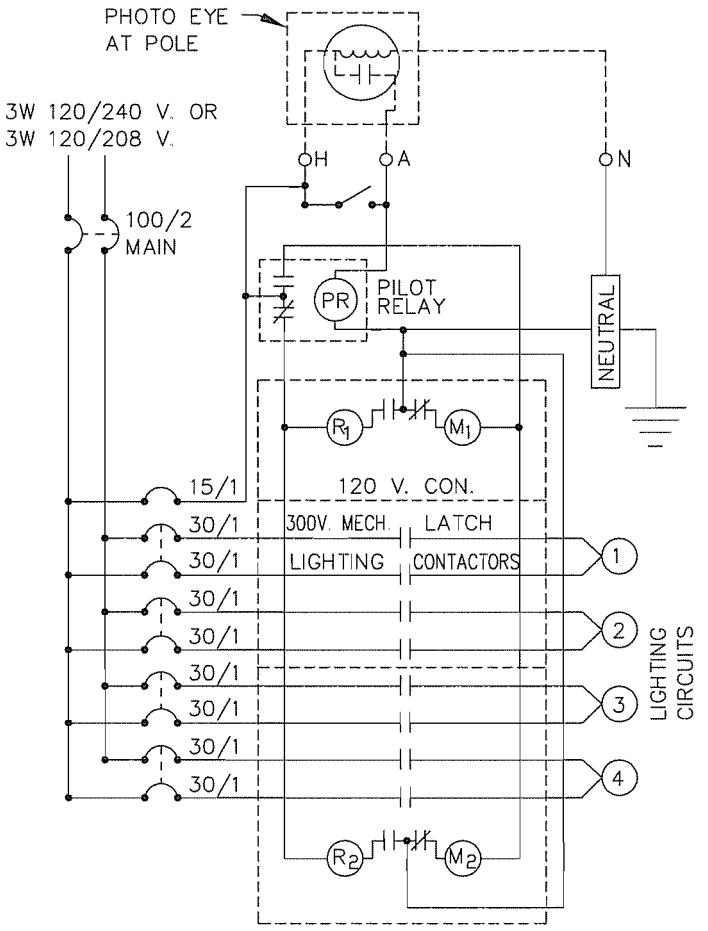
* Pole height may have to be adjusted in order to maintain mounting height in relationship to T.B.C.

** Typical setback, consult Roseville Electric job map for exact location.

ENGINEERING MANAGER OPERATIONS MANAGER ENG. TECH SUPERVISOR	**250 WATT EXPRESSWAY LUMINAIRE** REVIEW COMMITTEE	**CITY OF ROSEVILLE** ROSEVILLE ELECTRIC **CONSTRUCTION STANDARD**
	DATE **02/06/20**	DR.NO. **PAGE 9.4**



FOR 120 VOLT ST. LIGHT
LUMINAIRE SYSTEM



FOR 240 VOLT OR 208 VOLT
LUMINAIRE SYSTEM

NOTE: ALL STREET LIGHT CIRCUITS SHALL BE 2–#8 AND 1–#8 BARE SOLID CU WIRES.
1–RED, 1–BLACK, 1–BARE FOR 240 OR 208 VOLT SYSTEMS.
1–BLACK, 1–WHITE, 1–BARE FOR 120 VOLT SYSTEMS.

THE GROUND WIRE SHALL BE CONNECTED BETWEEN ALL POLES AND BACK TO THE CONTROLLER OR POINT OF CONNECTION.

CITY OF ROSEVILLE CALIFORNIA
Roseville Electric

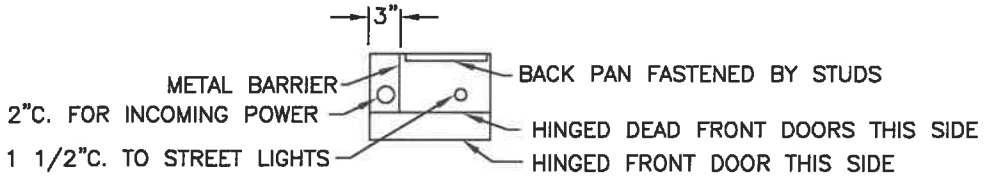
ELECTRIC SUPERINTENDENT Sonny McShaw
POWER ENG. MANAGER
ELECTRONICS MANAGER
REVIEW COMMITTEE
DR. NEB | DATE 10/17/06 | DR NO.
NEW SERVICES MANAGER

PAGE 9.5

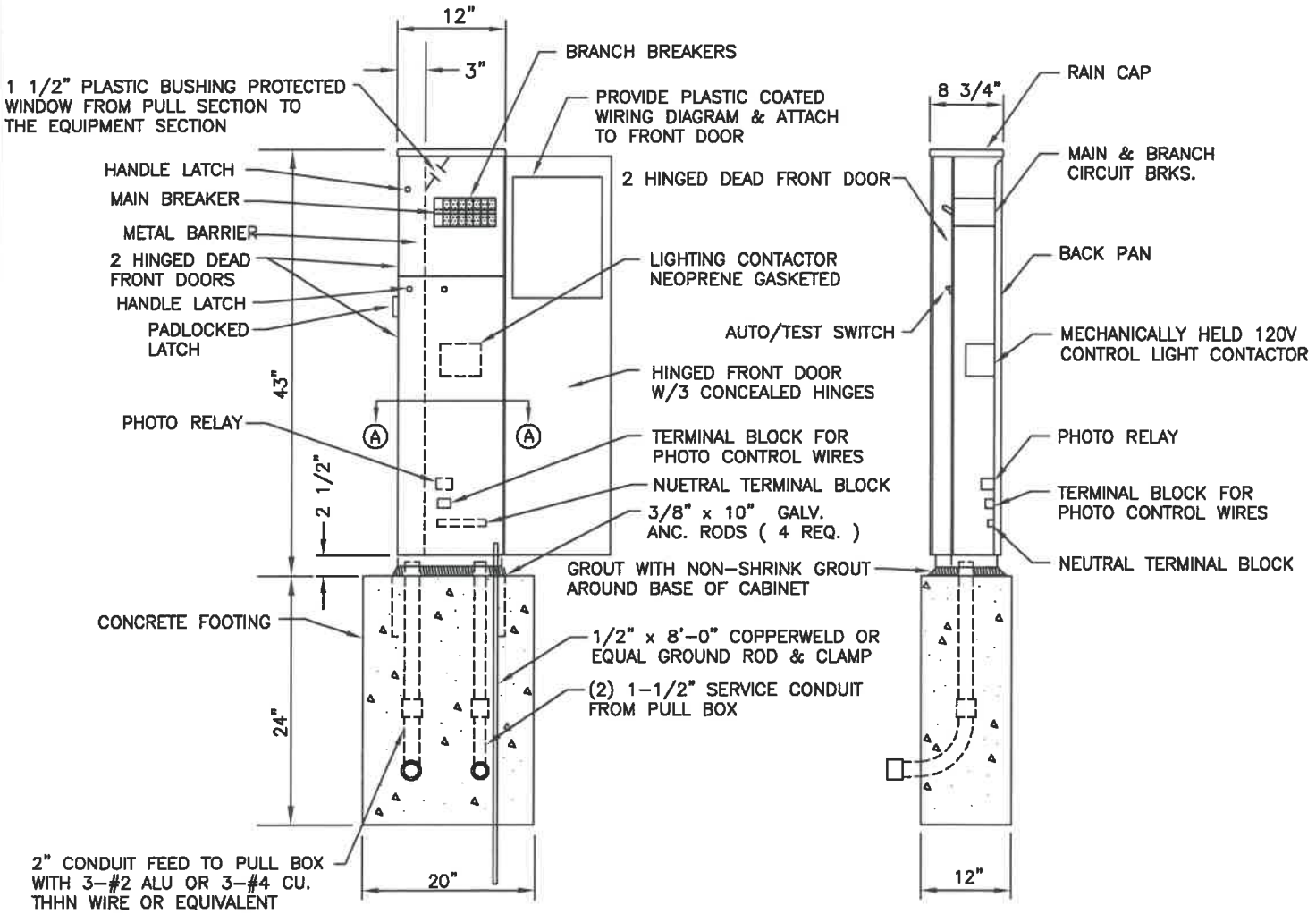
CONSTRUCTION STANDARD
ONE LINE DIAGRAMS, STREET LIGHT CONTROL PANEL FOR 120, 240, OR 208 V. LIGHTING

STREET LIGHTING CONTROL PANEL NOTES :

1. EQUIPMENT CABINET SHALL BE PRE-WIRED AND SHALL CONFORM TO NEMA STANDARDS.
2. ALL CONTROL WIRING SHALL BE AWG-14-THW STRAND CU. WIRE.
3. EQUIPMENT SHALL BE PAINTED FOREST GREEN, BE OF NEMA 3R CONSTRUCTION AND PROVIDED WITH DEAD FRONT PANELS.
4. ALL EQUIPMENT SHALL BE CURRENTLY MANUFACTURED ITEMS.
5. ALL STREET LIGHTS FED FROM A CONTROLLER SHALL BE PLACED IN THE TEST POSITION FOR A SEVEN DAY BURN IN PERIOD TO TEST THE LIGHTS, BALLASTS, CIRCUITS, ETC. BEFORE BEING PLACED IN NORMAL OPERATION.



SECTION A-A



FRONT VIEW

SIDE VIEW

ENGINEERING MANAGER OPERATIONS MANAGER ENGI/TECH SUPERVISOR	**STREET LIGHTING CONTROL PANEL** REVIEW COMMITTEE	**CITY OF ROSEVILLE** ROSEVILLE ELECTRIC **CONSTRUCTION STANDARD** DATE 02/06/20 DR.NO. **PAGE 9.6**

COBRAHEAD LED
LUMINAIRE SPECIFICATIONS

ENGINEERING MANAGER	**COBRAHEAD LED LUMINAIRE SPECIFICATIONS**		**CITY OF ROSEVILLE** ROSEVILLE ELECTRIC CONSTRUCTION STANDARD
OPERATIONS MANAGER			
ENG. TECH. SUPERVISOR	REVIEW COMMITTEE	DATE **08/24/17**	DR.NO. **9.7**

LED LUMINAIRE SPECIFICATIONS
(Mast Arm Mounted)

This specification is for the purchase of light emitting diode (LED) street lighting luminaires (herein referred to as luminaires) mast arm applications. This includes general lighting luminaires for residential, collector, and arterial roadways.

1.0 HOUSING

1.1 The housing shall be manufactured from aluminum, gray in color, powder coated, and rust resistant.

1.2 Driver must be mounted internally and be replaceable, and must be accessible without tools via a door with spring latches and hinges (no screws).

1.3 All screws shall be stainless steel.

1.4 Any parts constructed of polycarbonates shall be UV stabilized. Discoloration of any optical assemblies shall be considered a failure under warranty.

1.5 Each luminaire shall have the manufacturer's name, trademark, model number, serial number, date of manufacturing (month and year), and a lot number as identification permanently marked in each unit. The following operating characteristics shall also be permanently marked inside the unit: rated voltage and rated power in watts and volt-ampere.

2.0 THERMAL MANAGEMENT

2.1 Thermal management of the heat generated by the LED's shall be of sufficient capacity to assure proper operation of the luminaire over the expected useful life of more than 50,000 hours. IESNA LM-80-08 test report to be provided with submittal.

2.2 Thermal management shall consist of a heat sink with no fans, pumps, or liquids and shall be resistant to contamination and debris buildup.

3.0 OPERATING ENVIRONMENT

3.1 Luminaire shall operate within normal tolerance in ambient temperatures from -40°C to +50°C.

3.2 Each luminaire shall be designed to operate at an ambient nighttime temperature of 25°C.

4.0 HOUSE SHIELD

4.1 Luminaire shall provide option for house side light control.

5.0 LUMINAIRE CLASSIFICATION

5.1 The luminaire shall be International Dark-Sky Association (IDA) compliant.

6.0 MOUNTING ARM CONNECTION

6.1 Luminaires shall mount on 1.675" O.D. through 2.375" O.D. horizontal bracket with no more than four bolts and a two piece clamp.

7.0 WEIGHT

7.1 Luminaire shall not weigh more than 30 pounds.

8.0 DIMENSIONS

8.1 Maximum 45" Long x 15" Wide x 6.75" High.

9.0 PHOTOCELL RECEPTACLE

9.1 Luminaire shall have a locking ANSI C136.41 photocell receptacle.

9.2 The photocell shall not be provided with the luminaire.

10.0 OPTICS

10.1 Luminaire shall have IP66 sealed optics.

10.2 Each LED shall have its own individual optical system.

11.0 LIGHT DISTRIBUTION

11.1 Distribution shall be Type II or Type III.

12.0 CORRELATED COLOR TEMPERATURE (CCT)

12.1 For residential streets the CCT shall be 3000K nominal (3045K +/-175K). For collector and arterial streets the CCT shall be 4000K nominal (3985 +/-275K). All tolerances are per ANSI Standard C78.377-2015.

13.0 COLOR RENDERING INDEX (CRI)

13.1 Luminaires shall have a Minimum CRI of 70

14.0 MINIMUM EFFICACY

14.1 80 Lumens per Watt (IESNA LM-79-08 to be provided with submittal)

15.0 MINIMUM LIGHT OUTPUT (ILLUMINANCE)

15.1 Residential street type to have a minimum of 0.1fc for the physical layout, provide AGi32 photometric fc levels with point by point measurements for verification. Uniformity (Avg/Min Ratio) shall be 4.0 or better.

15.2 Collector street type to have a minimum of 0.2fc for the physical layout, provide AGi32 photometric fc levels with point by point measurements for verification. Uniformity (Avg/Min Ratio) shall be 3.5 or better.

15.3 Arterial street type to have a minimum of 0.25fc for the physical layout, provide AGi32 photometric fc levels with point by point measurements for verification. Uniformity (Avg/Min Ratio) shall be 3.0 or better

16.0 LEDS

16.1 Luminaire shall not use 5mm (indicator type) LED's

17.0 LUMEN DEPRECIATION

17.1 Please provide IESNA LM-80-08 test data showing predicted lumen output at a minimum of 50,000 hours of life in a 25 deg. C environment.

18.0 POWER CONSUMPTION

18.1 The power draw of the luminaire shall not exceed 0.50 Watts when in the off state.

18.2 The power draw of the luminaire (not including optional monitoring and control devices) shall not exceed the following:

Application	Residential	Collector	Arterial
Replaces	100W HPS	150W HPS	250W HPS
Max LED System Wattage	60W	80W	150W

19.0 WARRANTY

19.1 A warranty must be provided for the full replacement value of the luminaire due to any failure for ten years.

19.2 Each luminaire is expected to have a minimum operation life of 180 months (15 years)

19.3 All electrical components including LED's, optical systems, heat sinks and power supply/driver must be RoHS compliant

20.0 APPROVED MANUFACTURERS

20.1 Luminaire manufacturer shall be one of the following below or equivalent.

- Cree
- EOI E-Lite
- Phillips Lumec
- Leotek

20.2 Fixture should be on the approved products list by the Design Lights Consortium, http://www.designlights.org

Power Supply/Driver Requirements

1.0 Power Factor

1.1 Power supply shall have a minimum Power Factor of 0.90

2.0 Transient Protection

2.1 The luminaire on board circuitry shall include surge protection devices (SPD) to withstand high repetition noise transients as a result of utility line switching or other interference

2.2 Per IEEE C.62.41-1991 or latest revision, Class A operation. The line transient shall consist of seven strikes of a 100k HZ ring wave, 2.5 kV level, for both common mode and differential mode

3.0 Operating Temperature

3.1 Power Supply shall operate between -40°C and +50°C

4.0 Interference

4.1 Power Supply shall meet FCC 47 CFR Part 15/18

5.0 Noise

5.1 Power Supply shall have a Class A sound rating

6.0 Operating Voltages

6.1 120 V to 277 V, with no internal switching or wiring changes required

7.0 Total Harmonic Distortion

7.1 Less than 20% at full load

9.0 Life of Power Supply/Driver

9.1 Power Supply shall have a minimum life of 100,000 hours

10.0 Surge Suppression

10.2 The SPD shall protect the luminaire from damage and failure for transient peak voltages up to 10kV (minimum) and transient peak currents up to 5kA (minimum)

10.3 SPD shall conform to UL 1449, or UL 1283, depending of the components used in the design

All luminaries provided must comply with the Measurement/Performance/Safety Standards listed below:

ANSI C78.377.2008	Specifications for the Chromaticity of Solid State Lighting Products.
IESNA LM-79-08	IESNA Approved method for the Electrical and Photometric Measurements of Solid-State Lighting Products. To be provided with submittal.
IESNA LM-80-08	IESNA Approved method for Measuring Lumen Maintenance of LED Lighting Sources. To be provided with submittal.
UL Standards (latest approved)	• **8750** Light-Emitting Diode (LED) Light Sources for Use in Lighting Products • **1598** Luminaires • **1012** Power Units other than Class 2 • **1310** Class 2 Power Units • **2108** Low Voltage Lighting Systems

DECORATIVE POST TOP LED LUMINAIRE SPECIFICATIONS

ENGINEERING MANAGER	DECORATIVE POST TOP LED LUMINAIRE SPECIFICATIONS		CITY OF ROSEVILLE ROSEVILLE ELECTRIC CONSTRUCTION STANDARD
OPERATIONS MANAGER			
ENG. TECH. SUPERVISOR	REVIEW COMMITTEE	DATE 04/28/16	DR.NO. 9.8

LED LUMINAIRE SPECIFICATIONS
(Acorn Post Top Mounted)

This specification is for the purchase of acorn type, post top, decorative, light emitting diode (LED) street lighting luminaires (herein referred to as luminaires). This includes general lighting luminaires for minor residential roadways.

1.0 HOUSING

1.1 The housing shall be traditional acorn style fixture provided with a decorative cast aluminum fitter, black in color, powder coated, and rust resistant with a DR acrylic clear globe.

1.2 Driver must be mounted internally and be replaceable, and must be accessible without tools via a door with spring latches and hinges.

1.3 All screws shall be stainless steel

1.4 Discoloration of any optical assemblies shall be considered a failure under warranty

1.5 Each luminaire shall have the manufacturer's name, trademark, model number, serial number, date of manufacturing (month and year), and a lot number as identification permanently marked in each unit. The following operating characteristics shall also be permanently marked inside the unit: rated voltage and rated power in watts and volt-ampere

2.0 THERMAL MANAGEMENT

2.1 Thermal management of the heat generated by the LED's shall be of sufficient capacity to assure proper operation of the luminaire over the expected useful life of more than 70,000 hours. IESNA LM-80-08 test report to be provided with submittal or bid.

2.2 Thermal management shall consist of a heat sink with no fans, pumps, or liquids and shall be resistant to contamination and debris buildup

3.0 OPERATING ENVIRONMENT

3.1 Luminaire shall operate within normal tolerance in ambient temperatures from -40°C to +50°C

3.2 Each luminaire shall be designed to operate at an ambient nighttime temperature of 25°C

4.0 HOUSE SHIELD

4.1 Luminaire shall include full top reflector and house side light control

5.0 LUMINAIRE CLASSIFICATION

5.1 The luminaire shall have a Backlit, Up light, and Glare (BUG) rating of B2 U3 G2.

6.0 POST TOP CONNECTION

6.1 Luminaires shall mount on 3.0" O.D. X 3" tenon with no more than six hex bolts

7.0 WEIGHT

7.1 Luminaire shall not weigh more than 60 pounds

8.0 DIMENSIONS

8.1 Maximum 50" High x 18" Wide

9.0 PHOTOCELL RECEPTACLE

9.1 Luminaire shall have a 7-pin locking ANSI C136.42 photocell receptacle to be mounted inside the fixture.

9.2 The photocell shall not be provided with the luminaire

10.0 OPTICS

10.1 Luminaire shall have IP65 or IP66 sealed optics.

10.2 Each LED shall have its own individual optic system.

11.0 LIGHT DISTRIBUTION

11.1 Type III.

12.0 CORRELATED COLOR TEMPERATURE (CCT)

12.1 The CCT shall be in the range 4000K-5000K nominal.

13.0 COLOR RENDERING INDEX (CRI)

13.1 Luminaires shall have a Minimum CRI of 70.

14.0 MINIMUM EFFICACY

14.1 80 Lumens per Watt (IESNA LM-79-08 to be provided with submittal or bid)

15.0 MINIMUM LIGHT OUTPUT (Illuminance)

15.1 Residential street type to have a minimum range of 0.06 for the physical layout, provide AGi32 photometric fc levels with point by point measurements. Uniformity (Avg/Min Ratio) shall be 6.0 or better.

15.2 Collector street type to have a minimum range of 0.1 for the physical layout, provide AGi32 photometric fc levels with point by point measurements. Uniformity (Avg/Min Ratio) shall be 4.0 or better.

16.0 LEDS

16.1 Luminaire shall not use 5mm (indicator type) LED's

17.0 LUMEN DEPRECIATION

17.1 Please provide IESNA LM-80-08 test data showing predicted lumen output at a minimum of 50,000 hours of life in a 25 degrees C environment

18.0 POWER CONSUMPTION

18.1 The power draw of the luminaire shall not exceed 0.50 Watts when in the off state

18.2 The power draw of the luminaire (not including optional monitoring and control devices) shall not exceed the following:

Application	Residential	Collector
Replaces	100W HPS	150W HPS
Max LED System Wattage	60W	70W

19.0 WARRANTY

19.1 A warranty must be provided for the full replacement value of the luminaire due to any failure for seven years.

19.2 Each luminaire is expected to have a minimum operation life of 180 months (15 years)

19.3 All electrical components including LED's, optical systems, heat sinks and power supply/driver must be RoHS compliant

20.0 APPROVED MANUFACTURERS

20.1 Luminaire manufacturer shall be per the pre-qualified LED street light fixtures as stated below:

- Philips Lumec
- Sternberg

20.2 Fixture shall be on the approved products list by the Design Lights Consortium, http://www.designlights.org

Power Supply/Driver Requirements

1.0 POWER FACTOR

1.1 Power supply shall have a minimum Power Factor of 0.90.

2.0 DRIVER

2.1 Driver amperage shall be determined by vendor. Vendor shall supply documentation showing which driver amperage will provide the best system performance with submittal or bid.

2.2 The LED driver shall be supplied with a quick disconnect electrical connector on the power supply, providing easy connections and fixture installations.

3.0 TRANSIENT PROTECTION

3.1 The luminaire on board circuitry shall include surge protection devices (SPD) to withstand high repetition noise transients as a result of utility line switching or other interference.

3.2 Per IEEE C.62.41-1991 (or latest version), Class A operation. The line transient shall consist of seven strikes of a 100k HZ ring wave, 2.5 kV level, for both common mode and differential mode.

4.0 OPERATING TEMPERATURE

4.1 Power Supply shall operate between -40°C and +50°C.

5.0 INTERFERENCE

5.1 Power Supply shall meet FCC 47 CFR Part 15/18.

6.0 NOISE

6.1 Power Supply shall have a Class A sound rating.

7.0 OPERATING VOLTAGES

7.1 Auto sensing voltage of 120 V to 277 V, with no internal switching or wiring changes required.

8.0 TOTAL HARMONIC DISTORTION

8.1 Total harmonic distortion shall be less than 20% at full load.

9.0 LIFE OF POWER SUPPLY/DRIVER

9.1 Power Supply shall have a minimum life of 100,000 hours.

10.0 SURGE SUPPRESSION

10.1 The SPD shall protect the luminaire from damage and failure for transient peak voltages up to 10kV (minimum) and transient peak currents up to 5kA (minimum).

10.2 SPD shall conform to UL 1449, or UL 1283, depending of the components used in the design.

All luminaries provided must comply with the Measurement/Performance/Safety Standards listed below:

ANSI C78.377.2008	Specifications for the Chromaticity of Solid State Lighting Products.
IESNA LM-79-08	IESNA Approved method for the Electrical and Photometric Measurements of Solid-State Lighting Products. To be provided with submittal or bid.
IESNA LM-80-08	IESNA Approved method for Measuring Lumen Maintenance of LED Lighting Sources. To be provided with bid.
UL Standards (latest approved)	• **8750** Light-Emitting Diode (LED) Light Sources for Use in Lighting Products • **1598** Luminaires • **1012** Power Units other than Class 2 • **1310** Class 2 Power Units • **2108** Low Voltage Lighting Systems

CITY OF ROSEVILLE ELECTRIC DEPARTMENT
REQUIREMENTS FOR LANDSCAPE DESIGNS

The following items will need to be addressed within your landscape design:

1. All plans submitted to the City of Roseville Electric Department shall include existing and proposed electric facilities, roadway centerline and roadway stationing. The landscape architect shall contact the Electric Department for locations of existing and proposed facilities.

2. Electric service point for irrigation controllers and landscape lighting must originate from a metered service point at a location to be determined by the Electric Department. The developer is responsible for the installation of all service facilities from the service point to the metered pedestal and it's associated circuits. All installations shall conform to the National Electric Code as adopted by the City of Roseville.

3. Sidewalks shall be installed to avoid all electric facilities with the exception of secondary service and street light splice boxes (#9, #30 and #36 boxes). When placing sidewalk over these facilities, it is the developer's responsibility to set these boxes flush with the sidewalk surface.

4. Sidewalks, grass, ground covers or similar landscaping may be placed above utility trenches where required as long as they do not interfere with access to enclosures or above ground equipment.

5. No trees shall be planted directly over an underground joint utility trench. The typical trench centerline is located behind back of curb along roadway frontages.

6. Trees placed within P.U.E.'s that contain overhead electric lines will be restricted to a maximum height of 15 feet at maturity and may be prohibited in some locations due to safety. In all cases, adequate access shall be maintained for personnel and equipment to provide routine maintenance to existing electric facilities as determined by the Electric Department. See page 10.6 for a list of approved trees. Developers wishing to install trees not on the approved list must submit a request in writing for approval prior to installation.

7. Trees being planted along public roadways where street lights are installed must be located so as to provide minimum clearance from light standards and maximum lighting to roadways. See electric department "Specification for Commercial Construction", Page 10.5, for minimum street light clear areas.

8. When placing trees, shrubs, walls, or any other above ground facilities near existing or proposed electric equipment, the following clearances must be maintained:

EQUIPMENT	MINIMUM CLEARANCES REQUIRED (IN FEET) FRONT	SIDES	BACK
12kv Padmount Switchgear (See Page 10.2)	4 non-door	8 door	4 non-door
12kv Padmount Capacitor Bank (See Page 10.2)	4 non-door	8 door	4 non-door
12kv Junction Box			
(Below Ground Type - See Page 10.3)	4	4	4
(Above Ground Type - See Page 10.3.1)	8	3	3
Padmount Transformer (See Page 10.4)	8	3	3
Manhole Entry	8	8	8
Pull Box, Splice Box (4'x4', 3'x6', 4'x6')	4	4	4
Metered Pedestal	3	3	3

All minimum clearances shown above shall be flat and level surfaces with a slope no greater than 2% to provide a safe working area for field personnel.

Only turf or low growth ground covers less than 4 inches in height and suitable for walking on are permitted within the clear area. Where retaining walls are required to provide minimum clearances in areas with severe grade changes, contact the Electric Department for approval prior to installation.

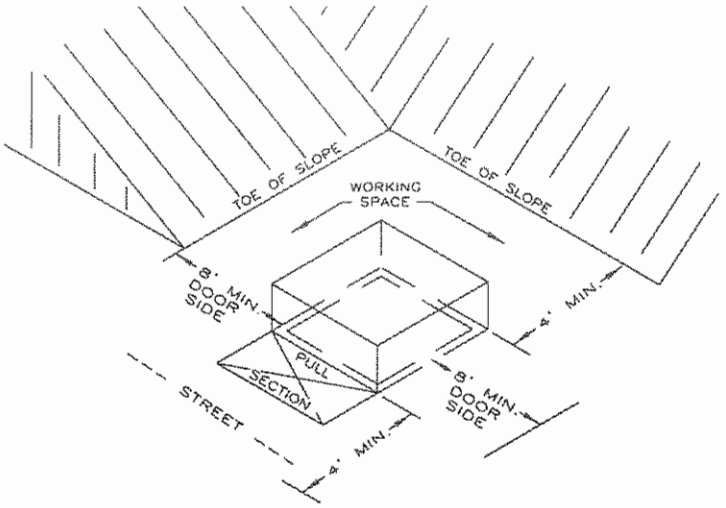
9. Landscaping being installed around electrical equipment shall be installed to meet the existing equipment grades with the following exceptions:

   A. Street light bases may be raised a maximum of 2 feet from existing grade. Beyond 2 feet, pole heights must be adjusted.

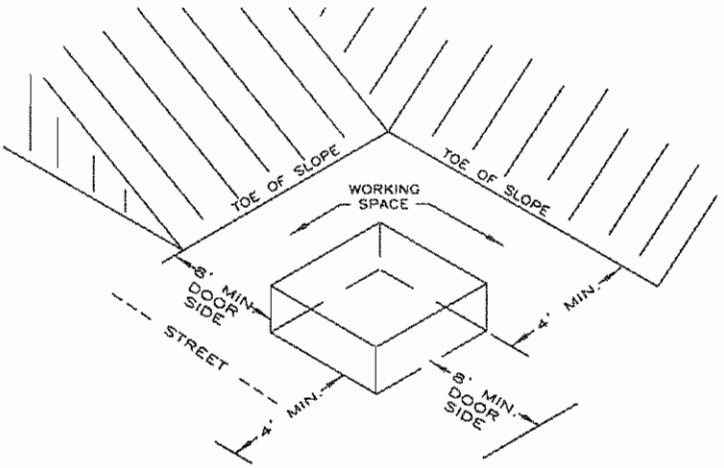
   B. Manhole risers may be raised a maximum of 12 inches.

   Any changes to electric equipment grades are the developer's responsibility and shall be completed at the developer's expense to electric department specifications.

10. Any conflicts between existing electric facilities and landscaping installed will be resolved by the developer at his expense to the satisfaction of the Electric Department.



SWITCHGEAR MOUNTED ON PAD VAULT



SWITCHGEAR OR CAPACITOR BANK MOUNTED ON CONCRETE PAD

NOTES:

1. Maintain an 8' clear and level working space to the door sides and 4' clear level space to the non-door sides of switchgear and capacitor banks. Typical switch and capacitor bank orientation shown. See job prints for specific orientation.

2. No slopes greater than 2% sloping away from switchgear or capacitor bank will be allowed within the required minimum clear working space shown. A retaining wall may be required to maintain the 2% maximum grade.

3. Vehicular access from street, parking lot or other hard drivable surface shall be maintained.

4. Parking barriers shall be installed whenever switchgear or capacitor banks are not protected from vehicular traffic.

CITY OF ROSEVILLE CALIFORNIA

Roseville Electric

ELECTRIC SUPERINTENDENT	REVIEW COMMITTEE
POWER ENG. MANAGER	DR. RINNE DATE 04/18/07 DR.NO.
ELECTRONICS MANAGER	NEW SERVICES MANAGER

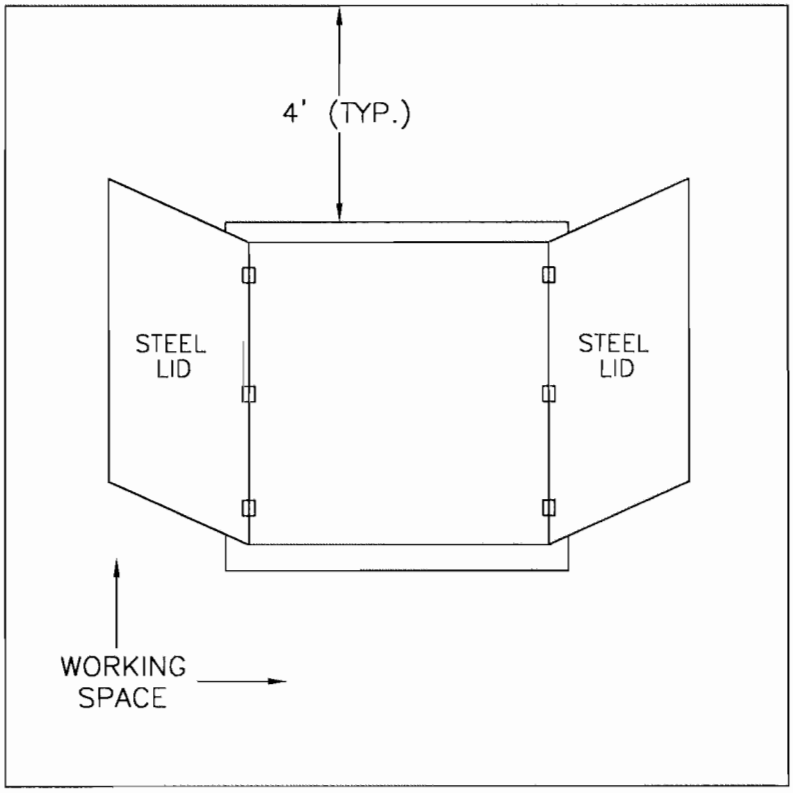
PAGE 10.2

CONSTRUCTION STANDARD

12kV PADMOUNT SWITCHGEAR AND CAPACITOR BANK CLEARANCE DETAIL

4'x4' J-BOX WORKING CLEARANCE DETAIL

N.T.S.



NOTES:

1. Maintain a clear and level working space of 4' on all sides of junction box as shown.
2. No slopes greater than 2% sloping away from box will be allowed within the required minimum clear working space shown. A retaining wall may be required to maintain the 2% maximum grade.
3. Vehicular access from street, parking lot or other hard drivable surface shall be maintained.
4. Junction box lid section shall be adjusted to one (1) to two (2) inches above final grade except when placed within or immediately adjacent to sidewalk, where lid shall be adjusted to sidewalk grade.

FOR SPECIAL CONDITIONS USE ONLY

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ELECTRIC SUPERINTENDENT	REVIEW COMMITTEE
POWER ENG. MANAGER	DR. MAH / DATE 11-20-01 / DR.NO.
ELECTRONIC SUPERINTENDENT	NEW SERVICES MANAGER

PAGE 10.3

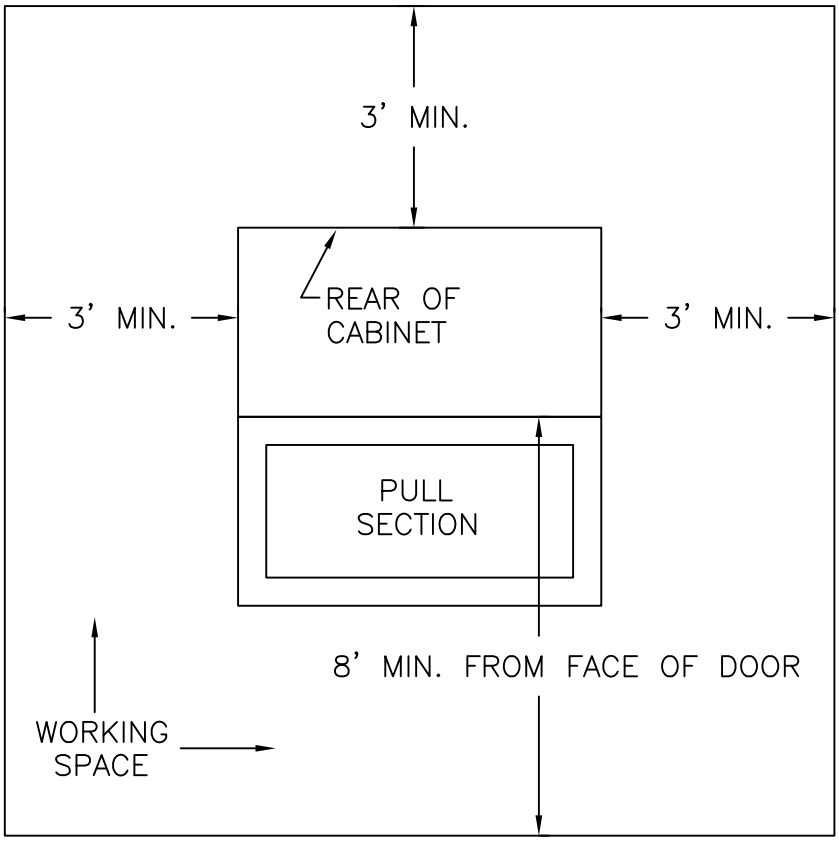
CONSTRUCTION STANDARD

12 kV PRIMARY 4'X4' J-BOX CLEARANCE DETAIL

3–PHASE ABOVE GROUND J–BOX OVER 4'x4' PRECAST

WORKING CLEARANCE DETAIL

N.T.S.



NOTES:

1. Maintain a clear and level working space of 3 feet on 3 sides and 8 feet in front of door of junction box as shown.

2. No slopes greater than 2% sloping away from box will be allowed within the required minimum clear working space shown. A retaining wall may be required to maintain the 2% maximum grade.

3. Vehicular access from street, parking lot or other hard drivable surface shall be maintained.

4. Junction box pull section lid shall be installed to one (1) to two (2) inches above final grade.

CITY OF ROSEVILLE CALIFORNIA

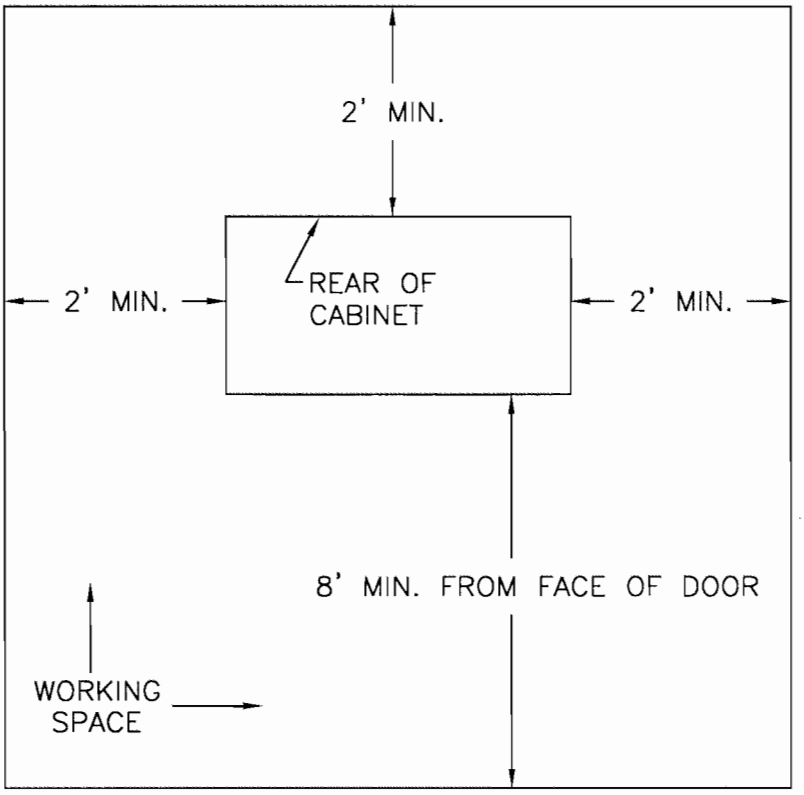
Roseville Electric

ENGINEERING MANAGER	REVIEW COMMITTEE	NEB	CP	Rm	Jon	MBK	MBK	
OPERATIONS MANAGER	DATE	03/16/12			DR.NO.	PAGE 10.3.1		
ENG. TECH SUPERVISOR	CONSTRUCTION STANDARD							

3–PHASE ABOVE GROUND J–BOX CLEARANCE DETAIL

ABOVE GROUND J-BOX
WORKING CLEARANCE DETAIL

N.T.S.



NOTES:

1. Maintain a clear and level working space of 2' on 3 sides and 8' in front of door of junction box as shown.
2. No slopes greater than 2% sloping away from box will be allowed within the required minimum clear working space shown. A retaining wall may be required to maintain the 2% maximum grade.
3. Vehicular access from street, parking lot or other hard drivable surface shall be maintained.
4. Finish grade shall be three (3) to four (4) inches below locking device on door face of J-box.

CITY OF ROSEVILLE INCORPORATED APRIL 10, 1909

ELECTRIC DEPARTMENT

(916) 774-5601

ELECTRIC SUPERINTENDENT: Tommy McGraw

POWER ENG. MANAGER: Charles Cook

ELECTRONIC SUPERINTENDENT: Jim Moore

REVIEW COMMITTEE: MJB | DJB | RB | TM | MS

DR. MAH | DATE 3-16-98 | DR.NO. PAGE 10.3.2

NEW SERVICES MANAGER: Jim Moore

CONSTRUCTION STANDARD

ABOVE GROUND J-BOX CLEARANCE DETAIL

TRANSFORMER WORKING CLEARANCE DETAIL

N.T.S.

FIGURE NO. 1

MINIMUM TRANSFORMER CLEARANCE REQUIREMENTS

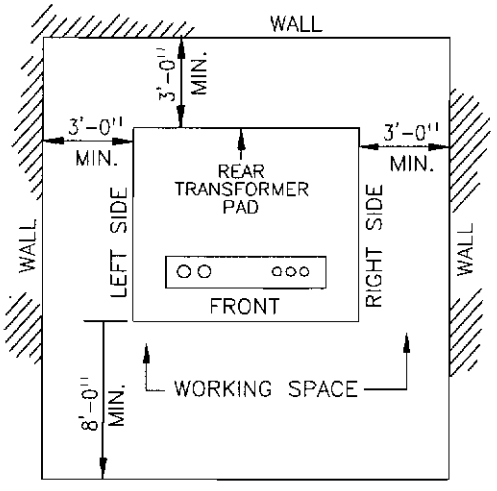
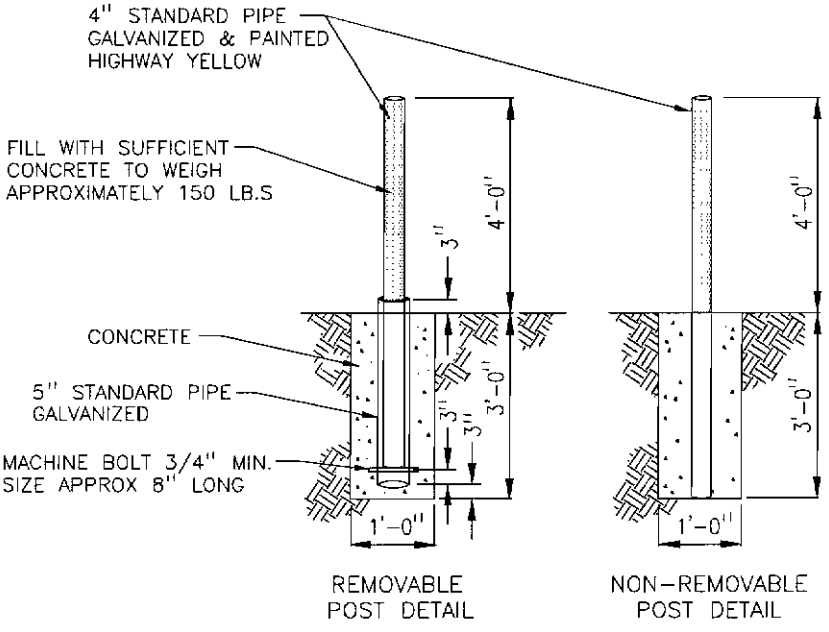


FIGURE NO. 2



NOTES:

1. The concrete pad should be located so that its associated transformer will be three feet minimum from the side of any building wall. If the wall is fireproof, the minimum clearance can be reduced to two feet. At least eight feet of clear space shall be provided in front of pad to allow complete opening of transformer cabinet doors and allow City personnel sufficient working room for Hot Stick work. Figure No. 1, shows the preferred location of a transformer pad with reference to other construction.
2. A minimum of 4' from top back of curb to edge of transformer pad must be maintained. If the 4' dimension cannot be obtained, posts per figure 2 must be installed. The number, type and placement of posts required will be determined by the Roseville Electric construction print or field inspector. In no case shall the clearance be less than 2' with parking barriers.
3. If the customer wishes to install a decorative wall to hide the transformer from public view, the requirement shall be in accordance with Note 1 and that additional air space be required for sufficient air circulation as determined by the Roseville Electric Department. Walls are allowed only on 3 sides with opening at front of transformer, no gates are allowed. Vehicular access from street, parking lot or hard drivable surface shall be maintained.
4. No slopes greater than 2% sloping away from transformer pad will be allowed within the required minimum clear working space shown. A retaining wall may be required to maintain the 2% maximum grade.

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ELECTRIC SUPERINTENDENT

POWER ENG. MANAGER

ELECTRONICS MANAGER

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DR. MAH | DATE 3-23-05

NEW SERVICES MANAGER

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DR.NO.

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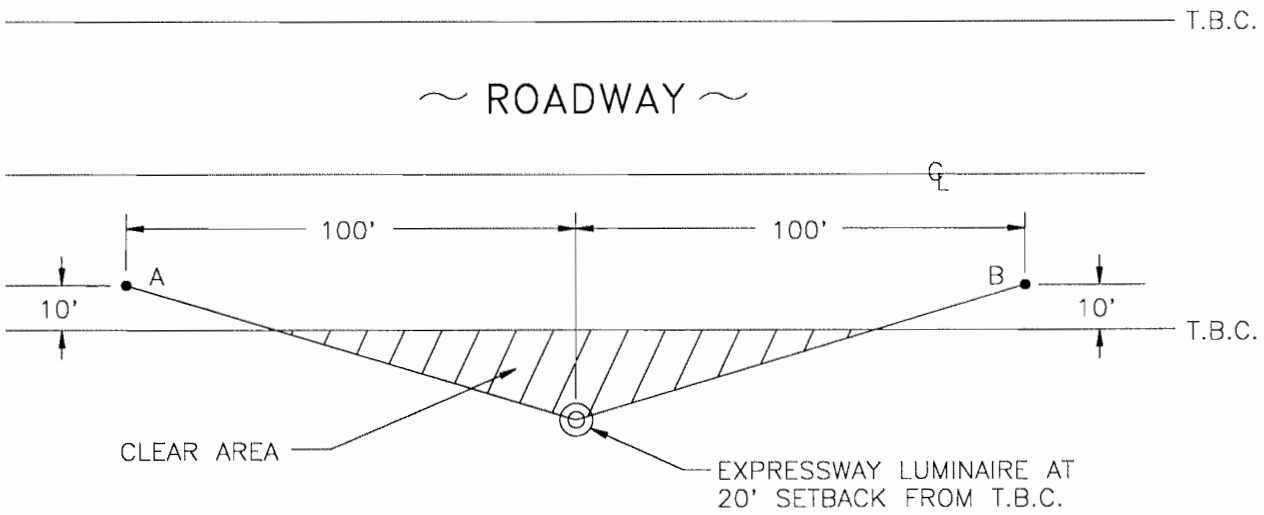
12 kV PADMOUNT TRANSFORMER CLEARANCE DETAIL



NOTES:

1. No plants, shrubs or trees which grow to a height greater than 4 feet at maturity shall be planted in the Clear Area shown above.

2. To determine the Clear Area required for any street light, proceed as follows:
   A. From a point located at top back of curb where street light is located, go 100' along roadway to the right and left and locate points A & B at a distance of 10' into the roadway from T.B.C.
   B. Draw a straight line from the street light location to points A & B.
   C. The area between the street light and T.B.C. on road side of line described above is the Clear Area.

3. Trees planted outside the Clear Area should have no more than 20% of their canopy projected to encroach within the Clear Area at maturity. This 20% encroachment is based on the diameter of the trees canopy at maturity.

CITY OF ROSEVILLE INCORPORATED APRIL 10 1909

ELECTRIC DEPARTMENT
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ELECTRIC SUPERINTENDENT	REVIEW COMMITTEE
POWER ENG. MANAGER	DR. MAH DATE 2-18-97 DR.NO.
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CONSTRUCTION STANDARD	

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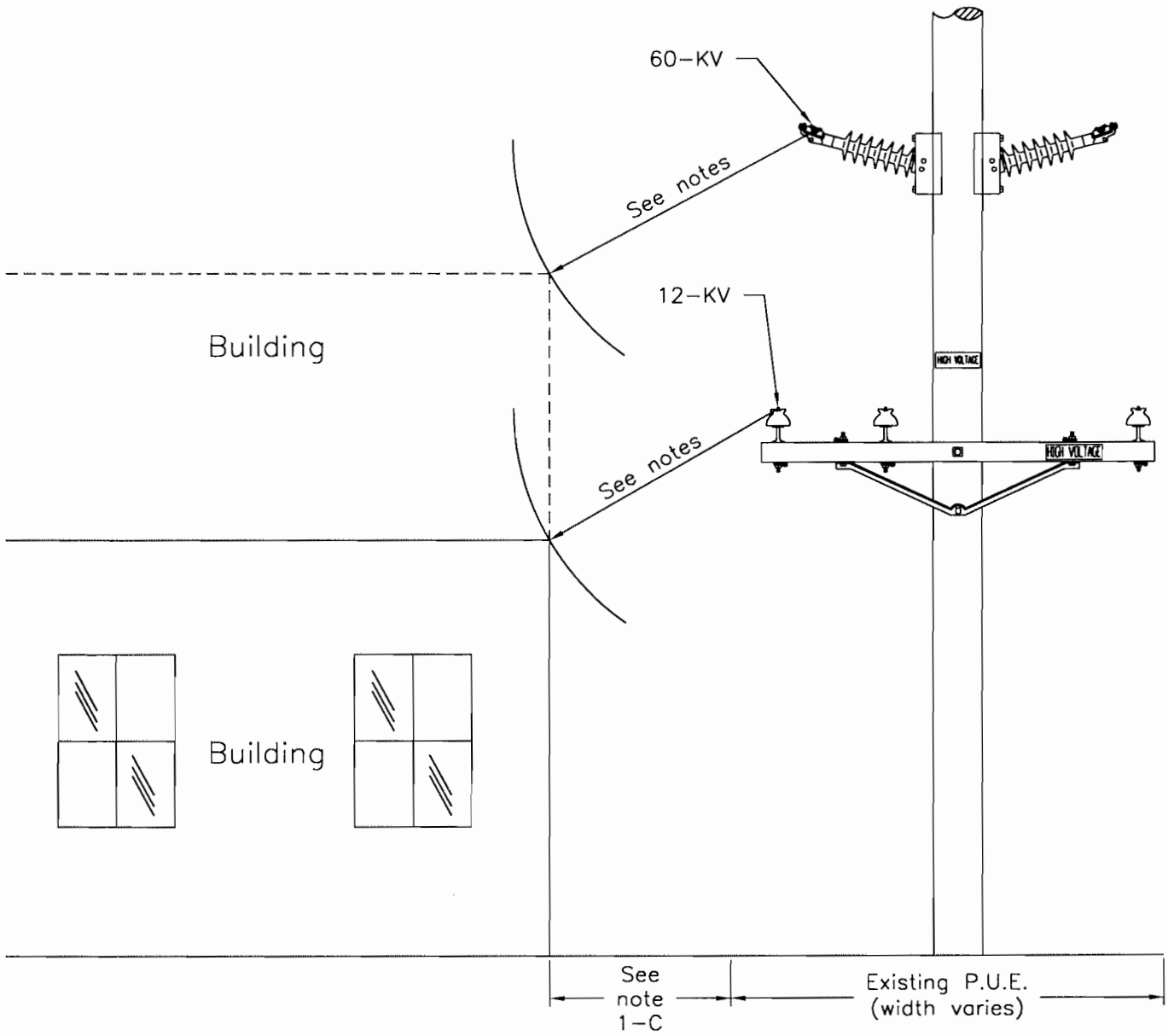
MINIMUM STREET LIGHT CLEAR AREAS

RECOMMENDED TREES AND SHRUBS FOR UNDER POWERLINES

Common Name *Botanical Name*	Type	Max Height	Max Spread	Features
Hydrangea *Hydrangea paniculata*	Deciduous	15'	10'	6"–10" flower clusters in summer, rapid growth.
Indian Hawthorn *Raphiolepis indica 'Majestic Beauty'*	Evergreen	15'	8'	Moderate–slow growing, flowers in April.
Western Redbud *Cersis occidentalis*	Deciduous	15'	15'	California native, bushy, showy spring blooms.
Smoke Tree *Cotinus coggygria*	Deciduous	12'	12'	Unusual flowers resemble smoke puffs, moderate growth.
Podocarpus *Podocarpaceae macrophyllus maki*	Evergreen	10'	10'	Slow growing, narrow leaves, good screen tree.
Xylosma *Xylosmacongestum*	Deciduous/ Evergreen	10'	10'	Well established plants usually evergreen.



Notes:

1. All buildings and/or structures must be constructed in such a manner to maintain a minimum clearance of 15' from all existing or proposed Roseville Electric overhead power lines. This clearance will be measured to the conductor at maximum sag and sway. Roseville Electric Engineering Department will provide the calculations necessary to obtain the maximum sag and sway of the conductors. This required clearance can be obtained by any of the following at the developer's expense:

   A. Raise the power lines by setting new power pole(s).

   B. Place a new pole mid-span to minimize the sway of the conductor.

   C. Locate the building to obtain the 15' required clearance.

   D. Underground the 12kV high-voltage lines per Roseville Electric design.

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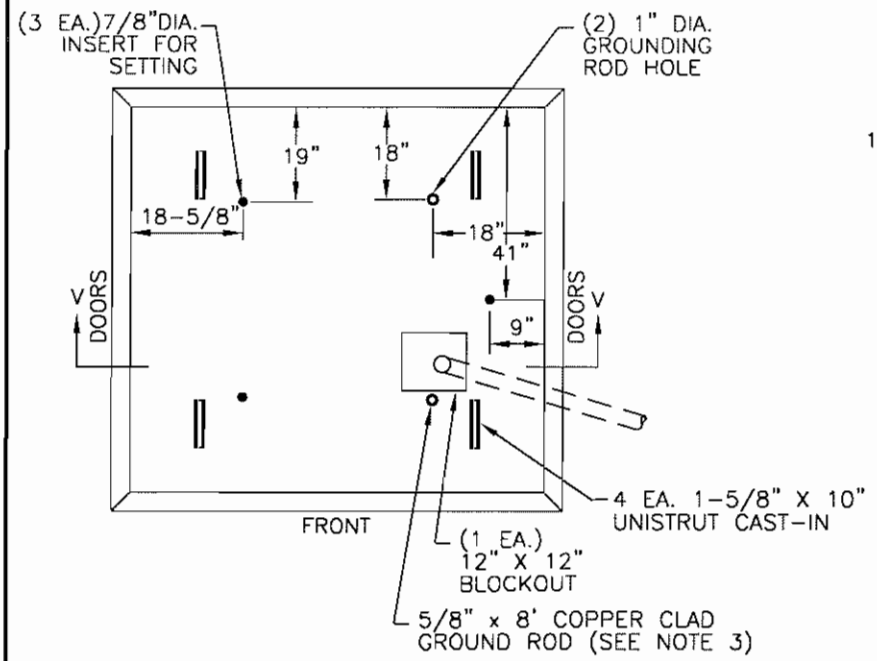
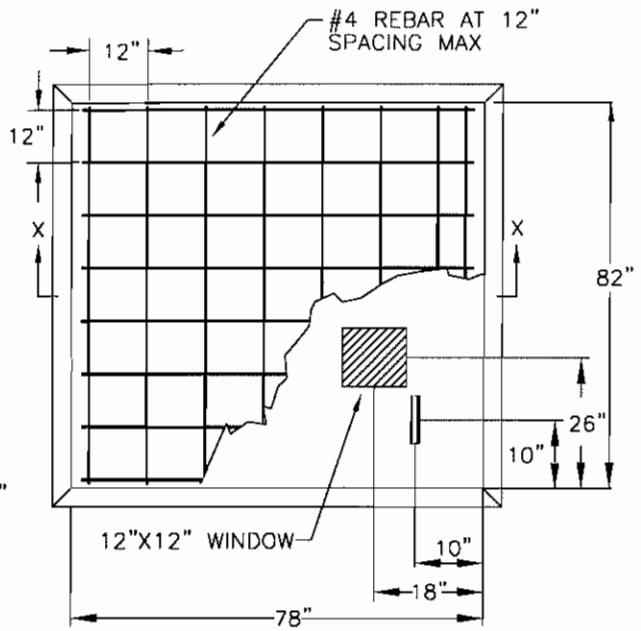
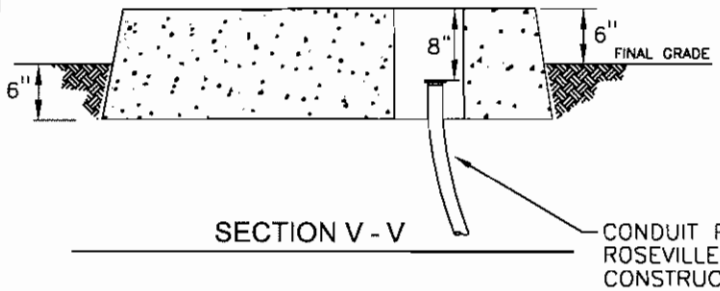
ELECTRIC SUPERINTENDENT Sonny McBrian	REVIEW COMMITTEE
POWER ENG. MANAGER Chas B Cumbie	DR. R. Corral / DATE 1/15/02 / DR.NO.
ELECTRONIC SUPERINTENDENT	NEW SERVICES MANAGER Tom Woods

CONSTRUCTION STANDARD

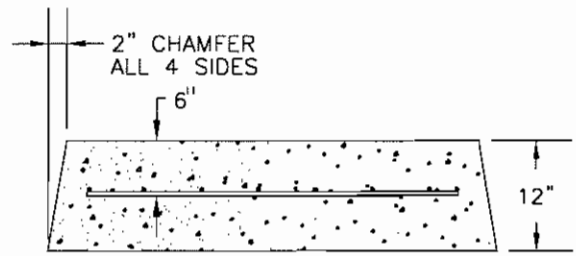
Clearance Requirements for Overhead Conductors in Proximity to Buildings







SECTION V - V



SECTION X - X

CONSTRUCTION NOTES:

1. A minimum of 8' clearance shall be maintained at the capacitor bank doors. 4' min clearance at sides of capacitor bank from walls, buildings, planters, or dirt embankments.
2. If a pad-mounted capacitor bank cannot be located away from vehicular traffic, a suitable barrier shall be provided for the protection of the capacitor bank.
3. In hard soil conditions where the ground rods cannot be driven, the developer has the option of placing two 35' lengths of #4 bare Cu. strand wire. The wire shall extend above the pad 5' and lay in the bottom of the trench (min. 48" depth) for a minimum distance of 25', in different directions. Wire shall be encased with a min. 3" of concrete.
4. Disturbed earth under pads shall be well tamped or shall be replaced by sand, or other suitable material to prevent settlement.

CITY OF ROSEVILLE CALIFORNIA

Roseville Electric

ELECTRIC SUPERINTENDENT	REVIEW COMMITTEE						
POWER ENG. MANAGER							
ELECTRONICS MANAGER	NEW SERVICES MANAGER	DR. RINNE	DATE 08/22/07	DR.NO.			

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CONSTRUCTION STANDARD

PRE-CAST CONCRETE PAD FOR 12kV PAD-MOUNTED CAPACITOR BANK