

## ELECTRICAL SPECIFICATIONS

### PART I - GENERAL

#### A. CONDITIONS

- FURNISH AND INSTALL A COMPLETELY WIRED AND OPERATIONAL ELECTRICAL SYSTEM AS SHOWN ON THE DRAWINGS AND SPECIFIED HEREIN, INCLUDING BUT NOT LIMITED TO, THESE MAJOR ITEMS.
  - LIGHTING FIXTURES AS INDICATED AND SPECIFIED ON THE PLANS.
  - ELECTRICAL PANELS, SERVICE, CONDUIT, WIRING, ETC., FOR ALL OUTLETS AND EQUIPMENT.
  - TELEPHONE, TELEVISION, AND FIRE ALARM. OUTLETS AND CONDUIT AS INDICATED.
- OBTAIN AND REVIEW ALL OTHER DRAWINGS INCLUDING REFLECTED CEILING PLAN, INTERIOR AND EXTERIOR ELEVATIONS, FURNITURE PLANS AND ALL MILL WORK DRAWINGS. COORDINATE INSTALLATION OF ALL ELECTRICAL DEVICES AND EQUIPMENT PRIOR TO ROUGH-IN.
- OBTAIN SUBMITTAL AND SHOP DRAWINGS FROM OTHER TRADES AND EQUIPMENT TO COORDINATE INSTALLATION ACCORDINGLY.
- INSTALLATION SHALL COMPLY WITH ALL CURRENT APPLICABLE CODES AND GOVERNING AGENCIES HAVING JURISDICTION.
- FIRE ALARM SYSTEM, IF REQUIRED PER IBC, SHALL BE DESIGN-BUILD BY OWNER'S/GC'S FIRE ALARM CONTRACTOR. DESIGN SHALL BE IN ACCORDANCE WITH NFPA 72. FIRE ALARM CONTRACTOR SHALL SUBMIT STAMPED DRAWINGS TO AHI FOR REVIEW AND APPROVAL. FIRE ALARM CONTRACTOR IS RESPONSIBLE FOR TESTING AND VERIFYING THAT THE AUDIBILITY OF THE FIRE ALARM SYSTEM MEETS A MINIMUM OF 15 DBA ABOVE AMBIENT NOISE LEVELS. ADD HORNS WHERE REQUIRED TO MAINTAIN MINIMUM LEVELS.
- PROVIDE FIRE STOP ON ALL PIPING THAT PENETRATES RATED WALLS. METHOD OF FIRE STOP SHALL MEET WALL RATING. REFER TO ARCHITECTURAL DRAWINGS FOR LOCATION OF FIRE RATED WALLS. THIS CONTRACTOR SHALL PROVIDE FIRE RATED ENCLOSURES AROUND ALL ROUGH-IN BOXES, PANELS, ETC. THAT ARE LOCATED IN FIRE RATED WALLS AND SHALL FIRE CAULK ALL OPENINGS IN RATED ASSEMBLIES.

#### B. RELATED WORK BY OTHERS

- THE ELECTRICAL CONTRACTOR SHALL PROVIDE CONDUIT, TRENCH, AND BACKFILL FOR ELECTRICAL SERVICE ENTRANCE FROM THE MAIN SERVICE TO UTILITY POINT OF ELECTRICAL SERVICE. ELECTRICAL CONTRACTOR SHALL COORDINATE THE INSTALLATION OF THE ELECTRICAL SERVICE ENTRANCE WITH SERVING UTILITY COMPANY.
- THE ELECTRICAL CONTRACTOR SHALL PROVIDE CONDUIT, TRENCH, AND BACKFILL FOR PRIMARY PHONE AND CATV SERVICE FROM THE TELEPHONE TERMINAL BOARD OR CABINET TO THE PHONE COMPANY AND CATV COMPANY POINT OF SERVICE COORDINATE WITH LOCAL UTILITY COMPANIES.

#### C. CODES, REGULATIONS, AND STANDARDS

- THE INSTALLATION SHALL COMPLY WITH APPLICABLE LOCAL AND STATE CODES AND ORDINANCES, WITH THE REGULATIONS OF THE LATEST EDITION OF THE NATIONAL ELECTRIC CODE AND WITH THE REQUIREMENTS OF THE POWER, TELEPHONE, AND CATV COMPANIES FURNISHING SERVICES TO THIS INSTALLATION.
- THE LATEST EDITIONS OF THE FOLLOWING INDUSTRY STANDARDS, SPECIFICATIONS, AND CODES ARE MINIMUM REQUIREMENTS:
  - THE NATIONAL ELECTRICAL MANUFACTURER'S ASSOCIATION STANDARDS.
  - THE NATIONAL ELECTRICAL CODE, INCLUDING LOCAL AMENDMENTS.
  - UNDERWRITER LABORATORIES INCORPORATED STANDARDS.
  - AMERICAN NATIONAL STANDARDS INSTITUTE.
  - INTERNATIONAL BUILDING CODE.

#### D. INSPECTION OF SITE

- PRIOR TO SUBMITTING A BID FOR ELECTRICAL WORK, THE CONTRACTOR SHALL VISIT THE SITE OF THE PROPOSED CONSTRUCTION AND SHALL THOROUGHLY ACQUAINT HIMSELF WITH EXISTING UTILITIES, AND WORKING CONDITIONS TO BE ENCOUNTERED, ETC. ALLOWANCE WILL NOT BE MADE FOR NONCOMPLIANCE WITH THIS CONDITION AFTER BIDDING.
- ELECTRICAL INSTALLATION SHALL MEET THE EXISTING CONDITIONS.

#### E. STORAGE AND HANDLING OF MATERIAL

- DELIVER MATERIALS AND EQUIPMENT TO THE PROJECT IN THE MANUFACTURER'S ORIGINAL, UNOPENED, LABELED CONTAINERS. PROTECT AGAINST MOISTURE, TAMPERING, OR DAMAGE FROM IMPROPER HANDLING OR STORAGE. CONTRACTOR SHALL PROTECT AND BE RESPONSIBLE FOR ANY DAMAGE TO WORK OR MATERIALS UNTIL FINAL ACCEPTANCE BY THE OWNER, AND SHALL MAKE GOOD WITHOUT COST TO THE OWNER, ANY DAMAGE OR LOSS THAT MAY OCCUR DURING THIS PERIOD.
- ARRANGE FOR TIMELY DELIVERY OF MATERIALS AND EQUIPMENT TO THE JOB SITE IN ORDER TO MINIMIZE THE LENGTH OF TIME BETWEEN DELIVERY AND INSTALLATION.
- COVER AND PROTECT ANY MATERIAL WHICH MAY BE AFFECTED BY THE WEATHER WHILE IN TRANSIT OR STORED AT THE PROJECT SITE. ANY MATERIAL FOUND DEFECTIVE OR NOT INSTALLED IN ACCORDANCE WITH THE CONTRACT DOCUMENTS MAY BE REJECTED BY THE ENGINEER.

#### F. CLEANUP

- KEEP THE PREMISES FREE FROM ACCUMULATION OF WASTE MATERIALS, OR RUBBISH CAUSED BY EMPLOYEES OR WORK UNDER THIS DIVISION OF THE SPECIFICATIONS. AT THE COMPLETION OF THE WORK REMOVE ALL SURPLUS MATERIALS, TOOLS, ETC., AND LEAVE THE PREMISES BROOM-CLEAN.

#### G. EXCAVATION, CUTTING, AND FITTING

- PERFORM ALL EXCAVATION AND BACK FILLING REQUIRED FOR WORK PERFORMED UNDER THIS DIVISION OF THE SPECIFICATIONS. USE EXCAVATED MATERIALS FOR BACKFILL UNLESS OFF SITE MATERIALS ARE DEEMED NECESSARY.
- PERFORM THE EXCAVATION, CUTTING, FITTING, REPAIRING, AND FINISHING OF THE WORK NECESSARY FOR THE INSTALLATION OF THE EQUIPMENT OF THIS SECTION. HOWEVER, NO CUTTING OF THE WORK OF OTHER TRADES OR OF ANY STRUCTURAL MEMBERS SHALL BE DONE WITHOUT THE CONSENT OF THE ARCHITECT.

#### H. DRAWINGS

- THE DRAWINGS INDICATE THE GENERAL ARRANGEMENT AND LOCATIONS OF THE ELECTRICAL WORK DATA PRESENTED ON THESE DRAWINGS ARE AS ACCURATE AS PLANNING CAN DETERMINE, BUT FIELD VERIFICATION OF ALL DIMENSIONS, LOCATIONS, LEVELS, ETC., TO SUIT FIELD CONDITIONS IS REQUIRED. REVIEW ALL ARCHITECTURAL, STRUCTURAL, AND MECHANICAL DRAWINGS AND ADJUST ALL WORK TO MEET THE REQUIREMENTS OF CONDITIONS SHOWN. THE ARCHITECTURAL DRAWINGS SHALL TAKE PRECEDENCE OVER ALL OTHER DRAWINGS. DISCREPANCIES BETWEEN DIFFERENT PLANS, OR BETWEEN DRAWINGS AND SPECIFICATIONS, OR REGULATIONS AND CODES GOVERNING THE INSTALLATION SHALL BE BROUGHT TO THE ATTENTION OF THE ENGINEER IN WRITING BEFORE THE DATE OF BID OPENING. IF DISCREPANCIES ARE NOT REPORTED, THE CONTRACTOR SHALL BID THE GREATER QUANTITY OR BETTER QUALITY, AND APPROPRIATE ADJUSTMENTS WILL BE MADE AFTER CONTRACT AWARD. CONTRACTOR SHALL BE RESPONSIBLE TO FIELD MEASURE AND CONFIRM MOUNTING HEIGHTS AND LOCATION OF ELECTRICAL EQUIPMENT WITH RESPECT TO COUNTERS, RADIATION, ETC. DO NOT SCALE DISTANCES OFF THE ELECTRICAL DRAWINGS, USE ACTUAL BUILDING DIMENSIONS.

#### I. COOPERATION WITH OTHER CONTRACTORS

- COOPERATE WITH THE OTHER TRADES SO THAT THE INSTALLATION OF THE ELECTRICAL OUTLETS AND EQUIPMENT WILL BE PROPERLY COORDINATED. CONDUIT, LIGHTING FIXTURES, AND OTHER EQUIPMENT LOCATIONS SHALL BE VERIFIED WITH OTHER TRADES TO AVOID CONFLICT WITH THE PIPING, DUCTWORK, STEEL, BEAMS, OR OTHER OBSTRUCTIONS.
- CAREFULLY VERIFY THE LOCATIONS OF THE OUTLET BOXES AND DETERMINE THAT THEY HAVE NOT BEEN DISTURBED DURING THE INSTALLATION OF MATERIALS OF OTHER TRADES.
- COORDINATE THE LOCATION OF THE TRENCHES AND CONDUITS FOR ELECTRICAL AND TELEPHONE UTILITY SERVICES WITH THE GENERAL CONTRACTOR.
- COORDINATE HVAC AND PLUMBING EQUIPMENT CONNECTION REQUIREMENTS WITH HVAC AND PLUMBING CONTRACTORS.

#### J. RECORD DRAWINGS

- THE ELECTRICAL CONTRACTOR SHALL MAINTAIN A SET OF DRAWINGS AT THE JOB SITE FOR THE EXCLUSIVE PURPOSE OF MAINTAINING A RECORD OF ALL WORK INSTALLED AND TO SHOW ANY DEVIATIONS FROM THE WORK INDICATED ON THE DRAWINGS.
- AT THE COMPLETION OF THE PROJECT, ONE SET OF REPRODUCIBLE DRAWINGS, SHOWING ALL RECORD CONDITIONS, SHALL BE DELIVERED TO THE OWNER FOR ACCEPTANCE PRIOR TO FINAL PAYMENT.

### PART II - PRODUCTS AND EXECUTION

#### A. MATERIALS

- ALL MATERIALS SHALL BE NEW AND OF QUALITY AS SPECIFIED ON THE PLANS OR SPECIFICATIONS AND MUST CARRY THE UNDERWRITER'S LABORATORIES APPROVAL COVERING THE PURPOSE FOR WHICH THEY ARE USED, IN ADDITION TO MEETING ALL REQUIREMENTS OF THE CURRENT APPLICABLE CODES AND REGULATIONS.

#### B. SHOP DRAWINGS AND APPROVALS

- THE ITEMS SPECIFIED HEREIN AND ON DRAWINGS ARE USED AS A STANDARD OF QUALITY. ANY MATERIALS OF EQUAL QUALITY AND AESTHETIC VALUE WILL BE GIVEN CONSIDERATION AS A SUBSTITUTE FOR THE MATERIALS SPECIFIED. NO APPROVAL WILL BE GIVEN TO A SPECIFIC CATALOG NUMBER, MODEL, OR TYPE OF EQUIPMENT, PRIOR TO BIDDING. AFTER BIDDING, THE DECISION OF THE ARCHITECT AND/OR ENGINEER DETERMINING EQUAL MATERIALS WILL BE FINAL.
- THE CONTRACTOR SHALL SUBMIT SEVEN (7) IDENTICAL BOUND SETS OF SHOP DRAWINGS ON THE FOLLOWING ITEMS:
  - LIGHTING FIXTURE CUTS AND PERFORMANCE DATA.
  - OUTLINE DRAWINGS AND DATA SHEETS OF EACH PANELBOARD, LOAD CENTERS, AND DISTRIBUTION PANELS.
  - OUTLINE DRAWINGS OF ALL SWITCH GEAR COMPONENTS.
  - WIRING DEVICES AND COVERPLATES.
  - ALL CIRCUIT BREAKERS INSTALLED IN PANELBOARDS, LOAD CENTERS, AND DISTRIBUTION PANELS.
- SUBMIT ITEMS AT ONE TIME IN A NEAT AND ORDERLY MANNER WITHIN 15 DAYS OF AWARD OF CONTRACT. PARTIAL SUBMITTALS WILL NOT BE ACCEPTABLE.

#### C. SYSTEM GROUNDING

- GROUNDING SHALL COMPLY WITH REQUIREMENTS OF ARTICLE 250. ALL EXPOSED NONCURRENT CARRYING METALLIC PARTS OF ELECTRICAL EQUIPMENT, METALLIC RACEWAY SYSTEMS, METALLIC CABLE ARMOR, GROUNDING CONDUCTOR OF NONMETALLIC SHEATHED CABLES, GROUNDING CONDUCTOR IN NONMETALLIC RACEWAYS, AND GROUNDED CONDUCTORS OF THE WIRING SYSTEM SHALL BE GROUNDED.
- GROUNDING CONDUCTOR (NEUTRAL) OF THE WIRING SYSTEM SHALL BE CONNECTED TO THE SYSTEM GROUNDING CONDUCTOR AT A SINGLE PLACE IN EACH SYSTEM BY REMOVABLE BONDING JUMPERS, SIZED ACCORDING TO THE APPLICABLE PROVISIONS OF THE NATIONAL ELECTRICAL CODE. THE GROUNDED CONDUCTOR (NEUTRAL) TO THE GROUNDING CONDUCTOR CONNECTION SHALL BE LOCATED IN THE ENCLOSURE FOR THE SYSTEM'S OVERCURRENT PROTECTION OR WHERE OTHERWISE INDICATED ON THE PLANS OR SPECIFICATIONS.
- A GROUND BUS SEPARATE FROM THE NEUTRAL BUS SHALL BE PROVIDED IN ALL DISTRIBUTION PANELS AND PANELBOARDS. PROPER TORQUE ON GROUND BUS SHALL BE VERIFIED, PER MANUFACTURER'S RECOMMENDATIONS, PRIOR TO ENERGIZING EQUIPMENT.
- GROUND BUSES AND NEUTRAL BUSES IN ALL DISTRIBUTION PANELS, LOAD CENTERS, PANELBOARDS, AND THOSE PROVIDED IN ANY EQUIPMENT SHALL BE ISOLATED EXCEPT WHERE REQUIRED TO BE CONNECTED AS SPECIFIED ABOVE FOR THE SERVICE ENTRANCE.
- WHEN INDICATED ON THE DRAWINGS, EQUIPMENT GROUNDING CONDUCTORS SHALL BE EXTENDED FROM THE GROUND BUS IN THE DISTRIBUTION EQUIPMENT TO THE RECEPTACLE, FIXTURE OR DEVICE LUGS WHERE THEY ARE PROVIDED. WHERE LUGS ARE NOT PROVIDED, EQUIPMENT GROUNDING CONDUCTORS SHALL BE CONNECTED TO EQUIPMENT ENCLOSURES. THE CONNECTIONS SHALL BE ARRANGED SUCH THAT REMOVAL OF THE RECEPTACLE, EQUIPMENT GROUND CONDUCTORS, OR GROUND JUMPERS FROM GROUND BUSING SHALL NOT AFFECT THE GROUND SYSTEM.
- RACEWAYS MAY NOT BE USED AS A GROUNDING CONDUCTOR FOR POWER AND LIGHTING CIRCUITS. ALL CONDUIT SHALL HAVE SEPARATE CODE SIZED GREEN GROUND WIRE INSTALLED IN THE CONDUIT TO INSURE A CONTINUOUS GROUNDING PATH.
- IN INACCESSIBLE LOCATIONS, MAKE CONNECTIONS BY EXOTHERMIC WELD PROCESS.
- IN ACCESSIBLE LOCATIONS, CONNECTIONS SHALL BE MADE WITH BOLTED THROUGH, APPROVED SOLDERLESS BRONZE GROUNDING DEVICES.

#### D. WIRE

- CONDUCTOR SIZES SHOWN ON THE DRAWINGS ARE BASED ON COPPER WIRE. UNLESS OTHERWISE SPECIFIED, ALL WIRE SHALL BE TYPE XHHW OR SE FOR FEEDERS OR BRANCH CIRCUITS LARGER THAN 4 AWG, TYPE THHN/THWN INSULATION FOR FEEDERS AND BRANCH CIRCUITS 4 AWG AND SMALLER. ALL BRANCH CIRCUIT WIRING SHALL BE COPPER.
- ALUMINUM CONDUCTORS MAY BE UTILIZED FOR SERVICE ENTRANCE AND PANEL FEEDERS. CONDUCTORS SHALL BE ALUMINUM ALLOW AA-8000 SERIES.
- THE WIRES SHALL BE MARKED WITH COLOR TO SIMPLIFY CIRCUIT IDENTIFICATION. UNLESS OTHERWISE REQUIRED BY LOCAL ORDINANCES GROUND WIRES SHALL BE GREEN, NEUTRAL WIRES SHALL BE 120V-WHITE, AND LIVE WIRES 208Y/120V AND 120/240 SHALL BE BLACK (PHASE A), RED (PHASE B), AND BLUE (PHASE C). CIRCUIT SHALL BE LABELED IN EACH J-BOX.
- ALL CONDUCTORS SHALL BE RATED 600 VOLT.
- SPLICES IN EXTERIOR PULL BOXES AND MANHOLES SHALL BE WEATHERPROOF USING "SCOTCHCAST" SPLICE KIT OR APPROVED EQUAL. SEAL ENDS OF CONDUITS AND DUCTS WITH "DUCTSEAL" OR APPROVED EQUAL.
- PROVIDE SOLID CONDUCTOR FOR 12 AWG AND SMALLER.
- NO WIRE SHALL BE INSTALLED IN THE CONDUIT SYSTEM UNTIL THE CONDUIT SYSTEM IS COMPLETE. USE MINERLAC NO. 100 OR EQUIVALENT AS A LUBRICANT TO FACILITATE THE INSTALLATION OF THE CONDUCTORS IN THE CONDUIT SYSTEM.
- MC CABLE WITH COPPER CONDUCTORS AND GROUND WIRE MAY BE USED WHERE PERMITTED.

#### E. CONDUIT

- ALL WIRING SHALL BE INSTALLED IN LISTED METALLIC CONDUIT EXCEPT AS PERMITTED IN OTHER SECTIONS. RGS, WITH A 20 MIL PVC COATING WILL BE USED WHEN IN CONTACT WITH EARTH. IMC MAY BE USED IN INDOOR LOCATIONS NOT IN CONTACT WITH THE EARTH. EMT MAY BE USED IN INDOOR LOCATIONS NOT IN CONTACT WITH EARTH, NOT IN CONCRETE SLABS OR WALLS AND NOT SUBJECT TO DAMAGE. PVC MAY BE USED IN OR BELOW CONCRETE AND DIRECT BURIED IN EARTH. FLEXIBLE STEEL CONDUIT SHALL BE USED FOR INDOOR FINAL CONNECTIONS TO EQUIPMENT IN LENGTHS NOT TO EXCEED 72". LIQUID-TIGHT FLEXIBLE STEEL CONDUIT SHALL BE FOR OUTDOOR FINAL CONNECTIONS TO EQUIPMENT NOT TO EXCEED 48".
- WHERE CONDUIT ENTERS OUTLET BOXES, FIXTURES OR CABINETS, FIRMLY FASTEN WITH STEEL SET SCREW, COMPRESSION CONNECTORS, OR DOUBLE LOCKNUTS FOR GRC. ALL CONNECTIONS SHALL HAVE BUSHINGS OR INSULATED THROAT CONNECTORS. FIRMLY FASTEN CONDUIT TO THE BUILDING CONSTRUCTION. RUN EXPOSED CONDUIT PARALLEL TO THE BUILDING LINES, SUPPORTED BY APPROPRIATE HANGERS (UNISTRUT, T & B OR APPLETON, OR EQUAL).
- COVER METALLIC CONDUIT IN CONTACT WITH EARTH WITH POLYETHYLENE TAPED SPIRAL WRAPPED, 1/2 LAPPED TO PROVIDE 20 MIL THICKNESS. TAPE SHALL BE SCOTCH NO. 50 TAPE. CONDUIT AND DUCTS NOT UNDER BUILDINGS AND FEEDER DUCTS SHALL BE INSTALLED PER N.E.C. 300-5. MAKE JOINTS WITH COMPOUND TO BE WATERTIGHT.
- SCHEDULE 40 PVC CONDUIT SHALL BE PERMITTED UNDERGROUND WITH PROPER FITTINGS, ALL UL APPROVED AND CEMENTED JOINTS. PENETRATIONS THROUGH FLOOR SLABS AND BENDS GREATER THAN 22" SHALL BE WRAPPED RIGID GALVANIZED STEEL ELBOWS.
- FITTINGS AND CONDUIT BODIES SHALL BE STEEL. DIECAST FITTINGS ARE NOT ACCEPTABLE.
- CONDUIT SIZES SHALL BE AS REQUIRED BY CODE AND AS INDICATED OR SPECIFIED.
- ALL EMPTY CONDUIT SYSTEMS SHALL HAVE A 200 LB. TEST NYLON PULL STRING TO FACILITATE INSTALLATION OF FUTURE WIRE.
- WIRING, CONDUITS, AND OUTLETS SHALL BE CONCEALED WITH THE BUILDING STRUCTURE, EXCEPT THAT CERTAIN MOTOR AND LIGHTING FEEDER CONDUITS MAY BE RUN EXPOSED IN CERTAIN AREAS AS INDICATED ON THE DRAWINGS.
- CONDUIT PENETRATION THROUGH ROOF SHALL HAVE ROOF FLASHING WITH CAULK TYPE COUNTER FLASHING SLEEVE. INSTALLATION SHALL BE WATERTIGHT.
- CONDUITS SHALL BE ROUTED PARALLEL AND PERPENDICULAR TO THE STRUCTURE.

#### F. OUTLET, PULL, AND JUNCTION BOXES

- ALL JUNCTION AND OUTLET BOXES CONCEALED IN WALLS SHALL BE STEEL.
- BOXES INSTALLED IN POLISHED CEMENT FLOORS SHALL BE FLUSH TYPE CAST IRON OR STEEL WITH WATERTIGHT GASKETED COVERS. WHERE BOXES ARE INSTALLED IN FLOORS WITH TILE OR CARPET FLOOR COVERING, COVERS SHALL BE OF THE RECESSED TYPE TO ACCOMMODATE THE FLOOR COVERING.
- BOXES INSTALLED FOR THE ALARM, COMPUTER, AND SECURITY SYSTEM SHALL BE PROVIDED WITH APPROPRIATE COVER PLATES.
- BOXES FOR TELEPHONE, COMPUTER, T.V., FIRE ALARM, SECURITY, AND SIMILAR SYSTEMS SHALL BE MINIMUM 2-1/8" DEEP.

#### G. WIRING DEVICES (COMMERCIAL)

- WALL SWITCHES SHALL BE SPECIFICATION GRADE AC SILENT TYPE SWITCHES, 20A 120/277 VOLT.
- RECEPTACLES SHALL BE SPECIFICATION GRADE, DUPLEX TYPE, NEMA5-20R, 20 AMPERE, 120VOLT GROUNDED TYPE. SPECIAL APPLICATION RECEPTACLES SHALL BE INDICATED ON PLANS. MOUNT WITH THE GROUND DOWN.
- DEVICE PLATES SHALL BE EQUAL TO SIERRA SMOOTH-LINE PLASTIC WALL PLATES. COLOR SHALL BE WHITE, UNLESS OTHERWISE NOTED.
- RECEPTACLES IN OUTDOOR AND WET LOCATIONS SHALL BE INSTALLED WITH A HINGED OUTLET COVER/ENCLOSURE CLEARLY MARKED AND U.L. LISTED SUITABLE FOR WET LOCATIONS WHILE IN USE, EQUAL TO TAYMAC SPECIFICATION GRADE.

#### H. SERVICE ENTRANCE SECTION

- THE SERVICE ENTRANCE EQUIPMENT SHALL BE AS INDICATED ON THE DRAWINGS. EQUIPMENT SHALL CARRY THE U.L. LABEL AND SHALL CONFORM TO THE POWER COMPANY REGULATIONS.
- SERVICE ENTRANCE EQUIPMENT SHALL BE PROVIDED WITH A FULLY RATED COPPER OR ALUMINUM BUS. HORIZONTALLY TAPERED BUSSING SHALL NOT BE ALLOWED.

#### J. PANEL BOARDS

- CIRCUIT BREAKER TYPE AS INDICATED ON DRAWINGS. UNLESS INDICATED OTHERWISE, ALL PANELS SHALL HAVE PANEL HAVE PANEL BOARD TYPE CONSTRUCTION WITH BOLT-ON CIRCUIT BREAKERS FOR 3ø PANELS.
- MANUFACTURERS SHALL BE GENERAL ELECTRIC, SQUARE D, SIEMENS, CUTLER-HAMMER WITH VOLTAGE, SIZES, AND RATINGS AS INDICATED ON DRAWINGS.
- THE CIRCUIT BREAKERS SHALL BE OPERABLE IN ANY POSITION AND BE REMOVABLE FROM THE FRONT OF THE PANEL BOARD WITHOUT DISTURBING THE ADJACENT UNITS. BRANCH BREAKERS SHALL BE OF SUCH DESIGN THAT COMBINATION OF SINGLE-POLE, DOUBLE-POLE, AND THREE-POLE BREAKERS CAN BE ASSEMBLED ON THE SAME PANEL. EACH BRANCH CIRCUIT SHALL BE CLEARLY NUMBERED. BRANCH AND MAIN TERMINALS SHALL BE SOLDERLESS TYPE. HANDLE TIES TO FORM MULTI-POLE BREAKERS NOT ACCEPTABLE.

#### L. LIGHTING FIXTURES

- PROVIDE ALL LIGHTING FIXTURES, WIRED AND CONNECTED. THE DRAWINGS INDICATE THE FIXTURES FOR EACH LOCATION. PROVIDE LAMPS FOR ALL FIXTURES. THE LAMPS SHALL BE BY THE SAME MANUFACTURER. VERIFY CEILING CONSTRUCTION BEFORE ORDERING RECESSED UNITS. PROVIDE PLASTER FRAMES AND HANGERS AS REQUIRED. CEILING CONSTRUCTION, ARCHITECTURAL ACCESSORIES, VOLTAGE, AND BALLASTS TO MEET THE EXISTING CEILING CONDITION.

#### M. LIGHTING CONTROL

- FURNISH AND INSTALL TIME SWITCHES, PHOTOCELLS, CONTRACTORS AND FULL LIGHTING CONTROL SYSTEMS AS REQUIRED FOR LIGHTING CONTROLS INDICATED ON THE DRAWINGS.
- TIME SWITCHES SHALL BE EQUAL TO PARAGON, GENERAL ELECTRIC, TORK, OR INTERMATIC AND SHALL HAVE SIZE AND NUMBER OF POLES AS REQUIRED.
- PHOTOCELLS SHALL BE EQUAL TO TORK OR INTERMATIC WITH VOLTAGE AS INDICATED.

#### N. TELEPHONE AND CABLE TELEVISION SYSTEMS

- TELEPHONE WALL OUTLETS SHALL CONSIST OF STANDARD BOXES MOUNTED 18" ABOVE THE FLOOR UNLESS OTHERWISE INDICATED. PROVIDE A TERMINAL MOUNTING BOARD FOR THE INCOMING SERVICE CABLE.
- CABLE TELEVISION OUTLETS SHALL CONSIST OF STANDARD BOXES MOUNTED 18" ABOVE THE FLOOR UNLESS OTHERWISE INDICATED. PROVIDE A TERMINAL MOUNTING BOARD FOR THE INCOMING SERVICE CABLE.

#### Q. GUARANTEE

- GUARANTEE ALL MATERIAL FURNISHED AND ALL WORKMANSHIP PERFORMED FOR A PERIOD OF ONE YEAR FROM DATE OF FINAL ACCEPTANCE OF WORK. ANY DEFECTS DEVELOPING WITHIN THIS PERIOD, TRACEABLE TO MATERIAL FURNISHED AS A PART OF THIS SECTION OR WORKMANSHIP PERFORMED HEREUNDER, SHALL BE MADE GOOD AT NO EXPENSE TO THE OWNER.

## SYMBOLS LEGEND

NOTE: THIS IS A MASTER LEGEND AND NOT ALL SYMBOLS, ETC, ARE NECESSARILY USED ON THE DRAWINGS.

### LIGHTING FIXTURES - SYMBOL/LETTER INDICATES LIGHT FIXTURE AS INDICATED ON FIXTURE SCHEDULE

- LED FIXTURE (SEE LIGHTING FIXTURE SCHEDULE)
- FIXTURE WITH EMERGENCY BATTERY DRIVER UNIT
- TRACK LIGHT
- DOWNLIGHT FIXTURE WITH EMERGENCY BATTERY DRIVER UNIT
- WALL MOUNTED FIXTURE WITH EMERGENCY BATTERY DRIVER UNIT
- PENDANT MOUNTED FIXTURE WITH EMERGENCY BATTERY DRIVER UNIT
- DOWNLIGHT FIXTURE
- WALL MOUNTED FIXTURE
- PENDANT MOUNTED FIXTURE
- WALL WASHER
- SINGLE FACE EXIT SIGN - UNIVERSAL MOUNTED
- SINGLE FACE EXIT SIGN W/ DIRECTIONAL ARROWS - UNIVERSAL MTD
- DOUBLE FACE EXIT SIGN W/ DIRECTIONAL ARROWS - UNIVERSAL MTD
- DUAL HEADED EMERGENCY UNIT
- COMBO DUAL HEADED EMERGENCY AND EXIT SIGN UNIT

### LIGHTING CONTROLS

- S SINGLE POLE SWITCH @ +48" UNLESS NOTED
- Sabc SWITCH BANK @ +48" UNLESS NOTED. LOWER CASE LETTER INDICATES FIXTURE CONTROLLED.
- S3 3-WAY SWITCH @ +48" UNLESS NOTED
- S4 4-WAY SWITCH @ +48" UNLESS NOTED
- Sd DIMMER SWITCH - SIZE AS REQUIRED @ +48" UNLESS NOTED
- Sm MANUAL MOTOR STARTER
- Sos WALL SWITCH WITH OCCUPANCY SENSOR. DIGITAL LOW VOLTAGE WALL SWITCH. SWITCH @ +48" UNLESS NOTED.
- SLV TWO BUTTON DIGITAL LOW VOLTAGE WALL SWITCH. PROVIDES ON/OFF/0-10V DIMMING. SWITCH @ +48" UNLESS NOTED. PROVIDE EXTRA CONTROL CABLES NEEDED TO FIXTURE CONTROLLED.
- CS LIGHTING CONTROLS CEILING MOUNT OCCUPANCY SENSOR
- PC LIGHTING CONTROLS POWER PACK
- PC PHOTOCELL
- TC TIMECLOCK

### POWER DISTRIBUTION

- SWITCHBOARD, MOTOR CONTROL CENTER OR DISTRIBUTION BOARD
- 277/480V, 3 PHASE, 4 WIRE PANELBOARD, UNO
- 120/208V, 1 PHASE, 4 WIRE PANELBOARD, UNO
- 120/240V, 1 PHASE, 3 WIRE PANELBOARD, UNO
- TRANSFORMER

### POWER DEVICES

- SPECIAL HEAVY DUTY RECEPTACLE - SIZE AS NOTED.
- @ +18" UNLESS NOTED
- 1/2 SWITCHED RECEPTACLE @ +18" UNLESS NOTED
- FIRE RATED POKE THRU WITH TYPE INDICATED
- FLUSH FLOOR BOX WITH TYPE INDICATED
- SINGLE RECEPTACLE @ +18" UNLESS NOTED
- DUPLEX RECEPTACLE @ +18" UNLESS NOTED
- DOUBLE DUPLEX RECEPTACLE @ +18" UNLESS NOTED
- DUPLEX RECEPTACLE INSTALLED ABOVE COUNTERTOP
- GFCI-RATED DUPLEX RECEPTACLE
- ARC FAULT RATED DUPLEX RECEPTACLE
- TAMPER RESISTANT RATED DUPLEX RECEPTACLE
- DUPLEX RECEPTACLE WITH WEATHERPROOF COVERPLATE @ 18" UNLESS NOTED
- JUNCTION BOX
- DISCONNECT SWITCH - SIZE AND TYPE NOTED
- COMBINATION FUSED STARTER DISCONNECT SWITCH FUSE SIZE AS INDICATED, STARTER SIZE '1'

### AUXILIARY SYSTEMS

- MECHANICAL EQUIP. CONNECTION, SEE SCHED. ON MECH. PLAN
- TELEPHONE OUTLET @ +18" UNLESS NOTED
- DATA OUTLET @ +18" UNLESS NOTED
- COMBINATION TELEPHONE/DATA OUTLET @ +18" UNLESS NOTED
- TELEVISION OUTLET @ +60" UNLESS NOTED
- SMOKE DETECTOR
- HEAT DETECTOR
- DUCT SMOKE DETECTOR
- REMOTE TEST STATION WITH INDICATING LIGHT. MOUNT AT 48" AFF UNO.
- AUXILIARY SYSTEM TERMINAL CABINET

### GENERAL

- CONDUIT RUN CONCEALED IN WALL OR ABOVE CEILING
- CONDUIT RUN BELOW FLOOR OR GRADE

P1-3,5,7 HOMERUN TO PANELBOARD, INFORMATION AT ARROWS ARE CIRCUIT NUMBERS AND PANELBOARD FOR TERMINATION. REFER TO ASSOCIATED NOTE FOR BRANCH CIRCUIT CONDUCTOR SIZES.

(E) OR ETR: DENOTES EXISTING ITEM/EQUIPMENT TO REMAIN

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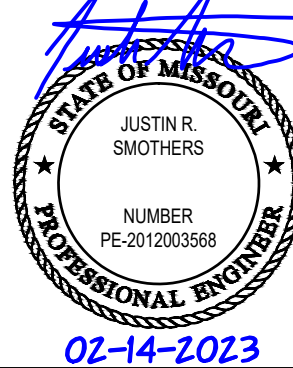
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Seal:



Project Number: 22-215

Project Type: NEW CONSTRUCTION

Project Name and Address:

I-470 B&T CENTER, LOT 7

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Lee's Summit, Missouri 64064

Issue:

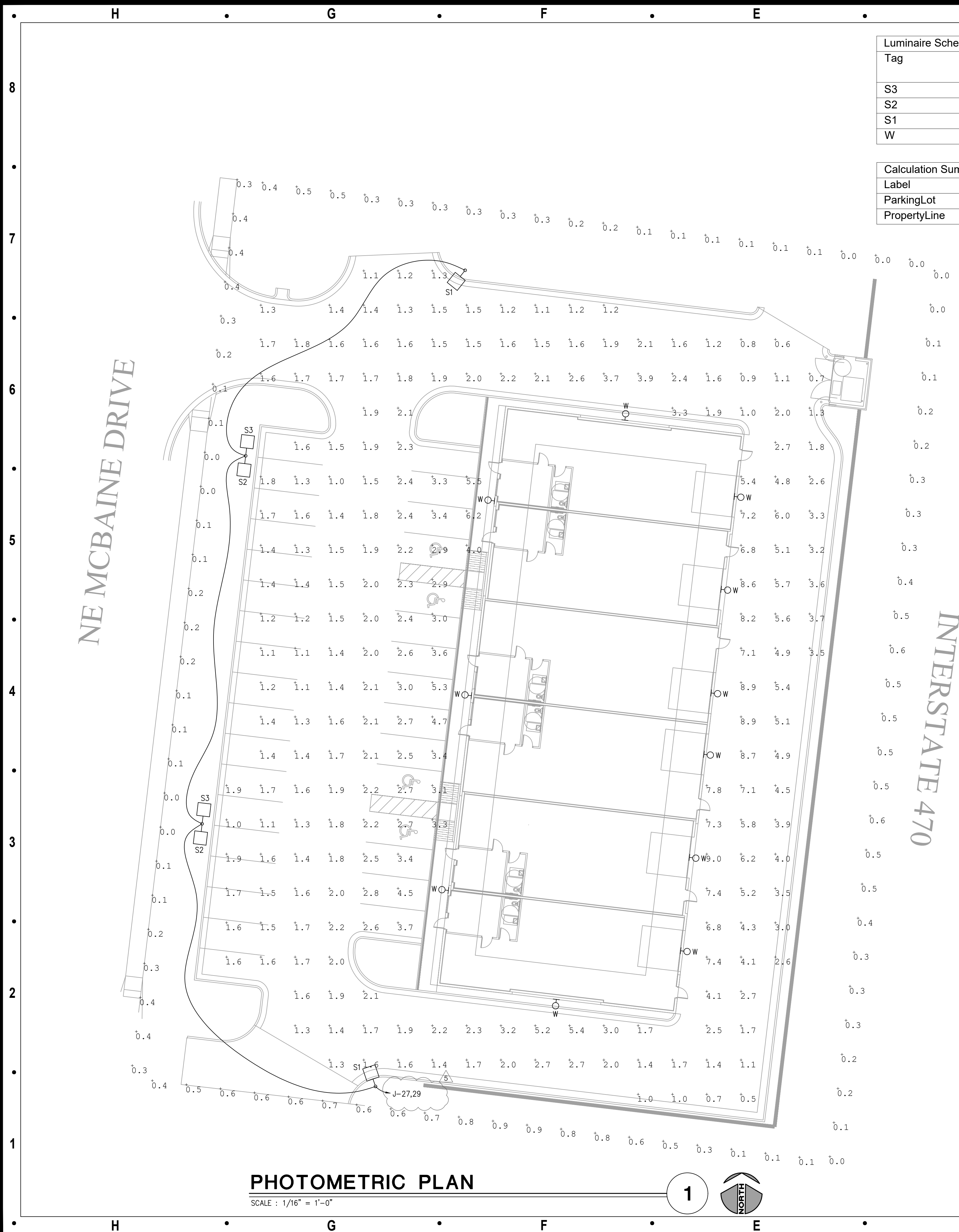
Plan Review 09.30.22  
Plan Review Revisions 11.17.22  
Plan Review Revisions 01.02.23  
Owner Comments 01.17.23  
Owner Comments 02.14.23

Sheet Title:

ELECTRICAL  
SPECIFICATIONS AND  
SYMBOLS

E-001





Luminaire Schedule				
Tag	Description	LLF	Luminaire Lumens	Luminaire Watts
S3	DSX1 LED P2 40K LCCO MVOLT	0.800	5429	70
S2	DSX1 LED P2 40K RCCO MVOLT	0.800	5429	70
S1	DSX1 LED P2 40K T3M MVOLT HS	0.800	7002	70
W	WDGE3 LED P2 70CRI R4 40K	0.800	8779	59.2761

Calculation Summary					
Label	Units	Avg	Max	Min	Max/Min
ParkingLot	Fc	2.66	9.0	0.5	18.00
PropertyLine	Fc	0.31	0.9	0.0	N.A.

## GENERAL NOTES

1. ALL WORK SHALL COMPLY WITH THE SECTION 2800 OF THE STREET LIGHTING OF KANSAS CITY METROPOLITAN CHAPTER OF THE AMERICAN PUBLIC WORKS ASSOCIATION, CONSTRUCTION & MATERIAL SPECIFICATION, THE SECTION 5800 – STREET LIGHTING OF THE CITY OF LEE'S SUMMIT, MO DESIGN CRITERIA, AND ALL APPLICABLE LEE'S SUMMIT, MO SUPPLEMENTS.
2. ALL ELECTRICAL/CONDUIT STREET CROSSINGS NEED TO BE BACKFILLED WITH AB-3 OR FLOWABLE FILL IN ACCORDANCE WITH MUNICIPAL REQUIREMENTS.

### SITE LIGHTING FIXTURE SPECIFICATIONS

[illegible][illegible]

Architect:

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t: (816) 229-8115

Client:

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Consultants:

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Structural Engineering:

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1925 CENTRAL STREET, SUITE 201

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Revisions to technical submissions which are not

Seal:



Project Number: 22-215

Project Type: NEW CONSTRUCTION

Project Name and Address

**1-470 B&T CENTER, LOT 7**

2701 NE McBaine Drive  
Lee's Summit, Missouri 64064

Issue:

Date:

Plan Review	09.30.22
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Plan Review Revisions  11.17.22

Plan Review Revisions	3	01.02.23
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Owner Comments  01 17 23

Owner Comments		02 14 23
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Sheet Title:

PHOTOMETRIC PLAN

E-002



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Seal:



Project Number: 22-215

Project Type: NEW CONSTRUCTION

Project Name and Address:

I-470 B&T CENTER, LOT 7

2701 NE McBaine Drive  
Lee's Summit, Missouri 64064

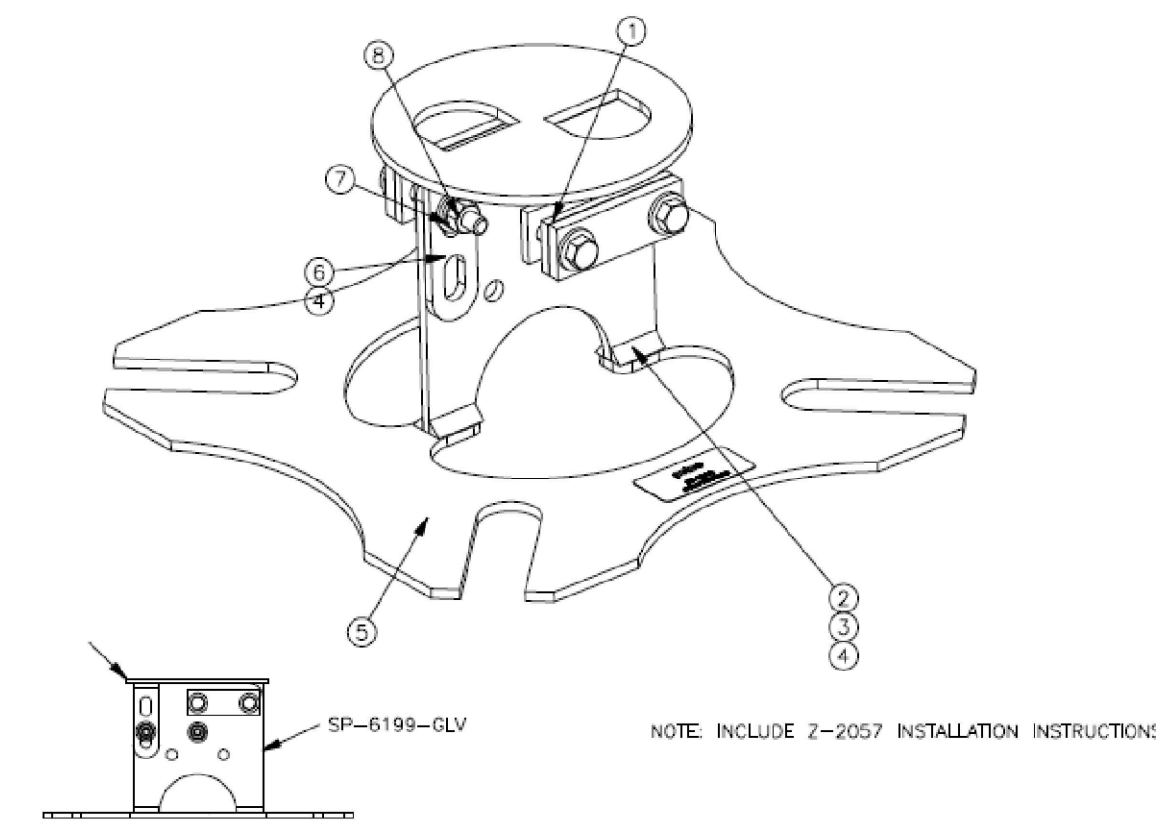
Issue:	Date:
Plan Review	09.30.22
Plan Review Revisions	11.17.22
Plan Review Revisions	01.02.23
Owner Comments	01.17.23
Owner Comments	02.14.23

Sheet Title:

PHOTOMETRIC PLAN

E-003

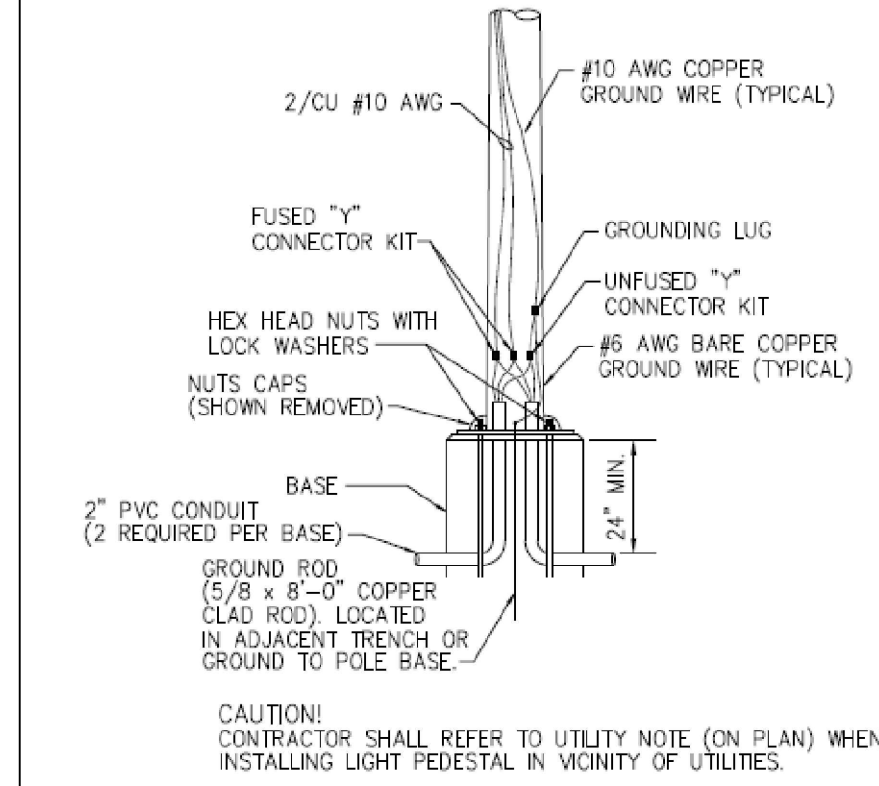
### CABLE RETAINER ASSEMBLY DETAIL



ITEM	PART NUMBER	DESCRIPTION	QTY
1	SP-6199	HELMENT, CABLE RETAINER ASSY. FOR 6" FOUNDATION ANCHOR, STEEL	1
2	FS-1001-SS	NUT, HEX 5/16"-18, STAINLESS, 304, WAXED	4
3	FS-4201-SS	WASHER, LOCK SPLIT, 5/16", STAINLESS	4
4	FS-4101-SS	WASHER, FLAT, 5/16" X .750" OD STAINLESS	8
5	D-3140	LABEL, 1" X 2" CABLE RETAINER	1
6	FS-2016-SS	BOLT, HEX HD TAP, 5/16"-18 X 2-1/4", STAINLESS	4
7	SP-6199-3	BAR, CABLE RETAINER ASSEMBLY, STEEL	2
8	SP-6199-4	PAD, CABLE RETAINER, 3/16" THICK, 90 DURO, RED URETHANE	4

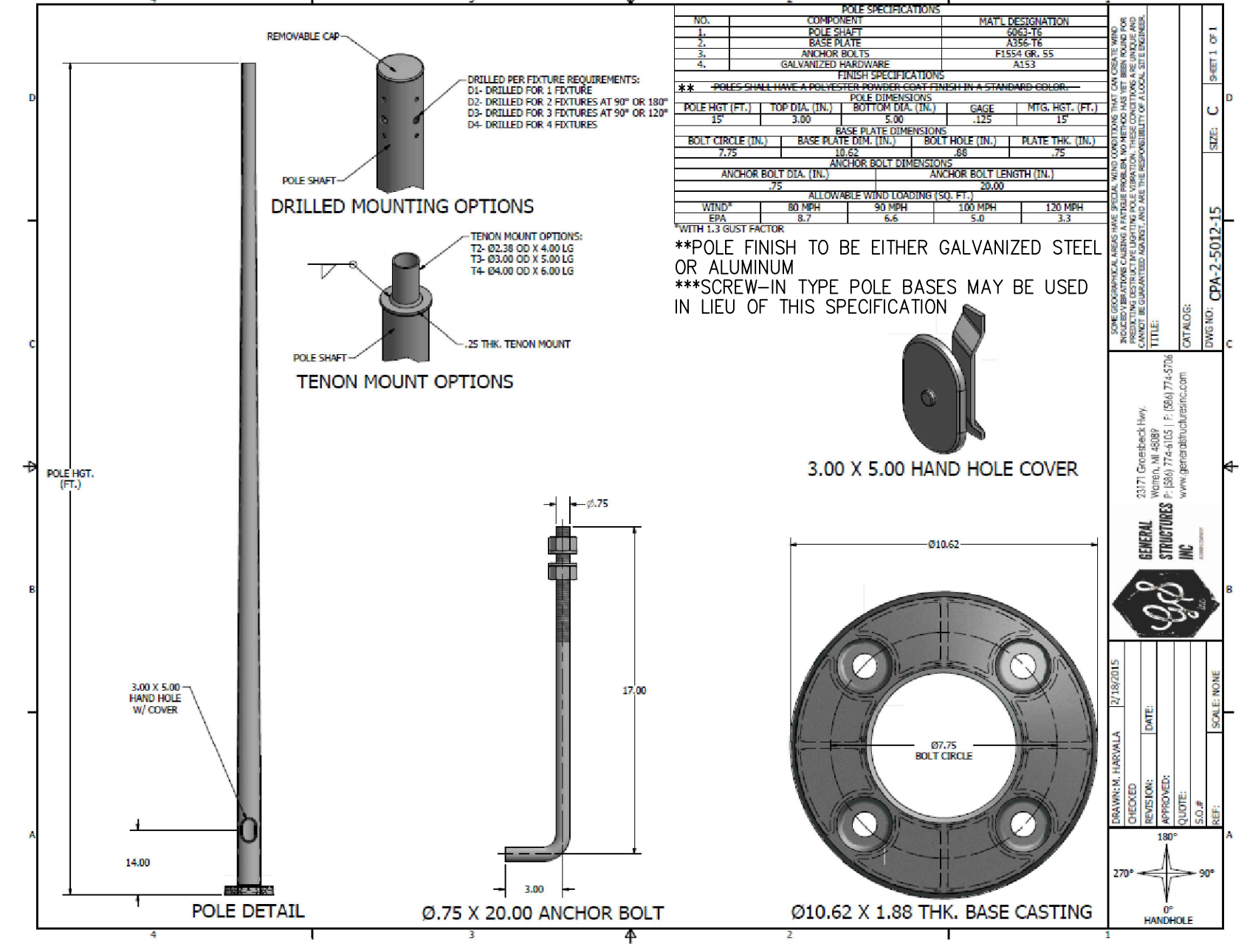
CABLE RETAINER ASSEMBLY  
FOR 6" FOUNDATION ANCHOR  
N.T.S.

### POLE-TO-BASE CONNECTION DETAIL

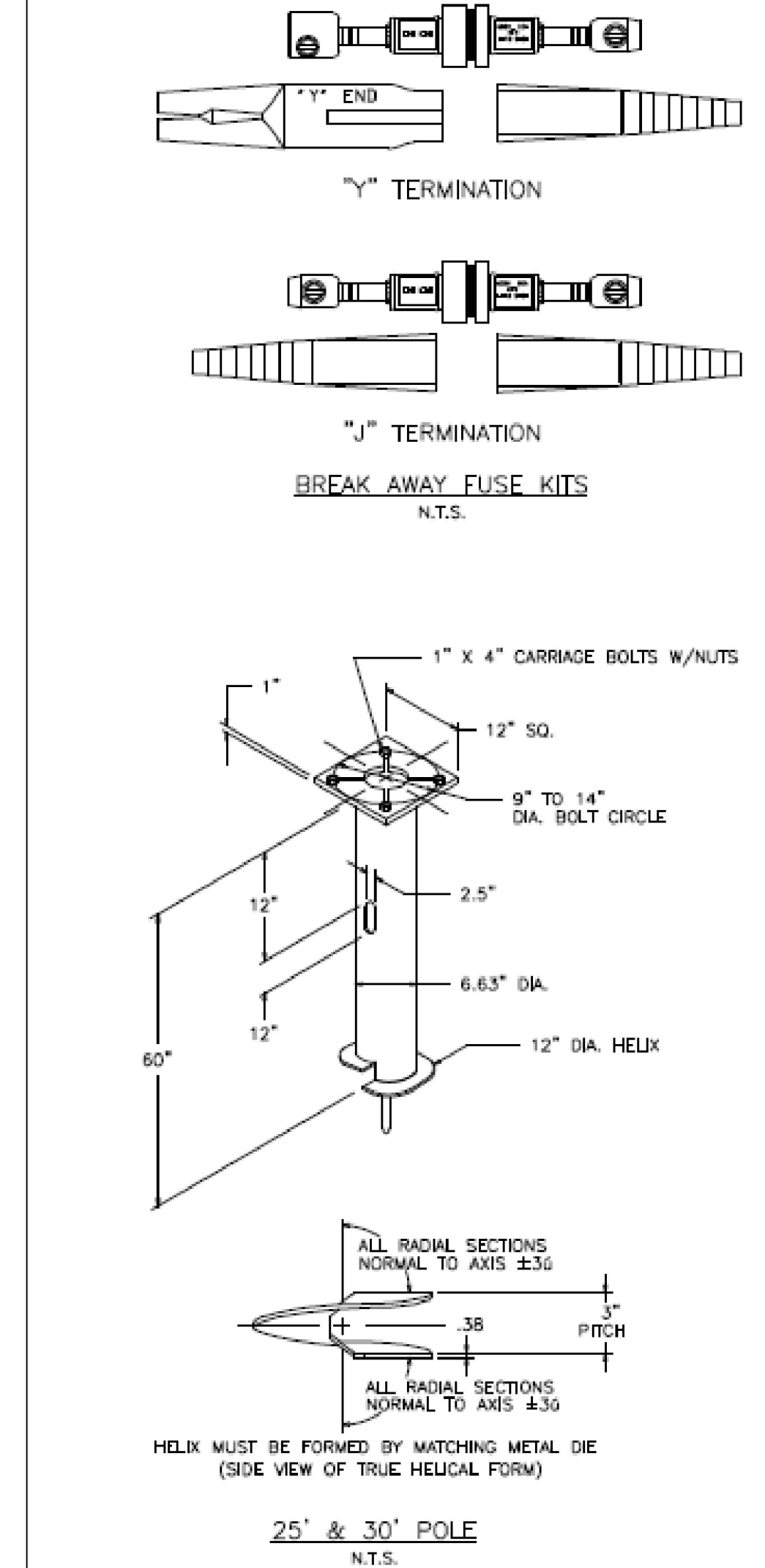


POLE TO BASE CONNECTIONS  
NOT TO SCALE

### FIXTURE POLE SPECIFICATION

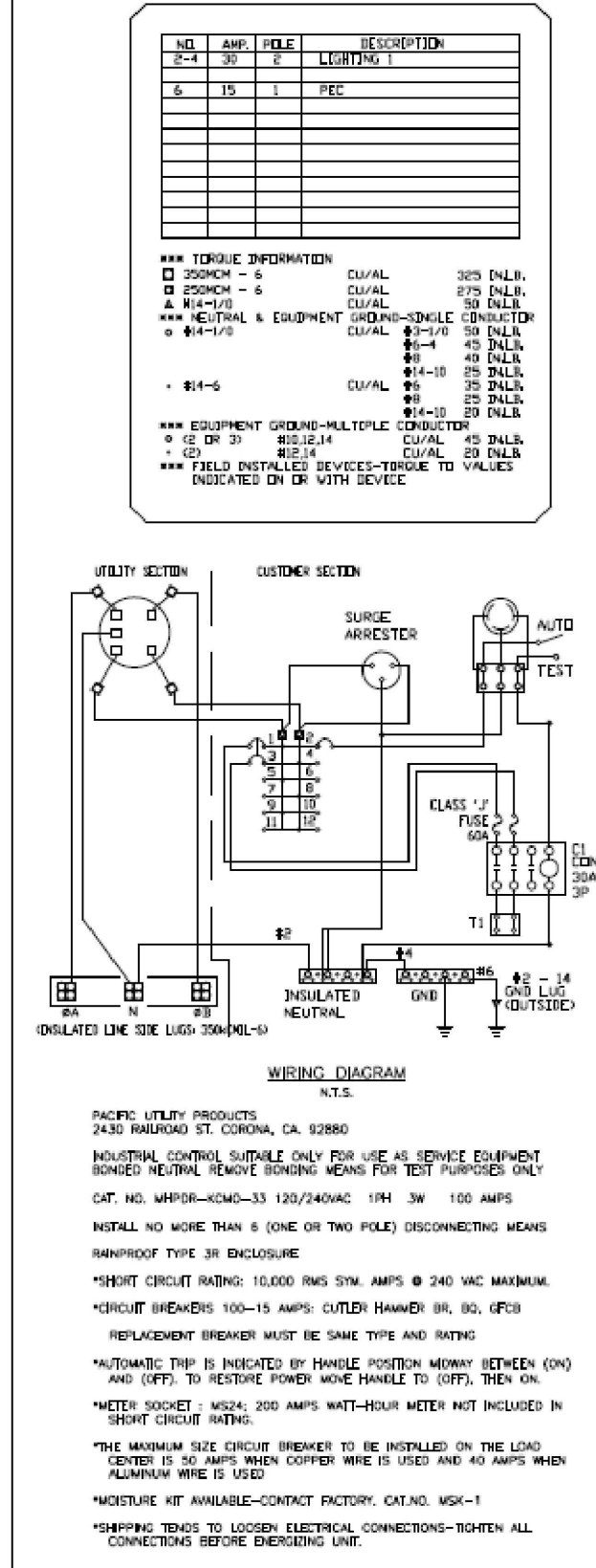


### BREAK AWAY FUSE DETAILS

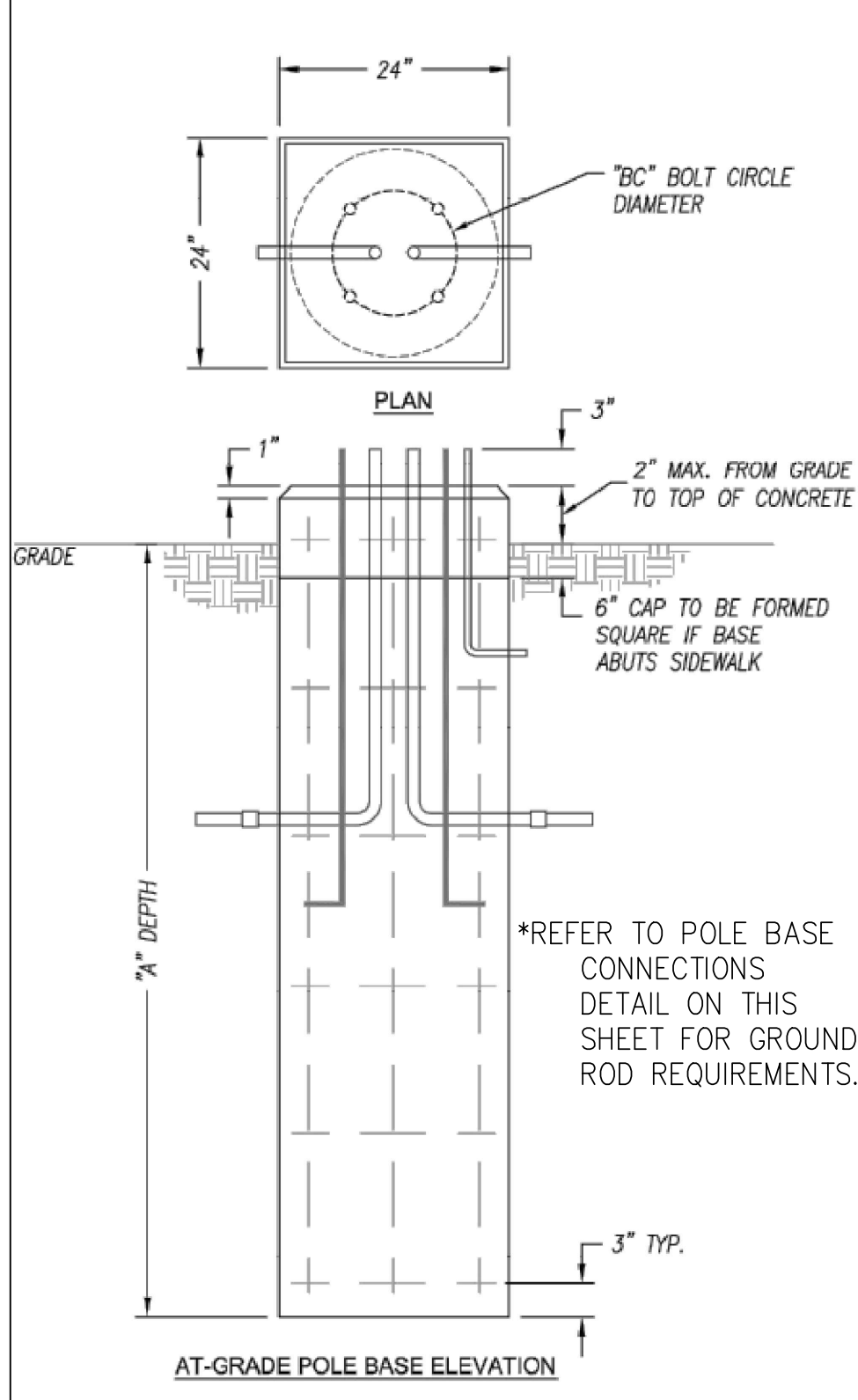


NOTES:  
1. FINISH: HOT DIP GALVANIZE PER ASTM-A153 (LATEST REVISION).  
2. BASEPLATE TO BE PERPENDICULAR TO SHAFT AXIS ( $\pm 1\%/250$ ) AND HOLE CENTERLINE CONCENTRIC ( $\pm 1/88$ ) TO SHAFT AXIS.  
3. STENCIL MIN. 1/2 IN. LETTERS MANUFACTURER'S NUMBER AFTER GALVANIZING.  
4. PILOT POINT AND SHAFT AXES TO BE CONCENTRIC ( $\pm 1/25$  FIM) AND IN LINE ( $\pm 2\%/250$ ).  
5. FLAME CUT SLOT PERPENDICULAR TO THE BASEPLATE.  
6. PREHEAT, TUMBLEBLAST, HANDGRIND, AND CLEAN BASEPLATE, HELIX, AND PILOT POINT ON ALL WELDED AREAS.  
7. FLAMECUT IRREGULARITIES PERMISSIBLE: (1) VALLEYS NOT TO EXCEED 3/32 IN. BELOW NOMINAL SURFACE LEVEL. (2) PEAKS OR POSITIVE IRREGULARITIES NOT TO EXCEED 1/32 IN. ABOVE NOMINAL SURFACE LEVEL OR INTERSECTIONS OF NOMINAL SURFACES.  
8. MANUFACTURER TO HAVE IN EFFECT INDUSTRY RECOGNIZED WRITTEN QUALITY CONTROL FOR ALL MATERIALS AND MANUFACTURING PROCESSES.  
9. ALL MATERIAL IS TO BE NEW, UNUSED AND WILL TRACEABLE MEETING THE FOLLOWING SPECIFICATIONS:  
BASEPLATE: ASTM A36-(LATEST REVISION) HOT ROLLED STEEL PLATE, (CONFORM TO AASHTO TECH. BUL. #270)  
SHAFT: STEEL PIPE PILES, SEAMLESS OR STRAIGHT WELDED, GRADE-2 PER ASTM A252.  
ALT. MATERIAL: STEEL PIPE TYPE E OR S, GRADE-B PER ASTM A53.  
HELIX: ASTM A635 (LATEST REVISION) HOT ROLLED STEEL.  
PILOT POINT: ASTM A575 (LATEST REVISION) STEEL BAR.  
BOLTS: CARR BOLT PER ANSI B-18.2.1, SAE J429 GRADE-5.3  
10. BASEPLATE IS PERMANENTLY STAMPED WITH MANUFACTURER'S IDENTIFICATION "ABC" IN 1/2" LETTERS AND DATE CODE IN 1/4" LETTERS.

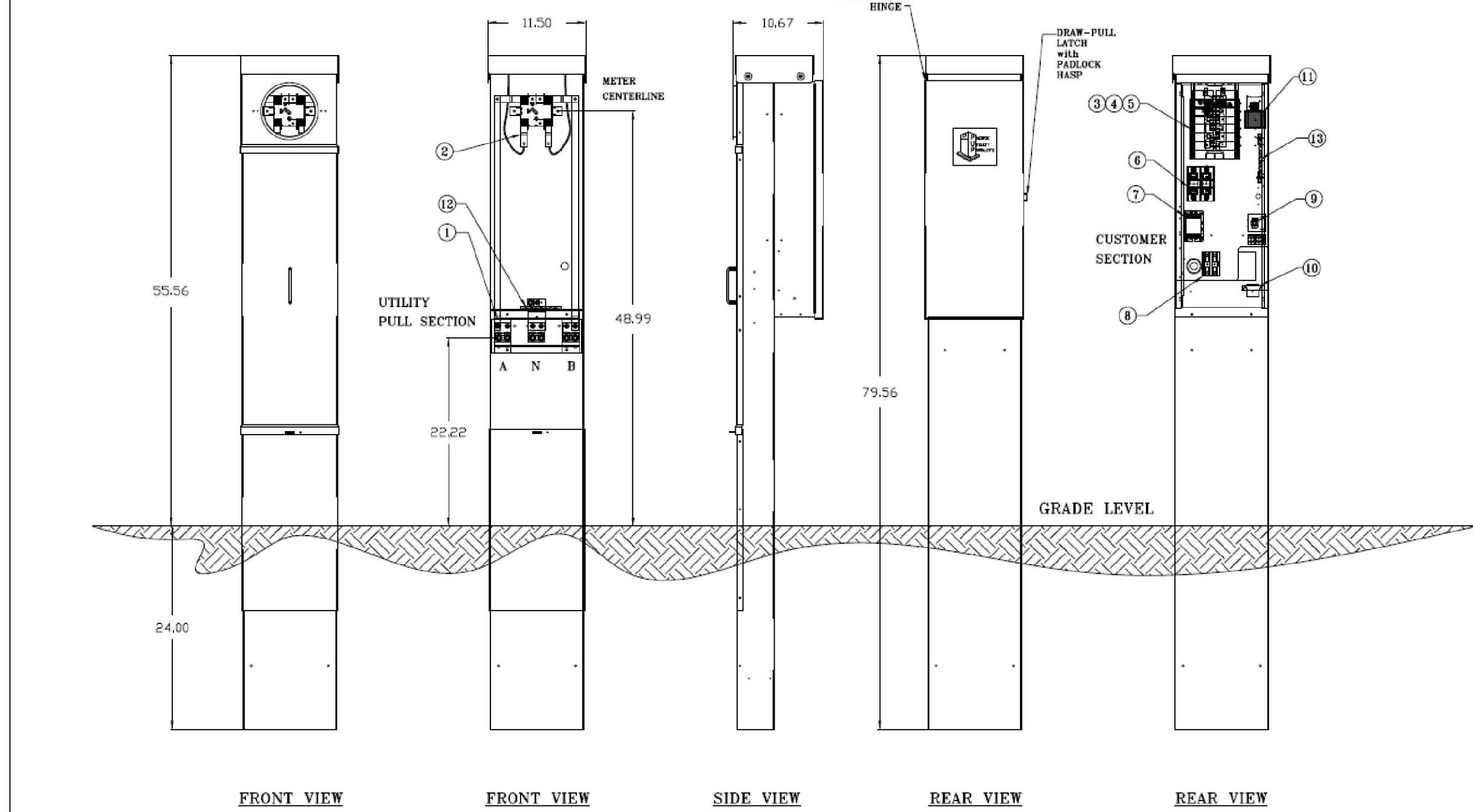
### PEDESTAL WIRING DIAGRAM



### POLE BASE DETAIL - CONFIRM "A" DIMENSION WITH POLE MANUFACTURER



### METER PEDESTAL DETAIL - PROVIDE WITH PHOTOCELL LOCATED ON METER PEDESTAL WITH SHIELD AND/OR TIME DELAY FUNTION.

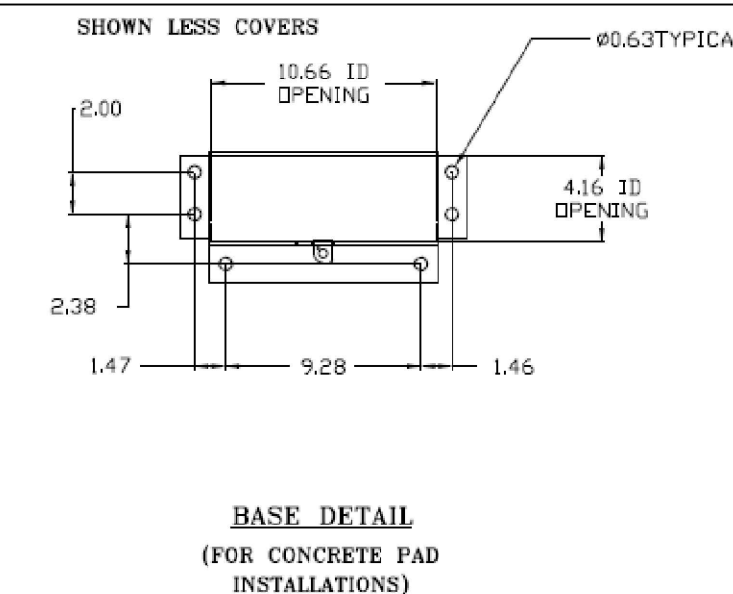


### SHOWN LESS COVERS

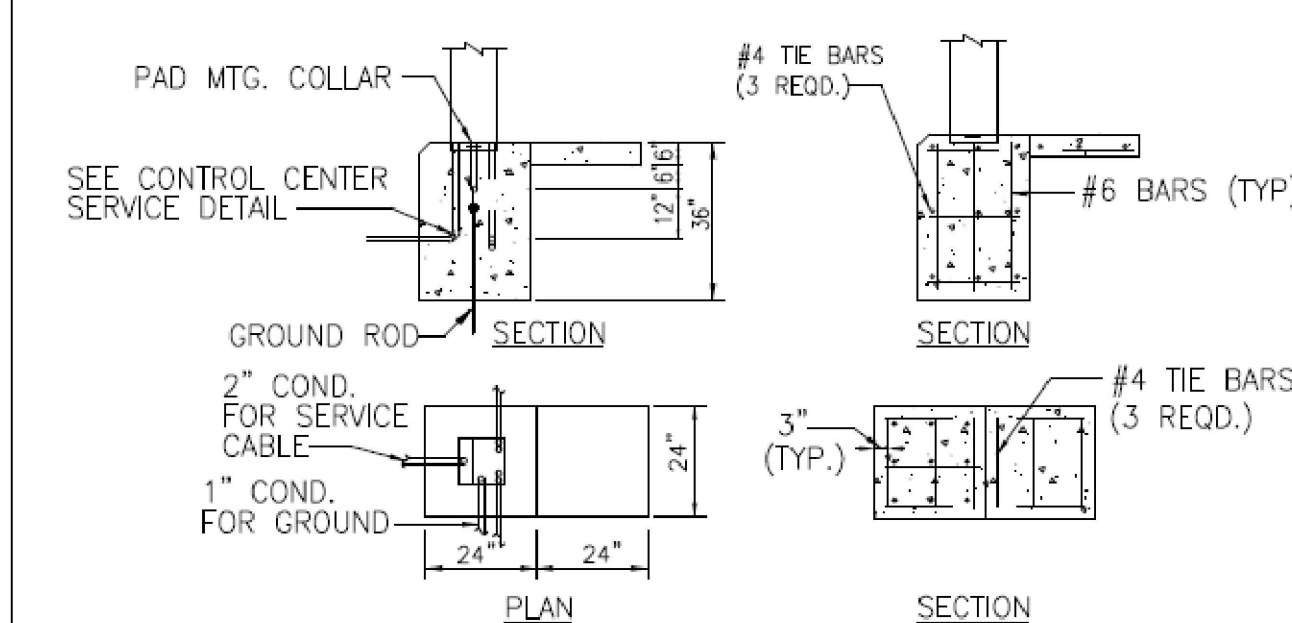
COMPONENT DIRECTORY
CAT. NO. MHPD-KCWO-3
NO. 120/240 VAC 1 PH 3W 100AMPS
1 LANDING LUGS DIA. 350XCMIL - 6
2 MTR SKT 4JAW 100AMPS WITH 5TH CLIP
3 LOADCENTER 125A 1PH 12-CKT
4 (2) CB 30A 2P 120/240VAC 10AIC
5 (1) CB 15A 1P 120/240VAC 10AIC
6 (4) FUSE .60A CLASS J 2 BODY BUSSMAN
7 (2) CONTRACTOR EH 30A SIEMENS LE
8 (2) TERM BLK 115A 2P MARATHON
9 SWITCH TOGGLE SPST 20A
10 PE RECEPTACLE
11 (1) SURGE ARRESTER 10E
12 BONDED NEUTRAL
13 INSULATED NEUTRAL

USP RESIDENTIAL SERVICE PEDESTAL  
0 - 200 AMPERES  
0 - 800 VOLTS  
N.T.S.

SPECIFICATIONS  
• NEWA 39 CONSTRUCTION  
• FABRICATED FROM CORROSION- RESISTANT ZINC COATED STEEL  
• FACTORY WIRING 600 VOLT RATED COPPER  
• COLOR FOREST/DARK GREEN UNLESS OTHERWISE SPECIFIED  
• POLYESTER POWDER-COATED FINISH EXCEEDS ASTM B-117 SPECIFICATIONS  
• ALL EXTERIOR HINGES CONTINUOUS PLANO TYPE STAINLESS STEEL  
• ALL COMPONENTS ARE UL LISTED  
• DELAY TIMER OR SHIELD FOR PHOTO CELL



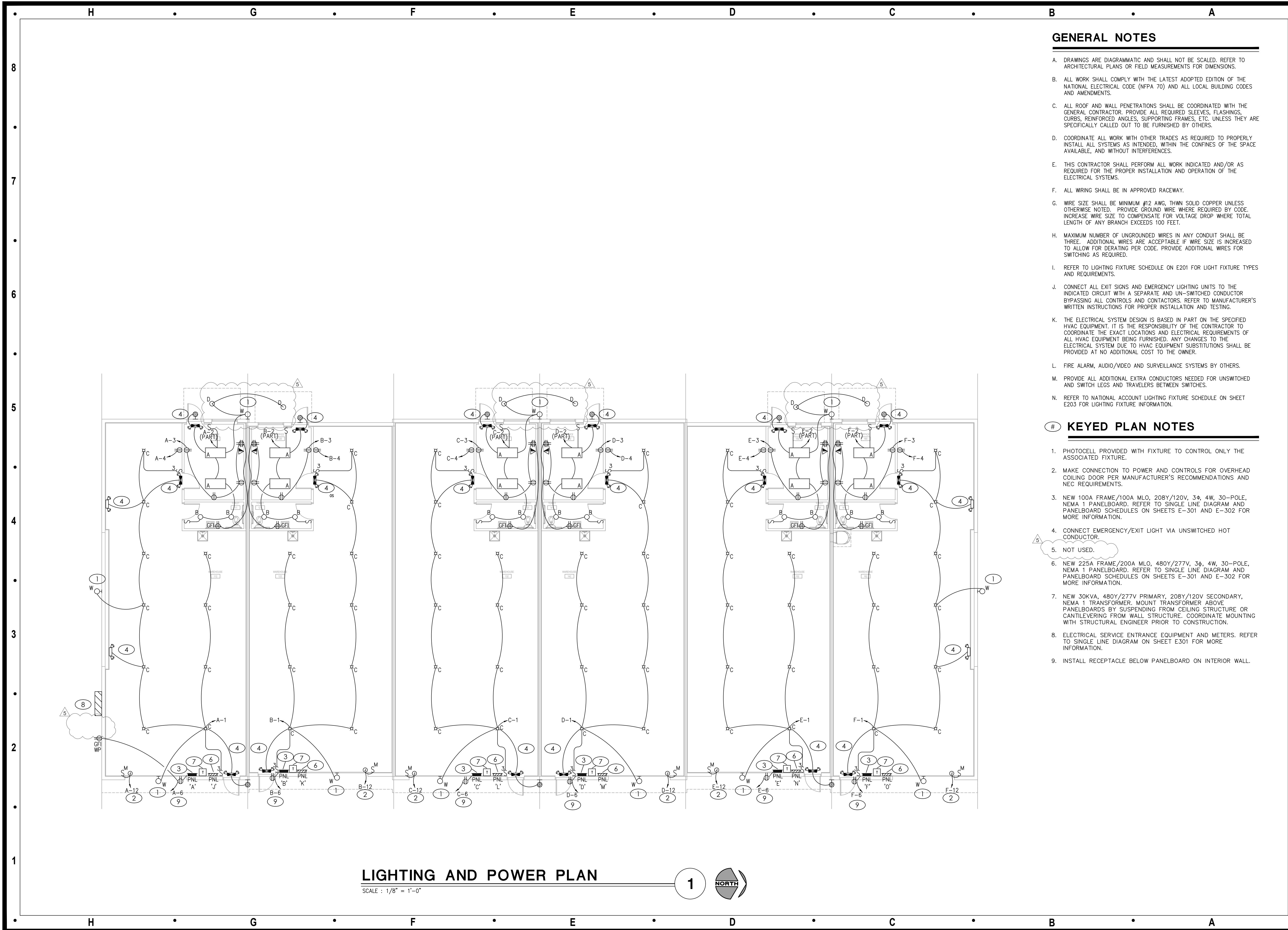
### POWER PEDESTAL FOUNDATION DETAIL



POWER PEDESTAL FOUNDATION  
NOT TO SCALE

- 1) PROVIDE GROUND ROD(S) AS REQUIRED FOR MAXIMUM OF 25 OHMS RESISTANCE TO GROUND. EXOTHERMIC WELD ONE END OF NO. 6 AWG GROUND CONDUCTOR TO THE GROUND ROD(S) AND BRUSH ON 2 COATS OF AN INSULATING VARNISH TO THE WELDED AREAS.
- 2) CONCRETE SLAB TO PROVIDE SEMI-DRY WORKING AREA IN FRONT OF CONTROLLER CABINET.
- 3) SECONDARY POWER SERVICE (DIRECT BURY) THRU CONTRACTOR INSTALLED 2" CONDUIT AND ELBOW.





## GENERAL NOTES

- DRAWINGS ARE DIAGRAMMATIC AND SHALL NOT BE SCALED. REFER TO ARCHITECTURAL PLANS OR FIELD MEASUREMENTS FOR DIMENSIONS.
- ALL WORK SHALL COMPLY WITH THE LATEST ADOPTED EDITION OF THE NATIONAL ELECTRICAL CODE (NFPA 70) AND ALL LOCAL BUILDING CODES AND AMENDMENTS.
- ALL ROOF AND WALL PENETRATIONS SHALL BE COORDINATED WITH THE GENERAL CONTRACTOR. PROVIDE ALL REQUIRED SLEEVES, FLASHINGS, CURBS, REINFORCED ANGLES, SUPPORTING FRAMES, ETC. UNLESS THEY ARE SPECIFICALLY CALLED OUT TO BE FURNISHED BY OTHERS.
- COORDINATE ALL WORK WITH OTHER TRADES AS REQUIRED TO PROPERLY INSTALL ALL SYSTEMS AS INTENDED, WITHIN THE CONFINES OF THE SPACE AVAILABLE, AND WITHOUT INTERFERENCES.
- THIS CONTRACTOR SHALL PERFORM ALL WORK INDICATED AND/OR AS REQUIRED FOR THE PROPER INSTALLATION AND OPERATION OF THE ELECTRICAL SYSTEMS.
- ALL WIRING SHALL BE IN APPROVED RACEWAY.
- WIRE SIZE SHALL BE MINIMUM #12 AWG, THWN SOLID COPPER UNLESS OTHERWISE NOTED. PROVIDE GROUND WIRE WHERE REQUIRED BY CODE. INCREASE WIRE SIZE TO COMPENSATE FOR VOLTAGE DROP WHERE TOTAL LENGTH OF ANY BRANCH EXCEEDS 100 FEET.
- MAXIMUM NUMBER OF UNGROUNDED WIRES IN ANY CONDUIT SHALL BE THREE. ADDITIONAL WIRES ARE ACCEPTABLE IF WIRE SIZE IS INCREASED TO ALLOW FOR DERATING PER CODE. PROVIDE ADDITIONAL WIRES FOR SWITCHING AS REQUIRED.
- REFER TO LIGHTING FIXTURE SCHEDULE ON E201 FOR LIGHT FIXTURE TYPES AND REQUIREMENTS.
- CONNECT ALL EXIT SIGNS AND EMERGENCY LIGHTING UNITS TO THE INDICATED CIRCUIT WITH A SEPARATE AND UN-SWITCHED CONDUCTOR BYPASSING ALL CONTROLS AND CONTACTORS. REFER TO MANUFACTURER'S WRITTEN INSTRUCTIONS FOR PROPER INSTALLATION AND TESTING.
- THE ELECTRICAL SYSTEM DESIGN IS BASED IN PART ON THE SPECIFIED HVAC EQUIPMENT. IT IS THE RESPONSIBILITY OF THE CONTRACTOR TO COORDINATE THE EXACT LOCATIONS AND ELECTRICAL REQUIREMENTS OF ALL HVAC EQUIPMENT BEING FURNISHED. ANY CHANGES TO THE ELECTRICAL SYSTEM DUE TO HVAC EQUIPMENT SUBSTITUTIONS SHALL BE PROVIDED AT NO ADDITIONAL COST TO THE OWNER.
- FIRE ALARM, AUDIO/VIDEO AND SURVEILLANCE SYSTEMS BY OTHERS.
- PROVIDE ALL ADDITIONAL EXTRA CONDUCTORS NEEDED FOR UNSWITCHED AND SWITCH LEGS AND TRAVELERS BETWEEN SWITCHES.
- REFER TO NATIONAL ACCOUNT LIGHTING FIXTURE SCHEDULE ON SHEET E203 FOR LIGHTING FIXTURE INFORMATION.

## KEYED PLAN NOTES

- PHOTOCELL PROVIDED WITH FIXTURE TO CONTROL ONLY THE ASSOCIATED FIXTURE.
- MAKE CONNECTION TO POWER AND CONTROLS FOR OVERHEAD COILING DOOR PER MANUFACTURER'S RECOMMENDATIONS AND NEC REQUIREMENTS.
- NEW 100A FRAME/100A MLO, 208Y/120V, 3 $\phi$ , 4W, 30-POLE, NEMA 1 PANELBOARD. REFER TO SINGLE LINE DIAGRAM AND PANELBOARD SCHEDULES ON SHEETS E-301 AND E-302 FOR MORE INFORMATION.
- CONNECT EMERGENCY/EXIT LIGHT VIA UNSWITCHED HOT CONDUCTOR.
- NOT USED.
- NEW 225A FRAME/200A MLO, 480Y/277V, 3 $\phi$ , 4W, 30-POLE, NEMA 1 PANELBOARD. REFER TO SINGLE LINE DIAGRAM AND PANELBOARD SCHEDULES ON SHEETS E-301 AND E-302 FOR MORE INFORMATION.
- NEW 30KVA, 480Y/277V PRIMARY, 208Y/120V SECONDARY, NEMA 1 TRANSFORMER. MOUNT TRANSFORMER ABOVE PANELBOARDS BY SUSPENDING FROM CEILING STRUCTURE OR CANTILEVERING FROM WALL STRUCTURE. COORDINATE MOUNTING WITH STRUCTURAL ENGINEER PRIOR TO CONSTRUCTION.
- ELECTRICAL SERVICE ENTRANCE EQUIPMENT AND METERS. REFER TO SINGLE LINE DIAGRAM ON SHEET E301 FOR MORE INFORMATION.
- INSTALL RECEPTACLE BELOW PANELBOARD ON INTERIOR WALL.

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Seal:



Project Number: 22-215

Project Type: NEW CONSTRUCTION

Project Name and Address:

I-470 B&T CENTER, LOT 7

2701 NE McBaine Drive  
Lee's Summit, Missouri 64064

Issue:	Date:
Plan Review	09.30.22
Plan Review Revisions	11.17.22
Plan Review Revisions	01.02.23
Owner Comments	01.17.23
Owner Comments	02.14.23

Sheet Title:

ELECTRICAL PLAN

E-101

## GENERAL NOTES

- DRAWINGS ARE DIAGRAMMATIC AND SHALL NOT BE SCALED. REFER TO ARCHITECTURAL PLANS OR FIELD MEASUREMENTS FOR DIMENSIONS.
- ALL WORK SHALL COMPLY WITH THE LATEST ADOPTED EDITION OF THE NATIONAL ELECTRICAL CODE (NFPA 70) AND ALL LOCAL BUILDING CODES AND AMENDMENTS.
- ALL ROOF AND WALL PENETRATIONS SHALL BE COORDINATED WITH THE GENERAL CONTRACTOR. PROVIDE ALL REQUIRED SLEEVES, FLASHINGS, CURBS, REINFORCED ANGLES, SUPPORTING FRAMES, ETC. UNLESS THEY ARE SPECIFICALLY CALLED OUT TO BE FURNISHED BY OTHERS.
- COORDINATE ALL WORK WITH OTHER TRADES AS REQUIRED TO PROPERLY INSTALL ALL SYSTEMS AS INTENDED, WITHIN THE CONFINES OF THE SPACE AVAILABLE, AND WITHOUT INTERFERENCES.
- THIS CONTRACTOR SHALL PERFORM ALL WORK INDICATED AND/OR AS REQUIRED FOR THE PROPER INSTALLATION AND OPERATION OF THE ELECTRICAL SYSTEMS.
- ALL WIRING SHALL BE IN APPROVED RACEWAY.
- WIRE SIZE SHALL BE MINIMUM #12 AWG, THWN SOLID COPPER UNLESS OTHERWISE NOTED. PROVIDE GROUND WIRE WHERE REQUIRED BY CODE. INCREASE WIRE SIZE TO COMPENSATE FOR VOLTAGE DROP WHERE TOTAL LENGTH OF ANY BRANCH EXCEEDS 100 FEET.
- MAXIMUM NUMBER OF UNGROUNDED WIRES IN ANY CONDUIT SHALL BE THREE. ADDITIONAL WIRES ARE ACCEPTABLE IF WIRE SIZE IS INCREASED TO ALLOW FOR DERATING PER CODE. PROVIDE ADDITIONAL WIRES FOR SWITCHING AS REQUIRED.
- REFER TO LIGHTING FIXTURE SCHEDULE ON E201 FOR LIGHT FIXTURE TYPES AND REQUIREMENTS.
- CONNECT ALL EXIT SIGNS AND EMERGENCY LIGHTING UNITS TO THE INDICATED CIRCUIT WITH A SEPARATE AND UN-SWITCHED CONDUCTOR BYPASSING ALL CONTROLS AND CONTACTORS. REFER TO MANUFACTURER'S WRITTEN INSTRUCTIONS FOR PROPER INSTALLATION AND TESTING.
- THE ELECTRICAL SYSTEM DESIGN IS BASED IN PART ON THE SPECIFIED HVAC EQUIPMENT. IT IS THE RESPONSIBILITY OF THE CONTRACTOR TO COORDINATE THE EXACT LOCATIONS AND ELECTRICAL REQUIREMENTS OF ALL HVAC EQUIPMENT BEING FURNISHED. ANY CHANGES TO THE ELECTRICAL SYSTEM DUE TO HVAC EQUIPMENT SUBSTITUTIONS SHALL BE PROVIDED AT NO ADDITIONAL COST TO THE OWNER.
- FIRE ALARM, AUDIO/VIDEO AND SURVEILLANCE SYSTEMS BY OTHERS.
- PROVIDE ALL ADDITIONAL EXTRA CONDUCTORS NEEDED FOR UNSWITCHED AND SWITCH LEGS AND TRAVELERS BETWEEN SWITCHES.
- REFER TO NATIONAL ACCOUNT LIGHTING FIXTURE SCHEDULE ON SHEET E203 FOR LIGHTING FIXTURE INFORMATION.

## KEYED PLAN NOTES

- MAKE CONNECTION TO DIV 22/23 EQUIPMENT PER MANUFACTURER'S RECOMMENDATION AND NEC REQUIREMENTS. COORDINATE WORK WITH DIVISION 22/23 CONTRACTOR PRIOR TO CONSTRUCTION.
- WIRE SO THAT ON/OFF OPERATION OF EXHAUST FAN COORDINATES WITH LIGHTING IN ROOM.
- MAKE CONNECTION FROM INDOOR TO OUTDOOR UNIT PER MANUFACTURER'S RECOMMENDATIONS. COORDINATE WORK WITH DIVISION 23 CONTRACTOR.
- INSTALL ROOF SERVICE RECEPTACLE ON UNISTRUT STAND NEXT TO CONDENSING UNIT DISCONNECT SWITCH.

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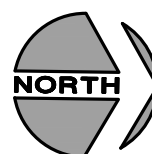
ELECTRICAL EQUIPMENT  
POWER PLAN

E-201

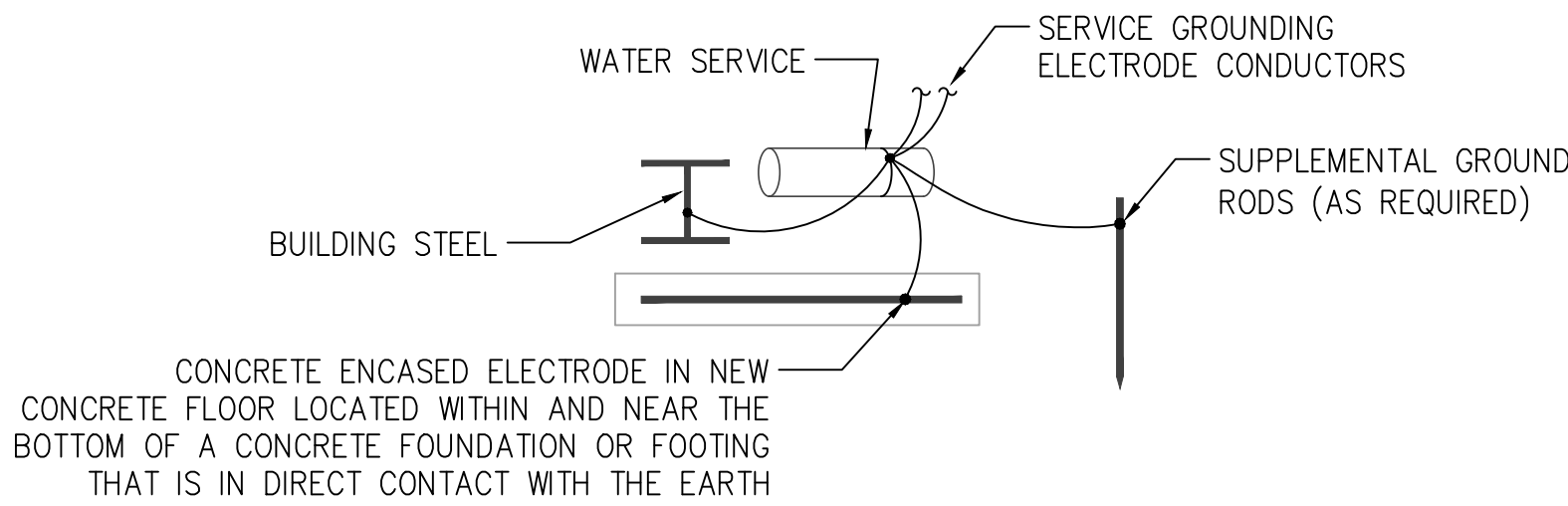
## EQUIPMENT POWER PLAN

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

1







## GROUNDING ELECTRODE SYSTEM DIAGRAM

SCALE : NO SCALE

2

### Short-Circuit and Voltage Drop Calculations

Distances are for calculation purposes only and shall not be used for contractor takeoffs nor bidding. Contractor shall notify Engineer of any field condition that results in a change of 10% or greater circuit distance.

The following calculations are based on the "Fortney-Clark" method where:  
 $ISC_{(L)} = ISC_{(A)} \times M_L$   
 $ISC_{(L)} =$  short circuit current at fault point L  
 $ISC_{(A)} =$  short circuit current at fault point A  
 $M_L = 1/(1 + L/C)$

Feeder:

$I_{SC(L)} = 1.732 \times V_L \times I_{SC(A)} / C \times E$

XFMR:

$I_{SC(L)} = (I_{SC(A)} \times V_L \times 1.732 \times \%Z) / V_L$

$IS_{(L)} = I_{SC(L)} \times M_L \times P_{(L)}$

$V_L =$

VOLTAGE DROP (VD)

$VD_{(L)} = (R \times \cos(\arccos(pf))) + X \times \sin(\arccos(pf)) \times I_{SC(L)} \times 1.732 / E$

VOLTAGE DROP (VD)

$VD_{(L)} = (R \times \cos(\arccos(pf))) + X \times \sin(\arccos(pf)) \times I_{SC(L)} \times 1.732 / E$

%VD CUM = Cumulative Voltage Drop from Fault Point 1 to Fault Point #

R = resistance in ohms per LF

X = reactances in ohms per LF

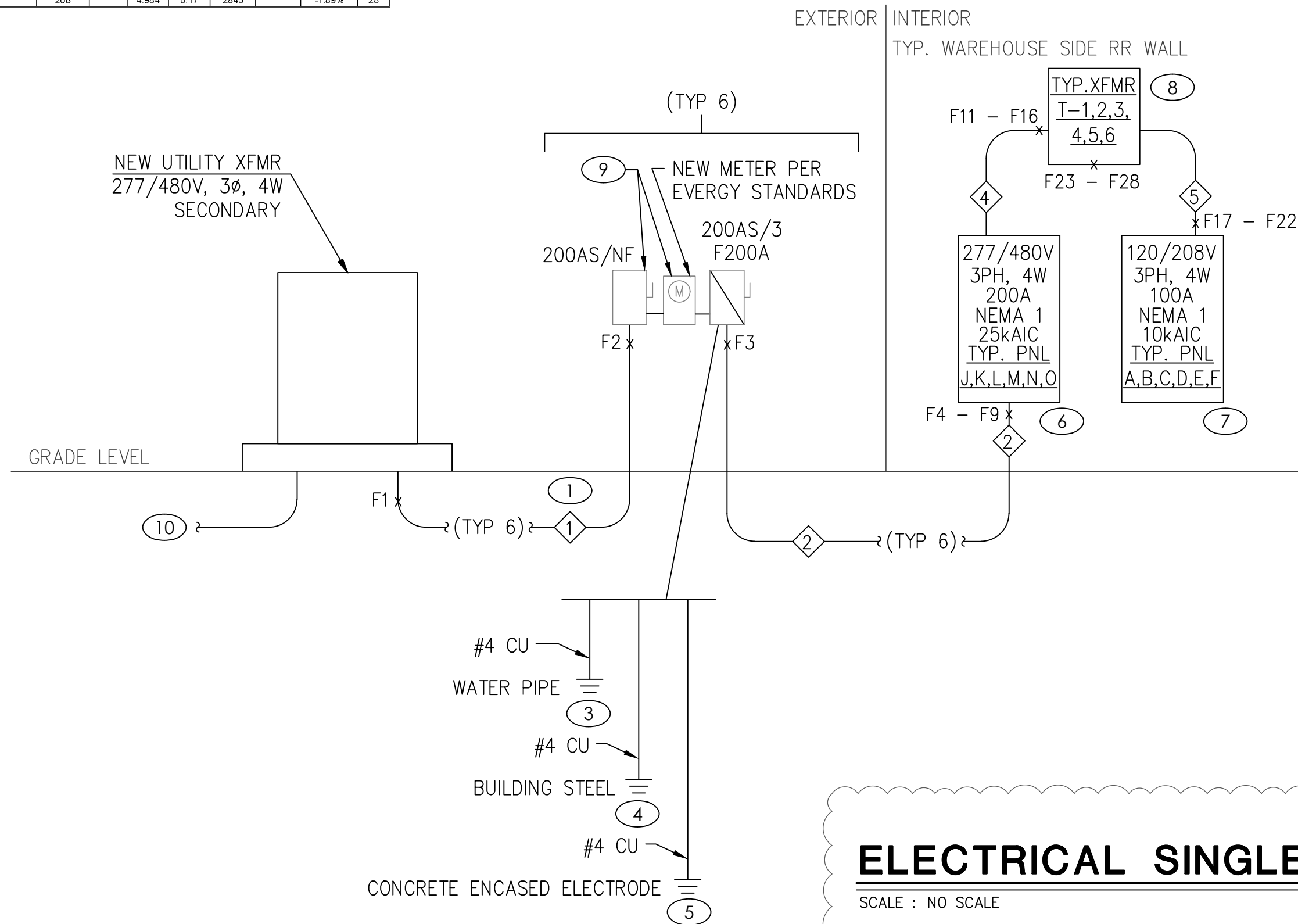
NM - Non Magnetic Conduit, M - Magnetic Conduit, F - Feeder Busway, P - Plug-in Busway, TX - Transformer																										Date of Calculation: 08.13.2024							
Fault Point (FP)	Bus/Feeder Description	Source (Fault Point)	Phase	Source (Fault Point)	Conduit Type/Size	Material	Feeder Quantity of Parallel Sets and Bus/Phase & Neutral Size	Conductor C Value	Busway C Value	L-L Voltage (V)	Circuit Length (L)	Load Power Factor (pf)	Circuit Load (Amperage)	Resistance (R)	Conductor Reactance (X)	Arccos (pf) (Radians)	Type	Degree Rise	Transformer kVA	Transformer New X <sub>1m</sub> Z	Transformer Existing X <sub>1m</sub> Z	Secondary Voltage	Tap Setting	I	M	Fault Current (amps)		Cumulative Voltage Drop (VVD)	Fault Point (FP)				
																										Fault Current =	EX Multiplier Contribution =						
1	Utility Service Point	63000 at the secondary of the utility transformer																									65160						
2	TO SERVICE DISCONNECT	360 The connected full load motor amps (includes compressors) on the system	1	3	69100	NM	AL	1 Set(s) of 250 kcmil	12862	--	480	100	0.9	160	0.000085	0.000041	0.451027									1.808	0.35	23450	-0.64%	-0.64%	2		
3	TO TENANT WEATHERDISCONNECTS		2	3	20400	M	AL	1 Set(s) of 250 kcmil	12122	--	480	10	0.9	160	0.000086	0.000052	0.451027									0.063	0.34	21562	-0.06%	-0.06%	3		
4	TO PNL BD 'D'		3	3	21562	M	AL	1 Set(s) of 250 kcmil	12122	--	480	70	0.9	160	0.000086	0.000052	0.451027									0.449	0.89	14877	-0.40%	-1.01%	4		
5	TO PNL BD 'N'		3	3	21562	M	AL	1 Set(s) of 250 kcmil	12122	--	480	30	0.9	160	0.000086	0.000052	0.451027									0.578	0.63	13667	-0.52%	-1.12%	5		
6	TO PNL BD 'V'		3	3	21562	M	AL	1 Set(s) of 250 kcmil	12122	--	480	130	0.9	160	0.000086	0.000052	0.451027									0.584	0.55	11754	-0.76%	-1.35%	6		
7	TO PNL BD 'W'		3	3	21562	M	AL	1 Set(s) of 250 kcmil	12122	--	480	150	0.9	160	0.000086	0.000052	0.451027									0.583	0.51	10885	-0.87%	-1.47%	7		
8	TO PNL BD 'Y'		3	3	21562	M	AL	1 Set(s) of 250 kcmil	12122	--	480	185	0.9	160	0.000086	0.000052	0.451027									1.187	0.46	9852	-1.07%	-1.67%	8		
9	TO PNL BD 'Z'		3	3	21562	M	AL	1 Set(s) of 250 kcmil	12122	--	480	200	0.9	160	0.000086	0.000052	0.451027									1.284	0.44	9442	-1.16%	-1.78%	9		
10	TO XFMR T-1		4	3	14877	M	CU	1 Set(s) of 6 AWG	2425	--	480	20	0.9	40	0.000490	0.000064	0.451027									0.443	0.89	10312	-0.14%	-1.14%	11		
11	TO XFMR T-2		5	3	13667	M	CU	1 Set(s) of 6 AWG	2425	--	480	20	0.9	40	0.000490	0.000064	0.451027									0.467	0.71	9715	-0.14%	-1.59%	12		
12	TO XFMR T-3		6	3	11754	M	CU	1 Set(s) of 6 AWG	2425	--	480	20	0.9	40	0.000490	0.000064	0.451027									0.350	0.74	8708	0.14%	-1.49%	13		
13	TO XFMR T-4		7	3	10885	M	CU	1 Set(s) of 6 AWG	2425	--	480	20	0.9	40	0.000490	0.000064	0.451027									0.327	0.76	8279	-0.14%	-1.50%	14		
14	TO XFMR T-5		8	3	9852	M	CU	1 Set(s) of 6 AWG	2425	--	480	20	0.9	40	0.000490	0.000064	0.451027									0.263	0.77	7821	-0.14%	-1.81%	15		
15	TO XFMR T-6		9	3	9442	M	CU	1 Set(s) of 6 AWG	2425	--	480	20	0.9	40	0.000490	0.000064	0.451027									0.281	0.78	7371	-0.14%	-1.89%	16		
16	TO PNL BD 'D'		23	3	2388	M	CU	1 Set(s) of 3 AWG	4774	--	208	20	0.9	80	0.000250	0.000059	0.451027									0.104	0.91	2703	-0.33%	-1.48%	17		
17	TO PNL BD 'N'		24	3	2262	M	CU	1 Set(s) of 3 AWG	4774	--	208	20	0.9	80	0.000250	0.000059	0.451027									0.103	0.91	2635	-0.33%	-1.59%	18		
18	TO PNL BD 'V'		25	3	2177	M	CU	1 Set(s) of 3 AWG	4774	--	208	20	0.9	80	0.000250	0.000059	0.451027									0.102	0.91	2648	-0.33%	-1.62%	19		
19	TO PNL BD 'W'		26	3	2088	M	CU	1 Set(s) of 3 AWG	4774	--	208	20	0.9	80	0.000250	0.000059	0.451027									0.101	0.91	2630	-0.33%	-1.64%	20		
20	TO PNL BD 'Y'		27	3	2058	M	CU	1 Set(s) of 3 AWG	4774	--	208	20	0.9	80	0.000250	0.000059	0.451027									0.100	0.91	2599	-0.33%	-1.14%	21		
21	TO PNL BD 'Z'		28	3	2443	M	CU	1 Set(s) of 3 AWG	4774	--	208	20	0.9	80	0.000250	0.000059	0.451027									0.098	0.91	2588	-0.33%	-2.37%	22		
22	XFMR T-1		11	3	10312	TX																					6.973	0.13	2885	-1.14%		23	
23	XFMR T-2		12	3	9715	TX																						6.569	0.13	2862	-1.26%		24
24	XFMR T-3		13	3	8708	TX																						5.988	0.15	2917	-1.45%		25
25	XFMR T-4		14	3	8279	TX																						5.568	0.15	2898	-1.60%		26
26	XFMR T-5		15	3	7821	TX																						5.153	0.16	2905	-1.81%		27
27	XFMR T-6		16	3	7371	TX																						4.984	0.17	2843	-1.89%		28

## SC / VD CALCULATIONS

SCALE : NO SCALE

3

FEEDER NUMBER	CONDUIT AND CONDUCTOR SIZES
1	(1) 2-1/2" W/ 4 #250KCM AL
2	(1) 2-1/2" W/ 4 #250KCM AL & #4 AL GND
3	REMOVED FROM PROJECT
4	(1) 1" W/ 4 #6 CU & #10 CU GND
5	(1) 1-1/4" W/ 4 #3 CU & #8 CU GND
THE DESIGN PROFESSIONAL HAS PERFORMED ALL THE REQUIRED VOLTAGE DROP CALCULATIONS FOR ALL BRANCH CIRCUITS AND FEEDERS PER THE NATIONAL ELECTRICAL CODE, ARTICLE 210.19(A)(1) FPN NO. 4.	
THE DESIGN PROFESSIONAL HAS PERFORMED ALL THE REQUIRED SHORT CIRCUIT CALCULATIONS AND THE AIC RATING INDICATED FOR EACH DEVICE IS ADEQUATE TO PROTECT THE EQUIPMENT AND THE ELECTRICAL SYSTEM.	



## ELECTRICAL SINGLE LINE DIAGRAM

SCALE : NO SCALE

1

### KEYED SLD NOTES

- PROVIDE NEW CONDUIT AND CONDUCTORS TO UTILITY SOURCE. VERIFY EXACT LOCATION AND REQUIREMENTS WITH UTILITY PRIOR TO ROUGH-IN.
- REMOVED FROM PROJECT.
- PROVIDE NEW GROUND PER NEC 250.52(A)(1).
- PROVIDE NEW GROUND PER NEC 250.52(A)(2).
- PROVIDE NEW GROUND PER NEC 250.52(A)(3).
- NEW 120/208V PANELBOARD. SEE PANELBOARD SCHEDULES ON SHEET E-302 FOR MORE INFORMATION.
- NEW 277/480V PANELBOARD. SEE PANELBOARD SCHEDULES ON SHEET E-302 FOR MORE INFORMATION.
- NEW 277/480V PRIMARY, 208/120V SECONDARY, 30KVA, NEMA 1 RATED TRANSFORMER.
- MOUNT ON FREE-STANDING UNI-STRUT RACK. COORDINATE EXACT LOCATION WITH UTILITY PRIOR TO ROUGH-IN.
- ROUTE (1) 4" CONDUIT UNDERGROUND FOR PRIMARY CONDUCTOR ROUTING BY UTILITY. COORDINATE EXACT ROUTING WITH UTILITY PRIOR TO CONSTRUCTION.

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Revisions to technical submissions which are not made or approved by the licensee are prohibited.

Seal:



Project Number: 22-215

Project Type: NEW CONSTRUCTION

Project Name and Address:

I-470 B&T CENTER, LOT 7

2701 NE McBaine Drive  
Lee's Summit, Missouri 64064

Issue:	Date:
Plan Review	09.30.22
Plan Review Revisions	11.17.22
Plan Review Revisions	01.02.23
Owner Comments	01.17.23
Owner Comments	02.14.23

Sheet Title:

ELECTRICAL SCHEDULES AND DIAGRAMS

E-301



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Project Number: 22-215

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Project Name and Address:

I-470 B&T CENTER, LOT 7

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Lee's Summit, Missouri 64064

Issue:

Date:

Plan Review 09.30.22

Plan Review Revisions 1 11.17.22

Plan Review Revisions 3 01.02.23

Owner Comments 4 01.17.23

Owner Comments 5 02.14.23

Sheet Title:

ELECTRICAL  
SCHEDULES

E-302

PANELBOARD: J,K,L,M,N,O (TYP) (NEW)										FED FROM:			METER CENTER			LINE-SIDE LUGS: MECHANICAL		
BUS AMPS: 225A										A/C RATING: 25000 FULLY RATED						EQUIPMENT GROUND BUS		
MAIN SIZE/TYPE: MLO										SERVES: WAREHOUSE & OFFICE								
VOLTS/PHASE: 480Y/277V, 3PH, 4W										MOUNTING: SURFACE								
SECTION: 1										LOCATION: WAREHOUSE SIDE RR WALL						SERVICE ENTRANCE RATED		
CKT NO.	DESCRIPTION	VOLTAMPS/PHASE			WIRE NO.	BKR AMP	P	P BKR AMP	WIRE NO.	VOLTAMPS/PHASE			DESCRIPTION	CKT NO.				
		A	B	C						A	B	C						
1	SUBFEED TO	3,062											PROVISIONAL SPACE	2				
3	PNL A,B,C,D,E,F (TYP.)		4,927		6	50	3	1					PROVISIONAL SPACE	4				
5	VA XFMR T-1,2,3,4,5,6 (TYP.)			3,327				1					PROVISIONAL SPACE	6				
7	PROVISIONAL SPACE							1	1				PROVISIONAL SPACE	8				
9	PROVISIONAL SPACE							1	1				PROVISIONAL SPACE	10				
11	PROVISIONAL SPACE							1	1				PROVISIONAL SPACE	12				
13	PROVISIONAL SPACE							1	1				PROVISIONAL SPACE	14				
15	PROVISIONAL SPACE							1	1				PROVISIONAL SPACE	16				
17	PROVISIONAL SPACE							1	1				PROVISIONAL SPACE	18				
19	PROVISIONAL SPACE							1	1				PROVISIONAL SPACE	20				
21	PROVISIONAL SPACE							1	1				PROVISIONAL SPACE	22				
23	PROVISIONAL SPACE							1	1				PROVISIONAL SPACE	24				
25	PROVISIONAL SPACE							1	1				PROVISIONAL SPACE	26				
27	LTG - SITE		210		12	20	2	1	1				PROVISIONAL SPACE	28				
29	(PANEL 'J' ONLY)			210				1					PROVISIONAL SPACE	30				
SUBTOTAL		3,062	5,137	3,537									SUBTOTAL					
TOTAL PHASE A - VA		3,062	LOAD		CONN VA		DF	LOAD		CONN VA		DF						
AMPS		11	COOLING		4,898		1.00	REFRIG				1.00						
TOTAL PHASE B - VA		5,137	HEATING		1,300		0	SIGN/DISP				1.25						
AMPS		19	LIGHTING		2,182		1.25	KITCHEN				1.00						
TOTAL PHASE C - VA		3,537	RECEPTACLES		1,980		1.0/5	EXISTING				1.00						
AMPS		13	MOTORS		800		1.00	LRG MOTOR				1.25	TOTAL DEMAND					
TOTAL PNLBD - VA		11,736	SUPP HEAT		1,500		1.00	SHOW WNDW				1.25	11,906 VA					
AMPS		14	MISC EQUIP				1.00	LTG TRACK				1.00	14 A					
PANELBOARD NOTES																		

PANELBOARD: A,B,C,D,E,F (TYP) (NEW)										FED FROM:				PNLBD J,K,L,M,N,O (TYP) VIA XF				LINE-SIDE LUGS: MECHANICAL			
BUS AMPS: 100A										A/C RATING: 10000 FULLY RATED								EQUIPMENT GROUND BUS			
MAIN SIZE/TYP: MLO										SERVES: WAREHOUSE & OFFICE											
VOLTS/PHASE: 208Y/120V, 3PH, 4W										MOUNTING: SURFACE											
SECTION: 1										LOCATION: WAREHOUSE SIDE RR WALL								SERVICE ENTRANCE RATED			
CKT NO.	DESCRIPTION	VOLTAMPS/PHASE			WIRE NO.	BKR AMP	P	P	BKR WIRE NO.	VOLTAMPS/PHASE			DESCRIPTION	CKT NO.							
		A	B	C						A	B	C									
1	LTG - WAREHOUSE	1,808			12	20	1	1	20	12	154		LTG - OFFICE / RESTROOM	2							
3	RCPT - OFFICE		1,260		12	20	1	1	20	12		180	RCPT - WAREHOUSE	4							
5	RCPT - ROOF SERVICE			180	12	20	1	1	20	12		360	RCPT - PANELBOARD	6							
7	*FWR - UNIT HTR	1,300			12	20	1	1	20	12	924		*FWR - FURNACE	8							
9	*FWR - CU-1		1,987		10	30	2	1	20	12		1,500	*FWR - WATER HEATER	10							
11				1,987					1	20	12		PWR - OVERHEAD DOOR	12							
13	SPARE					20	1	1	20				SPARE	14							
15	SPARE					20	1	1	20				SPARE	16							
17	SPARE					20	1	1	20				SPARE	18							
19	SPARE					20	1	1	20				SPARE	20							
21	PROVISIONAL SPACE								1	1			PROVISIONAL SPACE	22							
23	PROVISIONAL SPACE								1	1			PROVISIONAL SPACE	24							
25	PROVISIONAL SPACE								1	1			PROVISIONAL SPACE	26							
27	PROVISIONAL SPACE								1	1			PROVISIONAL SPACE	28							
29	PROVISIONAL SPACE								1	1			PROVISIONAL SPACE	30							
SUBTOTAL		2,908	3,247	2,167							1,078	1,680	1,160	SUBTOTAL							
TOTAL PHASE A - VA		3,986	LOAD		CONN VA		DF	LOAD		CONN VA		DF									
AMPS		33	COOLING		4,898		1.00	REFRIG				1.00									
TOTAL PHASE B - VA		4,927	HEATING		1,300		0	SIGN/DISP				1.25									
AMPS		41	LIGHTING		1,762		1.25	KITCHEN				1.00									
TOTAL PHASE C - VA		3,327	RECEPTACLES		1,980		1.0/5	EXISTING				1.00									
AMPS		28	MOTORS		800		1.00	LRG MOTOR				1.25	TOTAL DEMAND								
TOTAL PNLBD - VA		12,240	SUPP HEAT		1,500		1.00	SHOW WNDW				1.25	11,381 VA								
AMPS		34	MISC EQUIP				1.00	LTG TRACK				1.00	32 A								
PANELBOARD NOTES																					
* = HACR-TYPE CIRCUIT BREAKER																					

## ELECTRICAL PANEL SCHEDULES

SCALE : NO SCALE

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