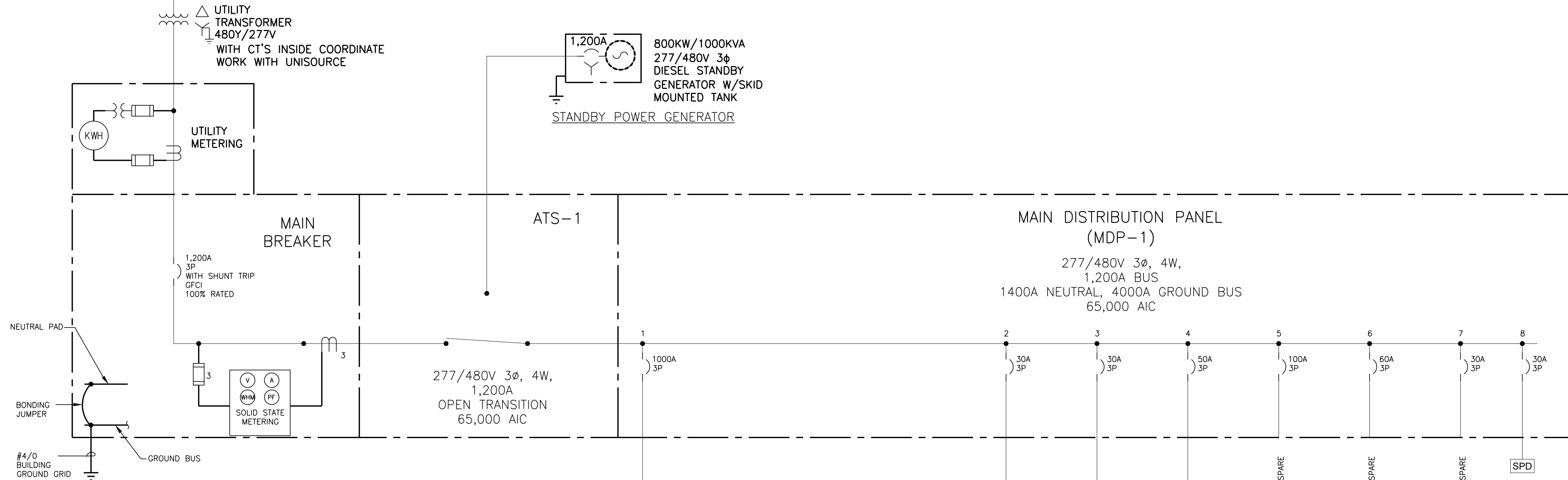
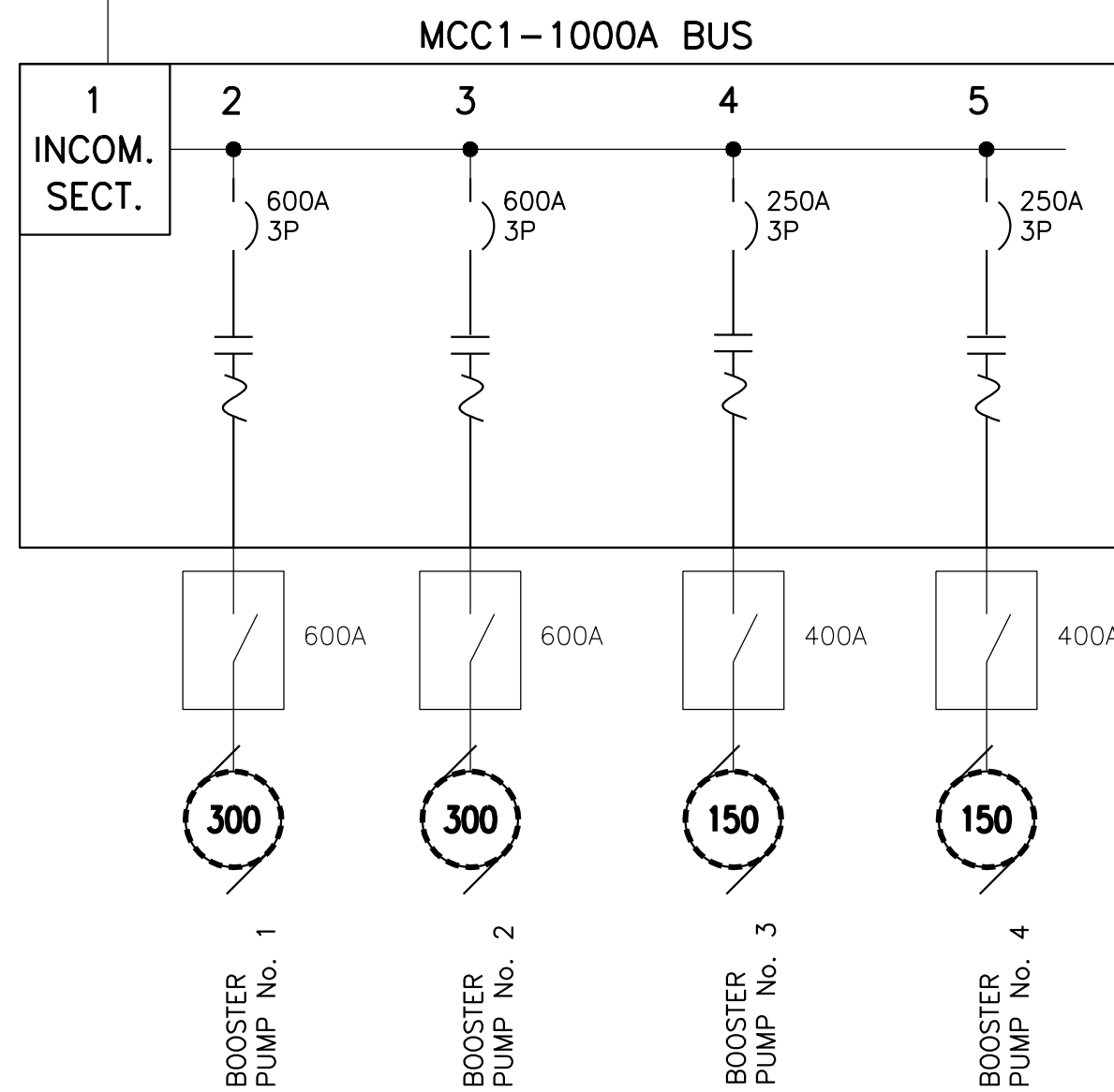


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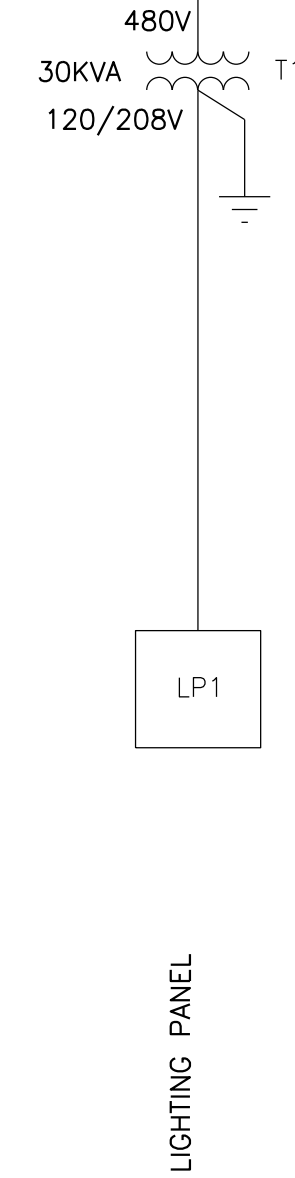
SERVICE FEEDER LOAD CALCULATIONS			
LOAD	HP	kVA	AMPS
BOOSTER PUMP NO. 1	300	300	361
BOOSTER PUMP NO. 2 (STANDBY)	300	300	361
BOOSTER PUMP NO. 3	150	150	180
BOOSTER PUMP NO. 4	150	150	180
AIR CONDITIONING UNIT A/C#1		19	23
AIR CONDITIONING UNIT A/C#2 (STANDBY)		19	23
LIGHTING PANEL "LP1"		30	36
SPARE LOAD (15%)		100	
TOTAL CONNECTED LOAD:		768	924
25% LARGEST LOAD x 1.25 (300KVA) = 75 KVA			
TOTAL DEMAND LOAD = 824 KVA			
MIN CAPACITY 992A			
PROPOSED CAPACITY 1,200A			
SERVICE FEEDER SIZE: REFER TO RISER DIAGRAM SHEET E-8			

(1) NON CONCURRENT LOAD



ONE-LINE DIAGRAM

N.T.S.



LEGEND:

- TRANSFORMER
- MOTOR HP
- CIRCUIT BREAKER
- GENERATOR
- KIRK KEY INTERLOCK
- FUSE
- CURRENT TRANSFORMER
- VOLTAGE TRANSFORMER
- SURGE PROTECTIVE DEVICE

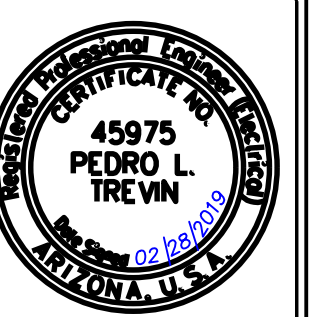
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POWER ONE LINE DIAGRAM  
 PROJECT:  
**BOOSTER STATION IC REPLACEMENT**  
 LAKE HAVASU CITY, ARIZONA

DESIGNED BY: JF  
 DRAWN BY: LBG



Expires 03 31 2022

PEDRO L. TREVIN  
 REG. No. P.E. 45975  
 ELECTRICAL ENGINEER

PROJECT NO.  
 WT7440

DWG NO.  
**E-2**

21 OF 47

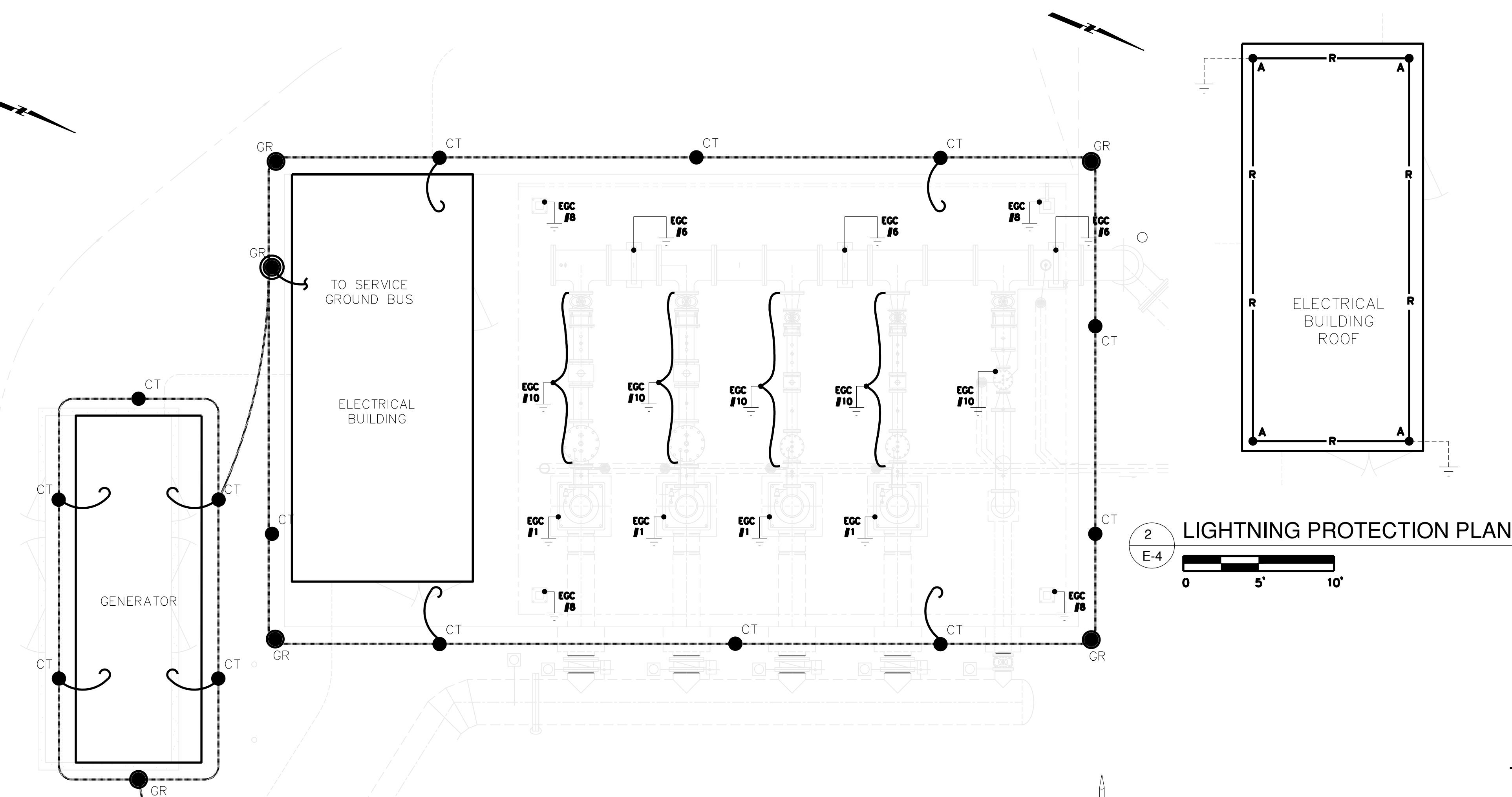
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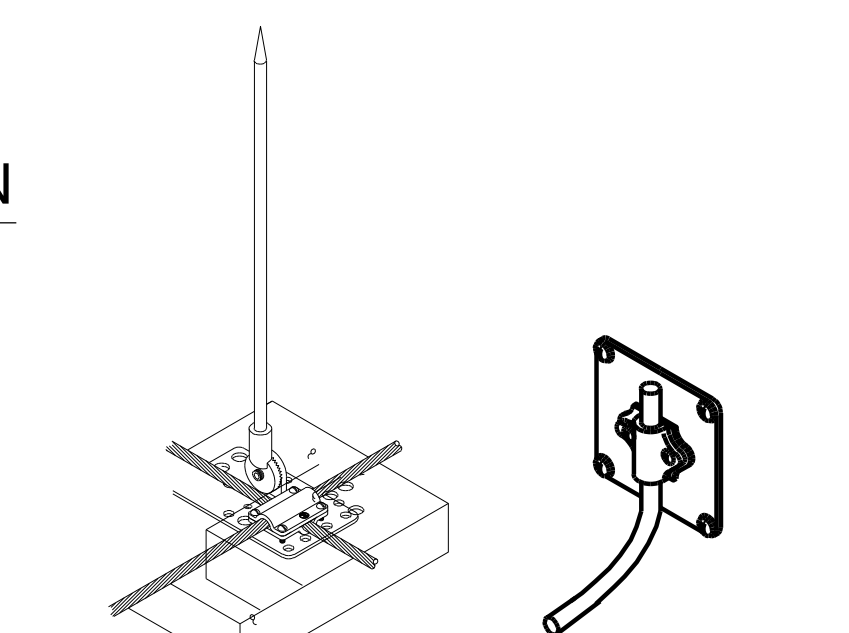
2 LIGHTNING PROTECTION PLAN  
 E-4  
 0 5 10'



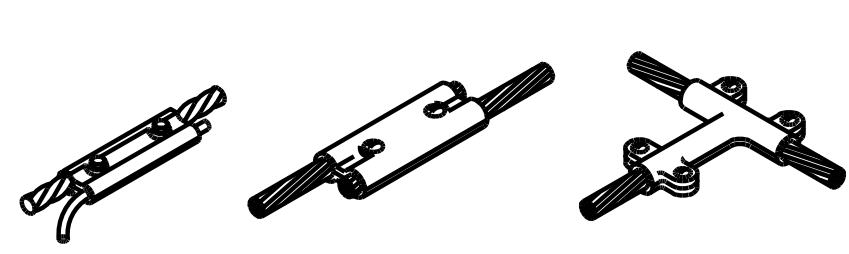
1 ELECTRICAL GROUNDING PLAN  
 E-3  
 0 5 10'

- LEGEND:**
- #4/0 AWG BARE STRANDED COPPER GROUND CONDUCTOR
  - #4/0 AWG BARE STRANDED COPPER GROUND CONDUCTOR (PIGTAIL) STUBBING-UP FROM GROUND. CONNECT TO REBAR IN CONCRETE STRUCTURE/SLAB.
  - GR GROUND ROD C/W GROUND ROD TAP TYPE CONNECTOR & GROUND ELECTRODE TEST BOX WITH CAST IRON COVER
  - GR GROUND ROD C/W GROUND ROD TAP TYPE CONNECTOR
  - CT COMPRESSION TYPE C-TAP COPPER GROUND CONNECTOR
  - EGC #10 DEDICATED COPPER EQUIPMENT GROUNDING CONDUCTOR (SIZE INDICATED) PER DETAIL 7, E-6

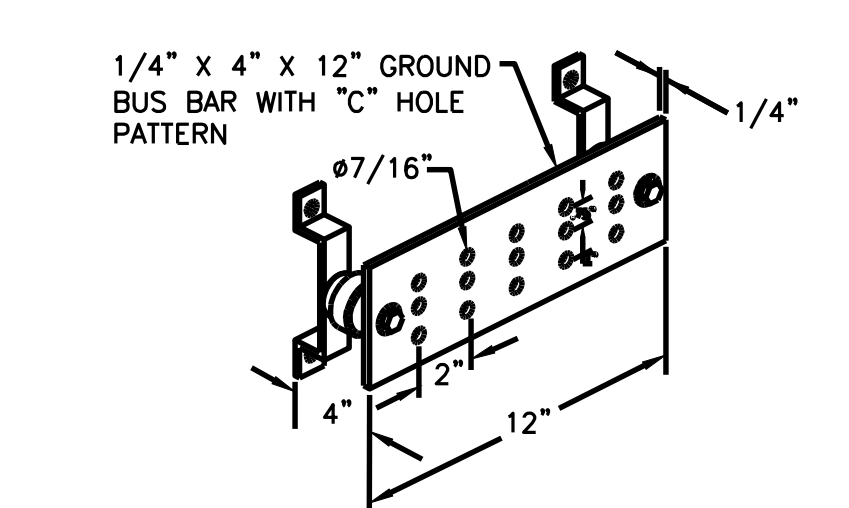
- GROUNDING NOTES:**
1. FOR GENERAL NOTES, SEE DRAWING E-1.
  2. BUILDING GROUND GRID SHALL BE 3 FT AWAY FROM OUTSIDE BUILDING WALL AND 3 FT BELOW FINISHED GRADE.
  3. CONNECT ALL ELECTRICAL EQUIPMENT ENCLOSURES WITHIN ELECTRICAL ROOM TO SITE MAIN GROUND GRID. ENSURE EQUIPMENT IS GROUNDED IN TWO PLACES.
  4. PROVIDE GROUND BUS IN ELECTRICAL ROOM WALL FOR BONDING LIGHTING PANEL, LIGHTING TRANSFORMER AND FUTURE EQUIPMENT.
  5. FLOW METER GROUND MUST BE PROVIDED ACROSS METER GROUND RINGS.
  6. GROUND RODS DRIVEN HORIZONTALLY, "UFER" METHOD: PROVIDE MINIMUM OF TWO 20' OF No.4 COOPER REBAR INSTALLED IN BUILDING FOUNDATION WITH MINIMUM OF 2" OF CONCRETE COVER. SPLICE REBARS AT 20" MINIMUM SPLICE LENGTH. A DRIVEN ROD ELECTRODE MUST BE INSTALLED SO AT LEAST 8' OF ITS LENGTH IS IN CONTACT WITH THE SOIL. THIS ELECTRODE CONNECTED TO THE SYSTEM WITH A GROUNDING ELECTRODE CONDUCTOR AND RUN TO THE BOUNDING BUS BAR AT SERVICE DISCONNECT.



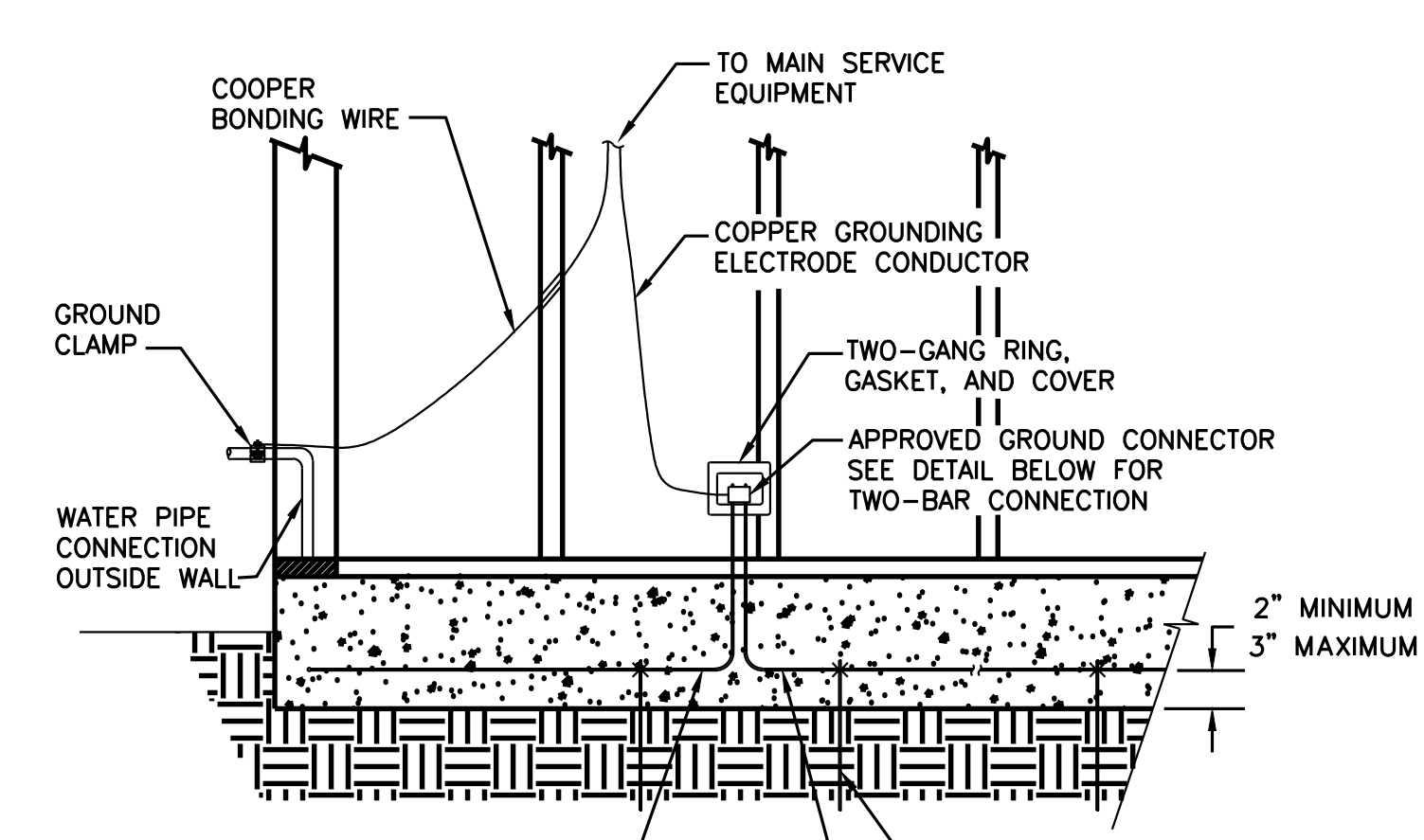
3 TYPICAL ADHESIVE BASE AIR TERMINAL  
 E-4



4 TYPICAL CABLE CONNECTIONS  
 E-4



5 SERVICE GROUND BUS DETAIL  
 E-4



INSTALL SECOND 20'-0" UFER GROUND FOR 201 AMPS TO 600 AMPS AT 90° OR 180° FROM FIRST UFER GROUND. OVER 600 AMPS REFER TO NEC TABLE 250-66

PLACE STAKES OR EQUAL FOR SUPPORT. SPACE EQUALLY ALONG 20 FOOT UFER WIRE OR REBAR. SECURE IN PLACE BEFORE PLACING CONCRETE.

1/2" REBAR OR #4 BARE COPPER, 20-FOOT LONG, EMBEDDED IN CONCRETE FOOTING FOR 200 AMPS OR LESS

NOTE: TO COMPLETE BONDING OF METALLIC PIPING SYSTEM INSIDE STRUCTURE INSTALL A BONDING JUMPER FROM A COLD WATER PIPE AT THE WATER HEATER TO THE GAS PIPING.

6 GROUNDING ELECTRODE (UFER)  
 E-4

- LIGHTNING PROTECTION NOTES:**
1. THE COMPLETED INSTALLATION SHALL MEET THE "INSTALLATION REQUIREMENTS FOR LIGHTNING PROTECTION SYSTEMS, UL96A" OF UNDERWRITERS LABORATORIES - CURRENT EDITION. A CERTIFICATE OF COMPLETION FROM AN AUTHORITY HAVING JURISDICTION SHALL BE FURNISHED TO THE OWNER UPON COMPLETION.
  2. ALUMINUM LIGHTNING PROTECTION SYSTEM COMPONENTS SHALL NOT BE MOUNTED TO COPPER SURFACES. COPPER COMPONENTS SHALL BE USED TO AVOID ELECTROLYTIC CORROSION.
  3. METAL BODIES WITHIN 6' - 0" OF THE LIGHTNING PROTECTION SYSTEM SHALL BE BONDED TO THE SYSTEM IN ACCORDANCE WITH UL96A, AND NFPA 780
  4. UNDERGROUND METALLIC PIPING ENTERING THE BUILDING SHALL BE BONDED TO THE NEAREST DOWN CONDUCTOR OR GROUND ELECTRODE.
  5. ADHESIVE USED WITH ADHESIVE AIR TERMINAL BASES AND CONDUCTOR FASTENERS SHALL BE COMPATIBLE WITH ROOFING MEMBRANE - VERIFY WITH ROOFING CONTRACTOR.
  6. AIR TERMINALS SHALL BE LOCATED ON THE ROOF TOP EQUIPMENT AS REQUIRED. IF THE METAL THICKNESS OF AN OBJECT IS 3/16" OR GREATER, AIR TERMINALS MAY BE ELIMINATED IF THE OBJECT IS PROPERLY CONNECTED TO THE SYSTEM.
  7. ROOF TOP EQUIPMENT NOT SHOWN ON THIS DRAWING SHALL BE PROTECTED AS REQUIRED TO MEET THE REQUIREMENTS LISTED ABOVE INCLUDING THE INSTALLATION OF AIR TERMINALS AND OR BONDING. IF THE METAL THICKNESS OF AN OBJECT IS 3/16" OR GREATER, AIR TERMINALS MAY BE ELIMINATED IF THE OBJECT IS PROPERLY CONNECTED TO THE SYSTEM.
  8. AIR TERMINALS ARE TO BE LOCATED AS SHOWN. THEY ARE TO BE A MAXIMUM OF 24" FROM THE ROOF EDGE AND PROJECT A MINIMUM OF 10" ABOVE THE PROTECTED EDGE. THE SPACING BETWEEN AIR TERMINALS ARE NOT TO EXCEED 20 FEET. AIR TERMINALS THAT EXTEND 24" ABOVE THE PROTECTED EDGE ARE NOT TO EXCEED A SPACING GREATER THAN 25', EXCEPT FOR MID-ROOF AIR TERMINALS (50' MAX SPACING).
  9. ALL LIGHTNING CONDUCTORS ARE TO MAINTAIN A HORIZONTAL OR DOWNWARD PATH. ALL BENDS IN THE CONDUCTOR SHALL HAVE A RADIUS BEND OF 8 INCHES OR GREATER, AND SHALL HAVE AN ANGLE BEND OF 90 DEGREES OR GREATER.
  10. EACH INDIVIDUAL ITEM OF THE LIGHTNING PROTECTION SYSTEM IS NOT LABELED FOR THE SAKE OF CLARITY. ITEMS ARE INDICATED AT RANDOM LOCATIONS ONLY, BUT A COMPLETE SYSTEM SHALL BE PROVIDED TO MEET MASTER LABEL REQUIREMENTS.
  11. ROOF PADS, PAVERS, FLASHINGS OR ANY OTHER SPECIAL ROOFING MATERIALS REQUIRED FOR THE INSTALLATION OF THE LIGHTNING PROTECTION SYSTEM SHALL BE FURNISHED AND INSTALLED BY THE ROOFING CONTRACTOR.
  12. BOND TO SERVICE GROUND BUS.

- LEGEND**
- NO. 1218ALAT, 1/2" x 18" GENTLY TAPERED SOLID ALUMINUM AIR TERMINAL WITH UNIVERSAL BASE MOUNTED VERTICALLY. -SEE DETAIL "3"
  - R— NO. 29 CLASS I COPPER LIGHTNING CONDUCTOR (29 STRANDS OF 16 AWG WIRE - 215 LBS. PER 1000 FEET). SEE AIR TERMINAL DETAILS FOR METHOD OF FASTENING. SECURE TO BUILDING EVERY THREE FEET MAXIMUM.
  - NO. 29 CLASS I COPPER DOWN-LEAD LIGHTNING CONDUCTOR (29 STRANDS OF 16 AWG WIRE - 215 LBS. PER 1000 FEET) IN 1" PVC CONDUIT CONNECTED TO GROUND RODS "GR" IN ELECTRICAL GROUNDING PLAN.

REVISIONS:

LAKE HAVASU CITY

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ELECTRICAL GROUNDING PLAN

PROJECT: BOOSTER STATION IC REPLACEMENT  
 LAKE HAVASU CITY, ARIZONA

DESIGNED BY: JF  
 DRAWN BY: LBG

45975  
 PEDRO L. TREVIN  
 REG. NO. P.E. 48975  
 ELECTRICAL ENGINEER  
 Expires 03/31/2022

PEDRO L. TREVIN  
 REG. NO. P.E. 48975  
 ELECTRICAL ENGINEER

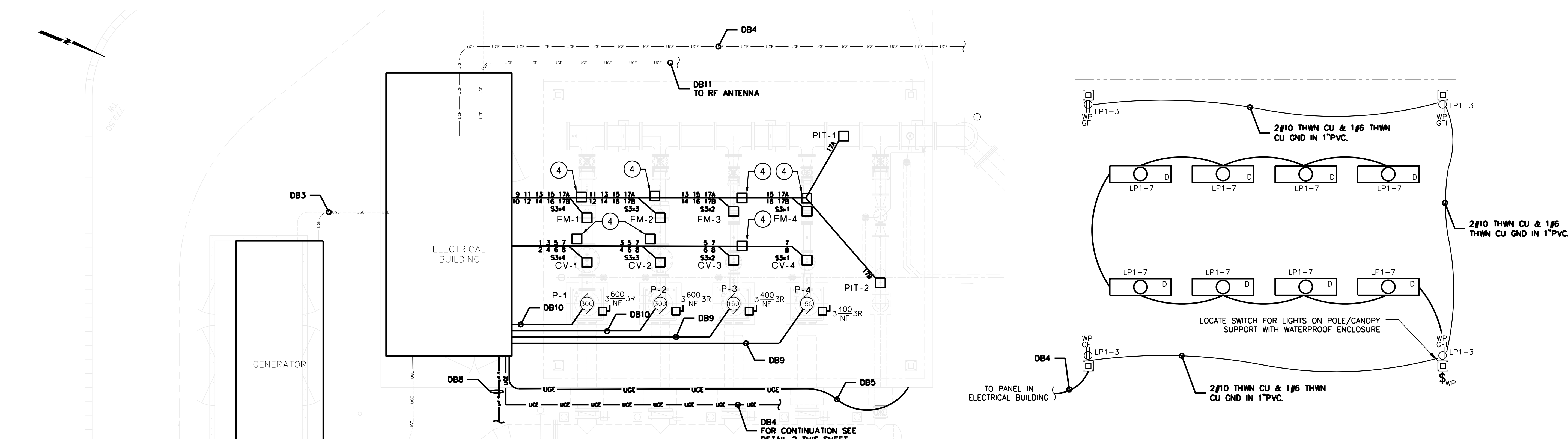
PROJECT NO. WT7440

DWG NO. E-4  
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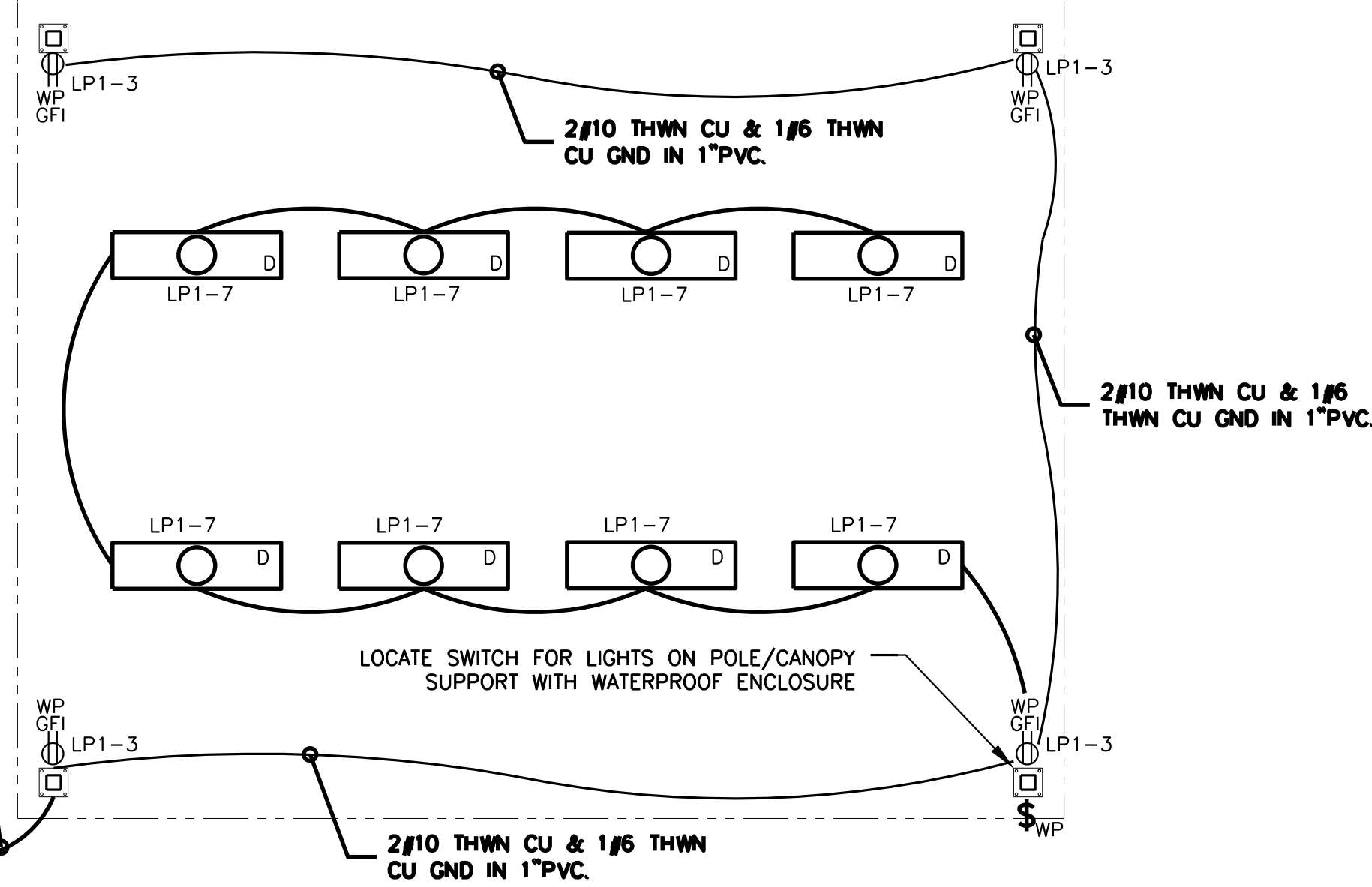
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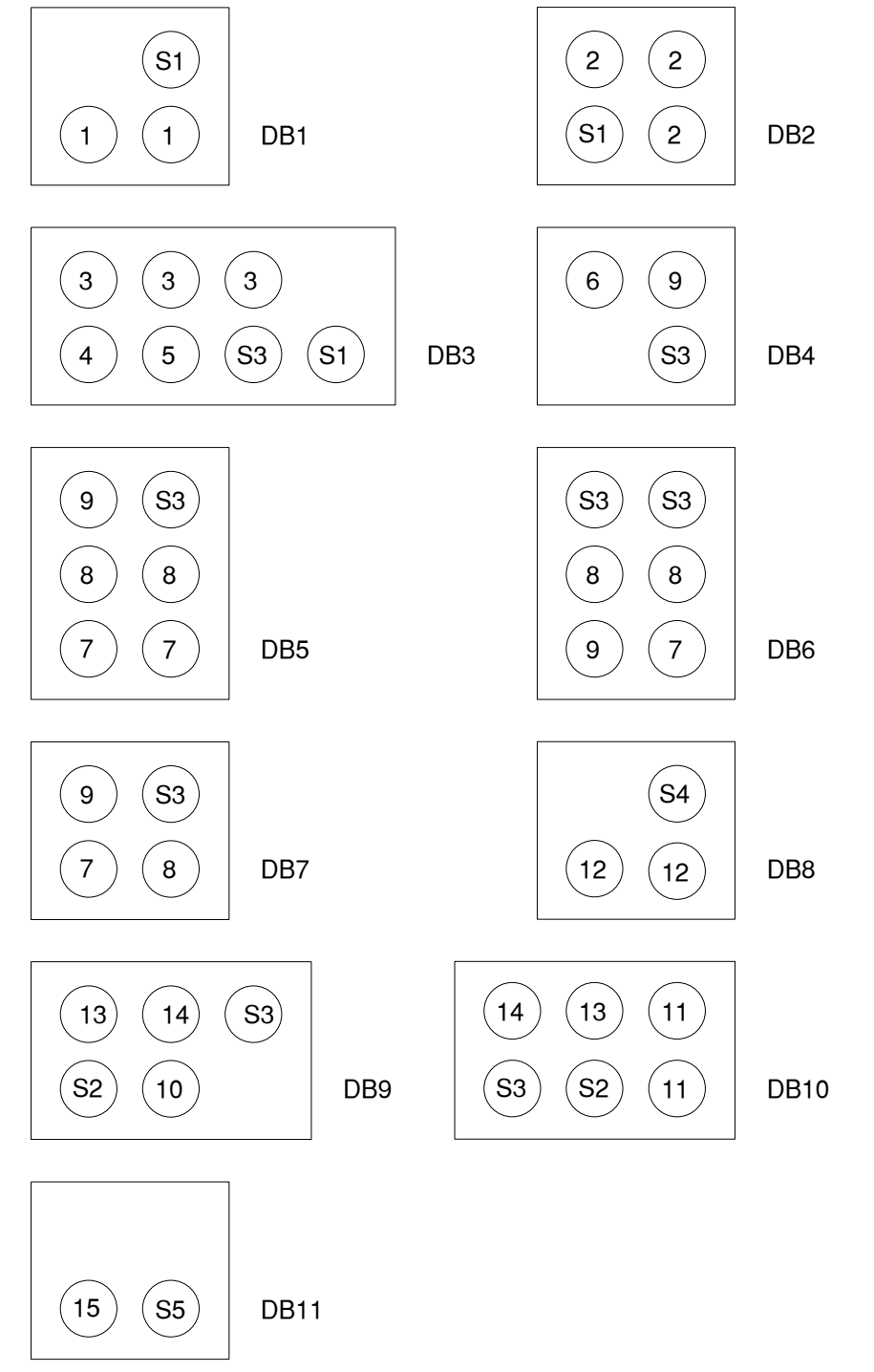


**1 BOOSTER STATION ELECTRICAL PLAN**  
 E-3  
 0 5' 10' 20'



**2 CANOPY LIGHTING DETAIL**  
 E-3  
 0 5' 10' 20'

**DUCT BANK SECTIONS**



REFER TO DETAIL 4, SHEET E-6 FOR DB1 AND DB2, AND DETAIL 3, SHEET E-6 FOR ALL REMAINING DUCT BANKS

**DUCTBANK SCHEDULES**

NUMBER	CONDUIT / CONDUCTOR	REMARKS
1	BY UNISOURCE	EMPTY UNISOURCE PRIMARY DUCTS
2	4" C. 4/600 KCMIL	SERVICE FEEDER
3	4" C. 4/600 KCMIL & 1/1" O GND	GENERATOR FEEDER
4	1" C. 10/12 AWG CU	GENERATOR - ATS CONTROLS
5	1" C. 3/6, 1/0 + GND	GENERATOR ENCLOSURE POWER
6	1" C. 2/10, & 1/12 CU GND	LIGHTING CIRCUIT (LIGHT POLES)
7	1" C. 2/16, + GND	TANK LEVEL
8	1" C. 2/10, + GND	CATHODIC PROTECTION
9	1" C. 2/10 & 1/12 CU GND	COURTESY GFCI RECEPTACLE
10	3" C. 3/250KCMIL & 1/2 CU GND	150 HP PUMP MOTORS
11	3" C. 3/350KCMIL & 1/2 CU GND	300 HP PUMP MOTORS
12	2" C. EMPTY	COMM/TEL SERVICE
13	1" C. 2/14, 1/14 CU GND	PUMP MOTOR HIGH TEMP
14	1" C. 2/14, 1/14 CU GND	PUMP MOTOR SEAL
15	1 1/2" C.	FOR RF ANTENNA CABLES
S1	4" C. SPARE	SPARE
S2	3" C. SPARE	SPARE
S3	1" C. SPARE	SPARE
S4	2" C. SPARE	SPARE
S5	1 1/2" C. SPARE	SPARE

"DUCT BANK" SHALL BE CONCRETE ENCASED.

**CONDUIT SCHEDULES**

CONDUIT NO.	CONDUIT / CONDUCTOR REFERENCE	
1	1" C. DETAIL 3/1-13	CONTROL VALVE 1
2	1" C. DETAIL 3/1-13	CONTROL VALVE 2
3	1" C. DETAIL 3/1-13	CONTROL VALVE 3
4	1" C. DETAIL 3/1-13	CONTROL VALVE 4
5	1" C. DETAIL 3/1-13	FLOW METER 1
6	1" C. DETAIL 3/1-13	FLOW METER 2
7	1" C. DETAIL 3/1-13	FLOW METER 3
8	1" C. DETAIL 3/1-13	FLOW METER 4
9	1" C. DETAIL 4/1-13	PIT-1
10	1" C. DETAIL 4/1-13	PIT-2
11	1" C. DETAIL 4/1-13	
12	1" C. DETAIL 4/1-13	
13	1" C. DETAIL 2/1-13	
14	1" C. DETAIL 2/1-13	
15	1" C. DETAIL 2/1-13	
16	1" C. DETAIL 2/1-13	
17A	1" C. DETAIL 2/1-13	
17B	1" C. DETAIL 2/1-13	

CONDUIT ARE SAND ENCASED AND CONCRETE CAPPED.

**GENERAL NOTES:**

- THE ENTIRE ELECTRICAL INSTALLATION SHALL COMPLY WITH THE NATIONAL ELECTRICAL CODE (NEC-2017) AND APPLICABLE STATE OF ARIZONA REGULATIONS.
  - ALL ELECTRICAL EQUIPMENT AND MATERIAL SHALL BE NEW AND NEC APPROVED WHERE STANDARDS HAVE BEEN ESTABLISHED BY THAT AGENCY.
  - THE ENTIRE INSTALLATION SHALL COMPLY WITH THE CONTRACT DOCUMENTS.
- PLAN NOTES:**
- REFER TO ONE-LINE DIAGRAMS FOR CONDUIT AND CONDUCTOR REQUIREMENTS FOR PUMPS, CONTROL VALVES AND FLOW METER.
  - CONDUIT FROM ELECTRICAL BUILDING TO EQUIPMENT ON PUMP PAD SHALL BE PVC CONDUIT TRENCHED 24" BELOW GRADE WITH SAND BEDDING. CONCRETE CAP IS NOT REQUIRED.
  - ALL CONDUIT SHALL TRANSITION FROM PVC BELOW GRADE TO RIGID STEEL CONDUIT FOR EXTERIOR ABOVE GRADE. CONDUIT SHALL BE PROVIDED WITH SUPPLEMENTARY CORROSION PROTECTION A MINIMUM OF 4 INCHES ABOVE AND 4 INCHES BELOW THE SLAB SURFACE. SUPPLEMENTARY CORROSION PROTECTION INCLUDES FACTORY APPLIED PVC COATING, PAINTS, TAPE WRAPS, OR SHRINK WRAPS, SUBJECT TO CITY APPROVAL.
  - PULL BOX PER DETAIL 1, SHEET E-6
  - REFER TO MECHANICAL PLANS FOR LOCATION OF FLOW METERS, PUMP CONTROL VALVES AND PRESSURE TRANSMITTERS.

**TRENCH AND DUCT NOTES:**

- TRENCH ROUTING IS APPROXIMATE. FIELD COORDINATE ROUTING TO ACCOMMODATE EXISTING UNDERGROUND PIPING AND STRUCTURES.
- REFER TO ONE-LINE DIAGRAMS, PLANS AND SPECIFICATIONS FOR QUANTITY AND SIZE OF DUCTS.
- "DUCTBANK" SHALL BE CONCRETE ENCASED. PROVIDE SAND ENCASEMENT OF DUCTS. PROVIDE 3" CONCRETE CAP ABOVE DUCTS, UNLESS OTHERWISE NOTED.
- INSTALL PULLBOXES PER DETAILS TO FACILITATE PULLING OF CONDUCTORS. DO NOT SPLICE CONDUCTORS IN BELOW GRADE ENCLOSURES.

**VOLTAGE DROP CALCULATION:**  
 FROM PANEL LP1 TO THE FARTHEST LIGHT POLE

<b>208V, 1PH LUMINAIRES</b>	
ELECTRICAL DEMAND LOAD (3 FIXT)	270 VA
TOTAL AMPERES	1.30 A
LENGTH OF CONDUCTORS	450 FT
NEC-316 SIZE OF CONDUCTORS	10 AWG
CIRCULAR MILL AREA	10.38
VOLTAGE DROP	1.5 V
VOLTAGE DROP %	0.7 %

**NOTES:**  
 1- RESISTANCE OF COPPER CALCULATED FROM 2014 NEC CHAPTER 9, TABLE B.  
 FEEDERS DON'T NEED TO BE OVERSIZED DUE TO VOLTAGE DROP

REVISIONS:

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BOOSTER STATION ELECTRICAL AND CONTROL PLAN

PROJECT: BOOSTER STATION 1C REPLACEMENT  
 LAKE HAVASU CITY, ARIZONA

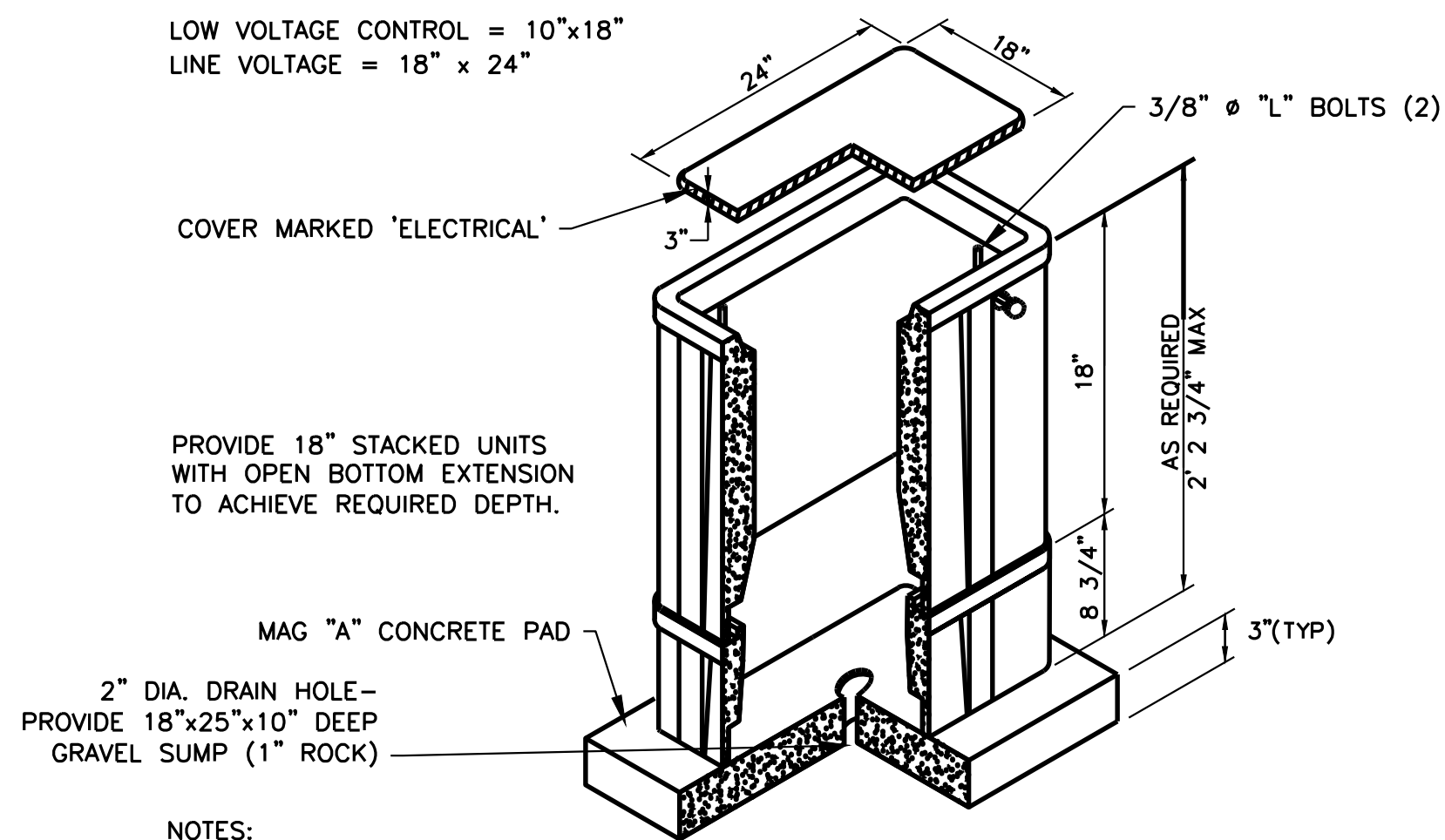
DESIGNED BY: JF  
 DRAWN BY: LBG

PROJECT NO. WT7440

DWG NO. E-5  
 24 OF 47

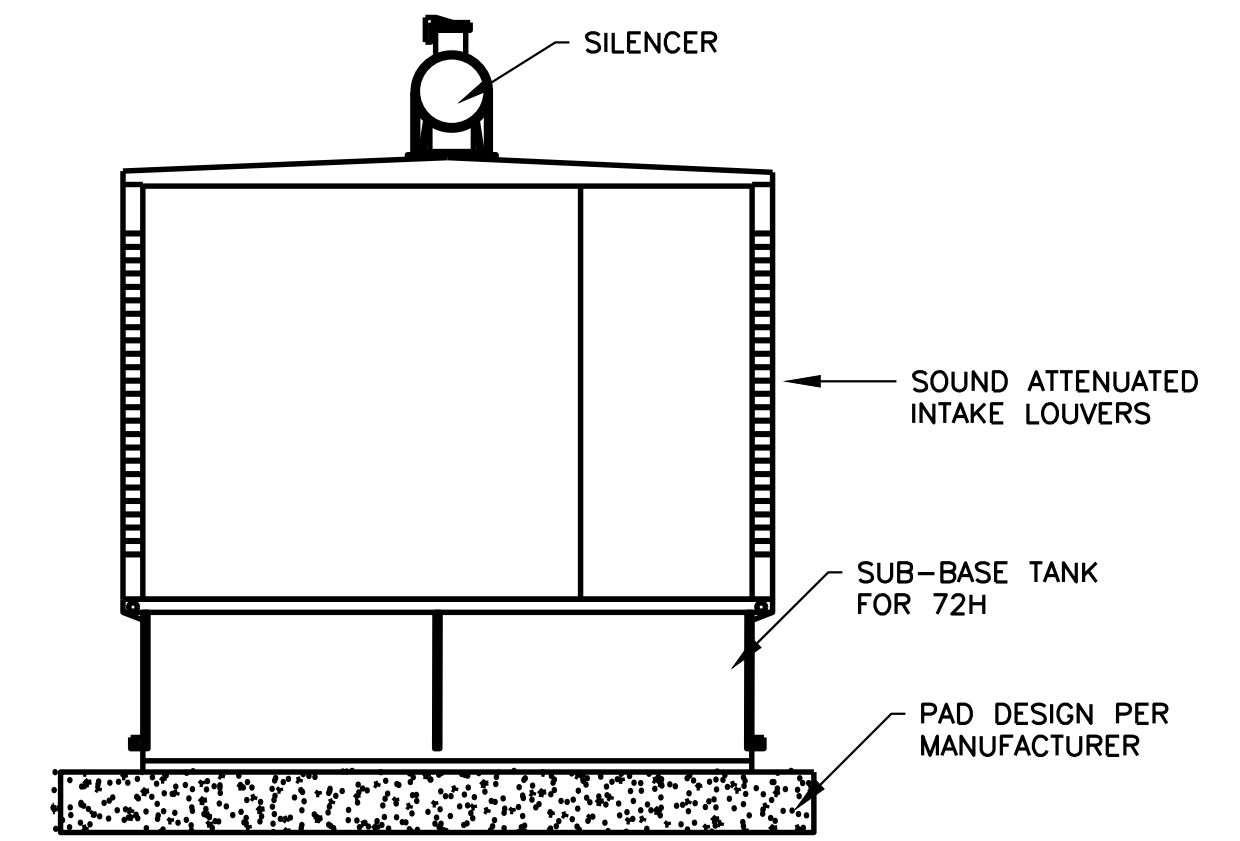
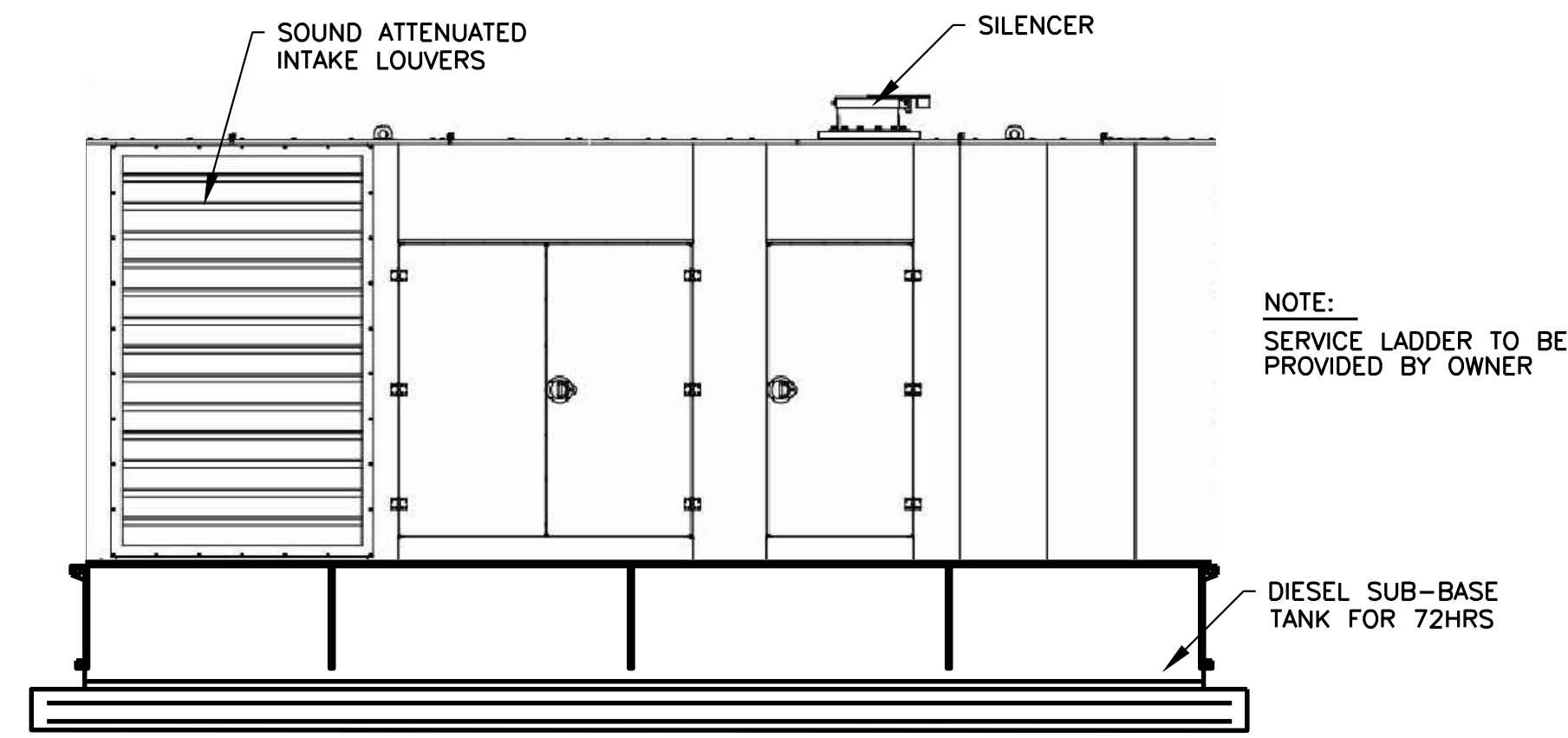
ORIGINAL SCALE: 1/8" = 1'-0"





- NOTES:
1. ALL CONDUIT ENTRIES SHALL TERMINATE IN THE SIDES OF THE BOX WITH END BELLS INSTALLED FLUSH WITH INSIDE WALL OF BOX OR HANDHOLE. SAW CUT KNOCKOUTS, BROKEN PULLBOX SECTIONS OR HANDHOLES ARE UNACCEPTABLE AND SHALL BE REPLACED AT CONTRACTOR'S EXPENSE.
  2. PULL BOXES TO BE POLYMER CONCRETE TYPE WITH EXTRA HEAVY DUTY COVERS. MINIMUM RATING 5,000LB. OVER 10" SQUARE AREA, AND 7,5000LB. MINIMUM TEST LOAD. EQUAL TO QUAZITE 'LG' 13" X 24".

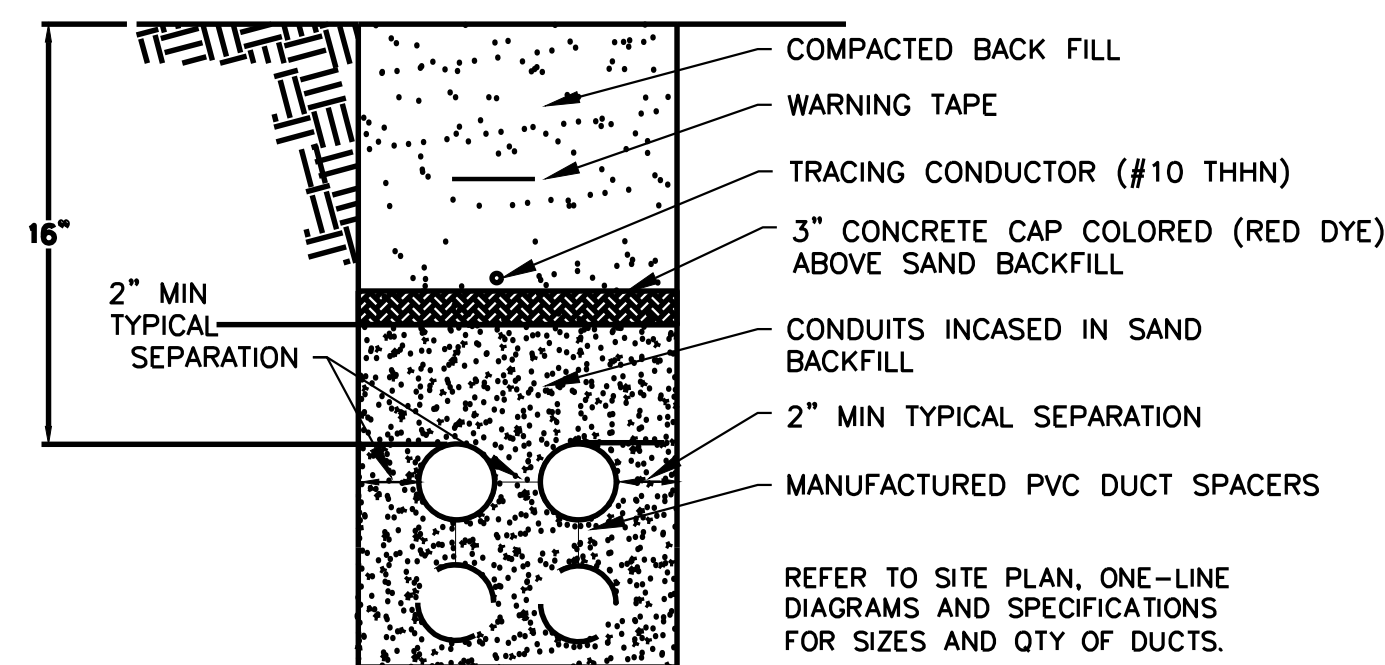
1 PULL BOX DETAIL  
E-3 NO SCALE



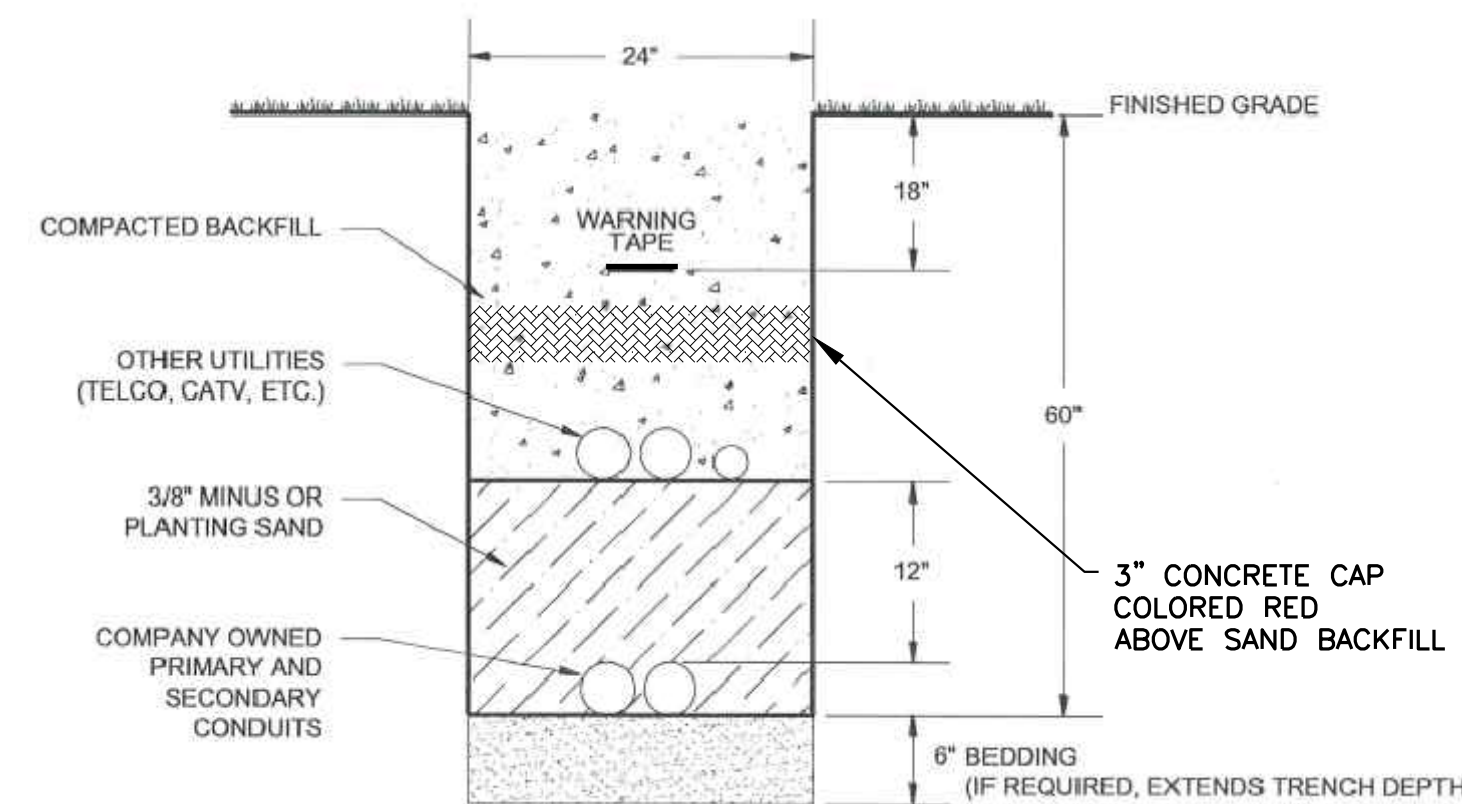
RIGHT SIDE

REAR

2 GENERATOR ENCLOSURE ELEVATIONS  
E-3 NO SCALE



3 DUCT BANK  
E-5 NO SCALE

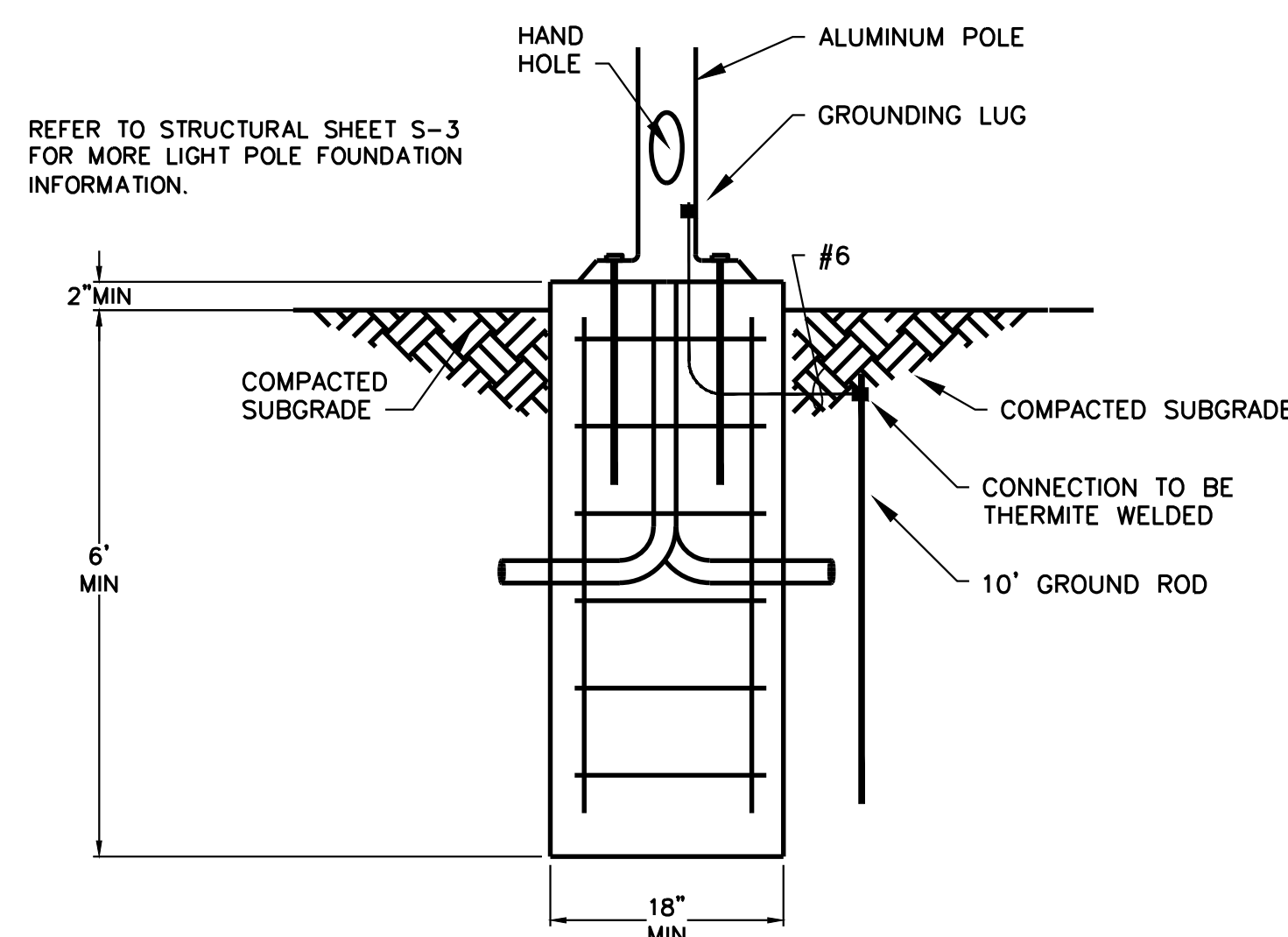


4 UNISOURCE ENERGY SERVICES ELECTRIC SERVICE INSTALLATION REQUIREMENTS  
E-3 NO SCALE

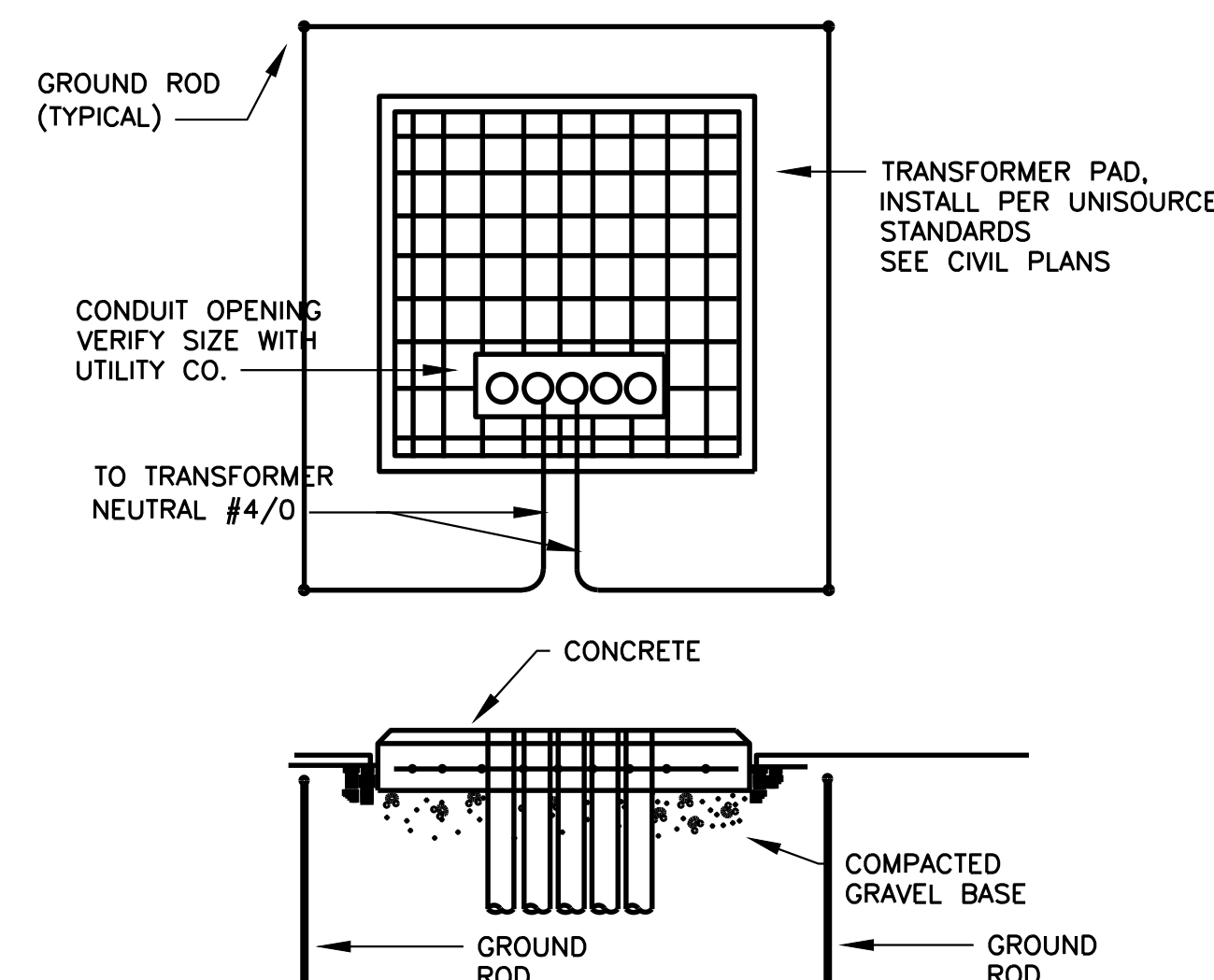
NOTES:

1. OSHA STANDARDS FOR TRENCHING MUST BE MET.
2. CUSTOMER IS RESPONSIBLE FOR ALL TRENCHING, SHADING, COMPACTION AND BACKFILL.
3. WATER, GAS AND SEWER LINES MUST BE IN A SEPARATE TRENCH OR MAINTAIN A MINIMUM 5 FOOT SEPERATION.
4. COMPANY SHALL INSPECT TRENCH PRIOR TO BACKFILL.
5. CUSTOMER TO ENSURE SHADING IS TO COMPANY SPECIFICATIONS AND WARNING TAPE IS INSTALLED AT PROPER DEPTH AND HAND SHADED PRIOR TO BACKFILL.
6. IF ONLY SECONDARY CABLE IS TO BE INSTALLED, TRENCH DEPTH MAY BE REDUCED TO 42".

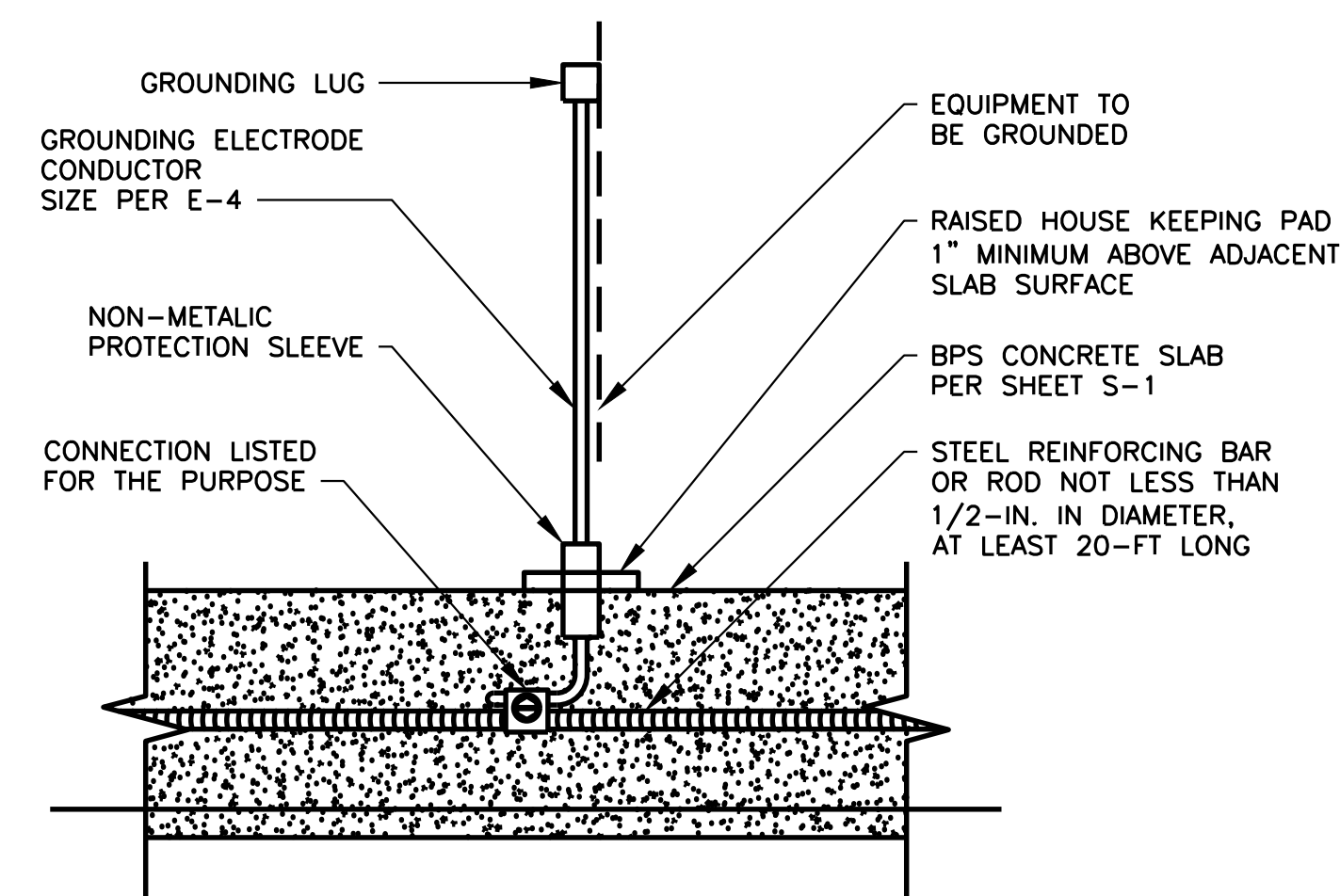
REVISIONS	DATE	NAME	APPROVED	UNISOURCE ENERGY SERVICES	SERVICE SPECIFICATIONS
ADD BEDDING, UPDATE NOTES	5/4/10	GMK	RAC		DISTRIBUTION PRIMARY AND SECONDARY TRENCH DETAIL



5 POLE BASE DETAIL  
E-3,S-3 NO SCALE



6 NEW TRANSFORMER PAD DETAIL  
E-3 NO SCALE



7 EQUIPMENT GROUND CONDUCTOR DETAIL  
E-4 NO SCALE

REVISIONS:



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ELECTRICAL DETAILS  
PROJECT:  
**BOOSTER STATION 1C REPLACEMENT**  
LAKE HAVASU CITY, ARIZONA

DESIGNED BY: JF  
DRAWN BY: LBG



PEDRO L. TREVIN  
REG. No. P.E. 45975  
ELECTRICAL ENGINEER

PROJECT NO.  
WT7440

DWG NO.  
**E-6**

25 OF 47

Plotted By: RODR2009 Date: 28-Feb-19-11:59 File: G:\BLDGS\COMMON\Lake Havasu - PS Arizona\Booster Station 1C\04\_CAD-BIM\02\_DWG\SHEET\1000054178\_1C\_E06 & E07.dwg

ORIGINAL SCALE: 1/8" = 1'-0" INCHES