ELECTRICAL GENERAL NOTES:

1. ALL ELECTRICAL WORKS, ALL MATERIALS AND INSTALLATIONS SHALL BE IN ACCORDANCE WITH THE LATEST NATIONAL ELECTRICAL CODE (NEC) 2017, APPLICABLE NATIONAL FIRE PROTECTION ASSOCIATION (NFPA), NATIONAL ELECTRICAL MANUFACTURERS ASSOCIATION (NEMA), AND AMERICAN NATIONAL STANDARDS INSTITUTE (ANSI), UNDERWRITERS LABORATORIES (UL), NATIONAL ELECTRICAL CONTRACTORS ASSOCIATION (NECA), INSTITUTE OF ELECTRICAL AND ELECTRONIC ENGINEERS (IEEE), INSTALLATION DRAWINGS, SPECIFICATIONS AND LOCAL CODES.
   A.) ALL MATERIALS SHALL BE NEW, LISTED AND LABELED BY AN APPROVED ORGANIZATION.
   B.) ALL WORK SHALL BE PERFORMED IN A WORKMANLIKE MANNER AS DEFINED BY PIPELINE INDUSTRY BEST PRACTICES AND NEC.
2. MANUFACTURER'S MODEL NUMBERS SPECIFIED HEREIN ARE USED FOR FACILITATING DESCRIPTION AND ESTABLISHING A STANDARD OF QUALITY AND REQUIRED DESIGN CHARACTERISTICS.
3. IT IS THE CONTRACTOR'S RESPONSIBILITY TO CONSTRUCT ALL ELECTRICAL ITEMS IN FULL ACCORDANCE WITH PROJECT DRAWINGS, NOTES AND THE CLIENT SPECIFICATIONS AND STANDARDS.
4. ALL ELECTRICAL WORKS SHALL COMPLY IN THE FOLLOWING ORDER:
   A.) CODES AND REGULATIONS CALLED OUT ABOVE AND CALLED OUT IN DUKE STANDARDS AND SPECIFICATIONS
   B.) DUKE CONSTRUCTION STANDARDS, DUKE ELECTRICAL STANDARDS AND DUKE SPECIFICATIONS
   C.) ELECTRICAL GENERAL NOTES
5. RACEWAY OPENINGS THROUGH GRATING SHALL BE FINISHED IN A NEAT WORKMANLIKE MANNER. OPENINGS FOR MULTIPLE CONDUITS AND CABLES SHALL INCLUDE A KICK PLATE.
6. RACEWAYS OR CONDUITS CROSSING BUILDING OR STRUCTURAL EXPANSION JOINTS SHALL BE PROVIDED WITH 40 PERCENT (40%) FILL SEALS EXPANSION FITTINGS, CROUSE-HINDS TYPE EYSX (OR EQUAL). THESE FITTINGS SHALL BE INSTALLED IN A MANNER THAT WILL ASSURE GROUND PATH CONTINUITY IN EACH CONDUIT OR RACEWAY, WHERE REQUIRED BY NEC. IF EXPANSION FITTINGS DO NOT HAVE AN APPROVED INTEGRAL GROUND, AN EXTERNAL BONDING JUMPER SHALL BE PROVIDED.
7. THE FOLLOWING MOUNTING HEIGHTS SHALL BE USED TO LOCATE THE TOP OF EQUIPMENT ABOVE FINISHED FLOORS OR PLATFORMS UNLESS NOTED OTHERWISE:
   A.) 1 FEET 6 INCHES (18") CONVENIENCE OUTLETS IN FINISHED WALL AREAS.
   B.) 3 FEET (3'-0") CONVENIENCE OUTLETS IN PLANT AREAS.
   C.) 4 FEET 6 INCHES (4'-6") CONTROL STATIONS, POWER RECEPTACLES, MANUAL MOTOR STARTER SWITCHES.
   D.) 6 FEET (6'-0") CONTROLLERS, STARTERS, SAFETY SWITCHES, POWER PANELS, DC PANELS, LIGHTING PANELS, SMALL CONTROL PANELS, JUNCTION BOXES.
8. THE CONTRACTOR SHALL INSTALL ADDITIONAL PULL POINTS (PULL SLEEVES, WIREWAYS, PULL BOXES OR CONDULETS) WHERE REQUIRED TO LIMIT THE NUMBER OF EQUIVALENT 90 DEGREES (90°) BENDS TO THE REQUIREMENTS OF THE NEC. MAXIMUM LENGTH OF RUNS BETWEEN PULL POINTS SHALL BE 250 FEET (250'-0") FOR STRAIGHT RUNS AND NOT TO EXCEED 360 DEGREES (360°). THESE PULL POINTS SHALL BE OF THE TYPE TO MEET AREA ENVIRONMENT REQUIREMENTS, SUCH AS HAZARDOUS AREA CLASSIFICATION AND WEATHER RATING. NUMBER OF PULL POINTS REFLECTED ON DRAWINGS MAY NOT REFLECT TOTAL. WHETHER OR NOT THEY ARE SHOWN ON DRAWINGS, ANY ADDITIONAL PULL POINTS WILL BE PROVIDED BY CONTRACTOR TO MEET REQUIREMENTS PER THESE NOTES AND NEC.
9. ALL ELECTRICAL DEVICES SUCH AS JUNCTION BOXES, PULL BOXES, LIGHTING PANELS, ELECTRONIC PANELS, LOCAL CONTROL STATIONS, LOCAL STARTERS, SAFETY SWITCHES SHALL BE PROVIDED WITH LAMINATED NAMEPLATES ENGRAVED WITH THE EQUIPMENT NAME AND NUMBER PER OWNER STANDARD.
10. JUNCTION BOXES AND PULL BOXES WHICH CONTAIN BOTH POWER AND CONTROL CIRCUITS SHALL BE LABELED ON THE OUTSIDE OF THE COVER, LISTING THE HIGHEST VOLTAGE. POWER CABLE, CONTROL CABLE AND CABLE OF DIFFERENT VOLTAGE LEVEL SHALL BE SEPARATED PER NEC AND AS SHOWN IN DRAWINGS.
11. CONDUITS TRANSITIONING FROM UNDERGROUND TO ABOVE GROUND OR VICE VERSA SHALL HAVE A 40 PERCENT (40%) CONDUIT SEAL INSTALLED.
12. FOR ALL CONDUITS AND CABLES PENETRATING WALLS OR FLOORS ABOVE THE GROUND FLOOR, THE CONTRACTOR SHALL BE RESPONSIBLE FOR LOCATING NECESSARY BLOCK-OUTS OR PIPE SLEEVES (THEY SHALL BE LEVEL AND SYMMETRICAL) FOR CONDUIT PENETRATION, WHETHER SHOWN ON THE DRAWINGS OR NOT. THIS WORK SHALL BE COORDINATED WITH THE CONCRETE POUR TO ELIMINATE AS MUCH CORE DRILLING AS POSSIBLE.
13. ALL CONDUIT 90 DEGREES (90°) BENDS (EITHER FACTORY PURCHASED OR FIELD BENT) SHALL BE OF THE MINIMUM RADIUS SHOWN IN LATEST NEC TABLE 2. ALL OFFSETS AND SWEEPS SHALL BE FIELD BENT TO A MINIMUM RADIUS AS SHOWN IN NEC TABLE 2. ALL FIELD BENDS SHALL BE MADE WITH A MACHINE BENDER.
14. IN ORDER TO PREVENT CABLE DAMAGE, ALL ROUGH EDGES SHALL BE GROUND SMOOTH AFTER INSTALLATION.
15. REDUCERS (SIZE AS REQUIRED) SHALL BE INSTALLED AT EQUIPMENT OR DEVICE CONDUIT OPENINGS TO SUIT CONDUIT AND CABLE SIZE SHOWN ON DRAWINGS.
16. ALL FITTINGS SHALL BE OF THE LONG RADIUS TYPE WITH VOLUMES MEETING THE LATEST NEC REQUIREMENTS. RETAINING CLIP TYPE COVER BOLTS ARE NOT ACCEPTABLE. ALL COVERS SHALL BE PROVIDED WITH NEOPRENE GASKETS.
17. LIQUIDTIGHT FLEXIBLE METAL CONDUIT ARE NOT SHOWN ON PLAN DRAWINGS BUT ALL CONDUIT, WHEN USED, SHALL BE TERMINATED AT MOTORS, DEVICES AND INSTRUMENTATION WITH LIQUIDTIGHT FLEXIBLE CONDUIT EXCEPT WHERE DEVICES ARE MOUNTED ON WALLS OR COLUMNS AND NOT SUBJECT TO MOVEMENT DUE TO VIBRATION OR EXPANSION AND CONTRACTION. FLEXIBLE CONDUIT FOR MOTOR SHALL HAVE EXTERNAL GROUND IF IN CLASS 1 DIVISION 2 AREA AND SHALL BE UL LISTED AND LABELED AS CLASS 1 DIVISION 1 IF IN CLASS 1 DIVISION 1 AREA.
18. ALL CONDUIT AND CABLES FITTINGS, JUNCTION BOXES, PULL BOXES, AND ELECTRICAL EQUIPMENT IN HAZARDOUS AREAS SHALL BE APPROVED FOR USE IN THAT HAZARDOUS AREA AND SHALL BE LABELED AND LISTED FOR THAT AREA. SEALS SHALL BE INSTALLED AS REQUIRED BY THE LATEST NEC.
19. WHERE THERE IS A CHANGE OF ELEVATION IN AN OUTDOOR ABOVE GRADE CONDUIT RUN, INSTALL A FITTING WITH A DRAIN AT THE LOWEST POINT. ADDITIONALLY, CONDUIT SEAL IS REQUIRED WITHIN 10 FEET (10'-0") OF AN AREA CLASS BOUNDARY CHANGES.
20. ALL CONDUIT LEAVING A CLASSIFIED AREA SHALL HAVE A SEAL INSTALLED WITHIN 10 FEET (10'-0") OF A DIVISION LINE.
   - REFER TO AREA CLASSIFICATION DRAWING.
   - REFER TO NEC 501.15(B)(2) AND 501.15(A)(4).
   - EXPLOSION-PROOF ENCLOSURES SHALL HAVE ITS CONDUIT SEALED WITHIN 1 FEET 6 INCHES (18") OF THE ENCLOSURE PER NEC 501.15(B)(1) AND 501.15(A)(1).
22. WHERE APPLICABLE ALL ELECTRICALLY OPERATED DEVICES, MOTORS AND EQUIPMENT SHALL BE PROPERLY MARKED, LABELED, BE TEMPERATURE RATED, AND APPROVED FOR USE IN THAT HAZARDOUS AREA. ALL ELECTRICAL INSTALLATIONS SHALL ADHERE TO NFPA 70 ARTICLE 501.
23. ALL OUTDOOR ENCLOSURES SHALL HAVE A DRAIN FITTING INSTALLED AND A GROUND LUG FOR EXTERNAL CONNECTION TO THE GROUND GRID.
24. STUB-UPS AND BOXES SHALL BE PROVIDED WITH GROUND BUSHINGS. STEEL CONDUITS CONNECTIONS SHALL BE THREADED WRENCH-TIGHT WITH CONDUCTIVE THREAD COMPOUND.
25. ALL SPARE CONDUITS SHALL BE STUBBED-UP AND PLUGGED. ALL UNUSED CONDUIT, CONDUIT ENTRIES IN FITTINGS, JUNCTION BOXES AND EQUIPMENT SHALL BE PLUGGED.
26. CONDUIT SHALL REMAIN PLUGGED ON BOTH ENDS UNTIL WIRE IS PULLED. INSTALL CONDUIT BUSHING AND GROUNDING BUSHING BEFORE PULLING WIRE.
27. MANUFACTURER APPROVED PULLING COMPOUND OR LUBRICANT SHALL BE USED WHERE NECESSARY. GREASE SHALL NOT BE USED. COMPOUND USED MUST NOT DETERIORATE CONDUCTOR OR INSULATION. DO NOT EXCEED MANUFACTURE'S RECOMMENDED MAXIMUM PULLING TENSIONS AND SIDEWALL PRESSURE VALUES.
28. AFTER PULLING WIRE, THE CONTRACTOR SHALL PERFORM AN INSULATION RESISTANCE TEST TO ENSURE IT HAS NOT BEEN DAMAGED. THE APPLIED POTENTIAL SHALL BE 500 VOLTS DC FOR 300-V CABLE AND 1000 VOLTS DC FOR 600-V CABLES. TEST DURATION SHALL BE 1 MINUTE. VALUES SHALL NOT BE LESS THAN 50 MEGAOHMS. THESE TESTS SHALL BE DOCUMENTED AND SUBMITTED TO OWNER AND THE REPRESENTATIVE OF THE OWNER.
29. CONTRACTOR SHALL PERFORM CONTINUITY TESTS TO ENSURE CORRECT CABLE CONNECTION. THESE TESTS SHALL BE DOCUMENTED AND SUBMITTED TO OWNER AND THE REPRESENTATIVE OF THE OWNER.
30. CONDUIT DRAINS OR DRAIN SEALS SHALL BE INSTALLED AT ALL LOW POINTS IN THE CONDUIT SYSTEM.
31. ALL SUPPORTING SYSTEM ACCESSORIES AND CONDUIT ATTACHING DEVICES SUCH AS BUT NOT LIMITED TO BOLTS, NUTS, WASHERS, CLAMPS, THREADED RODS SHALL BE HOT-DIPPED GALVANIZED STEEL.
32. ALL CONDUIT AND CABLE SHALL BE MARKED USING APPROVED MANUFACTURED TYPE MARKERS AND LABELS. NO TAPE OR HAND WRITTEN MARKERS ARE PERMITTED.
33. CONTRACTOR SHALL FOLLOW A MINIMUM OF THE FOLLOWING STANDARDS WHEN PERFORMING WORK:
   – NECA 1 STANDARD PRACTICE OF GOOD WORKMANSHIP IN ELECTRICAL CONSTRUCTION
   – NECA 101 STANDARD FOR INSTALLING STEEL CONDUIT [RIGID METAL CONDUIT (RMC), INTERMEDIATE METAL CONDUIT (IMC), ELECTRICAL METALLIC TUBING (EMT)]
   – NECA 130 STANDARD FOR INSTALLING AND MAINTAINING WIRING DEVICES
   – NECA 331 STANDARD FOR BUILDING AND SERVICE ENTRANCE GROUNDING AND BONDING
   – NECA 505 STANDARD FOR INSTALLING AND MAINTAINING HIGH MAST, ROADWAY AND AREA LIGHTING
   – NECA 90 RECOMMENDED PRACTICE FOR COMMISSIONING BUILDING ELECTRICAL SYSTEMS

BELOW GRADE CONDUIT AND CABLE SYSTEM

1. ALL CONDUIT AND CABLE RUNS ARE SHOWN DIAGRAMMATICALLY ONLY. THE EXACT ROUTING AND ARRANGEMENT SHALL BE DETERMINED BY THE CONTRACTOR TO SUIT MECHANICAL AND STRUCTURAL CONDITIONS AND GET AN APPROVAL FROM OWNER PRIOR TO INSTALLATION. FINAL ROUTING SHALL BE RECORDED BY THE CONTRACTOR AND SUBMITTED TO OWNER FOR APPROVAL PRIOR TO INSTALLATION. SUPPORTS ARE TO BE PROVIDED BY THE CONTRACTOR AT INTERVALS NOT TO EXCEED CODE REQUIREMENTS. CONDUIT AND CABLE SHALL NOT BE SUPPORTED FROM PIPE HANGERS. CONDUITS AND CABLES SHALL BE INSTALLED PARALLEL TO OR PERPENDICULAR TO WALLS, STRUCTURAL MEMBERS OR THE INTERSECTION OF VERTICAL PLANES AND CEILINGS UNLESS SHOWN OTHERWISE ON THE DRAWINGS.
2. UNDERGROUND CONDUITS SHALL BE PER DUKE STANDARDS AND SPECIFICATIONS.
3. CONDUITS SHALL SLOPE AT LEAST 3 INCHES (3") PER 100 FEET (100'-0") AND BE ARRANGED TO DRAIN INTO MANHOLES OR CABLE VAULTS. ALL CONDUIT RUNS SHALL BE INSTALLED TO BE FREE OF MOISTURE TRAPS.
4. CONDUIT SIZES SHALL BE AS SHOWN ON THE ASSOCIATED CABLE SCHEDULE AND PLAN DRAWINGS.
5. CONDUIT AND CABLE INSTALLATION SHALL FOLLOW EXCAVATION AS CLOSELY AS PRACTICAL. CONDUIT AND CABLE SHALL BE INSTALLED IN DRY TRENCHES MAINTAINED FREE OF ACCUMULATED WATER. TRENCH BOTTOM SHALL BE GRADED SMOOTH, FREE OF STONES, SOFT SPOTS AND LEVEL WITH SLOPE OF GRADE.
6. WUNPEECE (OR APPROVED EQUAL) PLASTIC SEPARATORS SPACED AT INTERVALS OF NOT MORE THAN 20 FEET (20'-0") SHALL BE PLACED ON THE BOTTOM OF THE TRENCH AND THE FIRST TIER OF THE CONDUITS. THE SEPARATION BETWEEN CONDUITS SHALL BE 3 INCHES (3"), UNLESS NOTED OTHERWISE. SUCCEEDING TIERS SHALL BE LAID ON SPACERS, PLACED ON TOP OF THE TIER BELOW.
7. DUCT BANK SPACERS AND JOINTS IN TIERS OF CONDUITS SHALL BE STAGGERED. THE COMPLETED DUCT BANK SHALL BE TIGHTLY WRAPPED WITH TWO TURNS OF #12 IRON WIRE AT 10 FEET (10'-0") INTERVALS TO MAINTAIN ALIGNMENT OF TIERS. WHERE DUCTS CROSS UNDER ROADWAYS, RAILROADS, DISTURBED SOIL, AND OPEN TRENCHES, SUCH AS FOR SEWERS OR WATER MAINS, A REINFORCED CONCRETE ENCASEMENT SHALL BE PROVIDED.
8. CONDUIT STUB-UPS (INDOOR AND OUTDOOR) SHALL BE TERMINATED WITH A COUPLING 6 INCHES (6") ABOVE THE FLOOR AND DUCT BANK ENCASEMENT FOR EXTENSION OF THE CONDUIT EXCEPT FOR CONDUITS UNDER MAJOR EQUIPMENT WHICH SHALL BE TERMINATED WITH A COUPLING FLUSH WITH THE FLOOR. ABOVE GRADE CONDUIT EXTENSIONS INCLUDING 90 DEGREE (90°) ELBOWS SHALL BE RIGID GALVANIZED STEEL (RGS). CONDUIT STUB-UPS SHALL BE ENCASED IN CONCRETE FROM A POINT 3 FEET (3'-0") FROM THE START OF THE BEND TO FLUSH WITH THE FLOOR UNDER EQUIPMENT OR 6 INCHES (6") ABOVE FLOOR AND GRADE FOR FLUSH WITH THE FLOOR UNDER EQUIPMENT OR 6 INCHES (6") ABOVE FLOOR AND GRADE FOR CONDUIT RISERS. ALL SPARE CONDUIT STUB-UPS SHALL BE THREADED, CAPPED AND LABELED "SPARE". INSTALL GROUNDING BUSHINGS AS REQUIRED.
9. PRIOR TO BACKFILL, EACH CONDUIT SHALL BE CLEANED AND TESTED (MANDATORY) WITH A MANDREL WITH DIAMETER NOT MORE THAN ¼ OF AN INCH (1/4") LESS THAN CONDUIT INSIDE DIAMETER (POSSIBLE MANDREL MANUFACTURERS, CONDUX INTL. OR GREENLEE). MANDRELS MUST BE APPROVED AND VERIFIED BY OWNER AND THE OWNER REPRESENTATIVE.
10. ALL BURIED CONDUIT SHALL HAVE A MINIMUM OF 2 FEET (2'-0") OF BELOW GRADE COVERAGE.
11. ALL BELOW GRADE CONDUIT AND CONTINUING FOR A DISTANCE OF 1 FEET 6 INCHES (18") MINIMUM ABOVE GRADE SHALL BE 40 MIL PVC COATED RIGID STEEL CONDUIT.
12. BACKFILL AND COMPACT FILL TO HAVE A MINIMUM OF 2 FEET (2'-0") ABOVE TOP OF DUCT BANK. INSTALL A CONTINUOUS WARNING STRIP OF 6 INCHES (6") WIDE RED DETECTABLE UNDERGROUND TAPE WITH LEGEND "CAUTION-ELECTRIC LINE BURIED BELOW" PANDUIT CATALOG NUMBER HTDU6R-E (OR EQUAL). CONTINUE BACKFILL AND COMPACTING PER SPECIFICATIONS. ALL BELOW GRADE CONDUIT RUNS REQUIRE CAUTION TAPE INSTALLED ABOVE CONDUIT.

UNDERGROUND CONDUIT INSTALLATION

1. INSTALLATION OF THE CONDUIT AND CABLE SHOULD BEGIN BY PLACING A 2 INCHES (2") LAYER OF GRANULAR FILL MATERIAL IN THE BOTTOM OF THE TRENCH AS A BASE FOR THE BOTTOM CONDUIT TIER. CARE MUST BE TAKEN HOWEVER, TO EXCAVATE MATERIAL FROM UNDER THE CONDUIT AND CABLE COUPLINGS TO ASSURE A SMOOTH HORIZONTAL RUN.
2. WHEN THE CONDUIT AND CABLE HAS BEEN LAID AND THE SEPARATORS POSITIONED BETWEEN THEM, THE FIRST LAYER OF FILL IS ADDED. THE MATERIAL IS NOW TAMPED AS REQUIRED TO ACHIEVE THE DESIRED PROCTOR DENSITY AT WHICH TIME THE SPACERS ARE REMOVED. FILL AND TAMP ALL VOIDS CREATED BY THEIR REMOVAL.
3. THE INSTALLATION IS NOW READY FOR THE SECOND LAYER OF CONDUIT AND CABLE WHICH IS PLACED IN THE SAME MANNER AS THE FIRST LAYER.
4. PLACEMENT OF THE CONDUIT AND CABLE SHALL BE DONE IN SUCH A WAY AS TO STAGGER THE LOCATION OF THE COUPLINGS BOTH HORIZONTALLY AND VERTICALLY.
5. THIS PROCEDURE OF LAYING CONDUIT AND CABLE, BACKFILLING AND TAMPING IS CONTINUED UNTIL THE APPROPRIATE NUMBER OF CONDUITS HAVE BEEN INSTALLED.
6. AFTER THE FINAL LAYER OF TAMPING AND COMB REMOVAL IS COMPLETE, NATIVE MATERIAL MAY BE USED TO FINISH THE BACKFILLING OPERATION UP TO GRADE AS PER PROJECT SPECIFICATIONS.

GROUNDING GENERAL NOTES:

1. ALL GROUNDING MATERIALS - INCLUDING BUT NOT LIMITED TO GROUND CABLE, GROUND RODS, TEST WELLS, CONNECTIONS, NUTS AND BOLTS SHALL BE PROVIDED BY CONTRACTOR UNLESS NOTED OTHERWISE.
2. FINAL EXACT GROUND ROUTING SHALL BE DETERMINED BY CONTRACTOR IN THE FIELD.
3. GROUNDING WORK SHALL CONFORM TO THE LATEST EDITION OF NEC.
4. GROUNDING WORK AND ALL GROUNDING MATERIALS SHALL COMPLY THE CLIENT STANDARDS AND SPECIFICATIONS.
5. THE TOTAL RESISTANCE TO GROUND OF THE COMPLETE GROUNDING SYSTEM SHALL BE LESS THAN 5 OHMS AND SHALL BE RECORDED AND SUBMITTED TO THE CLIENT.
6. GROUNDING SYSTEM SHALL CONSIST OF GALVANIZED STEEL GROUND RODS INTERCONNECTED BY 2/0 AWG 600V SIZE CONDUCTORS AS SHOWN ON THE GROUNDING DRAWINGS.
7. GALVANIZED STEEL GROUND RODS SHALL BE MINIMUM OF (3/4" X 10") 10-MIL THICK. TOP OF GROUND RODS SHALL BE A MINIMUM OF 1.5 FEET (1'-6") BELOW GRADE.
8. CONTRACTOR SHALL USE CORROSION RESISTANT BACKFILL PER NEC 250.62 WHERE APPLICABLE.
9. ALL BURIED GROUND CONDUCTORS TO BE LAID SLACK IN TRENCHES TO PREVENT STRESS AND BREAKAGE. GROUND CABLES SHALL BE INSTALLED
   - A MINIMUM OF 1.5 FEET (1'-6") BELOW GRADE,
   - 3 FEET (3'-0∀) MINIMUM DISTANCE FROM BUILDING FOOTINGS AND FOUNDATIONS, AND
   - 1 FEET (12") DISTANCE AWAY FROM ALL OTHER UNDERGROUND FACILITIES INCLUDING GAS PIPELINE.
10. PROVIDE MINIMUM 10 FEET (10'-0") OF GROUNDING CONDUCTOR PIGTAIL ABOVE FINISHED FLOOR ELEVATION TO ALLOW FOR CONNECTION TO STRUCTURAL STEEL OR EQUIPMENT UNLESS OTHERWISE NOTED. PIGTAILS SHALL BE CLEARLY MARKED WITH STAKES OR COLORED TAPE. WHERE BURIED LEADS OR TAPS ARE REQUIRED FOR CONNECTIONS NOT AVAILABLE AT TIME OF INSTALLATION SUCH LEADS SHALL BE BROUGHT UP AT OR NEAR THE FUTURE TERMINAL POINT, COILED AND TAGGED.
11. ALL BELOW GRADE GROUNDING CONNECTIONS SHALL BE OF EXOTHERMIC WELD CONNECTOR TYPE.
12. ABOVE GRADE GROUNDING CONNECTIONS SHALL BE BOLTED PRESSURE CONNECTOR TYPE OR MECHANICAL CONNECTION TYPE.
13. EXPOSED GROUNDING CONNECTIONS SHALL BE OF THE MECHANICAL TYPE WITH THE EXCEPTION OF ABOVE GROUND ANODE CONNECTION. THIS CONNECTION SHALL BE OF THE EXOTHERMIC TYPE.
14. A SEPARATELY DERIVED GROUND SYSTEM SHALL BE PROVIDED FOR THE PLANT INSTRUMENT CONTROL SYSTEM (CHASSIS, SIGNAL). THIS GROUND SYSTEM SHALL NOT BE USED FOR POWER EQUIPMENT UNDER ANY CIRCUMSTANCE. MAXIMUM GROUND RESISTANCE SHALL BE LESS THAN 5 OHMS.
15. AFTER COMPLETE INSTALLATION OF THE GROUNDING ELECTRODE SYSTEM THE CONTRACTOR SHALL MEASURE THE GROUNDING RESISTANCE AT THE DESIGNATED TEST POINTS. THIS DATA SHALL BE RECORDED AND SUBMITTED TO OWNER AND OWNER REPRESENTATIVE BY THE CONTRACTOR. THE TOTAL RESISTANCE OF THE GROUND LOOP SYSTEM SHALL BE 5 OHMS OR LESS.
16. GROUND RESISTANCE TESTING SHALL BE ACCOMPLISHED WITH A GROUNDING RESISTANCE DIRECT READING SINGLE TEST METER UTILIZING THE AC FALL OF POTENTIAL METHOD AND TWO REFERENCE ELECTRODES. PROVIDE OWNER AND OWNER REPRESENTATIVE WITH TEST RESULTS IN WRITING INCLUDING TEMPERATURE, HUMIDITY AND CONDITION OF THE SOIL AT THE TIME OF THE TEST.
17. ALL NON-CURRENT CARRYING METAL PARTS OF ELECTRICAL EQUIPMENT AND INSTALLATIONS SHALL BE CONNECTED TO THE GROUND GRID AS REQUIRED BY THE DRAWINGS. THESE WILL INCLUDE, BUT NOT NECESSARILY LIMITED TO RACEWAYS, ELECTRICAL EQUIPMENT ENCLOSURES, GROUND BUS, TRANSFORMERS, MOTOR FRAMES, TANKS, PIPE RACKS, ELECTRICAL EQUIPMENT RACKS, AND VESSELS.
18. CARE SHALL BE TAKEN TO ASSURE THAT GROUND SYSTEM DOES NOT DIRECTLY CONTACT UNDERGROUND STEEL (INCLUDING BUT NOT LIMITED TO DRIVEN PILES, REBAR AND ANCHOR BOLTS) FOR PURPOSE OF CORROSION PROTECTION, UNLESS INDICATED ON THE PLAN DRAWING.
19. WHERE GROUND RISERS ARE REQUIRED FOR ADDITIONAL SUPPLEMENTAL GRID OR BONDING CASES, BURNDY TYPE "GB" GROUND CLAMPS SHALL BE INSTALLED AT 5 FEET (5'-0") SPACING FOR THE ENTIRE LENGTH OF THE RISER. FASTENERS FOR LIGHTNING PROTECTION RISERS SHALL BE SPACED NOT MORE THAN 3 FEET (3'-0") APART ON ALL CONDUCTORS.
20. ALL ABOVE GROUND SURFACES TO BE GROUNDED SHALL BE THOROUGHLY CLEANED TO BARE METAL BEFORE ATTACHING GROUND CONNECTIONS. WHERE PAINTED SURFACES ARE CLEANED A TOUCH-UP COATING, MATCHING THE ORIGINAL FINISH, SHALL BE APPLIED AFTER GROUND CONNECTION IS COMPLETE.
21. ALL ALTERNATING CURRENT (AC) MOTOR FRAMES SHALL BE GROUNDED INSIDE THE CONDUIT BOX BY MEANS OF AN EQUIPMENT GROUNDING CONDUCTOR RUN IN THE CONDUIT AND CABLE WITH THE POWER CONDUCTORS. THE OTHER END OF THE GROUNDING CONDUCTOR SHALL BE CONNECTED TO THE MOTOR POWER SUPPLY EQUIPMENT GROUND BUS (MCC, PANEL). FLEXIBLE CONDUIT FOR MOTOR SHALL HAVE EXTERNAL GROUND IF IN CLASS 1 DIVISION 2 AREA, AND UL LISTED AND LABELED AS CLASS 1 DIVISION 1 IF IN CLASS 1 DIVISION 1 AREA.
22. TANKS AND VESSELS TIED INTO BELOW GRADE MAIN GAS PIPING SHALL BE CONNECTED TO THE PLANT GROUND GRID NEAR THE EQUIPMENT LOCATION.
23. GEOTECH FABRIC TO BE USED ON ALL NEW COMPACTED AND GRAVELED AREAS.
24. EXISTING FENCING GROUND TO BE CUT AND SPLICED WITH NEW FENCING GROUND ON BOTH SIDES OF NEW GATE.
25. ALL CONNECTORS SHALL COMPLY WITH IEEE 837 AND ANSI/UL 467; LISTED FOR USE FOR SPECIFIC TYPES, SIZES, AND COMBINATIONS OF CONDUCTORS AND CONNECTED ITEMS. CONNECTIONS INTENDED TO BE BURIED SHALL BE LISTED FOR SUCH USE.
26. BONDING STRAPS AND JUMPERS SHALL BE INSTALLED SO VIBRATION BY EQUIPMENT MOUNTED ON VIBRATION ISOLATION HANGERS OR SUPPORTS IS NOT TRANSMITTED TO RIGIDLY MOUNTED EQUIPMENT. BOND STRAPS DIRECTLY TO THE BASIC STRUCTURE AND CARE MUST BE TAKEN NOT TO PENETRATE ANY ADJACENT PARTS. INSTALL STRAPS ONLY IN LOCATIONS ACCESSIBLE FOR MAINTENANCE.
27. TIGHTEN SCREWS AND BOLTS FOR GROUNDING AND BONDING CONNECTIONS AND TERMINALS ACCORDING TO MANUFACTURER'S PUBLISHED TORQUE TIGHTENING VALUES. IF MANUFACTURER'S TORQUE VALUES ARE NOT INDICATED, USE THOSE SPECIFIED IN UL 486A AND UL 486B.
28. ALL GROUND WIRE CONDUIT STUB UPS SHALL BE SEALED TO PREVENT WATER, MOISTURE, AND DEBRIS FROM ENTERING CONDUIT.

LIGHTING GENERAL NOTES:

1. MINIMUM SIZE OF RIGID CONDUIT SHALL BE — OF AN INCH (3/4"). THE CONDUIT SIZE OF 1 AND ¼ INCHES (1-1/4") SHALL NOT BE USED EXCEPT FOR SUPPORT OF PLATFORM STANCHION MOUNTED LIGHTING FIXTURES.
2. SPLICES IN CABLE UP TO THE SIZE OF 10 AWG FOR LIGHTING AND RECEPTACLE CIRCUITS SHALL BE MADE WITH SOLDERLESS CONNECTORS. SPLICES MAY BE MADE WITH HAND TWIST WIRE JOINTS SIMILAR TO "SCOTCHLOK" AS MANUFACTURED BY 3M COMPANY.
3. SPLICES IN CABLE LARGER THAN 10 AWG SHALL BE MADE WITH SPLIT BOLT CONNECTORS.
4. FIXTURE STEMS (PENDANTS) SHALL NOT EXCEED 5 FEET (5'-0") IN LENGTH IN UNCLASSIFIED AREAS. ALL FIXTURE STEMS (PENDANTS) LOCATED IN CLASS 1 DIVISION 2 AREAS SHALL BE INSTALLED IN ACCORDANCE WITH THE LATEST EDITION OF NEC CODE. ADDITIONAL SUPPORTING STRUCTURE SHALL BE PROVIDED WHERE REQUIRED.
5. MOUNTING HEIGHT IS TO THE LOWEST PART OF THE FIXTURE FROM THE FINISH ELEVATION.
6. FIXTURES WITHOUT ELEVATIONS NOTED SHALL BE SURFACE OR FLUSH MOUNTED FROM BOTTOM OF STEEL OR CEILING.
7. THE CONTRACTOR SHALL INSTALL ALL FIXTURE WIRE, PENDANT CORD AND ASSOCIATED CONNECTORS REQUIRED TO CONNECT THE FIXTURE TO ITS LIGHTING OUTLET. SUCH MATERIALS SHALL BE FURNISHED IN ACCORDANCE WITH THE LIGHTING SYSTEM FIXTURE SCHEDULE AND THE FIXTURE MOUNTING DETAILS AND MANUFACTURER INSTRUCTIONS.
8. THE CONTRACTOR SHALL INSTALL ALL LIGHTING AND POWER DISTRIBUTION PANELS AS NEEDED. THE PANELS SHALL BE AS SPECIFIED AND AS LOCATED ON THE DRAWINGS. A COMPLETE TYPE WRITTEN DIRECTORY CARD FOR EACH PANEL SHALL BE PROVIDED.
9. COMPLETE ROUTING FOR CONDUIT AND CABLE IS NOT SHOWN ON THE DRAWINGS. THE CONTRACTOR SHALL ROUTE ALL CONDUITS AND CABLES AS REQUIRED.
10. THE CONTRACTOR SHALL BE RESPONSIBLE FOR THE INSTALLATION OF ALL FIXTURES AND RACEWAYS AND SHALL REPLACE ALL DAMAGED FIXTURES, BROKEN LAMPS OR LENSES AS REQUIRED TO INSURE A SOUND, OPERATING LIGHTING SYSTEM.
11. ALL FRAMING STRUT TO BE 1-5/8 INCHES (1-5/8") SQUARE GALVANIZED UNLESS OTHERWISE NOTED. INSULATED END CAPS SHALL BE INSTALLED FOR PROTECTION OR EDGES SHALL BE GROUND SMOOTH.

WIRE AND CONDUCTOR GENERAL NOTES:

1. WIRE AND CABLE SHALL BE PER DUKE SPECIFICATION AND PER NEC CODE.
2. WIRE COLOR CODING FOR 277/480 VAC, 3-PHASE, LIGHTING BRANCH CIRCUITS SHALL BE:
   - PHASE A: BROWN (BLACK WITH BROWN TAPE)
   - PHASE B: ORANGE (BLACK WITH ORANGE TAPE)
   - PHASE C: YELLOW (BLACK WITH YELLOW TAPE)
   - NEUTRAL: GRAY
   - GROUND: GREEN (BARE COPPER)
3. WIRE COLOR CODING FOR 120/208 VAC, 3-PHASE SMALL POWER AND LIGHTING BRANCH CIRCUITS SHALL BE:
   - PHASE A: RED
   - PHASE B: BLACK
   - PHASE C: BLUE
   - NEUTRAL: WHITE
   - GROUND: GREEN (BARE COPPER)
4. WIRE COLOR CODING FOR 120/240 VAC, 1-PHASE SMALL POWER AND LIGHTING BRANCH CIRCUITS SHALL BE:
   - HOT (PHASE A): RED
   - HOT (PHASE B): BLACK
   - NEUTRAL: WHITE
   - GROUND: GREEN (BARE COPPER)
5. ALL POWER CABLES WILL BE MARKED WITH APPROPRIATE PHASE MARKING AT BOTH ENDS AND ANY TERMINATION POINTS.

INSTRUMENTATION GENERAL NOTES:

1. ALL CONDUCTORS SHALL BE PERMANENTLY MARKED AND IDENTIFIED WITH DESTINATION MARKING NOMENCLATURE AT ALL TERMINATION POINTS AND PULL BOXES. CABLE MARKING LABELS MANUFACTURED BY BRADY (OR APPROVED EQUAL) SHALL BE USED FOR MARKING CONDUCTORS.
2. INSULATING WIRE FERRULES SHALL BE USED FOR ALL CONDUCTOR TERMINATIONS.
3. ALL INSTRUMENT LOCATIONS AND ELEVATIONS ARE APPROXIMATE. EXACT LOCATIONS ARE TO BE DETERMINED BY THE CONTRACTOR AND APPROVED BY OWNER PRIOR TO INSTALLATION.
4. ALL CONDUIT AND CABLE RUNS TO INSTRUMENTATION SHALL BE ORIENTED SO THAT STUB-UPS WILL CONNECT ON SAME SIDE AS DEVICE CONDUIT CONNECTION AND ALLOW ACCESS TO INSTRUMENT AND ELECTRICAL DEVICE.

BURNS & MCDONNELL
STATE LICENSE #43

YEVGENIY KHISLAVSKIY
02/12/2020
KENTUCKY
SEAL 34514

PROFESSIONAL ENG/ARCH STAMP

REF. DWG(S) - -

NO.	DATE	REVISION(S) DESCRIPTION	BY	CHK	APPD
0	02-19-2021	ISSUED FOR AS-BUILT	MCR	KM	AHD

DESCRIPTION	
AREA CODE	-
ACCOUNT NUMBER	-
PROJECT NUMBER	V8351
DRAWING BY	MCR
STATION ID	-
CHECKER INITIALS	KM

DATE	INITIALS	APPROVALS
N/A	N/A	REGIONAL ENGINEER
N/A	N/A	MGR TECH REC & STD
02-12-2020	YBK	PRINCIPAL ENGINEER

DUKE ENERGY. Piedmont Natural Gas

UL60 PROJECTS
ELECTRICAL GENERAL NOTE
BOONE COUNTY, KY
ERLANGER, KY

SHEET(S) 1 OF 1 | DWG SCALE NONE
DWG DATE 07/09/2019 | SUPERSEDED __
DRAWING NUMBER: PNG - E-043-0001075 | REVISION: 0
DISCIPLINE / RESOURCE CENTER / LINE NUMBER

CONDUIT AND CABLE

- EXPOSED CONDUIT OR CABLE VISIBLE
- EXPOSED CONDUIT OR CABLE HIDDEN
- CONDUIT BURIED IN FLOOR OR UNDERGROUND
- DIRECT BURIED CONDUIT OR CABLE
- FLEXIBLE CONDUIT
- CONDUIT OR CABLE CONTINUATION
- CONDUIT OR CABLE TURNING DOWN
- CONDUIT OR CABLE TURNING UP
- CONDUIT WITH BUSHING
- CONDUIT CAPPED FOR FUTURE USE
- CONDUIT CONTINUATION FROM EXISTING CAPPED STUB
- CONDUIT TURNED UP AND CAPPED (CAP AT ELEVATION NOTED) — EL XX' X"
- CONDUIT DROPPING OUT BOTTOM OF EQUIPMENT
- COMMUNICATIONS TEE
- TEE IN HORIZONTAL CONDUIT RUN WITH THE BRANCH GOING HORIZONTAL
- TEE IN HORIZONTAL CONDUIT RUN WITH THE BRANCH GOING UP (AND PIERCING THE PLANE OF PROJECTION)
- TEE IN HORIZONTAL CONDUIT RUN WITH THE BRANCH GOING DOWN
- TEE IN VERTICAL CONDUIT RUN WITH THE BRANCH GOING HORIZONTAL
- NO CONNECTION
- NEUTRAL CONNECTION
- LOOP INDICATES SHIELDED CABLE (SIZE AS REQUIRED)
- CABLE CHANNEL TURNS DOWN
- CABLE CHANNEL TURNS UP
- CONDUIT NUMBER CALLOUT, SEE CABLE SCHEDULE — C##

LINE SYMBOLS

- POWER CIRCUIT LINE — MCC BUS, PANEL BUS, FEEDER BUS, LOAD CENTER OR SWGR BRANCH CIRCUIT
- POWER PANEL AND MCC BRANCH CIRCUITS, METERING OR RELAY LINE
- EQUIPMENT ENCLOSURE LINE — SWITCHGEAR, MCC'S, TRANSFORMERS AND POWER PANELS
- OPERATION LINE (WITH DIRECTION OF OPERATION)
- FUTURE EQUIPMENT OR CIRCUIT
- CONTINUATION

GROUNDING

- GROUND CABLE BURIED
- GROUND CABLE EXPOSED
- GROUND ROD
- TEST WELL IN ACCESSIBLE BOX WITH COVER
- GROUND CONDUCTOR TURNING UP
- GROUND CONDUCTOR TURNING DOWN
- EXOTHERMIC CONNECTION
- EQUIPMENT, DEVICE, STRUCTURAL, SUPPORT CONNECTION
- GROUND CONDUCTOR PIGTAIL FOR ABOVE GRADE AND FINISHED CONCRETE CONNECTION TO EQUIPMENT AND FUTURE CONNECTION — 10 FT
- AIR TERMINAL (LIGHTNING ROD) CONNECTED TO GROUND CABLE
- GROUND CABLE CONTINUATION
- GROUND BAR

RECEPTACLE

RECEPTACLE AND DEVICE SUFFIXES

WP	WEATHERPROOF
EP	EXPLOSION-PROOF
LT	LOCKING TYPE
IG	ISOLATED GROUND
GFI	GROUND FAULT INTERRUPTER

- CLOCK HANGER RECEPTACLE, SINGLE, FLUSH MOUNTED
- SINGLE RECEPTACLE, FLUSH MOUNTED, STRAIGHT-BLADE
- SINGLE RECEPTACLE, SURFACE MOUNTED
- DUPLEX RECEPTACLE, FLUSH MOUNTED, STRAIGHT-BLADE (120V)
- DUPLEX RECEPTACLE, FLUSH MOUNTED, STRAIGHT-BLADE (240V)
- DUPLEX RECEPTACLE, SURFACE MOUNTED, STRAIGHT-BLADE
- FLOOR DUPLEX RECEPTACLE, STRAIGHT-BLADE
- FLOOR SPECIAL PURPOSE RECEPTACLE, STRAIGHT-BLADE
- SPECIAL PURPOSE POWER RECEPTACLE, SURFACE MOUNTED, STRAIGHT-BLADE, RATING AS NOTED
- WELDING RECEPTACLE
- S — SINGLE POLE SWITCH
- S_3 — THREE WAY SWITCH
- S_4 — FOUR WAY SWITCH
- S_D — DIMMER SWITCH
- S_K — SINGLE POLE SWITCH, KEY OPERATED
- S_P — SINGLE POLE SWITCH WITH PILOT LIGHT

LIGHTING

- BATTERY OPERATED EMERGENCY LIGHT LUMINAIRE
- EXIT LUMINAIRE
- FLOODLIGHT LUMINAIRE (AIMED)
- STREET LIGHTING LUMINAIRE, MAST ARM AND STEEL OR ALUMINUM POLE
- STREET LIGHTING LUMINAIRE, MAST ARM AND WOOD POLE

NORMAL EMERGENCY

- STRIP LUMINAIRE
- CEILING MOUNT LUMINAIRE
- PENDANT MOUNT LUMINAIRE
- STANCHION MOUNT LUMINAIRE
- WALL MOUNT LUMINAIRE
- LIGHTING CONTACTOR
- PHOTOELECTRIC CONTROL CELL

EQUIPMENT

- TWO WINDING TRANSFORMER
- AUTO TRANSFORMER — H, Y, X
- POTENTIAL TRANSFORMER — OR
- LINE TRAP
- CAPACITOR
- TRANSFER SWITCH
- AIR OR VACUUM CIRCUIT BREAKER
- LIGHTNING OR SURGE ARRESTER
- GROUND CONNECTION
- BATTERY
- EQUIPMENT AS NOTED ON PLANS
- GAUGEBOARD
- DISCONNECT SWITCH
- ELECTRICAL DEVICE
- THERMOSTAT — T
- JUNCTION BOX — J
- TB — TERMINAL BOX CONTAINING TERMINAL BLOCKS WITH SUFFICIENT NUMBER OF POLES TO TERMINATE ALL CONDUCTORS ENTERING THE BOX
- G — GENERATOR
- SPD — SURGE SUPPRESSION DEVICE
- R — INDICATING LIGHT (COLOR)
  - A - AMBER
  - BL - BLUE
  - C - CLEAR
  - G - GREEN
  - R - RED
  - W - WHITE
  - Y - YELLOW
- L — INDICATING LIGHT (FUNCTIONS)
  - L - LINE POTENTIAL
  - S - SYNCHRONIZING
  - SO - SCOPE ON
  - T - TRIP INDICATION
  - T&S - TRIP & SUPER-VISING (TWO LIGHTS)
- M — COIL DESIGNATIONS
  - M - MOTOR STARTER
  - TDR - TIME DELAY RELAY
  - C - CONTACTOR
  - CR - CONTROL RELAY
  - MX - MOTOR STARTER AUX RELAY (USUALLY PICKS UP THE "M" COIL)
  - F - FORWARD OR FAST
  - R - REVERSE
  - S - SLOW
- X — CONTROL STATION
  - X - TYPE/DESIGNATION:
  - A - HAND/OFF/AUTO
  - B - H/O/A WITH START
  - C - REMOTE STOP
  - D - START/STOP
  - E - AUTO/ON
  - F - JOG/OFF/AUTO
  - G - J/O/A WITH START
  - P - PHOTOCELL
  - V - VIBRATION SWITCH
- XXX — DCS INTERFACE SYMBOL W/ SCHEMATIC REFERENCE DRAWING NUMBER

GENERAL NOTES:

1. NOT ALL SYMBOLS AND ABBREVIATIONS SHOWN ON THE DRAWING ARE USED FOR THIS PROJECT.

CABLE CONDUCTOR COLOR CODING

BK	- BLACK
RD	- RED
BL	- BLUE
OR	- ORANGE
YL	- YELLOW
BR	- BROWN
WH	- WHITE
GN	- GREEN
RD/BK	- RED/BLACK
BL/BK	- BLUE/BLACK
OR/BK	- ORANGE/BLACK
YL/BK	- YELLOW/BLACK
BR/BK	- BROWN/BLACK
BK/RD	- BLACK/RED

ABBREVIATIONS

A	AMPERES
AC	ALTERNATING CURRENT
AGA	AMERICAN GAS ASSOCIATION
AH	ALARM HORN
ALM	ALARM
ANN	ANNUNCIATOR
API	AMERICAN PETROLEUM INSTITUTE
A/R (OR) AR	AS REQUIRED
AS	AMMETER SWITCH
ATS	AUTOMATIC TRANSFER SWITCH
AUTO	AUTOMATIC
AUX	AUXILIARY
AWG	AMERICAN WIRE GAUGE
BAT	BATTERY
BKR	BREAKER
B.O.M. (OR) BOM	BILL OF MATERIALS
C	CONDUIT
CA	CABLE
CB	CIRCUIT BREAKER
CHGR	CHARGER
CKT	CIRCUIT
CTRL	CONTROL
CNVT	CONVERTER
CONT'D	CONTINUED ON DRAWING
	CONTINUED
CP	CONTROL PANEL
CS	CIRCUIT SWITCHER
CT	CURRENT TRANSFORMER
DB	DIRECT BURIED
DC	DIRECT CURRENT
DET	DETECTOR
DI	DIGITAL INPUT
DIFF	DIFFERENTIAL
DISC	DISCONNECT
DN	DOWN
DO	DIGITAL OUTPUT
DP	DISTRIBUTION PANEL
DS	DISTRIBUTION SWITCH (OR) DISCONNECT SWITCH
DWG	DRAWING
EL	ELEVATION
ELEC	ELECTRICAL
EMER	EMERGENCY
EMT	ELECTRICAL METALLIC TUBING
EP	EXPLOSION PROOF
ES (OR) ESD	EMERGENCY STOP (OR) EMERGENCY SHUTDOWN
F (OR) FWD	FORWARD
FDR	FEEDER
FREQ	FREQUENCY
FU	FUSE
GEN	GENERATOR
GND	GROUND
GRC	GALVANIZED RIGID CONDUIT
HTR	HEATER
HV	HIGH VOLTAGE
HVS	HIGH VOLTAGE SWITCHGEAR
HZ	HERTZ (FREQUENCY)
INSTR	INSTRUMENT
INTLK	INTERLOCK
I/O	INPUT/OUTPUT FOR CONTROLLER
JB (OR)	J-BOX JUNCTION BOX
KV	KILOVOLT
KVA	KILOVOLT AMPERES
LP	LIGHTING PANEL, SMALL POWER PANEL
LTG	LIGHTING
LV	LOW VOLTAGE

ABBREVIATIONS CONT'D

M	METER
MAN	MANUAL
MISC	MISCELLANEOUS
MTR	MOTOR
NC	NORMALLY CLOSED
NEC	NATIONAL ELECTRICAL CODE
NEUT	NEUTRAL
NO	NORMALLY OPEN
NTS	NOT TO SCALE
Ω	OHMMETER
O/H (OR) OH	OVERHEAD
OL	OVERLOAD
OP	OPERATING
P	POLE
PC	PHOTOCELL
P.F. (OR) PF	POWER FACTOR
PH (OR) Ø	PHASE
PNL	PANEL
POT	POTENTIOMETER
PP	POWER PANEL
PS	PRESSURE SWITCH
PT	POTENTIAL TRANSFORMER
PVC	POLYVINYL CHLORIDE
PWR	POWER
R (OR) REV	REVERSE
RCT	RECTIFIER
RCPT	RECEPTACLE
REF	REFERENCE
REF DWG #	REFERENCE DRAWING NUMBER (AS INDICATED)
REQ'D	REQUIRED
RES	RESISTOR
RGS	RIGID GALVANIZED STEEL
RMC	RIGID METALLIC CONDUIT
RTD	RESISTANCE TEMPERATURE DETECTOR
SHLD	SHIELDED
SH (OR) SHT	SHEET
SP	SPARE
STA.	STATION
STR	STARTER
SW	SWITCH
SWBD	SWITCHBOARD
SWGR	SWITCHGEAR
TB	TERMINAL BLOCK
TBD	TERMINAL BOARD
TBX	TERMINAL BOX
TDR	TIME DELAY RELAY
TEL	TELEPHONE
T.O.C. (OR) TOC	TOP OF CONCRETE
T.O.D. (OR) TOD	TOP OF DUCT
T.O.G. (OR) TOG	TOP OF GRATING
T.O.S. (OR) TOS	TOP OF STEEL
TSP	TWISTED SHIELDED PAIR
TYP	TYPICAL
U/G (OR) UG	UNDERGROUND
UPS	UNINTERRUPTIBLE POWER SUPPLY
UV	UNDERVOLTAGE
V	VOLTS (OR) VOLTAGE
VFD	VARIABLE FREQUENCY DRIVE
VS	VOLTMETER SWITCH
W	WATT or WIRE
WP	WEATHERPROOF
WR	WELDING RECEPTACLE
XDCR	TRANSDUCER
XE	MISC. ELECTRICAL EQUIPMENT
XF	POWER TRANSFORMER
XFER	TRANSFER
XFMR	TRANSFORMER
XMTR	TRANSMITTER

BURNS & MCDONNELL
STATE LICENSE #43

YEVGENIY KHISLAVSKIY
04/17/2020
KENTUCKY
SEAL 34514

PROFESSIONAL ENG/ARCH STAMP

REF. DWG(S)

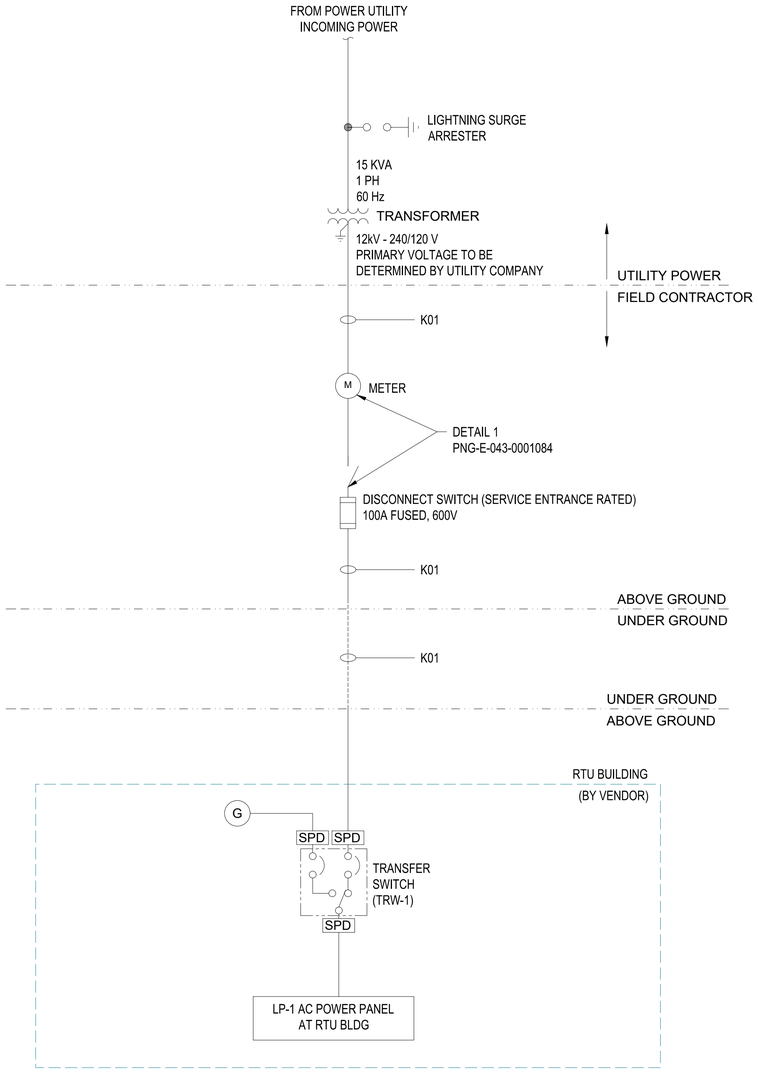
NO.	DATE	REVISION(S) DESCRIPTION	BY	CHK	APPD
0	02-19-2021	ISSUED FOR AS-BUILT	MCR	KM	AHD

DESCRIPTION	
AREA CODE	-
ACCOUNT NUMBER	-
PROJECT NUMBER	V8351
DRAWING BY	MCR
STATION ID	-
CHECKER INITIALS	KM

APPROVALS		
DATE N/A	INITIALS N/A	REGIONAL ENGINEER
DATE N/A	INITIALS N/A	MGR TECH REC & STD
DATE 04-17-2020	INITIALS YBK	PRINCIPAL ENGINEER

UL60 PROJECTS
ELECTRICAL LEGEND
BOONE COUNTY, KY
ERLANGER, KY

SHEET(S) 1 OF 1	DWG SCALE NONE		
DWG DATE 07/09/2019	SUPERSEDED —		
DRAWING NUMBER PNG - E-043-0001076	REVISION 0		
DISCIPLINE / RESOURCE CENTER / LINE NUMBER			



PANELBOARD NAME: LP-1 AC POWER PANEL — 10,000 RMS SYMMETRICAL A.I.C.
PANELBOARD TYPE: MAIN CIRCUIT BREAKER — SURFACE MOUNTED, NEMA 12 ENCLOSURE — 60 AMP TRIP MAIN BREAKER
PANEL LOCATION: RTU BUILDING — 120/240 VOLTS, 1 PHASE, 3 WIRE, 60 Hz — 100 AMP MAINS
SUPPLIED FROM: TO BE DETERMINED

CKT NO.	TRIP AMPS	NO. POLES	WIRE / GND / COND	LOAD SERVED	LOAD VA	Ø	LOAD VA	LOAD SERVED	WIRE / GND / COND	NO. POLES	TRIP AMPS	CKT NO.
1	20	1		LIGHTS 1-2, RTU BLDG	300	A	300	FLOOD LIGHT, RTU BLDG		1	20	2
3	20	1		OUTLET 1-2, RTU BLDG	720	B	720	OUTLET 3-4, RTU BLDG		1	20	4
5	20	1		OUTLET 5-6, RTU BLDG	720	A		SPARE		1	20	6
7	20	2		HVAC	1000	B		SPARE		1	20	8
					1000	A		SPARE		1	20	10
11	20	1		SPARE		B		SPARE		1	20	12
13	20	1		SPARE		A		SPARE		1	20	14
15	20	1		SPARE		B		SPARE		1	20	16

TOTAL CONNECTED LOAD = 5.4 kVA X 100% DEMAND FACTOR = 5.4 kVA ESTIMATED DEMAND LOAD
PHASE BALANCE (KVA) - A: 2.9 , B: 2.4 DESIGN LOAD = 22 AMPERES, TOTAL LOAD WITH EXPANSION = 34 AMPERES

NOTES:

1. TRANSFORMER SIZING, DISCONNECT SWITCH RATING, CABLE SIZES, CONDUIT SIZE ARE BASED ON THE MAXIMUM ESTIMATE 15KVA LOAD REQUIREMENT.
2. FIELD ELECTRICAL CONTRACTOR TO FURNISH AND INSTALL POWER CABLE, METER RACK, RISER, METER SOCKET, FUSED DISCONNECTED SWITCH COMBINATION WATT-HOUR METER AND CIRCUIT PANEL. ELECTRICAL SUBCONTRACTOR TO SECURE AND PASS ALL PERMITS AND COORDINATE POWER INSTALLATION WITH UTILITY. MINIMUM REQUIREMENT IS 100 AMP @ 120/240 VAC, SINGLE PHASE SERVICE.
3. WATT-HOUR METER, DISCONNECT SWITCH, RISER AND WEATHER HEAD CONFIGURATION MAY VARY BASED ON UTILITY POWER COMPANY REQUIREMENT. CONTRACTOR TO CONFIRM WITH THE OWNER REPRESENTATIVE AND UTILITY PRIOR TO PURCHASE.
4. CONTRACTOR TO RED-LINE UTILITY'S TRANSFORMER INFORMATION AS NEEDED.
5. COMBINATION METER, DISCONNECT, CIRCUIT PANEL BY ELECTRICAL SUBCONTRACTOR. ELECTRICAL SUBCONTRACTOR TO SECURE AND PASS ALL PERMITS AND COORDINATE POWER INSTALLATION WITH UTILITY.

BURNS & MCDONNELL
STATE LICENSE #43

YEVGENIY KHISLAVSKIY
04/17/2020
KENTUCKY
SEAL 34514

PROFESSIONAL ENG/ARCH STAMP

REF. DWG(S) -
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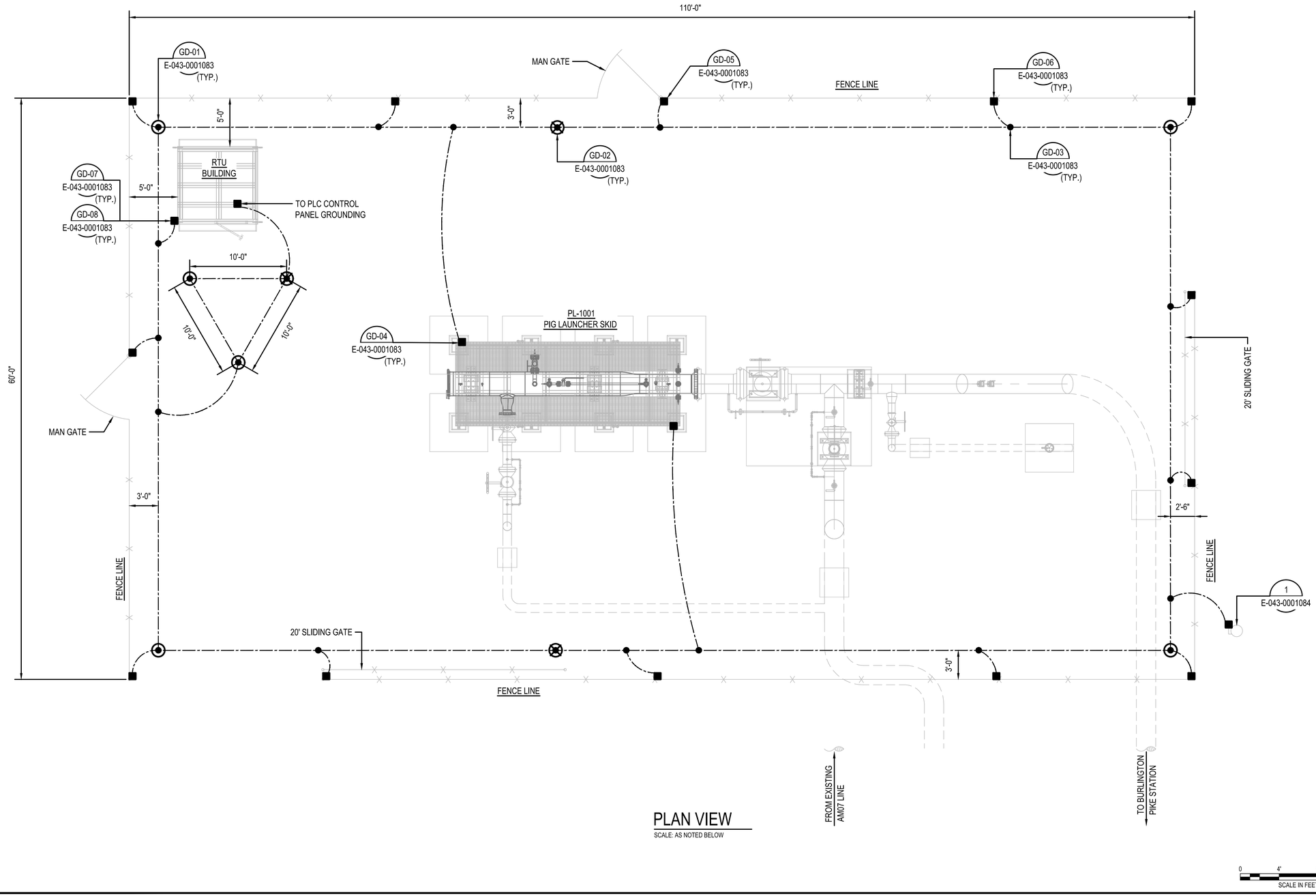
DESCRIPTION	
AREA CODE	-
ACCOUNT NUMBER	-
PROJECT NUMBER	V8351
DRAWING BY	MCR
STATION ID	S0903K1
CHECKER INITIALS	KM

APPROVALS		
DATE N/A	INITIALS N/A	REGIONAL ENGINEER
DATE N/A	INITIALS N/A	MGR TECH REC & STD
DATE 04-17-2020	INITIALS YBK	PRINCIPAL ENGINEER

UL60/AM07 INTERCONNECT
ONE-LINE DIAGRAM & PANELBOARD SCHEDULE
BOONE COUNTY, KY
ERLANGER, KY

SHEET(S) 1 OF 1 | DWG SCALE NONE
DWG DATE 07/09/2019 | SUPERSEDED —
DRAWING NUMBER: PNG - E-043-0001077 | REVISION: 0
DISCIPLINE / RESOURCE CENTER / LINE NUMBER



PLAN VIEW

SCALE: AS NOTED BELOW

0 4' 8' 12'
SCALE IN FEET

NOTES:

1. GROUNDING INSTALLATION MUST COMPLY WITH OSHA AND NATIONAL ELECTRICAL CODE REQUIREMENTS, EXCEPT WHERE LOCAL CODE PREVAILS.
2. A TEST MEASUREMENT OF THE RESISTANCE OF THE GROUNDING SYSTEM MUST BE TAKEN WHEN INSTALLED. IF THE RESISTANCE TO GROUND IS GREATER THAN 5 OHMS, ADDITIONAL GROUND RODS MUST BE INSTALLED UNTIL A COMBINED RESISTANCE OF 5 OHMS OR LESS IS OBTAINED.
3. THE GROUNDING SYSTEM IS SHOWN DIAGRAMMATICALLY SO THAT APPROXIMATE ROUTING OF GROUNDING CONDUCTORS AND LOCATIONS OF TAPS, WELLS AND GROUND RODS CAN BE ACCOMPLISHED.

ELECTRIC LINES PLACED AT 1.5' DEPTH.

BURNS & MCDONNELL
STATE LICENSE #43

YEVGENIY KHISLAVSKIY
04/17/2020
KENTUCKY
SEAL 34514

PROFESSIONAL ENG/ARCH STAMP

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DESCRIPTION	
AREA CODE	-
ACCOUNT NUMBER	-
PROJECT NUMBER	V8351
DRAWING BY	MCR
STATION ID	S0903K1
CHECKER INITIALS	KM

APPROVALS		
DATE	INITIALS	
N/A	N/A	REGIONAL ENGINEER
N/A	N/A	MGR TECH REC & STD
04-17-2020	YBK	PRINCIPAL ENGINEER

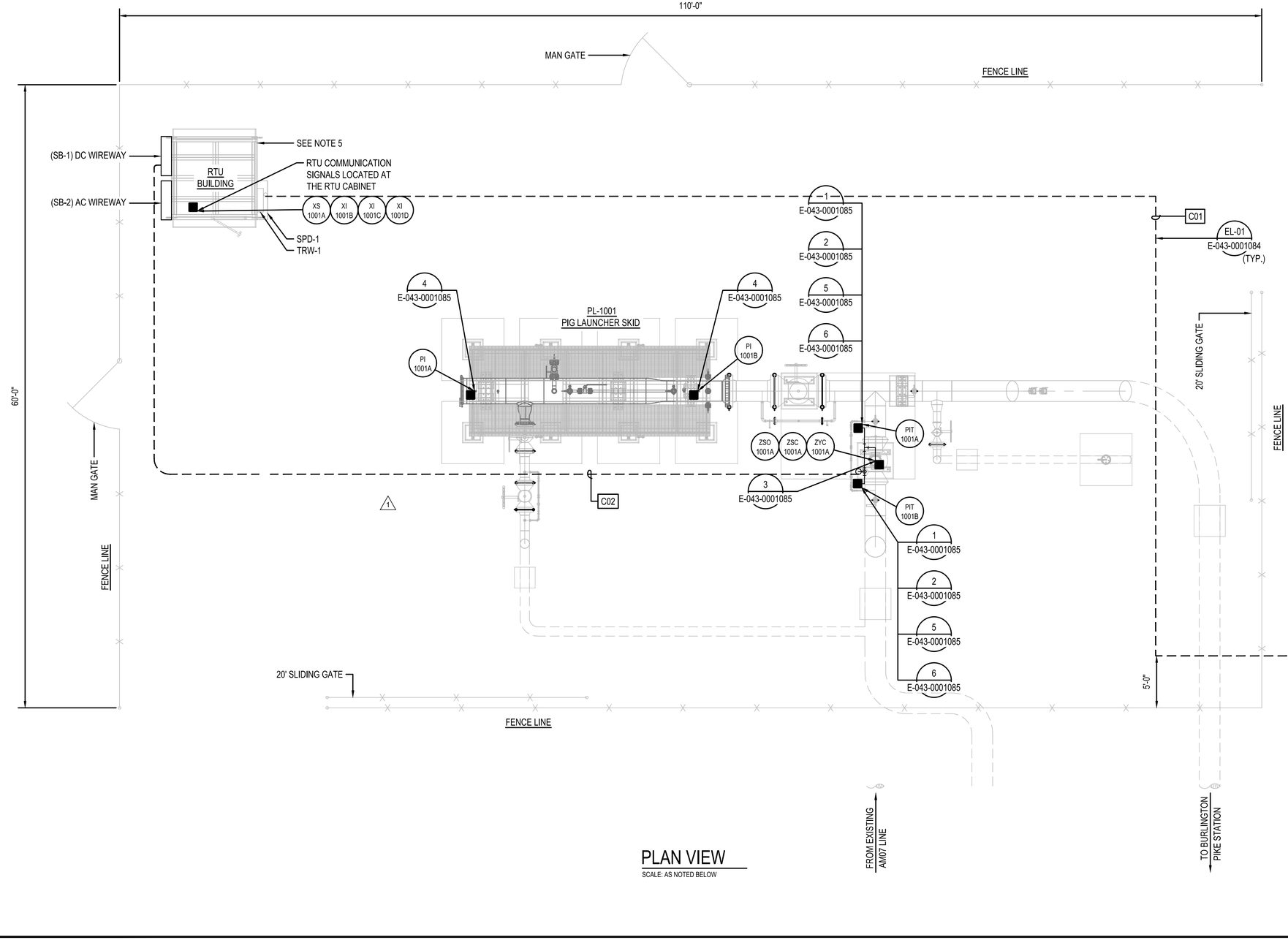
REF. DWG(S)

UL60/AM07 INTERCONNECT ELECTRICAL GROUNDING PLAN BOONE COUNTY, KY

ERLANGER, KY

SHEET(S)	1 OF 1	DWG SCALE	3/16" = 1'-0"
DWG DATE	06/26/2019	SUPERSEDED	—

DRAWING NUMBER: PNG - E-043-0001078
REVISION: 0
DISCIPLINE / RESOURCE CENTER / LINE NUMBER



PLAN VIEW

SCALE: AS NOTED BELOW

NOTES:

1. CONDUIT RUNS ARE SHOWN DIAGRAMMATIC IN NATURE. CONTRACTOR TO FIELD ROUTE CONDUITS IN ACCORDANCE WITH NEC REQUIREMENT AND AS DIRECTED BY OWNER'S REPRESENTATIVE.
2. REFER TO CABLE SCHEDULE FOR CABLE AND CONDUIT INFORMATION.
3. REFER TO INSTALLATION DETAILS ON DRAWING PNG-E-043-0001084, PNG-E-043-0001085.
4. COMBINATION METER, DISCONNECT, CIRCUIT PANEL BY ELECTRICAL SUBCONTRACTOR. ELECTRICAL SUBCONTRACTOR TO SECURE AND PASS ALL PERMITS AND COORDINATE POWER INSTALLATION WITH UTILITY. 100 AMP @ 120/240 VAC, SINGLE PHASE SERVICE.
5. RTU BUILDING SHOWN BASED ON TYPICAL DUKE ENERGY STANDARD LAYOUT. CONTRACTOR SHALL VERIFY EXACT DIMENSIONS, LAYOUT AND ORIENTATION WITH OWNER PRIOR TO COMMENCING WORK. REFER TO CONSOLIDATED ANALYTICAL SYSTEMS DRAWING #19.4003, DUKE UL60.

ELECTRIC LINES PLACED AT 1.5' DEPTH.

BURNS & MCDONNELL
STATE LICENSE #43

YEVGENIY KHISLAVSKIY
04/17/2020
KENTUCKY
SEAL 34514

PROFESSIONAL ENG/ARCH STAMP

REF. DWG(S)

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DESCRIPTION	
AREA CODE	-
ACCOUNT NUMBER	-
PROJECT NUMBER	V8351
DRAWING BY	MCR
STATION ID	S0903K1
CHECKER INITIALS	KM

APPROVALS		
DATE N/A	INITIALS N/A	REGIONAL ENGINEER
DATE N/A	INITIALS N/A	MGR TECH REC & STD
DATE 04-17-2020	INITIALS YBK	PRINCIPAL ENGINEER

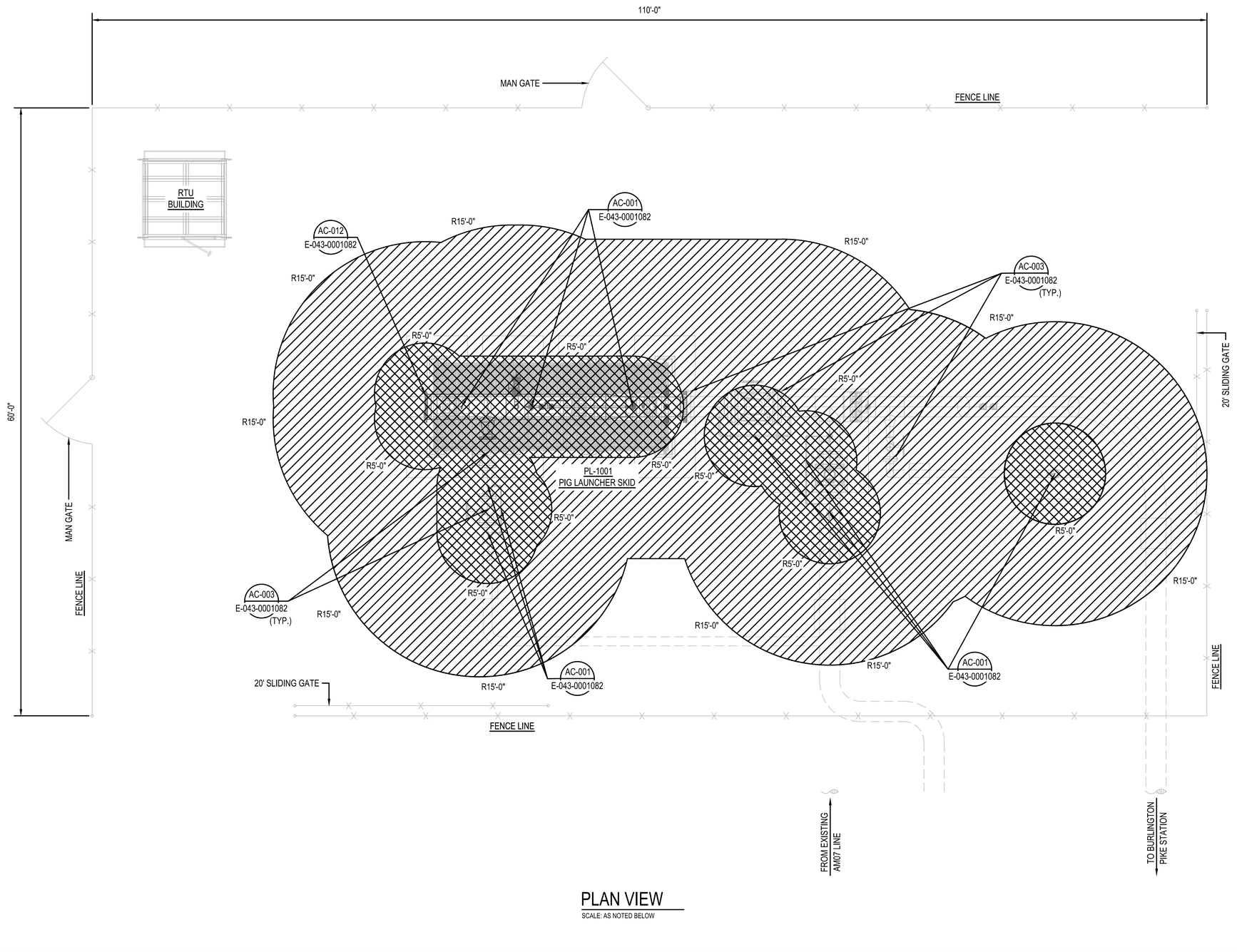
DUKE ENERGY. | Piedmont Natural Gas

UL60/AM07 INTERCONNECT
ELECTRICAL CONDUIT & INSTRUMENT PLAN
BOONE COUNTY, KY

ERLANGER, KY

SHEET(S) 1 OF 1	DWG SCALE 3/16" = 1'-0"
DWG DATE 07/12/2019	SUPERSEDED —
DRAWING NUMBER PNG - E-043-0001079	REVISION 0

DISCIPLINE / RESOURCE CENTER / LINE NUMBER



PLAN VIEW

SCALE: AS NOTED BELOW

0 4' 8' 12'
SCALE IN FEET

LEGEND:

- CLASS 1, DIVISION 1, GROUP D, T1
- CLASS 1, DIVISION 2, GROUP D, T1
- UNCLASSIFIED

NOTES:

1. AREA CLASSIFICATION ARE PER THE LATEST EDITION OF AMERICAN GAS ASSOCIATION AGA-XL1001
2. ELECTRICAL WORK IN AREA CLASSIFICATION SHALL BE IN COMPLIANCE WITH THE LATEST EDITION OF NATIONAL ELECTRIC CODE, ARTICLE 500, 501 AND 504, AND PER STATE, LOCAL AND OSHA REGULATIONS.

BURNS & MCDONNELL
STATE LICENSE #43

YEVGENIY KHISLAVSKIY
04/17/2020
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APPROVALS		
DATE	INITIALS	
N/A	N/A	REGIONAL ENGINEER
N/A	N/A	MGR TECH REC & STD
04-17-2020	YBK	PRINCIPAL ENGINEER

DUKE ENERGY. | Piedmont Natural Gas

UL60/AM07 INTERCONNECT
ELECTRICAL HAZARDOUS AREA CLASSIFICATION PLAN
BOONE COUNTY, KY

ERLANGER, KY

SHEET(S) 1 OF 1	DWG SCALE 3/16" = 1'-0"
DWG DATE 07/02/2019	SUPERSEDED —
DRAWING NUMBER	REVISION
PNG - E-043-0001080	0
DISCIPLINE / RESOURCE CENTER / LINE NUMBER	

AM07
CONDUIT SCHEDULE

CONDUIT NUMBER	CONDUIT SIZE	CONDUIT TYPE	% FILL	CONTENT	FROM	TO	LENGTH (FT.)	NOTES
C01	2"	RGS	23.98%	K01	UTILITY METER RACK	LP-1, AC PANEL	225	ROUTED VIA SURGE SUPPRESSION ENCLOSURE (SPD-1) AND TRANSFER SWITCH (TRW-1)
C02	1.5"	RGS	34.22%	K02, K03, K04, K05, K06	RTU, CONTROL PANEL	CV-1001A	125	

SCHEDULE NOTES:

1. POWER CABLES ARE SIZED IN ACCORDANCE WITH TYPICAL DUKE PANELBOARD SCHEDULE, 20 CIRCUIT LOAD CENTER, 240/120VAC, SINGLE PHASE WITH 100A MAIN BREAKER.
2. CABLE LENGTH ARE FOR REFERENCE AND CONTRACTOR TO FIELD VERIFY AND RESIZE AS NEEDED BASED ON FINAL ROUTING.

AM07
CABLE SCHEDULE

CABLE NUMBER	INSTRUMENT TAG	NUMBER OF CABLE	CONDUCTORS (COPPER) (600V INSULATION)	WORKING VOLTAGE	FROM	TO	LENGTH (FT.)	NOTES
K01	N/A	1	3-1/C #2 AWG + #8 AWG GND, THWN-2	120 VAC	UTILITY METER RACK	LP-1, AC PANEL	225	
K02	PIT-1001A	1	1PR #18 AWG TSP, THWN-2	24 VDC	RTU, CONTROL PANEL	PIT-1001A	125	
K03	PIT-1001B	1	1PR #18 AWG TSP, THWN-3	24 VDC	RTU, CONTROL PANEL	PIT-1001B	125	
K04	ZYC-1001A	1	1PR #18 AWG TSP, THWN-4	24 VDC	RTU, CONTROL PANEL	CV-1001A	125	
K05	ZSC-1001A	1	1PR #18 AWG TSP, THWN-5	24 VDC	RTU, CONTROL PANEL	CV-1001A	125	
K06	ZSO-1001A	1	1PR #18 AWG TSP, THWN-6	24 VDC	RTU, CONTROL PANEL	CV-1001A	125	

SCHEDULE NOTES:

1. POWER CABLES ARE SIZED IN ACCORDANCE WITH TYPICAL DUKE PANELBOARD SCHEDULE, 20 CIRCUIT LOAD CENTER, 240/120VAC, SINGLE PHASE WITH 100A MAIN BREAKER.
2. CABLE LENGTH ARE FOR REFERENCE AND CONTRACTOR TO FIELD VERIFY AND RESIZE AS NEEDED BASED ON FINAL ROUTING.
3. MULTIPAIR CONDUCTOR MAY BE USED IN PLACE OF SINGLE PAIR INSTRUMENT CABLE WITH OWNER'S APPROVAL.

BURNS & MCDONNELL
STATE LICENSE #43

YEVGENIY KHISLAVSKIY
04/17/2020
KENTUCKY
SEAL 34514

PROFESSIONAL ENG/ARCH STAMP

REF. DWG(S)

NO.	DATE	REVISION(S) DESCRIPTION	BY	CHK	APPD
0	02-19-2021	ISSUED FOR AS-BUILT	MCR	KM	AHD

DESCRIPTION	
AREA CODE	-
ACCOUNT NUMBER	-
PROJECT NUMBER	V8351
DRAWING BY	MCR
STATION ID	S0903K1
CHECKER INITIALS	KM

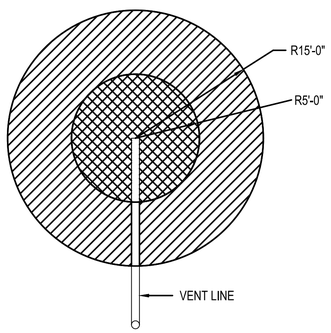
APPROVALS	DATE	INITIALS
REGIONAL ENGINEER	N/A	N/A
MGR TECH REC & STD	N/A	N/A
PRINCIPAL ENGINEER	04-17-2020	YBK

DUKE ENERGY. | Piedmont Natural Gas

UL60/AM07 INTERCONNECT
CABLE AND CONDUIT SCHEDULE
BOONE COUNTY, KY

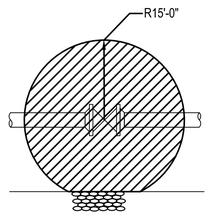
ERLANGER, KY

SHEET(S) 1 OF 1 | DWG SCALE NONE
DWG DATE 07/09/2019 | SUPERSEDED —
DRAWING NUMBER: PNG - E-043-0001081 | REVISION: 0
DISCIPLINE / RESOURCE CENTER / LINE NUMBER



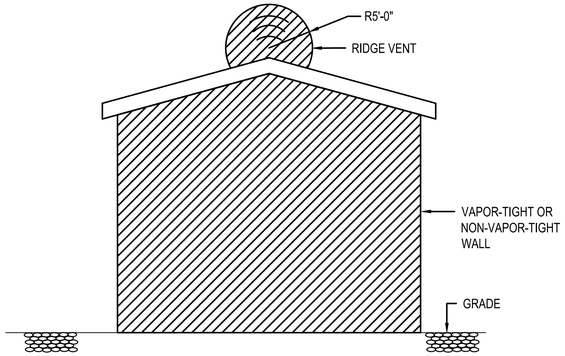
DETAIL AC-001
SCALE: N.T.S.

(REF: AGA XL1001, FIG. 1)
VENT RELIEF VALVE OR BLOWDOWN IN
ADEQUATELY VENTILATED NON-ENCLOSED AREA



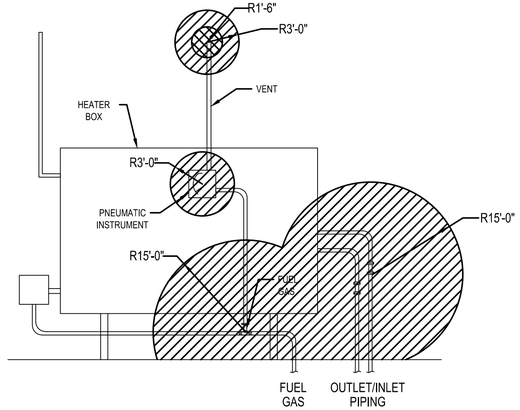
DETAIL AC-003
SCALE: N.T.S.

(REF: AGA XL1001, FIG. 3)
VALVES, FLANGES, SCREWED FITTINGS - ADEQUATELY
VENTILATED ENCLOSED AND NON-ENCLOSED AREA



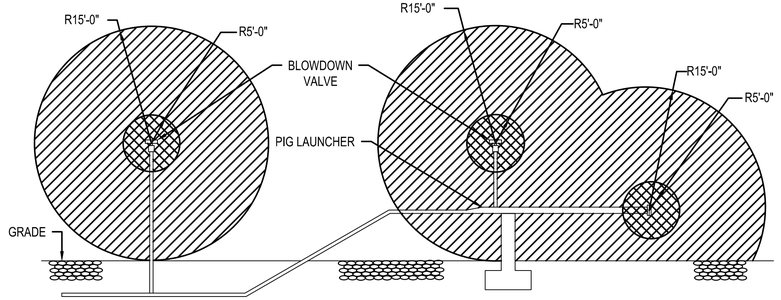
DETAIL AC-006
SCALE: N.T.S.

(REF: AGA XL1001, FIG. 6)
CLASS 1 DIVISION 2 ENCLOSURE



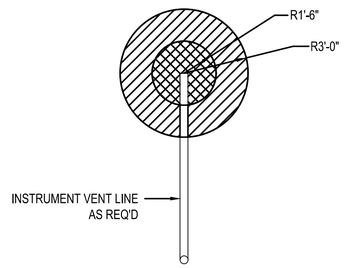
DETAIL AC-011
SCALE: N.T.S.

(REF: AGA XL1001, FIG. 11)
FIRED EQUIPMENT: INDIRECT/DIRECT-
FIRED HEATERS



DETAIL AC-012
SCALE: N.T.S.

(REF: AGA XL1001, FIG. 12)
PIG LAUNCHERS / RECEIVERS AND BLOW OFF



DETAIL AC-016
SCALE: N.T.S.

(REF: AGA XL1001, FIG. 16)
INSTRUMENT OR CONTROL DEVICE VENT IN
ADEQUATELY VENTILATED NON-ENCLOSED AREA

LEGEND:

- CLASS 1, DIVISION 1, GROUP D, T1
- CLASS 1, DIVISION 2, GROUP D, T1
- UNCLASSIFIED

NOTES:

1. AREA CLASSIFICATIONS ARE PER THE LATEST EDITION OF AMERICAN GAS ASSOCIATION AGA-XL1001.
2. ELECTRICAL WORK AND EQUIPMENT INSTALLED IN AREA CLASSIFICATION SHALL BE IN COMPLIANCE WITH THE LATEST EDITION OF NATIONAL ELECTRIC CODE, ARTICLE 500, 501, AND 504, PER INDUSTRY STANDARDS, AND PER STATE, LOCAL, AND OSHA REGULATIONS.
3. HAZARDOUS AREA CLASSIFICATION BASED ON:
   CLASS 1 - FLAMMABLE GASES OR VAPORS
   DIVISION 1 - NORMALLY HAZARDOUS *
   DIVISION 2 - NOT NORMALLY HAZARDOUS OR EXTENSION OF DIVISION 1*
   GROUP D - NATURAL GAS
   (*DEFINED BY NEC ARTICLE 500-5)
4. ENSURE THAT ELECTRICAL EQUIPMENT ENCLOSURES INCLUDING JUNCTION BOXES, AND CONDUIT FITTINGS DO NOT HAVE CL.1 DIV.1 INSTALLATION, OR SHALL MEET HAZARDOUS AREA CLASSIFICATION AS INDICATED ON THE DRAWINGS.
5. SOLENOIDS AND VALVES SHALL BE HAZARDOUS RATED AND STAMPED CL.1 DIV. 2 GROUP D, T1. VENTS OFF OF BLOW DOWN VALVES SHALL BE PIPED AT LEAST 5 FT. ABOVE ANY ELECTRICAL COMPONENTS OF THE VALVES.

BURNS & MCDONNELL
STATE LICENSE #43

YEVGENIY KHISLAVSKIY
02/12/2020
KENTUCKY
SEAL 34514

PROFESSIONAL ENG/ARCH STAMP

REF. DWG(S)

NO.	DATE	REVISION(S) DESCRIPTION	BY	CHK	APPD
0	02-19-2021	ISSUED FOR AS-BUILT	MCR	KM	AHD

DESCRIPTION	
AREA CODE	-
ACCOUNT NUMBER	-
PROJECT NUMBER	V8351
DRAWING BY	MCR
STATION ID	-
CHECKER INITIALS	KM

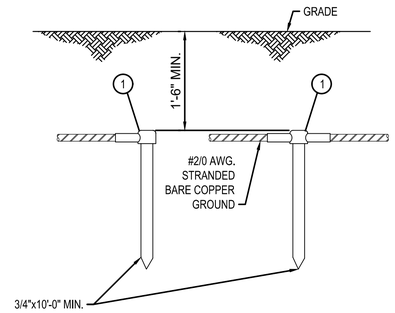
APPROVALS		
DATE N/A	INITIALS N/A	REGIONAL ENGINEER
DATE N/A	INITIALS N/A	MGR TECH REC & STD
DATE 02-12-2020	INITIALS YBK	PRINCIPAL ENGINEER

DUKE ENERGY. | Piedmont Natural Gas

UL60 PROJECTS
HAZARDOUS AREA CLASSIFICATION DETAILS
BOONE COUNTY, KY
ERLANGER, KY

SHEET(S) 1 OF 1	DWG SCALE NONE		
DWG DATE 04/30/2019	SUPERSEDED —		
DRAWING NUMBER PNG - E-043-0001082		REVISION 0	
DISCIPLINE / RESOURCE CENTER / LINE NUMBER			

ITEM	QTY.	DESCRIPTION (QUANTITY ARE FOR ONE INSTALLATION)
1	A/R	GALVANIZED STEEL COATED GROUND ROD, 3/4"x10'-0", 10MIL THICK MIN



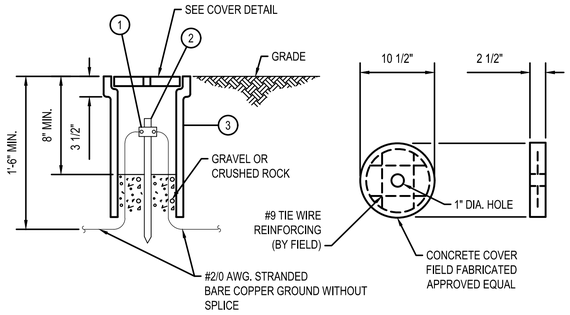
TYPE: 1 TYPE: 2

NOTES:

1. MAIN GROUND GRID SHALL BE #2/0 AWG. STRANDED BARE COPPER WIRE.

DETAIL GD-01
SCALE: N.T.S.
GROUND ROD

ITEM	QTY.	DESCRIPTION (QUANTITY ARE FOR ONE INSTALLATION)
1	1	GROUND CONNECTOR BURNDY TYPE "YGHR-C"
2	1	GALV. STEEL COATED GROUND ROD, 3/4"x10'-0", 10MIL THICK MIN. COATED
3	1	8" X 1'-6" VITRIFIED CLAY PIPE



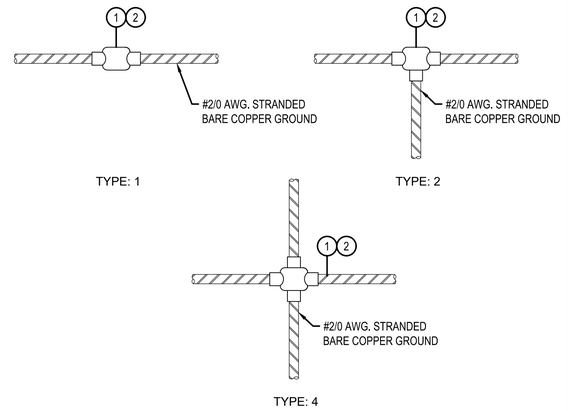
GROUND WELL ASSEMBLY COVER DETAIL

NOTES:

1. MAIN GROUND GRID SHALL BE #2/0 AWG. STRANDED BARE COPPER WIRE

DETAIL GD-02
SCALE: N.T.S.
TEST WELL

ITEM	QTY.	DESCRIPTION (QUANTITY ARE FOR ONE INSTALLATION)
1	A/R	EXOTHERMIC WELD, CABLE TO CABLE, CADWELD TYPE.
2	A/R	EXOTHERMIC WELD, TEE TYPE, BURNDY BCS-1 (OR) BCS-2 (OR) BCS-4

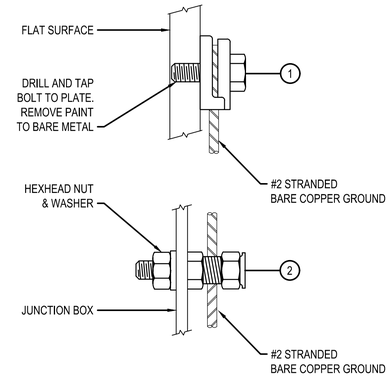


NOTES:

1. MAIN GROUND GRID SHALL BE #2/0 AWG. STRANDED BARE COPPER WIRE

DETAIL GD-03
SCALE: N.T.S.
EXOTHERMIC WELD CONNECTION

ITEM	QTY.	DESCRIPTION (QUANTITY ARE FOR ONE INSTALLATION)
1	1	GROUNDING, POST BURNDY# GZ4C-12
2	1	GROUNDING, SERVIT POST BURNDY# KC23

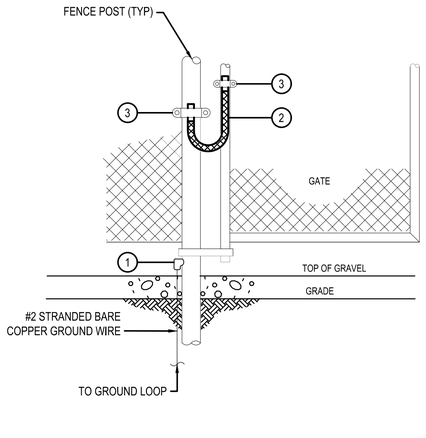


DETAIL GD-04
SCALE: N.T.S.
EQUIPMENT GROUNDING

NOTES:

1. GROUNDING INSTALLATION MUST COMPLY WITH OSHA AND NATIONAL ELECTRICAL CODE REQUIREMENTS, EXCEPT WHERE LOCAL CODE PREVAILS.
2. A TEST MEASUREMENT OF THE RESISTANCE OF THE GROUNDING SYSTEM MUST BE TAKEN WHEN INSTALLED. IF THE RESISTANCE TO GROUND IS GREATER THAN 5 OHMS. ADDITIONAL GROUND RODS MUST BE INSTALLED UNTIL A COMBINED RESISTANCE OF 5 OHMS OR LESS IS OBTAINED.
3. WHERE GROUNDING CONDUCTORS ARE ROUTED EXPOSED, THEY MUST BE SECURED MINIMUM EVERY 24".
4. BILL OF MATERIAL SHALL BE AS DESCRIBED IN DETAIL OR APPROVED EQUAL BY OWNER PRIOR TO INSTALLATION.
5. CONTRACTOR SHALL SUPPLY AND INSTALL ALL MATERIALS UNLESS OTHERWISE NOTED.

ITEM	QTY.	DESCRIPTION (QUANTITY ARE FOR ONE INSTALLATION)
1	1	EXOTHERMIC WELD, CABLE TO STEEL PIPE, TYPE BURNDY BCS-3 - NOTE 2
2	1	FLEXIBLE COPPER BRAID, BURNDY TYPE BD, LENGTH AS REQUIRED
3	2	GROUND CONNECTOR, BURNDY TYPE GAR, SIZE AS REQ.D

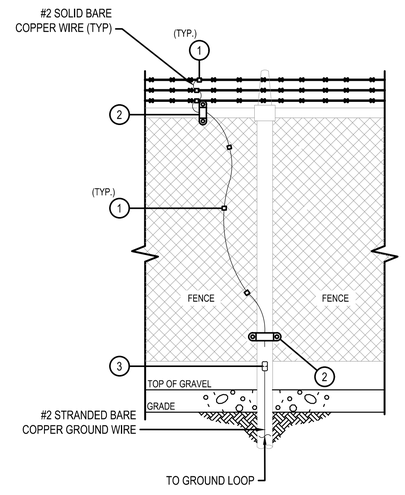


NOTES:

1. FOR DOUBLE GATE APPLICATION EACH GATE SHALL BE GROUNDED AS SHOWN.
2. REFERENCE BURNDY CATALOG FOR COMPLETE MODEL NO.

DETAIL GD-05
SCALE: N.T.S.
GATE GROUNDING

ITEM	QTY.	DESCRIPTION (QUANTITY ARE FOR ONE INSTALLATION)
1	A/R	COPPER COMPRESSION TAP, BURNDY #YGHC2C2
2	2	GROUND CONNECTOR, BURNDY TYPE GAR, SIZE AS REQ.D
3	1	EXOTHERMIC WELD, CABLE TO STEEL PIPE, TYPE BURNDY BCS-3 - NOTE 2

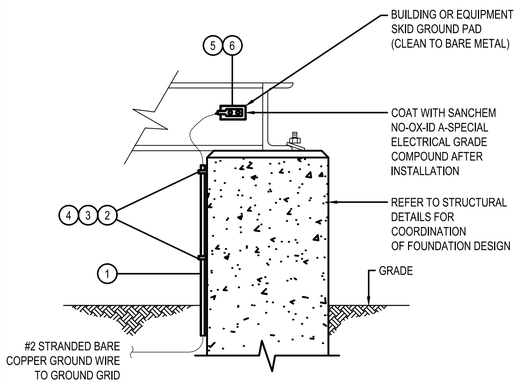


NOTES:

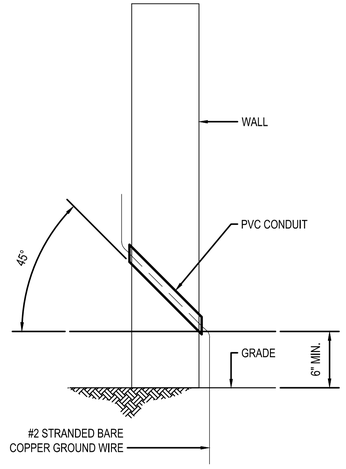
1. #6 WIRE SHALL BE LOOPED THROUGH GROUND WIRE CLAMPS AND FENCE CLAMPS TO KEEP WIRE SPLICES TO A MINIMUM.
2. REFERENCE BURNDY CATALOG FOR COMPLETE MODEL NO.

DETAIL GD-06
SCALE: N.T.S.
FENCE GROUNDING

ITEM	QTY.	DESCRIPTION (QUANTITY ARE FOR ONE INSTALLATION)
1	1	CONDUIT, 1" PVC, SCHEDULE 40 (LENGTH AS REQ.)
2	2	CONDUIT STRAP, 1", ONE HOLE, O-Z GEDNEY 14-100G
3	2	BOLT, 1/4"-20x1", CADMIUM-PLATED
4	2	ANCHOR, MASONRY, FOR 1/4"-20 BOLT, RAWL 9320
5	1	COMPRESSION LUG, TWO-HOLE, 2/0 AWG, BURNDY YA262LN
6	1	HEX SCREW, NUT 1/2-13 x 1" S.S



DETAIL GD-07
SCALE: N.T.S.
BUILDING & SKID GROUNDING



DETAIL GD-08
SCALE: N.T.S.
BUILDING GROUND PENETRATION

BURNS & MCDONNELL
STATE LICENSE #43

YEVGENIY KHISLAVSKIY
02/12/2020
KENTUCKY
SEAL 34514

PROFESSIONAL ENG/ARCH STAMP

NO.	DATE	REVISION(S) DESCRIPTION	BY	CHK	APPD
0	02-19-2021	ISSUED FOR AS-BUILT	MCR	KM	AHD

DESCRIPTION	
AREA CODE	-
ACCOUNT NUMBER	-
PROJECT NUMBER	V8351
DRAWING BY	MCR
STATION ID	-
CHECKER INITIALS	KM

APPROVALS		
DATE	INITIALS	
N/A	N/A	REGIONAL ENGINEER
N/A	N/A	MGR TECH REC & STD
02-12-2020	YBK	PRINCIPAL ENGINEER

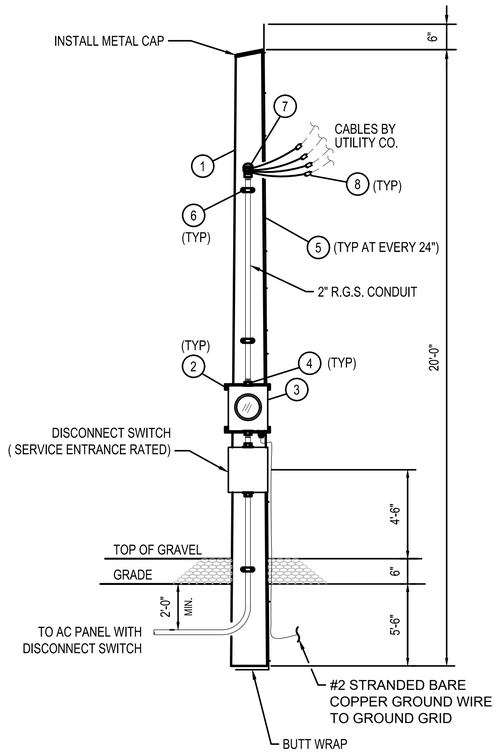
REF. DWG(S)

UL60 PROJECTS
ELECTRICAL INSTALLATION DETAILS: GROUNDING
BOONE COUNTY, KY
ERLANGER, KY

SHEET(S)	1 OF 1	DWG SCALE	NONE
DWG DATE	07/09/2019	SUPERSEDED	—
DRAWING NUMBER			REVISION
PNG - E-043-0001083			0

DISCIPLINE / RESOURCE CENTER / LINE NUMBER

ITEM	QTY.	DESCRIPTION (QUANTITY ARE FOR ONE INSTALLATION)
1	1	WOOD POLE, SOUTHERN PINE, CLASS 2, 20 FT
2	A/R	UNISTRUT CHANNEL, P-1000, GALV. WITH HARDWARE
3	1	METER, 240V, 1Ø
4	3	MYERS HUB FITTING, ZINC, SIZE AS REQUIRED
5	A/R	STAPLE, 1/4"X 1/4"
6	A/R	TWO HOLE STRAP, R.G.S., 2"
7	1	WEATHERHEAD FITTING, 2", R.G.S.
8	A/R	COPPER COMPRESSION TAP, BURNDY TYPE #YGHC, SIZE AS REQUIRED



NOTES:

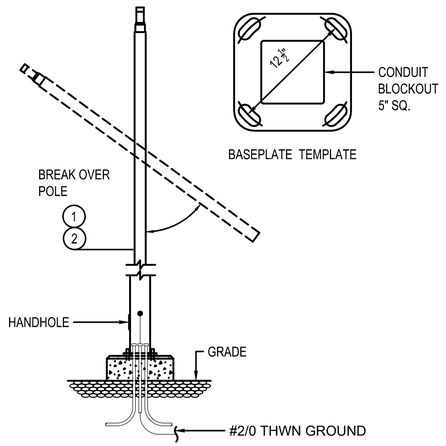
1. CONTRACTOR SHALL RUN 2" EMPTY R.G.S. CONDUIT WITH PULL WIRE TO UTILITY POWER SUPPLY POLE, TERMINATE CONDUIT 5'-0" ABOVE GRADE. UTILITY COMPANY WILL FURNISH AND PULL WIRE.

DETAIL 1
SCALE: N.T.S.

POLE / METER INSTALLATION
FOR OVERHEAD POWER SUPPLY

TYPICAL DUKE METER RACK DESIGN. TO BE INSTALL AND COORDINATE BY DUKE'S FIELD CONTRACTOR

ITEM	QTY.	DESCRIPTION
1	1	SQUARE HINGED STEEL POLE, 20' TALL, W/4" TENON, GRD. LUG, 12" BOLT CIRCLE, 1" DIA. BOLTS, VALMONT #DSF10-641A200
2	1	LOWERING WINCH VALMONT #M136 (ONLY ONE NEEDED PER SITE)

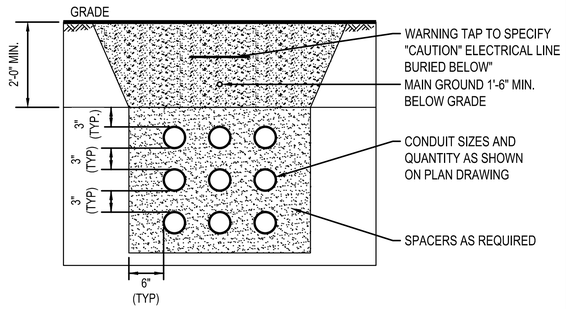


NOTES:

1. REFER TO STRUCTURAL DETAILS FOR FOUNDATION DESIGN
2. LIGHT POLE IS BREAK OVER POLE. CONTRACTOR SHALL INSTALL LIGHT POLE WITH 30' CLEARANCE IN THE DIRECTION THAT THE LIGHT POLE SHALL SWING DOWNWARD. NO STRUCTURE SHALL BE ON THE PATH WHERE LIGHT POLE SWING DOWNWARD.

DETAIL LT-01
SCALE: N.T.S.

LIGHT POLE



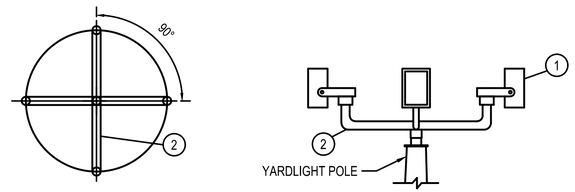
NOTES:

1. RESTORE SURFACE (GRADE) TO EXISTING CONDITIONS.
2. FOR PAVEMENT REPLACEMENT, THICKNESS OF ALL REPLACEMENT COURSES SHALL BE EQUAL TO EXISTING BUT ASPHALTIC CONCRETE SHALL NOT BE LESS THAN 2 INCHES AND AGGREGATE BASE COURSE SHALL NOT BE LESS THAN 6 INCHES. EXISTING PAVEMENT TO BE REMOVED SHALL BE SAWCUT. EXTEND AGGREGATE BASE COURSE 1'-0" BEYOND EXCAVATION LIMITS AND EXTEND ASPHALTIC CONCRETE 1'-0" BEYOND THE AGGREGATE BASE COURSE LIMITS. APPLY TACK COAT TO THE EXPOSED EXISTING ASPHALTIC CONCRETE SURFACES.

DETAIL EL-01
SCALE: NOT TO SCALE

TYPICAL DIRECT BURIED CONDUIT

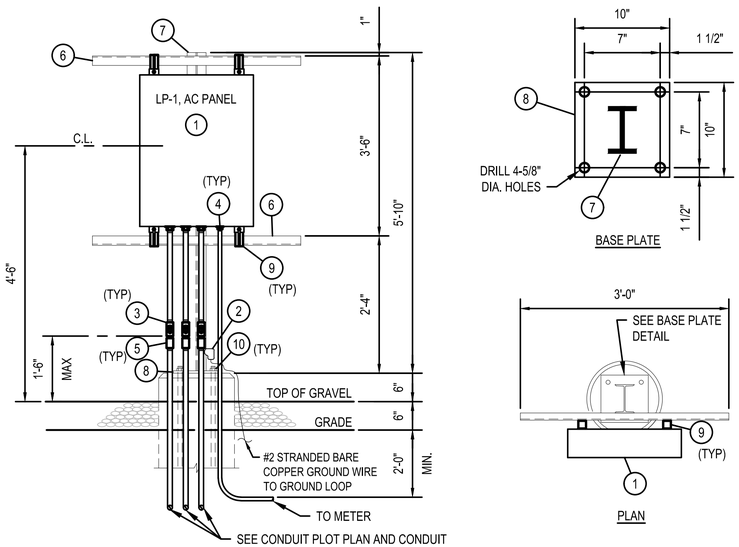
ITEM	QTY.	DESCRIPTION
1	4	FLOODLIGHT, C-H, #FMV-13L-C-Y/120 WITH FACTORY INSTALLED PHOTOCELL, CH #EV21H20
2	1	BULLHORN BRACKET, 4 TENON, 90°, 2 3/8" O.D. VALMONT #MX104-040-010



DETAIL LT-02
SCALE: N.T.S.

LIGHT FIXTURE

ITEM	QTY.	DESCRIPTION (ALL MANUFACTURERS ARE "OR EQUAL")
1	1	PANELBOARD, NEMA 3R ENCLOSURE, 100A MAIN BREAKER, 18 CIRCUITS MAXIMUM, 120/240V/, WITH NEUTRAL BUS, 4-20A SINGLE POLE CIRCUIT BREAKER, SQUARE D TYPE NQOD
2	1	EXOTHERMIC WELD, CABLE TO STEEL PIPE, TYPE BURNDY BCS-3
3	3	"DRAIN SEAL FITTING, M/F, SIZE AS REQUIRED, CROUSE-HINDS TYPE EYD
4	4	MYERS HUB FITTING, ZINC, SIZE AS REQUIRED
5	3	CONDUIT COUPLING, R.G.S., SIZE AS REQUIRED
6	A/R	UNISTRUT CHANNEL, P-1000, GALV. WITH HARDWARE
7	A/R	WIDE FLANGE, W6X12, ASTM A36
8	A/R	PLATE C.S. 1/2", ASTM A36
9	A/R	C.S. ANGLE 2" x 2" x 1/4"
10	4	H.H. 1/2" NUT, ASTM A325



DETAIL 2
SCALE: NOT TO SCALE
PNG-E-043-0001002

TYPICAL AC PANEL INSTALLATION

NOTES:

1. BILL OF MATERIAL SHALL BE AS DESCRIBED IN DETAIL OR APPROVED EQUAL BY OWNER PRIOR TO INSTALLATION.
2. CONTRACTOR SHALL SUPPLY AND INSTALL ALL MATERIALS UNLESS OTHERWISE NOTES.

BURNS & MCDONNELL
STATE LICENSE #43

YEVGENIY KHISLAVSKIY
02/12/2020
KENTUCKY
SEAL 34514

PROFESSIONAL ENG/ARCH STAMP

REF. DWG(S)

NO.	DATE	REVISION(S) DESCRIPTION	BY	CHK	APPD
0	02-19-2021	ISSUED FOR AS-BUILT	MCR	KM	AHD

DESCRIPTION	
AREA CODE	-
ACCOUNT NUMBER	-
PROJECT NUMBER	V8351
DRAWING BY	MCR
STATION ID	-
CHECKER INITIALS	KM

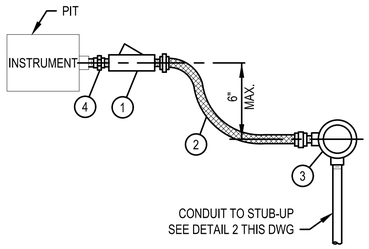
APPROVALS		
DATE	INITIALS	
N/A	N/A	REGIONAL ENGINEER
N/A	N/A	MGR TECH REC & STD
02-12-2020	YBK	PRINCIPAL ENGINEER

DUKE ENERGY. Piedmont Natural Gas

UL60 PROJECTS
ELECTRICAL INSTALLATION DETAILS: MISCELLANEOUS
BOONE COUNTY, KY
ERLANGER, KY

SHEET(S) 1 OF 1	DWG SCALE	NONE	
DWG DATE 07/09/2019	SUPERSEDED	—	
DRAWING NUMBER		REVISION	
PNG - E-043-0001084		0	
DISCIPLINE / RESOURCE CENTER / LINE NUMBER			

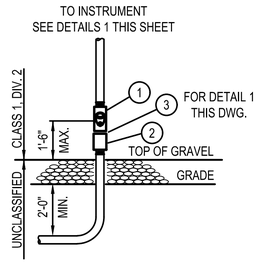
ITEM	QTY.	DESCRIPTION (ALL MANUFACTURERS ARE "OR EQUAL")
1	1	CONDUIT SEAL, M/F, 3/4", CROUSE-HINDS #EYS216
2	1	EXPLOSION PROOF FLEX COUPLING, M/F, 3/4", 8" LONG,CROUSE-HIND #ECLK28
3	1	CONDULET W/2-3/4" HUBS, CROUSE-HINDS #GUAL26
4	1	CONDUIT UNION, 3/4", CROUSE-HINDS #UNY205



ELECTRICAL DETAIL FOR
INSTRUMENT WITHOUT PIG-TAIL
(CLASS 1, DIVISION 1 AREA)

DETAIL 1
SCALE: N.T.S.

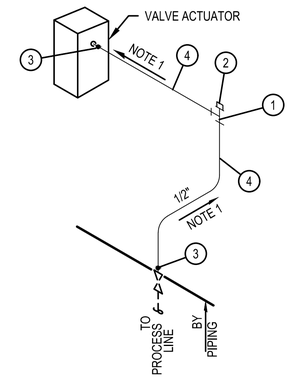
ITEM	QTY	DESCRIPTION (QUANTITY FOR ONE INSTALLATION)
1	1	DRAIN SEAL FITTING, M/F, SIZE A/R, CROUSE-HINDS TYPE EYD
2	1	CONDUIT COUPLING, R.G.S., SIZE AS REQ'D
3	1	REDUCING BUSHING, 1"X 3/4" (FOR DETAIL 1 ONLY)



TYPICAL CONDUIT STUB-UP

DETAIL 2
SCALE: N.T.S.

ITEM	QTY	DESCRIPTION (QUANTITY FOR ONE INSTALLATION)
1	1	1/2" TUBE TEE, 316 S.S.
2	1	1/2" TUBE CAP, 316 S.S.
3	2	1/2"T x 1/2" N.P.T. MALE CONNECTOR, 316 S.S.
4	A/R	1/2" O.D. x .035" WALL 316 S.S. TUBING SMLS



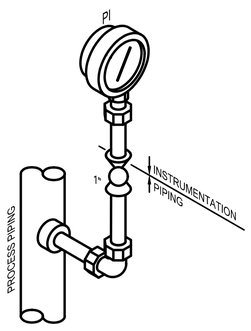
NOTES:
1. SLOPE TUBING DOWN TO DRAIN VALVE 1" PER 1'-0" MIN., DO NOT POCKET.
2. SUPPORT INSTRUMENT TUBING AT TAPS AND AT 5'-0" INTERVALS.

INSTRUMENT INSTALLATION DETAIL
INSTRUMENT MOUNTED ABOVE
PROCESS LINE

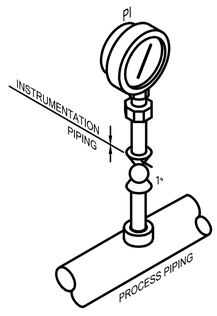
DETAIL 3
SCALE: N.T.S.

NOTES:

1. BILL OF MATERIAL SHALL BE AS DESCRIBED IN DETAIL OR APPROVED EQUAL BY OWNER PRIOR TO INSTALLATION.
2. CONTRACTOR SHALL SUPPLY AND INSTALL ALL MATERIALS UNLESS OTHERWISE NOTED.



VERTICAL MOUNT

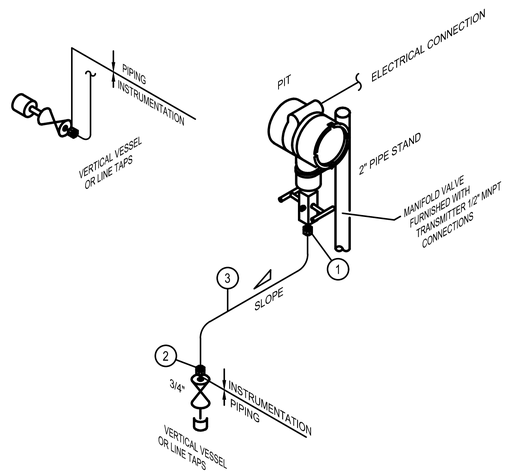


HORIZONTAL MOUNT

PRESSURE GAUGE WITH BALL VALVE

DETAIL 4
SCALE: N.T.S.

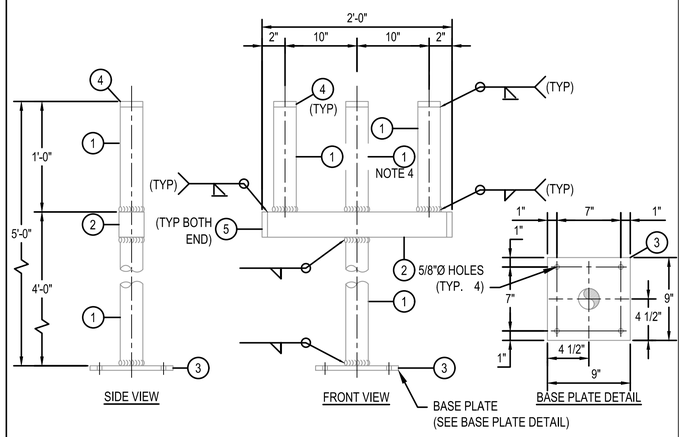
ITEM	QTY	DESCRIPTION (QUANTITY FOR ONE INSTALLATION)
1	1	TUBE CONNECTOR, MALE 316SS, 1/2"T X 1/2" MNPT, SWAGELOK
2	1	TUBE CONNECTOR, MALE 316SS, 1/2"T x 3/4"MNPT, SWAGELOK
3	A/R	TUBING, 316SS SEAMLESS, 1/2" O.D. x 0.035", ASTM A-269



PRESSURE TRANSMITTER

DETAIL 5
SCALE: N.T.S.

ITEM	QTY	DESCRIPTION (QUANTITY FOR ONE INSTALLATION)
1	A/R	2-3/8" O.D., SCH 80, HOT-DIPPED GALVANIZED STEEL PIPE
2	A/R	2"x2" NOMINAL, 5/16" THICK, SQUARE TUBING
3	1	9"x9", 3/8" THICK PLATE
4	2	2-3/8", 1/4" THICK CAP PLATE
5	2	2-5/8"x2-5/8", 1/4" THICK CAP PLATE



PRESSURE GAUGE WITH BALL VALVE

DETAIL 6
SCALE: N.T.S.

BURNS & MCDONNELL
STATE LICENSE #43

YEVGENIY KHISLAVSKIY
02/12/2020
KENTUCKY
SEAL 34514

PROFESSIONAL ENG/ARCH STAMP

NO.	DATE	REVISION(S) DESCRIPTION	BY	CHK	APPD
0	02-19-2021	ISSUED FOR AS-BUILT	MCR	KM	AHD

DESCRIPTION	
AREA CODE	-
ACCOUNT NUMBER	-
PROJECT NUMBER	V8351
DRAWING BY	MCR
STATION ID	-
CHECKER INITIALS	KM

APPROVALS		
DATE	INITIALS	
N/A	N/A	REGIONAL ENGINEER
N/A	N/A	MGR TECH REC & STD
02-12-2020	YBK	PRINCIPAL ENGINEER

UL60 PROJECTS
INSTRUMENT INSTALLATION DETAILS
BOONE COUNTY, KY
ERLANGER, KY

REF. DWG(S) -
-

SHEET(S) 1 OF 1	DWG SCALE NONE
DWG DATE 07/09/2019	SUPERSEDED —

DRAWING NUMBER: PNG - E-043-0001085
REVISION: 0
DISCIPLINE / RESOURCE CENTER / LINE NUMBER