NORWOOD C350 STATION

SCALE 1:200
LAT : 39.178327° LONG : -84.454349°

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ISSUED FOR CONSTRUCTION

BURNS & McDONNELL
ENGINEERING COMPANY, INC.
STATE LICENSE # COA:01557

STATE OF OHIO
CHAD A BACON
PE.85638
REGISTERED
PROFESSIONAL ENGINEER
1/8/2021
PROFESSIONAL ENGARCH STAMP

NO.	DATE	REVISION(S) DESCRIPTION	BY	CHK	APPD
0	01-08-2021	ISSUED FOR CONSTRUCTION	RDC	JBF	CAB

DESCRIPTION	
AREA CODE	
ACCOUNT NUMBER	AW2128
PROJECT NUMBER	1880115
DRAWING BY	MAS
STATION ID	S0868O1
CHECKER INITIALS	JBF

APPROVALS			
DATE	INITIALS		REGIONAL ENGINEER
			MGR TECH REC & STD
DATE	INITIALS		PRINCIPAL ENGINEER
01/08/2021	CAB		

DUKE ENERGY

C350 PROJECT
NORWOOD C350 STATION
COVER SHEET
HAMILTON COUNTY, OHIO

SHEET(S)	1 OF 68
DWG SCALE	AS NOTED
DWG DATE	07/15/2019
	SUPERSEDED
DRAWING NUMBER	PNG -G-004-0001043
REVISION	0

DISCIPLINE / RESOURCE CENTER / LINE NUMBER

GENERAL NOTES:

1. INSTALLER SHALL FURNISH ALL MATERIALS NOT PROVIDED BY THE COMPANY (UNLESS OTHERWISE NOTED ON DRAWINGS OR SPECIFICATIONS), INCLUDING EQUIPMENT, TRANSPORTATION, SERVICES, AND PERFORM ALL NECESSARY WORK AS SHOWN ON THE DRAWINGS AND SPECIFIED HEREINAFTER.
2. IT SHALL BE THE RESPONSIBILITY OF THE INSTALLER TO VERIFY ALL DIMENSIONS GIVEN ON THE DRAWINGS. ANY ITEM IN QUESTION SHALL BE BROUGHT TO THE ATTENTION OF THE PROJECT MANAGER IN WRITNG VIA RFI PROCESS PRIOR TO PROCEEDING WITH THE WORK.
3. INSTALLER SHALL BE RESPONSIBLE FOR PROTECTION OF ALL SURROUNDING AREAS. CONTRACTOR SHALL NOT UNNECESSARILY DISTURB EXISTING CONDITIONS WITHIN CONSTRUCTION LIMITS. DISCRETION SHALL BE PER COMPANY REPRESENTATIVE.
4. PROPOSED ELEVATIONS AND DIMENSIONS INDICATE TOP OF PIPE, UNLESS OTHERWISE NOTED. UNLESS SPECIFICALLY NOTED, DEPTHS OF EXISTING FACILITIES ARE ESTIMATED ONLY. CONTRACTOR IS RESPONSIBLE FOR VERIFYING DEPTH AND LOCATION OF ALL FACILITIES PRIOR TO COMMENCING WORK.
5. ALL BELOW GROUND WELDS SHALL BE COATED WITH DENSO 7200 PER PERTINENT DESIGN AND CONSTRUCTION STANDARDS OR AS APPROVED OTHERWISE. SURFACE PREPARATION AND BLASTING SHALL ADHERE TO PERTINENT DESIGN AND CONSTRUCTION STANDARDS AND COATING MATERIAL SPECIFICATIONS.
6. UPON BACKFILLING IN AREAS OF ROCK, BURIED PIPE SHALL HAVE MINIMUM 6" OF SAND PAD FILL PLACED AROUND THE PIPE'S CIRCUMFERENCE.
7. PRESSURE TESTING SHALL MEET THE REQUIREMENTS OF DUKE'S PRESSURE TESTING STANDARD, PER PERTINENT DESIGN AND CONSTRUCTION STANDARDS.
8. INSTALLER SHALL DEWATER ALL HYDROSTATICALLY TESTED PIPING, USING CLEANING PIGS AS REQUIRED, AND DRY TO A DEWPOINT OF -40 °F PER PERTINENT DESIGN AND CONSTRUCTION STANDARDS.
9. ALL DISTANCES SHOWN ARE GRID DISTANCES BASED ON OHIO STATE PLANE COORDINATE SOUTH ZONE (3402) NAD 83.
10. ABOVE GROUND FEATURES AND CONTOURS PROVIDED BY XP-RS, LLC FROM OVERLAND PARK, KS 66225.
11. BELOW GROUND SURVEY PROVIDED BY G.J. BERDING SURVEYING FROM MILFORD, OH 45150. SURVEY SUBS INCLUDE RLA UTILITIES FROM CINCINNATI, OH 45215 AND THE UNDERGROUND DETECTIVE® FROM CINCINNATI, OH 45251.
12. ANY CHANGES TO THE DESIGN SHOWN ON DRAWINGS SHALL BE APPROVED BY COMPANY REPRESENTATIVE IN WRITING VIA RFI PROCESS.

CONSTRUCTION NOTES:

1. EXISTING OVERHEAD AND BELOWGROUND FACILITIES MAY BE IN THE WORK AREA VICINITY. INSTALLER IS RESPONSIBLE FOR HAVING SUCH FACILITIES LOCATED AND IS RESPONSIBLE FOR MAINTENANCE AND PRESERVATION OF THESE FACILITIES.
2. PER PERTINENT DESIGN AND CONSTRUCTION STANDARDS, INSTALLER IS REQUIRED TO CALL 811 FOR UTILITY LOCATES A MINIMUM OF 72 HOURS PRIOR TO COMMENCEMENT OF WORK. NO EXTRA COMPENSATION WILL BE ALLOWED FOR DELAYS FROM ANY WORK PROVIDED BY OTHER UTILITIES.
3. IF EXISTING UTILITIES OF ANY TYPE ARE ENCOUNTERED IN THE FIELD AND DEEMED TO BE IN CONFLICT WITH INSTALLATION OF FACILITIES, INSTALLER SHALL NOTIFY THE PROJECT MANAGER IN WRITING VIA FRI PROCESS IMMEDIATELY SO THE CONFLICT MAY BE RESOLVED.
4. WHEN EXISTING DRAINAGE FACILITIES ARE DISTURBED, INSTALLER SHALL PROVIDE AND MAINTAIN TEMPORARY OUTLETS AND CONNECTIONS FOR PRIVATE DRAINS OR SEWERS. RESTORATION OF THESE FACILITIES IS TO BE PERFORMED ONCE CONSTRUCTION IS COMPLETE AND ARE CONSIDERED INCIDENTAL COSTS OF THE PROJECT.
5. ALL DRAWING MEASUREMENTS ARE TO BE TAKEN FROM EXISTING GRADE. FINAL GRADE SHALL BE MATCHED TO SURROUNDING GRADE AS PER PERTINENT DESIGN AND CONSTRUCTION STANDARDS.
6. INSTALLER IS TO REMAIN WITHIN CONSTRUCTION WORKING LIMITS. ACCESS TO AREAS OUTSIDE WORKING LIMITS MUST BE COORDINATED WITH THE OWNER OR DUKE ENERGY PROJECT MANAGER.
7. ALL EXCESS EXCAVATION, CONSTRUCTION DEMOLITION DEBRIS AND UNSUITABLE MATERIALS THAT DO NOT CONTAIN ASBESTOS SHALL BE REMOVED FROM THE SITE AND PROPERLY DISPOSED.
8. STANDARD SPECIFICATIONS REFERENCED ON THIS SHEET AND CONSTRUCTION PLANS ARE CONSIDERED AS PART OF THE CONTRACT DOCUMENTS. INCIDENTAL ITEMS OR ACCESSORIES NECESSARY TO COMPLETE THIS WORK MAY NOT BE SPECIFICALLY NOTED, BUT ARE CONSIDERED TO BE A PART OF THIS CONTRACT.
9. BEFORE ACCEPTANCE BY THE OWNER AND FINAL PAYMENT, ALL WORK SHALL BE INSPECTED AND APPROVED BY DUKE CR COMPANY REPRESENTATIVE. FINAL PAYMENT SHALL BE MADE AFTER ALL OF THE INSTALLER'S WORK HAS BEEN ACCEPTED AND APPROVED AND IN ACCORDANCE WITH THE CONTRACT DOCUMENTS.
10. DURING CONSTRUCTION, ALL LOOSE MATERIAL THAT ARE DEPOSITED IN THE FLOW LINE OF GUTTERS, DRAINAGE STRUCTURES, DITCHES, ETC. SUCH THAT THE NATURAL FLOW LINE OF WATER IS OBSTRUCTED, SHALL BE REMOVED AT THE END OF EACH WORK DAY.
11. ALL FIELD TILE ENCOUNTERED DURING CONSTRUCTION SHALL BE EXTENDED TO OUTLET INTO AN EXISTING DRAINAGE WAY. A RECORD OF ALL FIELD TILE FOR ONSITE DRAIN PIPE ENCOUNTERED SHALL BE KEPT BY THE INSTALLER AND TURNED OVER TO THE PROJECT MANAGER UPON COMPLETION OF THE PROJECT.
12. INSTALLER IS REQUIRED TO MAINTAIN A SET OF ISSUED FOR CONSTRUCTION DRAWINGS AND ALL PERMITS AT THE JOB SITE. ANY MODIFICATIONS OR ALTERATIONS TO THE PLANS OR SPECIFICATIONS SHALL BE APPROVED BY THE PROJECT MANAGER.
13. INSTALLER IS SOLELY RESPONSIBLE FOR EXECUTION OF HIS/HER WORK IN ACCORDANCE WITH THE CONTRACT DOCUMENTS AND SPECIFICATIONS. INSTALLER IS RESPONSIBLE FOR THE CONSTRUCTION METHODS AND TECHNIQUES, SEQUENCES, TIME OF PERFORMANCE ALL SAFETY PRECAUTIONS.
14. MINIMUM DEPTH OF BURIAL SHALL BE PER PERTINENT DESIGN AND CONSTRUCTION STANDARDS.
15. ALL PIPELINES BEING CROSSED ARE TO BE PROTECTED WITH A MINIMUM OF (3) 4 FEET X 18 FEET WOODEN MATS.
16. CONTRACTOR TO PROTECT SIDEWALKS AND BIKE PATHS FROM VEHICLE TRAFFIC UTILIZING STEEL PLATING, TIMBER MATTING OR SIMILAR. EXISTING SIDEWALK, BITUMINOUS SHOULDER, CURB/GUTTER AND/OR ROADWAY PAVEMENT DISTURBED OR DAMAGED DUE TO THE PERMITTED WORK SHALL BE REPLACED IN KIND UP TO THE LIMITS AS DETERMINED AND DIRECTED BY THE CITY REPRESENTATIVE IN WHICH DAMAGE WAS DONE.
17. PER PERTINENT DESIGN AND CONSTRUCTION STANDARDS, FOR OPEN DITCH EXCAVATION, A MINIMUM OF TWO FEET OF SEPARATION SHALL BE MAINTAINED BETWEEN ALL CROSSING STRUCTURES. SEPARATION BETWEEN CROSSING STRUCTURES AND PIPELINES THAT ARE INSTALLED VIA DIRECTIONAL DRILLING METHODS IS AT THE DISCRETION OF ENGINEERING.
18. DURING BACKFILLING, A SIX INCH CROWN SHALL BE PLACED ON ALL DISTURBED AREAS. COMPACTION REQUIREMENTS SHALL BE PER PERTINENT DESIGN AND CONSTRUCTION STANDARDS.
19. BOLTS FOR FLANGES TO BE TORQUE PER PERTINENT DESIGN AND CONSTRUCTION STANDARDS.
20. ALL BUTT WELDS SHALL BE 100% X-RAYED PER PERTINENT WELDING PROCEDURES. ALL OTHER WELDS SHALL BE NON DESTRUCTIVELY TESTED PERTINENT WELDING PROCEDURES

CIVIL AND STRUCTURAL NOTES:

1. ADDITIONAL EXCAVATIONS BELOW FOOTINGS MAY BE NECESSARY TO REACH UNDISTURBED SOIL. SHOULD THIS OCCUR, REFER TO THE SOILS AND FOUNDATIONS SECTION ON DWG PNG-S-004-0001009 FOR ADDITIONAL DETAILS.
2. CONCRETE SHALL BE MIXED AND POURED PER PERTINENT DESIGN AND CONSTRUCTION STANDARDS. TESTING SHALL CONFORM TO ACI 318. CONTRACTOR TO SUPPLY ALL CONCRETE AND TESTING.
3. ALL STRUCTURAL STEEL SHALL CONFORM TO ASTM A36 SPECIFICATION. STEEL REINFORCING BAR SHALL CONFORM TO ASTM A615 GRADE 60 AND WELDED WIRE FABRIC SHALL CONFORM TO ASTM A185. TIE WIRE SHALL CONFORM TO ASTM A82.
4. UNSUITABLE OR EXCESS EARTH SPOIL SHALL BE DISPOSED OF AT AN APPROVED WASTE LOCATION. SOIL BEING TRANSPORTED ONTO THE JOB SITE SHALL BE APPROVED BY DUKE ENERGY.
5. A LAYER OF NON ABRASIVE MATERIAL SUCH AS FRP SHALL BE INSTALLED BETWEEN ALL PIPE SUPPORTS AND PIPING.
6. ALL FIELD BENDING OF REBAR SHALL BE DONE COLD.

ENVIRONMENTAL NOTES:

1. CONTRACTOR IS TO CONSTRUCT ALL SOIL EROSION AND SEDIMENT CONTROL MEASURES AT THE COMMENCEMENT OF THE PROJECT, PROVIDE MAINTENANCE AND ASSURE EFFECTIVENESS THROUGHOUT THE DURATION OF THE PROJECT.
2. CARE SHALL BE TAKEN TO MINIMIZE DOWNSTREAM SILTATION. RAW BANKS MAY BE SEEDED AND MULCHED TO PREVENT EROSION.
3. ALL SPOILS INCLUDING ORGANIC SOILS, VEGETATION AND DEBRIS SHALL BE REMOVED FROM THE SITE AND PROPERLY DISPOSED OF IN SUCH A MANNER AS TO NOT ERODE INTO ANY BODY OF WATER OR WETLAND.
4. SOIL EROSION AND SEDIMENT CONTROLS SHALL BE PLACED WHERE NECESSARY TO PREVENT SEDIMENT FROM LEAVING THE WORK AREA.
5. INLET PROTECTION DEVICES ARE REQUIRED AT ALL SEWER INLETS, GRATES AND MANHOLES FOR SEDIMENT CONTROL.
6. TOPSOIL STOCKPILES SHALL BE LOCATED TO AVOID EROSION OF SAID STOCKPILE ONTO OFFSITE AREAS.
7. ALL ENVIRONMENTAL MEASURES SHALL BE PER PERTINENT DESIGN AND CONSTRUCTION STANDARDS.
8. DUKE ENERGY SHALL CONTACT OPSB STAFF, ODNR, AND USFWS WITHIN 24 HOURS IF STATE OR FEDERAL THREATENED OR ENDANGERED SPECIES ARE ENCOUNTERED DURING CONSTRUCTION ACTIVITIES. CONSTRUCTION ACTIVITIES THAT COULD ADVERSELY IMPACT THE IDENTIFIED PLANTS OR ANIMALS SHALL BE IMMEDIATELY HALTED UNTIL AN APPROPRIATE COURSE OF ACTION HAS BEEN AGREED UPON BY DUKE ENERGY, OPSB STAFF, AND THE APPROPRIATE REGULATORY AGENCIES.
9. THE CONSTRUCTION CONTRACTOR SHALL COMPLY WITH FUGITIVE DUST RULES BY THE USE OF WATER SPRAY OR OTHER APPROPRIATE DUST SUPPRESSANT MEASURES WHENEVER NECESSARY.
10. THE CONSTRUCTION CONTRACTOR SHALL REMOVE ALL TEMPORARY GRAVEL AND OTHER CONSTRUCTION STAGING AREA AND ACCESS ROAD MATERIALS AFTER COMPLETION OF CONSTRUCTION ACTIVITIES, AS WEATHER PERMITS, UNLESS OTHERWISE DIRECTED BY THE LANDOWNER OR DUKE ENERGY. IMPACTED AREAS SHALL BE RESTORED TO RECONSTRUCTION CONDITIONS IN COMPLIANCE WITH OHIO EPA GENERAL NATIONAL POLLUTANT DISCHARGE ELIMINATION SYSTEM (NPDES) PERMITS OBTAINED FOR THE PROJECT AND THE APPROVED STORMWATER POLLUTION PREVENTION PLAN (SWPPP) CREATED FOR THE PROJECT.

BURNS & MCDONNELL
ENGINEERING COMPANY, INC.
STATE LICENSE # COA2185

STATE OF OHIO
CHAD A BACON
PE.85638
REGISTERED
PROFESSIONAL ENGINEER
1/8/2021
PROFESSIONAL ENGINEER STAMP

NO.	DATE	REVISION(S) DESCRIPTION	BY	CHK	APPD
0	01-08-2021	ISSUED FOR CONSTRUCTION	RDC	JBF	CAB

DESCRIPTION	
AREA CODE	
ACCOUNT NUMBER	AW2128
PROJECT NUMBER	1880115
DRAWING BY	MAS
STATION ID	S0868O1
CHECKER INITIALS	JBF

APPROVALS	DATE	INITIALS	
			REGIONAL ENGINEER
			MGR TECH REC & STD
	01/08/2021	CAB	PRINCIPAL ENGINEER

DUKE ENERGY®

C350 PROJECT
NORWOOD C350 STATION
GENERAL NOTES & REQUIREMENTS

HAMILTON COUNTY, OHIO

REF. DWG(S) PNG-G-004-0001043

SHEET(S) 2 OF 68	DWG SCALE NONE
DWG DATE 08/28/2018	SUPERSEDED
DRAWING NUMBER	REVISION
PNG -G-004-0001044	0

DISCIPLINE / RESOURCE CENTER / LINE NUMBER

GENERAL NOTES:

1. THE EXISTING SITE UTILITIES AND FEATURES SHOWN ARE BASED ON A FIELD RUN TOPOGRAPHIC SURVEY PERFORMED BY BERDING SURVEY CONSULTING IN FEBRUARY, 2020.
2. ALL DIMENSIONS, ELEVATIONS, AND STATIONS ARE IN FEET, UNLESS INDICATED OTHERWISE.
3. CALLOUTS, COORDINATES, AND DIMENSIONS ARE POINTED TO OR MEASURED TO STRUCTURE CENTER, EDGE OF PAVEMENT, BACK OF CURB, OR OUTSIDE FACE OF FOUNDATION WALL, UNLESS INDICATED OTHERWISE.
4. ALL WORK SHALL BE SUBJECT TO INSPECTION BY AUTHORIZED PERSONNEL OF LOCAL AND GOVERNMENT REGULATORY AGENCIES AND THE CLIENT REPRESENTATIVE.
5. SEE OHIO DEPARTMENT OF TRANSPORTATION (ODOT) DESIGN STANDARDS FOR REFERENCES TO ODOT STANDARD DRAWINGS. ALL SUBSEQUENT SPECIFICATIONS AND STANDARDS SHALL APPLY.
6. ALL WORK SHALL BE CONDUCTED IN ACCORDANCE WITH THE PLANS AND SPECIFICATIONS AND LOCAL AND GOVERNMENT CODES, ORDINANCES, AND REGULATIONS. IN CASE OF CONTRADICTION OR DISCREPANCY BETWEEN REQUIREMENTS, CONTRACTOR SHALL INCORPORATE WHICHEVER IS MOST STRINGENT. WHERE A QUESTION REMAINS ON WHICH REQUIREMENT IS MOST STRINGENT, CONTRACTOR SHALL SUBMIT ISSUE TO THE CLIENT REPRESENTATIVE IN WRITING. THE DECISION OF THE CLIENT REPRESENTATIVE SHALL BE CONSIDERED FINAL.
7. ALL WORK SHALL BE CONDUCTED IN A PROFESSIONAL WORKMANSHIP MANNER USING QUALITY MATERIALS. WORK SHALL CONFORM TO THESE DRAWINGS, UNLESS INDICATED OTHERWISE OR AS DIRECTED BY THE CLIENT REPRESENTATIVE.
8. CONTRACTOR SHALL CONFINE ALL WORK TO BE WITHIN THE PERMANENT AND TEMPORARY EASEMENTS.
9. ALL GRADING, PAVEMENT WORK, AND ANY OTHER MISCELLANEOUS WORK SHALL BE PERFORMED IN ACCORDANCE WITH THE CURRENT ODOT STANDARD SPECIFICATIONS FOR ROAD AND BRIDGE CONSTRUCTION AND SUPPLEMENTAL SPECIFICATIONS.
10. CONTRACTOR SHALL TAKE CARE TO MAINTAIN THE SITE AND ADJACENT AREAS IN AS CLEAN A CONDITION AS POSSIBLE. ANY DEBRIS, DIRT, MUD, ETC. SHALL BE CLEANED DAILY, OR AS THE CLIENT REPRESENTATIVE DIRECTS, FROM ANY ADJOINING STREETS OR PROPERTIES BY THE CONTRACTOR AS A PART OF THE PRIMARY CONSTRUCTION WORK. THIS SHALL BE AT NO ADDITIONAL COMPENSATION TO THE CONTRACTOR.
11. DUKE ENERGY SHALL CONTACT OPSB STAFF, ODNR, AND USFWS WITHIN 24 HOURS IF STATE OR FEDERAL THREATENED OR ENDANGERED SPECIES ARE ENCOUNTERED DURING CONSTRUCTION ACTIVITIES. CONSTRUCTION ACTIVITIES THAT COULD ADVERSELY IMPACT THE IDENTIFIED PLANTS OR ANIMALS SHALL BE IMMEDIATELY HALTED UNTIL AN APPROPRIATE COURSE OF ACTION HAS BEEN AGREED UPON BY DUKE ENERGY, OPSB STAFF, AND THE APPROPRIATE REGULATORY AGENCY.
12. THE CONSTRUCTION CONTRACTOR SHALL COMPLY WITH FUGITIVE DUST RULES BY THE USE OF WATER SPRAY OR OTHER APPROPRIATE DUST SUPPRESSANT MEASURES WHENEVER NECESSARY.
13. THE CONSTRUCTION CONTRACTOR SHALL REMOVE ALL TEMPORARY GRAVEL AND OTHER CONSTRUCTION STAGING AREA AND ACCESS ROAD MATERIALS AFTER COMPLETION OF CONSTRUCTION ACTIVITIES, AS WEATHER PERMITS, UNLESS OTHERWISE DIRECTED BY THE LANDOWNER OR DUKE ENERGY. IMPACTED AREAS SHALL BE RESTORED TO PRECONSTRUCTION CONDITIONS IN COMPLIANCE WITH THE OHIO EPA GENERAL NATIONAL POLLUTANT DISCHARGE ELIMINATION SYSTEM (NPDES) PERMITS OBTAINED FOR THE PROJECT AND THE APPROVED STORMWATER POLLUTION PREVENTION PLAN (SWPPP) CREATED FOR THE PROJECT.

CONSTRUCTION DRAWING NOTES:

1. CONTRACTOR SHALL MAINTAIN UPDATED CONSTRUCTION DRAWINGS AT ALL TIMES THROUGH THE DURATION OF THE PROJECT. CONSTRUCTION RECORD DRAWINGS SHALL BE SUBMITTED TO THE CLIENT REPRESENTATIVE.
2. DURING CONSTRUCTION OF THE PROJECT, CONTRACTOR SHALL BE RESPONSIBLE FOR KEEPING TRACK OF ANY CLIENT REPRESENTATIVE-APPROVED FIELD CONSTRUCTION REVISIONS TO THE DESIGN DEPICTED ON APPROVED CONSTRUCTION DRAWINGS.
3. ALL VARIATIONS IN PROJECT CONDITIONS, LOCATIONS, AND CONFIGURATIONS, AND ANY OTHER CHANGES OR DEVIATIONS FROM THE INFORMATION PRESENTED ON THE ORIGINAL, APPROVED CONSTRUCTION DRAWINGS SHALL BE NOTED. THIS INCLUDES BURIED OR CONCEALED CONSTRUCTION AND UTILITY FEATURES THAT WERE REVEALED DURING CONSTRUCTION.
4. THE CLIENT REPRESENTATIVE SHALL REVIEW COMPLETENESS, ACCURACY, AND FORMAT OF SUBMITTED CONSTRUCTION DRAWINGS. IF THE CONSTRUCTION DRAWINGS ARE CONSIDERED UNACCEPTABLE, THEY SHALL BE RETURNED TO THE CONTRACTOR FOR CORRECTION AND RESUBMISSION. THIS SHALL BE AT NO ADDITIONAL COMPENSATION TO THE CONTRACTOR.

COORDINATION AND COMMUNICATION

1. CONTRACTOR SHALL APPOINT A PRIMARY CONSTRUCTION SUPERINTENDENT, SUBJECT TO THE APPROVAL OF THE CLIENT REPRESENTATIVE, WHO SHALL BE PRESENT ON THE CONSTRUCTION SITE AT ALL TIMES DURING WORKING HOURS AND ACCESSIBLE AT ALL TIMES WHILE WORK IS IN PROGRESS. THE PRIMARY CONSTRUCTION SUPERINTENDENT SHALL BE DESIGNATED THE RESPONSIBLE CONTRACTOR'S REPRESENTATIVE WHO SHALL BE AVAILABLE ON A 24-HOUR BASIS. WHEN THE CONTRACTOR'S PRIMARY CONSTRUCTION REPRESENTATIVE IS NOT AVAILABLE ON THE CONSTRUCTION SITE, AN ALTERNATE REPRESENTATIVE SHALL BE PROVIDED. CONTRACTOR SHALL PROVIDE NAMES AND CONTACT INFORMATION OF REPRESENTATIVES TO THE CLIENT REPRESENTATIVE PRIOR TO THE START OF CONSTRUCTION ACTIVITIES.
2. CONTRACTOR SHALL BE RESPONSIBLE FOR MAINTAINING CONSTANT COORDINATION BETWEEN ANY SUBCONTRACTORS AND THE CLIENT REPRESENTATIVE. ALL CONSTRUCTION ACTIVITIES PLANNED BY THE CONTRACTOR SHALL BE REVIEWED AND APPROVED BY THE CLIENT REPRESENTATIVE.
3. THE FOLLOWING CONTACT INFORMATION IS PROVIDED FOR CONTRACTOR'S USE IN CASE OF AN EMERGENCY:

   a. EMERGENCY 911
   b. OTHER CONTACTS AS DIRECTED AT PRE-CONSTRUCTION MEETING

EXCAVATION AND TRENCHES

1. CONTRACTOR SHALL COMPLY WITH THE MOST CURRENT EDITION OF OCCUPATIONAL SAFETY AND HEALTH ADMINISTRATION (OSHA) REGULATIONS AND THE STATE OF OHIO LAWS CONCERNING EXCAVATION.
2. CONTRACTOR SHALL BE RESPONSIBLE FOR ENSURING THAT ALL EXCAVATION, TRENCHING AND SHORING ARE PERFORMED IN A MANNER THAT COMPLIES WITH LOCAL REGULATIONS AND OSHA REGULATIONS FOR CONSTRUCTION.
3. OPEN TRENCHES AND EXCAVATIONS AT THE CONSTRUCTION SITE SHALL BE PROMINENTLY MARKED WITH ORANGE BARRICADES WITH FLASHING RED LIGHTS ACCEPTABLE TO THE CLIENT REPRESENTATIVE.
4. CONTRACTOR SHALL PROVIDE A MINIMUM NOTICE OF 48 HOURS TO THE CLIENT REPRESENTATIVE AND ASSOCIATED UTILITY COMPANIES AND AGENCIES BEFORE PROCEEDING WITH ANY EXCAVATION.
5. DEWATERING OF UTILITY TRENCHES AND OTHER EXCAVATIONS MAY BE REQUIRED.
6. OPEN ONLY THOSE TRENCHES FOR WHICH MATERIAL IS ON-HAND AND READY FOR PLACING THEREIN. AS SOON AS POSSIBLE AFTER THE MATERIAL HAS BEEN PLACED AND WORK APPROVED, BACKFILL AND COMPACT TRENCHES AS SPECIFIED.
7. NO SPECIAL PROVISIONS WILL BE MADE FOR ROCK EXCAVATION, ANY BOULDERS ENCOUNTERED SHALL BE REMOVED AND DISPOSED OF OFF SITE.
8. ALL TOPSOIL SHALL BE REMOVED FROM AREAS TO BE GRADED. ALL USEABLE TOPSOIL SHALL BE STOCKPILED DURING GRADING AND REAPPLIED IN 3" LAYERS TO ALL SLOPES IMMEDIATELY AFTER GRADING IS COMPLETE.

OTHER SAFETY REQUIREMENTS

1. CONTRACTOR SHALL MAINTAIN SAFETY PRACTICES THAT CONFORM TO OSHA REGULATIONS.
2. IT IS THE RESPONSIBILITY OF THE CONTRACTOR TO OBTAIN AND PAY FOR ALL APPLICABLE PERMITS, FEES AND LICENSES FOR CONSTRUCTION AND EQUIPMENT.
3. THE CONTRACTOR SHALL PERFORM ON-SITE INSPECTIONS THROUGHOUT THE PROJECT AND REMEDY ANY SAFETY CONCERNS IMMEDIATELY.
4. THERE SHALL BE NO PERMANENT WASTE SITES ON SITE PROPERTY. ANY TEMPORARY WASTE AREA SHALL BE APPROVED BY THE CLIENT REPRESENTATIVE AND SHALL BE KEPT IN AN ORDERLY CONDITION. REMOVAL OF WASTE THAT IS NOT PROPERLY MAINTAINED IS SUBJECT TO THE DIRECTION OF THE CLIENT REPRESENTATIVE.
5. EROSION CONTROL DEVICES SHALL BE USED FOR THE ACCESS AND HAUL ROUTES, STAGING AREA, AND ANY MATERIAL STOCKPILES WHEN NECESSARY TO CONTROL EROSION AND STORM WATER RUNOFF. SEE DRAWINGS PNG-C-004-0001273 AND PNG-C-004-0001274 FOR EROSION AND SEDIMENT CONTROL REQUIREMENTS.
6. STOCKPILED MATERIAL SHALL BE CONSTRAINED IN A MANNER TO PREVENT MOVEMENT RESULTING FROM WIND CONDITIONS.
7. CONTRACTOR SHALL MAKE NECESSARY PROVISIONS TO LIMIT DUST CAUSED BY CONSTRUCTION ACTIVITIES TO A LIMIT ACCEPTABLE TO PROJECT SITE OPERATIONS. THE CONTRACTOR SHALL CONTROL BLOWING DUST ON THE PROJECT SITE FROM ANY HAUL ROUTE OR WORK AREA REGARDLESS OF SOURCE.
8. WILDLIFE ATTRACTANTS, SUCH AS TRASH AND FOOD SCRAPS, FROM CONSTRUCTION PERSONNEL AND ACTIVITIES SHALL BE REMOVED FROM THE PROJECT LIMITS.
9. GASOLINE, DIESEL FUEL, OIL, AND HAZARDOUS WASTE RESULTING FROM CONTRACTOR'S OPERATIONS OR ACTIVITIES SHALL BE PROPERLY DISPOSED OF IN ACCORDANCE WITH THE SPECIFICATIONS AND LOCAL REGULATORY REQUIREMENTS AND PROPERLY REMOVED FROM THE PROJECT PROPERTY. IF HAZARDOUS MATERIALS ARE ENCOUNTERED OR UNCOVERED DURING CONSTRUCTION ACTIVITIES, THE CONTRACTOR SHALL IMMEDIATELY NOTIFY THE CLIENT REPRESENTATIVE.
10. FAILURE TO COMPLY WITH THE CLIENT REPRESENTATIVE SAFETY REQUIREMENTS SHALL RESULT IN THE SUSPENSION OF CONSTRUCTION ACTIVITIES UNTIL ALL SAFETY CONCERNS ARE ADDRESSED BY THE CONTRACTOR TO THE SATISFACTION OF THE CLIENT REPRESENTATIVE.
11. ANY WORKERS AND EQUIPMENT NOT IN COMPLIANCE WITH SAFETY PLAN SHALL IMMEDIATELY BE REMOVED FROM THE WORK AREA.
12. THE CONTRACTOR SHALL NOT BURN OR BURY DEBRIS WITHOUT PERMISSION FROM THE SITE INSPECTOR.

SURVEY AND SUBSURFACE INVESTIGATION NOTES:

1. SURVEY CONTROL POINTS WILL BE PROVIDED PRIOR TO CONSTRUCTION. IF THE CONTRACTOR SHOULD NEED TO DISTURB THE CONTROL POINTS DURING CONSTRUCTION, REQUEST SHALL BE GIVEN TO THE SURVEYOR TO HAVE THE CONTROL POINTS RESET.
2. IF BENCHMARKS SHOWN ARE IN AREAS THAT REQUIRE DEMOLITION, OTHER BENCHMARKS SHALL BE ESTABLISHED BEFORE DEMOLITION AND CONSTRUCTION WORK BEGINS. CONTRACTOR SHALL GIVE REQUEST TO THE SURVEYOR.
3. HORIZONTAL CONTROL IS BASED ON NAD 83, OHIO STATE PLANE SOUTH ZONE. VERTICAL CONTROL IS BASED ON NAVD 83.

EXISTING CONDITIONS NOTES:

1. THE LOCATIONS OF STRUCTURES AND UNDERGROUND UTILITIES AS INDICATED HAVE BEEN OBTAINED FROM EXISTING RECORDS AND FIELD SURVEYS. UNDERGROUND STRUCTURES AND UTILITIES MAY BE PRESENT WHICH ARE NOT DOCUMENTED OR LOCATED.
2. THE CONTRACTOR SHALL FIELD-CHECK ALL EXISTING CONDITIONS AND BE THOROUGHLY FAMILIAR WITH THE SITE BEFORE ANY WORK COMMENCES. ANY DISCREPANCIES IN THE DRAWINGS SHALL BE IMMEDIATELY REPORTED TO THE CLIENT REPRESENTATIVE BEFORE ANY FURTHER WORK COMMENCES.
3. IT SHALL BE THE CONTRACTOR'S RESPONSIBILITY TO FIELD-VERIFY EXISTING STRUCTURES, UTILITIES, AND SURVEY INFORMATION, AND TO TAKE NECESSARY PRECAUTIONS DURING DEMOLITION AND CONSTRUCTION. CONTRACTOR SHALL VERIFY EXISTENCE AND MARK LOCATIONS OF ALL UTILITIES, INCLUDING SERVICE CONNECTIONS TO UNDERGROUND UTILITIES, PRIOR TO BEGINNING WORK. CONTRACTOR SHALL CONTACT THE CLIENT REPRESENTATIVE AND ALL ASSOCATED UTILITY COMPANIES AND AGENCIES TO IDENTIFY THE LOCATION OF UTILITIES. THERE IS NO GUARANTEE, EITHER EXPRESSED OR IMPLIED, THAT THE LOCATIONS, SIZE AND TYPE OF MATERIAL OF EXISTING UNDERGROUND UTILITIES INDICATED ARE REPRESENTATIVE OF THOSE TO BE ENCOUNTERED DURING CONSTRUCTION.
4. PRIOR TO CONSTRUCTION, THE CONTRACTOR SHALL NOTIFY THE CLIENT REPRESENTATIVE OF OPERATIONAL PLANS. IN THE EVENT AN UNEXPECTED UTILITY OR STRUCTURE INTERFERENCE OR CONFLICT IS ENCOUNTERED DURING CONSTRUCTION, THE CONTRACTOR SHALL IMMEDIATELY NOTIFY THE CLIENT REPRESENTATIVE. ANY UTILITY SERVICES OR STRUCTURES DISTURBED BY THE CONTRACTOR'S OPERATIONS SHALL BE RESTORED IMMEDIATELY AT CONTRACTOR'S EXPENSE TO THE SATISFACTION OF THE OWNER.
5. THE CONTRACTOR IS RESPONSIBLE FOR PROTECTING ITEMS NOT TO BE DAMAGED DURING DEMOLITION AND CONSTRUCTION. THE CONTRACTOR SHALL REPAIR OR REPLACE DAMAGED OR DISTURBED ITEMS TO THE SATISFACTION OF THE CLIENT REPRESENTATIVE.

GENERAL GRADING NOTES

1. ALL GRADING, PAVEMENT WORK, AND ANY OTHER MISCELLANEOUS WORK SHALL BE PERFORMED IN ACCORDANCE WITH THE CURRENT ODOT STANDARD SPECIFICATIONS FOR ROAD AND BRIDGE CONSTRUCTION AND SUPPLEMENTAL SPECIFICATIONS.
2. THE GRAVEL SURFACE COURSE SHALL BE CONSTRUCTED IN ACCORDANCE WITH ITEM 411 OF THE ODOT CONSTRUCTION AND MATERIAL SPECIFICATIONS.
3. THE CONTRACTOR SHALL BE RESPONSIBLE FOR GRADING INCLUDING EXCAVATION, EMBANKMENT, AND BACKFILLING AS NECESSARY TO CONSTRUCT ALL AGGREGATE ACCESS ROADS, AS OUTLINED IN THESE TECHNICAL SPECIAL PROVISIONS AND AS DIRECTED BY THE CLIENT REPRESENTATIVE.
4. THE CONTRACTOR SHALL BE HELD RESPONSIBLE FOR ANY DAMAGE DONE TO STORM MANHOLES OR OTHER UTILITIES DURING GRADING.
5. DISTRIBUTE EXCESS SOIL ON SITE AT THE DIRECTION OF THE CLIENT REPRESENTATIVE. DO NOT ALTER DIRECTION OF SURFACE DRAINAGE PATTERNS.
6. THE TOLERANCE OF THIS WORK SHALL BE TO WITHIN TO 0.1 FT OF THE EXISTING GROUND SURFACE ELEVATIONS.
7. THE ACCESS ROAD SUBGRADE SHALL HAVE SUFFICIENT STABILITY TO ACCOMMODATE CONSTRUCTION TRAFFIC WITHOUT EXCESSIVE SUBRADE RUTTING OR SHOVING. AT THE TIME OF PLACEMENT OF THE PAVEMENT, THE IN SITU SUBGRADE SHALL HAVE A CALIFORNIA BEARING RATIO (CBR) OF AT LEAST 6 PERCENT IN THE TOP 12 INCHES OF SUBGRADE. THE CBR PERCENTAGE WILL BE ASCERTAINED BY THE CONTRACTOR.
8. IF SOFT SPOTS ARE IDENTIFIED IN THE SUBGRADE SOIL, THE SUBGRADE SHALL BE SCARIFIED AND PROOF-ROLLED TO THE DEPTHS REQUIRED BY THE OWNER'S CONSTRUCTION INSPECTOR TO COMPACT AREAS TO THE DENSITY REQUIREMENTS OF THIS DOCUMENT. IF THE SOFT AREAS CANNOT BE ADEQUATELY COMPACTED, THE SOFT SOIL SHALL BE REMOVED AND REPLACED PER THE DESIGN PLANS WITH SUITABLE SOIL MATERIAL AND COMPACTED TO THE DENSITY REQUIREMENTS IN ACCORDANCE WITH THIS DOCUMENT.
9. THE QUALITY OF THE SOIL TO BE USED AS FILL MATERIAL SHALL BE AS SPECIFIED IN THIS DOCUMENT. ALL BACKFILL SHALL BE SPREAD IN LOOSE LIFTS NOT EXCEEDING 8" IN THICKNESS WHEN SELF-PROPELLED EQUIPMENT IS USED AND NOT EXCEEDING 6" WHEN HAND GUIDED EQUIPMENT IS USED. ALL ROOTS, WOOD, AND VEGETATION SHALL BE REMOVED FROM THE LAYER OF FILL PRIOR TO COMPACTION. ALL FILL AND EXPOSED SOIL IN CUT AREAS SHALL BE COMPACTED AS SPECIFIED IN THIS DOCUMENT. SOIL COMPACTION TESTS WILL BE REQUESTED BY THE OWNER AT APPROPRIATE INTERVALS DURING GRADING OPERATIONS.
10. ALL HAUL-IN MATERIAL SHALL BE FREE OF ROCKS 3" IN DIAMETER AND LARGER. THE OWNER'S CONSTRUCTION INSPECTOR SHALL APPROVE ALL HAUL-IN MATERIAL TO ENSURE THE QUALITY AND THE ABSENCE OF ENVIRONMENTAL HAZARDS.
11. THE FILL AREA SHALL BE CONSTRUCTED TO THE LINES AND GRADES SHOWN ON THE DESIGN DRAWINGS WITH MATERIAL SPECIFIED IN THIS DOCUMENT. THE OWNER'S CONSTRUCTION INSPECTOR WILL PROVIDE ALL NECESSARY BENCHMARKS, SURVEY MONUMENTS, AND BASE LINES REQUIRED FOR THE WORK. THE CONTRACTOR SHALL LAY OUT ALL LINES AND GRADES FOR THE BACKFILL AREAS. ANY PROPOSED CHANGES TO THE SLOPES AND GRADES SHALL REQUIRE THE APPROVAL OF THE OWNER'S CONSTRUCTION INSPECTOR IN ADVANCE. THE CONTRACTOR SHALL BE REQUIRED TO REMOVE, AT HIS OWN EXPENSE, ANY COMPACTED MATERIAL PLACED OUTSIDE OF THE APPROVED LINES OR GRADES.
12. SPOIL MATERIAL SHALL BE TOPSOIL AND OTHER SOIL MATERIALS CONTAINING GREATER THAN 5 PERCENT ORGANIC MATERIAL, SOIL WHICH IS TOO WET, SOIL WHICH DOES NOT MEET THE PLASTICITY AND/OR GRADATION LIMITS FOR SELECT MATERIAL AS SPECIFIED IN THIS DOCUMENT, OR OTHER SOIL MATERIAL DESIGNATED BY THE OWNER'S CONSTRUCTION INSPECTOR TO BE UNSUITABLE FOR SELECT MATERIAL.
13. SELECT SOIL MATERIAL SHALL BE THAT MATERIAL CLASSIFIED AS SM, SP, SC, SW AND CL, OR SW AND SC IN ACCORDANCE WITH ASTM D2487, AND SHALL HAVE A MAXIMUM LIQUID LIMIT OF 30, A MAXIMUM PLASTICITY INDEX OF 8, AND A MAXIMUM OF 35 PERCENT PASSING THE #200 SIEVE.
14. THE TOP SURFACE OF EACH LIFT OF BACKFILL SHALL BE PROTECTED FROM PUMPING, PONDING, AND GULLYING.
15. COMPACTION TESTING WILL BE PROVIDED AT THE EXPENSE OF THE CONTRACTOR. COMPACTION REQUIREMENTS OF SOIL BACKFILL SHALL BE AS INDICATED IN THE FOLLOWING TABLE:

LOCATION OF FILL	MINIMUM REQUIRED COMPACTION LEVEL STANDARD PROCTOR
A. GENERAL YARD AREA	98%(ASTM D698)
B. UPPER 18 INCHES OF SOIL TO BE USED AS ROAD SUBGRADE MATERIAL AND EXTENDING A MINIMUM OF 5 FEET BEYOND THE EDGE OF DEFINED ROADWAYS (IMMEDIATELY UNDER BASE MATERIAL)	98%(ASTM D698)

16. CRUSHED STONE IN DRIVE AREAS SHALL BE COMPACTED WITH A STATIC STEEL DRUM ROLLER (APPROXIMATELY 8 TONS). IF A VIBRATORY COMPACTOR IS USED, NO MORE THAN FOUR (4) PASSES SHALL BE ALLOWED.
17. APPROVAL SHALL BE RECEIVED FROM THE CLIENT REPRESENTATIVE FOR EACH FILL TYPE TO BE USED PRIOR TO PROCEEDING WITH BACKFILL OPERATIONS WITH THE MATERIAL IN QUESTION.
18. BACKFILL TO BE IMPORTED SHALL BE TESTED IN ACCORDANCE WITH THIS DOCUMENT AND APPROVED BY THE PROJECT MANAGER PRIOR TO DELIVERY OF MATERIAL TO THE SITE. THE OWNER'S CONSTRUCTION INSPECTOR ACCEPTS NO LIABILITY FOR ANY OUT OF SPECIFICATION MATERIAL ACCEPTED AND STOCKPILED BY THE CONTRACTOR
19. INSPECTION AND TESTING OF MATERIAL SHALL BE PERFORMED AS REQUIRED BY THIS DOCUMENT AT THE EXPENSE OF THE CONTRACTOR.
20. TESTS AND ANALYSIS OF MATERIAL SHALL BE PERFORMED IN ACCORDANCE WITH THE APPLICABLE STANDARDS REFERENCED IN THIS DOCUMENT FOR THE SPECIFIC TEST. FIELD INSPECTION SHALL BE PERFORMED AS REQUIRED BY THIS DOCUMENT.
21. THE BACKFILL AND EXPOSED SOIL IN CUT AREAS SHALL BE COMPACTED AS SPECIFIED ON THIS DOCUMENT. FIELD DENSITY TESTS SHALL BE PERFORMED BY THE CONTRACTOR TO VERIFY COMPACTION REQUIREMENTS HAVE BEEN ACHIEVED. IN-PLACE FIELD DENSITY TESTING OF THE COMPACTED BACKFILL SHALL BE CONDUCTED ACCORDING TO THE PROCEDURES OF THE SAND CONE METHOD (ASTM 1556), NUCLEAR METHOD (ASTM D3017), OR ACCORDING TO THE PROVISIONS OF THIS DOCUMENT. TEST RESULTS REPORTED SHALL INCLUDE BOTH THE MOISTURE CONTENT AND DRY DENSITY, ALONG WITH OTHER PERTINENT DATA SUCH AS LOCATION, ELEVATION, PROCTOR CURVE USED FOR COMPARISON, ETC. THE TESTING FREQUENCY SHALL BE ONE TEST FOR EACH 5,000 SQUARE FEET OF LIFT AREA OR PORTION THEREOF FOR EACH LIFT. IN ISOLATED AREAS OF LESS THAN 5,000 SQUARE FEET, TEST AT LEAST EVERY THIRD LIFT. WHEN BACKFILL OPERATIONS ARE CONCENTRATED IN SMALL AREAS USING LIGHT MANUALLY-GUIDED EQUIPMENT AND RELATIVELY THIN LIFTS, THE FREQUENCY OF DENSITY TESTING MAY BE REVISED AS DIRECTED BY THE OWNER'S CONSTRUCTION INSPECTOR. TEST LOCATION SHALL BE THE WEAKEST APPEARING AREA OF THE TOP LIFT DETERMINED BY TRACKING ACTION OF THE EQUIPMENT.
22. SUITABILITY OF SOIL MATERIAL FOR USE AS BACKFILL SHALL BE DETERMINED FOR EACH FILL TYPE BY THE RESULTS OF THE FOLLOWING TESTS:

   A. LIQUID LIMIT IN ACCORDANCE WITH ASTM D4318.
   B. PARTICLE SIZE ANALYSIS IN ACCORDANCE WITH ASTM D422.
   C. MOISTURE-DENSITY RELATIONS (STANDARD PROCTOR) IN ACCORDANCE WITH ASTM D698.
   D. MOISTURE CONTENT IN ACCORDANCE WITH ASTM D2216.
   E. SAMPLING OF SOIL SHALL BE IN ACCORDANCE WITH ASTM D2216.
   F. SOIL SHALL BE CLASSIFIED IN ACCORDANCE WITH ASTM D2487.

23. FREQUENCY OF TESTS: TESTS OF MATERIALS TO BE USED IN THE OPERATIONS COVERED IN THIS DOCUMENT SHALL BE IN ACCORDANCE WITH THE REQUIREMENTS GIVEN IN THIS DOCUMENT. FREQUENCIES OF IN-PLACE DENSITY TESTS SHALL BE AS STATED IN THIS DOCUMENT.
24. IF QUESTIONABLE COMPACTION RESULTS ARE OBTAINED, THE CLIENT REPRESENTATIVE MAY REQUIRE THE CONTRACTOR TO PERFORM PROCTOR CHECKS (ON DRY SIDE OF OPTIMUM) TO VERIFY THAT THE PROPER PROCTOR CURVE IS BEING REFERENCED. IF NOT, A NEW PROCTOR CURVE DETERMINED BY A FIVE-POINT TEST SHALL BE REQUIRED. IF THE COMPACTION REQUIREMENTS FOR A LIFT HAVE NOT BEEN ACHIEVED, THE LIFT SHALL BE REWORKED OR REPLACED AT THE CONTRACTOR'S EXPENSE.
25. TESTING OF IN-PLACE DENSITY AND MOISTURE CONTENT BY NUCLEAR METHODS IN ACCORDANCE WITH ASTM D2922 AND ASTM D3017, RESPECTIVELY, WILL BE ALLOWED PROVIDED:

   A. ACCEPTABLE CORRELATION WITH SAND CONE DENSITY AND LABORATORY DETERMINED MOISTURE CONTENT TEST RESULTS CAN BE OBTAINED ACCORDING TO THE GUIDELINES OF "CALIBRATION" SECTIONS OF ASTM D2922 AND ASTM D3017.
   B. THE INITIAL CORRELATION RESULTS ARE REVIEWED AND USE OF THE NUCLEAR DEVICE IS APPROVED BY THE OWNER'S CONSTRUCTION INSPECTOR.
   C. THE CONTRACTOR INSURES THAT THE REPRESENTATIVE FROM THE TESTING AGENCY OPERATING THE NUCLEAR DENSITY TESTING HAS THE NECESSARY STATE AND/OR FEDERAL LICENSES TO OPERATE THE DEVICE AND CARRY A NUCLEAR ENERGY SOURCE.

EMBANKMENT FILL NOTES:

1. EMBANKMENT FILL SHALL CONSIT OF AN INORGANIC, NON-PLASTIC, GRANULAR SOIL CONTAINING LESS THAN 10% MATERIAL PASSING THE NO. 200 MESH SIEVE WITH UNIFIED SOIL CLASSIFICATION OF SP, SP-SC, OR SP-SM. EMBANKMENT FILL SHALL BE PLACED IN LIFTS NOT EXCEEDING 8 INCHES WHEN USING A STATIC DRUM ROLLER WITH A MINIMUM OPERATING WEIGHT OF 5 TONS WITH A DRUM DIAMETER OF 3 TO 4 FEET. WHERE LIGHTWEIGHT VIBRATORY COMPACTION METHODS ARE UTILIZED MAXIMUM LOOSE LIFT THICKNESS SHALL BE 6 INCHES. COMPACTION TO MEET A MAXIMUM DRY DENSITY OF 98% STANDARD PROCTOR DRY DENSITY.
2. ANY GRADING TO CORRECT SLOPES SHALL BE COMPACTED PER THIS DOCUMENT.

GENERAL EXCAVATION REQUIRED FOR CONSTRUCTION

1. THIS ITEM SHALL CONSIST OF FURNISHING ALL LABOR, MATERIALS, MACHINERY, TOOLS, AND SUPERVISION FOR EXCAVATION AND GRADING REQUIRED TO PREPARE THE ROADWAY, AND GRADING REQUIRED TO COMPLETE THE FINAL GRADING OF AREAS ADJACENT TO THE ROADWAY AS SHOWN ON THE PLANS IN ACCORDANCE WITH THE PROVISIONS OF ITEM 209 OF THE ODOT CONSTRUCTION AND MATERIAL SPECIFICATIONS INSOFAR AS THEY ARE NOT AMENDED BY THE PLANS AND THESE SPECIAL PROVISIONS, AND IN ACCORDANCE WITH THE FOLLOWING SPECIAL PROVISIONS.

SUBGRADE COMPACTION VERIFICATION

1. THE CONTRACTOR SHALL EMPLOY AN INDEPENDENT CONSTRUCTION MATERIAL ENGINEERING TESTING FIRM TO MONITOR THE PROOFROLLING OF THE SITE AFTER THE STRIPPINGS HAVE BEEN REMOVED TO INSPECT AND TEST THE COMPACTED FILL AREAS IN THE ACCESS ROAD AREAS AS INDICATED ON THE BID DOCUMENTS AND/OR AS SPECIFIED BY THE OWNER'S DESIGNATED REPRESENTATIVE. COPIES OF THE TEST RESULTS SHALL BE FURNISHED TO THE OWNER'S DESIGNATED REPRESENTATIVE AND OTHERS AS INDICATED BY OWNER'S DESIGNATED REPRESENTATIVE. THE OWNER'S DESIGNATED REPRESENTATIVE MUST APPROVE THE INDEPENDENT CONSTRUCTION MATERIAL ENGINEERING TESTING FIRM. INCLUDED WITH THIS BID PROPOSAL, THE CONTRACTOR SHALL FURNISH THE NAME, ADDRESS AND A PHONE NUMBER OF THE INDEPENDENT CONSTRUCTION MATERIAL ENGINEERING TESTING FIRM FOR APPROVAL.

DEWATERING NOTES

1. ALL DEWATERING SHALL BE PERFORMED IN ACCORDANCE WITH THE SWPPP.
2. CONTROL GRADING AROUND EXCAVATIONS TO PREVENT SURFACE WATER FROM FLOWING INTO EXCAVATION AREAS.
3. DRAIN OR PUMP AS REQUIRED TO MAINTAIN, INCLUDING DAYS NOT NORMALLY WORKED, ALL EXCAVATIONS FREE OF WATER OR MUD FROM ANY SOURCE, AND DISCHARGE TO APPROVED DRAINS OR CHANNELS. COMMENCE WHEN WATER FIRST APPEARS AND CONTINUE AS REQUIRED TO KEEP EXCAVATION FREE OF STANDING WATER DURING ENTIRE TIME EXCAVATION IS OPEN.
4. USE PUMPS OF ADEQUATE CAPACITY TO ENSURE RAPID DRAINAGE OF AREA, AND CONSTRUCT AND USE DRAINAGE CHANNELS AND SUBDRAINS WITH SUMPS AS REQUIRED BY QUANTITY OF INFLOW.
5. WHEN WATER IS FOUND IN THE EXCAVATION DUE TO CONTRACTOR NEGLIGENCE, REMOVE UNSUITABLE EXCESSIVELY WET SUBGRADE MATERIALS AND REPLACE WITH APPROVED COMPACTED EMBANKMENT MATERIAL AS DIRECTED BY OWNER AND AT NO ADDITIONAL COST TO OWNER.

ABBREVIATIONS:

ASTM	AMERICAN SOCIETY FOR TESTING AND MATERIALS
CBR	CALIFORNIA BEARING RATION
FT	FEET
JAB	JACK AND BORE
GIS	GEOGRAPHIC INFORMATION SYSTEM
MAX	MAXIMUM
MIN	MINIMUM
NPDES	NATIONAL POLLUTANT DISCHARGE ELIMINATION SYSTEM
NTS	NOT TO SCALE
ODOT	OHIO DEPARTMENT OF TRANSPORTATION
OSHA	OCCUPATIONAL SAFETY AND HEALTH ADMINISTRATION
PL	PROPERTY LINE

LEGEND:

ST	EXISTING STORM SEWER
	EXISTING UTILITY POLE
E	EXISTING OVERHEAD ELECTRIC
	EXISTING FENCE
PL	PROPERTY LINE
COMM	EXISTING OVERHEAD COMM LINE
SS	EXISTING SANITARY SEWER
T	EXISTING UNDERGROUND TELEPHONE LINE
W	EXISTING WATER LINE
G	EXISTING UNDERGROUND GAS LINE
X	PROPOSED FENCE

BURNS & McDONNELL
ENGINEERING COMPANY, INC.
STATE LICENSE # COA.01557

STATE OF OHIO
CHRISTOPHER D. WILSON
82217
REGISTERED
PROFESSIONAL ENGINEER
01/08/2021
PROFESSIONAL ENGINEER STAMP

NO.	DATE	REVISION(S) DESCRIPTION	BY	CHK	APPD
0	01/08/2021	ISSUED FOR CONSTRUCTION	JTG	CNS	CDW

DESCRIPTION	
AREA CODE	
ACCOUNT NUMBER	AW2128
PROJECT NUMBER	1880115
DRAWING BY	JTG
STATION ID	S0868O1
CHECKER INITIALS	CNS

APPROVALS DATE	INITIALS	
		REGIONAL ENGINEER
		MGR TECH REC & STD
01/08/2021	CDW	PRINCIPAL ENGINEER

DUKE ENERGY

C350 PROJECT
NORWOOD C350 STATION
CIVIL GENERAL NOTES AND ABBREVIATIONS
HAMILTON COUNTY, OHIO

REF. DWG(S)	PNG-G-004-0001043
SHEET(S)	3 OF 68
DWG SCALE	AS NOTED
DWG DATE	07/26/2019
SUPERSEDED	—
DRAWING NUMBER	PNG -C-004-0001271
REVISION	0

DISCIPLINE / RESOURCE CENTER / LINE NUMBER

BURNS & MCDONNELL ENGINEERING COMPANY, INC.
STATE LICENSE # COA:01557

ACCESS AND STAGING

1. ACCESS AND HAUL ROUTES FOR ALL CONTRACTOR PERSONNEL, VEHICLES, EQUIPMENT, AND DELIVERIES ARE ILLUSTRATED ON THIS DRAWING AND ARE SUBJECT TO THE APPROVAL OF THE CLIENT REPRESENTATIVE. IT SHALL BE THE CONTRACTOR'S RESPONSIBILITY TO COORDINATE OFF-SITE HAUL ROUTES WITH THE APPROPRIATE OWNER WHO HAS JURISDICTION OVER THE AFFECTED ROUTE. ACCESS ROUTES AND HAUL ROUTES ARE SUBJECT TO CHANGE AT THE DIRECTION OF THE CLIENT REPRESENTATIVE AND MAY CHANGE BASED ON OPERATIONAL REQUIREMENTS OF THE SITE.
2. CONTRACTOR SHALL COORDINATE ACTIVITIES AND MAINTAIN ALL ACCESS AND HAUL ROUTES IN A MANNER THAT ALLOWS UNOBSTRUCTED EMERGENCY ACCESS TO ALL PROJECT AREAS AND EXISTING ROADWAYS AT ALL TIMES WITHOUT DELAY TO EMERGENCY AND SECURITY VEHICLE RESPONSE TIME.
3. IF ANY EMERGENCY ROUTES REQUIRE CLOSURE DUE TO CONSTRUCTION ACTIVITIES, CONTRACTOR SHALL NOTIFY THE CLIENT REPRESENTATIVE, POLICE, LOCAL FIRE AUTHORITY, AND ALL OTHER EMERGENCY SERVICES OF THE CLOSURE.
4. CONTRACTOR SHALL MAINTAIN ACCESS AND HAUL ROUTES TO BE FREE FROM DEBRIS CAUSED FROM CONSTRUCTION ACTIVITIES ON A DAILY BASIS.
5. CONTRACTOR SHALL RESTRICT ALL OPERATIONS TO AREAS WITHIN THE CONSTRUCTION LIMITS UNLESS COORDINATED OTHERWISE WITH THE CLIENT REPRESENTATIVE.
6. CONTRACTOR SHALL PROVIDE TEMPORARY CONSTRUCTION FENCING AROUND THE ENTIRE SITE DURING CONSTRUCTION.
7. CONTRACTOR IS RESPONSIBLE FOR ESTABLISHING A STAGING AND STOCKPILE AREA FOR MATERIALS AND EQUIPMENT. LOCATION OF CONTRACTOR'S STAGING SHALL BE AS ILLUSTRATED ON THIS DRAWING, AND IS SUBJECT TO THE APPROVAL OF THE CLIENT REPRESENTATIVE. CONTRACTOR MAY SUBMIT ALTERNATIVES TO THE STAGING AREA LOCATIONS AS SHOWN. CONTRACTOR'S STAGING AREA IS SUBJECT TO CHANGE AT THE DIRECTION OF THE CLIENT REPRESENTATIVE AND MAY CHANGE BASED ON OPERATIONAL REQUIREMENTS OF THE PROJECT SITE.
8. WHEN NOT ENGAGED IN CONSTRUCTION ACTIVITIES, CONTRACTOR'S EQUIPMENT AND VEHICLES SHALL BE PARKED IN THE STAGING AREA.
9. ACCESS POINTS, HAUL ROUTES, STAGING AREA, AND ANY OTHER AREAS DISTURBED BY THE CONTRACTOR SHALL BE RESTORED TO THEIR ORIGINAL CONDITION OR BETTER TO THE SATISFACTION OF THE CLIENT REPRESENTATIVE.
10. CONTRACTOR SHALL IMPROVE THE EXISTING ACCESS ROAD AS REQUIRED AND AS DIRECTED BY AND APPROVED BY CLIENT REPRESENTATIVE.

TRAFFIC CONTROL

1. PRIOR TO CONSTRUCTION, CONTRACTOR SHALL CORDON OFF THE CONSTRUCTION WORK AREA AND ASSOCIATED ROADWAYS BY USING BARRICADES APPROVED BY THE CLIENT REPRESENTATIVE.
2. ALL CONSTRUCTION EQUIPMENT AND VEHICLES SHALL BE MARKED WITH COMPANY DESIGNS, INSIGNIAS, OR OTHER MARKINGS, WHICH ARE CLEARLY VISIBLE.
3. CONSTRUCTION EQUIPMENT SHALL HAVE AUTOMATIC SIGNALING DEVICES TO SOUND AN ALARM WHEN MOVING IN REVERSE.
4. NO PEDESTRIAN TRAFFIC SHALL BE ALLOWED INSIDE THE CONSTRUCTION LIMITS.
5. ANY DAMAGE TO ROADS AND PAVEMENTS-TO-REMAIN DUE TO CONSTRUCTION EQUIPMENT OR TRAFFIC SHALL BE REPAIRED TO RESTORE THE ROADS AND PAVEMENTS TO THEIR ORIGINAL CONDITION TO THE SATISFACTION OF THE CLIENT REPRESENTATIVE.

N

0 100' 200'
1IN = 100FT

STATE OF OHIO — CHRISTOPHER D. WILSON — 82217 — REGISTERED PROFESSIONAL ENGINEER
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PRINCIPAL ENGINEER	01/08/2021	CDW

DUKE ENERGY

C350 PROJECT
NORWOOD C350 STATION
ACCESS & CONSTRUCTION STAGING

HAMILTON COUNTY, OHIO

REF. DWG(S) PNG-G-004-0001043

SHEET(S) 4 OF 68	DWG SCALE AS NOTED
DWG DATE 07/26/2019	SUPERSEDED —
DRAWING NUMBER	REVISION
PNG -C-004-0001272	0

DISCIPLINE / RESOURCE CENTER / LINE NUMBER

GENERAL NOTES FOR SEDIMENT POLLUTANT CONTROLS:

1. PERIMETER SEDIMENT CONTROL MEASURES (FILTER SOCK) SHALL BE IMPLEMENTED AS THE FIRST STEP OF GRADING AND WITHIN SEVEN (7) DAYS FROM THE START OF GRUBBING AND SHALL CONTINUE TO FUNCTION UNTIL UPSLOPE AREAS DRAINING TO THEM ARE PERMANENTLY STABILIZED.

2. EXISTING STORM DRAINAGE SYSTEM SHALL BE FLUSHED OF SEDIMENT PRIOR TO BEGINNING GRADING ACTIVITIES.

3. NO EROSION AND SEDIMENT CONTROL BMPS SHALL BE REMOVED FROM THE SITE PRIOR TO ADEQUATE PERMANENT STABILIZATION OF THE ASSOCIATED UPLAND DRAINAGE AREAS. ALL BMPS WILL BE MAINTAINED IN ACCORDANCE WITH OHIO EPA GENERAL NPDES PERMIT AUTHORIZATION FOR STORM WATER DISCHARGE ASSOCIATED WITH CONSTRUCTION ACTIVITY.

4. THERE SHALL BE NO SEDIMENT-LADEN OR TURBID DISCHARGES TO WATER RESOURCES OR WETLANDS RESULTING FROM DEWATERING ACTIVITIES. IF TRENCH OR GROUNDWATER CONTAINS SEDIMENT, IT MUST PASS THROUGH A SEDIMENT TRAP OR OTHER EQUALLY EFFECTIVE SEDIMENT CONTROL DEVICE, PRIOR TO BEING DISCHARGED FROM THE CONSTRUCTION SITE. ALTERNATIVELY, SEDIMENT MAY BE REMOVED BY SETTLING IN PLACE OR BY DEWATERING INTO A SUMP PIT, FILTER BAG OR COMPARABLE PRACTICE. GROUND WATER DEWATERING WHICH DOES NOT CONTAIN SEDIMENT OR OTHER POLLUTANTS IS NOT REQUIRED TO BE TREATED PRIOR TO DISCHARGE. HOWEVER, CARE MUST BE TAKEN WHEN DISCHARGING GROUND WATER TO ENSURE THAT IT DOES NOT BECOME POLLUTANT-LADEN BY TRAVERSING OVER DISTURBED SOILS OR OTHER POLLUTANT SOURCES.

5. STREETS DIRECTLY ADJACENT TO CONSTRUCTION ENTRANCES AND RECEIVING TRAFFIC FROM THE DEVELOPMENT AREA, SHALL BE CLEANED DAILY TO REMOVE SEDIMENT TRACKED OFF-SITE. IF APPLICABLE, THE CATCH BASINS ON THESE STREETS NEAREST TO THE CONSTRUCTION ENTRANCES SHALL ALSO BE CLEANED WEEKLY.

6. IT SHALL BE THE RESPONSIBILITY OF THE CONTRACTOR, OR HIS/HER REPRESENTATIVE, TO INSPECT ALL CONTROLS ON THE SITE AT LEAST ONCE EVERY SEVEN (7) CALENDAR DAYS AND WITHIN TWENTY-FOUR (24) HOURS AFTER ANY STORM EVENT GREATER THAN ONE-HALF INCH OF RAIN PER TWENTY-FOUR (24) HOUR PERIOD. WHEN INSPECTIONS REVEAL THE NEED FOR REPAIR, REPLACEMENT, OR INSTALLATION OF EROSION AND SEDIMENT CONTROL BMPS, THE FOLLOWING PROCEDURES SHALL BE FOLLOWED:

   A. WHEN PRACTICES REQUIRE REPAIR OR MAINTENANCE: IF AN INTERNAL INSPECTION REVEALS THAT A CONTROL PRACTICE IS IN NEED OF REPAIR OR MAINTENANCE, WITH THE EXCEPTION OF A SEDIMENT-SETTLING POND, IT MUST BE REPAIRED OR MAINTAINED WITHIN THREE (3) DAYS OF THE INSPECTION. SEDIMENT-SETTLING PONDS MUST BE REPAIRED OR MAINTAINED WITHIN TEN (10) DAYS OF THE INSPECTION.

   B. WHEN PRACTICES FAIL TO PROVIDE THEIR INTENDED FUNCTION: IF AN INTERNAL INSPECTION REVEALS THAT A CONTROL PRACTICE FAILS TO PERFORM ITS INTENDED FUNCTION AS DETAILED IN THE SWP3 AND THAT ANOTHER, MORE APPROPRIATE CONTROL PRACTICE IS REQUIRED, THE SWP3 MUST BE AMENDED AND THE NEW CONTROL PRACTICE MUST BE INSTALLED WITHIN TEN (10) DAYS OF THE INSPECTION.

   C. WHEN PRACTICES DEPICTED ON THE SWPPP ARE NOT INSTALLED: IF AN INTERNAL INSPECTION REVEALS THAT A CONTROL PRACTICE HAS NOT BEEN IMPLEMENTED IN ACCORDANCE WITH THE SCHEDULE, THE CONTROL PRACTICE MUST BE IMPLEMENTED WITHIN TEN (10) DAYS FROM THE DATE OF THE INSPECTION. IF THE INTERNAL INSPECTION REVEALS THAT THE PLANNED CONTROL PRACTICE IS NOT NEEDED, THE RECORD MUST CONTAIN A STATEMENT OF EXPLANATION AS TO WHY THE CONTROL PRACTICE IS NOT NEEDED.

7. THE APPLICANT SHALL MAINTAIN FOR THREE (3) YEARS FOLLOWING FINAL STABILIZATION THE RESULTS OF THESE INSPECTIONS, THE NAMES AND QUALIFICATIONS OF PERSONNEL MAKING THE INSPECTIONS, THE DATES OF INSPECTIONS, MAJOR OBSERVATIONS RELATING TO THE IMPLEMENTATION OF THE SWP3, A CERTIFICATION AS TO WHETHER THE FACILITY IS IN COMPLIANCE WITH THE SWP3, AND INFORMATION ON ANY INCIDENTS OF NON-COMPLIANCE DETERMINED BY THESE INSPECTIONS.

8. ALL EROSION AND SEDIMENT CONTROL PRACTICES SPECIFIED ON THIS PLAN SHALL CONFORM WITH DETAILS AND SPECIFICATIONS OUTLINED IN THE CURRENT VERSION OF THE OHIO DEPARTMENT OF NATURAL RESOURCES BOOKLET, "RAINWATER AND LAND DEVELOPMENT" OR OTHER STANDARDS ACCEPTABLE TO OHIO EPA.

9. EROSION AND SEDIMENT CONTROL PRACTICES NOT ALREADY SPECIFIED ON THIS PLAN MAY BE NECESSARY DUE TO UNFORESEEN ENVIRONMENTAL CONDITIONS AND/OR CHANGES IN DRAINAGE PATTERNS CAUSED BY EARTH-MOVING ACTIVITY.

10. NO STRUCTURAL SEDIMENT CONTROLS (E.G. FILTER SOCK, SEDIMENT TRAPS, ETC.) SHALL BE USED IN A WATER RESOURCE OR WETLAND, UNLESS THEIR USE IS SPECIFICALLY PROVIDED FOR WITHIN THE SITE'S APPROVED PLAN.

11. SOIL STOCKPILES, TOPSOIL OR OTHERWISE, SHALL BE SITUATED AWAY FROM STREETS, SWALES, OR OTHER WATERWAYS AND SHALL BE SEEDED AND/OR MULCHED IN ACCORDANCE WITH THE OHIO EPA TIMEFRAME FOR STABILIZATION.

12. STORM DRAINAGE SHALL BE FLUSHED OF SEDIMENT AFTER COMPLETION OF CONSTRUCTION.

13. ON-SITE PERSONNEL SHALL TAKE ALL NECESSARY MEASURES TO COMPLY WITH APPLICABLE REGULATIONS REGARDING FUGITIVE DUST EMISSIONS. FUGITIVE DUST EMISSIONS SHALL BE CONTROLLED IN ACCORDANCE WITH OAC-3745-17-08.

14. FINAL STABILIZATION REQUIREMENTS SHALL INCLUDE A UNIFORM PERENNIAL VEGETATIVE COVER WITH A DENSITY OF AT LEAST 80% COVER FOR ALL UNPAVED AREAS AND AREAS NOT COVERED BY PERMANENT STRUCTURES OR EQUIVALENT STABILIZATION MEASURES.

PERMANENT/TEMPORARY SEEDING, FERTILIZING, AND MULCHING:

1. ALL ACTIVITIES, MATERIALS, EQUIPMENT AND PERFORMANCE IN CONNECTION WITH ESTABLISHING TURF SHALL BE IN ACCORDANCE WITH THE SPECIFICATIONS.
2. PERMANENT SEEDING SPECIES AND RATES SHALL BE IN ACCORDANCE WITH THE SEEDING SPECIFICATION.
3. TEMPORARY TOPSOIL STOCKPILE SHALL BE SEEDED AT A RATE OF 150 POUNDS OF PURE LIVE SEED (PLS) PER ACRE IF LEFT UNDISTURBED FOR OVER 7 DAYS. SEEDING RATE SHALL BE 80 LBS ACRE CEREAL RYE OR WHEAT PLUS 20 LBS/ACRE ANNUAL RYEGRASS.
4. ACTIVITIES ASSOCIATED WITH APPLICATION OF LIME, SEED, MULCH, COMPACTING, WATERING, MAINTENANCE AND PROTECTION SHALL BE IN ACCORDANCE WITH SPECIFICATIONS.
5. STABILIZATION SHALL BE IN ACCORDANCE WITH THE FOLLOWING TABLES.

PERMANENT STABILIZATION

AREAS REQUIRING PERMANENT STABILIZATION	TIME FRAME TO APPLY EROSION CONTROLS:
ANY AREAS THAT WILL LIE DORMANT FOR ONE (1) YEAR OR MORE	WITHIN SEVEN (7) DAYS OF THE MOST RECENT DISTURBANCE
ANY DISTURBED ARE WITHIN FIFTY (50) FEET OF A STREAM AND AT FINAL GRADE.	WITHIN TWO (2) DAYS OF REACHING FINAL GRADE.
ANY OTHER AREAS AT FINAL GRADE	WITHIN SEVEN (7) DAYS OF REACHING FINAL GRADE WITHIN THAT AREA
NOTE: WHERE VEGETATIVE STABILIZATION TECHNIQUES MAY CAUSE STRUCTURAL INSTABILITY OR ARE OTHERWISE UNOBTAINABLE, ALTERNATIVE STABILIZATION TECHNIQUES MUST BE EMPLOYED. THESE TECHNIQUES MAY INCLUDE MULCHING OR EROSION MATTING.	

TEMPORARY STABILIZATION

AREAS REQUIRING TEMPORARY STABILIZATION	TIME FRAME TO APPLY EROSION CONTROLS:
ANY DISTURBED AREA WITHIN FIFTY (50) FEET OF A STREAM AND NOT AT FINAL GRADE.	WITHIN TWO (2) DAYS OF THE MOST RECENT DISTURBANCE IF THAT AREA WILL REMAIN IDLE FOR MORE THAN FOURTEEN (14) DAYS.
FOR ALL CONSTRUCTION ACTIVITIES, ANY DISTURBED AREA, INCLUDING SOIL STOCKPILES THAT WILL BE DORMANT FOR MORE THAN FOURTEEN (14) DAYS BUT LESS THAN ONE YEAR, AND NOT WITHIN FIFTY (50) FEET OF A STREAM.	WITHIN SEVEN (7) DAYS OF THE MOST RECENT DISTURBANCE WITHIN THE AREA.
DISTURBED AREA THAT WILL BE IDLE OVER WINTER.	PRIOR TO THE ONSET OF WINTER WEATHER/NOVEMBER 1ST.
NOTE: WHERE VEGETATIVE STABILIZATION TECHNIQUES MAY CAUSE STRUCTURAL INSTABILITY OR ARE OTHERWISE UNOBTAINABLE, ALTERNATIVE STABILIZATION TECHNIQUES MUST BE EMPLOYED. THESE TECHNIQUES MAY INCLUDE MULCHING OR EROSION MATTING.	

GENERAL NOTES FOR NON-SEDIMENT POLLUTANT CONTROLS:

1. CONCRETE WASH WATER SHALL NOT BE ALLOWED TO FLOW TO STREAMS, DITCHES, STORM DRAINS, OR ANY OTHER WATER CONVEYANCE. A SUMP OR PIT WITH NO POTENTIAL FOR DISCHARGE SHALL BE CONSTRUCTED IF NEEDED TO CONTAIN CONCRETE WASH WATER. FIELD TILE OR OTHER SUBSURFACE DRAINAGE STRUCTURES WITHIN 10 FT. OF THE SUMP SHALL BE CUT AND PLUGGED. FOR SMALL PROJECTS, TRUCK CHUTES MAY BE RINSED AWAY FROM ANY WATER CONVEYANCES.
2. CONSTRUCTION MATERIALS THAT POSE A POTENTIAL CONTAMINATION THREAT TO STORM WATER SHALL BE MANAGED TO MINIMIZE EXPOSURE TO STORM WATER. MATERIALS SHALL BE KEPT IN SECURE CONTAINERS AND PROPERLY LABELED. SOLID AND LIQUID WASTE AND OTHER WASTES SHALL BE DISPOSED OF PROPERLY IN ACCORDANCE WITH APPLICABLE FEDERAL, STATE AND LOCAL DISPOSAL REQUIREMENTS. DISPOSAL SHALL BE CONSISTENT WITH APPLICABLE STATE AND/OR LOCAL WASTE DISPOSAL, SANITARY SEWER OR SEPTIC SYSTEM REGULATIONS AND SHALL PROVIDE FOR THE PROPER DISPOSAL OF CONTAMINATED SOILS TO THE EXTENT THESE ARE LOCATED WITHIN THE PERMITTED AREA.
3. HANDLING CONSTRUCTION CHEMICALS, MIXING, PUMPING, TRANSFERRING OR OTHER HANDLING OF CONSTRUCTION CHEMICALS SUCH AS FERTILIZER, LIME, ASPHALT, CONCRETE DRYING COMPOUNDS, AND ALL OTHER POTENTIALLY HAZARDOUS MATERIALS SHALL BE PERFORMED IN AN AREA AWAY FROM ANY WATERCOURSE, DITCH OR STORM DRAIN.
4. EQUIPMENT FUELING AND MAINTENANCE, OIL CHANGING, ETC., SHALL BE PERFORMED IN ACCORDANCE WITH THE SITE SPECIFIC SWP3 AND GENERAL PERMIT.
5. THE FOLLOWING GOOD HOUSEKEEPING PRACTICES WILL BE FOLLOWED ON SITE DURING THE CONSTRUCTION PROJECT:
   A. AN EFFORT WILL BE MADE TO STORE ONLY ENOUGH PRODUCT REQUIRED TO DO THE JOB.
   B. ALL MATERIALS STORED ON SITE WILL BE STORED IN A NEAT, ORDERLY MANNER IN THEIR APPROPRIATE CONTAINERS AND, IF POSSIBLE, UNDER A ROOF OR OTHER ENCLOSURE.
   C. PRODUCTS WILL BE KEPT IN THEIR ORIGINAL CONTAINERS WITH THE MANUFACTURER'S LABEL. SUBSTANCES WILL NOT BE MIXED WITH ONE ANOTHER UNLESS RECOMMENDED BY THE MANUFACTURER.
   D. WHENEVER POSSIBLE, ALL OF A PRODUCT WILL BE USED UP BEFORE DISPOSING OF THE CONTAINER.
   E. THE MANUFACTURER'S RECOMMENDATIONS FOR PROPER USE AND DISPOSAL WILL BE FOLLOWED.
   F. PROPER USE AND DISPOSAL OF MATERIALS ON SITE SHALL BE IN ACCORDANCE WITH THE SITE SPECIFIC SWP3.
6. IN ADDITION TO PREVIOUS NOTES, THE FOLLOWING PRACTICES WILL BE FOLLOWED FOR SPILL PREVENTION AND CLEAN-UP:
   A. SPILL CLEAN-UP AND PROCEDURES SHALL BE IN CONFORMANCE WITH THE SITE SPECIFIC SWP3.
   B. MATERIALS AND EQUIPMENT NECESSARY FOR SPILL CLEANUP WILL BE KEPT READILY AVAILABLE ON THE SITE IN ACCORDANCE WITH THE SITE SPECIFIC SWP3.
   C. ALL SPILLS WILL BE CLEANED UP IMMEDIATELY AFTER DISCOVERY.
   D. SPILLS OF TOXIC OR HAZARDOUS MATERIALS SHALL BE ADDRESSED AND REPORTED IN CONFORMANCE WITH THE SITE SPECIFIC SWP3.
   E. THE SPILL PREVENTION PLAN WILL BE ADJUSTED TO INCLUDE MEASURES TO PREVENT THIS TYPE OF SPILL FROM REOCCURRING AND HOW TO CLEAN UP THE SPILL IF THERE IS ANOTHER ONE. A DESCRIPTION OF THE SPILL, WHAT CAUSED IT, AND THE CLEANUP MEASURES WILL ALSO BE INCLUDED.
   F. SPILL CONTROL AND CLEANUP AND SITE PERSONNEL AWARENESS SHALL BE IN CONFORMANCE WITH THE SITE SPECIFIC SWP3.

SOIL CLASSIFICATIONS:

UrUXC URBAN LAND
UDORTHENTS COMPLEX
0 TO 12 PERCENT SLOPES
GROUP D

PER THE USDA NATURAL RESOURCES CONSERVATION SERVICE, THIS SOIL IS DEFINED AS FOLLOWS:

GROUP D: SOILS HAVING A VERY SLOW INFILTRATION RATE (HIGH RUNOFF POTENTIAL) WHEN THOROUGHLY WET. THESE CONSIST CHIEFLY OF CLAYS THAT HAVE A HIGH SHRINK-SWELL POTENTIAL, SOILS THAT HAVE A HIGH WATER TABLE, SOILS THAT HAVE A CLAYPAN OR CLAY LATER AT OR NEAR THE SURFACE, AND SOILS THAT ARE SHALLOW OVER NEARLY IMPERVIOUS MATERIAL. THESE SOILS HAVE A VERY SLOW RATE OF WATER TRANSMISSION.

SEEDING SCHEDULE:

TYPE 1 MIX - CUT AND EMBANKMENT FILL, AREAS (NON-WET)/CHANNELS

BOTANICAL NAME	COMMON NAME	RATE OF PURE LIVE SEED (PLS) PER ACRE:
Festuca Arundinacea	TALL FESCUE	40-50 LBS

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CHRISTOPHER D. WILSON 82211 REGISTERED PROFESSIONAL ENGINEER
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0	01/08/2021	ISSUED FOR CONSTRUCTION	JTG	CNS	CDW

DESCRIPTION	
AREA CODE	
ACCOUNT NUMBER	AW2128
PROJECT NUMBER	1880115
DRAWING BY	JTG
STATION ID	S0668O1
CHECKER INITIALS	CNS

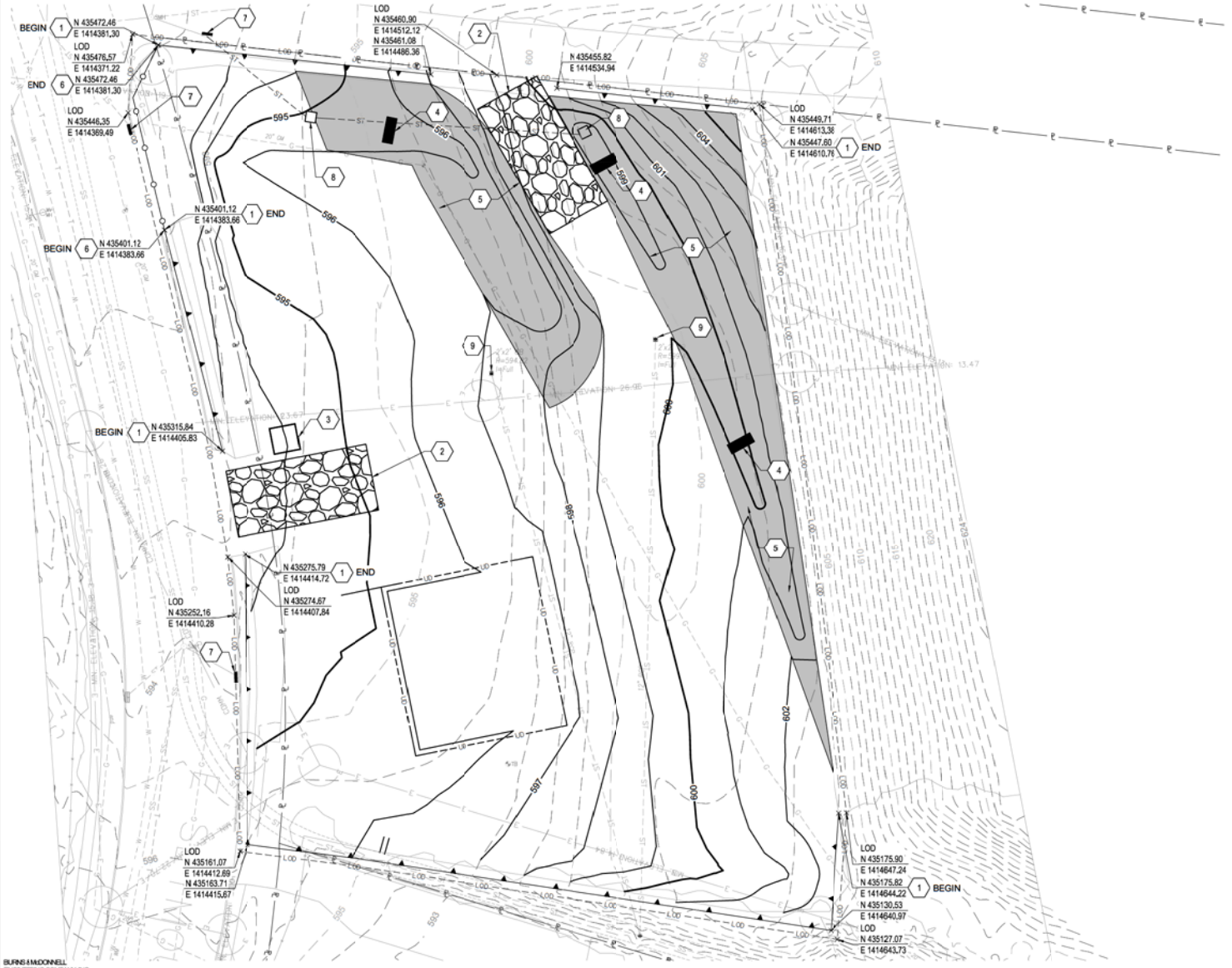
APPROVALS	DATE	INITIALS	
			REGIONAL ENGINEER
			MGR TECH REC & STD
	01/08/2021	CDW	PRINCIPAL ENGINEER

DUKE ENERGY

C350 PROJECT
NORWOOD C350 STATION
ES&PC NOTES
HAMILTON COUNTY, OHIO

REF. DWG(S) PNG-G-004-0001043

SHEET(S) 5 OF 68	DWG SCALE AS NOTED
DWG DATE 07/26/2019	SUPERSEDED —
DRAWING NUMBER	REVISION
PNG -C-004-0001273	0
DISCIPLINE / RESOURCE CENTER / LINE NUMBER	



NOTES:

1. THE EXISTING SITE UTILITIES AND FEATURES SHOWN ARE BASED ON A FIELD RUN TOPOGRAPHIC SURVEY PERFORMED BY BERDING SURVEY IN FEBRUARY, 2020. COORDINATES ARE IN OHIO STATE PLANE SOUTH ZONE, 3702, NAD83 HORIZONTAL DATUM AND NAVD88 VERTICAL DATUM.
2. SEE SHEET C-004-0001271 FOR CIVIL GENERAL NOTES AND ABBREVIATIONS.
3. SEE SHEET C-004-0001273 FOR GENERAL EROSION CONTROL NOTES.
4. SEE SHEET C-004-001273 FOR TEMPORARY AND PERMANENT STABILIZATION REQUIREMENTS AND SEEDING SCHEDULES.
5. ALL DIMENSIONS SHOWN ARE IN FEET UNLESS NOTED OTHERWISE

KEY NOTES:

1. SILT FENCE — C-350-0001279 (3)
2. TEMPORARY CONSTRUCTION ENTRANCE — C-004-0001279 (1)
3. CONCRETE WASHOUT — C-004-0001279 (2)
4. ROCK CHECK DAM — C-004-0001279 (4)
5. EROSION CONTROL BLANKET — C-004-0001280 (1)
6. FIBER ROLL — C-004-0001280 (2)
7. CURB INLET PROTECTION — C-004-0001280 (3)
8. NON-PAVED AREA INLET PROTECTION — C-004-0001280 (4)
9. PAVED AREA INLET PROTECTION — C-004-0001280 (5)

LEGEND:

- CONSTRUCTION ENTRANCE/EXIT
- SILT FENCE
- COMPOST SOCK
- LOD — LIMITS OF DISTURBANCE
- EROSION CONTROL BLANKET

N

0 20 40
1IN = 20FT

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STATE OF OHIO — CHRISTOPHER D. WILSON — 82217 — REGISTERED PROFESSIONAL ENGINEER
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DESCRIPTION	
AREA CODE	
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DRAWING BY	JTG
STATION ID	S0868O1
CHECKER INITIALS	CNS

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REGIONAL ENGINEER		
MGR TECH REC & STD		
PRINCIPAL ENGINEER	01/08/2021	CDW

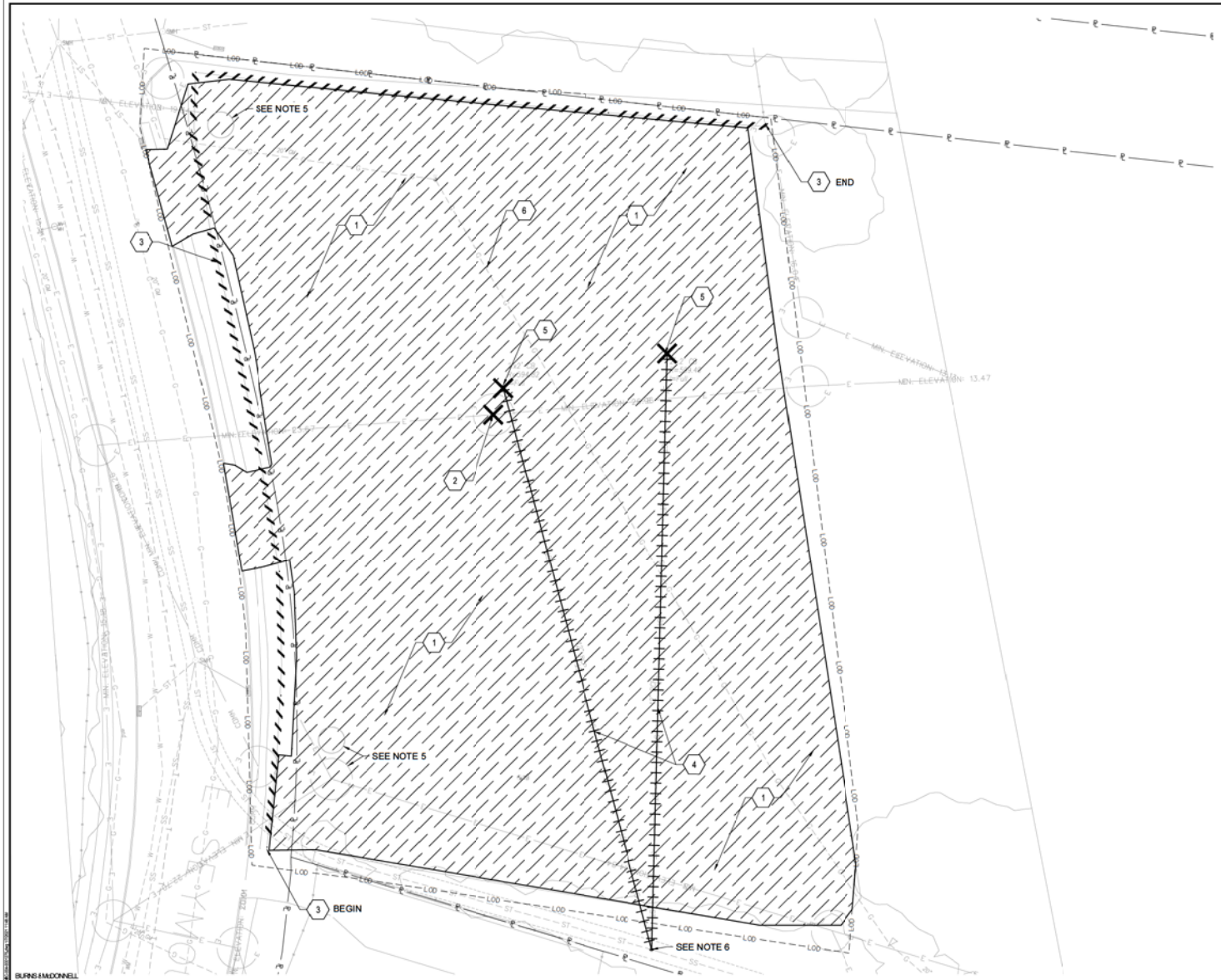
DUKE ENERGY

C350 PROJECT
NORWOOD C350 STATION
ES&PC PLAN

HAMILTON COUNTY, OHIO

REF. DWG(S) PNG-G-004-0001043

SHEET(S) 6 OF 68	DWG SCALE AS NOTED
DWG DATE 07/26/2019	SUPERSEDED —
DRAWING NUMBER	REVISION
PNG -C-004-0001274	0
DISCIPLINE / RESOURCE CENTER / LINE NUMBER	



NOTES:

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2. SEE SHEET C-004-0001271 FOR CIVIL GENERAL NOTES AND ABBREVIATIONS.
3. ALL DIMENSIONS SHOWN ARE IN FEET UNLESS NOTED OTHERWISE
4. SEE ODOT DESIGN STANDARDS, LATEST EDITION, AS INDICATED, ALL SUBSEQUENT AND RELEVANT STANDARDS AND SPECIFICATIONS SHALL APPLY
5. EXISTING OVERHEAD ELECTRIC POLE AND BILLBOARD SHALL REMAIN IN PLACE AND BE PROTECTED FROM DAMAGE DURING DEMOLITION AND GRADING.
6. EXISTING STORMWATER PIPES SHALL BE CUT OFF TO 2FT NORTH OF THE EXISTING MANHOLE. CUT AND CAP PIPES SUCH THAT REMAINS ARE WATER TIGHT.

KEY NOTES:

1. DEMOLISH AND REMOVE ASPHALT PAVEMENT, ASSUME 2" ASPHALT OVER 4" BASE COURSE
2. DEMOLISH AND REMOVE OVERHEAD POWER POLE
3. DEMOLISH AND REMOVE SINGLE WIRE BOLLARD FENCE
4. DEMOLISH AND REMOVE STORM DRAIN LINE
5. DEMOLISH AND REMOVE STORM INLET
6. MAINTAIN AND PROTECT EXISTING 20" GAS LINE

LEGEND:

- DEMOLISH AND REMOVE ASPHALT PAVEMENT, ASSUME 2" ASPHALT OVER 4" BASE COURSE
- DEMOLISH AND REMOVE UTILITY FEATURE AS NOTED
- DEMOLISH AND REMOVE SINGLE WIRE BOLLARD FENCE
- DEMOLISH AND REMOVE STORM DRAIN LINE
- LOD — LIMITS OF DISTURBANCE

N

0 20 40
1IN = 20FT

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STATE OF OHIO
CHRISTOPHER D. WILSON
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REGIONAL ENGINEER		
MGR TECH REC & STD		
PRINCIPAL ENGINEER	01/08/2021	CDW

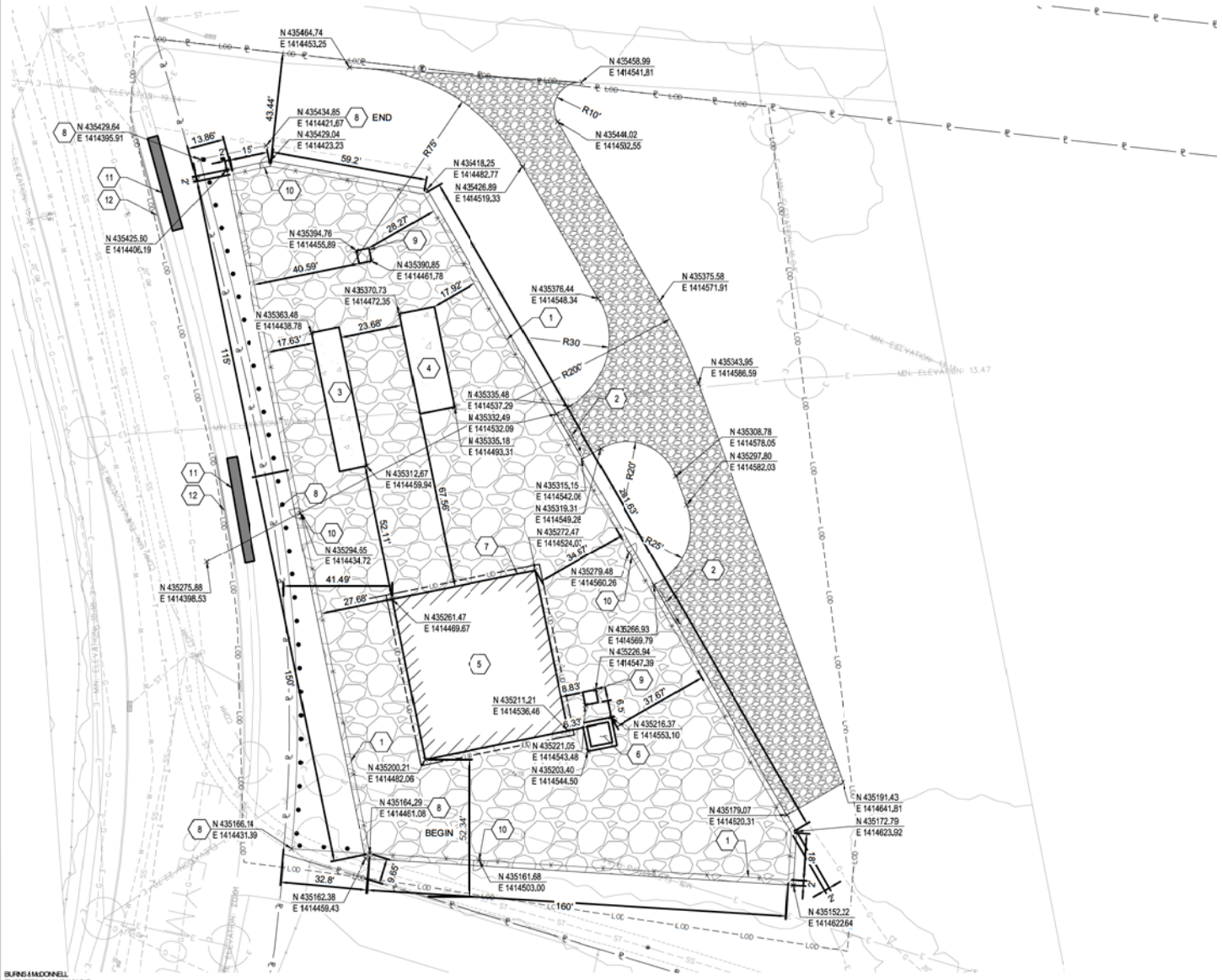
DUKE ENERGY

C350 PROJECT
NORWOOD C350 STATION
DEMOLITION PLAN

HAMILTON COUNTY, OHIO

REF. DWG(S) PNG-G-004-0001043

SHEET(S) 7 OF 68	DWG SCALE AS NOTED
DWG DATE 07/26/2019	SUPERSEDED —
DRAWING NUMBER	REVISION
PNG -C-004-0001275	0
DISCIPLINE / RESOURCE CENTER / LINE NUMBER	



NOTES:

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2. SEE SHEET C-004-0001271 FOR CIVIL GENERAL NOTES AND ABBREVIATIONS.
3. ALL DIMENSIONS SHOWN ARE IN FEET UNLESS NOTED OTHERWISE

KEY NOTES:

1. CHAIN-LINK SECURITY FENCE WITH VINYL SCREENING — 1 / C-004-0001281
2. 16' SLIDE GATE — 1 / C-004-0001281
3. LAUNCHER/RECEIVER CONCRETE PAD
4. HEATER CONCRETE PAD
5. REGULATOR CONCRETE PAD (WITHIN BUILDING, SEE MECHANICAL AND STRUCTURAL DRAWINGS)
6. CONTROL BUILDING
7. REGULATOR BUILDING
8. ODOT STANDARD MIDWEST GUARDRAIL SYSTEM (MGS 1.1 AND 2.1)
9. LIGHT POLE
10. 4' MANUAL PERSONNEL GATE — 1 / C-004-0001281
11. CONCRETE SIDEWALK — 3 / C-004-0001283
12. ODOT STANDARD CONCRETE CURB TYPE 6 (BP-5.1) — 2 / C-004-0001284

LEGEND:

- PROPOSED GRAVEL SURFACE COURSE — 2 / C-004-0001282
- PROPOSED ACCESS ROAD SURFACE COURSE — 2 / C-004-0001282
- CONCRETE PAD
- CONCRETE SIDEWALK — 3 / C-004-0001283
- LOD — LIMITS OF DISTURBANCE

N

0 20 40
1IN = 20FT

BURNS & McDONNELL
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STATE OF OHIO
CHRISTOPHER D. WILSON
PROFESSIONAL ENGINEER
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MGR TECH REC & STD		
PRINCIPAL ENGINEER	01/08/2021	CDW

DUKE ENERGY

C350 PROJECT
NORWOOD C350 STATION
SITE PLAN

HAMILTON COUNTY, OHIO

REF. DWG(S) PNG-G-004-0001043

SHEET(S) 8 OF 68	DWG SCALE AS NOTED
DWG DATE 07/26/2019	SUPERSEDED —
DRAWING NUMBER	REVISION
PNG -C-004-0001276	0

DISCIPLINE / RESOURCE CENTER / LINE NUMBER

NOTES:

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2. SEE SHEET C-004-0001271 FOR CIVIL GENERAL NOTES AND ABBREVIATIONS.
3. ALL DIMENSIONS SHOWN ARE IN FEET UNLESS NOTED OTHERWISE
4. SEE ODOT DESIGN STANDARDS, LATEST EDITION, AS INDICATED, ALL SUBSEQUENT AND RELEVANT STANDARDS AND SPECIFICATIONS SHALL APPLY
5. DIMENSIONS NOTED AS MATCH ARE INTENDED TO MATCH EXISTING GRADE.
6. ALL ELEVATIONS ARE TO FINISHED GRADE UNLESS OTHERWISE NOTED.

KEY NOTES:

1. 12" RCP CLASS III — 1 / C-004-0001283
2. CATCH BASIN NO. 2-2A; SEE ODOT STANDARD DRAWING CB-1.1
3. NYOPLAST PVC MANHOLE W/ WEIR AT ELEVATION 591, 30" DIA, HS-20 RATED
4. INLINE CATCH BASIN BY TRENCH DRAIN MANUFACTURER
5. REINFORCED CONCRETE PIPE SADDLE — 1 / C-004-0001283
6. UNDERGROUND DETENTION VAULT — 1 / C-004-0001284
7. TRENCH DRAIN — 3 / C-004-0001282
8. CONNECT TO EXISTING INLET, REMOVE AND REPLACE EXISTING ASPHALT PAVEMENT
9. 24" CORRUGATED HDPE
10. TAP RCP AND CONNECT WITH WATER TIGHT SEAL, INCLUDE CORRUGATED HDPE ADAPTER
11. 6" PERFORATED PVC BUILDING DRAIN — 4 / C-004-0001283

LEGEND:

- PROPOSED GRAVEL SURFACE COURSE — 2 / C-004-0001282
- PROPOSED ACCESS ROAD SURFACE COURSE — 2 / C-004-0001282
- LOD — LIMITS OF DISTURBANCE

N

0 20 40
1IN = 20FT

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STATE OF OHIO — CHRISTOPHER D. WILSON — 82217 — REGISTERED PROFESSIONAL ENGINEER
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STATION ID	S86801
CHECKER INITIALS	CNS

APPROVALS	DATE	INITIALS	
			REGIONAL ENGINEER
			MGR TECH REC & STD
	01/08/2021	CDW	PRINCIPAL ENGINEER

DUKE ENERGY

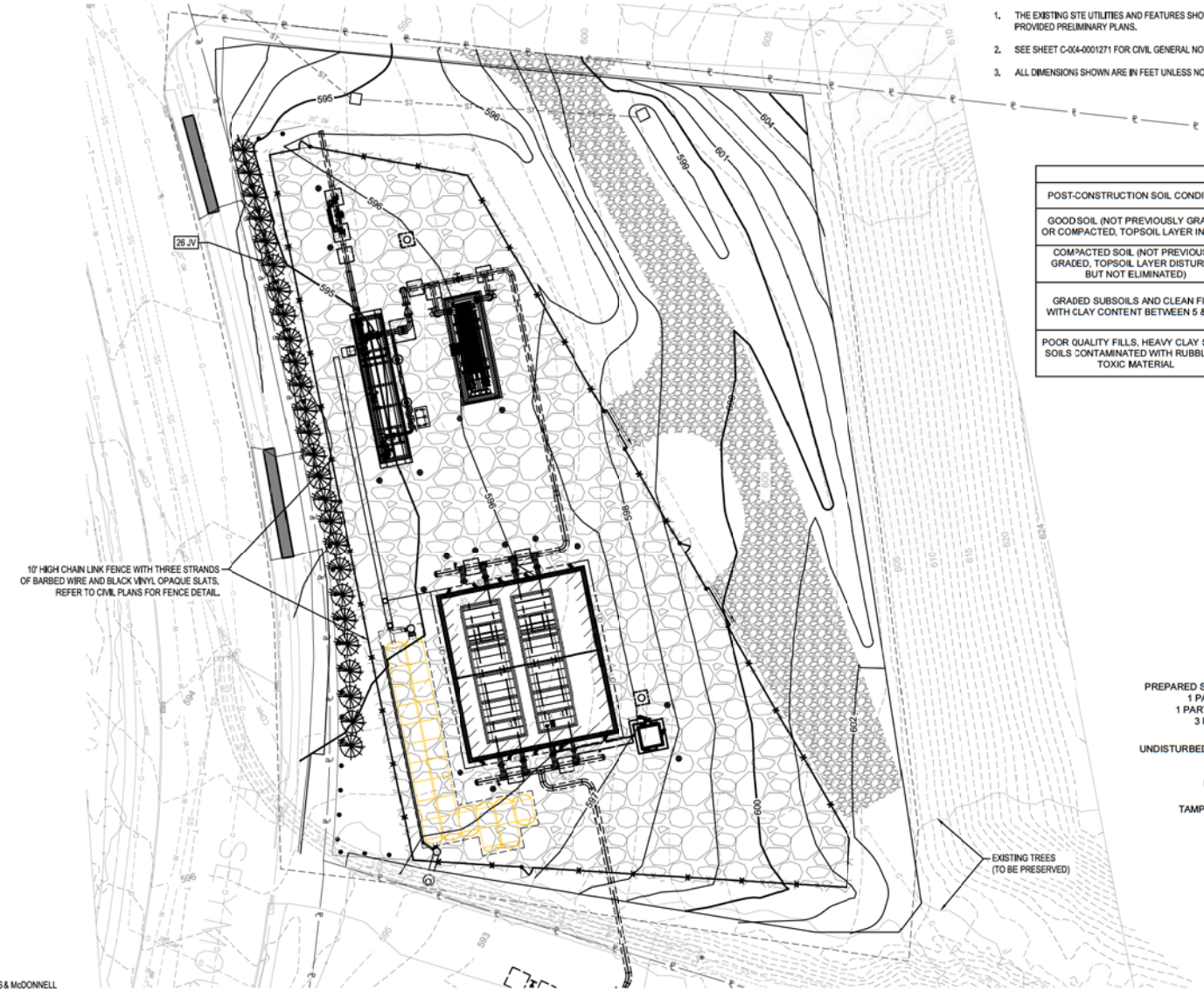
C350 PROJECT
NORWOOD C350 STATION
GRADING PLAN

HAMILTON COUNTY, OHIO

REF. DWG(S) PNG-G-004-0001043

SHEET(S) 9 OF 68	DWG SCALE AS NOTED
DWG DATE 07/26/2019	SUPERSEDED —
DRAWING NUMBER	REVISION
PNG -C-004-0001277	0

DISCIPLINE / RESOURCE CENTER / LINE NUMBER

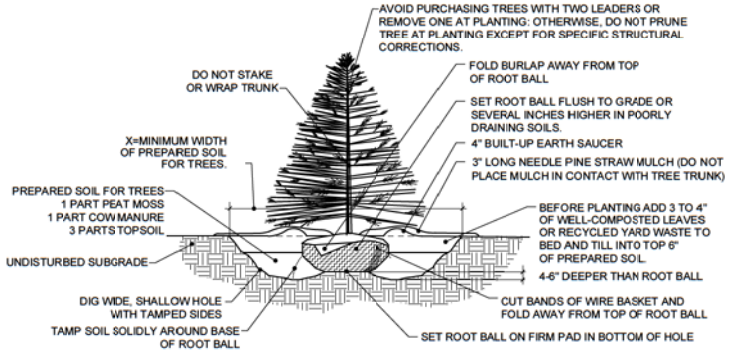


NOTES:

1. THE EXISTING SITE UTILITIES AND FEATURES SHOWN ARE BASED ON ODOT PROVIDED PRELIMINARY PLANS.
2. SEE SHEET C-004-0001271 FOR CIVIL GENERAL NOTES AND ABBREVIATIONS.
3. ALL DIMENSIONS SHOWN ARE IN FEET UNLESS NOTED OTHERWISE.

LANDSCAPE SCHEDULE					
SYMBOL	QTY	BOTANICAL NAME	COMMON NAME	SIZE	ROOT
EVERGREEN TREES					
JV	26	JUNIPERUS VIRGINIANA	EASTERN RED CEDAR	6' - 8'	B & B
TOTAL	26				
ANY DISCREPANCIES BETWEEN QUANTITIES ON THE PLAN AND SCHEDULE, THE PLAN SHALL DICTATE.					

GENERAL RANGE OF SOIL MODIFICATIONS & VOLUMES FOR VARIOUS SOIL CONDITIONS		
POST-CONSTRUCTION SOIL CONDITION	MIN./ WIDTH PREPARED SOIL FOR TREES (X)	TYPE OF PREPARATION
GOOD SOIL (NOT PREVIOUSLY GRADED OR COMPACTED, TOPSOIL LAYER INTACT)	6 FT. OR TWICE THE WIDTH OF THE ROOT BALL, WHICHEVER IS GREATER	GENERAL RANGE OF SOIL MODIFICATIONS & VOLUMES FOR VARIOUS SOIL CONDITIONS
COMPACTED SOIL (NOT PREVIOUSLY GRADED, TOPSOIL LAYER DISTURBED BUT NOT ELIMINATED)	15 FT.	LOOSEN THE EXISTING SOILS TO THE WIDTHS AND DEPTHS SHOWN IN DETAILS ABOVE; ADD COMPOSTED ORGANIC CONTENT UP TO 5% DRY WEIGHT.
GRADED SUBSOILS AND CLEAN FILLS WITH CLAY CONTENT BETWEEN 5 & 35%	20 FT.	MINIMUM TREATMENT: LOOSEN EXISTING SOIL TO WIDTHS AND DEPTHS SHOWN. ADD COMPOSTED ORGANIC MATTER TO BRING ORGANIC CONTENT UP TO 5% DRY WEIGHT. OPTIMUM TREATMENT : REMOVE TOP 8-10 IN. OR THE EXISTING SOILS TO THE WIDTHS AND DEPTHS SHOWN, ADD 8-10 IN. OF LOAM TOPSOIL.
POOR QUALITY FILLS, HEAVY CLAY SOILS, SOILS CONTAMINATED WITH RUBBLE OR TOXIC MATERIAL	20 FT.	REMOVE EXISTING SOILS TO THE WIDTHS AND DEPTHS CONTAMINATED WITH RUBBLE OR TOXIC MATERIAL



EVERGREEN PLANTING DETAIL 1
NOT TO SCALE

LEGEND:

PROPOSED GRAVEL SURFACE COURSE

CONCRETE PAD

0 20 40
1IN = 20FT

BURNS & McDONNELL
ENGINEERING COMPANY INC.
STATE LICENSE #COA.01557

STATE OF OHIO
CHRISTOPHER D. WILSON
92211
REGISTERED PROFESSIONAL ENGINEER
01/08/2021
PROFESSIONAL ENGIARCH STAMP

NO.	DATE	REVISION(S) DESCRIPTION	BY	CHK	APPD
0	01/08/2021	ISSUED FOR CONSTRUCTION	JTG	CNS	CDW

DESCRIPTION	
AREA CODE	
ACCOUNT NUMBER	AW2128
PROJECT NUMBER	1880115
DRAWING BY	JTG
STATION ID	S868O1
CHECKER INITIALS	CNS

APPROVALS			
DATE	INITIALS		REGIONAL ENGINEER
DATE	INITIALS		MGR TECH REC & STD
01/08/2021	CDW		PRINCIPAL ENGINEER

DUKE ENERGY

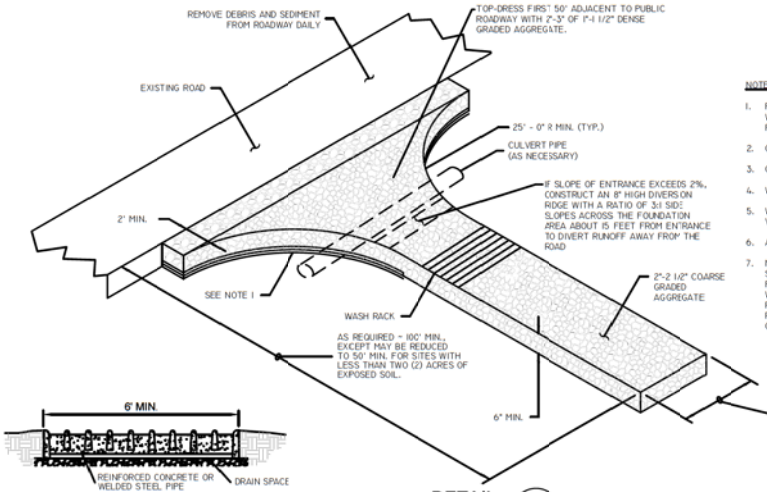
C350 PROJECT
NORWOOD C350 STATION
LANDSCAPING PLAN

HAMILTON COUNTY, OHIO

REF. DWG(S) PNG-G-004-0001043

SHEET(S) 10 OF 68	DWG SCALE AS NOTED
DWG DATE 07/26/2019	SUPERSEDED —
DRAWING NUMBER	REVISION
PNG -C-004-0001278	0

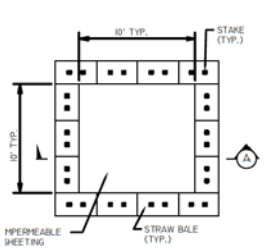
DISCIPLINE / RESOURCE CENTER / LINE NUMBER



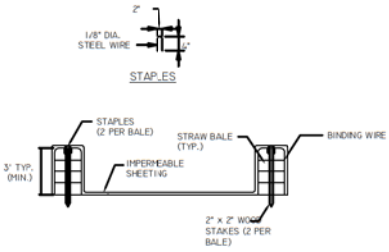
DETAIL 1
SCALE: NTS
TEMPORARY CONSTRUCTION ENTRANCE

NOTES:

1. PLACE 8 OZ/SY NON-WOVEN GEOTEXTILE FABRIC UNDERLINER TO STABILIZE FOUNDATION (ESPECIALLY WHEN WET CONDITIONS ARE EXPECTED) TO EXTEND 2' FROM OUTSIDE EDGE. GEOGRID CAN ALSO BE ADDED FOR INCREASED STABILITY.
2. COUNTY OR STATE HIGHWAY ACCESS PERMITTING MAY BE REQUIRED FOR PLACEMENT OF ENTRANCE.
3. CULVERT PLACEMENT MAY BE REQUIRED TO MAINTAIN FLOW.
4. WASH RACK SHALL BE 20 FEET (MIN.) WIDE OR TOTAL WIDTH OF ACCESS.
5. WASH RACK SHALL BE DESIGNED AND CONSTRUCTED TO ACCOMMODATE ANTICIPATED CONSTRUCTION VEHICULAR TRAFFIC.
6. A WATER SUPPLY SHALL BE MADE AVAILABLE TO WASH THE WHEELS OF ALL VEHICLES EXITING THE SITE.
7. MAINTENANCE: ROCK CONSTRUCTION ENTRANCE THICKNESS SHALL BE CONSTANTLY MAINTAINED TO THE SPECIFIED DIMENSIONS BY ADDING ROCK. A STOCKPILE OF ROCK MATERIAL SHALL BE MAINTAINED ON SITE FOR THIS PURPOSE. DRAIN SPACE UNDER WASH RACK SHALL BE KEPT OPEN AT ALL TIMES. DAMAGE TO THE WASH RACK SHALL BE REPAIRED PRIOR TO FURTHER USE OF THE RACK. ALL SEDIMENT DEPOSITED ON ROADWAYS SHALL BE REMOVED AND RETURNED TO THE CONSTRUCTION SITE IMMEDIATELY. WASHING THE ROADWAY OR SWEEPING THE DEPOSITS INTO ROADWAY DITCHES, SEWERS, CULVERTS, OR OTHER DRAINAGE COURSES IS NOT ACCEPTABLE.



PLAN VIEW

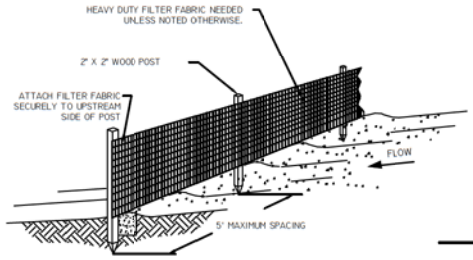


SECTION (A)

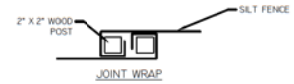
NOTES:

1. LOCATE WASHOUT STRUCTURE A MINIMUM OF 50 FEET AWAY FROM OPEN CHANNELS, STORM DRAIN INLETS, SENSITIVE AREAS, WETLANDS, BUFFERS AND WATER COURSES AND AWAY FROM CONSTRUCTION TRAFFIC.
2. SIZE WASHOUT STRUCTURE FOR VOLUME NECESSARY TO CONTAIN WASH WATER AND SOLIDS AND MAINTAIN AT LEAST 4 INCHES OF FREEBOARD. TYPICAL DIMENSIONS ARE 10 FEET X 10 FEET X 3 FEET DEEP.
3. PREPARE SOIL BASE FREE OF ROCKS OR OTHER DEBRIS THAT MAY CAUSE TEARS OR HOLES IN THE LINER. FOR LINER, USE 10 MIL OR THICKER UV RESISTANT, IMPERMEABLE SHEETING, FREE OF HOLES AND TEARS OR OTHER DEFECTS THAT COMPROMISE IMPERMEABILITY OF THE MATERIAL.
4. PROVIDE A SIGN FOR THE WASHOUT IN CLOSE PROXIMITY TO THE FACILITY.
5. KEEP CONCRETE WASHOUT STRUCTURE WATER TIGHT. REPLACE IMPERMEABLE LINER IF DAMAGED (E.G., RIPPED OR PUNCTURED). EMPTY OR REPLACE WASHOUT STRUCTURE THAT IS 75 PERCENT FULL, AND DISPOSE OF ACCUMULATED MATERIAL PROPERLY. DO NOT REUSE PLASTIC LINER. WET-VACUUM STORED LIQUIDS THAT HAVE NOT EVAPORATED AND DISPOSE OF IN AN APPROVED MANNER. PRIOR TO FORECASTED RAINSTORMS, REMOVE LIQUIDS OR COVER STRUCTURE TO PREVENT OVERFLOWS. REMOVE HARDENED SOLIDS, WHOLE OR BROKEN UP, FOR DISPOSAL OR RECYCLING. MAINTAIN RUNOFF DIVERSION AROUND EXCAVATED WASHOUT STRUCTURE UNTIL STRUCTURE IS REMOVED.
6. BALES CAN BE TWO STACKED OR PARTIALLY EXCAVATED TO REACH 3FT DEPTH (MIN.).
7. PREFABRICATED UNITS MAY BE USED WITH APPROVAL.

DETAIL 2
SCALE: NTS
CONCRETE WASHOUT



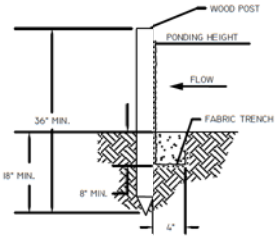
ISOMETRIC VIEW



JOINT WRAP

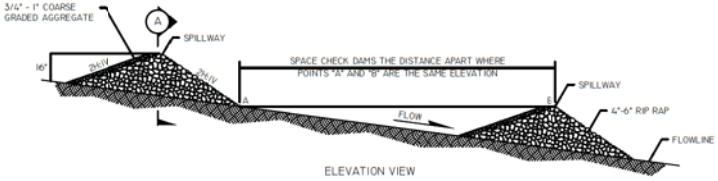
NOTES:

1. SILT FENCE SHALL BE PLACED ON SLOPE CONTOURS TO MAXIMIZE PONDING EFFICIENCY.
2. INSPECT AND REPAIR FENCE AFTER EACH STORM EVENT AND REMOVE SEDIMENT WHEN IT REACHES ONE-HALF HEIGHT OF FENCE OR FABRIC STARTS TO BULGE.
3. REMOVED SEDIMENT SHALL BE DEPOSITED TO AN AREA THAT WILL NOT CONTRIBUTE SEDIMENT OFF-SITE AND CAN BE PERMANENTLY STABILIZED.
4. TURN END OF SILT FENCE UP SLOPE TO PREVENT BYPASS FLOW AND ALLOW FOR PONDING.

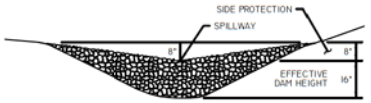


TYPICAL SECTION

DETAIL 3
SCALE: NTS
SILT FENCE



ELEVATION VIEW



SECTION (A)

DETAIL 4
SCALE: NTS
ROCK CHECK DAM

BURNS & McDONNELL ENGINEERING COMPANY, INC.
STATE LICENSE # COA:01557

STATE OF OHIO
CHRISTOPHER D. WILSON
82217
REGISTERED PROFESSIONAL ENGINEER
01/08/2021
PROFESSIONAL ENGINEER STAMP

NO.	DATE	REVISION(S) DESCRIPTION	BY	CHK	APPD
0	01/08/2021	ISSUED FOR CONSTRUCTION	JTG	CNS	CDW

DESCRIPTION		APPROVALS		
AREA CODE				REGIONAL ENGINEER
ACCOUNT NUMBER	AW2128			
PROJECT NUMBER	1880115			MGR TECH REC & STD
DRAWING BY	JTG			
STATION ID	S0868O1			PRINCIPAL ENGINEER
CHECKER INITIALS	CNS	01/08/2021	CDW	

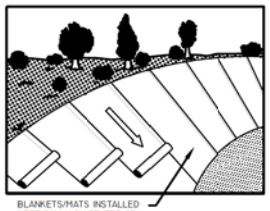
DUKE ENERGY

C350 PROJECT
NORWOOD C350 STATION
CIVIL DETAILS - 1
HAMILTON COUNTY, OHIO

REF. DWG(S) PNG-G-004-0001043

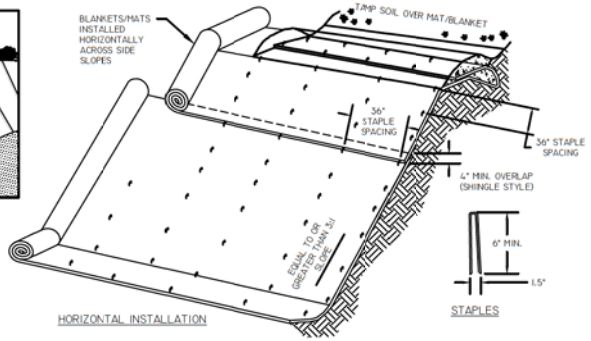
SHEET(S) 11 OF 68	DWG SCALE AS NOTED
DWG DATE 07/26/2019	SUPERSEDED —

DRAWING NUMBER: PNG -C-004-0001279 | REVISION: 0
DISCIPLINE / RESOURCE CENTER / LINE NUMBER



BLANKETS/MATS INSTALLED VERTICALLY ON SEVERE OR LONGER SLOPES. SEE HORIZONTAL INSTALLATION FOR DETAILS.

VERTICAL INSTALLATION

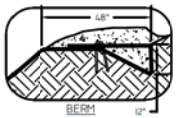


HORIZONTAL INSTALLATION

STAPLES

NOTES:

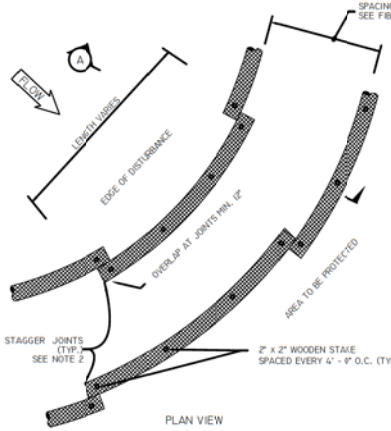
1. SLOPE SURFACE SHALL BE FREE OF ROCKS, CLODS, STICKS AND GRASS. MATS/BLANKETS SHALL HAVE GOOD SOIL CONTACT.
2. APPLY PERMANENT SEEDING BEFORE PLACING BLANKETS.
3. LAY BLANKETS LOOSELY AND STAKE OR STAPLE TO MAINTAIN DIRECT CONTACT WITH THE SOIL. DO NOT STRETCH.
4. USE ON SIDE SLOPES EXCEEDING A 3:1 SLOPE AND DISTURBED STREAMBANKS.
5. **THE FOLLOWING BLANKET TYPES SHALL BE UTILIZED:**
   A. LONG-TERM BIODEGRADABLE DOUBLE-NET COCONUT BLANKET ON STREAMBANKS.
   B. SHORT-TERM BIODEGRADABLE DOUBLE-NET STRAW BLANKET ON 3:1 SLOPES OR GREATER.
   C. SHORT-TERM BIODEGRADABLE SINGLE-NET STRAW ON LESSER SLOPES, FLAT FLOODPLAIN, AND WORKSPACE AREAS.
6. FOR STREAMBANK STABILIZATION:
   A. TUCK/UNDERLAP BASE OF BLANKET TO PREVENT HIGH WATER FROM REMOVING BLANKET AND SEED.
   B. STAPLE SPACING MAY NEED TO BE DECREASED.
   C. PREPARE SUBGRADE PRIOR TO INSTALLING BLANKET BY REMOVING DISPLACED ROCKS AND WOODY DEBRIS.



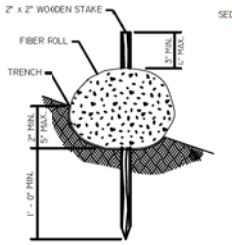
BERM

DETAIL 1
SCALE: NTS

EROSION CONTROL BLANKET



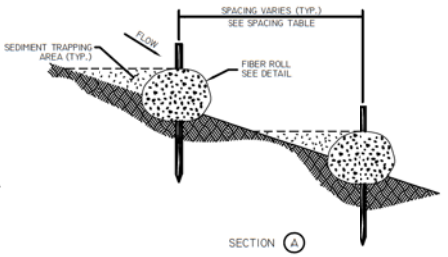
PLAN VIEW



TYPICAL SECTION

SPACING TABLE	
SLOPE	MAXIMUM SPACING
1:1	10' - 0"
2:1	20' - 0"
3:1	30' - 0"
4:1	40' - 0"

* INSTALL FIRST ROW AT TOP OF BANK. INSTALL LAST ROW 10' FROM TOE OF SLOPE.

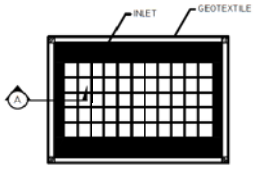


NOTES:

1. INSTALL FIBER ROLLS ALONG CONTOURS DURING FINAL RESTORATION TO CHECK FLOW TO ALLOW ADEQUATE REVEGETATION.
2. ABUT ADJACENT FIBER ROLLS TIGHTLY WHILE OVERLAPPING THE ENDS. STAGGER JOINTS WITH THE NEXT PARALLEL ROW.
3. PILOT HOLES MAY BE DRIVEN THROUGH THE FIBER ROLLS AND INTO THE SOIL WHEN SOIL CONDITIONS REQUIRE.
4. FIBER ROLLS SHALL BE INSPECTED REGULARLY, AND IMMEDIATELY AFTER A RAINFALL PRODUCES RUNOFF, TO ENSURE THEY REMAIN THOROUGHLY ENTRENCHED AND IN CONTACT WITH THE SOIL.
5. A SINGLE ROW MAY BE INSTALLED ON FLAT SLOPES.

DETAIL 2
SCALE: NTS

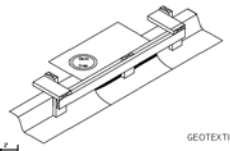
FIBER ROLL

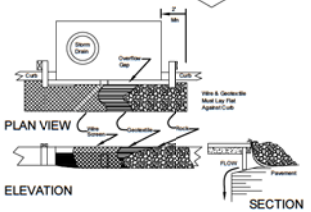


PLAN VIEW
(CROSS BRACES NOT SHOWN)

NOTES:

1. PREFABRICATED UNITS MAY BE USED WITH APPROVAL.
2. STRUCTURE SHALL BE CONSTRUCTED SUCH THAT GEOTEXTILE MATERIAL SHALL BE FASTENED TO POSTS CREATING A SEAM-LESS JOINT.
3. ENSURE THAT PONDING HEIGHT OF WATER DOES NOT CAUSE FLOODING ON ADJACENT ROADWAYS OR PRIVATE PROPERTY.





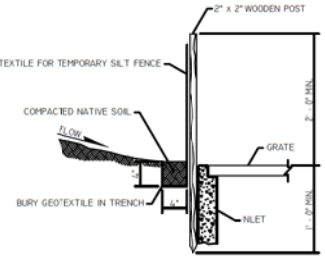
PLAN VIEW

ELEVATION

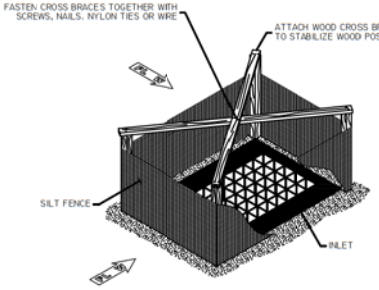
SECTION

DETAIL 3
SCALE: NTS

CURB INLET PROTECTION



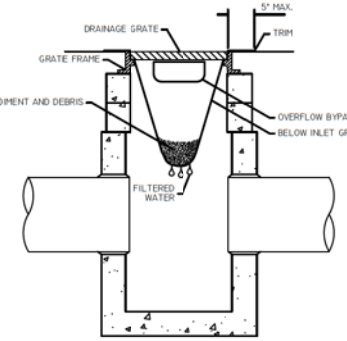
SECTION A



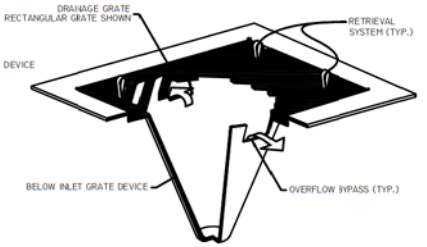
ISOMETRIC VIEW
(ENTIRE FENCE NOT SHOWN FOR ILLUSTRATIVE PURPOSES)

DETAIL 4
SCALE: NTS

NON-PAVED AREA INLET PROTECTION



TYPICAL SECTION



ISOMETRIC VIEW

DETAIL 5
SCALE: NTS

PAVED AREA INLET PROTECTION

BURNS & McDONNELL ENGINEERING COMPANY, INC.
STATE LICENSE # COA:01557

STATE OF OHIO — CHRISTOPHER D. WILSON — 82217 — REGISTERED PROFESSIONAL ENGINEER

01/08/2021

PROFESSIONAL ENGINEER STAMP

NO.	DATE	REVISION(S) DESCRIPTION	BY	CHK	APPD
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DESCRIPTION	
AREA CODE	
ACCOUNT NUMBER	AW2128
PROJECT NUMBER	1880115
DRAWING BY	JTG
STATION ID	S0868O1
CHECKER INITIALS	CNS

APPROVALS	DATE	INITIALS
REGIONAL ENGINEER		
MGR TECH REC & STD		
PRINCIPAL ENGINEER	01/08/2021	CDW

DUKE ENERGY

C350 PROJECT
NORWOOD C350 STATION
CIVIL DETAILS - 2

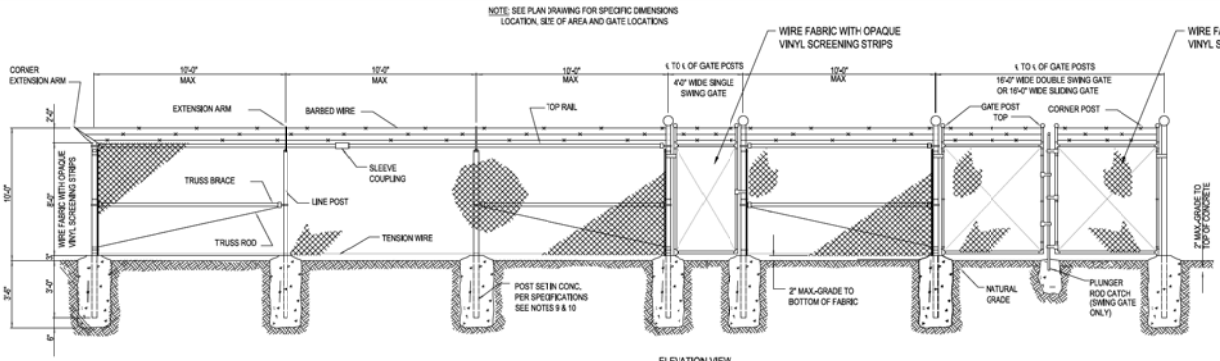
HAMILTON COUNTY, OHIO

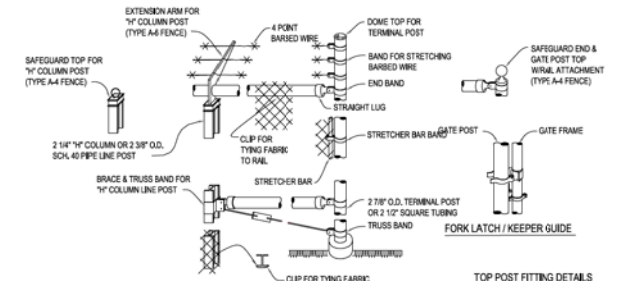
REF. DWG(S) PNG-G-004-0001043

SHEET(S) 12 OF 68	DWG SCALE AS NOTED
DWG DATE 07/26/2019	SUPERSEDED —

DRAWING NUMBER: PNG -C-004-0001280 — REVISION: 0

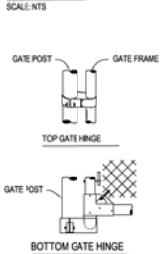
DISCIPLINE / RESOURCE CENTER / LINE NUMBER



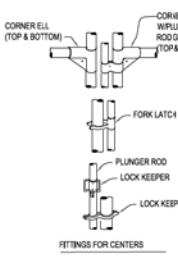


FORK LATCH / KEEPER GUIDE

TOP POST FITTING DETAILS
SCALE: NTS

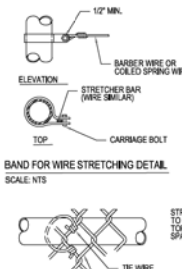


BOTTOM GATE HINGE



FITTINGS FOR CENTERS

GATE FITTING DETAILS
SCALE: NTS

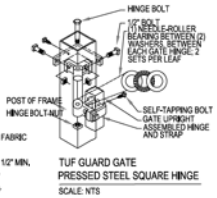


BAND FOR WIRE STRETCHING DETAIL
SCALE: NTS

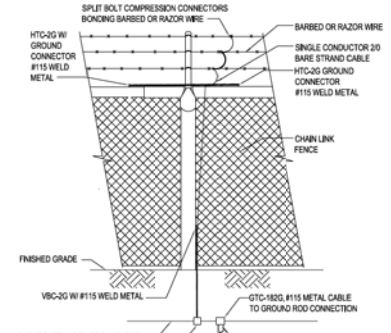
WIRE TIES POST DETAIL
SCALE: NTS

WIRE TIES TOP OR BRACE RAIL DETAIL
SCALE: NTS

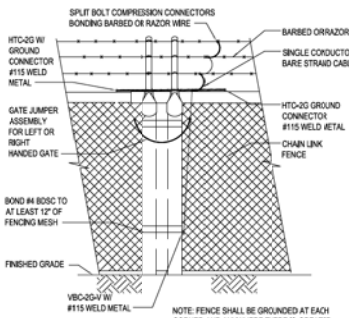
END OR GATE POST DETAIL
SCALE: NTS



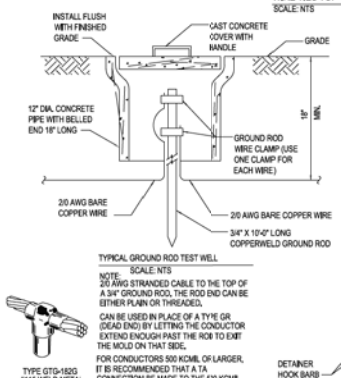
TUF GUARD GATE PRESSED STEEL SQUARE HINGE
SCALE: NTS



TYPICAL FENCE GROUND
SCALE: NTS



TYPICAL GATE GROUND
SCALE: NTS



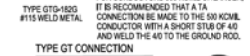
TYPICAL GROUND ROD TEST WELL
SCALE: NTS

NOTE: 2/0 AWG STRANDED CABLE TO THE TOP OF A 3/4" GROUND ROD, THE ROD END CAN BE EITHER PLAIN OR THREADED,

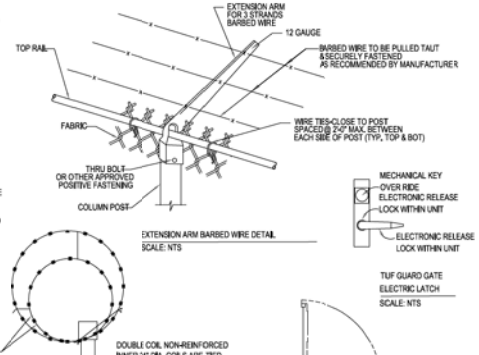
CAN BE USED IN PLACE OF A TYYE GR (DEAD END) BY LETTING THE CONDUCTOR EXTEND ENOUGH PAST THE ROD TO EXIT THE MOLD ON THAT SIDE,

FOR CONDUCTORS 500 KCMIL OR LARGER, IT IS RECOMMENDED THAT A TA CONNECTION BE MADE TO THE 500 KCMIL CONDUCTOR WITH A SHORT STUB OF 4/0 AND WELD THE 4/0 TO THE GROUND ROD.

TYPE GT CONNECTION
SCALE: NTS

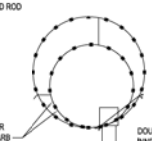


CHAIN-LINK SECURITY FENCE DOUBLE SWING GATE MAN GATE



EXTENSION ARM BARBED WIRE DETAIL
SCALE: NTS

TUF GUARD GATE ELECTRIC LATCH
SCALE: NTS

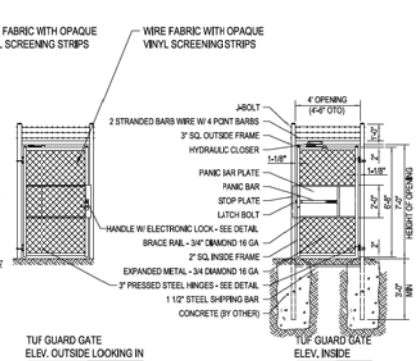


DOUBLE COIL NON-REINFORCED INNER 24" DIA. COILS ARE TIED TO THE TENSION WIRE AND TO TOP OF THE CHAIN LINK FABRIC

EXTENSION ARM RAZOR WIRE DETAIL
SCALE: NTS

TUFF GUARD GATE
SCALE: NTS

TUF GUARD GATE ELEV. OUTSIDE LOOKING IN
SCALE: NTS



TUF GUARD GATE ELEV. INSIDE
SCALE: NTS

CHAIN LINK FENCE SPECIFICATIONS

1) INSTALLATION OF FENCE ADDITION SHALL BE PLUMB AND TRUE TO LINE, CHAIN LINK FABRIC SHALL BE TAUT AND PROPERLY SECURED, CORNER BRACES AND DIAGONAL BRACES SHALL BE PROPERLY PLACED TO PREVENT SAGGING. THE COMPLETE INSTALLATION SHALL BE INSTALLED BY SKILLED AND EXPERIENCED FENCE ERECTORS, IN A WORKMANLIKE MANNER, IN ACCORDANCE WITH GOOD CONSTRUCTION PRACTICE AND IN ACCORDANCE WITH ALL LOCAL APPLICABLE CODES.
2) MATERIAL SHALL BE HOT-DIP GALVANIZED FENCE CHAIN LINK FABRIC - THE CHAIN LINK FABRIC SHALL BE IN ACCORDANCE WITH ASTM A-392 SPECIFICATIONS AND SHALL BE HOT DIPPED GALVANIZED AFTER WEAVING, HAVING A COATING WEIGHT OF 2 OUNCES OF ZINC PER SQUARE FOOT, MINIMUM, OF UNCOATED WIRE SURFACE (CLASS II). FABRIC SHALL BE NO. 9 GAUGE WIRE WOVEN IN A 2-INCH CHAIN LINK DIAMOND MESH. THE FABRIC SHALL BE FASTENED TO THE LINE POST BY MEANS OF NO. 6 GAUGE ALUMINUM WIRE CLIPS SPACED 12 INCHES ON CENTER. IT SHALL BE ATTACHED TO TOP RAIL WITH NO. 9 GAUGE ALUMINUM TIE WIRES SPACED 24 INCHES ON CENTER. FABRIC SHALL BE ATTACHED TO TERMINAL POST BY MEANS OF A 1/4" X 3/4" TENSION BAR WITH HEAVY GAUGE PRESSED STEEL BAND OR CLIPS SPACED APPROXIMATELY 14 INCHES ON CENTER.
3) BARBED WIRE SHALL BE OF 4 POINT PATTERN, COMPOSED OF TWO STRANDS OF NO. 11-1/2 GAUGE GALVANIZED WIRE WITH LARGE BARBS SPACED APPROXIMATELY 4 TO 5 INCHES ON CENTER. RAZOR WIRE SHALL BE USED WHEN LOCAL ORDINANCE REQUIRES OR AT PROJECT MANAGERS REQUEST.
4) BOTTOM TENSION WIRE - NO. 7 GAUGE GALVANIZED COIL SPRING TENSION WIRE WITH CLASS I COATING, WIRE TO BE FASTENED TO CHAIN LINK FABRIC WITH NO. 11 GAUGE HOG RINGS ON 18 INCH CENTERS.
5) POST AND OTHER APPURTENANCES - ALL POST AND OTHER APPURTENANCES SHALL BE HOT-DIP GALVANIZED WITH A MINIMUM ZINC COATING OF 2.0 OUNCES PER SQUARE FOOT OF SURFACE (CLASS II COATING ASTM A-392).
6) LINE POST SHALL BE 2-1/4" "H" COLUMN WEIGHING 4.1 LBS. PER FOOT, MINIMUM CARBON CONTENT .35%, MINIMUM TENSILE STRENGTH 75,000 PSI OR 2-3/8" O.D. SCHEDULE 40 PIPE, OF SUFFICIENT LENGTH TO ALLOW FOR INSTALLATION TO A DEPTH OF 1'-0" BELOW GROUND LEVEL. THE POSTS SHALL BE SPACED IN THE LINE OF FENCE, NO FURTHER.
7) TERMINAL POST AND ALL END, CORNER AND PULL POSTS SHALL BE 2-1/2" X 2-1/2" X .1875" W.T. SQUARE TUBING OR 2- 7/8" O.D. SCHEDULE 40 PIPE.
8) GATE POST SHALL BE OF THE FOLLOWING SIZE FOR SINGLE SWING GATES OR ONE LEAF OF DOUBLE GATE

POST	SIZE	NOM. WT.
UP TO 6' WIDE	2-1/2" SQ. OR 2-7/8" O.D.	SAME AS TERMINAL POST
OVER 6' TO 13'	4" O.D.	9.11 LB/FT

9) EACH POST SHALL BE OF SUFFICIENT LENGTH TO ALLOW FOR INSTALLATION TO A DEPTH OF 3'-0" BELOW GROUND LEVEL.
10) LINE POST AND TERMINAL POST ANCHORAGE SHALL BE SET IN CYLINDRICAL CONCRETE FOUNDATIONS WITH TOP OF FINISH CONCRETE SURFACE 3 INCHES ABOVE FINISH GRADE. EXCAVATION SHALL BE 3'-6" DEEP AND NOT LESS THAN TEN INCHES (10") IN DIAMETER FOR ALL LINE POSTS, AND NOT LESS THAN 3.5 TIMES THE DIAMETER FOR TERMINAL AND GATE POST. CONCRETE SHALL MEET ACI-318 SPECIFICATION FOR 3000 PSI-28 DAY STRENGTH CONCRETE.
11) FENCE SHALL HAVE A CONTINUOUS TOP RAIL FOR ITS FULL LENGTH OF STANDARD GALVANIZED PIPE, 1-5/8" O.D.. THE TOP RAIL SHALL PASS THROUGH OPENINGS PROVIDED FOR THAT PURPOSE IN THE POST TOPS AND EACH LENGTH SHALL BE COUPLED WITH A SLEEVE COUPLING, WITH EXPANSION COUPLING EVERY FIFTH JOINT.
12) TRUSS BRACES SHALL BE STANDARD GALVANIZED 1-5/8" O.D. PIPE 2.71 LB./FT., WITH A 3/8" O.D. TRUSS ROD AND TURNBUCKLE ATTACHMENT SHALL BE INSTALLED BETWEEN EACH END OR GATE POST AND THE ADJACENT LINE POST. TWO TRUSS BRACES SHALL BE FURNISHED ON CORNER OR PULL POSTS.
13) FITTINGS USED IN THE COMPLETE FENCE ASSEMBLY SHALL BE OF MALLEABLE, CAST IRON OR PRESSED STEEL AND SHALL BE HOT-DIP GALVANIZED AFTER FABRICATION.
14) EXTENSION ARM LINE POST SHALL BE EQUIPPED WITH EXTENSION ARMS TO WITHSTAND A MINIMUM PULL-DOWN WEIGHT OF 450 LBS. FROM END OF ARM. ARMS TO BE DESIGNED TO EXTEND AT A 45 DEGREE ANGLE WITH LOCKING DEVICE TO SECURELY FASTEN THREE STRANDS OF BARBED WIRE EQUALLY SPACED WITH THE TOP STRAND LOCATED 12 INCHES (12") ABOVE FABRIC AND 12 INCHES (12") OUT FROM THE FENCE LINE.
15) POST TOPS AND ALL END, CORNER, PULL AND GATE POST SHALL BE EQUIPPED WITH TOPS. TUBULAR POST TOPS TO BE SO DESIGNED AS TO EXCLUDE MOISTURE FROM THE POST. ALL LINE POST TOPS DESIGNED TO HOLD THE TOP RAIL AND THE EXTENSION ARM FOR THREE STRANDS OF BARBED WIRE.
16) GATE FRAMES SHALL BE MADE OF 2" X 2" X .110" W.T. SQUARE STEEL TUBING OR 1.9 INCH O.D. SCHEDULE 40, 2.72 LB./FT. STANDARD WEIGHT PIPE, HOT-DIP GALVANIZED, FRAMES TO BE JOINED AT CORNERS TO FORM A RIGID PANEL AND SHALL BE FILLED WITH CHAIN LINK FABRIC OF SAME GAUGE AS USED ON THE FENCE. FABRIC SHALL BE FASTENED IN THE FRAME ON ALL FOUR SIDES BY MEANS OF TENSION BARS AND CLIPS, THREE STRANDS OF BARBED WIRE SHALL BE FASTENED TO THE EXTENDED FRAMES OF GATE, EACH FRAME TO BE EQUIPPED WITH 3/8" DIAMETER ADJUSTABLE TRUSS ROD, HINGES, POSITIVE TYPE LATCHING DEVICE WITH PROVISIONS FOR PADLOCKING. ALL DRIVE GATES TO BE PROVIDED WITH CENTER PLUNGER ROD, CATCH AND SEMI-AUTOMATIC OUTER CATCHES TO SECURE GATES IN OPEN POSITION.
17) FENCE SECTION
COMPANY TYPE - A-8
FABRIC HEIGHT - 96"
TOTAL FENCE HEIGHT - 10'-0"

TUF GUARD GATE:

18) SPECIFICATIONS SHOWN CAN BE CHANGED WITH ENGINEERING APPROVAL.
19) FOOTING WIDTH TO BE (4)X POST WIDTH. VERIFY FOOTING DEPTH AND WIDTH WITH LOCAL CODES AND SITE CONDITIONS.
20) ALL COMPONENTS OF THE TUF GUARD WILL BE COATED BLACK, EXCEPT FOR THE HANDLE WITH ELECTRONIC LOCK, PANIC BAR, AND CLOSER.
21) OUTSIDE LOCKING IN, GATE WILL LATCH ON LEFT AND OPEN OUTSIDE OF FENCE LINE.

BURNS & McDONNELL ENGINEERING COMPANY, INC.
STATE LICENSE # COA:01557

STATE OF OHIO — CHRISTOPHER D. WILSON — 82217 — REGISTERED PROFESSIONAL ENGINEER
01/08/2021
PROFESSIONAL ENGIARCH STAMP

NO.	DATE	REVISION(S) DESCRIPTION	BY	CHK	APPD
0	01/08/2021	ISSUED FOR CONSTRUCTION	JTG	CNS	CDW

DESCRIPTION	
AREA CODE	
ACCOUNT NUMBER	AW2128
PROJECT NUMBER	1880115
DRAWING BY	JTG
STATION ID	S0868O1
CHECKER INITIALS	CNS

APPROVALS	DATE	INITIALS	
			REGIONAL ENGINEER
			MGR TECH REC & STD
	01/08/2021	CDW	PRINCIPAL ENGINEER

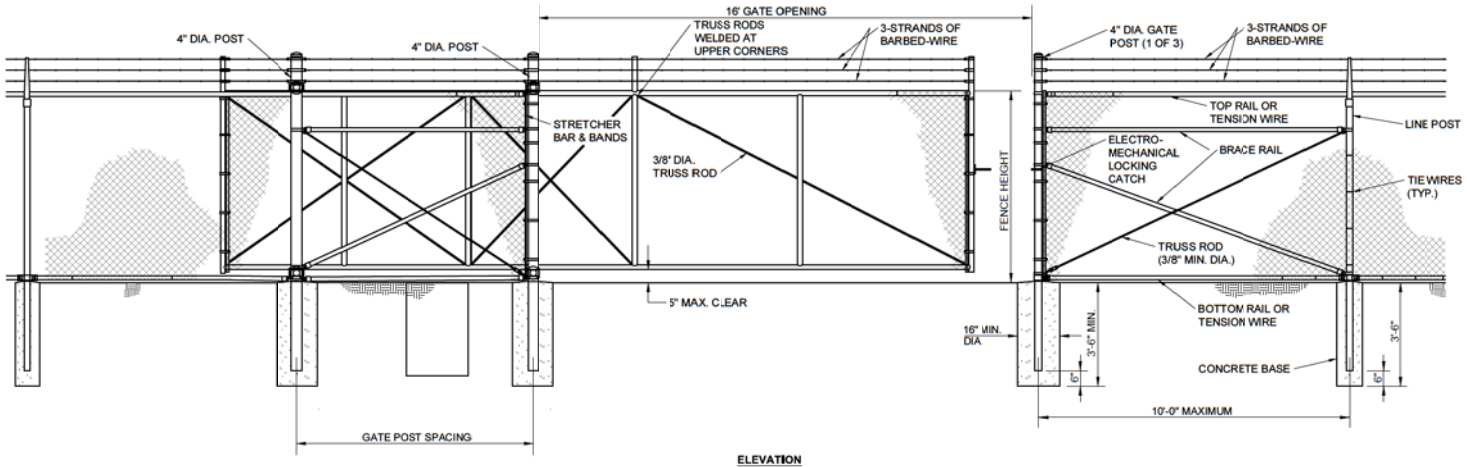
DUKE ENERGY

C350 PROJECT
NORWOOD C350 STATION
CIVIL DETAILS - 3
HAMILTON COUNTY, OHIO

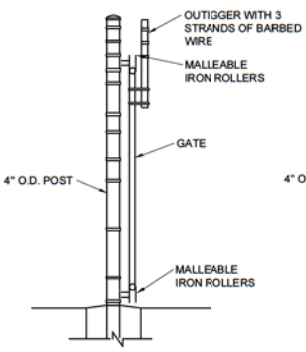
REF. DWG(S) PNG-G-004-0001043

SHEET(S) 13 OF 68	DWG SCALE AS NOTED
DWG DATE 07/26/2019	SUPERSEDED —

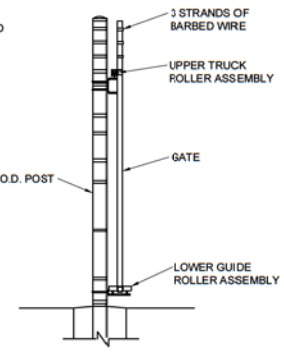
DRAWING NUMBER: PNG -C-004-0001281 | REVISION: 0
DISCIPLINE / RESOURCE CENTER / LINE NUMBER



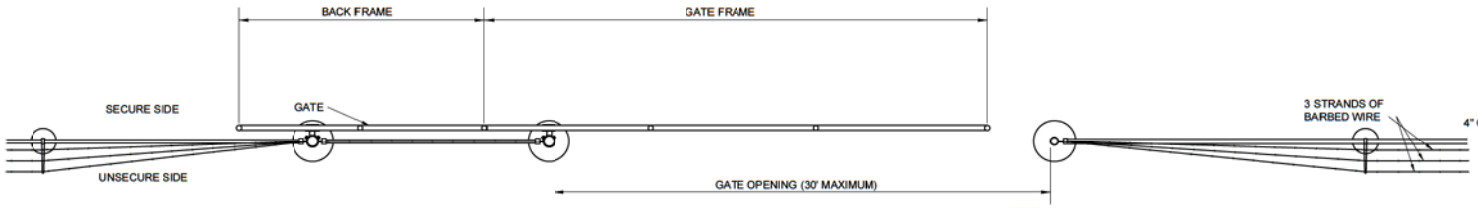
ELEVATION
NO SCALE



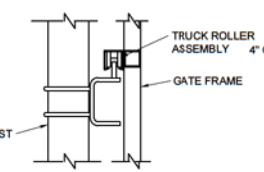
EXTERNAL ROLLERS



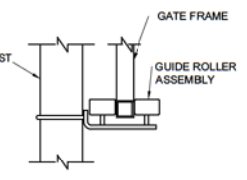
INTERNAL ROLLERS



PLAN
NO SCALE



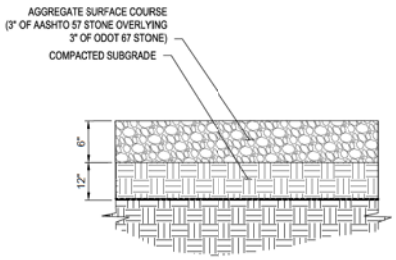
UPPER TRUCK ROLLER ASSEMBLY
NO SCALE



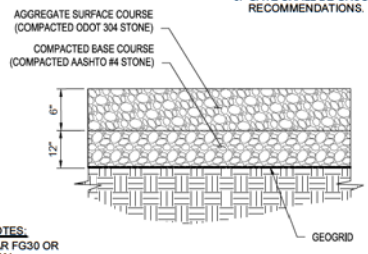
LOWER GUIDE ROLLER ASSEMBLY
NO SCALE

NOTES:
1. CANTILEVERED SLIDE GATES SHALL CONFORM TO ASTM F1184.
2. GATE FRAMES SHALL BE EITHER ZINC-COATED STEEL.
3. ROLLERS SHALL BE EITHER INTERNAL OR EXTERNAL.
4. DETAILS SHOWN ARE TO CLARIFY REQUIREMENTS AND ARE NOT INTENDED TO LIMIT OTHER TYPES OF GATE SECTIONS AND METHODS OF INSTALLATION.
5. GATE SHALL BE GROUNDED IN ACCORDANCE WITH MANUFACTURER'S RECOMMENDATIONS.

DETAIL 1
SCALE: NTS
SLIDE GATE



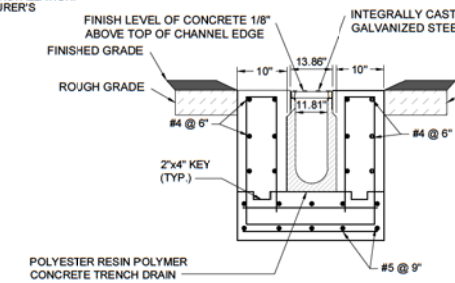
GRAVEL SURFACE COURSE



ACCESS ROAD SURFACE COURSE

SURFACE COURSE MATERIAL NOTES:
1. GEOGRID SHALL BE TENSAR FG30 OR ENGINEER APPROVED EQUAL.

DETAIL 2
SCALE: NTS
SURFACE COURSE MATERIAL



NOTES:
1. TRENCH DRAIN SYSTEM SHALL BE ONE OF THE FOLLOWING OR AN APPROVED EQUAL:

   KLASSIKDRAIN KS300
   ACO POLYMER PRODUCTS
2. TRENCH GRATE AND CHANNEL SHALL BE HS-20 RATED.

DETAIL 3
SCALE: NTS
TRENCH DRAIN

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STATE LICENSE # COA:01557

STATE OF OHIO
CHRISTOPHER D. WILSON
82217
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DUKE ENERGY

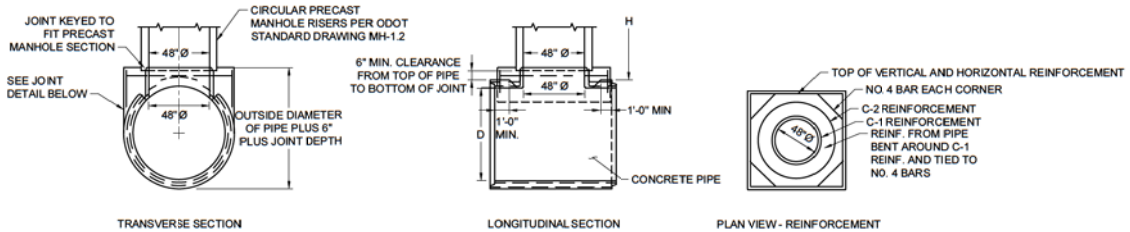
C350 PROJECT
NORWOOD C350 STATION
CIVIL DETAILS - 4
HAMILTON COUNTY, OHIO

REF. DWG(S) PNG-G-004-0001043

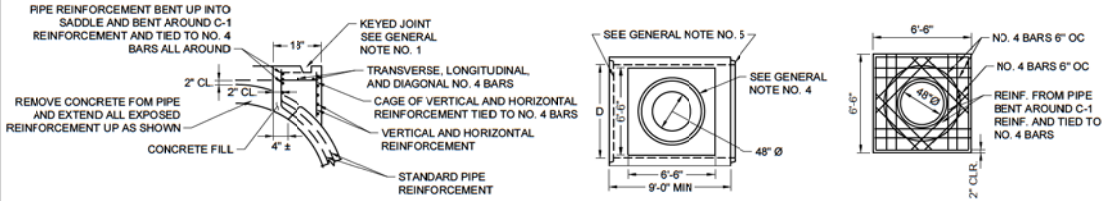
SHEET(S) 14 OF 68	DWG SCALE AS NOTED
DWG DATE 07/26/2019	SUPERSEDED —

DRAWING NUMBER	REVISION
PNG -C-004-0001282	0

DISCIPLINE / RESOURCE CENTER / LINE NUMBER



TRANSVERSE SECTION | LONGITUDINAL SECTION | PLAN VIEW - REINFORCEMENT (2" FROM TOP OF SADDLE)



JOINT DETAIL | PLAN | PLAN VIEW - REINFORCEMENT (2" ABOVE TOP OF PIPE)

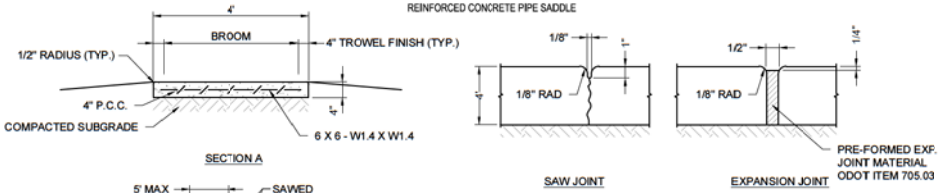
NOTES:

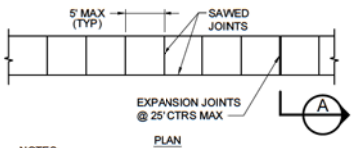
1. KEYED JOINT: WHERE PRECAST CIRCULAR MANHOLE SECTIONS ARE TO BE LOCATED ON TOP OF SADDLE, A CIRCULAR KEYED JOINT WILL BE REQUIRED. JOINT SHALL BE DESIGNATED TO MATCH WITH RISER SECTIONS AND SHALL PROVIDE BEARING SURFACE AREA EQUAL TO THAT OF RISER JOINT. KEYED JOINT MAY BE PROTRUDED OR RECESSED SO LONG AS THE 6" MIN. CLEARANCE IS RETAINED.
2. SADDLE PORTION OF STRUCTURE MAY BE:
   2.1. PRECAST OR BUILT-IN PLACE ONTO PIPE SECTION AS SHOWN.
   2.2. PRECAST SEPARATELY AND ATTACHED TO PIPE WITH EPOXY. EXPOSED REINFORCEMENT FROM PIPE WILL BE CUT OFF AT OPENING IF THIS METHOD IS USED.

REINFORCEMENT NOTES:

1. VERTICAL AND HORIZONTAL REINFORCEMENT WILL CONSIST OF A CAGE OF 2/2 6X6 WELDED WIRE FABRIC OR NO. 4 BARS SPACE 12" (MAX.) ON CENTER, MEETING THE DIMENSIONS AND CLEARANCES SHOWN.
2. TRANSVERSE, LONGITUDINAL, AND DIAGONAL REINFORCEMENT WILL BE NO. 4 BARS.
3. ALL REINFORCEMENT EXTENDING FROM PIPE WILL BE TIED TO TRANSVERSE AND LONGITUDINAL REINFORCEMENT AT ALL POINTS OF TANGENCY.
4. C-1 REINFORCEMENT: FOUR NO. 3 RINGS IN THROAT OF TEE, 2.5" CENTER TO CENTER REINFORCEMENT FROM PIPE EXTENDED UP AND BENT AROUND THESE RINGS ALL AROUND.
5. C-2 REINFORCEMENT: SAME REINFORCEMENT AS REQUIRED FOR PRECAST MANHOLE RISER SECTIONS (ASTM C-476) PROVIDING A MINIMUM OF TWO LINES FOR CIRCUMFERENTIAL REINFORCEMENT WITH A MINIMUM OF ONE LINE OF CIRCUMFERENTIAL REINFORCEMENT IN KEYED JOINT. C-2 REINFORCEMENT MAY BE OMITTED WHERE CIRCULAR RISERS WILL NOT BE REQUIRED ON SADDLE.

DETAIL 1
SCALE: NTS
REINFORCED CONCRETE PIPE SADDLE





PLAN

NOTES:

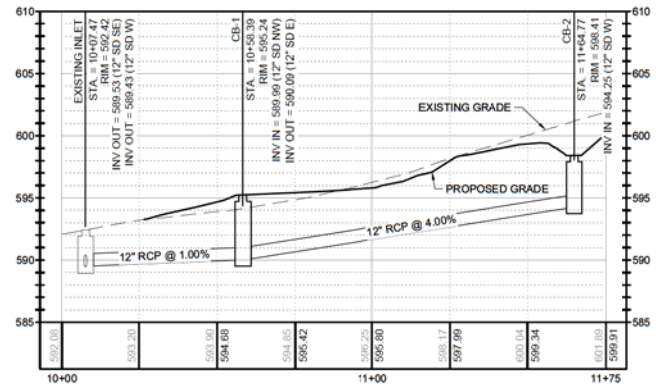
1. BROOM FINISH SHALL BE APPLIED NORMAL TO DIRECTION OF TRAFFIC.

NOTES:

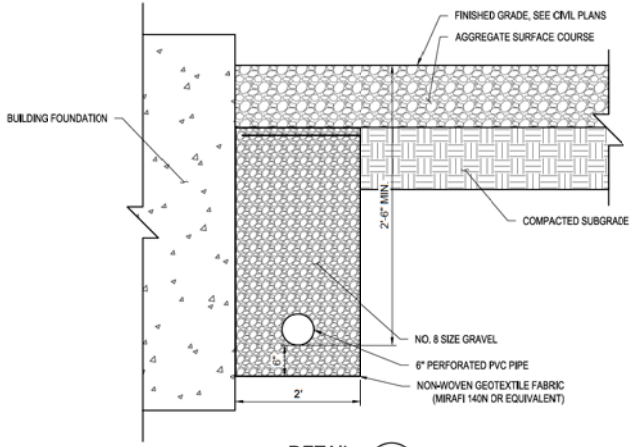
1. SAW JOINTS TO BE LOCATED TO MAINTAIN AN APPROXIMATE SQUARE SLAB AS INDICATED ON PLANS.
2. EXPANSION JOINTS TO BE LOCATED WHERE WALK ABUTS CONCRETE CURBS, DRIVES, STRUCTURES AND WHERE WALK CHANGES DIRECTION.

TYPICAL SIDEWALK JOINT DETAIL

DETAIL 3
SCALE: NTS
CONCRETE SIDEWALK



DETAIL 2
SCALE: NTS
STORM DRAINAGE PROFILE



DETAIL 4
SCALE: NTS
PVC BUILDING DRAIN

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STATE LICENSE # COA:01557

STATE OF OHIO — CHRISTOPHER D. WILSON — 92211 — REGISTERED PROFESSIONAL ENGINEER
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APPROVALS	DATE	INITIALS	
			REGIONAL ENGINEER
			MGR TECH REC & STD
	01/08/2021	CDW	PRINCIPAL ENGINEER

DUKE ENERGY

C350 PROJECT
NORWOOD C350 STATION
CIVIL DETAILS - 5

HAMILTON COUNTY, OHIO

REF. DWG(S) PNG-G-004-0001043

SHEET(S) 15 OF 68	DWG SCALE AS NOTED
DWG DATE 07/26/2019	SUPERSEDED —

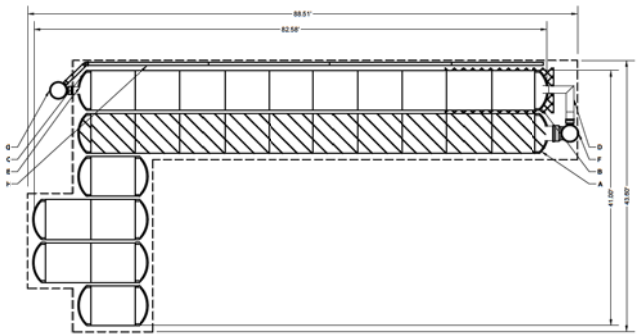
DRAWING NUMBER	REVISION
PNG -C-004-0001283	0

DISCIPLINE / RESOURCE CENTER / LINE NUMBER

*INVERT ABOVE BASE OF CHAMBER

PART TYPE	ITEM ON LAYOUT	DESCRIPTION	INVERT*	MAX FLOW
*REFABRICATED END CAP	A	24" BOTTOM CORED END CAP(TYP OF ALL 24" BOTTOM CONNECTIONS AND ISOLATOR ROWS)	2.66"	
*REFABRICATED END CAP	B	12" TOP CORED END CAP(TYP OF ALL 12" TOP CONNECTIONS	26.40"	
*REFABRICATED END CAP	C	12" BOTTOM CORED END CAP(TYP OF ALL 12" BOTTOM CONNECTIONS	1.35"	
MANIFOLD	D	12" X 12" TOP, ADS N-12	26.36"	
TEE CONNECTION	E	12" BOTTOM CONNECTION	1.35"	
NYLOPLAST (INLET W/ ISO ROW)	F	30" DIAMETER (24" SUMP MIN)		2.5 CFS IN
NYLOPLAST (OUTLET)	G	30" DIAMETER (DESIGN BY ENGINEER)		2.5 CFS OUT
INVERDRAIN	H	6" ADS N-12 DUAL WALL PERFORATED HDPE UNDERDRAIN		

PROPOSED LAYOUT		PROPOSED ELEVATIONS	
26	STORMTECH MC-3500 CHAMBERS	MAXIMUM ALLOWABLE GRADE (TOP OF PAVEMENT/UNPAVED)	599.50
13	STORMTECH MC-3500 END CAPS	MINIMUM ALLOWABLE GRADE (UNPAVED WITH TRAFFIC)	594.00
12	STONE ABOVE (in)	MINIMUM ALLOWABLE GRADE (UNPAVED NO TRAFFIC)	593.00
9	STONE BELOW (in)	MINIMUM ALLOWABLE GRADE (TOP OF RIGID CONCRETE PAVEMENT)	593.00
40	% STONE VOID	MINIMUM ALLOWABLE GRADE (BASE OF FLEXIBLE PAVEMENT)	593.00
5701	INSTALLED SYSTEM VOLUME (CF) (PERIMETER STONE INCLUDED)	TOP OF STONE	592.50
		TOP OF MC-3500 CHAMBER	591.50
	(COVER STONE INCLUDED)	12" x 12" TOP MANIFOLD INVERT	589.90
	(BASE STONE INCLUDED)	24" ISOLATOR ROW INVERT	587.50
1765	SYSTEM AREA (SF)	12" BOTTOM CONNECTION INVERT	587.90
264.23	SYSTEM PERIMETER (ft)	BOTTOM OF MC-3500 CHAMBER	587.75
		UNDERDRAIN INVERT	587.00
		BOTTOM OF STONE	587.00



ISOLATOR ROW (SEE DETAIL)

PLACE MINIMUM 17.50' OF ADS GEOSYNTHETICS 315WTM WOVEN GEOTEXTILE OVER BEDDING STONE AND UNDERNEATH CHAMBER FEET FOR SCOUR PROTECTION AT ALL CHAMBER INLET ROWS

Perimeter

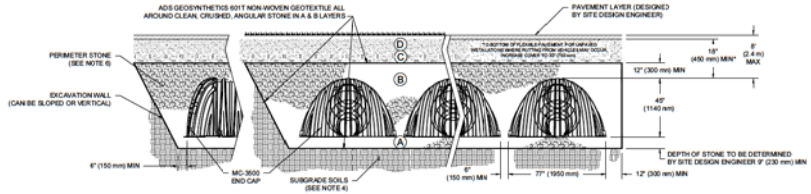
NOTES

- MANIFOLD SIZE TO BE DETERMINED BY SITE DESIGN ENGINEER. SEE TECH SHEET #7 FOR MANIFOLD SIZING GUIDANCE.
- DUE TO THE ADAPTATION OF THIS CHAMBER SYSTEM TO SPECIFIC SITE AND DESIGN CONSTRAINTS, IT MAY BE NECESSARY TO CUT AND COUPLE ADDITIONAL PIPE TO STANDARD MANIFOLD COMPONENTS IN THE FIELD.
- THE SITE DESIGN ENGINEER MUST REVIEW ELEVATIONS AND IF NECESSARY ADJUST GRADING TO ENSURE THE CHAMBER COVER REQUIREMENTS ARE MET.
- THIS CHAMBER SYSTEM WAS DESIGNED WITHOUT SITE-SPECIFIC INFORMATION ON SOIL CONDITIONS OR BEARING CAPACITY. IT IS THE SITE DESIGN ENGINEER IS RESPONSIBLE FOR DETERMINING THE SUITABILITY OF THE SOIL AND PROVIDING THE BEARING CAPACITY OF THE IN-SITU SOILS. THE BASE STONE DEPTH MAY BE INCREASED OR DECREASED ONCE THIS INFORMATION IS PROVIDED.
- NOT FOR CONSTRUCTION

ACCEPTABLE FILL MATERIALS: STORMTECH MC-3500 CHAMBER SYSTEMS

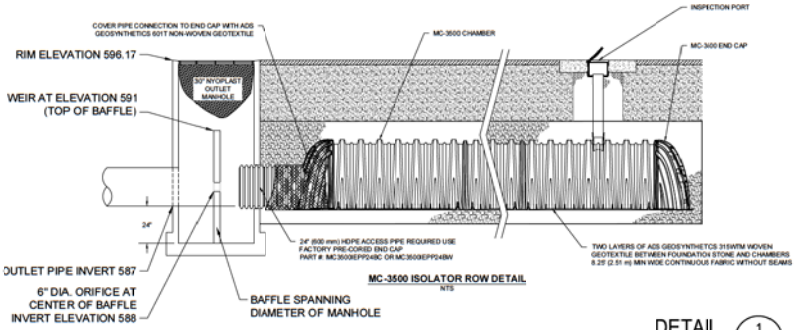
	MATERIAL LOCATION	DESCRIPTION	AASHTO MATERIAL CLASSIFICATIONS	COMPACTION / DENSITY REQUIREMENT
D	**FINAL FILL:** FILL MATERIAL FOR LAYER 'D' STARTS FROM THE TOP OF THE 'C' LAYER TO THE BOTTOM OF FLEXIBLE PAVEMENT OR UNPAVED FINISHED GRADE ABOVE. NOTE THAT PAVEMENT SUBBASE MAY BE PART OF THE 'D' LAYER	ANY SOIL/ROCK MATERIALS, NATIVE SOILS, OR PER ENGINEERS PLANS. CHECK PLANS FOR PAVEMENT SUBGRADE REQUIREMENTS.	N/A	PREPARE PER SITE DESIGN ENGINEER'S PLANS. PAVED INSTALLATIONS MAY HAVE STRINGENT MATERIAL AND PREPARATION REQUIREMENTS.
C	**INITIAL FILL:** FILL MATERIAL FOR LAYER 'C' STARTS FROM THE TOP OF THE EMBEDMENT STONE (B' LAYER) TO 24" (600 mm) ABOVE THE TOP OF THE CHAMBER. NOTE THAT PAVEMENT SUBBASE MAY BE A PART OF THE 'C' LAYER.	GRANULAR WELL-GRADED SOIL/AGGREGATE MIXTURES, <35% FINES OR PROCESSED AGGREGATE. OR MOST PAVEMENT SUBBASE MATERIALS CAN BE USED IN LIEU OF THIS LAYER.	AASHTO M145[4] A-1, A-2-4, A-3 OR AASHTO M43[3] 3, 357, 4, 467, 5, 56, 57, 6, 67, 68, 7, 78, 8, (9), 9, 10	BEGIN COMPACTIONS AFTER 24" (600 mm) OF MATERIAL OVER THE CHAMBERS IS REACHED. COMPACT ADDITIONAL LAYERS IN 12" (300 mm) MAX LIFTS TO A MIN. 95% PROCTOR DENSITY FOR WELL GRADED MATERIAL AND 95% RELATIVE DENSITY FOR PROCESSED AGGREGATE MATERIALS.
B	**EMBEDMENT STONE:** FILL SURROUNDING THE CHAMBERS FROM THE FOUNDATION STONE ('A' LAYER) TO THE 'C' LAYER ABOVE.	CLEAN, CRUSHED, ANGULAR STONE	AASHTO M43[3] 3, 4	NO COMPACTION REQUIRED.
A	**FOUNDATION STONE:** FILL BELOW CHAMBERS FROM THE SUBGRADE UP TO THE FOOT (BOTTOM) OF THE CHAMBER.	CLEAN, CRUSHED, ANGULAR STONE	AASHTO M43[3] 3, 4	PLATE COMPACT OR ROLL TO ACHIEVE A FLAT SURFACE.[2,3]

PLEASE NOTE:
1. THE LISTED AASHTO DESIGNATIONS ARE FOR GRADATIONS ONLY. THE STONE MUST ALSO BE CLEAN, CRUSHED, ANGULAR. FOR EXAMPLE, A SPECIFICATION FOR #4 STONE WOULD STATE: "CLEAN, CRUSHED, ANGULAR NO. 4 (AASHTO M43) STONE".
2. STORMTECH COMPACTION REQUIREMENTS ARE MET FOR 'A' LOCATION MATERIALS WHEN PLACED AND COMPACTED IN 9" (230 mm) (MAX) LIFTS USING TWO FULL COVERAGES WITH A VIBRATORY COMPACTOR.
3. WHERE INFILTRATION SURFACES MAY BE COMPROMISED BY COMPACTION, FOR STANDARD DESIGN LOAD CONDITIONS, A FLAT SURFACE MAY BE ACHIEVED BY RAKING OR DRAGGING WITHOUT COMPACTION EQUIPMENT. FOR SPECIAL LOAD DESIGNS, CONTACT STORMTECH FOR COMPACTION REQUIREMENTS.
4. ONCE LAYER 'C' IS PLACED, ANY SOIL/MATERIAL CAN BE PLACED IN LAYER 'D' UP TO THE FINISHED GRADE. MOST PAVEMENT SUBBASE SOILS CAN BE USED TO REPLACE THE MATERIAL REQUIREMENTS OF LAYER 'C' OR 'D' AT THE SITE DESIGN ENGINEER'S DISCRETION.



NOTES:

1. CHAMBERS SHALL MEET THE REQUIREMENTS OF ASTM F2418-16a, "STANDARD SPECIFICATION FOR POLYPROPYLENE (PP) CORRUGATED WALL STORMWATER COLLECTION CHAMBERS" CHAMBER CLASSIFICATION 45x76 DESIGNATION SS.
2. MC-3500 CHAMBERS SHALL BE DESIGNED IN ACCORDANCE WITH ASTM F2787 "STANDARD PRACTICE FOR STRUCTURAL DESIGN OF THERMOPLASTIC CORRUGATED WALL STORMWATER COLLECTION CHAMBERS".
3. THE SITE DESIGN ENGINEER IS RESPONSIBLE FOR ASSESSING THE BEARING RESISTANCE (ALLOWABLE BEARING CAPACITY) OF THE SUBGRADE SOILS AND THE DEPTH OF FOUNDATION STONE WITH CONSIDERATION FOR THE RANGE OF EXPECTED SOIL MOISTURE CONDITIONS.
4. PERIMETER STONE MUST BE EXTENDED HORIZONTALLY TO THE EXCAVATION WALL FOR BOTH VERTICAL AND SLOPED EXCAVATION WALLS.
5. REQUIREMENTS FOR HANDLING AND INSTALLATION:
   - TO MAINTAIN THE WIDTH OF CHAMBERS DURING SHIPPING AND HANDLING, CHAMBERS SHALL HAVE INTEGRAL, INTERLOCKING STACKING LUGS.
   - TO ENSURE A SECURE JOINT DURING INSTALLATION AND BACKFILL, THE HEIGHT OF THE CHAMBER JOINT SHALL NOT BE LESS THAN 3".
   - TO ENSURE THE INTEGRITY OF THE ARCH SHAPE DURING INSTALLATION, a) THE ARCH STIFFNESS CONSTANT AS DEFINED IN SECTION 6.2.8 OF ASTM F2418 SHALL BE GREATER THAN OR EQUAL TO 500 LBS/IN/IN. AND b) TO RESIST CHAMBER DEFORMATION DURING INSTALLATION AT ELEVATED TEMPERATURES (ABOVE 75° F / 25° C), CHAMBERS SHALL BE PRODUCED FROM REFLECTIVE GOLD OR YELLOW COLORS.



MC-3500 ISOLATOR ROW DETAIL
NTS

INSPECTION & MAINTENANCE

STEP 1) INSPECT ISOLATOR ROW FOR SEDIMENT
- A. INSPECTION PORTS (IF PRESENT)
  - A.1. REMOVE/OPEN LID ON NYLOPLAST INLINE DRAIN
  - A.2. REMOVE AND CLEAN FLEXSTORM FILTER IF INSTALLED
  - A.3. USING A FLASHLIGHT AND STADIA ROD, MEASURE DEPTH OF SEDIMENT AND RECORD ON MAINTENANCE LOG
  - A.4. LOWER A CAMERA INTO ISOLATOR ROW FOR VISUAL INSPECTION OF SEDIMENT LEVELS (OPTIONAL)
  - A.5. IF SEDIMENT IS AT, OR ABOVE, 3" (80 mm) PROCEED TO STEP 2. IF NOT, PROCEED TO STEP 3.
- B. ALL ISOLATOR ROWS
  - B.1. REMOVE COVER FROM STRUCTURE AT UPSTREAM END OF ISOLATOR ROW
  - B.2. USING A FLASHLIGHT INSPECT DOWN THE ISOLATOR ROW THROUGH OUTLET PIPE
    - i) MIRRORS ON POLES OR CAMERAS MAY BE USED TO AVOID A CONFINED SPACE ENTRY
    - ii) FOLLOW OSHA REGULATIONS FOR CONFINED SPACE ENTRY IF ENTERING MANHOLE
  - B.3. IF SEDIMENT IS AT, OR ABOVE, 3" (80 mm) PROCEED TO STEP 2. IF NOT, PROCEED TO STEP 3.

STEP 2) CLEAN OUT ISOLATOR ROW USING THE JETVAC PROCESS
- A. A FIXED CULVERT CLEANING NOZZLE WITH REAR FACING SPREAD OF 45° (1.1 m) OR MORE IS PREFERRED
- B. APPLY MULTIPLE PASSES OF JETVAC UNTIL BACKFLUSH WATER IS CLEAN
- C. VACUUM STRUCTURE SUMP AS REQUIRED

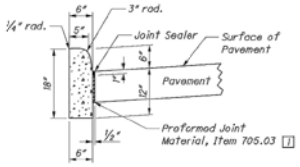
STEP 3) REPLACE ALL COVERS, GRATES, FILTERS, AND LIDS; RECORD OBSERVATIONS AND ACTIONS.

STEP 4) INSPECT AND CLEAN BASINS AND MANHOLES UPSTREAM OF THE STORMTECH SYSTEM.

NOTES

1. INSPECT EVERY 6 MONTHS DURING THE FIRST YEAR OF OPERATION. ADJUST THE INSPECTION INTERVAL BASED ON PREVIOUS OBSERVATIONS OF SEDIMENT ACCUMULATION AND HIGH WATER ELEVATIONS.
2. CONDUCT JETTING AND VACTORING ANNUALLY OR WHEN INSPECTION SHOWS THAT MAINTENANCE IS NECESSARY.

DETAIL 1
SCALE: NTS
UNDERGROUND DETENTION VAULT



TYPE 6

JOINTS: 1" expansion joints shall extend up to the top of the curb and shall be constructed in the curb and gutter section in such a manner that the joint seal will extend the full width of the gutter and into the curb face a sufficient distance to seal the joint to an elevation of at least 2" above the flow line of the gutter. Dowel bars shall be used in the curb and gutter section at expansion joints and to the surface of the pavement.

Transverse expansion joint material shall meet the requirements of Item 705.03.

GUTTER PLATE THICKNESS: Thickness of gutter plate "T" shall be 9" unless otherwise shown on the plans.

TOLERANCES: Dimensional tolerances are as follows:
Curbs: 0" to +1/4".
Gutters: 0 to +1/4".

LEGEND

[1] Expansion joint material and joint sealer are not required for the portion of the curb that is adjacent to a flexible pavement type. Both materials are required, as detailed, for the full height of rigid pavement and concrete bases.

DETAIL 2
SCALE: NTS
ODOT STANDARD CONCRETE CURB TYPE 6 (BP-5.1)

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DESCRIPTION	
AREA CODE	
ACCOUNT NUMBER	AW2128
PROJECT NUMBER	1880115
DRAWING BY	JTG
STATION ID	S0868O1
CHECKER INITIALS	CNS

APPROVALS		
DATE	INITIALS	
		REGIONAL ENGINEER
		MGR TECH REC & STD
01/08/2021	CDW	PRINCIPAL ENGINEER

DUKE ENERGY

C350 PROJECT
NORWOOD C350 STATION
CIVIL DETAILS - 6
HAMILTON COUNTY, OHIO

REF. DWG(S) PNG-G-004-0001043

SHEET(S) 16 OF 68	DWG SCALE AS NOTED
DWG DATE 07/26/2019	SUPERSEDED —

DRAWING NUMBER	REVISION
PNG -C-004-0001284	0

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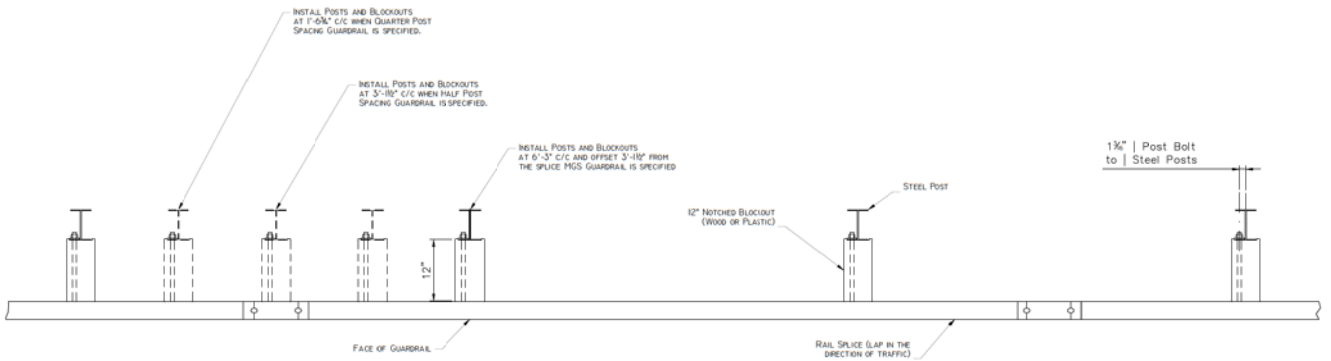
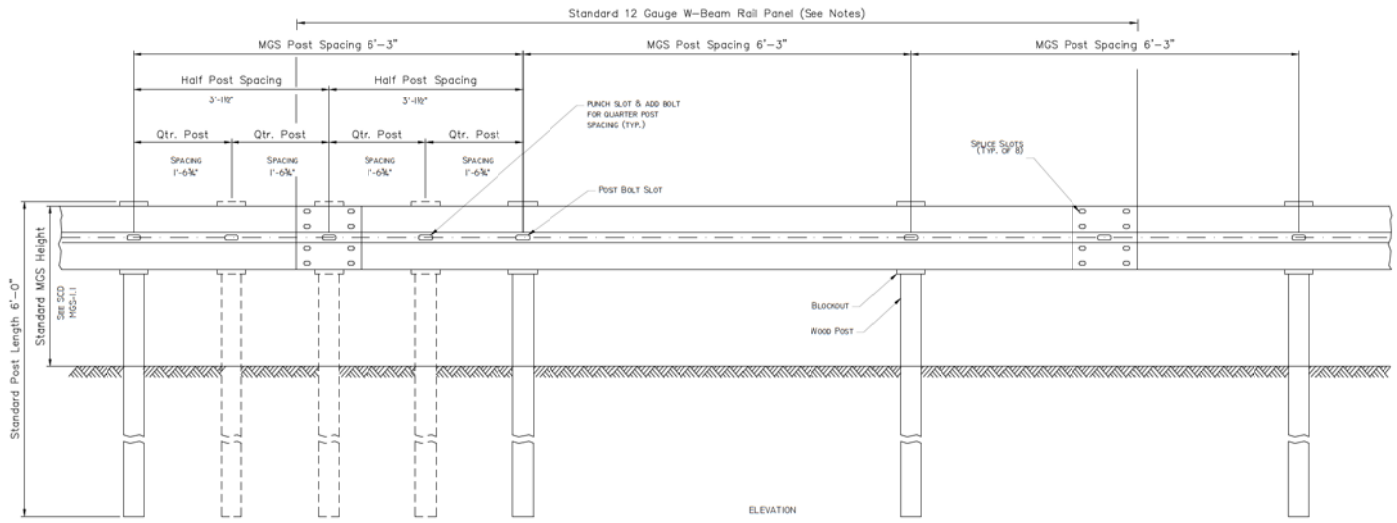


PLAN VIEW

(STEEL POSTS SHOWN)



ELEVATION

(WOOD POSTS SHOWN)

DETAIL 1

SCALE: NTS

ODOT STANDARD MIDWEST GUARDRAIL SYSTEM (MGS 2.1)

NOTES

RAIL: USE W-BEAM RAIL MEETING AASHTO M 180-12 TYPE II CLASS A, AS SPECIFIED IN CMS 606. EITHER 13'-6¼" LONG (12'-6" BETWEEN SPLICES) OR 26'-½" LONG (25'-0" BETWEEN SPLICES) RAIL SECTIONS MAY BE USED.

POSTS: POSTS MAY BE CONSTRUCTED OF WOOD OR STEEL. USE THE SAME TYPE OF POST THROUGHOUT THE LENGTH OF THE PROJECT UNLESS OTHERWISE SPECIFIED IN THE PLANS OR PERMITTED BY THE ENGINEER.

WOOD POST SHALL BE FABRICATED AND PRESSURE-TREATED FOR APPROVED SPECIES AS PER CMS 710.12. BORE BOLT HOLES AND, IF REQUIRED, TRIM THE TOPS OF POSTS AFTER THE POSTS ARE SET.

SEE SCD MGS-1.1 FOR STANDARD STEEL POSTS.

ALL RECTANGULAR POSTS ARE 6'-0" LONG (+3", -0 TOLERANCE) UNLESS OTHERWISE IN THE CONTRACT DOCUMENT. POSTS MAY BE DRILLED HOLES OR MAY BE DRIVEN TO GRADE. EMBEDMENT DEPTH SHALL BE 37" WHEN USING THE ROUND WOODEN POST OPTION.

BLOCKOUTS: BLOCKOUT DIMENSIONS ARE DEPENDENT ON POST USED. WOOD BLOCKOUTS ARE TO BE PRESSURE TREATED AS SPECIFIED IN CMS 710.14. BORE BOLT HOLES. APPROVED ALTERNATE BLOCKOUTS MAY BE USED IN LIEU OF THE WOOD BLOCKOUTS SHOWN. THE APPROVED LIST IS MAINTAINED BY THE OFFICE OF ROADWAY ENGINEERING.

WHEN TERMINATING DOUBLE-SIDED BARRIER GUARDRAIL WITH AN IMPACT ATTENUATOR, USE REDUCED 8" DEEP BLOCKOUTS ON THE LAST 4 POSTS ON THE BARRIER DESIGN TO ACCOMODATE THE NARROWER WIDTHS OF THE ATTENUATORS.

WASHERS: INSTALL APPROPRIATE SIZED STANDARD GALVANIZED STEEL WASHERS ON THE NUT SIDE OF BOLTS INSTALLED ON WOOD POSTS. BEAM WASHERS ARE NOT TO BE USED.

DELINEATION: FOR BARRIER REFLECTORS SEE CMS 626.

MISCELLANEOUS: FOR OTHER GUARDRAIL DETAILS, SEE SCD MGS-1.1.

PAYMENT: GUARDRAIL IS PAID IN FEET PER
- ITEM 606 - GUARDRAIL, TYPE MGS.
- HALF OR QUARTER POST SPACING GUARDRAIL PER
- ITEM 606 - GUARDRAIL, TYPE MGS HALF POST SPACING
- ITEM 606 - GUARDRAIL, TYPE MGS QUARTER POST SPACING

WASHERS:

DELINEATION:

MISCELLANEOUS:

PAYMENT:
- ITEM 606 - GUARDRAIL, TYPE MGS.
- ITEM 606 - GUARDRAIL, TYPE MGS HALF POST SPACING
- ITEM 606 - GUARDRAIL, TYPE MGS QUARTER POST SPACING

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APPROVALS			
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DUKE ENERGY

C350 PROJECT
NORWOOD C350 STATION
CIVIL DETAILS - 7

HAMILTON COUNTY, OHIO

REF. DWG(S) PNG-G-004-0001043

SHEET(S)	17 OF 68
DWG SCALE	AS NOTED
DWG DATE	07/26/2019
SUPERSEDED	—
DRAWING NUMBER	PNG -C-004-0001286
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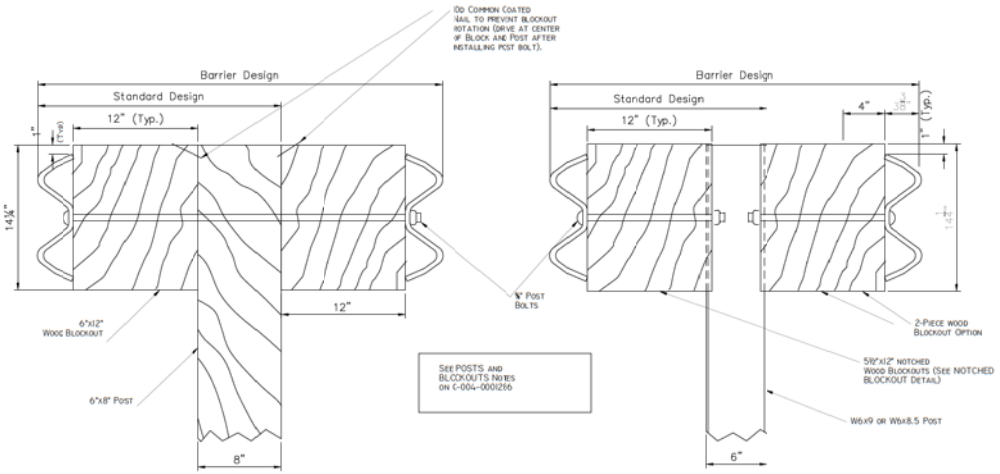
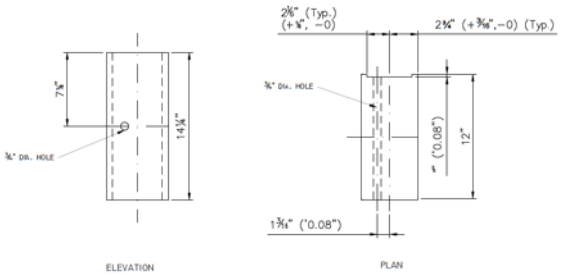


SQUARE WOOD POST

STEEL POST

See POSTS Note, C-104-0001286

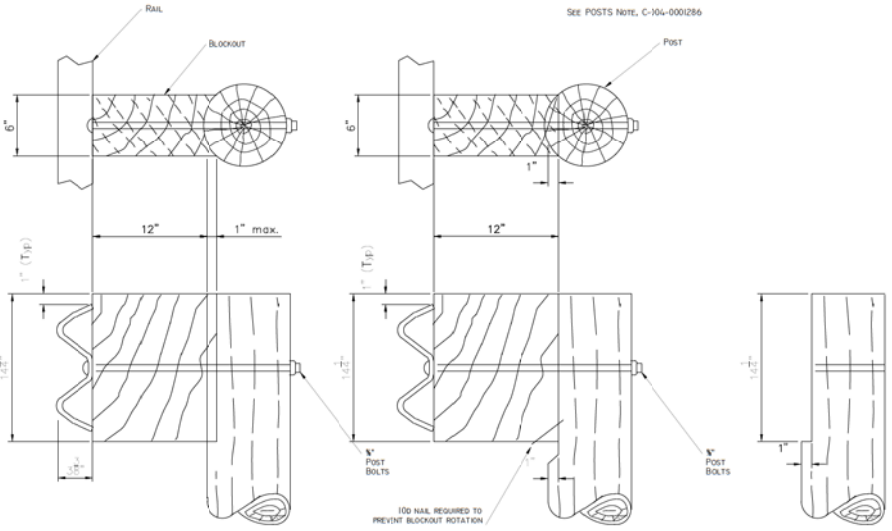


ELEVATION

PLAN

NOTCHED BLOCKOUTS FOR STEEL POSTS

See BLOCKOUTS Note on Sheet 1



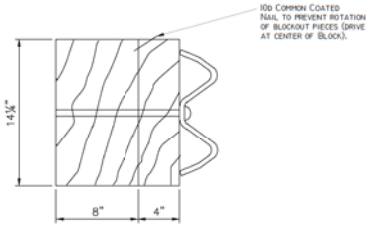
METHOD 1 ROUTED BLOCKOUT

METHOD 2 NOTCHED POST

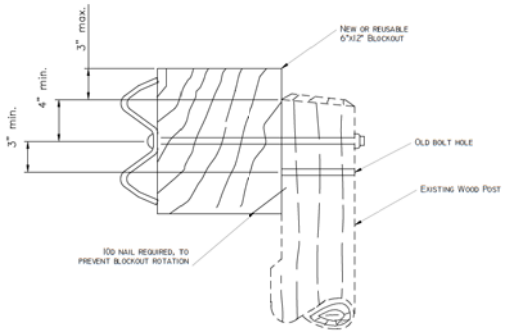
TOE NAIL NOT REQUIRED IF POST IS CUT AS SHOWN

ALTERNATE METHODS OF PLACING THE BLOCKOUTS ON ROUND POSTS MAY BE SUBMITTED FOR CONSIDERATION AND APPROVED BY THE ENGINEER.

ROUND WOOD POSTS



TWO-PIECE WOOD BLOCKOUT OPTION



RAISING EXISTING GUARDRAIL HEIGHT

DETAIL 1

SCALE: NTS

ODOT STANDARD MIDWEST GUARDRAIL SYSTEM (MGS 2.1)

BURNS & McDONNELL ENGINEERING COMPANY, INC. STATE LICENSE # COA:01557

STATE OF OHIO — CHRISTOPHER D. WILSON — 82217 — REGISTERED PROFESSIONAL ENGINEER

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C350 PROJECT
NORWOOD C350 STATION
CIVIL DETAILS - 8

HAMILTON COUNTY, OHIO

REF. DWG(S) PNG-G-004-0001043

SHEET(S) 18 OF 68	DWG SCALE AS NOTED
DWG DATE 07/26/2019	SUPERSEDED —

DRAWING NUMBER: PNG -C-004-0001287 — REVISION: 0

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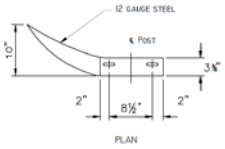
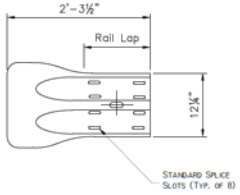
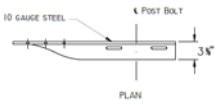


PLAN



ELEVATION

W-BEAM FLARED END SECTION



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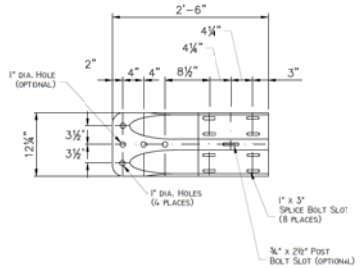
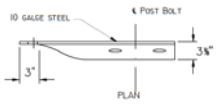
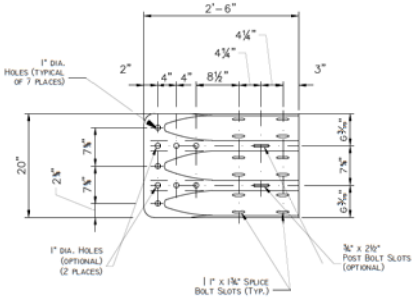


ELEVATION

W-BEAM TERMINAL CONNECTOR

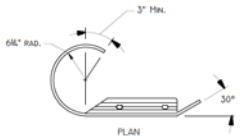


PLAN

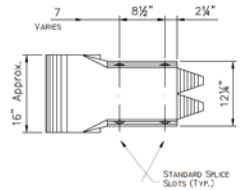


ELEVATION

THRIE-BEAM TERMINAL CONNECTOR

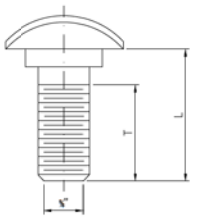


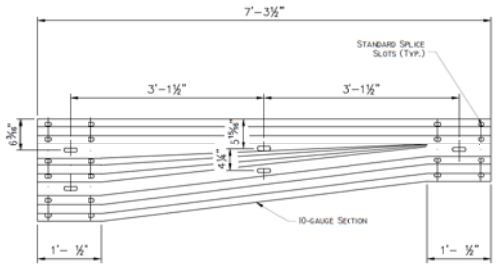
PLAN



ELEVATION

ROUNDED W-BEAM END SECTION





ASYMMETRIC TRANSITION SECTION

NOTES

GENERAL: COMPONENTS SHOWN ON THIS DRAWING ARE USED IN A VARIETY OF GUARDRAIL SYSTEMS. SEE INDIVIDUAL GUARDRAIL DRAWING FOR SPECIFIC APPLICATIONS.

SEE CMS 606 FOR GUARDRAIL SPECIFICATIONS NOT COVERED ON THESE DRAWINGS.

REFER TO AASHTO M 180-12 FOR DIMENSIONAL DETAILS OF W-BEAM AND THRIE-BEAM RAIL ELEMENTS, RELATED BUFFER AND END SECTIONS, BEAM SPLICES, POST AND SPLICE BOLTS, NUTS, AND TYPE I W-BEAM TO THRIE-BEAM TRANSITION SECTIONS. BEAM WASHERS ARE NOT TO BE USED. BOLTS GRADE SHALL BE ASTM A307.

RAIL ELEMENTS: UNLESS OTHERWISE SPECIFIED, W-BEAM RAIL IS 12 GAUGE STEEL WITH AN EFFECTIVE LENGTH OF 12'-6" OR 25'-0", WITH 5⁹⁄₁₆"x1⅛" SPLICE BOLT SLOTS, AND ¾" x 2½" POST BOLT SLOTS ON 3'-1½" CENTERS REGARDLESS OF POST SPACING. FIELD PUNCH OR DRILL BOLT HOLES OR SLOTS FOR IRREGULARLY SPACED POSTS AS SPECIFIED IN CMS 606.04.

SUBSTITUTING ONE 10 GUAGE STEEL BEAM ELEMENT WHERE TWO NESTED 12 GUAGE STEEL BEAMS ARE SPECIFIED IS PERMITTED (BOTH W-BEAM AND THRIE-BEAM).

RAIL SPLICES: LAP SPLICES BETWEEN TWO RAIL ELEMENTS OR BETWEEN A RAIL AND TERMINAL CONNECTOR IN THE DIRECTION OF TRAFFIC. LAP THE FLARED END SECTIONS IN THE DIRECTION OF TRAFFIC.

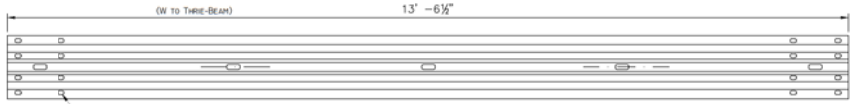
GUARDRAIL BOLT

(FOR POST AND SPLICE BOLTS)

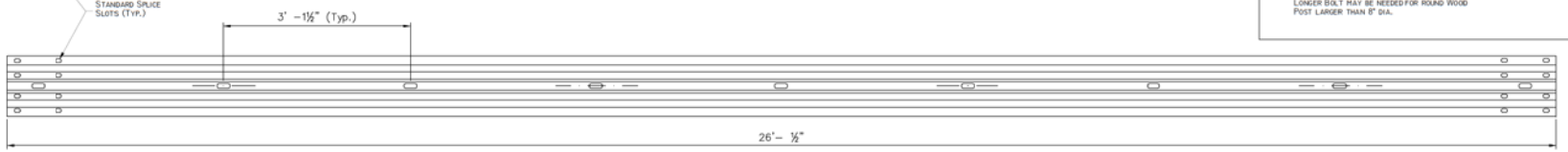
L	T MIN.	BOLT USE
22" (STANDARD RAIL)	4"	TYPE MGS: WP/WB, PB
34" (BARRIER RAIL)		
14"	4"	TYPE MGS: SP/WB, PB
16"	8"	SPLICE BOLT

WP = WOOD POST WB = WOOD BLOCKOUT
SP = STEEL POST PB = PLASTIC BLOCKOUT

LONGER BOLT MAY BE NEEDED FOR ROUND WOOD POST LARGER THAN 8" DIA.



12'-6" W-BEAM SECTION



25'-0" W-BEAM SECTION

DETAIL 1

SCALE: NTS

ODOT STANDARD MIDWEST GUARDRAIL SYSTEM (MGS 1.1)

BURNS & McDONNELL ENGINEERING COMPANY, INC.
STATE LICENSE # COA:01557

STATE OF OHIO
CHRISTOPHER D. WILSON
82217
REGISTERED
PROFESSIONAL ENGINEER
01/08/2021
PROFESSIONAL ENGIARCH STAMP

NO.	DATE	REVISION(S) DESCRIPTION	BY	CHK	APPD
0	01/08/2021	ISSUED FOR CONSTRUCTION	JTG	CNS	CDW

DESCRIPTION	
AREA CODE	
ACCOUNT NUMBER	AW2128
PROJECT NUMBER	1880115
DRAWING BY	JTG
STATION ID	S0868O1
CHECKER INITIALS	CNS

APPROVALS			
DATE	INITIALS		REGIONAL ENGINEER
			MGR TECH REC & STD
01/08/2021	CDW		PRINCIPAL ENGINEER

DUKE ENERGY®

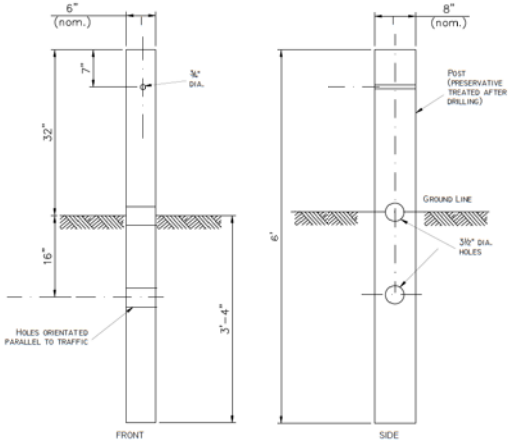
C350 PROJECT
NORWOOD C350 STATION
CIVIL DETAILS - 9

HAMILTON COUNTY, OHIO

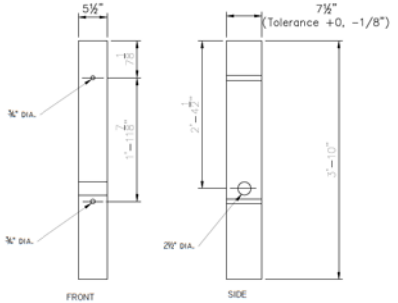
REF. DWG(S) PNG-G-004-0001043

SHEET(S) 19 OF 68	DWG SCALE AS NOTED
DWG DATE 07/26/2019	SUPERSEDED —
DRAWING NUMBER	REVISION
PNG -C-004-0001288	0

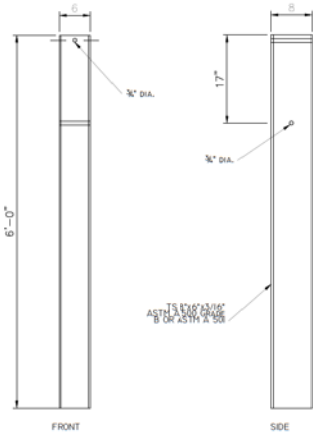
DISCIPLINE / RESOURCE CENTER / LINE NUMBER



TYPE 1 BREAKAWAY CRT POST



TYPE 2 BREAKAWAY BCT TIMBER POST



STEEL GROUND FOUNDATION TUBE

STEEL BEAM POSTS				
SIZE	BEAM DEPTH	FLANGE WIDTH	FLANGE THICKNESS	WEB THICKNESS
ROLLED W6X8.5	5.8"	3.94"	0.193"	0.170"
ROLLED W6X9	5.9"	3.94"	0.215"	0.170"
WELDED 6X8.5	6.0"	3.94"	0.193"	0.170"
WELDED 6X9	6.0"	3.94"	0.215"	0.170"

NOTES

GUARDRAIL HEIGHT: FOR INITIAL INSTALLATION, CONSTRUCT THE GUARDRAIL WITHIN 1" OF THE STANDARD 31" HEIGHT TO THE TOP OF W-BEAM RAIL. WHEN SUBSEQUENT PROJECTS, SUCH AS RESURFACINGS, AFFECT THE HEIGHT OF EXISTING GUARDRAIL, ADJUSTMENT IS NOT REQUIRED IF THE FINISHED HEIGHT IS WITHIN 3" OF THE STANDARD HEIGHT.

POSTS: THE STANDARD POST LENGTH IS 6'-0" (+3",-0" TOLERANCE). WOOD POSTS ARE PERMITTED INSTEAD OF STANDARD STEEL POSTS PER CMS 710.11.

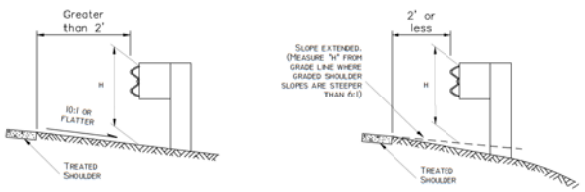
POST EMBEDMENT DEPTH: STANDARD EMBEDMENT DEPTH IS 3'-4" MINIMUM. EMBEDMENT DEPTH SHALL BE 37" WHEN USING THE ROUND WOODEN POST OPTION. DO NOT DRIVE POSTS LOCATED OVER A CULVERT WITH LESS THAN 4'-3" OF COVER; INSTEAD SET IN DRILLED OR DUG HOLES. WHERE SITE CONSTRAINTS PROHIBIT THE POST FROM BEING PLACED AT LEAST ONE FOOT IN FRONT OF THE SLOPE BREAK POINT, USE LONGER POSTS AS SHOWN IN THE GUARDRAIL POST LENGTH AND POSITION DETAIL. THE FACE OF THE RAIL MAY NOT BE BEYOND THE SLOPE BREAK POINT.

SPECIAL POST MOUNTINGS: INSTALL POSTS LOCATED OVER A DRAINAGE INLET OR STRUCTURE WITH A COVER OF LESS THAN 3'-4" AS SHOWN IN THE FOOTING ANCHOR DETAIL.

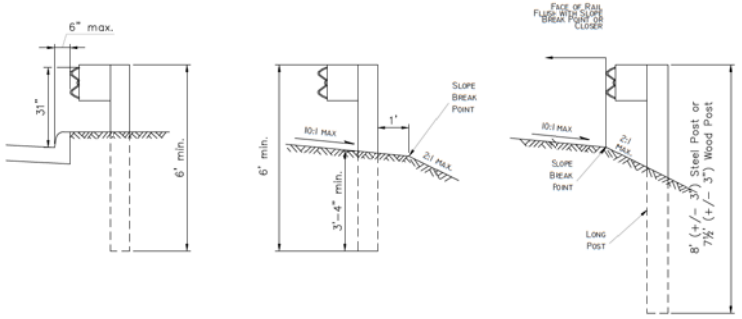
ANCHORS: HOLES SHALL COMPLY WITH CMS 510. USE NON-SHRINK, NONMETALLIC GROUT PER CMS 705.20.

PROTECTIVE COATING: IN LIEU OF THE COMPLYING WITH CMS 710.06, COAT EXPANSION SHIELDS, ANCHORS AND CONCRETE INSERT ANCHOR ASSEMBLIES EMBEDDED IN CONCRETE IN ACCORDANCE WITH ASTM A 153 OR BE OF STAINLESS STEEL. ANY BOLTS SCREWED INTO THESE DEVICES SHALL MEET CMS 710.06.

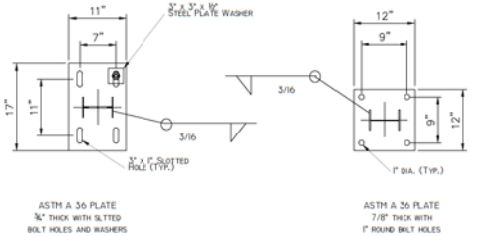
PAYMENT: PAYMENT FOR STANDARD GUARDRAIL IS MEASURED IN FEET AS ITEM 606 - GUARDRAIL, TYPE MGS. RUNS WITH LONGER POSTS SHOULD BE PAID AS ITEM 606 - GUARDRAIL, TYPE MGS WITH LONG POSTS, ALSO MEASURED IN FEET. ALL COSTS ASSOCIATED WITH SPECIAL POST MOUNTINGS ARE INCLUDED IN THE UNIT PRICE BID OF ITEM 606 GUARDRAIL OF THE TYPE SPECIFIED IN THE PLANS.



MEASURING GUARDRAIL HEIGHT

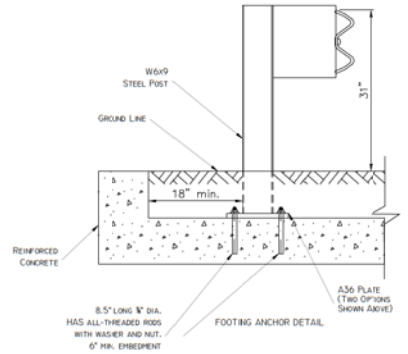


GUARDRAIL POST LENGTH AND POSITION



ASTM A 36 PLATE ¾" THICK WITH SLTTED BOLT HOLES AND WASHERS

ASTM A 36 PLATE 7/8" THICK WITH 1" ROUND BILT HOLES



DETAIL 1
SCALE: NTS

ODOT STANDARD MIDWEST GUARDRAIL SYSTEM (MGS 1,1)

BURNS & McDONNELL ENGINEERING COMPANY, INC.
STATE LICENSE # COA:01557

STATE OF OHIO
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DUKE ENERGY

C350 PROJECT
NORWOOD C350 STATION
CIVIL DETAILS - 10

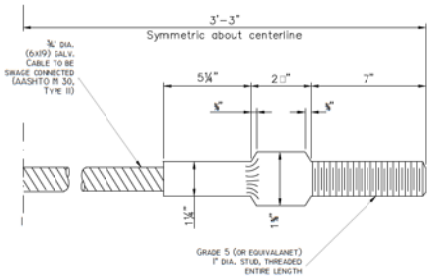
HAMILTON COUNTY, OHIO

REF. DWG(S) PNG-G-004-0001043

SHEET(S) 20 OF 68	DWG SCALE AS NOTED
DWG DATE 07/26/2019	SUPERSEDED —

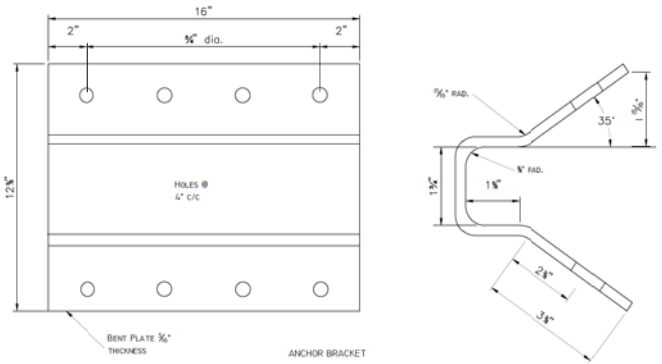
DRAWING NUMBER	REVISION
PNG -C-004-0001289	0

DISCIPLINE / RESOURCE CENTER / LINE NUMBER

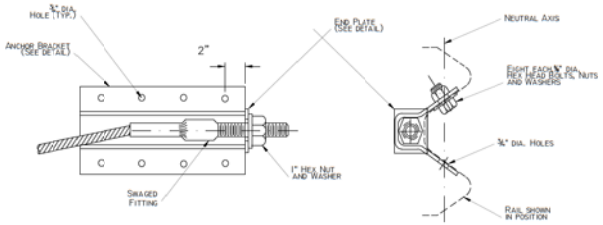


STANDARD SWAGED FITTING AND STUD

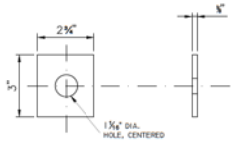
CABLE ANCHOR



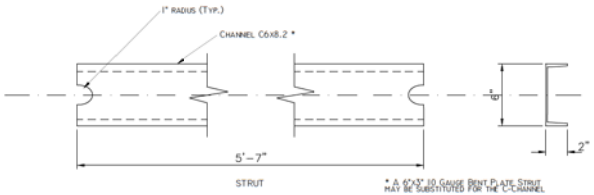
ANCHOR BRACKET



ANCHOR BRACKET ASSEMBLY DETAILS

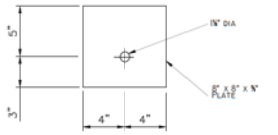


END PLATE

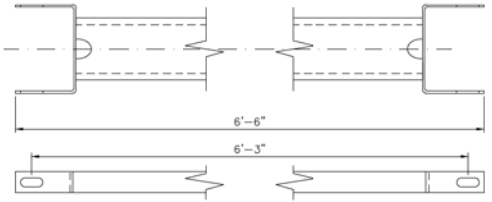


STRUT

* A 6"x3" 10 GAUGE BENT PLATE STRUT MAY BE SUBSTITUTED FOR THE C-CHANNEL

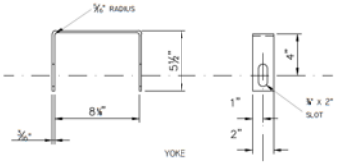


BEARING PLATE



CHANNEL LEGS SHOWN DOWN. FOR OPPOSITE HAND, INSTALL CHANNEL LEGS UP.

STRUT AND YOKE ASSEMBLY



YOKE

TWO REQUIRED IN ASSEMBLY

DETAIL 1

SCALE: NTS

ODOT STANDARD MIDWEST GUARDRAIL SYSTEM (MGS 1,1)

BURNS & McDONNELL ENGINEERING COMPANY, INC.
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	01/08/2021	CDW	PRINCIPAL ENGINEER

DUKE ENERGY

C350 PROJECT
NORWOOD C350 STATION
CIVIL DETAILS - 11

HAMILTON COUNTY, OHIO

REF. DWG(S) PNG-G-004-0001043

SHEET(S) 21 OF 68	DWG SCALE AS NOTED
DWG DATE 07/26/2019	SUPERSEDED —
DRAWING NUMBER	REVISION
PNG -C-004-0001290	0
DISCIPLINE / RESOURCE CENTER / LINE NUMBER	

GENERAL NOTES:

1. THESE NOTES AND OTHER DRAWING NOTES CONTAINED WITHIN ARE PROVIDED TO MEET SPECIFIC REQUIREMENTS AND TO SUPPLEMENT THE CONTRACT SPECIFICATIONS. THESE NOTES NEITHER REPLACE NOR OVERRIDE THE PROVISIONS AND REQUIREMENTS OF THE CONTRACT SPECIFICATIONS.
2. CONTRACTOR SHALL COORDINATE ALL STRUCTURAL WORK WITH WORK SHOWN ON ALL OTHER DRAWINGS.
3. CONTRACTOR SHALL VERIFY ALL DIMENSIONS OF EXISTING CONSTRUCTION AND REPORT ANY DISCREPANCIES FROM THE CONTRACT DRAWINGS TO THE ENGINEER PRIOR TO COMMENCING WITH WORK. SCALING OF WORKING DIMENSIONS FROM THE STRUCTURAL DRAWINGS IS PROHIBITED.
4. CONTRACTOR TO FIELD VERIFY ALL FOUNDATION TOPS OF CONCRETE, REVEALS, AND DIMENSIONS PRIOR TO CONSTRUCTION.
5. CONTRACT DRAWINGS AND SPECIFICATIONS REPRESENT THE FINISHED STRUCTURE. CONTRACTOR SHALL BE RESPONSIBLE FOR ALL MEANS AND METHODS OF CONSTRUCTION INCLUDING, BUT NOT LIMITED TO, SHORING AND TEMPORARY BRACING. CONTRACTOR SHALL UNDERTAKE ALL NECESSARY MEASURES TO ENSURE SAFETY OF ALL PERSONS AND STRUCTURES AT THE SITE AND ADJACENT TO THE SITE. VISITS TO THE SITE BY THE COMPANY OR ENGINEER SHALL NOT RELIEVE THE CONTRACTOR OF SUCH RESPONSIBILITY.
6. IF CERTAIN FEATURES ARE NOT FULLY SHOWN OR CALLED FOR ON THE CONTRACT DRAWINGS OR SPECIFICATIONS, THEIR CONSTRUCTION SHALL BE OF THE SAME CHARACTER AS FOR SIMILAR CONDITIONS THAT ARE SHOWN OR CALLED FOR WITH THE APPROVAL OF THE ENGINEER. WHERE SECTIONS VARY, CONTRACTOR SHALL PROVIDE FOR SMOOTH TRANSITIONS BETWEEN THEM, UNLESS NOTED OTHERWISE.
7. ALL PRODUCTS SHALL BE INSTALLED IN ACCORDANCE WITH THE MANUFACTURERS' WRITTEN INSTRUCTIONS AND RECOMMENDATIONS, UNLESS NOTED OTHERWISE.
8. ITEMS WHICH ARE TO BE FURNISHED AND INSTALLED BY SEPARATE CONTRACTS ARE IDENTIFIED AND LABELED FOR EACH CONTRACT.
9. FOR ADDITIONAL INFORMATION, SUBMITTAL REQUIREMENTS, AND CODES AND STANDARDS, SEE THE CONTRACT SPECIFICATIONS.

DESIGN STANDARDS:

1. PRINCIPAL CODE OF RECORD: INTERNATIONAL BUILDING CODE 2018.
2. AMERICAN CONCRETE INSTITUTE: (ACI)
   a. ACI 318-14, BUILDING CODE REQUIREMENTS FOR STRUCTURAL CONCRETE
3. AMERICAN INSTITUTE OF STEEL CONSTUCTION: (AISC)
   a. AISC 360-10, SPECIFICATION FOR STRUCTURAL STEEL BUILDINGS, 14TH EDITION
4. AMERICAN SOCIETY OF CIVIL ENGINEERS: (ASCE)
   a. ASCE 7-10, MINIMUM DESIGN LOADS FOR BUILDINGS AND OTHER STRUCTURES
5. AMERICAN WELDING SOCIETY: (AWS)
   a. AWS D1.1, STRUCTURAL WELDING CODE, 2011
6. PROCESS INDUSTRY PRACTICES: (PIP)
   a. STC01015, STRUCTURAL DESIGN CRITERIA
   b. STE05121, ASCE ANCHORAGE DESIGN FOR PETROCHEMICAL FACILITIES
   c. STF05121, ANCHOR FABRICATION AND INSTALLATION INTO CONCRETE
   d. STS03001, PLAIN AND REINFORCED CONCRETE SPECIFICATION
   e. STS03600, NONSHRINK CEMENTITIOUS GROUT SPECIFICATION
   f. STS03601, EPOXY GROUT SPECIFICATION
   g. STS05120, STRUCTURAL MISCELLANEOUS STEEL FABRICATION SPECIFICATION
   h. STS05130, STRUCTURAL AND MISCELLANEOUS STEEL ERECTION SPECIFICATION
7. DUKE ENERGY STANDARDS

STATEMENT OF SPECIAL INSPECTIONS

1. REQUIRED AND PREPARED IN ACCORDANCE WITH IBC 2018 SECTIONS 1704 AND 1705.
2. THE OWNER OR REGISTERED DESIGN PROFESSIONAL IN RESPONSIBLE CHARGE SHALL EMPLOY ONE OR MORE APPROVED AGENCIES/SPECIAL INSPECTORS TO PROVIDE "SPECIAL INSPECTIONS" DURING CONSTRUCTION.
3. THE SPECIAL INSPECTOR(S) SHALL BE QUALIFIED PER IBC 2018 SECTION 1704.2.1.
4. THE SPECIAL INSPECTOR(S) SHALL SUBMIT REPORTS PER IBC 2018 SECTION 1704.2.4.
5. THE SPECIAL INSPECTOR(S) SHALL USE THE LATEST ISSUE OF THE STRUCTURAL DRAWINGS FOR THE INSPECTIONS. SHOP FABRICATION DRAWINGS SHALL NOT BE USED FOR INSPECTION PURPOSES.
6. SPECIAL INSPECTIONS:
   a. STEEL CONSTRUCTION PER IBC 2018 SECTION 1705.2.
   b. CONCRETE CONSTRUCTION PER IBC 2018 SECTION 1705.3 AND TABLE 1705.3.
   c. SOILS PER IBC IBC 2018 SECTION 1705.6 AND TABLE 1705.6.
   d. DRILLED PIERS PER IBC 2018 SECTION 1705.7 AND TABLE 1705.7.

DESIGN LOADS:

1. RISK CATEGORY: 3 PER ASCE 7
2. DEAD LOAD
   a. EQUIPMENT LOADS ARE ACTUAL WEIGHTS OF EQUIPMENT (EMPTY, OPERATING, AND/OR TESTING WEIGHTS AS PROVIDED BY EQUIPMENT SUPPLIER)
   b. FOUNDATIONS ARE DESIGN FOR EQUIPMENT, WHICH SATISFIES THE CONTRACT SPECIFICATIONS.
3. LIVE LOADS PER ASCE 7:
   a. PLATFORMS AND WALKWAYS: 60 PSF
   b. STAIRS AND EXITWAYS: 100 PSF
   c. LIGHT STORAGE: 125 PSF
4. SNOW LOADS PER ASCE 7:
   a. GROUND SNOW LOAD: 20 PSF
   b. EXPOSURE FACTOR: 0.9
   c. THERMAL FACTOR: 1.2
   d. IMPORTANCE FACTOR: 1.2
5. ICE LOADS PER ASCE 7:
   a. NOMINAL ICE THICKNESS: 0.75 INCH
   b. CONCURRENT WIND SPEED: 30 MPH
   c. IMPORTANCE FACTOR: - MULTIPLIER ON ICE THICKNESS: 1.25 - MULTIPLIER ON CONCURRENT WIND PRESSURE: 1.0
6. WIND LOAD PER ASCE 7:
   a. BASIC WIND SPEED: 120 MPH 3-SECOND GUST - ULTIMATE
   b. BASIC WIND SPEED: 90 MPH 3-SECOND GUST - SERVICE LEVEL
   c. EXPOSURE CATEGORY: C
7. SEISMIC LOAD PER ASCE 7:
   a. MAXIMUM CONSIDERED EARTHQUAKE SPECTRAL RESPONSE ACCELERATIONS: - Ss COEFFICIENT: 0.143g - S1 COEFFICIENT: 0.077g
   b. DESIGN EARTHQUAKE SPECTRAL RESPONSE ACCELERATIONS: - Sds COEFFICIENT: 0.115g - Sd1 COEFFICIENT: 0.087g
   c. IMPORTANCE FACTOR: 1.5
   d. SITE CLASS: D
   e. SEISMIC DESIGN CATEGORY: D
8. FROST DEPTH: 30" (PER 2018 OHIO BUILDING CODE)

SOILS AND FOUNDATIONS:

1. USE SPECIAL CARE DURING EXCAVATION NOT TO DAMAGE EXISTING STRUCTURES. PROVIDE SHEETING OR SHORING WHERE NECESSARY.
2. FOUNDATION CONSTRUCTION SHALL BE OBSERVED BY THE GEOTECHNICAL ENGINEER OF RECORD.
3. SITE PREPARATION PER TERRACON GEOTECHNICAL ENGINEERING REPORT DATED 04/13/2017 AND C350 CENTRAL CORRIDOR PIPELINE EXPANSION GEOTECHNICAL ENGINEERING REPORT DATED 07/06/2020:
   a. GEOTECHNICAL ENGINEER OF RECORD SHALL OBSERVE SUBGRADE PRIOR TO CONCRETE PLACEMENT.
   b. EXCAVATION, FILL, AND BACKFILL SHALL BE IN ACCORDANCE WITH THE CONTRACT AND SPECIFICATIONS. CONTRACTOR SHALL NOTIFY THE ENGINEER WHEN LOOSE OR SOFT SOILS ARE EXPOSED WHERE SLABS, MATS, OR FOOTINGS ARE TO BE PLACED SO A DETERMINATION MAY BE MADE REGARDING IMPROVEMENT OF THIS POTENTIALLY UNDESIRABLE CONDITION.
   c. EXISTING UNDERGROUND UTILITIES AND FOUNDATIONS SHALL BE LOCATED BY CAREFUL EXCAVATION BEFORE STARTING FOUNDATION OR HYDROEXCAVATION AS REQUIRED. SUPPORT AND PROTECTION OF THESE UTILITIES AND FOUNDATIONS SHALL BE PROVIDED DURING EARTHWORK OPERATIONS.
   d. SHALLOW FOUNDATION GROUND IMPROVEMENTS:
      - SUBGRADE PREP (ALL FOUNDATIONS EXCEPT BUILDING SLAB): OVEREXCAVATE AND RE-COMPACT UNCONSOLIDATED NATIVE SITE SOIL 36 INCHES BELOW BEARING ELEVATION, UNLESS OTHERWISE NOTED, 36 INCHES OUTSIDE FOOTING PERIMETER.
      - SUBGRADE PREP (BUILDING SLAB): OVEREXCAVATE AND RE-COMPACT UNCONSOLIDATED NATIVE SITE SOIL 18 INCHES BELOW BEARING ELEVATION, 18 INCHES OUTSIDE SLAB PERIMETER.
      - BACKFILL: STRUCTURAL FILL IS USED BELOW OR WITHIN 10 FEET OF STRUCTURES OR PAVEMENTS. GENERAL FILL IS USED TO ACHIEVE GRADE OUTSIDE OF THESE AREAS. EARTHEN MATERIALS USED FOR STRUCTURAL FILL INCLUDING COHESIVE SOILS, SHALE, AND SMALL PIECES OF LIMESTONE CAN BE INCLUDED IN THE BACKFILL. CONTROLLED LOW STRENGTH MATERIAL MAY ALSO BE USED UNDER FOUNDATIONS WITHOUT GEOGRID LAYERS.
      - COMPACTION: 6 INCH LAYERS, 95% ASTM D 1557
      - ALL SOIL BACKFILL SHOULD BE MOISTURE-CONDITIONED TO WITHIN ±3% OF THEIR OPTIMUM MOISTURE CONTENT, PLACED IN THIN HORIZONTAL LIFTS (8" OR LESS WHEN USING HEAVY COMPACTION EQUIPMENT AND 4" WHEN USING HAND COMPACTION EQUIPMENT), AND COMPACTED TO A MINIMUM 95% IN LAWN, NON-STRUCTURAL AREAS AND 98% TO 100% STANDARD PROCTOR MAXIMUM DRY DENSITY (ASTM D 698) IN PAVEMENT AND OTHER STRUCTURAL AREAS.
4. FILL AND BACKFILL MATERIALS:
   a. STRUCTURAL FILL: ODOT #304

RECOMMENDED GRADED MATERIALS	
ODOT #304 AGGREGATE BASE	
SIEVE	PERCENT FINER
1"	100
3/4"	90-100
3/8"	20-55
#4	0-10
#8	0-5

   b. CONTROLLED LOW-STRENGTH MATERIAL: ODOT ITEM 613 SPECIFICATION
      - FLOWABLE FILL SHALL BE REMOVABLE WITH A COMPRESSIVE STRENGTH LOWER THAN 150PSI AND SHALL GENERALLY CONFORM TO THE ODOT TYPE 2 MIX.
5. DESIGN PARAMETERS:
   a. MINIMUM STABILITY FACTORS OF SAFETY:
      - OVERTURNING: 1.5
      - UPLIFT: 1.5
      - SLIDING: 1.0
   b. NET ALLOWABLE BEARING PRESSURE: 2000 PSF
   c. COEFFICIENT OF FRICTION: 0.4

MATERIALS:

1. SEE THE CONTRACT SPECIFICATIONS FOR COMPLETE REQUIREMENTS AND COMPLY WITH ALL APPLICABLE OSHA REGULATIONS.
2. REINFORCED CONCRETE:
   a. REINFORCED CONCRETE SHALL BE PREPARED AND PLACED IN ACCORDANCE WITH ACI, PIP STS03001, PROJECT SPECIFICATIONS, AND OWNER STANDARD.
   b. CONCRETE:
      - ALL CONCRETE CONSTRUCTION SHALL COMPLY WITH THE LATEST ADOPTED EDITION OF THE FOLLOWING ACI CODES: ACI 318, ACI 315, AND ACI 301.
      - ALL CEMENT SHALL BE TYPE I CEMENT AND CONFORM TO ASTM C150, UNLESS OTHERWISE SPECIFIED OR REQUIRED AND HAVE MINIMUM 28-DAY COMPRESSIVE STRENGTH OF 4,500 PSI.
      - MAXIMUM WATER/CEMENT RATIO SHALL BE 0.45.
      - SLUMP OF CONCRETE SHALL BE BETWEEN 3 AND 4 INCHES AS TESTED IN ACCORDANCE WITH ASTM C143. IF CONTRACTOR WISHES TO USE A MIX WITH SLUMP OUTSIDE THE RANGE LISTED ABOVE, WRITTEN APPROVAL FROM ENGINEER OF RECORD IS REQUIRED PRIOR TO MIX DESIGN SUBMITTAL.
      - MIXING WATER SHALL BE POTABLE WATER AND CONFORM TO ASTM C1602.
      - AGGREGATES FOR NORMAL WEIGHT CONCRETE SHALL CONFORM TO ASTM C33 "SPECIFICATION FOR CONCRETE AGGREGATES". THE NOMINAL MAXIMUM SIZE OF THE AGGREGATE SHALL NOT BE MORE THAN 1-1/2".
      - FOR NEW COARSE-AGGREGATE SOURCE, WHEN 3 YEARS' APPROVED SERVICE RECORDS ARE NOT AVAILABLE OR WHEN SERVICE RECORDS ARE UNACCEPTABLE, AGGREGATE SHALL BE EVALUATED FOR POTENTIAL REACTIVITY. AGGREGATE MUST BE CONSIDERED INNOCUOUS IN ACCORDANCE WITH ASTM 1260. IF EVALUATION ABOVE INDICATES REACTIVE AGGREGATES AND ALTERNATE AGGREGATE SOURCES ARE NOT AVAILABLE, REQUEST RE-EVALUATION OF AGGREGATE USING ASTM C1567. COARSE AGGREGATES CONSIDERED DELETERIOUS OR POTENTIALLY DELETERIOUS SHALL NOT BE USED WITHOUT APPROVAL.
      - ADMIXTURES SHALL NOT BE USED WITHOUT THE APPROVAL OF THE ENGINEER'S CONSTRUCTION FIELD REPRESENTATIVE. SHOULD ADMIXTURES BE APPROVED, ALL MATERIALS SHALL BE TESTED IN ACCORDANCE WITH THE LATEST EDITION OF ASTM C260 "STANDARD SPECIFICATION FOR AIR-ENTRAINING ADMIXTURES FOR CONCRETE."
      - CONCRETE FOR ALL PARTS OF THE WORK SHALL BE OF THE SPECIFIED QUALITY, CAPABLE OF BEING PLACED WITHOUT EXCESSIVE SEGREGATION, AND WHEN HARDENED, OF DEVELOPING ALL CHARACTERISTICS REQUIRED BY THESE SPECIFICATIONS AND THE CONTRACT DOCUMENTS. BEFORE CONCRETE WORK BEGINS, THE PROPOSED CONCRETE MIX DESIGN ALONG WITH COLLABORATING DATA SHOWING COMPLIANCE WITH THE SPECIFICATIONS SHALL BE SUBMITTED TO ENGINEER FOR APPROVAL.
      - ALL REINFORCING STEEL, WIRE MESH, ANCHOR BOLTS, HOLD-DOWN ANCHORS, AND OTHER INSERTS SHALL BE SECURED IN POSITION PRIOR TO PLACING OF CONCRETE.
      - EXPOSED HORIZONTAL CONCRETE SURFACES SHALL BE WOOD FLOATED TO DEPRESS COARSE AGGREGATE AND STEEL TROWELED TO A SMOOTH SURFACE.
      - LL WALKING SURFACES SHALL HAVE A LIGHT BROOM FINISH.
      - CONCRETE SURFACES SHALL BE PROTECTED DURING CURING AGAINST EARLY EVAPORATION OF WATER, ACTION BY SUN, RAIN, WATER, FROST, AND CRACKING.
3. FORMWORK:
   a. CONTRACTOR SHALL BE RESPONSIBLE FOR DESIGN, ENGINEERING, STRUCTURAL ADEQUACY, AND CONSTRUCTION OF ALL CONCRETE FORMWORK IN ACCORDANCE WITH THE CONTRACT SPECIFICATIONS.
   b. COORDINATE ALL CONCRETE WORK WITH THE PLACEMENT OF PIPING, INSERTS, FLOOR DRAINS, AND OTHER EMBEDDED ITEMS INDICATED ON THE CONTRACT DRAWINGS OR IN THE CONTRACT SPECIFICATIONS.
   c. ALL NEW OR EXISTING PIPING OR UTILITIES PASSING THROUGH NEW CONCRETE SHALL BE SLEEVED 1/2" CLEAR ALL AROUND UNLESS NOTED OTHERWISE. (SEE OTHER DISCIPLINE DRAWINGS FOR SLEEVE DETAILS. CONTRACTOR SHALL PROVIDE MEASURES TO ENSURE THAT SLEEVES REMAIN FREE OF DEBRIS AND WATER DURING CONSTRUCTION).
   d. PROVIDE 1", 45° CHAMFER ON ALL EDGES OF EXPOSED CONCRETE UNLESS CONCRETE NOT EXPOSED TO WEATHER OR IN CONTACT WITH THE GROUND.
4. REINFORCING STEEL:
   a. BARS: ASTM A615 GRADE 60
   b. ALL CONCRETE SHALL BE REINFORCED UNLESS SPECIFICALLY MARKED "NOT REINFORCED" OR "UNREINFORCED".
   c. CONTRACTOR SHALL DETAIL AND PLACE ALL REINFORCEMENT IN ACCORDANCE WITH ACI SP-66, ACI 301, ACI 318, AND CRSI MANUAL OF STANDARD PRACTICE.
   d. MINIMUM CONCRETE CLEAR COVER OVER REINFORCEMENT SHALL BE AS FOLLOWS, UNLESS NOTED OTHERWISE:
      - CONCRETE CAST AGAINST AND PERMANENTLY EXPOSED TO EARTH: 3"
      - CONCRETE EXPOSED TO EARTH OR WEATHER:
        - #6 THROUGH #18 BARS - 2"
        - #5 AND SMALLER BARS AND WELDED WIRE FABRIC - 1 1/2"
      - CONCRETE NOT EXPOSED TO WEATHER OR IN CONTACT WITH THE GROUND:
        - SLABS AND WALLS - #14 AND #18 BARS - 1 1/2"
        - #11 AND SMALLER BARS - 3/4"
      - BEAMS AND COLUMNS, PRIMARY REINFORCEMENT, TIES, STIRRUPS, SPIRALS - 1 1/2"
   e. EMBEDMENT AND LAP SPLICE LENGTHS FOR ALL REINFORCING STEEL BARS SHALL CONFORM TO THE FOLLOWING PROVISIONS, UNLESS NOTED OTHERWISE. LAP SPLICES SHALL NOT BE PLACED WITHIN 5FT OF THE LONG END OF THE FOUNDATION.

MINIMUM STRAIGHT EMBEDMENT LENGTHS:

#3 - 15"	#6 - 29"	#9 - 54"
#4 - 19"	#7 - 42"	#10 - 61"
#5 - 24"	#8 - 48"	#11 - 67"

MINIMUM LAP SPLICE LENGTHS:

#3 - 19"	#6 - 37"	#9 - 70"
#4 - 25"	#7 - 54"	#10 - 79"
#5 - 31"	#8 - 62"	#11 - 87"

MINIMUM HOOK EMBEDMENT LENGTHS:

#3 - 8"	#6 - 15"	#9 - 22"
#4 - 10"	#7 - 17"	#10 - 25"
#5 - 12"	#8 - 19"	#11 - 27"

   f. THE MINIMUM LENGTHS SHOWN ABOVE ARE BASED ON THE FOLLOWING CONCRETE COVERAGE AND REINFORCING C/C SPACING:
      BEAMS AND COLUMNS: COVER = 1.0db (BAR DIAMETER)
      CENTER TO CENTER (C/C) SPACING = 2.0db
      ALL OTHERS: COVER = 1.0db (BAR DIAMETER)
      CENTER TO CENTER (C/C) SPACING = 3.0db
   g. THE DEVELOPMENT AND SPLICE LENGTHS SHOWN SHALL NOT APPLY IF ANY OF THE FOLLOWING CONDITIONS OCCUR:
      - $f'c$ < 4,000 PSI
      - f_y > 60,000 PSI
   h. THE COVER OR C/C BAR SPACING IS NOT AS LISTED ABOVE.
      - THE REINFORCING STEEL IS EPOXY COATED.
      - LIGHT WEIGHT CONCRETE IS USED.
   i. HORIZONTAL BARS HAVING MORE THAN 12" OF CONCRETE PLACED BELOW THEM SHALL BE CONSIDERED TOP REINFORCEMENT AND SHALL HAVE MINIMUM STRAIGHT EMBEDMENT AND LAP SPLICE LENGTHS INCREASED BY NOT LESS THAN 30% OVER THOSE GIVEN ABOVE.
   j. HOOK EMBEDMENT IS THE MINIMUM STRAIGHT LINE DISTANCE FROM THE CRITICAL SECTION OF THE BAR TO THE FARTHEST EDGE OF THE HOOK.
5. JOINTS:
   a. LOCATE ALL CONSTRUCTION, CONTRACTION, ISOLATION, EXPANSION, AND OTHER JOINTS AS INDICATED OR SPECIFIED, OR OTHERWISE APPROVED BY THE ENGINEER.
   b. SURFACES OF ALL HORIZONTAL AND VERTICAL CONSTRUCTION JOINTS SHALL BE CLEANED OF LAITANCE AND SHALL EXPOSE CLEAN COARSE AGGREGATE SOLIDLY EMBEDDED IN MORTAR MIX TO MINIMUM 1/4" AMPLITUDE. APPLY CONCRETE BONDING AGENT PRIOR TO DEPOSITING CONCRETE IN ACCORDANCE WITH MANUFACTURER'S INSTRUCTIONS.
   c. THESE PROVISIONS SHALL ALSO APPLY WHEN NEW CONCRETE IS PLACED AGAINST EXISTING CONCRETE.
   d. PROVIDE WATERSTOPS AT CONCRETE JOINTS WHERE INDICATED ON THE CONTRACT DRAWINGS. ALL WATERSTOPS SHALL BE FUEL RESISTANT TYPE, UNLESS NOTED OTHERWISE.

BURNS & McDONNELL
ENGINEERING COMPANY, INC.
STATE LICENSE # COA:01557

STATE OF OHIO — CHRISTOPHER D. WILSON — 82211 — REGISTERED PROFESSIONAL ENGINEER
01/08/2021
PROFESSIONAL ENGINEER STAMP

NO.	DATE	REVISION(S) DESCRIPTION	BY	CHK	APPD
0	01-08-2021	ISSUED FOR CONSTRUCTION	DJS	EAB	CDW

DESCRIPTION	
AREA CODE	
ACCOUNT NUMBER	AW2128
PROJECT NUMBER	1880115
DRAWING BY	DJS
STATION ID	S0868O1
CHECKER INITIALS	EAB

APPROVALS	DATE	INITIALS
REGIONAL ENGINEER		
MGR TECH REC & STD		
PRINCIPAL ENGINEER	01/08/2021	CDW

DUKE ENERGY

REF. DWG(S) PNG-G-004-000104

C350 PROJECT
NORWOOD C350 STATION
STRUCTURAL NOTES (1 OF 2)

HAMILTON COUNTY, OHIO

SHEET(S) 22 OF 68	DWG SCALE NONE
DWG DATE 05/19/2020	SUPERSEDED —
DRAWING NUMBER	REVISION
PNG -S-004-0001009	0
DISCIPLINE / RESOURCE CENTER / LINE NUMBER	

6. STRUCTURAL AND MISCELLANEOUS STEEL:
   a. STRUCTURAL AND MISCELLANEOUS STEEL SHALL BE FABRICATED AND ERECTED IN ACCORDANCE WITH AISC STEEL CONSTRUCTION MANUAL, 14TH EDITION, PIP STS05120 AND PIP STS05130, AND ALL APPLICABLE OWNER STANDARDS.
   b. TEMPORARY ERECTION BRACING SHALL BE DESIGNED AND PROVIDED BY THE CONTRACTOR AS REQUIRED AND SHALL NOT BE REMOVED UNTIL ALL PERMANENT LATERAL-LOAD-RESISTING ELEMENTS AND CONNECTIONS ARE COMPLETELY INSTALLED.
   c. ALL STEEL SHALL BE HOT-DIP GALVANIZED UNLESS NOTED OTHERWISE ON PLANS.
   d. WIDE FLANGE SHAPES AND TEES: ASTM A992, Fy = 50 KSI OR ASTM A572, Fy = 50 KSI
   e. PLATES, ANGLES, AND CHANNELS: ASTM A36, Fy = 36 KSI, UNLESS NOTED OTHERWISE
   f. SQUARE AND RECTANGULAR HOLLOW STRUCTURAL SECTIONS: ASTM A500 GRADE B, Fy = 46 KSI
   g. ROUND HOLLOW STRUCTURAL SECTIONS: ASTM A500 GRADE B, Fy = 42 KSI
   h. PIPE: ASTM A53 GRADE B, Fy = 35 KSI
   i. ALL DOUBLE ANGLE MEMBERS SHALL HAVE SPACER PLATES CONFORMING TO AISC STEEL CONSTRUCTION MANUAL PARAGRAPH E6. SPACER PLATES SHALL BE THE SAME THICKNESS AS THE GUSSET PLATES.
7. BOLTS:
   a. 3/4" DIAMETER ASTM A325 GRADE A325, UNLESS NOTED OTHERWISE.
   b. FRAMING CONNECTIONS: SNUG-TIGHTENED JOINTS WITH STANDARD HOLES, UNLESS NOTED OTHERWISE.
   c. BRACING CONNECTIONS: SNUG-TIGHTENED JOINTS WITH STANDARD HOLES, UNLESS NOTED OTHERWISE.
   d. ON ONE SIDE OF EACH DOUBLE CONNECTION OF BEAMS TO A COLUMN WEB OR A GIRDER WEB DIRECTLY OVER A COLUMN, PROVIDE A TEMPORARY SEAT ANGLE ATTACHED TO COLUMN OR GIRDER WEB AND TO BOTTOM FLANGE OF BEAM. MINIMUM SEAT CONNECTION SHALL BE L4x3x5/8 LLH WITH TWO 3/4" DIAMETER A307 OR A325-ST BOLTS EACH LEG. SINGLE AND DOUBLE STAGGERED CONNECTIONS ARE PROHIBITED WITHOUT THE EXPLICIT PRIOR APPROVAL IN WRITING OF THE STRUCTURAL ENGINEER OF RECORD.
8. WELDING:
   a. IN ACCORDANCE WITH AWS D1.1 USING E70 ELECTRODE
   b. MINIMUM STRUCTURAL WELD REQUIREMENTS ARE SHOWN ON DESIGN DRAWINGS. CLIENT REQUESTS WELDED CONNECTIONS TO BE FINISHED WITH MINIMUM SEAL WELDING ON REMAINDER OF JOINT AT ALL OTHER CREVICES. SEAL WELDING SHALL NOT PRODUCE AN UNSAFE CONDITION FOR HOT-DIP GALVANIZING.
9. ANCHOR BOLTS:
   a. ASTM F1554 GRADE 55 NOTED OTHERWISE ON DRAWINGS.
   b. ANCHOR BOLT HOLES IN BASE PLATES TO BE OVERSIZED TO ACCOUNT FOR CONSTRUCTION TOLERANCES IN ANCHOR BOLT PLACEMENT. HOLES CORRESPONDING TO APPROPRIATE ANCHOR BOLT SIZE SHALL BE NO LARGER THAN THE MAXIMUM RECOMMENDED SIZES IN THE AISC STEEL CONSTRUCTION MANUAL, 14TH EDITION, TABLE 14-2
   c. PROVIDE PLATE WASHERS AT OVERSIZED ANCHOR BOLT HOLES.
   d. LOCATE ANCHOR BOLTS ACCURATELY, SET WITH TEMPLATE, AND SECURELY HOLD IN POSITION WHILE PLACING CONCRETE. PROTECT IN-PLACE ANCHOR BOLTS FROM CONSTRUCTION ACTIVITY.
   e. THE FOLLOWING ARE PROHIBITED WITHOUT THE EXPLICIT PRIOR APPROVAL IN WRITING OF THE ENGINEER:
      - INSERTING ANCHOR BOLTS INTO FRESH OR PARTIALLY HARDENED CONCRETE.
      - SUBSTITUTING POST-INSTALLED ANCHORS WHERE EMBEDDED ANCHOR BOLTS ARE INDICATED.
      - REPAIRING, REPLACING, OR MODIFYING INSTALLED ANCHOR BOLTS.
   f. ANCHOR BOLT THREADS SHALL BE UNC2A AND PROTECTED FROM DAMAGE DURING CONSTRUCTION.
   g. SLEEVES FOR STATIONARY EQUIPMENT AND STRUCTURAL BASE PLATES SHALL BE FILLED WITH GROUT WHEN BASE PLATE/EQUIPMENT IS GROUTED IN FINAL LOCATION.
   h. ANCHOR BOLTS, NUTS, AND WASHERS SHALL BE SHIPPED GALVANIZED.
10. POST-INSTALLED ANCHORS:
   a. INSTALL ANCHORS PER MANUFACTURER INSTRUCTIONS INCLUDED IN ANCHOR PACKAGING.
   b. CONTRACTOR SHALL ARRANGE AN ANCHOR MANUFACTURER'S REPRESENTATIVE TO PROVIDE ONSITE INSTALLATION TRAINING FOR ALL OF THEIR ANCHORING PRODUCTS SPECIFIED. ENGINEER OF RECORD MUST RECEIVE DOCUMENTED CONFIRMATION THAT ALL OF CONTRACTOR'S PERSONNEL WHO INSTALL ANCHORS ARE TRAINED PRIOR TO COMMENCEMENT OF INSTALLING ANCHORS.
   c. ANCHOR CAPACITY IS DEPENDENT ON SPACING BETWEEN ADJACENT ANCHORS AND PROXIMITY OF ANCHORS TO EDGE OF CONCRETE. INSTALL ANCHORS IN ACCORDANCE WITH SPACING AND EDGE CLEARANCES INDICATED ON DRAWINGS.
   d. EXISTING REINFORCING BARS IN CONCRETE STRUCTURE MAY CONFLICT WITH SPECIFIC ANCHOR LOCATIONS. REINFORCING BARS SHALL NOT BE CUT UNLESS NOTED ON DRAWINGS THAT BARS CAN BE CUT. CONTRACTOR SHALL CONTACT ENGINEER OF RECORD WHEN INTERFERENCES OCCUR.
   e. PERMITTED POST INSTALLED ANCHORS: EPOXY ARE LISTED AS FOLLOWS (ALTERNATE PRODUCTS MUST BE APPROVED IN WRITING BY ENGINEER OF RECORD PRIOR TO USE. SUBSTITUTIONS REQUIRE STAMPED CALCULATIONS)
      - WEDGE TYPE - LIFE SAFETY APPLICATIONS:
      - SIMPSON STRONG TIE - STRONG BOLT 2
      - HILTI KWIK BOLT TZ
      - POWERS POWER STUD SD2
      - WEDGE TYPE - NON-LIFE SAFETY APPLICATIONS:
      - SIMPSON STRONG TIE - WEDGE ALL
      - HILTI KWIK BOLT 3
      - POWER POWER STUD SD1
      - UNDERCUT TYPE (USE ONLY WHERE SPECIFICALLY INDICATED ON DRAWINGS):
      - SIMPSON STRONG TIE - TORQUE-CUT
      - HILTI HDA UNDERCUT ANCHOR
      - POWERS ATOMIC + UNDERCUT
      - EPOXY ANCHORS - LIFE SAFETY APPLICATIONS:
      - SIMPSON STRONG TIE - SET XP
      - HILTI HIT-RE500 V3
      - HILTI HIT-HY200
      - POWER PE1000
      - ADHESIVE ANCHORS - FOR NON-VIBRATING EQUIPMENT ANCHORAGE AND OTHER NON-LIFE SAFETY APPLICATIONS:
      - SIMPSON STRONG TIE - AT
      - HILTI HIT-HY200
      - POWER - AC100+ GOLD
   f. CONCRETE ANCHORS:
      - GALVANIZED OR ZINC-COATED CARBON STEEL MANUALLY EXPANDED WEDGE TYPE, UNLESS NOTED OTHERWISE.
   g. ADHESIVE ANCHORS:
      - INSTALL ADHESIVE ANCHORS AS INDICATED ON DRAWINGS.
      - ALL PERSONNEL INSTALLING ADHESIVE ANCHORS SHALL BE ACI ADHESIVE ANCHOR CERTIFIED.
      - ADHESIVE ANCHORS SHALL BE INSTALLED IN CONCRETE HAVING A MINIMUM AGE OF 21 DAYS AT TIME OF ANCHOR INSTALLATION.
11. GROUT:
   a. NON-SHRINK GROUT IN ACCORDANCE W PIP STS03600.
      - NON-METALLIC, HYDRAULIC-CEMENT GROUT IN ACCORDANCE WITH ASTM C1107.
      - MINIMUM COMPRESSIVE STRENGTH = 6,000 PSI @ 28 DAYS.
      - GROUT SHALL BE SUITED FOR OUTDOOR USE.
   b. EPOXY GROUT IN ACCORDANCE W PIP STS03601.
      - PROVIDE EPOXY GROUT FOR ALL PUMP BASES
12. STEEL BAR GRATING:
   a. PER VENDOR INSTRUCTIONS

ABBREVIATIONS:

AB	–	ANCHOR BOLT
ABV	–	ABOVE
ACI	–	AMERICAN CONCRETE INSTITUTE
AGGR	–	AGGREGATE
AISC	–	AMERICAN INSTITUTE OF STEEL CONSTRUCTION
ANSI	–	AMERICAN NATIONAL STANDARD INSTITUTE
ASTM	–	AMERICAN SOCIETY FOR TESTING OF MATERIALS
AWS	–	AMERICAN WELDING SOCIETY
BBP	–	BOTTOM OF BASE PLATE
BTW	–	BETWEEN
BLDG	–	BUILDING
BM	–	BEAM
BOC	–	BOTTOM OF CONCRETE
BOP	–	BOTTOM OF PIPE
BOS	–	BOTTOM OF STEEL
BOT	–	BOTTOM
CAP	–	CAPACITY
C/C	–	CENTER TO CENTER
CL	–	CENTERLINE
CIR	–	CIRCLE
CJ	–	CONSTRUCTION JOINT
CLR	–	CLEAR
CLJ	–	CONTROL JOINT
COL	–	COLUMN
CONC	–	CONCRETE
CONT	–	CONTINUOUS
COORD	–	COORDINATE
CTR	–	CENTER
db	–	BAR DIAMETER
DET	–	DETAIL
DIA	–	DIAMETER
DIAG	–	DIAGONAL
DIM	–	DIMENSION
DL	–	DEAD LOAD
DN	–	DOWN
DWG	–	DRAWING
DWL	–	DOWEL
EA	–	EACH
EF	–	EACH FACE
EJ	–	EXPANSION JOINT
EL	–	ELEVATION
ELEC	–	ELECTRICAL
ELEV	–	ELEVATION
EMBED	–	EMBEDMENT
EQ	–	EQUAL
EQUIP	–	EQUIPMENT
EQUIV	–	EQUIVALENT
EXIST	–	EXISTING
EXP	–	EXPANSION
EW	–	EACH WAY
f'c	–	SPECIFIED 28-DAY CONCRETE COMPRESSIVE STRENGTH (MINIMUM)
FDN	–	FOUNDATION
FF	–	FAR FACE
FLG	–	FLANGE
FS	–	FAR SIDE
FT	–	FEET
FTG	–	FOOTING
Fy, fy	–	YIELD STRESS
FV	–	FIELD VERIFY
GA	–	GAGE
GALV	–	GALVANIZE
GR	–	GRADE
GRTG	–	GRATING
H	–	HIGH
HORIZ	–	HORIZONTAL
HR	–	HANDRAIL
HS	–	HIGH STRENGTH
IBC	–	INTERNATIONAL BUILDING CODE
ID	–	INSIDE DIAMETER
IF	–	INSIDE FACE
IJ	–	ISOLATION JOINT
INTR	–	INTERIOR
INVT	–	INVERT
JT	–	JOINT
KB	–	KNEE BRACE
KSI	–	KIPS PER SQUARE INCH
L	–	ANGLE
LB	–	POUND
LG	–	LONG
LL	–	LIVE LOAD
LLBB	–	LONG LEG BACK TO BACK
LLH	–	LONG LEG HORIZONTAL
LLV	–	LONG LEG VERTICAL
LONG	–	LONGITUDINAL
LS	–	LAP SPLICE
MATL	–	MATERIAL
MAX	–	MAXIMUM
MECH	–	MECHANICAL
MFR	–	MANUFACTURER
MH	–	MANHOLE
MIN	–	MINIMUM
MISC	–	MISCELLANEOUS
NA	–	NOT APPLICABLE
NF	–	NEAR FACE
NO	–	NUMBER
NOM	–	NOMINAL
NS	–	NEAR SIDE
NTS	–	NOT TO SCALE
OC	–	ON CENTER
OD	–	OUTSIDE DIAMETER
OF	–	OUTSIDE FACE
OPP	–	OPPOSITE
OSHA	–	OCCUPATIONAL SAFETY AND HEALTH ADMINISTRATION
PED	–	PEDESTAL
PEN	–	PENETRATE, PENETRATION
PERP	–	PERPENDICULAR
PL	–	PLATE
PROJ	–	PROJECTION
PSF	–	POUNDS PER SQUARE FOOT
PSI	–	POUNDS PER SQUARE INCH
PVC	–	POLYVINYL CHLORIDE
RAD	–	RADIUS
REF	–	REFERENCE
REINF	–	REINFORCE
REQD	–	REQUIRED
REV	–	REVISION
SCHED	–	SCHEDULE
SECT	–	SECTION
SH	–	SHEET
SIM	–	SIMILAR
SLP	–	SLOPE
SPEC	–	SPECIFICATION
SQ	–	SQUARE
STD	–	STANDARD
STIFF	–	STIFFENER
STIR	–	STIRRUP
STL	–	STEEL
STR	–	STRAIGHT
STRL	–	STRUCTURAL
STRUC	–	STRUCTURE
SYMM	–	SYMMETRICAL
T&B	–	TOP & BOTTOM
TOB	–	TOP OF BOLT
TOC	–	TOP OF CONCRETE
TOG	–	TOP OF GRATING
TOS	–	TOP OF STEEL
TYP	–	TYPICAL
UNO	–	UNLESS NOTED OTHERWISE
VAR	–	VARIES
VERT	–	VERTICAL
W	–	WIDE
W/	–	WITH
W/O	–	WITHOUT
WD	–	WIDTH
WF	–	WIDE FLANGE
WP	–	WORK POINT
WT	–	WEIGHT/STRUCTURAL
WWF	–	WELDED WIRE FABRIC
@	–	AT
&	–	AND
#	–	POUNDS OR NUMBER
%	–	PERCENT
Ø	–	DIAMETER

BURNS & McDONNELL
ENGINEERING COMPANY, INC.
STATE LICENSE # COA:01557

STATE OF OHIO
CHRISTOPHER D. WILSON
82217
REGISTERED PROFESSIONAL ENGINEER
01/08/2021
PROFESSIONAL ENGIARCH STAMP

NO.	DATE	REVISION(S) DESCRIPTION	BY	CHK	APPD
0	01-08-2021	ISSUED FOR CONSTRUCTION	DJS	EAB	CDW

DESCRIPTION	
AREA CODE	
ACCOUNT NUMBER	AW2128
PROJECT NUMBER	1880115
DRAWING BY	DJS
STATION ID	S0868O1
CHECKER INITIALS	EAB

APPROVALS	DATE	INITIALS
REGIONAL ENGINEER		
MGR TECH REC & STD		
PRINCIPAL ENGINEER	01/08/2021	CDW

DUKE ENERGY

C350 PROJECT
NORWOOD C350 STATION
STRUCTURAL NOTES (2 OF 2)

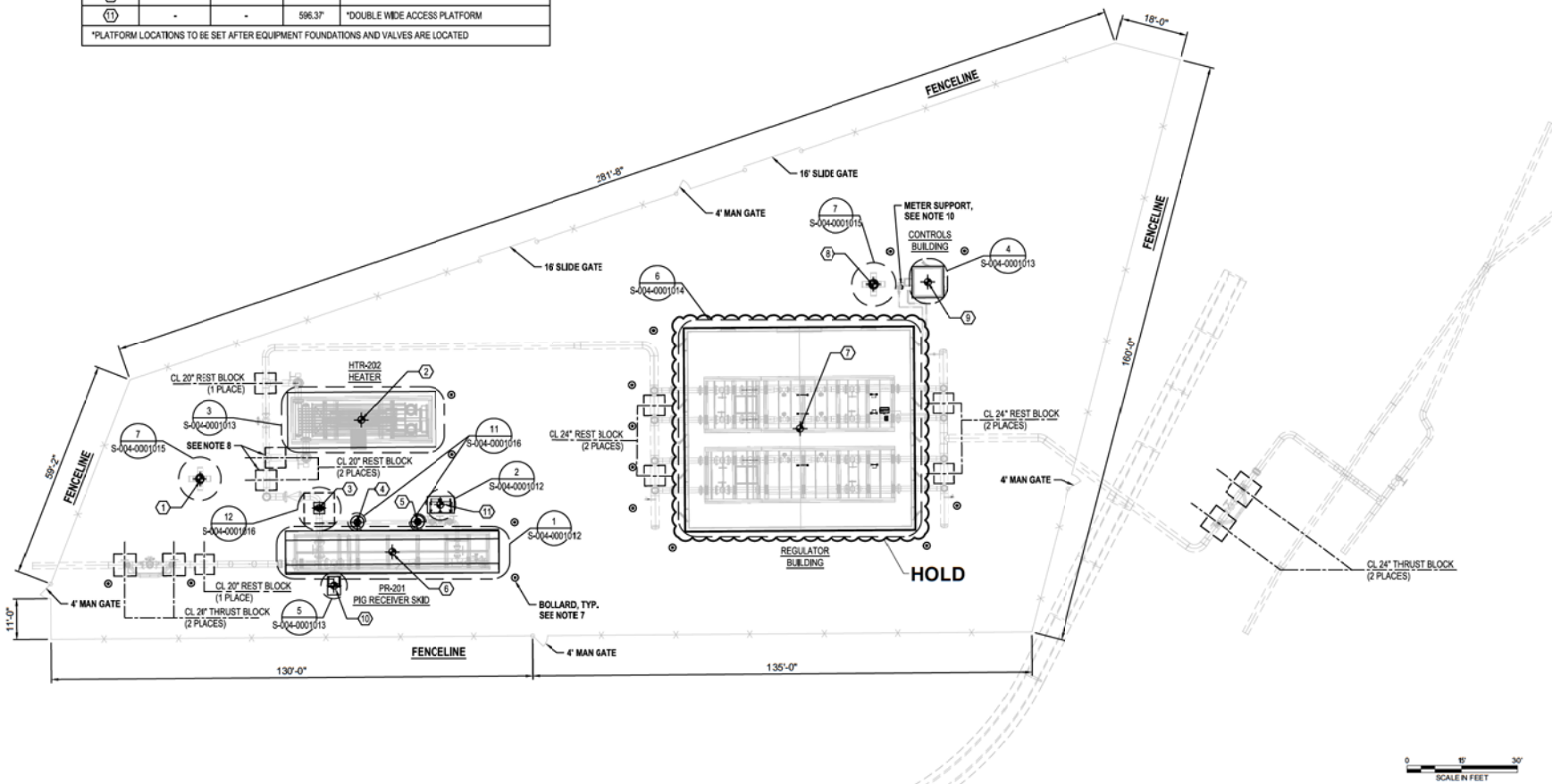
HAMILTON COUNTY, OHIO

REF. DWG(S) PNG-G-004-000104

SHEET(S) 23 OF 68	DWG SCALE AS NOTED
DWG DATE 05/19/2020	SUPERSEDED —
DRAWING NUMBER	REVISION
PNG -S-004-0001010	0

DISCIPLINE / RESOURCE CENTER / LINE NUMBER

EQUIPMENT FOUNDATION TABLE				
POINT #	NORTHING	EASTING	TOC	DESCRIPTION
1	435392.81	1414458.83	596.45'	LIGHT POLE
2	435353.77	1414482.67	596.88'	HEATER
3	435359.61	1414457.24	597.72'	20" PIPE SUPPORT
4	435348.75	1414455.42	598.57'	10" PIPE SUPPORT
5	435332.92	1414458.62	598.64'	10" PIPE SUPPORT
6	435338.07	1414449.36	595.65'	PIG RECEIVER
7	435236.34	1414503.07	596.83'	REGULATOR BUILDING
8	435224.00	1414545.44	598.07'	LIGHT POLE
9	435209.89	1414548.80	598.07'	CONTROLS BUILDING
10	-	-	595.55'	*SINGLE WIDE ACCESS PLATFORM
11	-	-	596.37'	*DOUBLE WIDE ACCESS PLATFORM
*PLATFORM LOCATIONS TO BE SET AFTER EQUIPMENT FOUNDATIONS AND VALVES ARE LOCATED				



NOTES:

1. ⌖ DENOTES REFERENCE COORDINATE LOCATION.
2. ANY CHANGES REQUIRED DUE TO FIELD CONDITIONS MUST BE APPROVED BY THE ENGINEER OF RECORD.
3. CONTRACTOR TO VERIFY ALL FOUNDATION LOCATIONS & HEIGHTS PRIOR TO CONSTRUCTION.
4. LOCATE PIPE SUPPORTS, REST & THRUST BLOCKS PER MECHANICAL DWGS.
5. SEE DETAIL 8, DWG S-004-0001015 FOR REST BLOCK DETAILS.
6. SEE DETAIL 9, DWG S-004-0001015 FOR THRUST BLOCK DETAILS.
7. SEE DETAIL 10, DWG S-004-0001015 FOR BOLLARD DETAILS.
8. CONTRACTOR TO INSTALL FRP PAD BETWEEN FOUNDATIONS WITH LESS THAN 6" CLEARANCE.
9. COORDINATES SHOWN ON THIS DRAWING ARE IN OHIO STATE PLANE SOUTH COORDINATES, ZONE 3402, NAD83 HORIZONTAL DATUM AND NAVD88 VERTICAL DATUM.
10. SEE DETAIL 18, DWG S-004-0001015 FOR DIAPHRAGM METER SUPPORT FOUNDATION.

BURNS & McDONNELL ENGINEERING COMPANY, INC.
STATE LICENSE # COA:01557

STATE OF OHIO — CHRISTOPHER D. WILSON — 82217 — REGISTERED PROFESSIONAL ENGINEER
01/08/2021
PROFESSIONAL ENGIARCH STAMP

REF. DWG(S) PNG-G-004-0001043

NO.	DATE	REVISION(S) DESCRIPTION	BY	CHK	APPD
0	01-08-2021	ISSUED FOR CONSTRUCTION	DJS	EAB	CDW

DESCRIPTION	
AREA CODE	
ACCOUNT NUMBER	AW2128
PROJECT NUMBER	1880115
DRAWING BY	DJS
STATION ID	S0668O1
CHECKER INITIALS	EAB

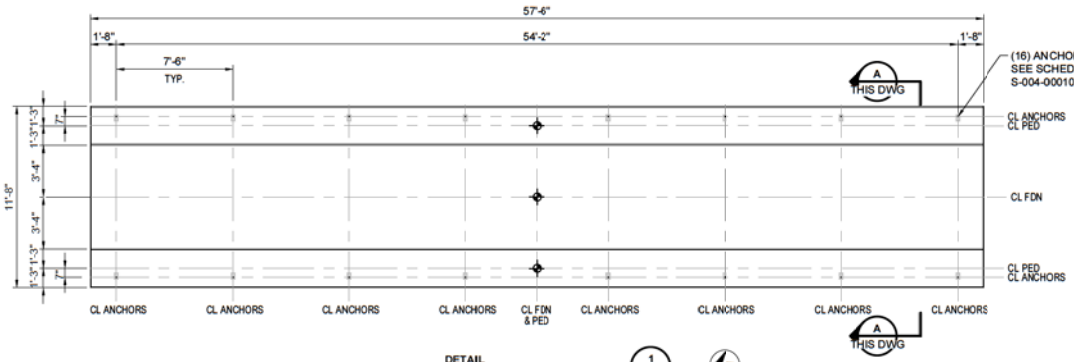
APPROVALS		
DATE	INITIALS	
		REGIONAL ENGINEER
		MGR TECH REC & STD
01/08/2021	CDW	PRINCIPAL ENGINEER

DUKE ENERGY

C350 PROJECT
NORWOOD C350 STATION
FOUNDATION LOCATION

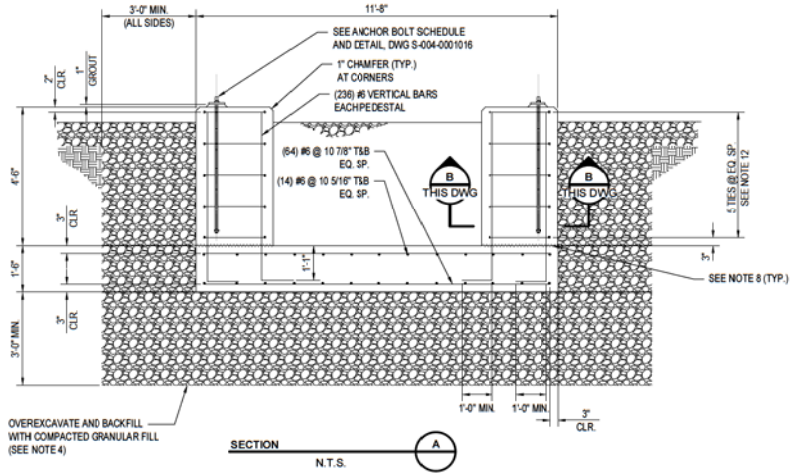
HAMILTON COUNTY, OHIO

SHEET(S) 24 OF 68	DWG SCALE 1" = 10'
DWG DATE 07/23/2019	SUPERSEDED
DRAWING NUMBER	REVISION
PNG -S-004-0001011	0
DISCIPLINE / RESOURCE CENTER / LINE NUMBER	

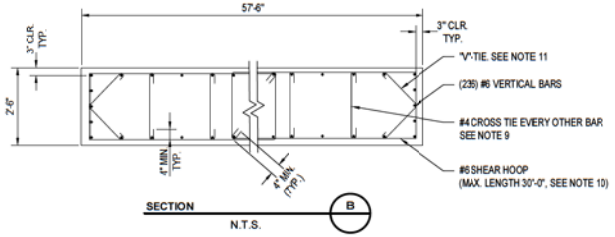


DETAIL 1 — PIG RECEIVER SKID FOUNDATION PLAN — S-004-0001011

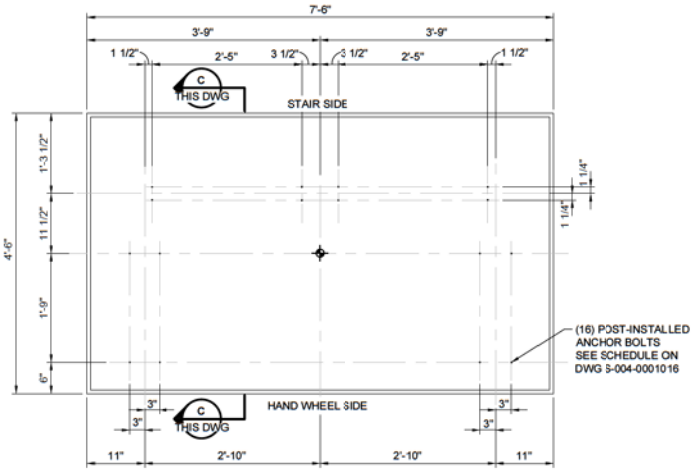
SCALE IN FEET 0 4' 8'



SECTION A — N.T.S.

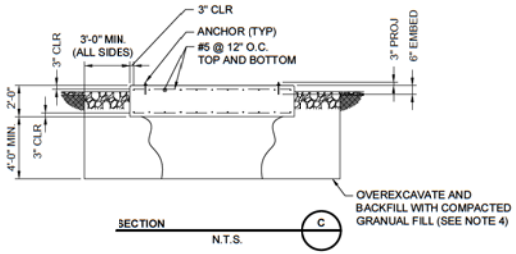


SECTION B — N.T.S.



DETAIL 2 — DOUBLE WIDE ACCESS PLATFORM FOUNDATION PLAN — S-004-0001011

SCALE IN FEET 0 1' 2'



SECTION C — N.T.S.

NOTES:

1. CONCRETE SHALL HAVE A MINIMUM COMPRESSIVE STRENGTH OF 4500PSI AT 28 DAYS.
2. REINFORCING STEEL SHALL BE ASTM A-615 GRADE 60.
3. EXPOSED FOUNDATION EDGES SHALL HAVE 1" CHAMFER.
4. GRANULAR FILL SHALL CONSIST OF ODOT 304 COMPACTED TO A MINIMUM OF 98% MAXIMUM DRY DENSITY. STRUCTURAL FILL TO BE IN 6" MAXIMUM LIFTS WITH HAND-GUIDED COMPACTION EQUIPMENT OR HEAVY, SELF-PROPELLED COMPACTION EQUIPMENT. APPROVED CONTROLLED LOW-STRENGTH MATERIAL CAN BE USED IN PLACE OF GRANULAR FILL. SEE DWG. PNG-S-004-0001009 FOR CLSM SPECIFICATIONS.
5. ⌖ DENOTES REFERENCE COORDINATE LOCATION FROM FOUNDATION LOCATION PLAN.
6. GROUT AVERAGE THICKNESS ADOPTED 1" TO ASSURE PROPER LEVELING AT BOTTOM OF STEEL BETWEEN PIERS. GROUT MAY NOT BE REQUIRED BY OWNER'S DECISION FOR PIERS BUILT WITH THEIR TOP OF CONCRETE HAVING A MAXIMUM DEVIATION OF ± 1" STEEL ELEVATION, AND WITH A SURFACE PROPERLY FINISHED TO ALLOW THE SKID BEAMS TO REST ON ALL PIERS AFTER THE CLAMPS ARE INSTALLED.
7. CONTRACTOR TO VERIFY BASE PLATE SIZES AND BOLT HOLE SIZES & SPACING PRIOR TO CONSTRUCTING FOUNDATIONS.
8. ROUGHEN TO ±1/4" AMPLITUDE, CLEAN EXPOSED AGGREGATE PRIOR TO PEDESTAL POUR.
9. INSTALL CROSS TIE BARS AT EVERY OTHER VERTICAL BAR SPACING TO COMPLETE CAGE. THESE TIES MAY BE INSTALLED AT THE TOP AND BOTTOM OF THE PEDESTAL.
10. OUTER SHEAR HOOPS SHALL BE NO GREATER THAN 30 FT LONG PER SIDE. SHEAR HOOPS SHALL OVERLAP IN THE MIDDLE OF THE PEDESTAL'S LENGTH.
11. "V"-TIES SHALL BE #4 BARS INSTALLED AT THE SHORT ENDS OF THE PEDESTALS. THESE TIES MAY BE INSTALLED AT THE TOP AND BOTTOM OF THE PEDESTAL.
12. LAP SPLICES REQUIRED. SEE DWG. PNG-S-004-0001009 FOR REQUIRED LAP SPLICE LENGTHS AND DETAILS.

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PROJECT NUMBER	1880115
DRAWING BY	DJS
STATION ID	S0868O1
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APPROVALS	DATE	INITIALS
REGIONAL ENGINEER		
MGR TECH REC & STD		
PRINCIPAL ENGINEER	01/08/2021	CDW

DUKE ENERGY

C350 PROJECT
NORWOOD C350 STATION
FOUNDATION DETAILS 1 OF 5

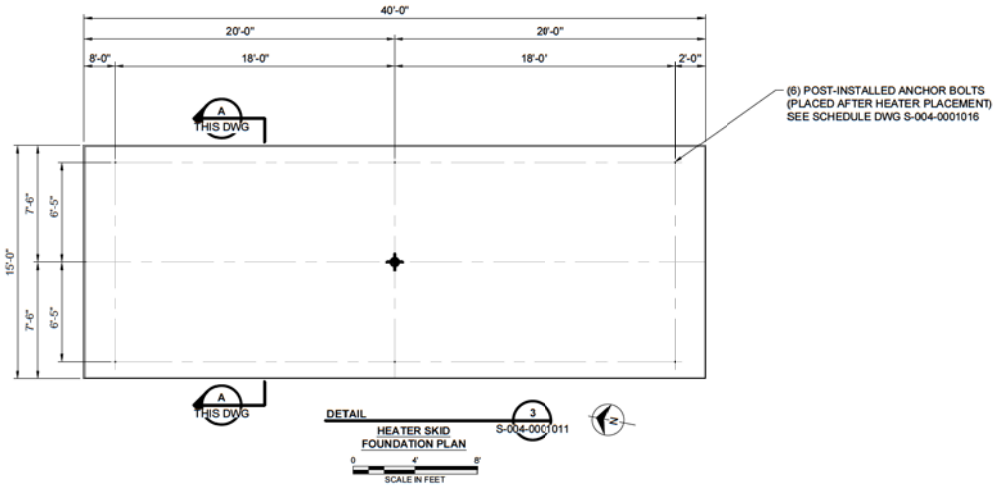
HAMILTON COUNTY, OHIO

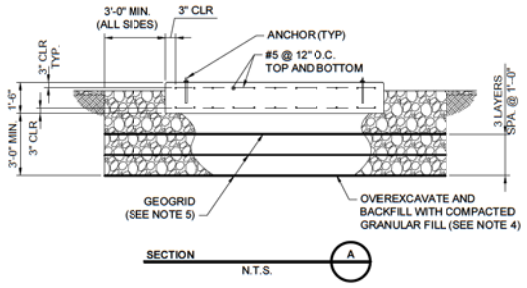
REF. DWG(S) PNG-G-004-0001043

SHEET(S) 25 OF 68	DWG SCALE AS NOTED
DWG DATE 08/21/2018	SUPERSEDED —

DRAWING NUMBER: PNG -S-004-0001012 — REVISION: 0

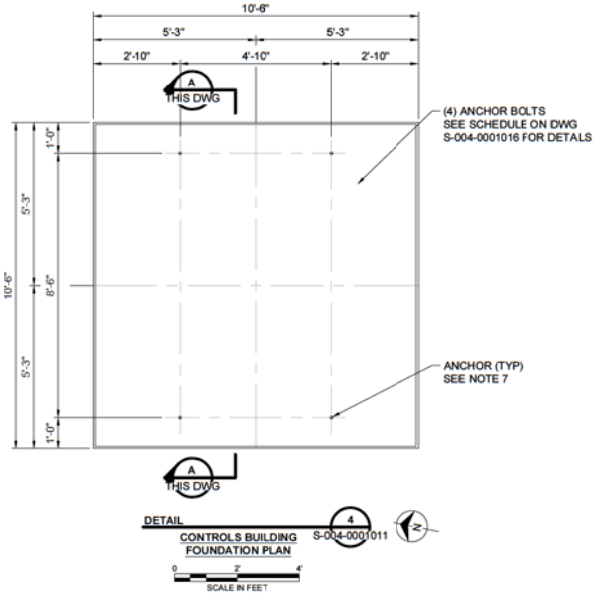
DISCIPLINE / RESOURCE CENTER / LINE NUMBER

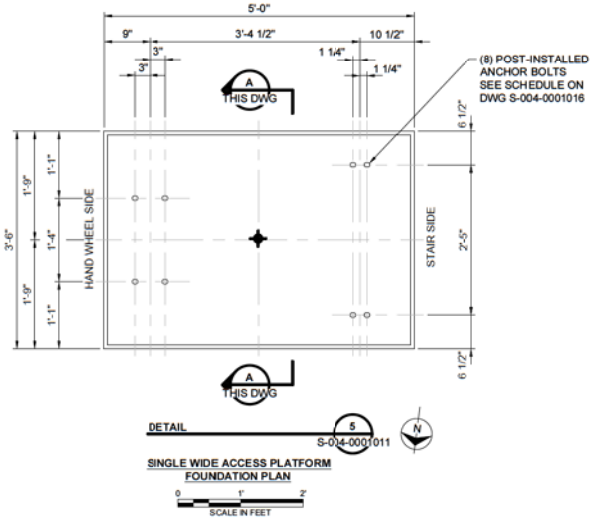




NOTES:

1. CONCRETE SHALL HAVE A MINIMUM COMPRESSIVE STRENGTH OF 4500PSI AT 28 DAYS.
2. REINFORCING STEEL SHALL BE ASTM A-615 GRADE 60.
3. EXPOSED FOUNDATION EDGES SHALL HAVE 1" CHAMFER.
4. GRANULAR FILL SHALL CONSIST OF ODOT 304 COMPACTED TO A MINIMUM OF 98% MAXIMUM DRY DENSITY. STRUCTURAL FILL TO BE COMPACTED IN 6" MAXIMUM LIFTS WITH HAND-GUIDED COMPACTION EQUIPMENT OR HEAVY, SELF-PROPELLED COMPACTION EQUIPMENT. APPROVED CONTROLLED LOW-STRENGTH MATERIAL CAN BE USED IN PLACE OF GRANULAR FILL. SEE DWG. PNG-S-004-0001009 FOR CLSM SPECIFICATIONS.
5. ONE LAYER OF GEOGRID SHALL BE PLACED AT THE BASE OF THE UNDERCUT AND TWO ADDITIONAL LAYERS OF GEOGRID SHALL BE PLACED AT APPROXIMATE 1 FOOT VERTICAL SPACING BENEATH THE FOUNDATION. GEOGRID SHALL BE TENSAR TX160FG OR ENGINEER-APPROVED EQUAL.
6. ✚ DENOTES REFERENCE COORDINATE LOCATION FROM FOUNDATION LOCATION PLAN.
7. INSTALL CONTROLS BUILDING ANCHOR BOLTS AFTER ENCLOSURE IS PLACED ON THE FOUNDATION. LOCATIONS SHOWN ARE APPROXIMATE.





BURNS & McDONNELL
ENGINEERING COMPANY, INC.
STATE LICENSE # COA:01557

STATE OF OHIO
CHRISTOPHER D. WILSON
82217
REGISTERED
PROFESSIONAL ENGINEER
01/08/2021
PROFESSIONAL ENGIARCH STAMP

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DESCRIPTION	
AREA CODE	
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PROJECT NUMBER	1880115
DRAWING BY	DJS
STATION ID	S0868O1
CHECKER INITIALS	EAB

APPROVALS	DATE	INITIALS
REGIONAL ENGINEER		
MGR. TECH REC & STD		
PRINCIPAL ENGINEER	01/08/2021	CDW

DUKE ENERGY

C350 PROJECT
NORWOOD C350 STATION
FOUNDATION DETAILS 2 OF 5

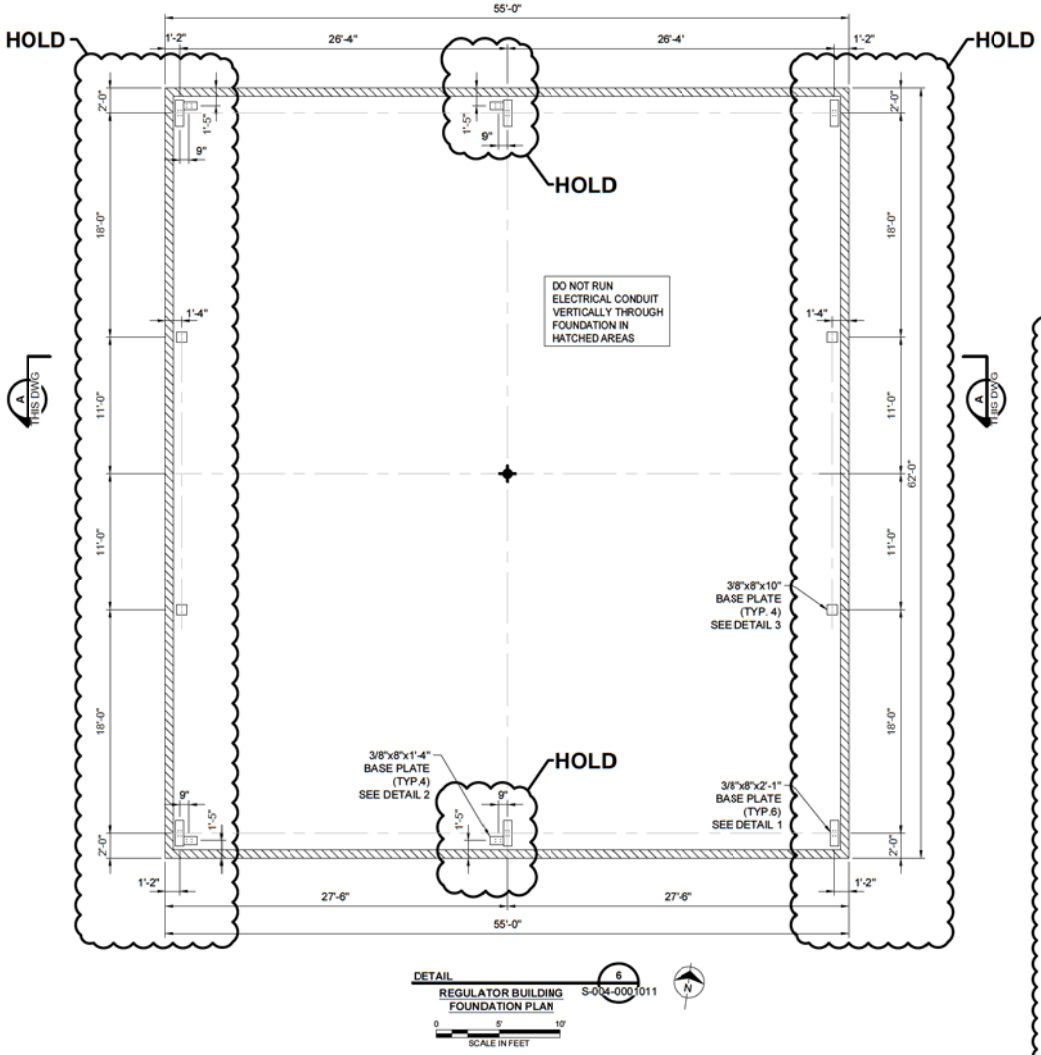
HAMILTON COUNTY, OHIO

REF. DWG(S) PNG-G-004-000104

SHEET(S) 26 OF 68	DWG SCALE VARIES
DWG DATE 08/21/2018	SUPERSEDED —

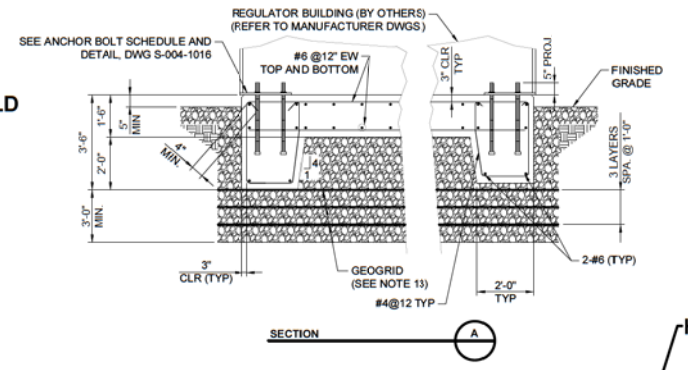
DRAWING NUMBER: PNG -S-004-0001013 | REVISION: 0

DISCIPLINE / RESOURCE CENTER / LINE NUMBER

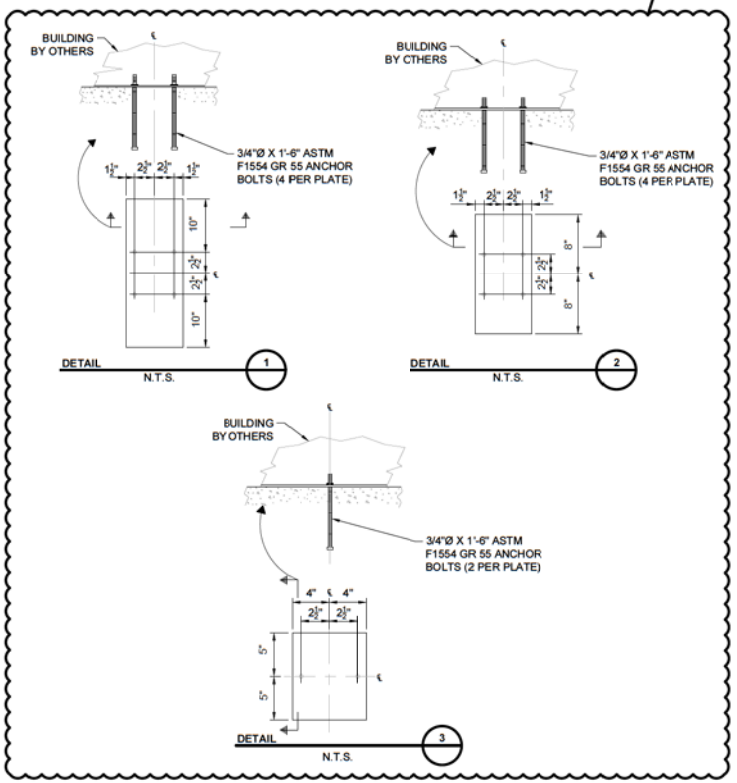


DETAIL 6 — REGULATOR BUILDING FOUNDATION PLAN — S-004-0001011

SCALE IN FEET 0 5' 10'



SECTION A



NOTES

1. CONCRETE WORK SHALL BE IN ACCORDANCE WITH ACI 318, LATEST EDITION. CONCRETE STRENGTH SHALL BE 4500 PSI AT 28 DAYS. REINFORCING STEEL SHALL BE ASTM A-615, GRADE 60.
2. SLAB TOLERANCE FOR BOTH LENGTH AND WIDTH: PLUS OR MINUS 1/4".
3. MEASURED DIAGONAL LENGTHS SHALL BE WITHIN 1/2" OF EACH OTHER.
4. PERIMETER EDGE OF CONCRETE SLAB SHALL BE CHAMFERED 1"X 1".
5. THE FOLLOWING SLAB SPECIFICATIONS APPLY TO THE AREA OF THE SLAB DEFINED BY THE SLAB CUTER EDGE INWARD 8".

   VARIATION FROM LEVEL:
   1. IN ANY 10 FT OF LENGTH - 1/8" MAX.
   2. FOR THE ENTIRE LENGTH - 1/4" MAX.

   VARIATION FROM FLAT:
   1. IN ANY 10 FT OF LENGTH - 1/8" MAX.
   2. FOR THE ENTIRE LENGTH - 1/4" MAX.
6. APPLY A CONTINUOUS 3/8" BEAD OF A GOOD GRADE SILICONE SEALANT ON THE SLAB APPROXIMATELY 1" FROM EDGE OF SLAB WHERE THE PERIMETER ANGLE OF THE STRUCTURE WILL BE PLACED. APPLY A CONTINUOUS 3/8" BEAD OF A GOOD GRADE SILICONE SEALANT BELOW THE INTERIOR WALL AS NECESSARY.
7. SPLICE FOR REINFORCEMENT SHALL BE PER STRUCTURAL NOTES ON DWG PNG-S-004-0001009.
8. CONTRACTOR SHALL VERIFY THE LOCATION OF EXISTING BURIED CONDUITS PRIOR TO CONSTRUCTION. SEE ELECTRICAL DRAWINGS FOR INFORMATION ON UNDERGROUND AND EMBEDDED CONDUITS.
9. ANCHORS SHALL BE 3/4" DIA. x 1'-6" LG BOLTS CONFORMING TC ASTM F1554 GR 55. ALL ANCHORS ARE SUPPLIED BY THE FOUNDATION CONTRAC"OR.
10. CONTRACTOR SHALL FCLLOW ALL RECOMMENDATIONS PROVIDED IN THE GEOTECHNICAL REPORTS (TERRACON, DATED 04-13-2017 AND 07-06-2020)
11. ORIENTATION AND LOCATION OF FOUNDATION SHALL BE AS SHOWN ON THE FOUNDATION LOCATION PLAN.
12. GRANULAR FILL SHALL CONSIST OF ODOT 304 COMPACTED TO A MINIMUM OF 98% MAXIMUM DRY DENSITY. STRUCTURAL FILL TO BE COMPACTED IN 6" MAXIMUM LIFTS WITH HAND-GUIDED COMPACTION EQUIPMENT OR HEAVY, SELF PROPELLED COMPACTION EQUIPMENT. APPROVED CONTROLLED LOW-STRENGTH MATERIAL CAN BE USED IN PLACE OF GRANULAR FILL. SEE DWG. PNG-S-004-0001009 FOR CLSM SPECIFICATIONS.
13. ONE LAYER OF GEOGRID SHALL BE PLACED AT THE BASE OF THE UNDERCUT AND TWO ADDITIONAL LAYERS OF GEOGRID SHALL BE PLACED AT APPROXIMATE 1 FOOT VERTICAL SPACING BENEATH THE FOUNDATION. GEOGRID SHALL BE TENSAR TX160FG OR ENGINEER-APPROVED EQUAL.

BURNS & McDONNELL ENGINEERING COMPANY, INC.
STATE LICENSE # COA:01557

CHRISTOPHER D. WILSON 82217 REGISTERED PROFESSIONAL ENGINEER
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NO.	DATE	REVISION(S) DESCRIPTION	BY	CHK	APPD
0	01-08-2021	ISSUED FOR CONSTRUCTION	DJS	EAB	CDW

DESCRIPTION	
AREA CODE	
ACCOUNT NUMBER	AW2128
PROJECT NUMBER	1880115
DRAWING BY	DJS
STATION ID	S0868O1
CHECKER INITIALS	EAB

APPROVALS	DATE	INITIALS
REGIONAL ENGINEER		
MGR TECH REC & STD		
PRINCIPAL ENGINEER	01/08/2021	CDW

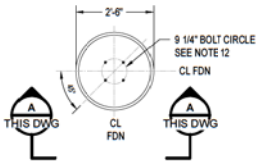
DUKE ENERGY

C350 PROJECT
NORWOOD C350 STATION
FOUNDATION DETAILS 3 OF 5
HAMILTON COUNTY, OHIO

REF. DWG(S) PNG-G-004-000104

SHEET(S) 27 OF 68	DWG SCALE VARIES
DWG DATE 08/21/2018	SUPERSEDED —

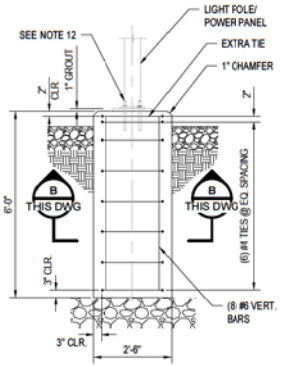
DRAWING NUMBER: PNG -S-004-0001014 | REVISION: 0
DISCIPLINE / RESOURCE CENTER / LINE NUMBER



DETAIL 7 S-004-0001011

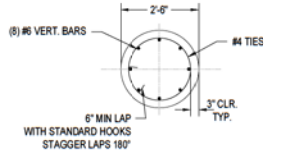
LIGHT POLE FOUNDATION

SCALE IN FEET



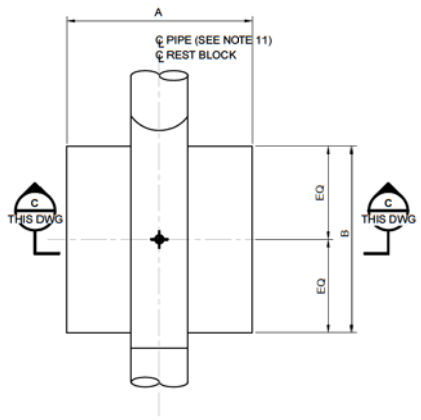
SECTION A

SCALE IN FEET



SECTION B

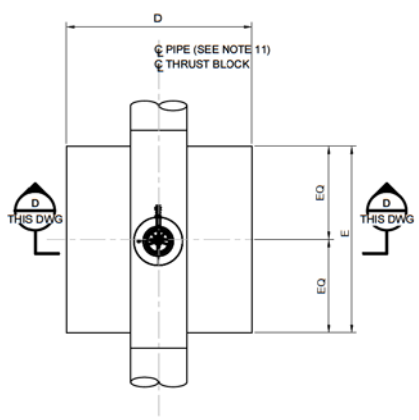
SCALE IN FEET



DETAIL 8 S-004-0001011

REST BLOCK FOUNDATION PLAN

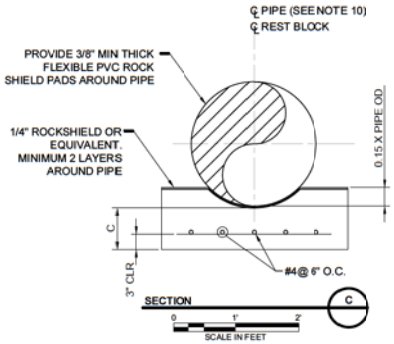
SCALE IN FEET



DETAIL 9 S-004-0001011

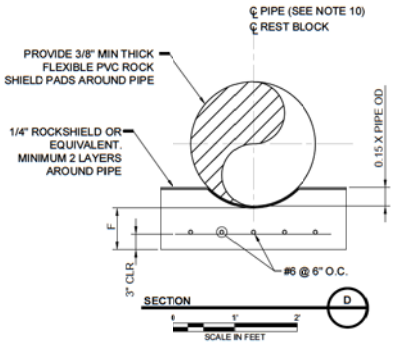
THRUST BLOCK FOUNDATION PLAN

SCALE IN FEET



SECTION C

SCALE IN FEET

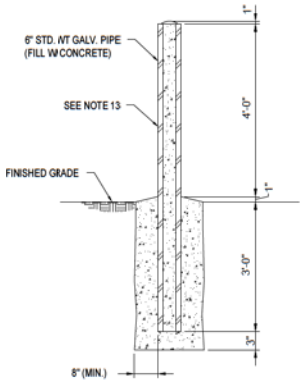


SECTION D

SCALE IN FEET

REST BLOCK DIMENSIONS			
PIPE SIZE	A	B	C
20"	5'-6"	5'-6"	6"
24"	5'-6"	5'-6"	6"

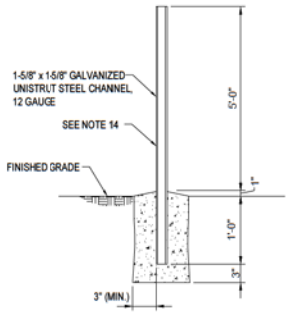
THRUST BLOCK DIMENSIONS			
PIPE SIZE	D	E	F
20"	6'-0"	6'-0"	1'-0"
24"	7'-0"	7'-0"	1'-0"



BOLLARD

DETAIL 10 S-004-0001011

N.T.S.



DIAPHRAGM METER SUPPORT FOUNDATION

DETAIL 18 S-004-0001011

N.T.S.

NOTES:

1. CONCRETE SHALL HAVE A MINIMUM COMPRESSIVE STRENGTH OF 4500PSI AT 28 DAYS.
2. REINFORCING STEEL SHALL BE ASTM A-615 GRADE 60.
3. EXPOSED FOUNDATION EDGES SHALL HAVE 1" CHAMFER.
4. ALL BOLTS, NUTS, AND WASHERS SHALL BE HOT-DIP GALVANIZED PER ASTM A-153, UNLESS OTHERWISE NOTED.
5. GRANULAR FILL SHALL CONSIST OF ODOT 304 COMPACTED TO A MINIMUM OF 98% MAXIMUM DRY DENSITY. STRUCTURAL FILL TO BE COMPACTED IN 6" MAXIMUM LIFTS WITH HAND-GUIDED COMPACTION EQUIPMENT OR HEAVY, SELF-PROPELLED COMPACTION EQUIPMENT. APPROVED CONTROLLED LOW-STRENGTH MATERIAL CAN BE USED IN PLACE OF GRANULAR FILL. SEE DWG. PNG-S-004-0001009 FOR CLSM SPECIFICATIONS.
6. ✦ DENOTES REFERENCE COORDINATE LOCATION FROM FOUNDATION LOCATION PLAN.
7. DEVIATIONS FROM THE DESIGN DRAWINGS SHALL NOT BE PERMITTED WITHOUT PRIOR APPROVAL FROM ENGINEER.
8. ALL REINFORCING AND ANCHOR BOLTS SHALL BE RIGIDLY SECURED PRIOR TO THE PLACING OF CONCRETE.
9. ALL GROUT SHALL BE NON-SHRINK, 2500 PSI MINIMUM. GROUT SHALL ONLY BE INSTALLED UNDERNEATH THE BASE PLATE, EXTENDING AT A 45 DEGREE ANGLE IN ALL DIRECTIONS.
10. INSTALL AND SIZE PIPE WRAP SUCH THAT IT EXTENDS 2 INCHES PAST THE EDGE OF FOUNDATION.
11. REFER TO MECHANICAL DRAWINGS FOR PIPE DIAMETER.
12. LIGHT POLE ANCHORS DESIGNED AND PROVIDED BY VENDOR. CONTRACTOR TO VERIFY ANCHOR PLACEMENT PRIOR TO POURING FOUNDATION.
13. AFTER INSTALLATION PAINT BOLLARD WITH ALKYD GLOSS ENAMEL (40% SOLIDS BY VOLUME) "SAFETY" YELLOW AT 1.5 MILS DRY FILM THICKNESS.
14. INSTALL DIAPHRAGM METER AND SECURE WITH 3/4" STAINLESS STEEL BANDS WITH BUCKLE. REFER TO MECHANICAL DWG PNG-M-004-0001075.

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01/08/2021	CDW		PRINCIPAL ENGINEER

DUKE ENERGY

C350 PROJECT
NORWOOD C350 STATION
FOUNDATION DETAILS 4 OF 5

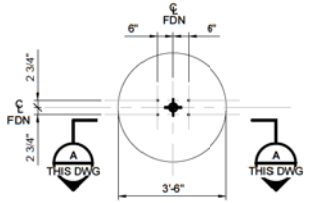
HAMILTON COUNTY, OHIO

REF. DWG(S) PNG-G-004-001043

SHEET(S) 28 OF 68	DWG SCALE VARIES
DWG DATE 08/21/2018	SUPERSEDED —

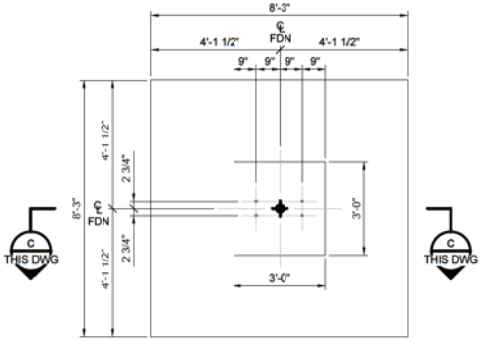
DRAWING NUMBER	REVISION
PNG -S-004-0001015	0

DISCIPLINE / RESOURCE CENTER / LINE NUMBER



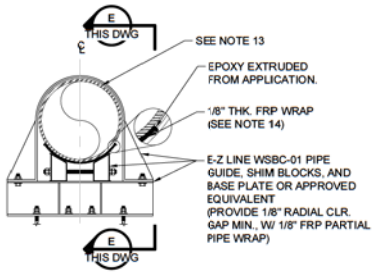
10" CLAMP SUPPORT

DETAIL 11 N.T.S. S-004-0001011

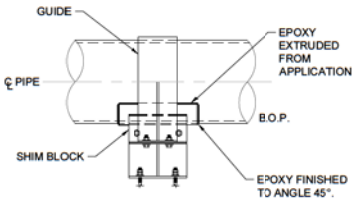


20" CLAMP SUPPORT

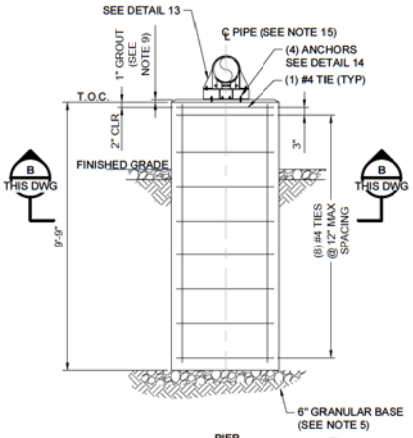
DETAIL 12 N.T.S. S-004-0001011



DETAIL 13 N.T.S.

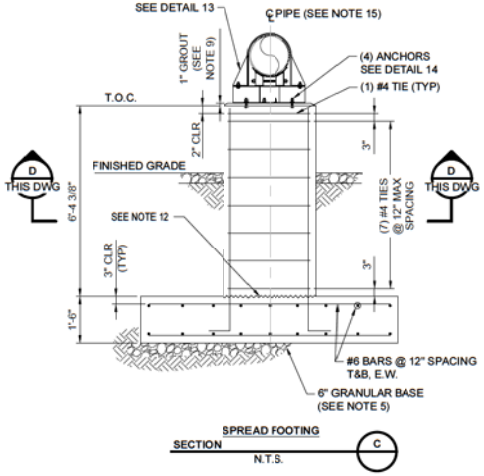


SECTION E N.T.S.



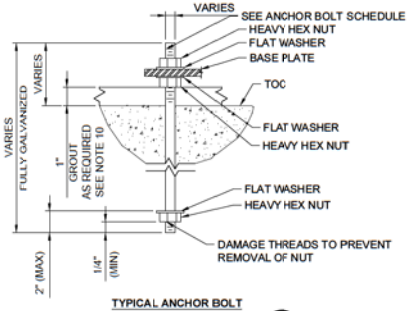
PIER

SECTION A N.T.S.



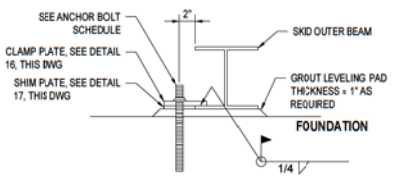
SPREAD FOOTING

SECTION C N.T.S.



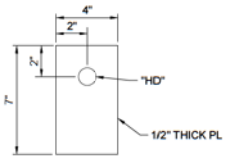
TYPICAL ANCHOR BOLT

DETAIL 14 N.T.S.



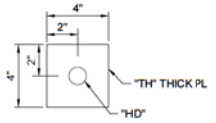
ANCHOR, SKID, GROUT, & CLAMP DETAIL

DETAIL 15 N.T.S.



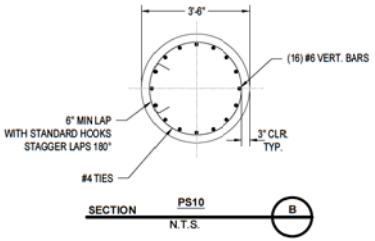
CLAMP PLATE

DETAIL 16 N.T.S.



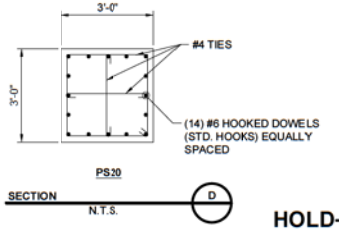
SHIM PLATE

DETAIL 17 N.T.S.



PS10

SECTION B N.T.S.



PS20

SECTION D N.T.S.

HOLD

ANCHOR BOLT SCHEDULE									
DETAIL	FOUNDATION	AB TYPE	DIA	LENGTH	PROJ	EMBEDMENT	HD HOLE DIAMETER	"TH" SHIM PL	NOTES
1	PIG LAUNCHER	CAST-IN PLACE	1 1/2"	4'-6"	5"	4'-1"	1 5/8"	9/16"	F 1554 GR 105
2,5	DOUBLE AND SINGLE WIDE ACCESS PLATFORM	POST INSTALL	5/8"	0'-7"	4 1/2"	0'-2 1/2"	3/4"	-	HILTI KWIK BOLT 3 HDG
3	HEATER	POST INSTALL	1/2"	0'-7"	4 1/2"	0'-2 1/2"	5/8"	7/16"	HILTI KWIK BOLT 3 HDG
4	CONTROLS BUILDING	POST INSTALL	1/2"	0'-7"	3"	0'-4"	5/8"	7/16"	HILTI KWIK BOLT 3 HDG
6	REGULATOR BUILDING	CAST-IN PLACE	3/4"	1'-5"	5"	1'-1"	-	-	F 1554 GR 55
11	10" PIPE SUPPORT	CAST-IN PLACE	7/8"	1'-0"	4"	0'-8"	-	-	F 1554 GR 55
12	20" PIPE SUPPORT	CAST-IN PLACE	7/8"	1'-0"	4"	0'-8"	-	-	F 1554 GR 55

NOTES:

1. CONCRETE SHALL HAVE A MINIMUM COMPRESSIVE STRENGTH OF 4500PSI AT 28 DAYS.
2. REINFORCING STEEL SHALL BE ASTM A-615 GRADE 60.
3. EXPOSED FOUNDATION EDGES SHALL HAVE 1" CHAMFER.
4. ALL BOLTS, NUTS, AND WASHERS SHALL BE HOT-DIP GALVANIZED PER ASTM A-153, UNLESS OTHERWISE NOTED.
5. GRANULAR FILL SHALL CONSIST OF ODOT 304 COMPACTED TO A MINIMUM OF 98% MAXIMUM DRY DENSITY. STRUCTURAL FILL TO BE COMPACTED IN 6" MAXIMUM LIFTS WITH HAND-GUIDED COMPACTION EQUIPMENT OR HEAVY, SELF-PROPELLED COMPACTION EQUIPMENT. APPROVED CONTROLLED LOW-STRENGTH MATERIAL CAN BE USED IN PLACE OF GRANULAR FILL. SEE DWG. PNG-S-004-0001009 FOR CLSM SPECIFICATIONS.
6. ✦ DENOTES REFERENCE COORDINATE LOCATION FROM FOUNDATION LOCATION PLAN.
7. DEVIATIONS FROM THE DESIGN DRAWINGS SHALL NOT BE PERMITTED WITHOUT PRIOR APPROVAL FROM ENGINEER.
8. ALL REINFORCING AND ANCHOR BOLTS SHALL BE RIGIDLY SECURED PRIOR TO THE PLACING OF CONCRETE.
9. ALL GROUT SHALL BE NON-SHRINK, 2500 PSI MINIMUM. GROUT SHALL ONLY BE INSTALLED UNDERNEATH THE BASE PLATE, EXTENDING AT A 45 DEGREE ANGLE IN ALL DIRECTIONS.
10. GROUT AVERAGE THICKNESS ADOPTED 1" TO ASSURE PROPER LEVELING AT BOTTOM OF STEEL BETWEEN PIERS. GROUT MAY NOT BE REQUIRED BY OWNER'S DECISION FOR PIERS BUILT WITH THEIR TOP OF CONCRETE HAVING MAXIMUM DEVIATION OF ± 1" STEEL ELEVATION, AND WITH A SURFACE PROPERLY FINISHED TO ALLOW THE SKID BEAMS TO REST ON ALL PIERS AFTER THE CLAMPS ARE INSTALLED.
11. CONTRACTOR TO VERIFY BASE PLATE SIZES AND BOLT HOLE SIZES & SPACING PRIOR TO CONSTRUCTING FOUNDATIONS.
12. ROUGHEN TO ±1/4" AMPLITUDE, CLEAN EXPOSED AGGREGATE PRIOR TO PEDESTAL POUR.
13. FIELD TO ENSURE THAT A MINIMUM 1/8" RADIAL CLEARANCE GAP IS MAINTAINED BETWEEN THE PIPE AND THE GUIDE.
14. INSTALL AND SIZE PIPE WRAP SUCH THAT IT EXTENDS 2 INCHES PAST THE EDGE OF FOUNDATION.
15. REFER TO MECHANICAL DRAWINGS FOR PIPE DIAMETER.

BURNS & McDONNELL ENGINEERING COMPANY, INC.
STATE LICENSE # COA:01557

STATE OF OHIO — CHRISTOPHER D. WILSON — 82217 — REGISTERED PROFESSIONAL ENGINEER
01/08/2021
PROFESSIONAL ENGIARCH STAMP

NO.	DATE	REVISION(S) DESCRIPTION	BY	CHK	APPD
0	01-08-2021	ISSUED FOR CONSTRUCTION	DJS	EAB	CDW

DESCRIPTION	
AREA CODE	
ACCOUNT NUMBER	AW2128
PROJECT NUMBER	1880115
DRAWING BY	DJS
STATION ID	S0868O1
CHECKER INITIALS	EAB

APPROVALS			
DATE	INITIALS		REGIONAL ENGINEER
			MGR TECH REC & STD
DATE 01/08/2021	INITIALS CDW		PRINCIPAL ENGINEER

DUKE ENERGY

C350 PROJECT
NORWOOD C350 STATION
FOUNDATION DETAILS 5 OF 5

HAMILTON COUNTY, OHIO

REF. DWG(S) PNG-G-004-000104

SHEET(S) 29 OF 68	DWG SCALE VARIES
DWG DATE 08/21/2018	SUPERSEDED —

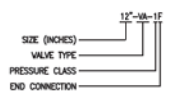
DRAWING NUMBER: PNG -S-004-0001016 — REVISION: 0

DISCIPLINE / RESOURCE CENTER / LINE NUMBER

SYMBOLS AND LEGEND

FLOW TAG

VALVE IDENTIFICATION



VALVE TYPE DESIGNATION

VA	GATE VALVE
VB	BALL VALVE
VC	CHECK VALVE
VF	BUTTERFLY VALVE
VG	GLOBE VALVE
VI	GAUGE VALVE W/ BLEEDER AND PLUG
VN	NEEDLE VALVE
VP	PLUG VALVE
V3	3-WAY VALVE

PRESSURE CLASS DESIGNATION

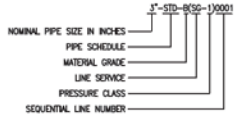
0	ATMOSPHERIC
U	CLASS 125
1	CLASS 150
3	CLASS 300
4	CLASS 400
6	CLASS 600
9	CLASS 900
15	CLASS 1500
20	2000 PSI CWP
30	3000 PSI CWP
60	6000 PSI CWP

NOTE:
SEE PROJECT PIPING MATERIAL SPECIFICATIONS FOR DESIGN PRESSURE AND MAOP FOR SPECIFIC PRESSURE CLASS.

END CONNECTION DESIGNATION

A	SOCKET WELD
B	SCREWED
C	BUTT WELD
E	FLAT FACED FLANGED
F	RAISED FACED FLANGED
G	BUTT WELD X RASED FACED FLANGED
H	BUTT WELD X RING JOINT FLANGED
J	RING JOINT FLANGED

LINE NUMBER IDENTIFICATION



MATERIAL GRADE DESIGNATION

X65	API 5L X65
X60	API 5L X60
X52	API 5L X52
X42	API 5L X42
AL	ALUMINUM TUBING
B	API 5L GRADE B OR ASTM GRADE B
304L	ASTM A312 GRADE TP
PVC	ASTM D1785 POLYVINYL CHLORIDE
SS	ASTM 316 SS SEAMLESS ANNEALED TUBING

LINE SERVICE DESIGNATION

A	AIR
BG	PILOT GAS (BSD)
CA	COMBUSTION AIR
CO	CARBON DIOXIDE
D	DRAIN
DF	DIESEL FUEL
DW	DOMESTIC WATER
EA	ENGINE AIR
EG	PILOT GAS (ESD)
EX	EXHAUST
FA	FREE AIR
FG	FUEL GAS
FW	FIRE WATER
G	PROCESS GAS
GL	GYLCOL
HD	HYDROCARBON DRAIN
HO	HYDRAULIC OIL
HW	HEATED WATER
IA	INSTRUMENT AIR
IG	INSTRUMENT GAS
L	PROCESS LIQUID
LO	LUBE OIL
M	METHANOL
OW	OILY WATER
PG	POWER GAS
PW	POTABLE WATER
RW	RAW WATER
SG	STARTING GAS
SPG	SECONDARY POWER GAS
UA	UTILITY AIR
V	VENT
WW	WASTE WATER

ABBREVIATIONS

ACP	INST. AIR COMP. CONTROL PANEL
AOV	AIR OPERATED VALVE
AOY	AIR OPERATED SOLENOID
A/M	AUTOMATIC/MANUAL 2 POSITION SWITCH
BSW	BASIC SEDIMENT & WATER
CSC	CAR SEAL CLOSED
CSO	CAR SEAL OPEN
D	DRAIN
DS	DOWNSTREAM
ESD	STATION EMERGENCY SHUTDOWN
	CONTROL PANEL C = "CLOSE"
BSD	BUILDING EMERGENCY SHUTDOWN
	CONTROL PANEL O = "OPEN"
E/H	ELECTRO-HYDRAULIC ACTUATOR
EX	EXHAUST
FC	FAIL CLOSED
FLP	FAIL IN LAST POSITION
FO	FAIL OPEN
GOV	GAS OPERATED VALVE
GOY	GAS OPERATED SOLENOID
HOA	HAND-OFF-AUTO STATION
IAS	INSTRUMENT AIR SUPPLY
IGS	INSTRUMENT GAS SUPPLY
LC	LOCK CLOSED
LCB	LOCAL CONTROL BOARD
LHC	LOCKING HANDLE VALVE CLOSED
LHO	LOCKING HANDLE VALVE OPEN
LO	LOCK OPEN
MCC	MOTOR CONTROL CENTER
MOV	MOTOR OPERATED VALVE
PD	POSITIVE DISPLACEMENT
PLC	PROGRAMMABLE LOGIC CONTROLLER
PP	PERSONNEL PROTECTION
RA	REVERSE ACTING
RCP	REGULATOR STATION CONTROL PANEL
RF	RAISED FACE
RTU	REMOTE TERMINAL UNIT
SCP	STATION CONTROL PANEL
SD	SHUTDOWN
SE	SCREWED END
SP	SET POINT
T/C	THERMOCOUPLE
TDR	TIME DELAY RELAY
UCP	COMPRESSOR CONTROL PANEL
US	UPSTREAM
V	VENT
WE	WELD END
PV	PRESSURE CONTROL VALVE
RO	RESTRICTION ORIFICE

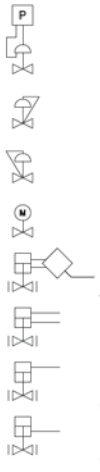
VALVES

NOTE: THE DEFAULT CONFIGURATION FOR VALVE SYMBOLS SHOWN IS WELDED/THREADED/OPEN. FOR FLANGED VALVES OR CLOSED VALVES SEE THE EXAMPLES SHOWN.

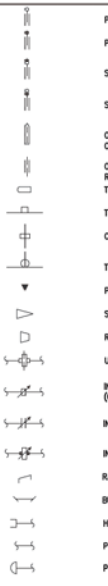
ACTUATED VALVES

NOTE: VALVE BODIES IN THIS SECTION ARE SHOWN AS SIMPLE GATE, ANGLE OR THREE WAY VALVES. THE ACTUATOR CAN BE SHOWN ON ANY TYPE OF VALVE.

ACTUATED VALVES



FITTINGS



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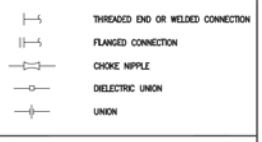
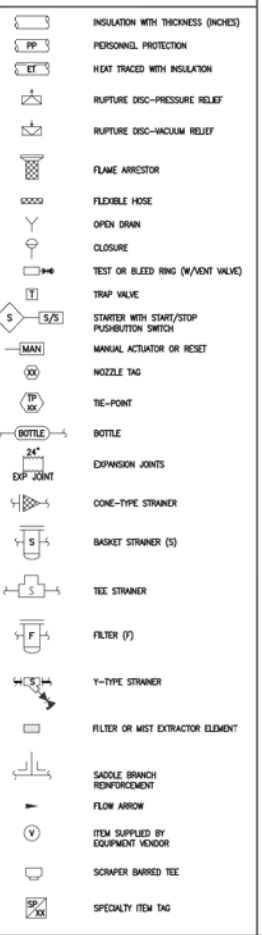


MISCELLANEOUS



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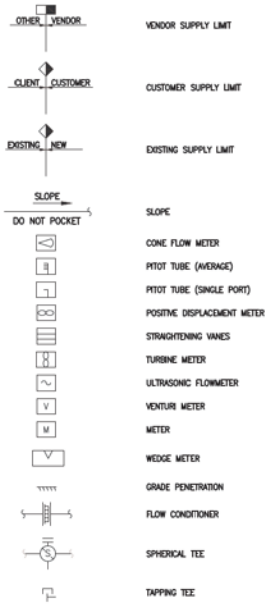


STATE OF OHIO
CHAD A BACON
PE-85438
REGISTERED PROFESSIONAL ENGINEER
1/8/2021
PROFESSIONAL ENGIARCH STAMP

BURNS & McDONNELL ENGINEERING COMPANY, INC.
STATE LICENSE # COA 21557

NO.	DATE	REVISION(S) DESCRIPTION	BY	CHK	APPD
0	01-08-2021	ISSUED FOR CONSTRUCTION	RDC	JBF	CAB

DESCRIPTION	
AREA CODE	
ACCOUNT NUMBER	AW2128
PROJECT NUMBER	1880115
DRAWING BY	MAS
STATION ID	S0868O1
CHECKER INITIALS	JBF

APPROVALS	DATE	INITIALS	
			REGIONAL ENGINEER
			MGR TECH REC & STD
	01/08/2021	CAB	PRINCIPAL ENGINEER

DUKE ENERGY

C350 PROJECT
NORWOOD C350 STATION
P&ID SYMBOLS AND LEGEND - 1
HAMILTON COUNTY, OHIO

REF. DWG(S) PNG-G-004-0001043

SHEET(S)	30 OF 68
DWG SCALE	NONE
DWG DATE	05/15/2018
	SUPERSEDED

DRAWING NUMBER: PNG -D-004-0001021
REVISION: 0
DISCIPLINE / RESOURCE CENTER / LINE NUMBER

SYMBOLS AND LEGEND

PUMPS


CENTRIFUGAL


CENTRIFUGAL (SIDE VIEW)


POSITIVE DISPLACEMENT


DIAPHRAM

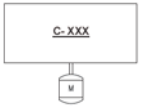

PMP41P LIQUID DRIVE


COMPRESSOR


VOLUME BOTTLE


PUMP


PUMP



RECIP. COMPRESSOR

EQUIPMENT

HORIZONTAL FILTER SEPARATOR

GENERIC EQUIPMENT

HORIZONTAL TANK

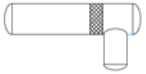
VERTICAL TANK (FLAT BOTTOM)

VERTICAL TANK (ROUNDED BOTTOM)

LAUNCHER/RECEIVER (CONCENTRIC)

LAUNCHER/RECEIVER (ECCENTRIC)


WELLHEAD


HORIZONTAL FILTER SEPARATOR


FILTER

BLOWDOWN SILENCER W/ RAIN HOOD

EQUIPMENT IDENTIFICATION

AC	GAS COOLER
C	COMPRESSOR
E	HEAT EXCHANGER
F	FILTER
FE	FLOW ELEMENT
G	FUEL GAS SCRUBBER
H	HEATER/REBOILER
I	LACT UNIT
L/R	LAUNCHER/RECEIVER
M	MOTOR
P	PUMP
SL	SILENCER
T	CONTACTOR/ACCUMULATOR
TK	TANK
V	VESSEL
W	WELL HEAD
SCP	STATION CONTROL PANEL

MISCELLANEOUS

FAN MOTOR


SATELLITE DISH


SUMP


BLOWER, CENTRIGAL

BLOWER, AXIAL


EXHAUST HOOD/DIFFUSER

AUTOMATIC DAMPER ARROW INDICATES DIRTECTION OF FLOW

RELIEF DAMPER ARROW INDICATES DIRTECTION OF FLOW

MOTORIZED (POSITIONING) DAMPER


FILTER

BURNS & MCDONNELL ENGINEERING COMPANY, INC. STATE LICENSE # COA:21557

STATE OF OHIO
CHAD A BACON
PE.85438
REGISTERED PROFESSIONAL ENGINEER
1/8/2021
PROFESSIONAL ENGIARCH STAMP

NO.	DATE	REVISION(S) DESCRIPTION	BY	CHK	APPD
0	01-08-2021	ISSUED FOR CONSTRUCTION	RDC	JBF	CAB

DESCRIPTION	
AREA CODE	
ACCOUNT NUMBER	AW2128
PROJECT NUMBER	1880115
DRAWING BY	MAS
STATION ID	S0868O1
CHECKER INITIALS	JBF

APPROVALS	DATE	INITIALS	
			REGIONAL ENGINEER
			MGR TECH REC & STD
	01/08/2021	CAB	PRINCIPAL ENGINEER

DUKE ENERGY

C350 PROJECT
NORWOOD C350 STATION
P&ID SYMBOLS AND LEGEND - 2
HAMILTON COUNTY, OHIO

REF. DWG(S) PNG-G-004-0001043

SHEET(S) 31 OF 68	DWG SCALE NONE
DWG DATE 05/15/2018	SUPERSEDED

DRAWING NUMBER: PNG -D-004-0001022
REVISION: 0
DISCIPLINE / RESOURCE CENTER / LINE NUMBER

SYMBOLS AND LEGEND

INSTRUMENTATION IDENTIFICATION LETTERS
(USED INSIDE INSTRUMENT BALLOONS) (FROM ISA "TABLE 2")

FIRST LETTER	MEASURED OR INITIATING VARIABLE	CONTROLLING DEVICES: RECORDING	CONTROLLING DEVICES: INDICATING	CONTROLLING DEVICES: BLIND	CONTROLLING DEVICES: SELF-ACTUATED CONTROL VALVE	READOUT DEVICES: RECORDING	READOUT DEVICES: INDICATING	SWITCHES & ALARM DEVICES*: HIGH	SWITCHES & ALARM DEVICES*: LOW	SWITCHES & ALARM DEVICES*: COMBO	TRANSMITTERS: RECORDING	TRANSMITTERS: INDICATING	TRANSMITTERS: BLIND	DEVICES: SOLENOIDS, RELAYS & COMPUTING	PRIMARY ELEMENT	TEST POINT		WELL OR PROBE	VIEWING DEVICE GLASS	SAFETY DEVICE	FINAL ELEMENT
A	ANALYSIS	ARC	AIC	AC		AR	AI	ASH	ASL	ASHL	ART	AIT	AT	AY	AE	AP		AW			AV
B	BURNER/COMBUSTION	BRC	BIC	BC		BR	BI	BSH	BSL	BSHL	BRT	BIT	BT	BY	BE			BW	BG		BZ
C	USER'S CHOICE																				
D	USER'S CHOICE																				
E	VOLTAGE	ERC	EIC	EC		ER	EI	ESH	ESL	ESHL	ERT	EIT	ET	EY	EE						EZ
F	FLOW RATE	FRC	FIC	FC	FCV	FR	FI	FSH	FSL	FSHL	FRT	FIT	FT	FY	FE	FP			FG		FV
FQ	FLOW QUANTITY	FQRC	FQIC			FQR	FQI	FQSH	FQSL			FQIT	FQT	FQY	FQE						FQV
FF	FLOW RATIO	FFRC	FFIC	FFC		FFR	FFI	FFSH	FFSL						FFE						FFV
G	USER'S CHOICE																				
H	HAND		HIC	HC						HS											HV
I	CURRENT	IRC	IIC			IR	II	ISH	ISL	ISHL	IRT	IIT	IT	IY	IE						IZ
J	POWER	JRC	JIC			JR	JI	JSH	JSL	JSHL	JRT	JIT	JT	JY	JE						JV
K	TIME	KRC	KIC	KC	KCV	KR	KI	KSH	KSL	KSHL	KRT	KIT	KT	KY	KE						KV
L	LEVEL	LRC	LIC	LC	LCV	LR	LI	LSH	LSL	LSHL	LRT	LIT	LT	LY	LE			LW	LG		LV
M	USER'S CHOICE																				
N	USER'S CHOICE																				
O	USER'S CHOICE																				
P	PRESSURE/VACUUM	PRC	PIC	PC	PCV	PR	PI	PSH	PSL	PSHL	PRT	PIT	PT	PY	PE	PP				PSV	PV
PD	PRESSURE, DIFFERENTIAL	PDRC	PDIC	PDC	PDCV	PDR	PDI	PDSH	PDSL		PDRT	PDIT	PDT	PDY	PE	PP					PDV
Q	QUANTITY	QRC	QIC			QR	QI	QSH	QSL	QSHL	QRT	QIT	QT	QY	QE						QZ
R	RADIATION	RRC	RIC	RC		RR	RI	RSH	RSL	RSHL	RRT	RIT	RT	RY	RE			RW			RZ
S	SPEED/FREQUENCY	SRC	SIC	SC	SCV	SR	SI	SSH	SSL	SSHL	SRT	SIT	ST	SY	SE						SV
T	TEMPERATURE	TRC	TIC	TC	TCV	TR	TI	TSH	TSL	TSHL	TRT	TIT	TT	TY	TE	TP		TW		TSE	TV
TD	TEMPERATURE, DIFFERENTIAL	TDRC	TDIC	TDC	TDCV	TDR	TDI	TDSH	TDSL		TDRT	TDIT	TDT	TDY	TE	TP		TW			TDV
U	MULTIVARIABLE					UR	UI							UY							UV
V	VIBRATION/MACHINERY ANALYSIS					VR	VI	VSH	VSL	VSHL	VRT	VIT	VT	VY	VE						VZ
W	WEIGHT/FORCE	WRC	WIC	WC	WCV	WR	WI	WSH	WSL	WSHL	WRT	WIT	WT	WY	WE						WZ
WD	WEIGHT/FORCE DIFFERENTIAL	WDRC	WDIC	WDC	WDCV	WDR	WDI	WDSH	WDSL		WDRT	WDIT	WDT	WDY	WE						WDZ
X	UNCLASSIFIED																				
Y	EVENT/STATE/PRESENCE		YIC	YC		YR	YI	YSH	YSL				YT	YY	YE						YZ
Z	POSITION/DIMENSION	ZRC	ZIC	ZC	ZCV	ZR	ZI	ZSH	ZSL	ZSHL	ZRT	ZIT	ZT	ZY	ZE						ZV
ZD	GAUGING/DEVIATION	ZDRC	ZDIC	ZDC	ZDCV	ZDR	ZDI	ZDSH	ZDSL		ZDRT	ZDIT	ZDT	ZDY	ZDE						ZDV

*NOTE: ADDITIONAL INSTRUMENT ABBREVIATIONS, IF REQUIRED, SHALL USE THIS TABLE AS A GUIDE.

"H", "L", "HH", OR "LL" SUFFIXED TO TAGS FOR SWITCHES AND RELATED DEVICES INDICATE ALARM OR SHUTDOWN AS FOLLOWS:

H = HIGH, L = LOW } ALARM

HH = HIGH HIGH, LL = LOW LOW } SHUTDOWN

ZSC = LIMIT SWITCH CLOSE
ZSO = LIMIT SWITCH OPEN
ZLO = SOLENOID VALVE OPEN
ZLC = SOLENOID VALVE CLOSE
IR = FIRE DETECTOR
RO = RESTRICTION ORIFICE
COE = GAS DETECTOR

INSTRUMENT BALLOONS

PLC I/O — AI=ANALOG INPUT AO=ANALOG OUTPUT DI=DIGITAL INPUT DO=DIGITAL OUTPUT

XXXX — LOCAL MOUNTED INSTRUMENT

REMOTE PANEL MOUNTED INSTRUMENT (FRONT OF PANEL) (PRIMARY)

LOCAL PANEL MOUNTED INSTRUMENT (FRONT OF PANEL) (AUXILIARY)

REMOTE PANEL MOUNTED INSTRUMENT (REAR OF PANEL) (PRIMARY)

LOCAL PANEL MOUNTED INSTRUMENT (REAR OF PANEL) (AUXILIARY)

INSTRUMENT FOR TWO MEASURED VARIABLES OR FUNCTIONS (COMMON ENCLOSURE)

PNEUMATIC SUPPLY TO INSTRUMENT

ELECTRICAL SUPPLY TO INSTRUMENT

STATION RTU CONTROL SYSTEM INSTRUMENT WITH COMMON (SHARED) DISPLAY (CRT)

LOCAL PANEL MOUNTED INSTRUMENT WITH COMMON (SHARED) DISPLAY (CRT)

XXXX — STATION PLC FUNCTION OR STATION ESD (PROGRAMMABLE LOGIC CONTROLLER)

XXXX — LOCAL PLC FUNCTION OR UNIT CONTROL PANEL

ESD — EMERGENCY SHUTDOWN (HARDWIRED)

EBO — EMERGENCY BLOWDOWN (HARDWIRED)

MCC — MOTOR CONTROL CENTER

VFD — VARIABLE FREQUENCY DRIVE

MISCELLANEOUS

MISCELLANEOUS

RELAY FUNCTION DESIGNATIONS
(ADJACENT TO INSTRUMENT BALLOON)

- F — CHARACTERIZE
- Σ — SUMMING
- √ — SQUARE ROOT
- Σ — TOTALIZE
- > — HIGH SIGNAL SELECT
- < — LOW SIGNAL SELECT
- CURRENT REPEATER
- CURRENT TO PRESSURE TRANSDUCER
- PNEUMATIC TO CURRENT TRANSDUCER
- RESISTANCE TO CURRENT CONVERTER
- VOLTAGE TO ELECTROMAGNETIC
- VOLTAGE TO CURRENT

XX / XXX — EXAMPLE LOCAL DISPLAY TOTALIZER (Σ)

LINE SYMBOLS

- CAPILLARY TUBING
- COMPUTER CONNECTION
- ELECTRICAL LEAD
- FIBER OPTIC/ELECTROMAGNETIC SIGNAL
- HYDRAULIC LINE
- SIGNAL PNEUMATIC LINE
- SKID LIMITS

LOGIC

- I — GENERALIZED FOR UNDEFINED OR COMPLEX INTERLOCK LOGIC
- AND — INTERLOCK IS EFFECTIVE ONLY IF ALL INPUTS EXIST
- OR — INTERLOCK IS EFFECTIVE IF ANY ONE OR MORE INPUTS EXIST
- P — PURGE LINE – AIR, GAS, LIQUID
- UNDEFINED CONTROL LOGIC (USUALLY HIGH PRESSURE GAS OR GAS/HYD. VALVE ACTUATORS)

MISCELLANEOUS

- G — RUNNING LIGHT ON (GREEN)
- R — RUNNING LIGHT OFF (RED)
- A — RUNNING LIGHT READY (AMBER)
- S — S/S — STARTER WITH START/STOP PUSHBUTTON SWITCH

BURNS & MCDONNELL ENGINEERING COMPANY, INC.
STATE LICENSE #COA:21557

STATE OF OHIO — CHAD A BACON — PE.85438 — REGISTERED PROFESSIONAL ENGINEER — 1/8/2021
PROFESSIONAL ENGIARCH STAMP

NO.	DATE	REVISION(S) DESCRIPTION	BY	CHK	APPD
0	01-08-2021	ISSUED FOR CONSTRUCTION	RDC	JBF	CAB

DESCRIPTION	
AREA CODE	
ACCOUNT NUMBER	AW2128
PROJECT NUMBER	1880115
DRAWING BY	MAS
STATION ID	S0868O1
CHECKER INITIALS	JBF

APPROVALS	DATE	INITIALS	
			REGIONAL ENGINEER
			MGR TECH REC & STD
	01/08/2021	CAB	PRINCIPAL ENGINEER

DUKE ENERGY®

C350 PROJECT
NORWOOD C350 STATION
P&ID SYMBOLS AND LEGEND - 3
HAMILTON COUNTY, OHIO

REF. DWG(S) PNG-G-004-0001043

SHEET(S) 32 OF 68	DWG SCALE NONE
DWG DATE 05/15/2018	SUPERSEDED
DRAWING NUMBER	REVISION
PNG -D-004-0001023	0

DISCIPLINE / RESOURCE CENTER / LINE NUMBER

NORWOOD C350 STATION

NORWOOD C350 STATION

DESIGN FLOW:	9,500 MCFH
INLET OPERATING PRESSURE RANGE:	210-500 PSIG
MINIMUM FLOW:	500 MCFH
OPERATING TEMPERATURE RANGE:	40-80° F
MAOP:	500 PSIG
DESIGN FACTOR:	0.2

PIG RECEIVER (PR-201)

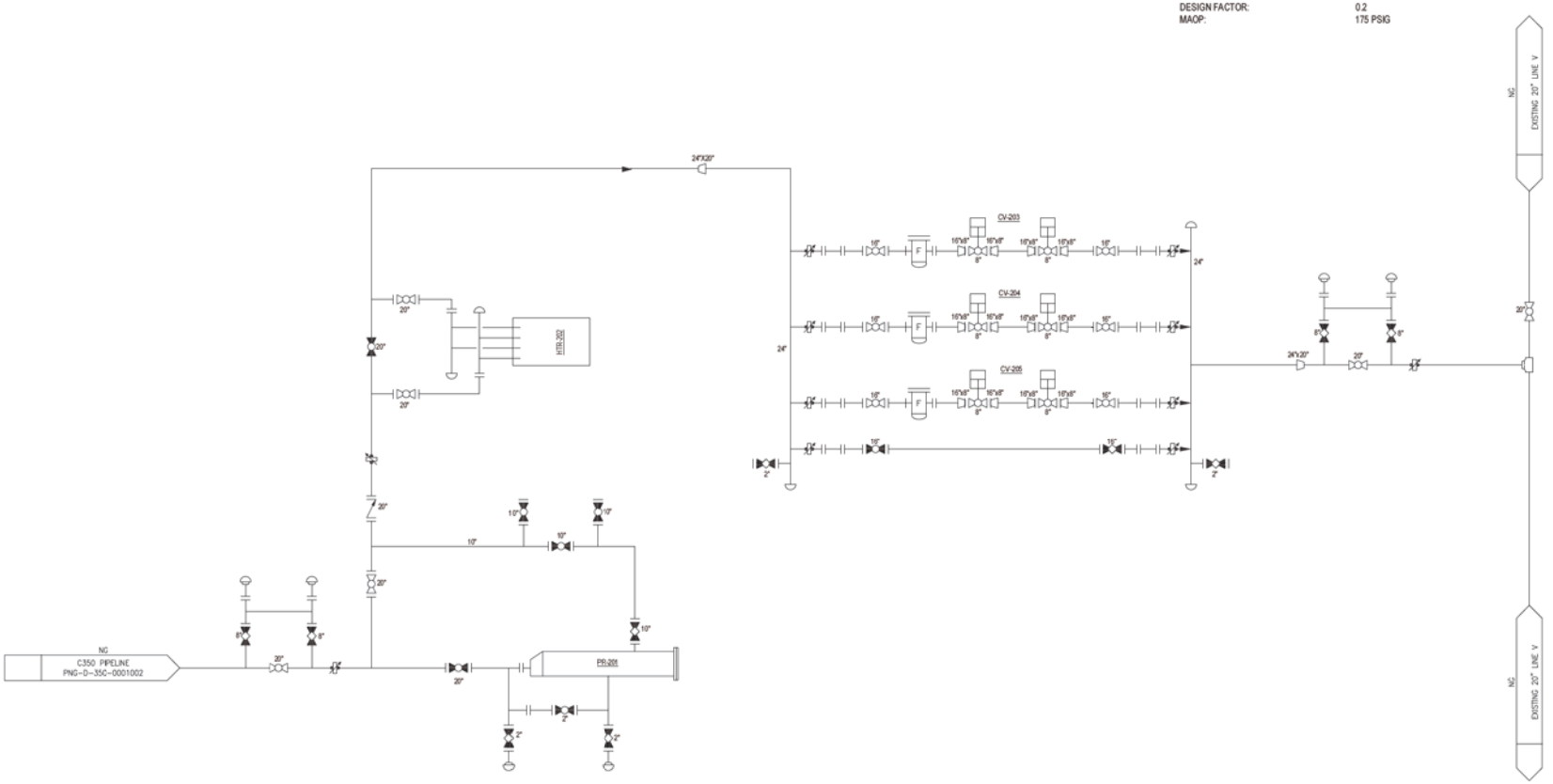
ANSI CLASS 600	
DESIGN PRESSURE:	500 PSIG
DESIGN FACTOR:	0.2

HEATER (HTR-202)

DESIGN FLOW:	9,500 MCFH
INLET PRESSURE:	210-400 PSIG
INLET TEMPERATURE:	40° F
HEATER OUTLET TEMPERATURE:	57° F
OPERATING BATH TEMPERATURE:	160° F
PROCESS DUTY:	1.6 MMBTU/HR

CONTROL VALVES (CV-203/204/205)

INLET CONDITIONS:	
MIN / MAX PRESSURE:	210-500 PSIG
MIN / MAX FLOW RATE:	500-9500 MCFH (EACH)
1 DEDICATED SPARE RUN	
DESIGN PRESSURE	500 PSIG
DESIGN FACTOR:	0.2
MAOP:	500 PSIG
OUTLET CONDITIONS:	
SET PRESSURE:	170 PSIG
DESIGN PRESSURE:	500 PSIG
DESIGN FACTOR:	0.2
MAOP:	175 PSIG



C350

DESIGN INFORMATION

500 PSIG	DESIGN PRESSURE					
500 PSIG	MAXIMUM ALLOWABLE OPERATING PRESSURE					
500 PSIG	MAXIMUM ACTUAL WORKING PRESSURE OF MAIN					
210 PSIG	MIN EXPECTED OPERATING PRESSURE OF MAIN					
175 PSIG	DOWNSTREAM MAOP					
170 PSIG	REQUIRED DELIVERY PRESSURE					
226 MMSCFD	ANTIOPATED LOAD					
-	RATE SCHEDULE					
METER:		CFH CAPACITY @				PSIG INLET
FIRST CUT REGULATOR:						
18,200,000	CFH CAPACITY @	400	INLET	170	OUTLET	
8,000,000	CFH CAPACITY @	210	INLET	170	OUTLET	
MONITOR PILOT SET PRESSURE:						
AUTOMATIC SHUT-OFF SETTING:						
FIRST CUT RELIEF SET PRESSURE:						
RELIEF:		CFH CAPACITY @				PSIG INLET
SECOND CUT REGULATOR:						
	CFH CAPACITY @		INLET		OUTLET	
	CFH CAPACITY @		INLET		OUTLET	
AUTOMATIC SHUT-OFF SETTING:						
SECOND CUT RELIEF SET PRESSURE:						
RELIEF:		CFH Capacity @				PSIG INLET

BURNS & MCDONNELL ENGINEERING COMPANY, INC.
STATE LICENSE # COA:01557

STATE OF OHIO
CHAD A BACON
PE.85438
REGISTERED PROFESSIONAL ENGINEER
1/8/2021
PROFESSIONAL ENG/ARCH STAMP

NO.	DATE	REVISION(S) DESCRIPTION	BY	CHK	APPD
0	01-08-2021	ISSUED FOR CONSTRUCTION	RDC	JBF	CAB

DESCRIPTION	
AREA CODE	
ACCOUNT NUMBER	AW2128
PROJECT NUMBER	1880115
DRAWING BY	MAS
STATION ID	S0868O1
CHECKER INITIALS	JBF

APPROVALS	DATE	INITIALS
REGIONAL ENGINEER		
MGR TECH REC & STD		
PRINCIPAL ENGINEER	01/08/2021	CAB

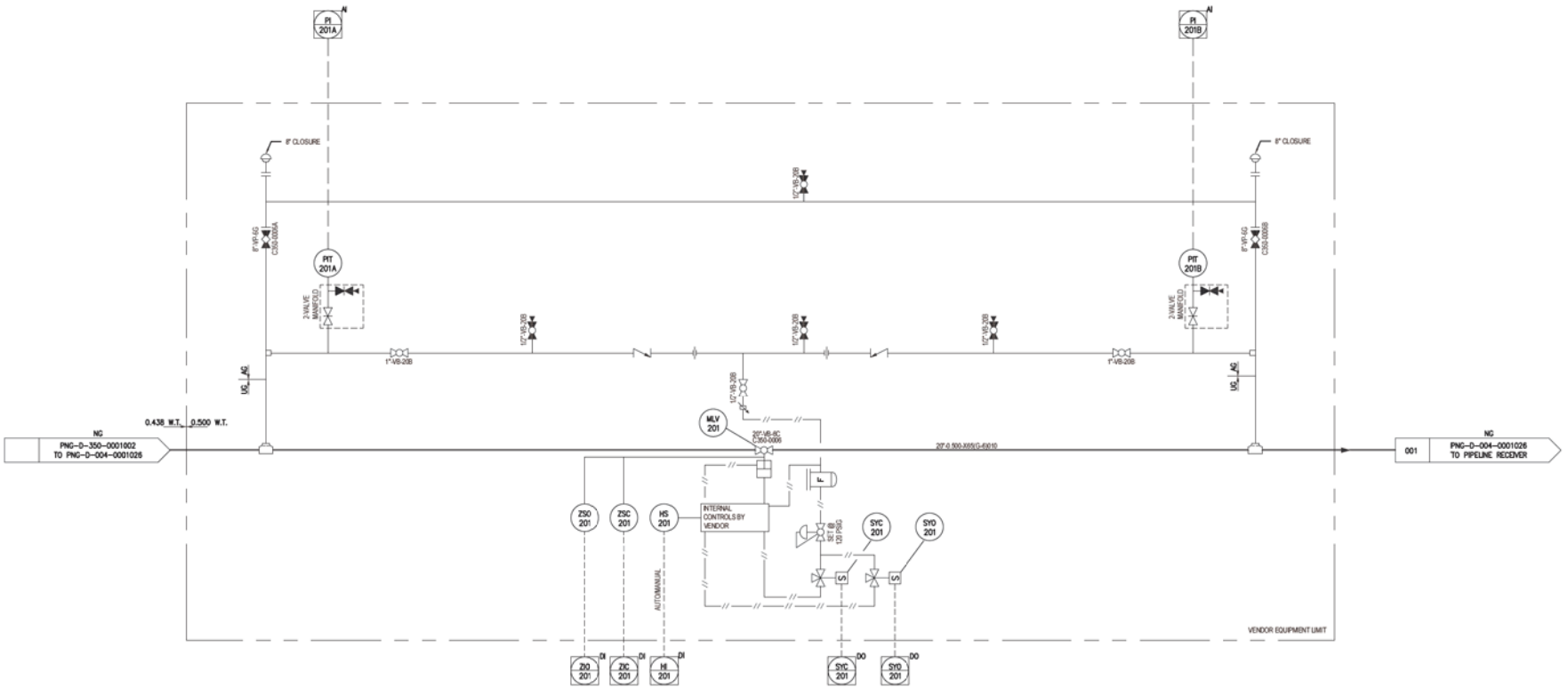
DUKE ENERGY

C350 PROJECT
NORWOOD C350 STATION
PROCESS FLOW DIAGRAM
HAMILTON COUNTY, OHIO

REF. DWG(S) PNG-G-004-0001043

SHEET(S) 33 OF 68	DWG SCALE NONE
DWG DATE 06/19/2019	SUPERSEDED
DRAWING NUMBER	REVISION
PNG -D-004-0001024	0

DISCIPLINE / RESOURCE CENTER / LINE NUMBER



NOTES:

1. REFER TO VENDOR EQUIPMENT DRAWINGS FOR ADDITIONAL DETAIL.
2. ANY CHANGES REQUIRED DUE TO FIELD CONDITIONS MUST BE APPROVED BY THE ENGINEERING DEPARTMENT.

BURNS & MCDONNELL ENGINEERING COMPANY, INC. STATE LICENSE # COA:21557

STATE OF OHIO — CHAD A BACON — PE.85438 — REGISTERED PROFESSIONAL ENGINEER — 1/8/2021

PROFESSIONAL ENG/ARCH STAMP

NO.	DATE	REVISION(S) DESCRIPTION	BY	CHK	APPD
0	01-08-2021	ISSUED FOR CONSTRUCTION	RDC	JBF	CAB

DESCRIPTION	
AREA CODE	
ACCOUNT NUMBER	AW2128
PROJECT NUMBER	1880115
DRAWING BY	MAS
STATION ID	S0868O1
CHECKER INITIALS	JBF

APPROVALS	DATE	INITIALS
REGIONAL ENGINEER		
MGR TECH REC & STD		
PRINCIPAL ENGINEER	01/08/2021	CAB

DUKE ENERGY®

C350 PROJECT
NORWOOD C350 STATION
MAINLINE VALVE P&ID

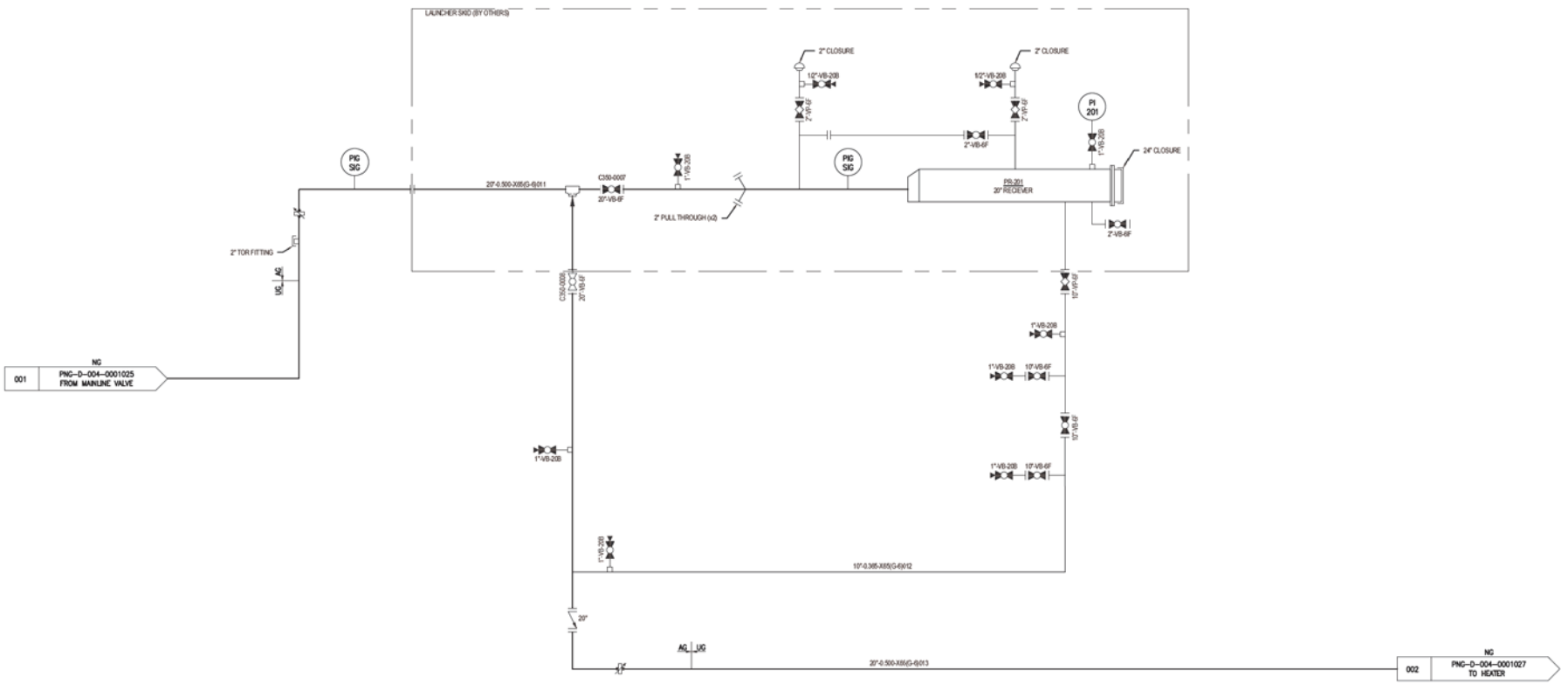
HAMILTON COUNTY, OHIO

REF. DWG(S) PNG-G-004-0001043

SHEET(S) 34 OF 68	DWG SCALE NONE
DWG DATE 05/14/2018	SUPERSEDED
DRAWING NUMBER	REVISION
PNG -D-004-0001025	0

DISCIPLINE / RESOURCE CENTER / LINE NUMBER

PIG RECEIVER (PR-201)
ANSI CLASS 600
DESIGN PRESSURE: 500 PSIG
DESIGN FACTOR: 0.2



NOTES:
1. REFER TO VENDOR EQUIPMENT DRAWINGS FOR ADDITIONAL DETAILS.
2. ANY CHANGES REQUIRED DUE TO FIELD CONDITIONS MUST BE APPROVED BY THE ENGINEERING DEPARTMENT.

BURNS & MCDONNELL ENGINEERING COMPANY, INC.
STATE LICENSE #COA:01557

STATE OF OHIO
CHAD A BACON
PE.85438
REGISTERED PROFESSIONAL ENGINEER
1/8/2021
PROFESSIONAL ENGIARCH STAMP

NO.	DATE	REVISION(S) DESCRIPTION	BY	CHK	APPD
0	01-08-2021	ISSUED FOR CONSTRUCTION	RDC	JBF	CAB

DESCRIPTION	
AREA CODE	
ACCOUNT NUMBER	AW2128
PROJECT NUMBER	1880115
DRAWING BY	MAS
STATION ID	S0868O1
CHECKER INITIALS	JBF

APPROVALS		
DATE	INITIALS	
		REGIONAL ENGINEER
		MGR TECH REC & STD
01/08/2021	CAB	PRINCIPAL ENGINEER

DUKE ENERGY

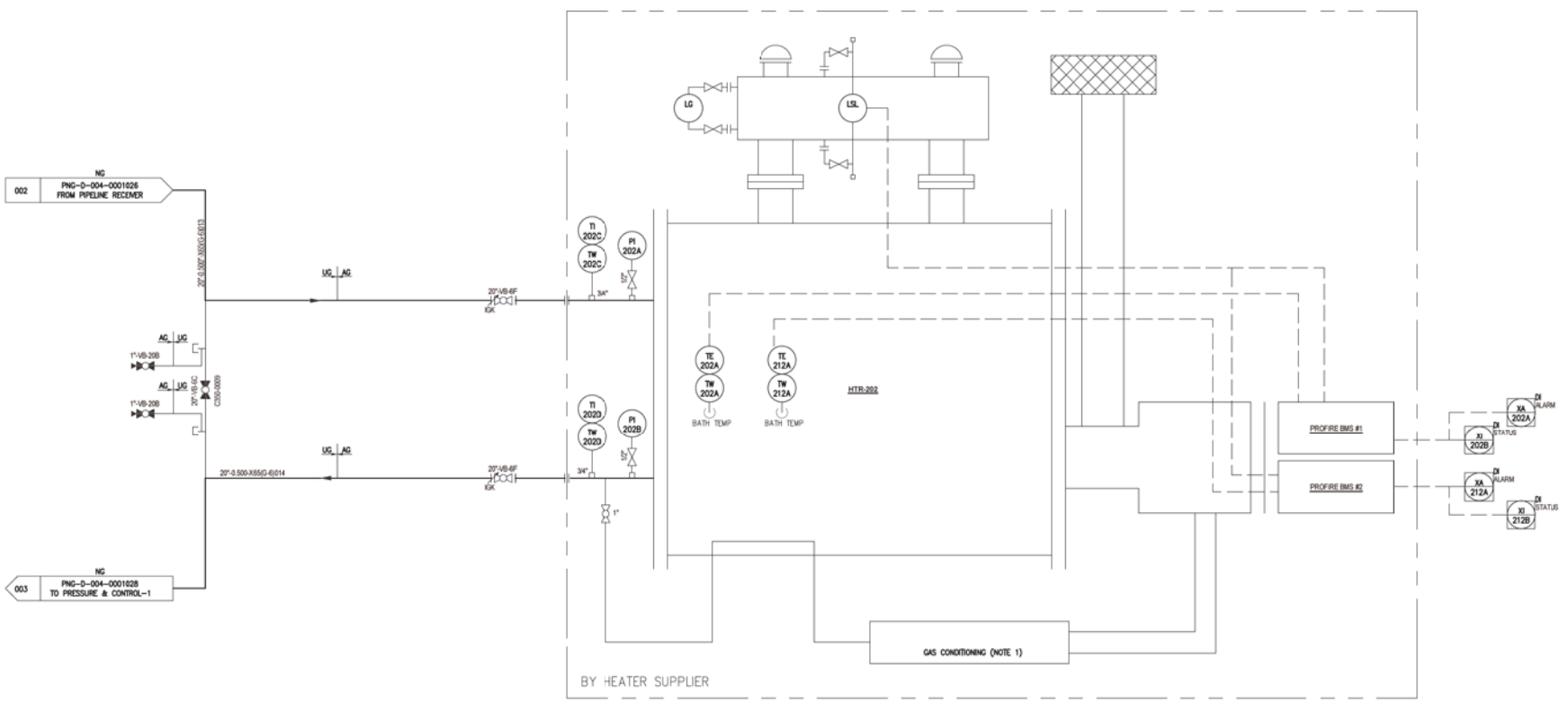
C350 PROJECT
NORWOOD C350 STATION
PIPELINE RECEIVER P&ID
HAMILTON COUNTY, OHIO

REF. DWG(S) PNG-G-004-0001043

SHEET(S) 35 OF 68	DWG SCALE NONE
DWG DATE 05/14/2018	SUPERSEDED
DRAWING NUMBER	REVISION
PNG -D-004-0001026	0
DISCIPLINE / RESOURCE CENTER / LINE NUMBER	

HEATER (HTR-202)

DESIGN FLOW:	9,500 MCFH
INLET PRESSURE:	210-400 PSIG
MINIMUM INLET TEMPERATURE:	40° F
HEATER OUTLET TEMPERATURE:	57° F
OPERATING BATH TEMPERATURE:	160° F
PROCESS DUTY:	1.6 MMBTU/HR



NOTES:

1. REFER TO VENDOR EQUIPMENT DRAWINGS FOR ADDITIONAL DETAILS REGARDING THE HEATER PIPING, INSTRUMENTATION AND CONTROLS.
2. ANY CHANGES REQUIRED DUE TO FIELD CONDITIONS MUST BE APPROVED BY THE ENGINEERING DEPARTMENT.

BURNS & McDONNELL ENGINEERING COMPANY, INC.
STATE LICENSE # COA 01557

STATE OF OHIO
CHAD A BACON
PE.85438
REGISTERED PROFESSIONAL ENGINEER
1/8/2021
PROFESSIONAL ENG/ARCH STAMP

NO.	DATE	REVISION(S) DESCRIPTION	BY	CHK	APPD
0	01-08-2021	ISSUED FOR CONSTRUCTION	RDC	JBF	CAB

DESCRIPTION	
AREA CODE	
ACCOUNT NUMBER	AW2128
PROJECT NUMBER	1880115
DRAWING BY	MAS
STATION ID	S0868O1
CHECKER INITIALS	JBF

APPROVALS	DATE	INITIALS	
			REGIONAL ENGINEER
			MGR TECH REC & STD
	01/08/2021	CAB	PRINCIPAL ENGINEER

DUKE ENERGY

C350 PROJECT
NORWOOD C350 STATION
HEATER P&ID

HAMILTON COUNTY, OHIO

REF. DWG(S) PNG-G-004-0001043

SHEET(S) 36 OF 68	DWG SCALE NONE
DWG DATE 05/14/2018	SUPERSEDED
DRAWING NUMBER	REVISION
PNG -D-004-0001027	0

DISCIPLINE / RESOURCE CENTER / LINE NUMBER

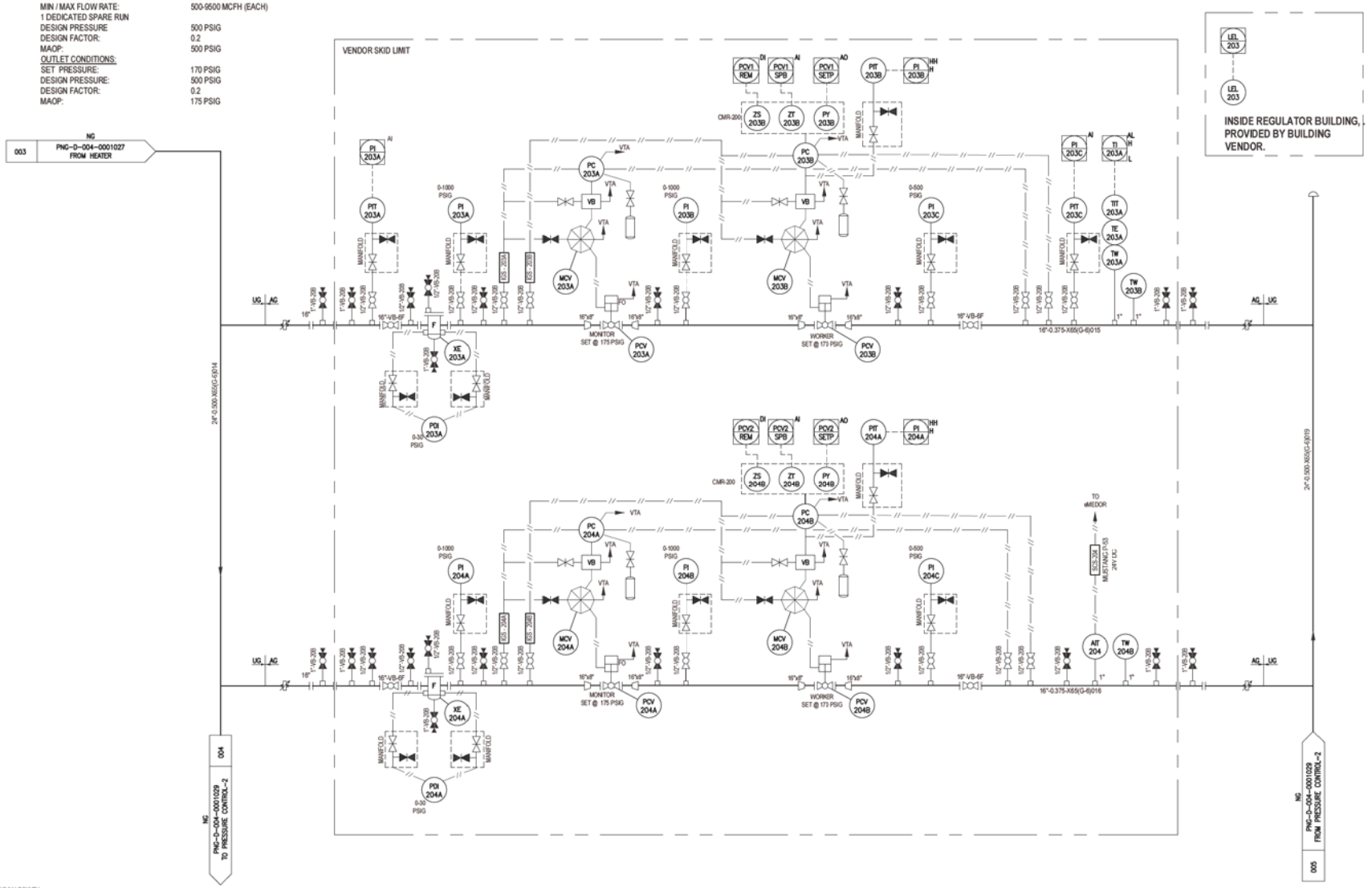
CONTROL VALVES (CV-203/204)

INLET CONDITIONS:

MIN / MAX PRESSURE:	210-500 PSIG
MIN / MAX FLOW RATE:	500-9500 MCFH (EACH)
1 DEDICATED SPARE RUN	
DESIGN PRESSURE	500 PSIG
DESIGN FACTOR:	0.2
MAOP:	500 PSIG

OUTLET CONDITIONS:

SET PRESSURE:	170 PSIG
DESIGN PRESSURE:	500 PSIG
DESIGN FACTOR:	0.2
MAOP:	175 PSIG



NOTES:

1. REFER TO VENDOR EQUIPMENT DRAWINGS FOR ADDITIONAL DETAIL.
2. ANY CHANGES REQUIRED DUE TO FIELD CONDITIONS MUST BE APPROVED BY THE ENGINEERING DEPARTMENT.

BURNS & MCDONNELL ENGINEERING COMPANY, INC. STATE LICENSE #COA:21557

STATE OF OHIO — CHAD A BACON — PE.85438 — REGISTERED PROFESSIONAL ENGINEER — 1/8/2021

PROFESSIONAL ENGIARCH STAMP

NO.	DATE	REVISION(S) DESCRIPTION	BY	CHK	APPD
0	01-08-2021	ISSUED FOR CONNSTRUCTION	RDC	JBF	CAB

DESCRIPTION	
AREA CODE	
ACCOUNT NUMBER	AW2128
PROJECT NUMBER	1880115
DRAWING BY	MAS
STATION ID	S0868O1
CHECKER INITIALS	JBF

APPROVALS	DATE	INITIALS
REGIONAL ENGINEER		
MGR TECH REC & STD		
PRINCIPAL ENGINEER	01/08/2021	CAB

DUKE ENERGY

C350 PROJECT
NORWOOD C350 STATION
PRESSURE CONTROL P&ID - 1

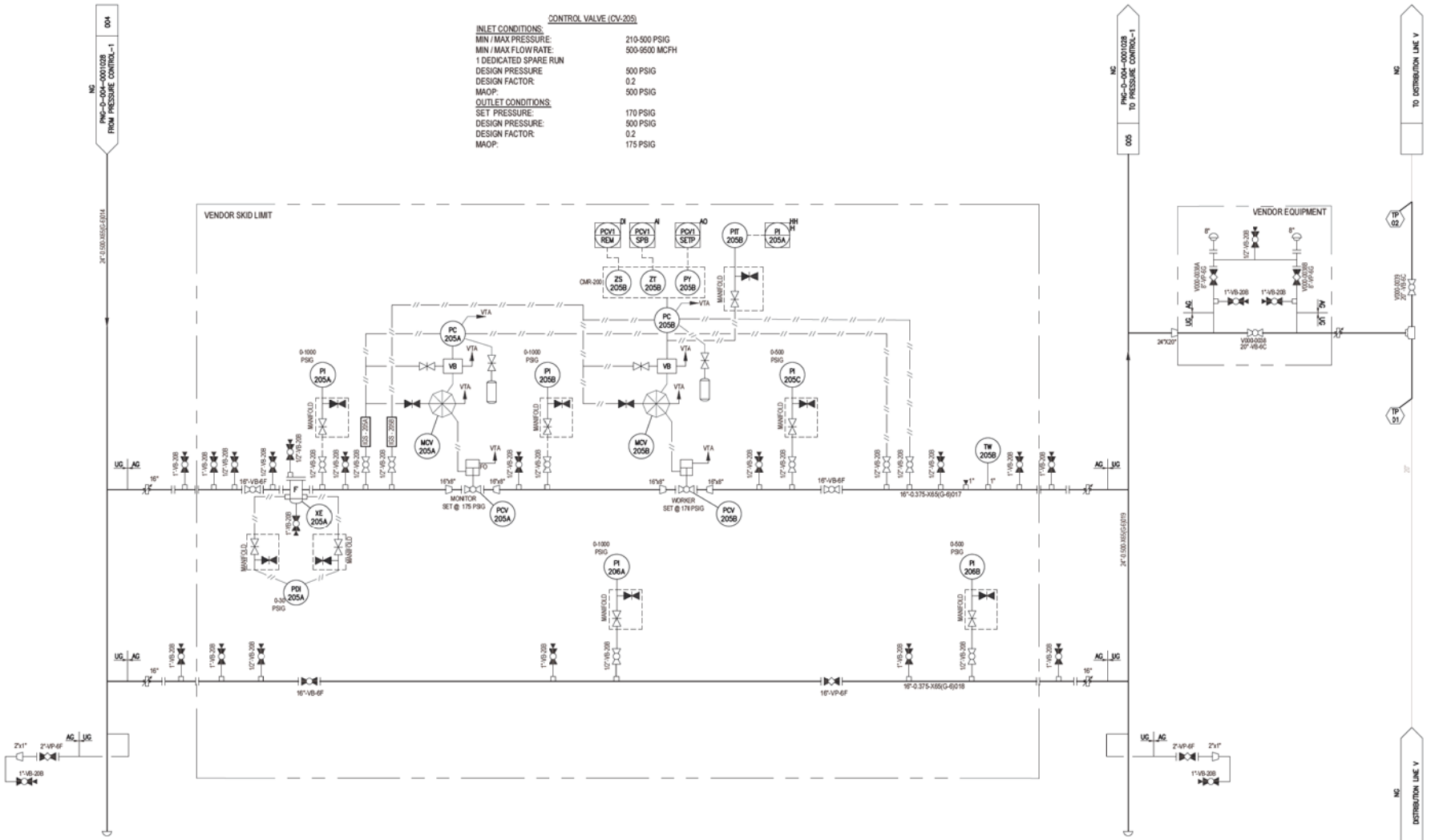
HAMILTON COUNTY, OHIO

REF. DWG(S) PNG-G-004-0001043

SHEET(S) 37 OF 68	DWG SCALE NONE
DWG DATE 05/14/2018	SUPERSEDED

DRAWING NUMBER: PNG -D-004-0001028 — REVISION: 0

DISCIPLINE / RESOURCE CENTER / LINE NUMBER



NOTES:
1. REFER TO VENDOR EQUIPMENT DRAWINGS FOR ADDITIONAL DETAIL.
2. ANY CHANGES REQUIRED DUE TO FIELD CONDITIONS MUST BE APPROVED BY THE ENGINEERING DEPARTMENT.

BURNS & MCDONNELL ENGINEERING COMPANY, INC. STATE LICENSE #COA:01557

STATE OF OHIO — CHAD A BACON — PE.85438 — REGISTERED PROFESSIONAL ENGINEER — 1/8/2021
PROFESSIONAL ENGIARCH STAMP

NO.	DATE	REVISION(S) DESCRIPTION	BY	CHK	APPD
0	01-08-2021	ISSUED FOR CONTRUCTION	RDC	JBF	CAB

DESCRIPTION	
AREA CODE	
ACCOUNT NUMBER	AW2128
PROJECT NUMBER	1880115
DRAWING BY	MAS
STATION ID	S0868O1
CHECKER INITIALS	JBF

APPROVALS	DATE	INITIALS
REGIONAL ENGINEER		
MGR TECH REC & STD		
PRINCIPAL ENGINEER	01/08/2021	CAB

DUKE ENERGY

C350 PROJECT
NORWOOD C350 STATION
PRESSURE CONTROL P&ID - 2
HAMILTON COUNTY, OHIO

REF. DWG(S) PNG-G-004-0001043

SHEET(S) 38 OF 68	DWG SCALE NONE
DWG DATE 05/14/2018	SUPERSEDED
DRAWING NUMBER	REVISION
PNG -D-004-0001029	0

DISCIPLINE / RESOURCE CENTER / LINE NUMBER

PIPE CLEANING:

1. THOROUGHLY CLEAN INTERIOR OF ALL PIPE, FITTINGS, AND JOINTS BEFORE INSTALLATION. EXCLUDE ENTRANCE OF FOREIGN MATTER DURING DISCONTINUANCE OF INSTALLATION BY CAPPING OR PLUGGING TO A WATERTIGHT CONDITION AT THE END OF EACH WORK DAY. PRIOR TO FINAL FITTING OF THE SYSTEM, VISUALLY INSPECT ALL LINES AND JOINTS, REMOVE ALL STRUTS, SWEEP AND/OR FLUSH CLEAN TO THE SATISFACTION OF DUKE ENERGY. NOTIFY DUKE ENERGY AT LEAST 24 HOURS IN ADVANCE OF INTENDED CLOSING UP OF A SYSTEM.

2. CONTRACTOR IS RESPONSIBLE FOR PROPERLY CLEANING NEW PIPE TO BE INSTALLED BEFORE RELEASING IT FOR SERVICE. CONTRACTOR SHALL PROVIDE PROCEDURES FOR CLEANING PIPE FOR APPROVAL BY DUKE ENERGY.

PRESSURE AND LEAK TESTING:

1. ALL PIPE SHALL BE PRESSURE TESTED IN ACCORDANCE WITH ASME B31.8 AND CFR 192 AT A PRESSURE DESIGNATED ON THE DRAWINGS. CONTRACTOR SHALL PROVIDE ALL EQUIPMENT AND MATERIALS ASSOCIATED WITH PRESSURE TESTING. SHOULD SURFACE LEAKS BECOME APPARENT, THE LEAKS SHALL BE LOCATED AND REPAIRED, AND THE LINE RE-TESTED UNTIL IT FULFILLS THE ABOVE REQUIREMENTS. CONTRACTOR SHALL BE RESPONSIBLE FOR ALL COSTS ASSOCIATED WITH REPAIRS AND RE-TESTING. CONTRACTOR SHALL PROVIDE NOTIFICATIONS TO DUKE ENERGY 48 HOURS PRIOR TO TESTING FOR WITNESS.

2. CONTRACTOR SHALL BE RESPONSIBLE FOR PROVIDING ALL MATERIALS, TOOLS, EQUIPMENT, AND PERSONNEL NECESSARY TO CONDUCT THE PRESSURE TEST INCLUDING BUT NOT LIMITED TO AIR COMPRESSOR, TEST MANIFOLDS, DEAD WEIGHT, AND CERTIFIED GAUGES.

3. THE CONTRACTOR IS RESPONSIBLE TO PERFORM INITIAL SERVICE LEAK TESTS IN ACCORDANCE WITH THE REQUIREMENTS OF ASME B31.8

4. A SEALED CERTIFIED TEST RECORD SHALL BE PROVIDED TO DUKE ENERGY WITHIN 30 DAYS OF COMPLETION OF THE TEST. TEST RECORDS SHALL INCLUDE ALL EQUIPMENT CERTIFICATIONS AND PRESSURE AND TEMPERATURE RECORDING CHARTS. DRAFT COPY OF TEST RECORDS SHALL BE PROVIDED TO DUKE ENERGY THE DAY OF THE TEST.

5. CONTRACTOR SHALL ALLOW THE TEST PRESSURE TO REACH EQUILIBRIUM WITH TEMPERATURE, PRIOR TO STARTING THE TEST.

6. CONTRACTOR SHALL BE RESPONSIBLE FOR DE-PRESSURIZATION OF THE TEST MEDIUM TO THE ENVIRONMENT IN A SAFE AND REASONABLE MANNER.

7. TEST PRESSURES SHALL BE 1.5 TIMES DESIGN PRESSURE.

8. ALL PIPING SHALL BE TESTED FOR 8.5 HOURS MINIMUM.

MATERIAL NOTES:

1. MATERIAL LIST SHALL BE CONSIDERED AN ESTIMATE. DUKE ENERGY WILL PROVIDE THE MATERIALS IN THE MATERIALS LIST. CONTRACTOR TO PROVIDE ANY REMAINING MATERIALS NECESSARY TO COMPLETE THE PROJECT.

STEEL PIPE, FITTING, AND VALVE NOTES:

1. ALL STEEL PIPE, FITTINGS, VALVES, AND EQUIPMENT SHALL BE INSTALLED ACCORDING TO ASME B31.8 LATEST EDITION, MANUFACTURER'S RECOMMENDATIONS, AND CONSTRUCTION DRAWINGS.

STEEL PIPE, FITTING, AND VALVE NOTES (CONTINUED):

2. CONTRACTOR TO PROVIDE EXTRA HARDWARE, BEYOND WHAT IS SPECIFIED IN THE BILL OF MATERIALS, AS NECESSARY TO COMPLETE THE CONSTRUCTION AND TESTING OF THE FACILITIES INCLUDING GASKETS, NUTS, AND BOLTS. ONLY NEW GASKETS AND BOLTS SHALL BE USED WHEN CONNECTING FLANGES.

3. FIELD VERIFY ALL DIMENSIONS.

WELDING AND NON-DESTRUCTIVE EXAMINATION:

1. THE CONTRACTOR SHALL FURNISH ALL LABOR, MATERIAL, TOOLS AND EQUIPMENT REQUIRED FOR SURFACE PREPARATION AND WELDING.

2. WELDING PROCEDURES SPECIFIC TO PROJECT SHALL BE PROVIDED TO ENGINEER AND DUKE ENERGY BY THE CONTRACTOR FOR APPROVAL. WELDING PROCEDURE TO BE QUALIFIED PER API 1104.

3. ALL CONTRACTOR WELDERS MUST HAVE THE APPROPRIATE QUALIFICATION RECORDS TO BE SUBMITTED TO DUKE ENERGY FOR REVIEW PRIOR TO WELDING. DUKE ENERGY INSPECTOR RESERVES THE RIGHT TO WITNESS ANY NEW WELDER QUALIFICATIONS.

4. CONTRACTOR IS RESPONSIBLE FOR COST FOR TESTING AND QUALIFICATION OF WELDERS INCLUDING MATERIALS AND NDE.

5. DUKE ENERGY SHALL HIRE A 3RD PARTY X-RAY COMPANY TO XRAY 100% OF ALL THE BUTT WELDS. CONTRACTOR TO COORDINATE SCHEDULING WITH X-RAY COMPANY.

6. ALL WELDS SHALL BE EXAMINED PER API 1104.

PAINTING NOTES:

1. THE CONTRACTOR SHALL FURNISH ALL LABOR, MATERIAL, PAINTS, TOOLS AND EQUIPMENT REQUIRED FOR PAINTING.

2. ALL STEEL SHALL BE THOROUGHLY WIPED DOWN TO REMOVE ALL TRACES OF GRIT OR OTHER CONTAMINANTS. REMOVE ALL WELD SPLATTER AND GRIND SMOOTH THE BURRS ON ANY CUT EDGES AND ROUGH WELDS. SURFACES TO BE PAINTED SHALL BE PRIMED BEFORE ANY RUSTING CAN OCCUR AND, IN ANY CASE, WITHIN 8 HOURS OF COMPLETION OF SURFACE PREPARATION AND UNDER CONTROLLED TEMPERATURE AND HUMIDITY. IF IT CANNOT BE PRIMED WITHIN THE 8-HOUR PERIOD, THEN ANY RUST BLOOM SHALL BE REMOVED BEFORE PAINT APPLICATION BY SUITABLE HAND OR POWER TOOL.

3. THE PIPING AND PIPING COMPONENT PAINTING SHALL BE INSPECTED AND REPAIRED ACCORDINGLY AFTER INSTALLATION.

4. THE FOLLOWING THREE-COAT PAINT SYSTEM SHALL BE USED. ALL COATS SHALL BE APPLIED ACCORDING TO MANUFACTURES RECOMMENDATION. ABRASIVE BLAST TO SSPC SP-10 WITH A NOMINAL PROFILE OF 2 MILS. FINAL COAT APPLIED WITHIN 30 DAYS OF PRIMER COAT IF EXPOSED TO SUNLIGHT.

   a. COAT NO. 1 - SHERWIN WILLIAMS FAST CLAD HS REINFORCED ZINC 2-PART EPOXY PRIMER-MINIMUM 5 MILS
   b. COAT NO. 2 - SHERWIN WILLIAM MACROPOXY 6462-PART MARINE EPOXY-5MILS
   c. COAT NO. 3 - SHERWIN WILLIAMS ACROLON ULTRA HIGH PERFORMANCE MARINE POLYURETHANE UV ADDITIVE-5MILS

BURNS & McDONNELL
ENGINEERING COMPANY, INC.
STATE LICENSE # COA:01557

STATE OF OHIO
CHAD A BACON
PE.85438
REGISTERED
PROFESSIONAL ENGINEER
1/8/2021
PROFESSIONAL ENGIARCH STAMP

NO.	DATE	REVISION(S) DESCRIPTION	BY	CHK	APPD
0	01-08-2021	ISSUED FOR CONSTRUCTION	RDC	JBF	CAB

DESCRIPTION	
AREA CODE	
ACCOUNT NUMBER	AW2128
PROJECT NUMBER	1880115
DRAWING BY	MAS
STATION ID	S0680I01
CHECKER INITIALS	JBF

APPROVALS			
DATE	INITIALS		REGIONAL ENGINEER
DATE	INITIALS		MGR TECH REC & STD
01/08/2021	CAB		PRINCIPAL ENGINEER

DUKE ENERGY®

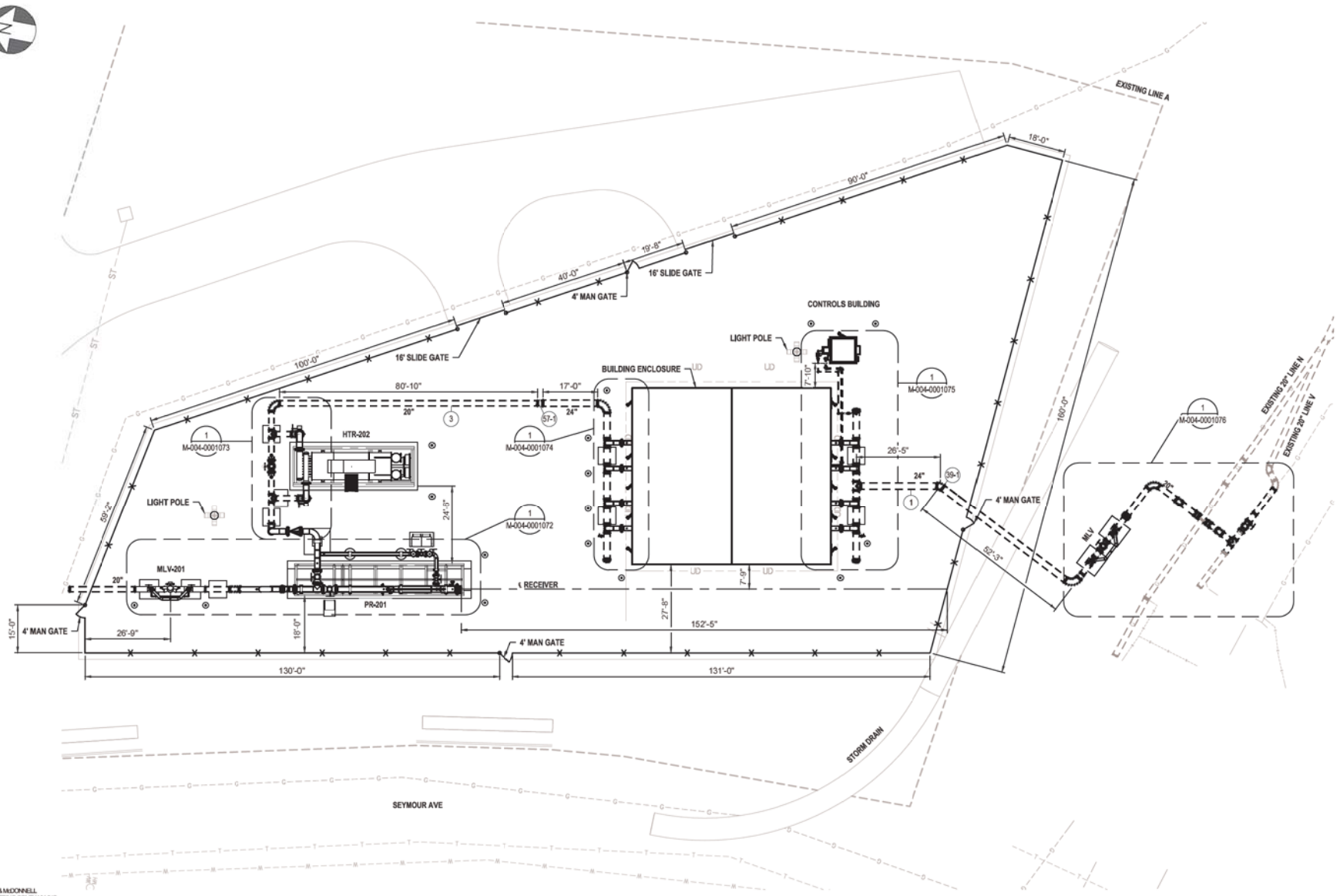
C350 PROJECT
NORWOOD C350 STATION
MECHANICAL NOTES

HAMILTON COUNTY, OHIO

REF. DWG(S) PNG-G-004-0001043

SHEET(S) 39 OF 68	DWG SCALE NONE
DWG DATE 08/28/2018	SUPERSEDED
DRAWING NUMBER	REVISION
PNG -M-004-0001070	0

DISCIPLINE / RESOURCE CENTER / LINE NUMBER



BURNS & McDONNELL
ENGINEERING COMPANY, INC.
STATE LICENSE # COA.01557

STATE OF OHIO
CHAD A BACON
PE.85438
REGISTERED PROFESSIONAL ENGINEER
1/8/2021
PROFESSIONAL ENGIARCH STAMP

NO.	DATE	REVISION(S) DESCRIPTION	BY	CHK	APPD
0	01-08-2021	ISSUED FOR CONSTRUCTION	RDC	JBF	CAB

DESCRIPTION	
AREA CODE	
ACCOUNT NUMBER	AW2128
PROJECT NUMBER	1880115
DRAWING BY	MAS
STATION ID	S0868O1
CHECKER INITIALS	JBF

APPROVALS	DATE	INITIALS
REGIONAL ENGINEER		
MGR TECH REC & STD		
PRINCIPAL ENGINEER	01/08/2021	CAB

DUKE ENERGY

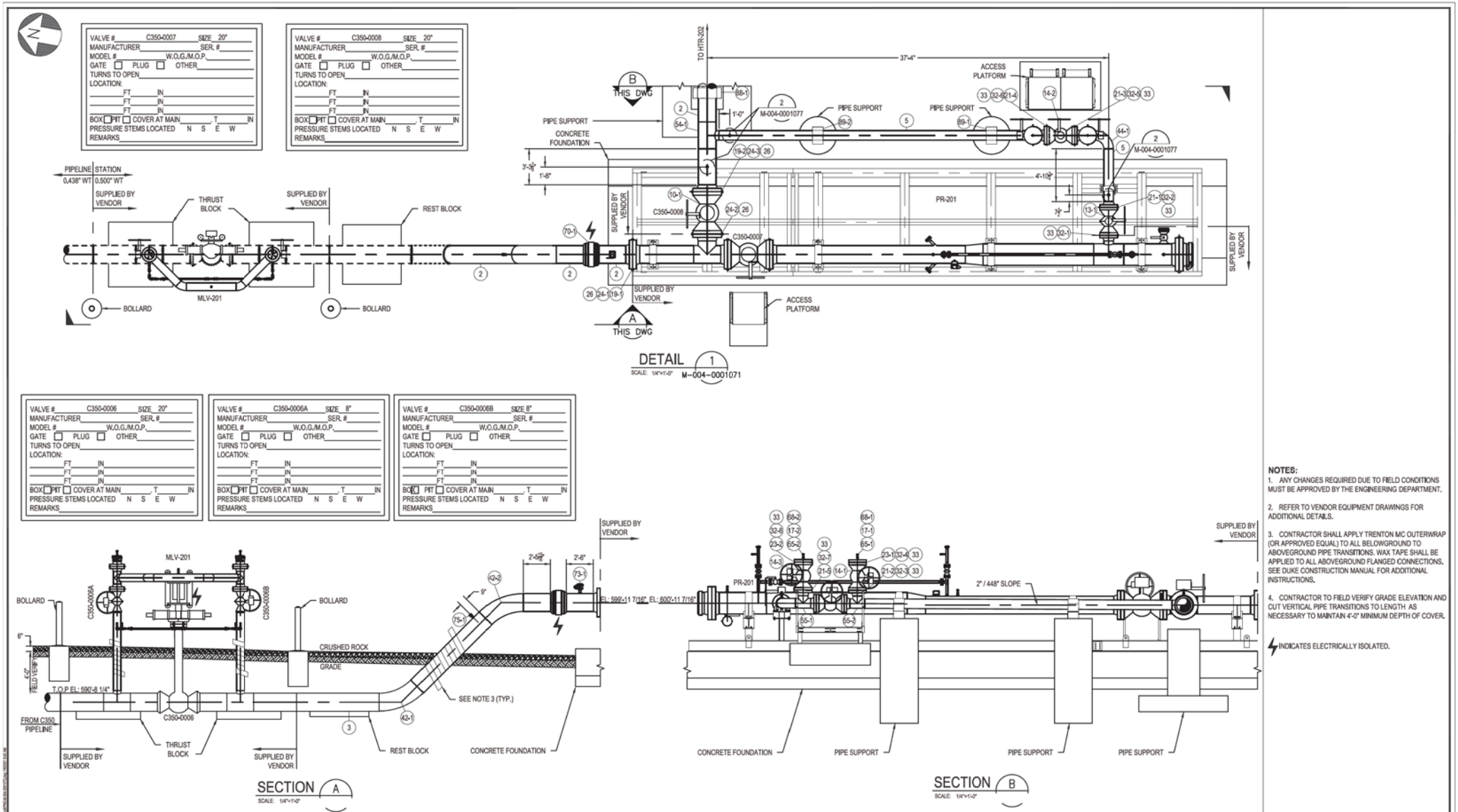
C350 PROJECT
NORWOOD C350 STATION
MECHANICAL PLOT PLAN

HAMILTON COUNTY, OHIO

REF. DWG(S) PNG-G-004-0001043

SHEET(S) 40 OF 68	DWG SCALE 1" = 15'
DWG DATE 08/28/2018	SUPERSEDED
DRAWING NUMBER	REVISION
PNG -M-004-0001071	0

DISCIPLINE / RESOURCE CENTER / LINE NUMBER



NOTES:

1. ANY CHANGES REQUIRED DUE TO FIELD CONDITIONS MUST BE APPROVED BY THE ENGINEERING DEPARTMENT.
2. REFER TO VENDOR EQUIPMENT DRAWINGS FOR ADDITIONAL DETAILS.
3. CONTRACTOR SHALL APPLY TRENTON MC OUTERWRAP (OR APPROVED EQUAL) TO ALL BELOWGROUND TO ABOVEGROUND PIPE TRANSITIONS. WAX TAPE SHALL BE APPLIED TO ALL ABOVEGROUND FLANGED CONNECTIONS. SEE DUKE CONSTRUCTION MANUAL FOR ADDITIONAL INSTRUCTIONS.
4. CONTRACTOR TO FIELD VERIFY GRADE ELEVATION AND CUT VERTICAL PIPE TRANSITIONS TO LENGTH AS NECESSARY TO MAINTAIN 4'-0" MINIMUM DEPTH OF COVER.

⚡ INDICATES ELECTRICALLY ISOLATED.

BURNS & McDONNELL ENGINEERING COMPANY, INC.
STATE LICENSE # COA.01557

CHAD A BACON PE.85438 REGISTERED PROFESSIONAL ENGINEER
STATE OF OHIO
1/8/2021
PROFESSIONAL ENGIARCH STAMP

NO.	DATE	REVISION(S) DESCRIPTION	BY	CHK	APPD
0	01-08-2021	ISSUED FOR CONSTRUCTION	RDC	JBF	CAB

DESCRIPTION		APPROVALS		
AREA CODE		DATE	INITIALS	REGIONAL ENGINEER
ACCOUNT NUMBER	AW2128			
PROJECT NUMBER	1880115	DATE	INITIALS	MGR TECH REC & STD
DRAWING BY	MAS			
STATION ID	S0868O1	DATE	INITIALS	PRINCIPAL ENGINEER
CHECKER INITIALS	JBF	01/08/2021	CAB	

DUKE ENERGY®

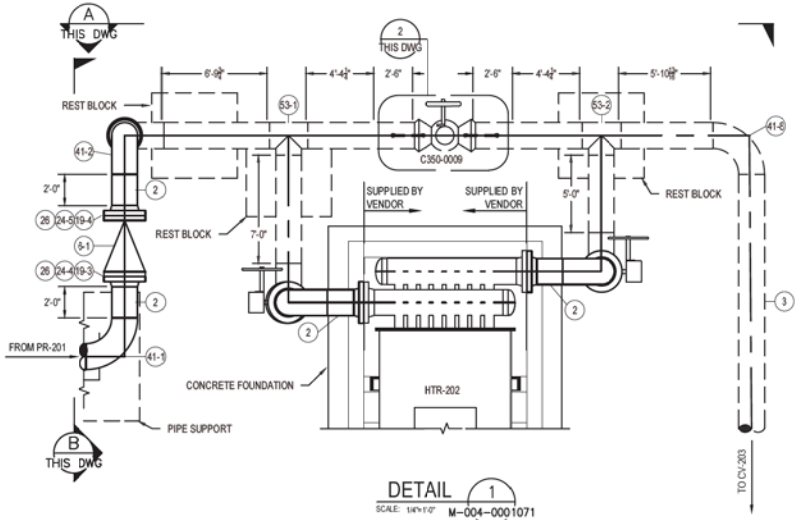
C350 PROJECT
NORWOOD C350 STATION
PIPELINE RECEIVER PR-201

HAMILTON COUNTY, OHIO

REF. DWG(S) PNG-G-004-0001043

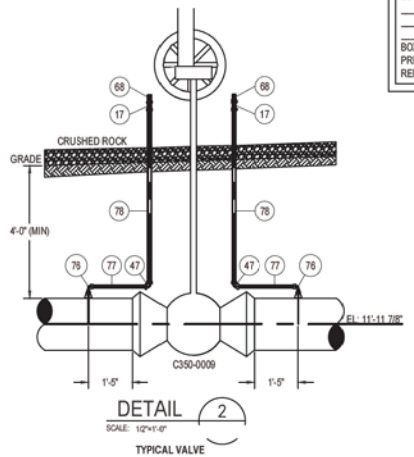
SHEET(S) 41 OF 68	DWG SCALE 1/4"=1'-0"
DWG DATE 08/28/2018	SUPERSEDED
DRAWING NUMBER	REVISION
PNG -M-004-0001072	0

DISCIPLINE / RESOURCE CENTER / LINE NUMBER

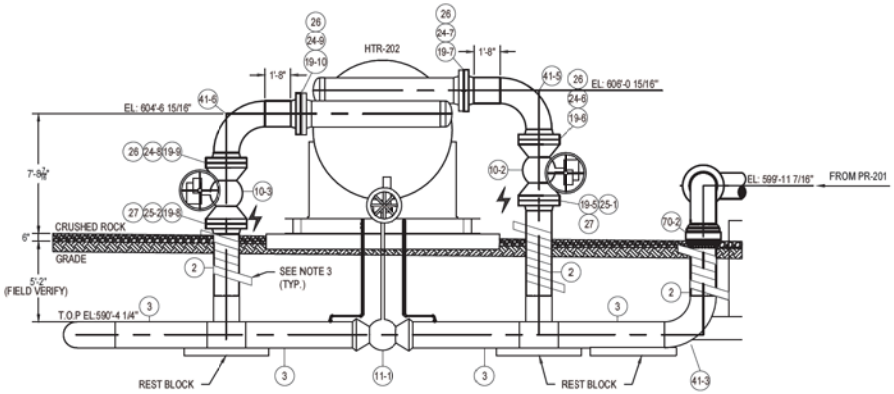


DETAIL 1
SCALE: 1/4"=1'-0"
M-004-0001071

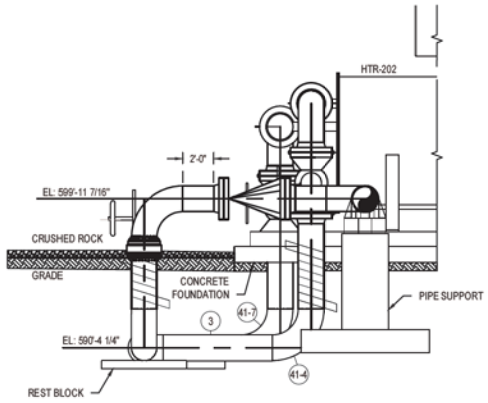
VALVE # C350-0009 SIZE 20"
MANUFACTURER SER. #
MODEL # W.O.G./M.O.P.
GATE ☐ PLUG ☐ OTHER
TURNS TO OPEN
LOCATION:
FT IN
FT IN
FT IN
BOX ☐ PIT ☐ COVER AT MAIN T IN
PRESSURE STEMS LOCATED N S E W
REMARKS



DETAIL 2
SCALE: 1/2"=1'-0"
TYPICAL VALVE STEM ASSEMBLY



SECTION A
SCALE: 1/4"=1'-0"



SECTION B
SCALE: 1/4"=1'-0"

NOTES:
1. ANY CHANGES REQUIRED DUE TO FIELD CONDITIONS MUST BE APPROVED BY THE ENGINEERING DEPARTMENT.
2. REFER TO VENDOR EQUIPMENT DRAWINGS FOR ADDITIONAL DETAILS.
3. CONTRACTOR SHALL APPLY TRENTON MC OUTERWRAP (OR APPROVED EQUAL) TO ALL BELOWGROUND TO ABOVE GROUND PIPE TRANSITIONS. WAX TAPE SHALL BE APPLIED TO ALL ABOVEGROUND FLANGED CONNECTIONS. SEE DUKE CONSTRUCTION MANUAL FOR ADDITIONAL INSTRUCTIONS.
4. CONTRACTOR TO FIELD VERIFY GRADE ELEVATION AND CUT VERTICAL PIPE TRANSITIONS TO LENGTH AS NECESSARY TO MAINTAIN 4'-0" MINIMUM DEPTH OF COVER.

INDICATES ELECTRICALLY ISOLATED.

BURNS & McDONNELL ENGINEERING COMPANY, INC.
STATE LICENSE # COA.01557

STATE OF OHIO
CHAD A BACON
PE.85438
REGISTERED PROFESSIONAL ENGINEER
1/8/2021
PROFESSIONAL ENGIARCH STAMP

NO.	DATE	REVISION(S) DESCRIPTION	BY	CHK	APPD
0	01-08-2021	ISSUED FOR CONSTRUCTION	RDC	JBF	CAB

DESCRIPTION	
AREA CODE	
ACCOUNT NUMBER	AW2128
PROJECT NUMBER	1880115
DRAWING BY	MAS
STATION ID	S0868O1
CHECKER INITIALS	JBF

APPROVALS	DATE	INITIALS
REGIONAL ENGINEER		
MGR TECH REC & STD		
PRINCIPAL ENGINEER	01/08/2021	CAB

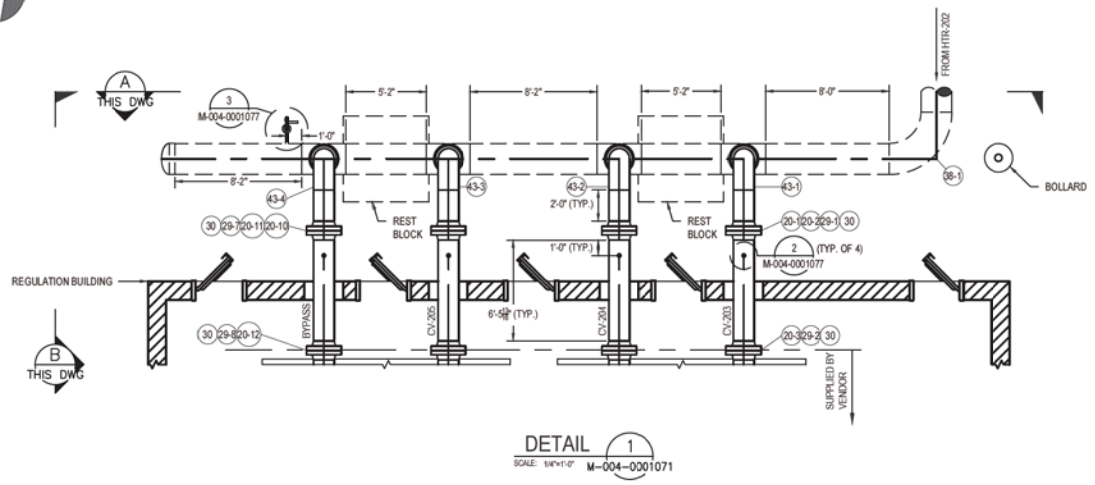
DUKE ENERGY®

C350 PROJECT
NORWOOD C350 STATION
HEATER HTR-202 PIPING DETAILS

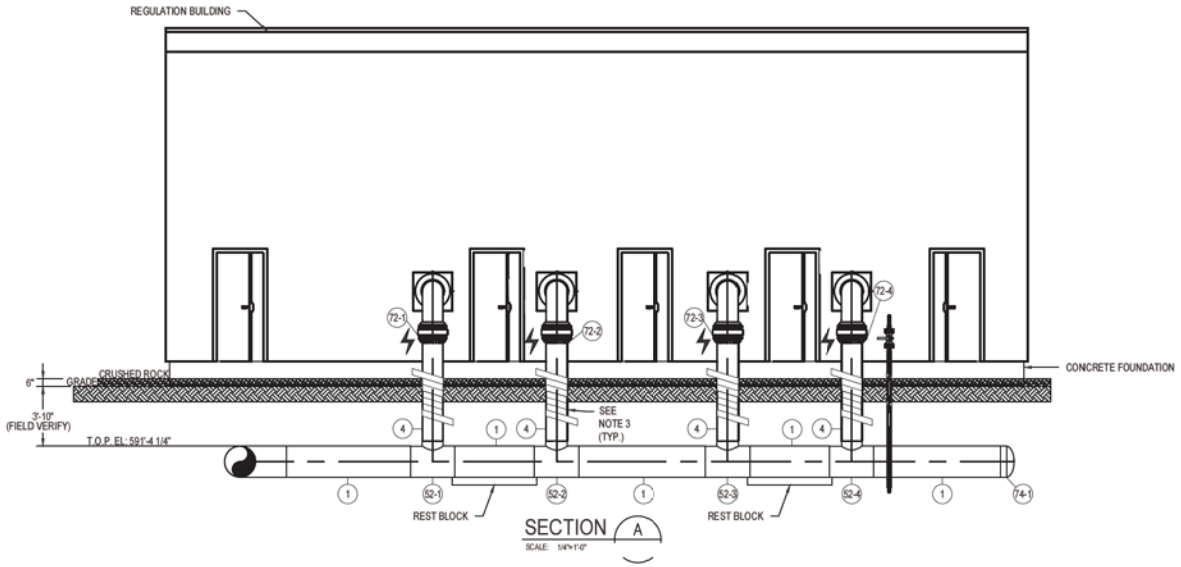
HAMILTON COUNTY, OHIO

REF. DWG(S) PNG-G-004-0001043

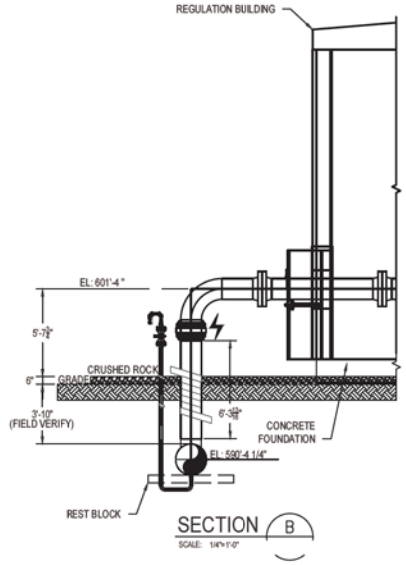
SHEET(S) 42 OF 68 | DWG SCALE AS NOTED
DWG DATE 08/28/2018 | SUPERSEDED
DRAWING NUMBER: PNG -M-004-0001073 | REVISION: 0
DISCIPLINE / RESOURCE CENTER / LINE NUMBER



DETAIL 1
SCALE: 1/4"=1'-0" M-004-0001071



SECTION A
SCALE: 1/4"=1'-0"



SECTION B
SCALE: 1/4"=1'-0"

NOTES:

1. ANY CHANGES REQUIRED DUE TO FIELD CONDITIONS MUST BE APPROVED BY THE ENGINEERING DEPARTMENT.
2. REFER TO VENDOR EQUIPMENT DRAWINGS FOR ADDITIONAL DETAILS.
3. CONTRACTOR SHALL APPLY TRENTON MC OUTERWRAP (OR APPROVED EQUAL) TO ALL BELOWGROUND TO ABOVE GROUND PIPE TRANSITIONS. WAX TAPE SHALL BE APPLIED TO ALL ABOVEGROUND FLANGED CONNECTIONS. SEE DUKE CONSTRUCTION MANUAL FOR ADDITIONAL INSTRUCTIONS.
4. CONTRACTOR TO FIELD VERIFY GRADE ELEVATION AND CUT VERTICAL PIPE TRANSITIONS TO LENGTH AS NECESSARY TO MAINTAIN 4'-0" MINIMUM DEPTH OF COVER.

INDICATES ELECTRICALLY ISOLATED.

BURNS & McDONNELL
ENGINEERING COMPANY, INC.
STATE LICENSE # COA.01557

STATE OF OHIO
CHAD A BACON
PE.85438
REGISTERED PROFESSIONAL ENGINEER
1/8/2021
PROFESSIONAL ENGIARCH STAMP

NO.	DATE	REVISION(S) DESCRIPTION	BY	CHK	APPD
0	01-08-2021	ISSUED FOR CONSTRUCTION	RDC	JBF	CAB

DESCRIPTION	
AREA CODE	
ACCOUNT NUMBER	AW2128
PROJECT NUMBER	1880115
DRAWING BY	MAS
STATION ID	S0680I
CHECKER INITIALS	JBF

APPROVALS	DATE	INITIALS
REGIONAL ENGINEER		
MGR TECH REC & STD		
PRINCIPAL ENGINEER	01/08/2021	CAB

DUKE ENERGY

C350 PROJECT
NORWOOD C350 STATION
CONTROL VALVE INLET HEADER

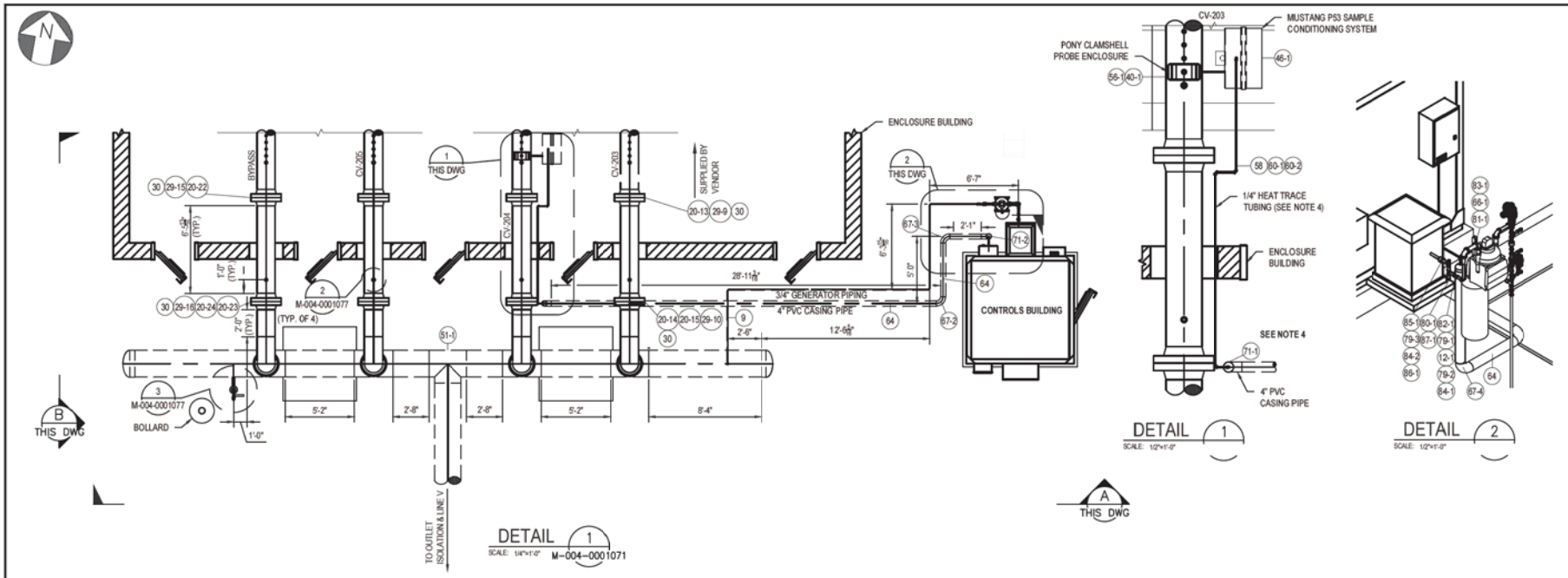
HAMILTON COUNTY, OHIO

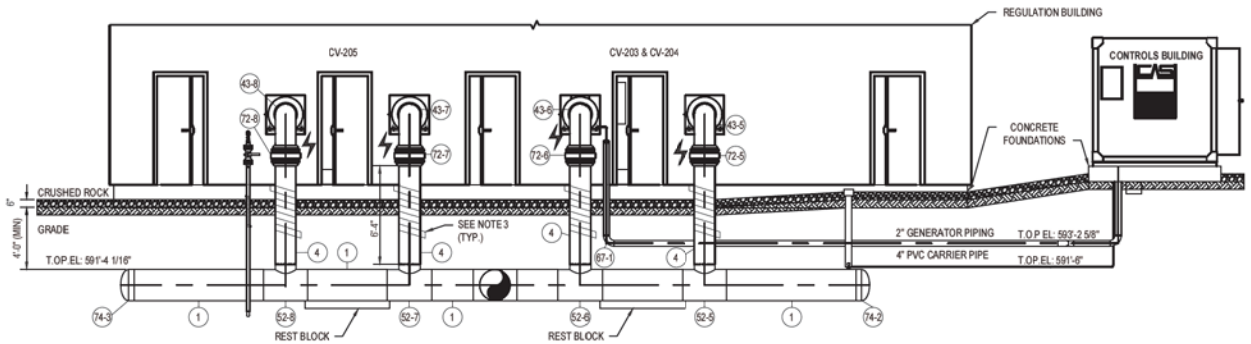
REF. DWG(S) PNG-G-004-0001043

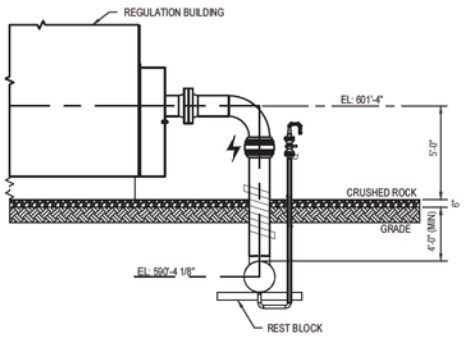
SHEET(S) 43 OF 68	DWG SCALE 1/4"=1'-0"
DWG DATE 08/28/2018	SUPERSEDED

DRAWING NUMBER	REVISION
PNG -M-004-0001074	0

DISCIPLINE / RESOURCE CENTER / LINE NUMBER







NOTES:

1. ANY CHANGES REQUIRED DUE TO FIELD CONDITIONS MUST BE APPROVED BY THE ENGINEERING DEPARTMENT.
2. REFER TO VENDOR EQUIPMENT DRAWINGS FOR ADDITIONAL DETAILS.
3. CONTRACTOR SHALL APPLY TRENTON MC OUTERWRAP (OR APPROVED EQUAL) TO ALL BELOWGROUND TO ABOVE GROUND PIPE TRANSITIONS. WAX TAPE SHALL BE APPLIED TO ALL ABOVEGROUND FLANGED CONNECTIONS. SEE DUKE CONSTRUCTION MANUAL FOR ADDITIONAL INSTRUCTIONS.
4. CONTRACTOR TO FIELD ROUTE ALL 1/4" HEAT TRACE TUBING. USE 4" PVC CARRIER PIPE BELOWGROUND. DRILL HOLE IN CAP FOR TUBE PENETRATION AND SEAL GAPS WITH SILICONE. LEAVE THE PVC CAP ON LOOSE
5. CONTRACTOR TO FIELD VERIFY GRADE ELEVATION AND CUT VERTICAL PIPE TRANSITIONS TO LENGTH AS NECESSARY TO MAINTAIN 4'-0" MINIMUM DEPTH OF COVER.

INDICATES ELECTRICALLY ISOLATED.

BURNS & McDONNELL
ENGINEERING COMPANY, INC.
STATE LICENSE # COA.01557

STATE OF OHIO
CHAD A BACON
PE-85438
REGISTERED PROFESSIONAL ENGINEER
1/8/2021
PROFESSIONAL ENGIARCH STAMP

NO.	DATE	REVISION(S) DESCRIPTION	BY	CHK	APPD
0	01-08-2021	ISSUED FOR CONSTRUCTION	RDC	JBF	CAB

DESCRIPTION	
AREA CODE	
ACCOUNT NUMBER	AW2128
PROJECT NUMBER	1880115
DRAWING BY	MAS
STATION ID	S0868O1
CHECKER INITIALS	JBF

APPROVALS	DATE	INITIALS	
			REGIONAL ENGINEER
			MGR TECH REC & STD
	01/08/2021	CAB	PRINCIPAL ENGINEER

DUKE ENERGY®

C350 PROJECT
NORWOOD C350 STATION
CONTROL VALVE OUTLET HEADER

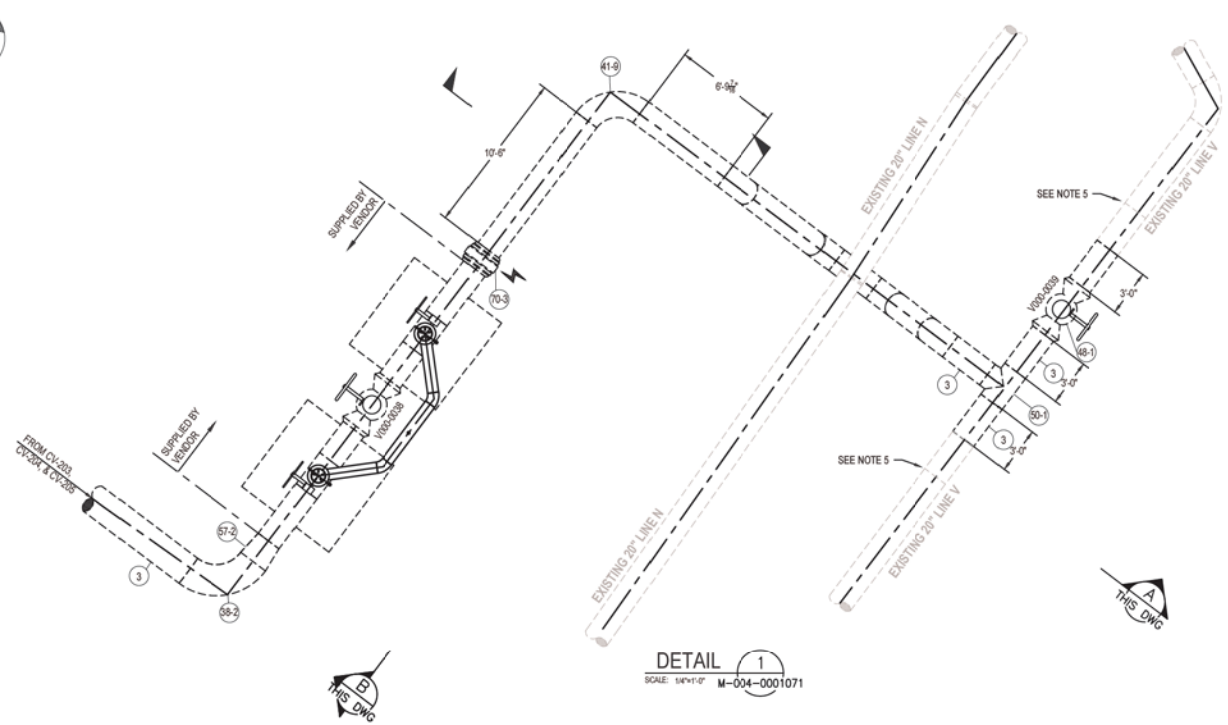
HAMILTON COUNTY, OHIO

REF. DWG(S) PNG-G-004-0001043

SHEET(S) 44 OF 68	DWG SCALE AS NOTED
DWG DATE 08/28/2018	SUPERSEDED

DRAWING NUMBER: PNG -M-004-0001075 | REVISION: 0

DISCIPLINE / RESOURCE CENTER / LINE NUMBER



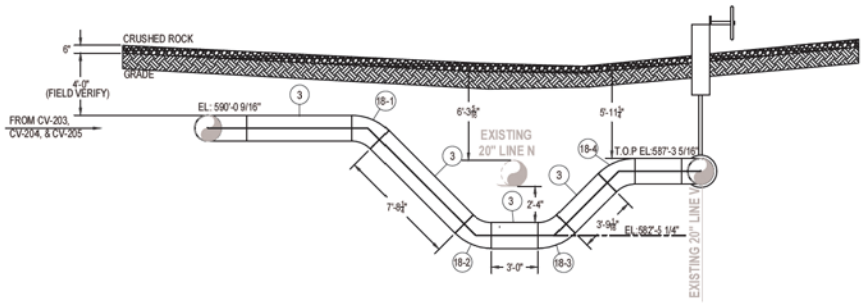
DETAIL 1
SCALE: 1/4"=1'-0" M-004-0001071

VALVE # V000-0038 SIZE 20"
MANUFACTURER SER. #
MODEL # W.O.G.M.O.P.
GATE ☐ PLUG ☐ OTHER
TURNS TO OPEN
LOCATION:
FT IN
FT IN
FT IN
BOX ☐ PIT ☐ COVER AT MAIN T IN
PRESSURE STEMS LOCATED N S E W
REMARKS

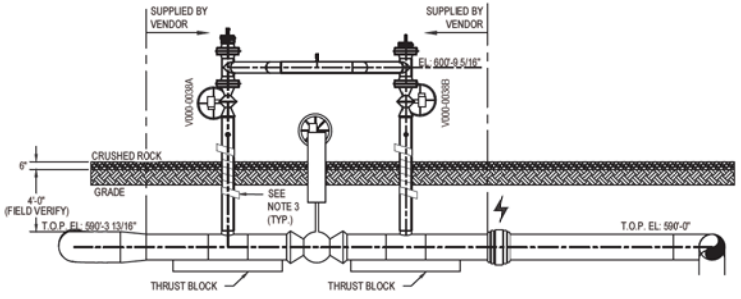
VALVE # V000-0038A SIZE 8"
MANUFACTURER SER. #
MODEL # W.O.G.M.O.P.
GATE ☐ PLUG ☐ OTHER
TURNS TO OPEN
LOCATION:
FT IN
FT IN
FT IN
BOX ☐ PIT ☐ COVER AT MAIN T IN
PRESSURE STEMS LOCATED N S E W
REMARKS

VALVE # V000-0038B SIZE 8"
MANUFACTURER SER. #
MODEL # W.O.G.M.O.P.
GATE ☐ PLUG ☐ OTHER
TURNS TO OPEN
LOCATION:
FT IN
FT IN
FT IN
BOX ☐ PIT ☐ COVER AT MAIN T IN
PRESSURE STEMS LOCATED N S E W
REMARKS

VALVE # V000-0039 SIZE 20"
MANUFACTURER SER. #
MODEL # W.O.G.M.O.P.
GATE ☐ PLUG ☐ OTHER
TURNS TO OPEN
LOCATION:
FT IN
FT IN
FT IN
BOX ☐ PIT ☐ COVER AT MAIN T IN
PRESSURE STEMS LOCATED N S E W
REMARKS



SECTION A
SCALE: 1/4"=1'-0"



SECTION B
SCALE: 1/4"=1'-0"

NOTES:

1. ANY CHANGES REQUIRED DUE TO FIELD CONDITIONS MUST BE APPROVED BY THE ENGINEERING DEPARTMENT.
2. REFER TO VENDOR EQUIPMENT DRAWINGS FOR ADDITIONAL DETAILS.
3. CONTRACTOR SHALL APPLY TRENTON MC OUTERWRAP (OR APPROVED EQUAL) TO ALL BELOWGROUND TO ABOVE GROUND PIPE TRANSITIONS. WAX TAPE SHALL BE APPLIED TO ALL ABOVEGROUND FLANGED CONNECTIONS. SEE DUKE CONSTRUCTION MANUAL FOR ADDITIONAL INSTRUCTIONS.
4. CONTRACTOR TO FIELD VERIFY GRADE ELEVATION AND CUT VERTICAL PIPE TRANSITIONS TO LENGTH AS NECESSARY TO MAINTAIN 4'-0" MINIMUM DEPTH OF COVER.
5. CONTRACTOR TO USE A CUTOUT OF EXISTING PIPE APPROXIMATELY 2FT IN LENGTH TO CREATE A TRANSITION PIECE. REFER TO ASME B31.8 FIG I-5 (d) TO BEVEL AND BACK-WELD THE EXISTING SECTION TO THE NEW PIPING AND THEN LOWER AND WELD THE EXISTING PIPE BACK INTO THE EXISTING PIPELINE.

⚡ INDICATES ELECTRICALLY ISOLATED.

BURNS & McDONNELL ENGINEERING COMPANY, INC.
STATE LICENSE # COA.01557

STATE OF OHIO
CHAD A BACON
PE.85438
REGISTERED PROFESSIONAL ENGINEER
1/8/2021
PROFESSIONAL ENGIARCH STAMP

NO.	DATE	REVISION(S) DESCRIPTION	BY	CHK	APPD
0	01-08-2021	ISSUED FOR CONSTRUCTION	RDC	JBF	CAB

DESCRIPTION	
AREA CODE	
ACCOUNT NUMBER	AW2128
PROJECT NUMBER	1880115
DRAWING BY	MAS
STATION ID	S0868O1
CHECKER INITIALS	JBF

APPROVALS	DATE	INITIALS
REGIONAL ENGINEER		
MGR TECH REC & STD		
PRINCIPAL ENGINEER	01/08/2021	CAB

DUKE ENERGY®

C350 PROJECT
NORWOOD C350 STATION
DOWNSTREAM ISOLATION AND TIE-IN

HAMILTON COUNTY, OHIO

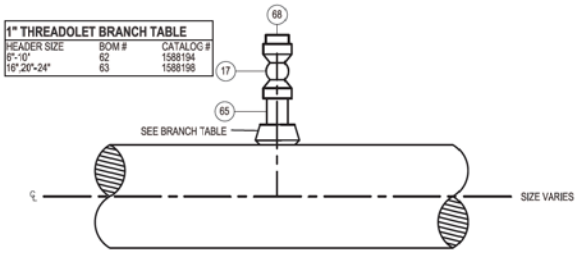
REF. DWG(S) PNG-G-004-0001043

SHEET(S) 45 OF 68	DWG SCALE 1/4"=1'-0"
DWG DATE 08/28/2018	SUPERSEDED

DRAWING NUMBER	REVISION
PNG -M-004-0001076	0

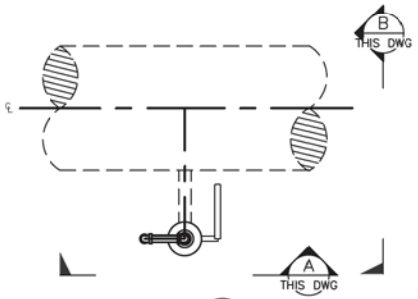
DISCIPLINE / RESOURCE CENTER / LINE NUMBER

1" THREADOLET BRANCH TABLE		
HEADER SIZE	BOM #	CATALOG #
6"-10"	62	1588194
16",20"-24"	63	1588196



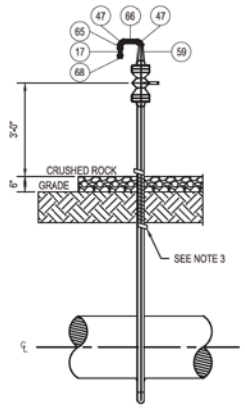
DETAIL 2
SCALE: 3"=1'-0"

TYPICAL 1" TAP VALVE
(TYP OF 11)



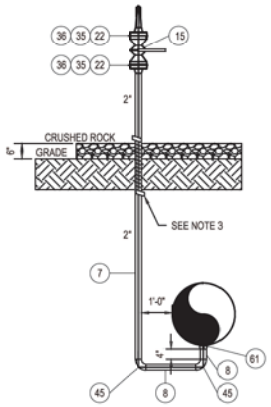
DETAIL 3
SCALE: 1"=1'-0"

TYPICAL 2" DRAIN
(TYP OF 2)



SECTION A
SCALE: 1/2"=1'-0"

TYPICAL 2" DRAIN
(TYP OF 2)



SECTION B
SCALE: 1/2"=1'-0"

TYPICAL 2" DRAIN
(TYP OF 2)

NOTES:
1. ANY CHANGES REQUIRED DUE TO FIELD CONDITIONS MUST BE APPROVED BY THE ENGINEERING DEPARTMENT.
2. REFER TO VENDOR EQUIPMENT DRAWINGS FOR ADDITIONAL DETAILS.
3. CONTRACTOR SHALL APPLY TRENTON MC OUTERWRAP (OR APPROVED EQUAL) TO ALL BELOWGROUND TO ABOVE GROUND PIPE TRANSITIONS. WAX TAPE SHALL BE APPLIED TO ALL ABOVEGROUND FLANGED CONNECTIONS. SEE DUKE CONSTRUCTION MANUAL FOR ADDITIONAL INSTRUCTIONS.
4. CONTRACTOR TO FIELD VERIFY GRADE ELEVATION AND CUT VERTICAL PIPE TRANSITIONS TO LENGTH AS NECESSARY TO MAINTAIN 4'-0" MINIMUM DEPTH OF COVER.

BURNS & McDONNELL
ENGINEERING COMPANY, INC.
STATE LICENSE # COA:01557

STATE OF OHIO
CHAD A BACON
PE.85438
REGISTERED
PROFESSIONAL ENGINEER
1/8/2021
PROFESSIONAL ENG/ARCH STAMP

NO.	DATE	REVISION(S) DESCRIPTION	BY	CHK	APPD
0	01-08-2021	ISSUED FOR CONSTRUCTION	RDC	JBF	CAB

DESCRIPTION		APPROVALS		
AREA CODE		DATE	INITIALS	REGIONAL ENGINEER
ACCOUNT NUMBER	AW2128			
PROJECT NUMBER	1880115	DATE	INITIALS	MGR TECH REC & STD
DRAWING BY	MAS			
STATION ID	S0868O1	DATE	INITIALS	PRINCIPAL ENGINEER
CHECKER INITIALS	JBF	01/08/2021	CAB	

DUKE ENERGY®

C350 PROJECT
NORWOOD C350 STATION
MECHANICAL PIPING DETAILS

HAMILTON COUNTY, OHIO

REF. DWG(S) PNG-G-004-0001043

SHEET(S) 46 OF 68	DWG SCALE AS NOTED
DWG DATE 08/28/2018	SUPERSEDED

DRAWING NUMBER: PNG -M-004-0001077
REVISION: 0
DISCIPLINE / RESOURCE CENTER / LINE NUMBER

MARK	LEGACY NUMBER	MAXIMO PART #	DATA SHEET?	SOURCE SYSTEM	QTY	RETIRED?	DESCRIPTION	ORDERING INSTRUCTIONS	ORDERING SPECIFICATIONS	MANUF	MODEL	MANUF PART #
1	17110	1551329		PNG	187+53 FT		PIPE, 24" NPS X 0.500 W.T., DBL RANDOM LG, BEVELED ENDS, LONGITUDINAL SUBMERGED ARC WELDED, FBE, STL, API 5L PSL-2, GR X65, NO JOINTERS			UNKNOWN,		1551329
2	1601560	1601560		5 STATE	40+40 FT		PIPE, 20" NPS, DBL RANDOM LG, BEVELED ENDS, ELECTRIC RESISTANCE WELD, 0.50" WALL THK, STL, API 5L PSL-2, GR X65, NO JOINTERS, BARE			IPSCO		1601560
3	1601561	1601561		5 STATE	140+60 FT		PIPE, 20" NPS, DBL RANDOM LG, BEVELED ENDS, ELECTRIC RESISTANCE WELD, 0.50" WALL THK, STL, API 5L PSL-2, GR X65, NO JOINTERS, W/ FUSION BONDED EPOXY COATING			IPSCO		1601561
4	16662	1552348		PNG	116+44 FT		PIPE, 16" NPS X 0.375 W.T., DBL RANDOM LG, BEVELED ENDS, ELECTRIC RESISTANCE WELD, BARE, STL, API 5L PSL-2, GR X65, NO JOINTERS			UNKNOWN,		1552348
5	16382	1551571		PNG	34+6 FT		PIPE, 10" NPS X 0.365 W.T., DBL RANDOM LG, BEVELED ENDS, ELECTRIC RESISTANCE WELD, BARE, STL, API 5L PSL-2, GR X52, NO JOINTERS			UNKNOWN,		1551571
6	1599848	1599848		5 STATE	1		VALVE,CHECK, SWING, 20", ANSI 600, FLG, STL BODY, API 6D, DM-ST-2080, SYNTHETIC RBR SEATS, W/ INTEGRAL SEAT, ASTM A126 GR WCB			TOMWHEATLEYV		V20-P6-E-2-M1-51-X1111
7	16348	1552392		PNG	50+20 FT		PIPE, 2" NPS X 0.218 W.T., DBL RANDOM LG, BEVELED ENDS, ELECTRIC RESISTANCE WELD, BARE, STL, API 5L PSL-1, GR X52, NO JOINTERS			UNKNOWN,		1552392
8	16403	1552396		PNG	48+32 FT		PIPE, 2" NPS X 0.218 W.T., DBL RANDOM LG, BEVELED ENDS, ELECTRIC RESISTANCE WELD, FBE, STL, API 5L PSL-1, GR X52, NO JOINTERS			UNKNOWN,		1552396
9	10415	1550783		PNG	55+25 FT		PIPE, 3/4" NPS X 0.154 W.T., DBL RANDOM LG, SQ ENDS, SEAMLESS, BARE, STL, ASTM A106, GR B			UNKNOWN,		1550783
10	16988	1555544		PNG	3		VALVE,BALL, TRUNNION, 20" NPS, ANSI 600, FULL PORT, RF, HANDWHEEL GEAR OPERATED, STL BODY, BOLTED BODY, API 6D, DM-ST-2080, ABOVE GROUND APPLICATION. IF OPERATOR EXTENSION IS ORDERED, BODY DRAIN AND SEALANT PORTS TO BE FACTORY PIPED UP TO THE OPERATOR WITH WELDED AND COATED CS PIPE WITH GIANT BUTTON HEAD GREASE FITTINGS, PER DM-ST-2085.	SPECIFY IF AN OPERATOR EXTENSION IS REQUIRED AND THE EXTENSION LENGTH.	NO EXTENSION REQUIRED	DELTA,GROVE,		FIG 55-20
11	1601596	1601596		5 STATE	1		VALVE,BALL, TRUNNION, 20" NPS, CLASS 600, FULL PORT, WELD X WELD, HANDWHEEL WORM GEAR OPERATED, CS BODY, STD TRIM, API 6D, W/ OPERATOR EXTENSION, BODY DRAIN & SEALANT PORTS TO BE FACTORY PIPED UP TO THE OPERATOR, MUST SPECIFY WALL THK & MATERIAL YIELD STRENGTH OF MATING PIPE, WHETHER PIPE PUPS ARE REQUIRED & OPERATOR EXTENSION LG	SPECIFY WALL THK & MATERIAL YIELD STRENGTH OF MATING PIPE, WHETHER PIPE PUPS ARE REQUIRED & OPERATOR EXTENSION LG	FOR CONNECTION TO 20" NPS, 0.500" WT, API 5L-PSL2, GRADE X65 PIPE, INCLUDE PIPE PUPS OF 1.5*OD, INCLUDE OPERATOR STEM EXTENSION OF 8.5FT AS MEASURED FROM PIPE CENTERLINE TO HANDWHEEL	CAMERON	T-31	20"NPS 800602-2A-1
12	14241	1556269		PNG	1		VALVE,BALL, FLOATING, 3/4", 2-WAY, 2000 PSIG, REDUCED PORT, FPT, LOCKING LEVER OPERATED, CS BODY, 316 SS BALL& STEM, ASME B16.34 OR MSS SP-110, API 607, F/ NATURAL GAS USE			APOLLO		73A-144-24-27A
13	13256	1556573		PNG	1		VALVE,PLUG, 10" NPS, ANSI 600, FLG, HANDWHEEL GEAR OPERATED, CS BODY, API 6D, DM-ST-2080, REGULAR PATTERN, PRESSURE BALANCED			SERCKAUDCOVA,		HRG 633
14	17038	1555581		PNG	3		VALVE,BALL, TRUNNION, 10" NPS, CLASS 600, FULL PORT, RF, HANDWHEEL GEAR OPERATED, STL BODY, BOLTED BODY, API 6D	SPECIFY IF AN OPERATOR EXTENSION IS REQUIRED AND THE EXTENSION LENGTH.		DELTA,GROVE,		FIG 55-10
15	11611	1556656		PNG	2		VALVE,PLUG, 2" NPS, ANSI 600, FLG, CS BODY, API 6D, DM-ST-2080, LEVER, REGULAR PATTERN, PRESSURE BALANCED			SERCKAUDCOVA,		HRW 633
16	NOT USED	#N/A	#N/A	#N/A	NOT USED	#N/A	#N/A	#N/A		#N/A	#N/A	#N/A
17	1570839	1570839		PNG	17		VALVE,BALL, FLOATING, 1", 2-WAY, 2000 PSIG, REDUCED PORT, FPT, LOCKING LEVER OPERATED, CS BODY, 316 SS BALL & STEM, ASME B16.34 OR MSS SP-110, API 607, F/ NATURAL GAS USE			CONBRACOINDU,	APOLLO	73A-145-24-27A
18	1600438	1600438		OHKY	4		ELBOW,PIPE, 20", BW, 45 DEG, 1.5D RADIUS, 0.5" WALL, CS, MSS SP-75, GR Y65, FULLY SEGMENTABLE, PAINTED PREFERRED, BARE ACCEPTABLE, MACHINE BEVEL ENDS PER ASME B31.8 APPENDIX I, FIGURE I-4			HACKNEYLADIS		20-45-1.5D-.500
19	17162	1551450		PNG	10		FLANGE,PIPE, WN, RF, 20" NPS, CLASS 600, FORGED STL, MSS SP-44, ASTM A694 GR F65, 125 - 250 MICRO INCHES AARH		FOR CONNECTION TO 20" NPS, 0.500" WT, API 5L-PSL2, GRADE X65 PIPE	UNKNOWN,		1551450
20	12638	1551756		PNG	24		FLANGE,PIPE, WN, RF, 16" NPS, CLASS 600, FORGED STL, MSS SP-44, ASTM A694 GR F65, ASSME B16.5, 125 - 250 MICRO INCHES AARH			HACKNEYLADIS,		1551756
21	17249	1551493		PNG	5		FLANGE,PIPE, WN, RF, 10" NPS, CLASS 600, FORGED STL, ASTM A694, ASME B16.5, GR F52, MSS SP-44, 125-250 MICRO INCHES AARH			UNKNOWN		1551493
22	17245	1551917		PNG	4		FLANGE,PIPE, WN, RF, 2" NPS, CLASS 600, ASTM A694, GR F52, XS 0.218" WALL THK, MSS SP-44, 1.939" BORE NO INTERNAL TAPER, 125-250 MICRO INCHES AARH			HACKNEYLADIS,		2-RFWN-YS2-600
23	14416	1551980		PNG	2		FLANGE,PIPE, BLIND, RF, 10" NPS, CLASS 600, FORGED STL, MSS SP-44, ASTM A105, ASSME B16.5, 125 - 250 MICRO INCHES AARH			GALPERTI,		1551980
24	16118	1557023		PNG	9+2		GASKET,SPIRAL WOUND, 20" NPS, CLASS 600, 1/8" THK, 304 SS RIBBON WITH GRAPHITE FILLER, SS INNER RING, CS OUTER RING, ASME B16.20, TYPE E. MSS SP-44			FLEXITALLICI,		1557023
25	15225	1555795		PNG	2		GASKET, INSULATING, KIT, 20" NPS, G10, CLASS 600, THICK, ASME B16.21, 1/8" THICK GASKET: BUNA-N SEALING ELEMENTS WITH G10 RETAINER OR NEOPRENE-FACED PHENOLIC. SLEEVES: MYLAR. DOUBLE WASHERS: G10 , TYPE E (FULL FACE). GASKET: NITRILE FACED WITH G10 CORE. SLEEVE: G10. WASHER: G10			GPTINDUSTRIE,		1555795
26	1598031	1598031		5 STATE	264+48		STUD,ALL-THREAD, 1-5/8" DIA, 8 UNC, 11-1/2" LG, HEAT TREATED CS, ASTM A193, GR B7, TEFLON COATED, W/ (2) HEX NUTS			HIGHLANDTHRE		24721099
27	1602340	1602340		5 STATE	48		STUD,ALL-THREAD, 1-5/8" DIA, 8 UNC, 12-1/2" LG, HEAT TREATED CS, ASTM A193, GR B7, TEFLON COATED, W/ (2) HEX NUTS			HIGHLANDTHRE		1602340
28	NOT USED	#N/A	#N/A	#N/A	NOT USED	#N/A	#N/A	#N/A		#N/A	#N/A	#N/A
29	16086	1557033		PNG	16+3		GASKET,SPIRAL WOUND, 16" NPS, CLASS 600, 1/8" THK, 304 SS RIBBON WITH GRAPHITE FILLER, SS INNER RING, CS OUTER RING, ASME B16.20, TYPE E. MSS SP-44			FLEXITALLICI,		1557033
30	1598948	1598948		0	320+60		STUD,ALL-THREAD, 1-1/2" DIA, 8 UNC, 10-1/2" LG, HEAT TREATED CS, ASTM A193, GR B7, TEFLON COATED, W/ (2) HEX NUTS			HIGHLANDTHRE		2472-0985
31	NOT USED	#N/A	#N/A	#N/A	NOT USED	#N/A	#N/A	#N/A		#N/A	#N/A	#N/A
32	14993	1557059		PNG	8+2		GASKET,SPIRAL WOUND, 10" NPS, CLASS 600, 1/8" THK, 304 SS RIBBON WITH GRAPHITE FILLER, SS INNER RING, CS OUTER RING, ASME B16.20, TYPE E. TO SUIT MSS SP-44 FLANGE			FLEXITALLICI,		1557059
33	1600113	1600113		5 STATE	128+32		STUD,ALL-THREAD, 1-1/4" DIA, 7 THD, 9-3/4" LG, HEAT TREATED CS, ASTM A193, GR B7, TEFLON COATED, W/ (2) HEX NUTS			HIGHLANDTHRE		1600113
34	NOT USED	#N/A	#N/A	#N/A	NOT USED	#N/A	#N/A	#N/A		#N/A	#N/A	#N/A
35	14991	1557067		PNG	4+2		GASKET,SPIRAL WOUND, 2" NPS, CLASS 600, 1/8" THK, 304 SS RIBBON W/ GRAPHITE FILLER, FLEXITALLIC GC\, SS INNER RING, CS OUTER RING, ASME B16.20, TYPE F, TO SUIT MSS SP-44 FLG			FLEXITALLICI,		2"-600-CGI-SS-CS-ASMEB16.20

NOTES:

1. ANY CHANGES REQUIRED DUE TO FIELD CONDITIONS MUST BE APPROVED BY THE ENGINEERING DEPARTMENT.
2. CONTRACTOR SHALL SUPPLY ALL NECESSARY CONSUMABLE ITEMS FOR SITE CONSTRUCTION.

BURNS & McDONNELL
ENGINEERING COMPANY, INC.
STATE LICENSE # COA:D1557

STATE OF OHIO
CHAD A BACON
PE.85438
REGISTERED PROFESSIONAL ENGINEER
1/8/2021
PROFESSIONAL ENG/ARCH STAMP

REF. DWG(S) PNG-G-004-0001043

NO.	DATE	REVISION(S) DESCRIPTION	BY	CHK	APPD
0	01-08-2021	ISSUED FOR CONSTRUCTION	RDC	JBF	CAB

DESCRIPTION	
AREA CODE	-
ACCOUNT NUMBER	AW2128
PROJECT NUMBER	1880115
DRAWING BY	RDC
STATION ID	S0868O1
CHECKER INITIALS	JBF

APPROVALS			
DATE	INITIALS		REGIONAL ENGINEER
			MGR TECH REC & STD
DATE	INITIALS		PRINCIPAL ENGINEER
01/08/2021	CAB		

DUKE ENERGY®

C350 PROJECT
NORWOOD C350 STATION
MECHANICAL BILL OF MATERIALS - 1

HAMILTON COUNTY, OHIO

SHEET(S)	47 OF 68
DWG SCALE	AS NOTED
DWG DATE	06/10/2020
SUPERSEDED	—
DRAWING NUMBER	PNG -M-004-0001078
REVISION	0

DISCIPLINE / RESOURCE CENTER / LINE NUMBER

MARK	LEGACY NUMBER	MAXIMO PART #	DATA SHEET?	SOURCE SYSTEM	QTY	RETIRED?	DESCRIPTION	ORDERING INSTRUCTIONS	ORDERING SPECIFICATIONS	MANUF	MODEL	MANUF PART #
36	1600709	1600709		5 STATE	32+16		STUD,ALL-THREAD, 5/8" DIA, 11 UNC, 4-1/2" LG, HEAT TREATED CS, ASTM A193, GR B7, TEFLON COATED, W/ (2) HEX			HIGHLANDTHRE		2472-0183
37	NOT USED	#N/A	#N/A	#N/A	NOT USED	#N/A	#N/A	#N/A		#N/A	#N/A	#N/A
38	17383	1553267		PNG	2		ELBOW,PIPE, 24" NPS X 0.5 W.T., BW, 90 DEG, 1.5D RADIUS, STL, MSS SP-75, GR Y65, FULLY SEGMENTABLE, PAINTED PREFERRED, BARE ACCEPTABLE., MACHINE BEVEL ENDS PER ASME B31.8 APPENDIX I, FIG I-4			HACKNEYLADIS,LNKNOWN,		24-940, 1553267
39	17385	1553024		PNG	1		ELBOW,PIPE, 24" NPS X 0.5 W.T., BW, 45 DEG, 3D RADIUS, STL, MSS SP-75, GR Y65, FULLY SEGMENTABLE, BARE, MACHINE BEVEL ENDS PER ASME B31.8 APPENDIX I, FIG I-4			UNKNOWN,		1553024
40	NON-STOCK	#N/A	#N/A	#N/A	1	#N/A	GENIE GP2 MEMBRANE PROBE 7", 1" NPT HOUSING, 316 SS WITH 1/8 FNPT OUTLET, NEOPRENE AND PERFLUOROELASTOMER O-RINGS AND BTU MEMBRANE, MODEL #GP2-206-SS-B-1	#N/A	TO BE SHIPPED LOOSE WITH CONTROL BUILDING	#N/A	#N/A	#N/A
41	1600439	1600439		OHKY	9		ELBOW,PIPE, 20", BW, 90 DEG, 1.5D RADIUS, 0.5" WALL, CS, MSS SP-75, GR Y65, FULLY SEGMENTABLE, PAINTED PREFERRED, BARE ACCEPTABLE., MACHINE BEVEL ENDS PER ASME B31.8 APPENDIX I, FIGURE I-4			HACKNEYLADIS		20-90-1.5D-.500
42	1600437	1600437		OHKY	2		ELBOW,PIPE, 20", BW, 45 DEG, 3D RADIUS, 0.5" WALL, CS, MSS SP-75, GR Y65, FULLY SEGMENTABLE, PAINTED PREFERRED, BARE ACCEPTABLE., MACHINE BEVEL ENDS PER ASME B31.8 APPENDIX I, FIGURE I-4			HACKNEYLADIS		20-3D-45-.500
43	16845	1575615		PNG	8		ELBOW,PIPE, 16" NPS X 0.375 W.T., BW, 90 DEG, 1.5D RADIUS, STL, MSS SP-75, GR Y65, FULLY SEGMENTABLE., PAINTED PREFERRED, BARE ACCEPTABLE., MACHINE BEVEL ENDS PER ASME B31.8 APPENDIX I, FIG I-4			UNKNOWN,		1575615
44	15833	1552865		PNG	1		ELBOW,PIPE, 10" NPS X 0.365 W.T., BW, 90 DEG, 1.5D RADIUS, STL, MSS SP-75, GR Y52, FULLY SEGMENTABLE., PAINTED PREFERRED, BARE ACCEPTABLE., MACHINE BEVEL ENDS PER ASME B31.8 APPENDIX I, FIG I-4			HACKNEYLADIS,		1552865
45	16269	1575614		PNG	4		ELBOW,PIPE, 2" NPS X 0.218 W.T., BW, 90 DEG, 1.5D RADIUS, ST;, MSS SP-75, GR Y52, FULLY SEGMENTABLE, PAINTED PREFERRED, BARE ACCEPTABLE., MACHINE BEVEL ENDS PER ASME B31.8 APPENDIX I, FIG I-4			HACKNEY LADISH, TECTUBIRACCO		2-940-SEG, 2"-90-1.5D-XS-Y52-SEG
46	NON-STOCK	#N/A	#N/A	#N/A	1	#N/A	MUSTANG PS3, GAS SAMPLING CONDITIONING SYSTEM, WITH HEATED ENCLOSURE, 24VDC POWER SUPPLY, LIQUID MEMBRANE SEPARATOR, REGUALTOR, PRESSURE GAUGE 0-60PSIG, RELIEF VALVE, DIAL THERMOMETER, 2" PIPE MOUNT BRACKETS.	#N/A	TO BE SHIPPED LOOSE WITH CONTROL BUILDING	#N/A	#N/A	#N/A
47	10022	1552345		PNG	6		ELBOW,PIPE, 1" NPS X 0.179 W.T., FPT, 90 DEG, 1D RADIUS, CLASS 3000, FORGED STL, ASME B16.11, ASTM A105 GR WPB, NON SEGMENTABLE			BOTH-WELLSTE,		1552345
48	1601596	1601596		5 STATE	1		VALVE,BALL, TRUNNION, 20" NPS, CLASS 600, FULL PORT, WELD X WELD, HANDWHEEL WORM GEAR OPERATED, CS BODY, STD TRIM, API 6D, W/ OPERATOR EXTENSION, BODY DRAIN & SEALANT PORTS TO BE FACTORY PIPED UP TO THE OPERATOR, MUST SPECIFY WALL THK & MATERIAL YIELD STRENGTH OF MATING PIPE, WHETHER PIPE PUPS ARE REQUIRED & OPERATOR EXTENSION LG	SPECIFY WALL THK & MATERIAL YIELD STRENGTH OF MATING PIPE, WHETHER PIPE PUPS ARE REQUIRED & OPERATOR EXTENSION LG	FOR CONNECTION TO 20" NPS, 0.500" WT, API 5L-PSL2, GRADE X65 PIPE, INCLUDE PIPE PUPS OF 1.5*OD, INCLUDE OPERATOR STEM EXTENSION OF 9.5FT AS MEASURED FROM PIPE CENTERLINE TO HANDWHEEL	CAMERON	T-31	20"NPS 800602-2A-1
49	NOT USED	#N/A	#N/A	#N/A	NOT USED	#N/A	#N/A	#N/A		#N/A	#N/A	#N/A
50	1602689	1602689		5 STATE	1		TEE,PIPE, (20" X 20" X 20") NPS, WELD, 0.5" WALL THK, STL, MSS SP-75, GR Y65, BARRED BRANCH, PAINTED PREFERRED, BARE ACCEPTABLE., MACHINE BEVEL ENDS PER ASME B31.8 APPENDIX I, FIG I-4			HACKNEYLADIS,		20-TEE-Y65-BBT
51	17326	1570100		PNG	1		TEE,PIPE, 24" NPS X 24" NPS X 24" NPS X 0.500" W.T., WELD, STL, MSS SP-75, GR Y65, PAINTED PREFERRED, BARE ACCEPTABLE., MACHINE BEVEL ENDS PER ASME B31.8 APPENDIX I, FIG I-4			HACKNEYLADIS,		1570100
52	17322	1570213		PNG	8		TEE,PIPE REDUCING, 24" NPS X 24" NPS RUN, 16" NPS BRANCH, WELD, STL, MSS SP-75, GR Y65, PAINTED PREFERRED, BARE ACCEPTABLE., MACHINE BEVEL ENDS PER ASME B31.8 APPENDIX I, FIG I-4		24" NPS SHOULD HAVE 0.500" WT, 16" NPS IS 0.375" WT	HACKNEYLADIS,		1570213
53	1600059	1600059		5 STATE	2		TEE,PIPE, (20" X 20" X 20") NPS, WELD, 0.500" WALL THK., STL, MSS SP-75, GR Y65, PAINTED PREFERRED, BARE ACCEPTABLE., MACHINE BEVEL ENDS PER ASME B31.8 APPENDIX I, FIG I-4			HACKNEYLADIS		1600059
54	13556	1570193		PNG	1		TEE,PIPE REDUCING, 20" NPS X 20" NPS RUN, 10" NPS BRANCH, WELD, STL, MSS SP-75, GR Y65, PAINTED PREFERRED, BARE ACCEPTABLE., MACHINE BEVEL ENDS PER ASME B31.8 APPENDIX I, FIG I-4		20" NPS SHOULD HAVE 0.500" WT, 10" NPS IS 0.365" WT	HACKNEYLADIS,		1570193
55	15837	1570096		5 STATE	2		TEE,PIPE, 10" NPS X 10" NPS X 10" NPS X 0.365" W.T., WELD, STL, MSS SP-75, GR Y52, PAINTED PREFERRED, BARE ACCEPTABLE., MACHINE BEVEL ENDS PER ASME B31.8 APPENDIX I, FIG I-4			TECTUBI		10-TEE-W-365-Y52
56	NON-STOCK	#N/A	#N/A	#N/A	1	#N/A	MUSTANG PONY HEATED PROBE ENCLOSURE, INSULATED ENCLOSURE, 120VAC BLOCK HEATER, HEAT TRACE TUBING SHRINK BOOT AND SHRINK SLEEVE, CLASS 1 DIV 1 TERMINATION ENCLOSURE WITH TERMINATION KIT, BOLTS, NUTS & WASHERS TO MOUNT PONY TO KT NUT, KT COLLAR	#N/A	TO BE SHIPPED LOOSE WITH CONTROL BUILDING	#N/A	#N/A	#N/A
57	1601562	1601562	#N/A	5 STATE	2		REDUCER,PIPE, CONCENTRIC, 24" NPS X 0.500 W.T. X 20" NPS X 0.500 W.T., WELD, STL, MSS SP-75, GR Y65, PAINTED PREFERRED, BARE ACCEPTABLE., MACHINE BEVEL ENDS PER ASME B31.8 APPENDIX I, FIG I-4			HACKNEYLADIS		1601562
58	NON-STOCK	#N/A	#N/A	#N/A	100 FT	#N/A	HEAT TRACE BUNDLE TUBING, 1/8" SS, 5 WATT 110V AC, CLASS 1 GROUP D	#N/A	TO BE PROVIDED AND INSTALLED BY TFO	#N/A	#N/A	#N/A
59	17150	1554620		PNG	2		NIPPLE,PIPE, SWAGE, 2" NPS X 1" NPS X 0.218 W.T., BEVELED LARGE END X THD SMALL END, 6-1/2" LG, STL, MSS SP-95, ASTM A234 GR WPB, BARE, CONCENTRIC			UNKNOWN,		1554620
60	NON-STOCK	#N/A	#N/A	#N/A	2	#N/A	MUSTANG, HEAT TRACE TERMINATION KIT, CLASS 1, DIV 1 RATING, EXPLOSION PROOF CONNECTION, INCLUDES ELECTRICAL CONNECTION KIT P/N HAK-C-100, TERMINATION ENCLOSURE, P/N HAK-JB2, HEAT SHRINK BOOT P/N TSI-SB2, MOUNTING BRACKET AND STRAP P/N UMB & PS-03	#N/A		#N/A	#N/A	#N/A
61	1588264	1588264		PNG	2		OUTLET,PIPE,WELDOLET,36-20" RUN,2" BRANCH,CS,XS, ATSM A-694,FITTING,DESIGNED TO BE WELDED ON API 5L X65 NPS 20 & 24 LINE PIPE,CMTR REQUIRED			Bonney Forge	WELDOLET	Q1900114-79
62	1588194	1588194		PNG	2		OUTLET,PIPE,THREADOLET,10-6" RUN,1" BRANCH,THD,CS,3000 LB,ATSM A-694,FITTING,DESIGNED TO BE WELDED ON API 5L X52 NPS 6, 8 & 10 LINE PIPE,CMTR REQUIRED			Bonney Forge	THREDOLET	Q1900114-15
63	1588198	1588198		PNG	9		OUTLET,PIPE,THREADOLET, 36-12" RUN, 1" BRANCH,THD,CS,3000 LB,ATSM A-694,FITTING,DESIGNED TO BE WELDED ON API 5L X65 NPS 16, 20 & 24 LINE PIPE,CMTR REQUIRED			Bonney Forge	THREDOLET	Q1900114-17
64	NON-STOCK	#N/A	#N/A	#N/A	80FT	#N/A	PIPE, 4" IPS, SCH 40, POLYVINYL CHLORIDE (PVC)	#N/A		#N/A	#N/A	#N/A
65	16369	1551456		PNG	15		NIPPLE,PIPE, 1" NPS X 0.179 W.T., THD BOTH END, 3" LG, STL, ASTM A733 A106 GR B, SMLS			UNKNOWN,		1551455
66	16384	1551460		PNG	3		NIPPLE,PIPE, 1" NPS X 0.179 W.T., THD BOTH END, 6" LG, STL, ASTM A733 A106 GR B, SMLS			UNKNOWN,		1551460
67	15391	1552377		PNG	4		ELBOW,PIPE, 4" IPS, 90 DEG, PVC, S.X.S, SCH 40 4" DIAMETER POLYVINYL CHLORIDE (PVC)90 DEGREE ELBOW SCHEDULE 40 SOCKET BY SOCKET0			NIBCOINC,		1552377

NOTES:

1. ANY CHANGES REQUIRED DUE TO FIELD CONDITIONS MUST BE APPROVED BY THE ENGINEERING DEPARTMENT.
2. CONTRACTOR SHALL SUPPLY ALL NECESSARY CONSUMABLE ITEMS FOR SITE CONSTRUCTION.

BURNS & McDONNELL
ENGINEERING COMPANY, INC.
STATE LICENSE # COA:01557

STATE OF OHIO
CHAD A BACON
PE-85438
REGISTERED PROFESSIONAL ENGINEER
1/8/2021
PROFESSIONAL ENGINEER STAMP

REF. DWG(S) PNG-G-004-0001043

NO.	DATE	REVISION(S) DESCRIPTION	BY	CHK	APPD
0	01-08-2021	ISSUED FOR CONSTRUCTION	RDC	JBF	CAB

DESCRIPTION	
AREA CODE	-
ACCOUNT NUMBER	AW2128
PROJECT NUMBER	1880115
DRAWING BY	RDC
STATION ID	S0868O1
CHECKER INITIALS	JBF

APPROVALS			
DATE	INITIALS		REGIONAL ENGINEER
			MGR TECH REC & STD
DATE	INITIALS		PRINCIPAL ENGINEER
01/08/2021	CAB		

DUKE ENERGY®

C350 PROJECT
NORWOOD C350 STATION
MECHANICAL BILL OF MATERIALS - 2

HAMILTON COUNTY, OHIO

SHEET(S)	48 OF 68
DWG SCALE	AS NOTED
DWG DATE	06/10/2020
SUPERSEDED	—
DRAWING NUMBER	PNG -M-004-0001079
REVISION	0

DISCIPLINE / RESOURCE CENTER / LINE NUMBER

MARK	LEGACY NUMBER	MAXIMO PART #	DATA SHEET?	SOURCE SYSTEM	QTY	RETIRED?	DESCRIPTION	ORDERING INSTRUCTIONS	ORDERING SPECIFICATIONS	MANUF	MODEL	MANUF PART #
68	11112	50056901		5 STATE	17		PLUG,PIPE, 1" NPS, SQ HEAD, THD, CLASS 3000, FORGED STL, ASME B16.11, ASTM A105, GR 55			CAPITOLMFGCO, PHOENIXFORGE, BONNEY FORGE		12203310, 5.151410
69	15367	1552043		PNG	4		COUPLING,PIPE, 4" IPS, PVC, SCH 40 4" DIAMETER POLYVINYL CHLORIDE (PVC)COUPLING SCHEDULE 40 SOCKET BY SOCKET			NIBCOINC,		1552043
70	1599486	1599486		5 STATE	3		INSULATOR, MONOLITHIC, WELD, 20" NPS, FORGED STL, ASTM A105, CLASS 600, ASME B16.11, W STYLE, API 5L PSL-2, GR X65, PIPE WITH 0.500" W.T, BEVEL ENDS 30 - 35 DEG WITH 1/16" LANDING.			SYPRISTECHOL		1599486
71	NON-STOCK	#N/A	#N/A	#N/A	2	#N/A	CAP,PIPE, 4" IPS, PVC, SCH 40, POLYVINYL CHLORIDE (PVC), SOCKET BY SOCKET	#N/A		#N/A	#N/A	#N/A
72	12845	1557618		PNG	8		INSULATOR, MONOLITHIC, WELD, 16" NPS, FORGED STL, ASTM A105, CLASS 600, ASME B16.11, W STYLE, MACHINED TO MATCH API 5L PSL-2, GR X65, PIPE WITH 0.375" W.T, BEVEL ENDS 30 - 35 DEG WITH 1/16" LANDING.			SYPRISTECHOL,		2000320943
73	16443	1575633		PNG	1		INDICATOR, PIG SIGNAL ASSEMBLY, 3-6" NPS X 0.250-0.500 W.T., SS, FLAG AND MANUAL RESET NONEXTENDED SHAFT ASSEMBLY, 316 SS OMNIDIRECTIONAL PLUG ASSEMBLY, EXPLOSIVE DECOMPRESSION AND EXTRUSION RESISTANT VITON O-RING MATERIAL.			TDWILLIAMSON,		04-9548-0000-51
74	17410	1553800		PNG	3		CAP,PIPE, 24" NPS X 0.500 W.T., WELD, GR Y65, BARE			UNKNOWN,		1553800
75	14151	1553338		PNG	2		FITTING, THREAD-O-RING, 2" X 30-6" NPS WE, STL, ASTM A333 GR. 6 ASME B31.8, , BARE, NIPPLE, ASTM A333. CAP, ASTM A105. PLUG, ASTM B-16 YELLOW BRASS. VITON O-RING			TDWILLIAMSON,		TR-0000-0002-00
76	16006	1556900		PNG	2		TEE, SERVICE TEE, 1" NPS, WELD, FORGED STL, ASME B16.11, ASME B16.11, ASTM A105, NO-BLO SERVICE, BARE, CAP, ASTM A105, TAPPING TEE			MUELLERCO,		330H17501
77	17297	1557796		PNG	4+16FT		PIPE, 1" NPS X 0.179 W.T., SRL RANDOM LG, BEVELED ENDS, SEAMLESS, FBE, STL, ASTM A106, GR B	Does not come in DRL		UNKNOWN,		1557796
78	17234	1557790		PNG,KY-OH	10+10FT		PIPE, 1" NPS X 0.179 W.T., 20' RANDOM LG, BEVELED ENDS, SEAMLESS, BARE, STL, ASTM A106, GR B			IPSCOINC		1-179-20LG-ASTMA106-BARE
79	16440	1551853		PNG	3		NIPPLE,PIPE, 3/4" NPS X 0.154 W.T., THD BOTH END, 3" LG, STL, ASTM A733 A106 GR B			UNKNOWN,		1551853
80	13472	1551432		PNG	1		NIPPLE,PIPE, 3/4" NPS X 0.154 W.T., THD BOTH END, 6" LG, STL, ASTM A733 A106 GR B, SMLS			WESTBROOKELE,		1551432
81	10714	1554569		PNG	1		NIPPLE,PIPE, SWAGE, 1" NPS X 3/4" NPS X 0.179 W.T., THD BOTH END, 3-1/2" LG, ZINC PLTD STL, MSS SP-95, A STM A234 GR WPB, CONCENTRIC			WESTBROOKMAN,		1554569
82	11092	1552355		PNG	1		ELBOW,PIPE, 3/4" NPS X 0.154 W.T., THD, 90 DEG, 1D RADIUS, CLASS 3000, FORGED STL, ASME B16.11, ASTM A105 GR WPB, NON SEGMENTABLE, STREET			BOTH-WELLSTE,		1552355
83	11441	1553235		PNG	1		ELBOW,PIPE REDUCING, 1-1/2" NPS X 1" NPS, THD, 90 DEG, 1D RADIUS, CLASS 150, BLACK MI, ASME B16.3, ASTM A197 GR WPB, NON SEGMENTABLE, 0.200 W.T.			BOTH-WELLSTE,		1553235
84	10404	1575673		PNG	2		TEE,PIPE, 3/4" NPS X 3/4" NPS X 3/4" NPS, FNPT, CLASS 3000, FORGED STL, ASME B16.11, ASTM A105 GR B			ENLINSTEELCO,		1557647
85	11322	1553333		PNG	1		UNION,PIPE, 3/4" NPS, FPT, CLASS 3000, FORGED STL, MSS SP-83, ASTM A105, INSULATED UNION, O-RING TYPE, FLAT FACE			GEORGFISCHER,		108757510000
86	50056895	50056895		OH/KT	1		PLUG,PIPE, 3/4" NPS, SQ HEAD, THD, CLASS 3000, FORGED STL, ASME B16.11, ASTM A105			BONNEYFORGEC,		39860
87	11329	4015103		PNG	1		CAP,PIPE, 3/4" NPS, THD, CLASS 3000, FORGED STL, ASME B16.11, ASTM A105, NPT			UNKNOWN,		BY DESCRIPTION
88	17509	1554574		PNG	1		SUPPORT, PIPE, 26" NPS, STL, SUPPORT PIPE 20 EZ-LINE TYPE WSBC-01 ADJUSTABLE SUPPORT SHIM BLOCKS WITH CLAMP FOR 20" STEEL PIPE, 1/8"' THICK PVC LINING INSIDE CLAMP AND TOP OF SHIM BLOCKS, SHIM BLOCKS AND CLAMP FABRICATED FROMASTM A-572 GR. 50,, STEEL BASE PLATE WITH 4 SLOTTED HOLES ADJUSTMENT SHIM BLOCKS AND CLAMP TOPREVENT BOTH LATERAL AND VERTICAL PIPE MOVEMENT, ENTIRE ASSEMBLY TO BE GALVANIZED COATED,, E-Z LINE PIPE SUPPORT CO PART #WSBC-01, PROVIDE ANCHOR BOLTS WITH NUTS AND WASHERS			EZLINEPIPESU,		1554574
89	17506	1554624		PNG	2		SUPPORT, PIPE, 16" NPS, STL, SUPPORT PIPE 10 EZ-LINE TYPE WSBC-01 ADJUSTABLE SUPPORT SHIM BLOCKS WITH CLAMP FOR 10" STEEL PIPE, 1/8"' THICK PVC LINING INSIDE CLAMP AND TOP OF SHIM BLOCKS, SHIM BLOCKS AND CLAMP FABRICATED FROMASTM A-572 GR. 50, STEEL BASE PLATE WITH 4 SLOTTED HOLES ADJUSTMENT SHIM BLOCKS AND CLAMP TO PREVENT BOTH LATERAL AND VERTICAL PIPE MOVEMENT, ENTIRE ASSEMBLY TO BE GALVANIZED COATED,, E-Z LINE PIPE SUPPORT CO PART #WSBC-01, PROVIDE ANCHOR BOLTS WITH NUTS AND WASHERS			EZLINEPIPESU,		1554624

NOTES:

1. ANY CHANGES REQUIRED DUE TO FIELD CONDITIONS MUST BE APPROVED BY THE ENGINEERING DEPARTMENT.
2. CONTRACTOR SHALL SUPPLY ALL NECESSARY CONSUMABLE ITEMS FOR SITE CONSTRUCTION.

BURNS & McDONNELL
ENGINEERING COMPANY, INC.
STATE LICENSE # COA:01557

STATE OF OHIO
CHAD A BACON
PE.85438
REGISTERED PROFESSIONAL ENGINEER
1/8/2021
PROFESSIONAL ENG/ARCH STAMP

REF. DWG(S) PNG-G-004-0001043

NO.	DATE	REVISION(S) DESCRIPTION	BY	CHK	APPD
0	01-08-2021	ISSUED FOR CONSTRUCTION	RDC	JBF	CAB

DESCRIPTION		APPROVALS		
AREA CODE	-	DATE	INITIALS	REGIONAL ENGINEER
ACCOUNT NUMBER	AW2128			
PROJECT NUMBER	1880115	DATE	INITIALS	MGR TECH REC & STD
DRAWING BY	RDC			
STATION ID	S0868O1	DATE	INITIALS	PRINCIPAL ENGINEER
CHECKER INITIALS	JBF	01/08/2021	CAB	

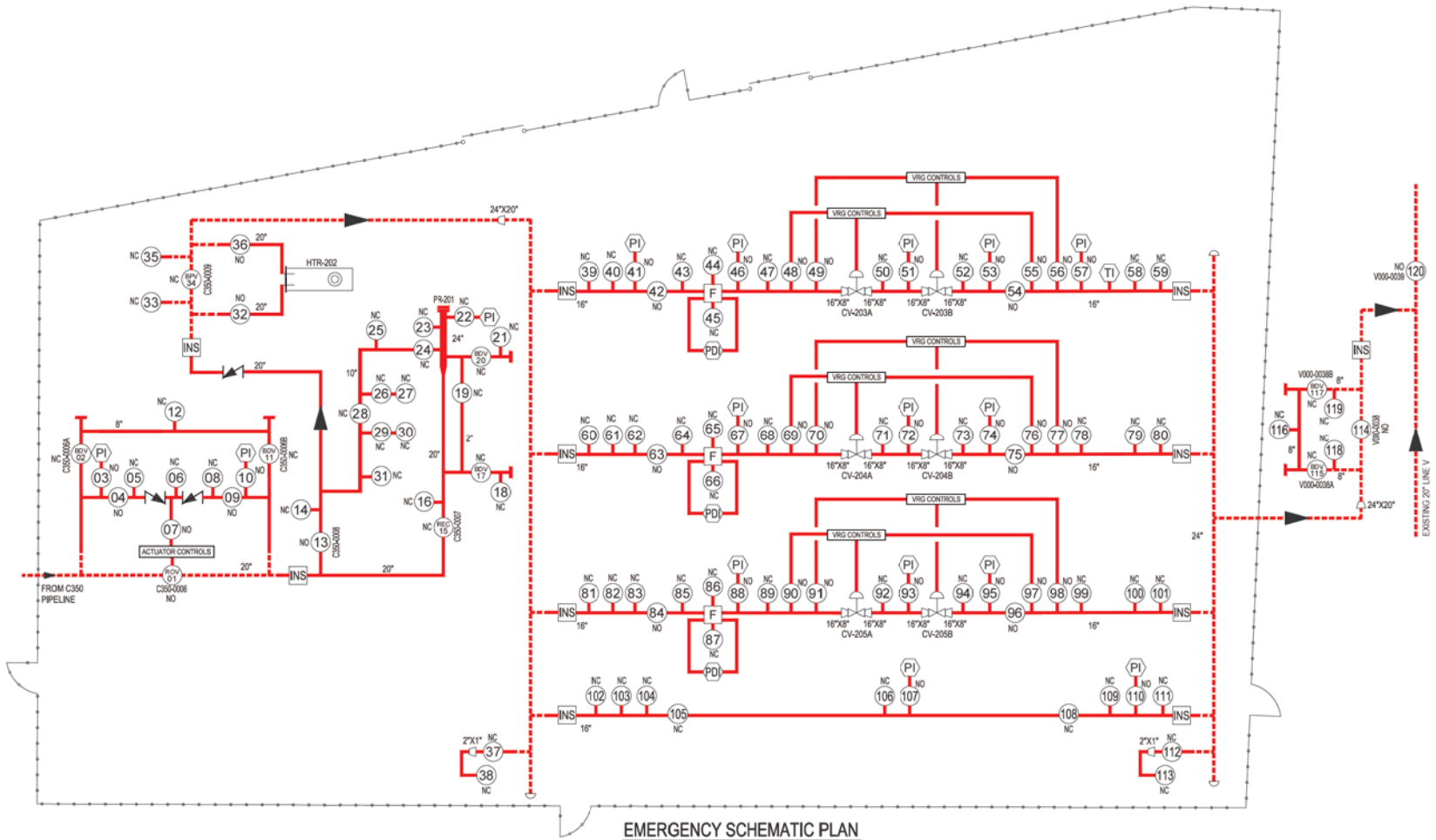
DUKE ENERGY®

C350 PROJECT
NORWOOD C350 STATION
MECHANICAL BILL OF MATERIALS - 3

HAMILTON COUNTY, OHIO

SHEET(S) 49 OF 68	DWG SCALE AS NOTED
DWG DATE 06/10/2020	SUPERSEDED —
DRAWING NUMBER	REVISION
PNG -M-004-0001080	0
DISCIPLINE / RESOURCE CENTER / LINE NUMBER	

STATION ID : S0868O1



EMERGENCY SCHEMATIC PLAN
NORWOOD C350 STATION
HAMILTON COUNTY, OHIO

BURNS & McDONNELL ENGINEERING COMPANY, INC.
STATE LICENSE # COA.01557

LEGEND

- NO or NC — VALVE
- REMOTE OPERATED VALVE
- NC — BLOWDOWN VALVE
- NC — BYPASS VALVE
- NO or NC — LAUNCHER VALVE
- NO or NC — RECEIVER VALVE
- NO or NC — VALVE - OTHER - NON PNG
- CHECK VALVE
- RELIEF VALVE
- REGULATOR
- F — FILTER / SEPARATOR
- F/S — FILTER / STRAINER
- M — METER
- INS — INSULATOR
- GAS FLOW
- S — SPECIAL EQUIP (ANNOTATE)
- FIRE EXTINGUISHER

NO = VALVE IS NORMALLY OPEN
NC = VALVE IS NORMALLY CLOSED

- REDUCER
- HEATER — HEATING UNIT
- LAUNCHER / RECEIVER
- FENCING
- GREATER THAN 150 PSI - ABOVE GROUND
- GREATER THAN 150 PSI - BELOW GROUND
- 100 TO 150 PSI - ABOVE GROUND
- 100 TO 150 PSI - BELOW GROUND
- LESS THAN 100 PSI - ABOVE GROUND
- LESS THAN 100 PSI - BELOW GROUND
- BY-PASS LINE - ABOVE GROUND
- BY-PASS LINE - BELOW GROUND

REF. DWG(S) PNG-G-004-0001043

NO.	DATE	REVISION(S) DESCRIPTION	BY	CHK	APPD
0	01-08-2021	ISSUED FOR CONSTRUCTION	RDC	JBF	CAB

DESCRIPTION	
AREA CODE	-
ACCOUNT NUMBER	AW2128
PROJECT NUMBER	1880115
DRAWING BY	NFH
STATION ID	S0868O1
CHECKER INITIALS	JBF

APPROVALS	DATE	INITIALS
REGIONAL ENGINEER		
MGR TECH REC & STD		
PRINCIPAL ENGINEER	01/08/2021	CAB

STATE OF OHIO — CHAD A BACON — PE-85438 — REGISTERED PROFESSIONAL ENGINEER — 1/8/2021
PROFESSIONAL ENGIARCH STAMP

DUKE ENERGY®

C350 PROJECT
NORWOOD C350 STATION
EMERGENCY SCHEMATIC
HAMILTON COUNTY, OHIO

SHEET(S)	50 OF 68
DWG SCALE	NONE
DWG DATE	07/08/2020
SUPERSEDED	—
DRAWING NUMBER	PNG -X-004-0001021
REVISION	0

DISCIPLINE / RESOURCE CENTER / LINE NUMBER

ELECTRICAL GENERAL NOTES:

1. ALL ELECTRICAL WORKS, ALL MATERIALS AND INSTALLATIONS SHALL BE IN ACCORDANCE WITH THE LATEST EDITION OF THE NATIONAL ELECTRICAL CODE (NEC), 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 WORK 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 DEGREE (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 AND 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 DEGREE (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).
21. 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.
22. ALL OUTDOOR ENCLOSURES SHALL HAVE A DRAIN FITTING INSTALLED AND A GROUND LUG FOR EXTERNAL CONNECTION TO THE GROUND GRID.
23. STUB-UPS AND BOXES SHALL BE PROVIDED WITH GROUND BUSHINGS. STEEL CONDUITS CONNECTIONS SHALL BE THREADED WRENCH-TIGHT WITH CONDUCTIVE THREAD COMPOUND.
24. ALL SPARE CONDUITS SHALL BE STUBBED-UP AND PLUGGED. ALL UNUSED CONDUIT, CONDUIT ENTRIES IN FITTINGS, JUNCTION BOXES AND EQUIPMENT SHALL BE PLUGGED.
25. CONDUIT SHALL REMAIN PLUGGED ON BOTH ENDS UNTIL WIRE IS PULLED. INSTALL CONDUIT BUSHING AND GROUNDING BUSHING BEFORE PULLING WIRE.
26. 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 MANUFACTURERS RECOMMENDED MAXIMUM PULLING TENSIONS AND SIDEWALL PRESSURE VALUES.
27. 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 CABLES 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.
28. 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.
29. CONDUIT DRAINS OR DRAIN SEALS SHALL BE INSTALLED AT ALL LOW POINTS IN THE CONDUIT SYSTEM.
30. 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.
31. ALL CONDUIT AND CABLE SHALL BE MARKED USING APPROVED MANUFACTURED TYPE MARKERS AND LABELS. NO TAPE OR HAND WRITTEN MARKERS ARE PERMITTED.
32. 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 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 — THREE QUARTER OF AN INCH (3/4").
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
ENGINEERING COMPANY, INC.
STATE LICENSE # COA.01557

STATE OF OHIO
YEVGENIY KHISLAVSKIY
E-84164
REGISTERED
PROFESSIONAL ENGINEER

PROFESSIONAL ENG/ARCH STAMP

NO.	DATE	REVISION(S) DESCRIPTION	BY	CHK	APPD
0	01-08-2021	ISSUED FOR CONSTRUCTION	MCR	MCH	YBK

DESCRIPTION	
AREA CODE	-
ACCOUNT NUMBER	AW2128
PROJECT NUMBER	1880115
DRAWING BY	MCR
STATION ID	S086801
CHECKER INITIALS	MCH

APPROVALS		
DATE	INITIALS	REGIONAL ENGINEER
DATE	INITIALS	MGR. TECH REC & STD
DATE 01/08/2021	INITIALS YBK	PRINCIPAL ENGINEER

DUKE ENERGY

C350 PROJECT
NORWOOD C350 STATION
ELECTRICAL GENERAL NOTES
HAMILTON COUNTY, OHIO

REF. DWG(S) PNG-G-004-0001043

SHEET(S) 51 OF 68	DWG SCALE NONE
DWG DATE 07/10/2019	SUPERSEDED —
DRAWING NUMBER PNG -E-004-0001052	REVISION 0

DISCIPLINE / RESOURCE CENTER / LINE NUMBER

CONDUIT AND CABLE

- EXPOSED CONDUIT OR CABLE VISIBLE
- UNDERGROUND OR CABLE HIDDEN
- 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
- C## — CONDUIT NUMBER CALLOUT, SEE CABLE SCHEDULE

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
- 10 FT — GROUND CONDUCTOR PIGTAIL FOR ABOVE GRADE AND FINISHED CONCRETE CONNECTION TO EQUIPMENT AND FUTURE CONNECTION
- AIR TERMINAL (LIGHTNING ROD) CONNECTED TO GROUND CABLE
- GROUND CABLE CONTINUATION
- GROUND BAR

CATHODIC PROTECTION

- R / J / W — RECTIFIER AND RECTIFIER JUNCTION BOX FOR CATHODIC PROTECTION

EQUIPMENT

- TWO WINDING TRANSFORMER
- H / Y / X — AUTO TRANSFORMER
- OR — POTENTIAL TRANSFORMER
- 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
- T — THERMOSTAT
- J — JUNCTION BOX
- 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
- XXX-#### — INSTRUMENTATION WITH TAG 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 (OR) 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
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) CH	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

ABBREVIATIONS CONT'D

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
ENGINEERING COMPANY, INC.
STATE LICENSE # COA:01557

STATE OF OHIO — YEVGENIY KHISLAVSKIY — E-84164 — REGISTERED PROFESSIONAL ENGINEER
PROFESSIONAL ENGINEER STAMP

NO.	DATE	REVISION(S) DESCRIPTION	BY	CHK	APPD
0	01-08-2021	ISSUED FOR CONSTRUCTION	MCR	MCH	YBK

DESCRIPTION	
AREA CODE	-
ACCOUNT NUMBER	AW2128
PROJECT NUMBER	1880115
DRAWING BY	MCR
STATION ID	S0868O1
CHECKER INITIALS	MCH

APPROVALS	DATE	INITIALS
REGIONAL ENGINEER		
MGR TECH REC & STD		
PRINCIPAL ENGINEER	01/08/2021	YBK

DUKE ENERGY®

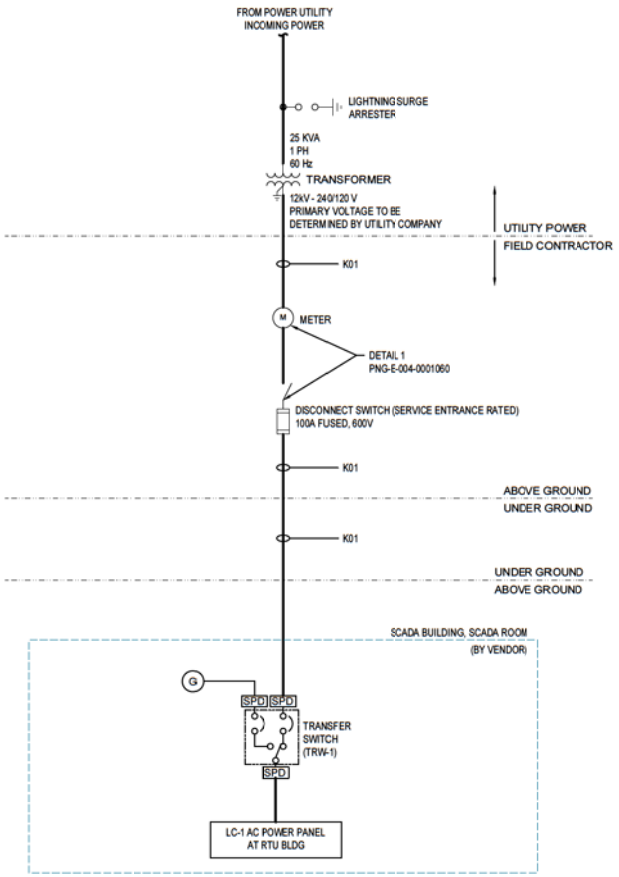
C350 PROJECT
NORWOOD C350 STATION
ELECTRICAL LEGEND

HAMILTON COUNTY, OHIO

REF. DWG(S) PNG-G-004-0001043

SHEET(S)	52 OF 68
DWG SCALE	NONE
DWG DATE	07/10/2019
SUPERSEDED	—
DRAWING NUMBER	PNG -E-004-0001053
REVISION	0

DISCIPLINE / RESOURCE CENTER / LINE NUMBER



PANELBOARD NAME:	LC-1 AC POWER PANEL				10,000 RMS SYMMETRICAL A.I.C.								
PANELBOARD TYPE:	MAIN CIRCUIT BREAKER				SURFACE MOUNTED, NEMA 12 ENCLOSURE				100 AMP TRIP MAIN BREAKER				
PANEL LOCATION:	SCADA BUILDING				120/240 VOLTS, 1 PHASE, 3 WIRE, 60 Hz				100 AMP MAINS				
SUPPLIED FROM:	TRANSFER SWITCH / DISCONNECT												
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		SCADA BUILDING LIGHT 1 & 2 (LT-1, LT-2)	100	A	125	FLOOD LIGHT (EXTRIOR)		1	20	2	
3	20	1		SCADA BUILDING OUTLET 1 & 2	480	B	1500	POWER SUPPLY (RESERVED)		1	20	4	
5	20	1		SCADA BUILDING OUTLET 3	240	A	200	CP RECTIFIER		1	20	6	
7	20	2		HVAC UNIT	1800	B	500	MUSTANG SAMPLE GAS HEAT TRACING POWER		1	20	8	
					1800	A		SPARE		1	20	10	
11	20	1		YARDLIGHT #1	448	B		SPARE		1	20	12	
13	20	1		YARDLIGHT #2	448	A		SPARE		1	20	14	
15	20	1		SPARE		B		SPARE		1	20	16	
17	20	1		SPARE		A		SPARE		1	20	18	
19	20	1		SPARE		B		SPARE		1	20	20	
21		1		SPACE		A		SPACE		1		22	
23		1		SPACE		B		SPACE		1		24	

TOTAL CONNECTED LOAD = 7.6 kVA X 99% DEMAND FACTOR = 7.6 kVA ESTIMATED DEMAND LOAD
PHASE BALANCE (KVA) - A: 2.9 , B: 4.7 DESIGN LOAD = 32 AMPERES, TOTAL LOAD WITH EXPANSION = 48 AMPERES

NOTES:

1. TRANSFORMER SIZING, DISCONNECT SWITCH RATING, CABLE SIZES, CONDUIT SIZE ARE BASED ON THE MAXIMUM ESTIMATE25KVA LOAD REQUIREMENT.
2. 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. FIELD ELECTRICAL CONTRACTOR TO FURNISH AND INSTALL POWER CABLE, FUSED DISCONNECTED SWITCH, COMBINATION WATT-HOUR METER AND CIRCUIT PANEL. ELECTRICAL SUBCONTRACTOR TO SECURE AND PASS ALL PERMITS AND COORDINATE POWER INSTALLATION WITH UTILITY.
6. FOR MORE INFORMATION, REFER TO ELECTRICAL PLOT PLAN PNG-E-004-0001058.

BURNS & McDONNELL
ENGINEERING COMPANY, INC.
STATE LICENSE # COA:01557

STATE OF OHIO
YEVGENIY KHISLAVSKIY
E-84164
REGISTERED
PROFESSIONAL ENGINEER
PROFESSIONAL ENGINEER STAMP

REF. DWG(S) PNG-G-004-0001043

NO.	DATE	REVISION(S) DESCRIPTION	BY	CHK	APPD
0	01-08-2021	ISSUED FOR CONSTRUCTION	MCR	MCH	YBK

DESCRIPTION	
AREA CODE	-
ACCOUNT NUMBER	AW2128
PROJECT NUMBER	1880115
DRAWING BY	MCR
STATION ID	S0868O1
CHECKER INITIALS	MCH

APPROVALS	DATE	INITIALS
REGIONAL ENGINEER		
MGR TECH REC & STD		
PRINCIPAL ENGINEER	01/08/2021	YBK

DUKE ENERGY

C350 PROJECT
NORWOOD C350 STATION
ONE-LINE DIAGRAM & PANELBOARD SCHEDULE

HAMILTON COUNTY, OHIO

SHEET(S)	53 OF 68
DWG SCALE	NONE
DWG DATE	07/10/2019
SUPERSEDED	—
DRAWING NUMBER	PNG -E-004-0001054
REVISION	0

DISCIPLINE / RESOURCE CENTER / LINE NUMBER

NORWOOD CONDUIT SCHEDULE

CONDUIT NUMBER	CONDUIT SIZE	CONDUIT TYPE	% FILL	CONTENT	FROM	TO	LENGTH (FT.)	NOTES
C01	1.5"	RGS	21.42%	K01	UTILITY METER	SCADA BUILDING, LC-1	125	
C02	1"	RGS	3.13%	K02	SCADA BUILDING, RTU	HTR-202 BMS #1 AND BMS #2 POWER	175	POWER BOTH BMSs IN SERIES
C03	1"	RGS	13.15%	K03	SCADA BUILDING, LC-1	YARD LIGHT #1	40	ROUTE: LC-1 - YARDLIGHT #1 - YARDLIGHT #2
C04	1"	RGS	13.15%	K04	SCADA BUILDING, LC-1	YARD LIGHT #2	200	ROUTE: LC-1 - YARDLIGHT #1 - YARDLIGHT #2
C05	1.5"	RGS	15.29%	K05, K06, K07, K08	SCADA BUILDING, RTU	HTR-202 BMS #1	175	
C06	1.5"	RGS	19.50%	K09, K10, K11, K12, K13, K14, K15, K16, K17, K18, K19, K20	SCADA BUILDING, RTU	PCV-203 JB	60	
C07	1.5"	RGS	19.50%	K21, K22, K23, K24, K25, K26	SCADA BUILDING, RTU	PCV-204 JB	75	
C08	1.5"	RGS	19.50%	K27, K28, K29, K30, K31, K32	SCADA BUILDING, RTU	PCV-205 JB	100	
C09	1.5"	RGS	15.29%	K33, K34, K35, K36, K37, K38, K39	SCADA BUILDING, RTU	MLV-201, PIT-201A, PIT-201B	275	
C10	1"	RGS	6.84%	K40	SCADA ROOM, RTU	LEL-203	30	RESERVED FOR REGULATOR BUILDING LEL GAS DETECTOR
C11	1"	RGS	13.15%	K41	SCADA BUILDING, LC-1	REGULATOR BUILDING AC JB	90	RESERVED FOR REGULATOR BUILDING AC POWER J-BOX
C12	1"	RGS	13.15%	K42	SCADA BUILDING, LC-1	CP RECTIFIER	250	
C13	3/4"	RGS	5.06%	K43	PCV-204 JB	AIT-204	10	FIELD ROUTED MUSTANG SAMPLE GAS ANALYZER POWER
C14	4"	PVC	N/A	PRE-HEAT TRACED 1/4" TUBING FOR MUSTANG SAMPLE GAS	SCADA BUILDING eMEDOR SYSTEM	REGULATOR BUILDING AIT-204 MUSTANG SAMPLE SYSTEM	100	PVC CONDUIT MATERIAL PROVIDED BY OTHER. TUBING MATERIAL PROVIDED BY DUKE. PVC CONDUIT INSTALLATION BY ELECTRICAL SUBCONTRACTOR.

SIZES BASED ON DUKE'S TYPICAL PANELBOARD SCHEDULE (240/120 VAC, 100A, 1 PHASE, MAIN BREAKER)

NORWOOD 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	240/120 VAC	UTILITY METER	SCADA BUILDING, LC-1	125	
K02	N/A	1	2/C #14 AWG	24 VDC	SCADA BUILDING, RTU	HTR-202 BMS #1 AND BMS #2 POWER	175	POWER BOTH BMSs IN SERIES
K03	N/A	1	2-1/C #10 AWG + #12 AWG GND, THWN-2	120 VAC	SCADA BUILDING, LC-1	YARD LIGHT #1	40	ROUTE: LC-1 - YARDLIGHT #1 - YARDLIGHT #2
K04	N/A	1	2-1/C #10 AWG + #12 AWG GND, THWN-2	120 VAC	SCADA BUILDING, LC-1	YARD LIGHT #2	200	ROUTE: LC-1 - YARDLIGHT #1 - YARDLIGHT #2
K05	XI-202A	1	8PR #18 AWG TSP, THWN-2	24 VDC	SCADA BUILDING, RTU	HTR-202 BMS#1	175	
K06	XS-202A			24 VDC	SCADA BUILDING, RTU	HTR-202 BMS#1	175	
K07	XI-212A			24 VDC	SCADA BUILDING, RTU	HTR-202 BMS#2	175	
K08	XS-212A			24 VDC	SCADA BUILDING, RTU	HTR-202 BMS#2	175	
K09	PIT-203A	1	12PR #18 AWG TSP, THWN-2	24 VDC	SCADA BUILDING, RTU	PCV-203 JB	60	
K10	ZS-203B			24 VDC	SCADA BUILDING, RTU	PCV-203 JB	60	
K11	ZT-203B			24 VDC	SCADA BUILDING, RTU	PCV-203 JB	60	
K12	PY-203B			24 VDC	SCADA BUILDING, RTU	PCV-203 JB	60	
K13	PIT-203B			24 VDC	SCADA BUILDING, RTU	PCV-203 JB	60	
K14	PIT-203C			24 VDC	SCADA BUILDING, RTU	PCV-203 JB	60	
K15	TIT-203A			24 VDC	SCADA BUILDING, RTU	PCV-203 JB	60	
K16	PCV-203B-PWR			24 VDC	SCADA BUILDING, RTU	PCV-203 JB	60	PCV-203B POWER
K17	PIT-203A-SPARE			24 VDC	SCADA BUILDING, RTU	PCV-203 JB	60	
K18	PCV-203B-SPARE			24 VDC	SCADA BUILDING, RTU	PCV-203 JB	60	
K19	PIT-203C-SPARE			24 VDC	SCADA BUILDING, RTU	PCV-203 JB	60	
K20	TIT-203A-SPARE			24 VDC	SCADA BUILDING, RTU	PCV-203 JB	60	
K21	ZS-204B	1	12PR #18 AWG TSP, THWN-2	24 VDC	SCADA BUILDING, RTU	PCV-204 JB	75	
K22	ZT-204B			24 VDC	SCADA BUILDING, RTU	PCV-204 JB	75	
K23	PY-204B			24 VDC	SCADA BUILDING, RTU	PCV-204 JB	75	
K24	PIT-204A			24 VDC	SCADA BUILDING, RTU	PCV-204 JB	75	
K25	PCV-204B-PWR			24 VDC	SCADA BUILDING, RTU	PCV-204 JB	75	PCV-204B POWER
K26	PCV-204A-SPARE			24 VDC	SCADA BUILDING, RTU	PCV-204 JB	75	
K27	ZS-205B	1	12PR #18 AWG TSP, THWN-2	24 VDC	SCADA BUILDING, RTU	PCV-205 JB	100	
K28	ZT-205B			24 VDC	SCADA BUILDING, RTU	PCV-205 JB	100	
K29	PY-205B			24 VDC	SCADA BUILDING, RTU	PCV-205 JB	100	
K30	PIT-205A			24 VDC	SCADA BUILDING, RTU	PCV-205 JB	100	
K31	PCV-205B-PWR			24 VDC	SCADA BUILDING, RTU	PCV-205 JB	100	PCV-205B POWER
K32	PCV-205B-SPARE			24 VDC	SCADA BUILDING, RTU	PCV-205 JB	100	
K33	ZIO-201	1	8PR #18 AWG TSP, THWN-2	24 VDC	SCADA BUILDING, RTU	MLV-201	275	
K34	ZIC-201			24 VDC	SCADA BUILDING, RTU	MLV-201	275	
K35	HI-201			24 VDC	SCADA BUILDING, RTU	MLV-201	275	
K36	SYO-201			24 VDC	SCADA BUILDING, RTU	MLV-201	275	
K37	SYC-201			24 VDC	SCADA BUILDING, RTU	MLV-201	275	
K38	PIT-201A	1	1PR #18 AWG TSP, THWN-2	24 VDC	SCADA BUILDING, RTU	MLV-201, INLET PIT-201A	275	
K39	PIT-201B	1	1PR # 18 AWG TSP, THWN-2	24 VDC	SCADA BUILDING, RTU	MLV-201, OUTLET PIT-201B	275	
K40	LEL-203	1	1PR #18 AWG TSP, THWN-2	24 VDC	SCADA BUILDING, RTU	LEL-203	30	RESERVED FOR REGULATOR BUILDING LEL GAS DETECTOR
K41	N/A	1	2-1/C #10 AWG + #12 AWG GND, THWN-2	120 VAC	SCADA BUILDING, LC-1	REGULATOR BUILDING AC JB	90	RESERVED FOR REGULATOR BUILDING AC POWER J-BOX
K42	N/A	1	2-1/C #10 AWG + #12 AWG GND, THWN-2	120 VAC	SCADA BUILDING, LC-1	CP RECTIFIER	250	
K43	AIT-204	1	2/C #14 AWG	24 VDC	SCADA BUILDING, RTU	PCV-204 JB	100	FIELD ROUTED MUSTANG SAMPLE GAS ANALYZER POWER VIA PCV-204 JB

SIZES BASED ON DUKE'S TYPICAL PANELBOARD SCHEDULE (240/120 VAC, 100A, 1 PHASE, MAIN BREAKER)

NOTES:

1. FOR MORE INFORMATION, REFER TO ELECTRICAL PLOT PLAN PNG-E-004-0001058.

BURNS & McDONNELL ENGINEERING COMPANY, INC.
STATE LICENSE # COA:01557

STATE OF OHIO
YEVGENIY KHISLAVSKIY
E-84164
REGISTERED
PROFESSIONAL ENGINEER
PROFESSIONAL ENGIARCH STAMP

NO.	DATE	REVISION(S) DESCRIPTION	BY	CHK	APPD
0	01-08-2021	ISSUED FOR CONSTRUCTION	MCR	MCH	YBK

DESCRIPTION	
AREA CODE	-
ACCOUNT NUMBER	AW2128
PROJECT NUMBER	1880115
DRAWING BY	MCR
STATION ID	S0868O1
CHECKER INITIALS	MCH

APPROVALS	DATE	INITIALS	
			REGIONAL ENGINEER
			MGR TECH REC & STD
	01/08/2021	YBK	PRINCIPAL ENGINEER

DUKE ENERGY

C350 PROJECT
NORWOOD C350 STATION
CABLE AND CONDUIT SCHEDULE

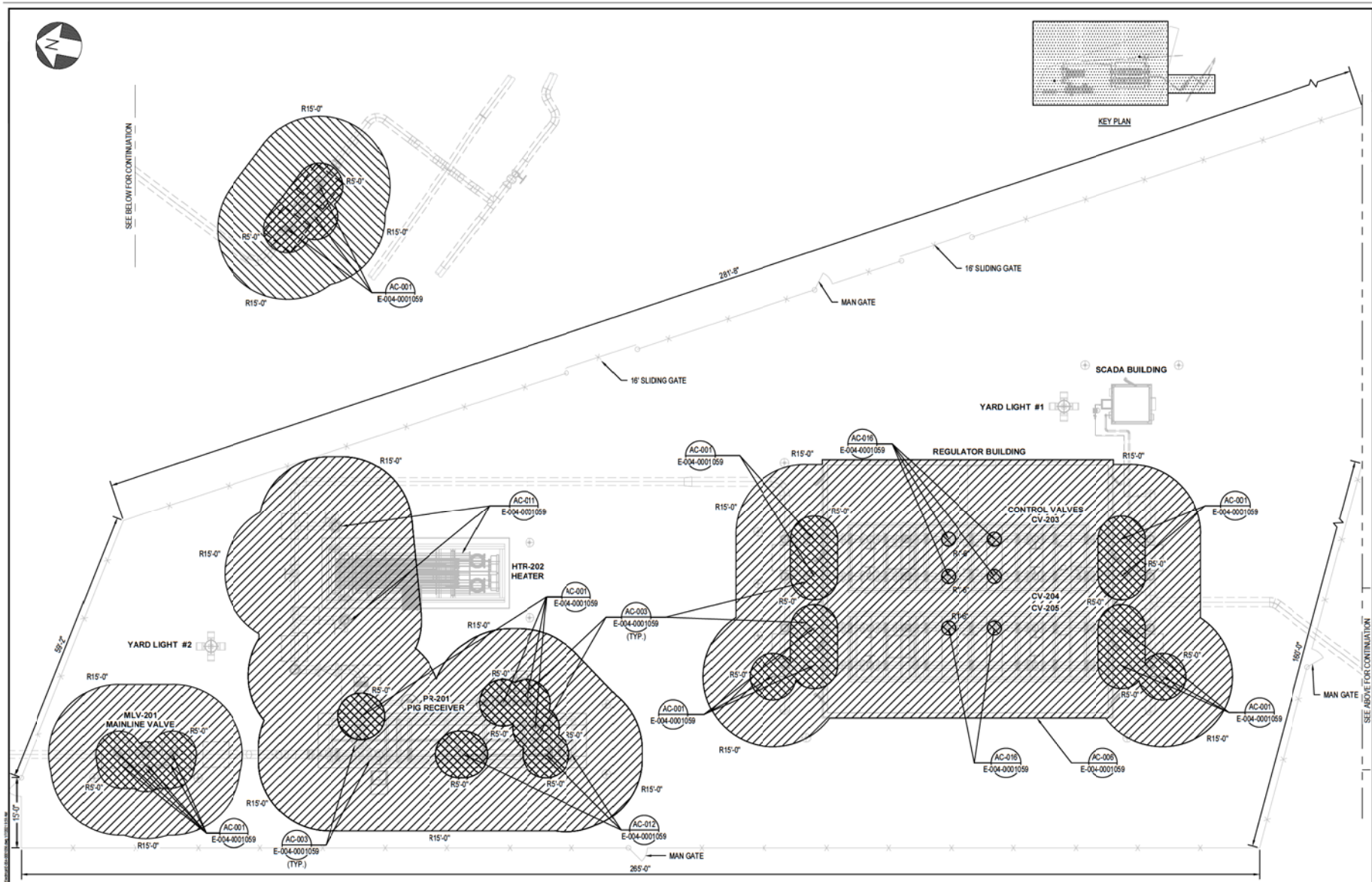
HAMILTON COUNTY, OHIO

REF. DWG(S) PNG-G-004-0001043

SHEET(S) 54 OF 68	DWG SCALE NONE
DWG DATE 07/19/2019	SUPERSEDED —

DRAWING NUMBER: PNG -E-004-0001055 | REVISION: 0

DISCIPLINE / RESOURCE CENTER / LINE NUMBER



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 AREACLASSIFICATION SHALL BE IN COMPLIANCE WITH THE LATEST EDITION OF NATIONAL ELECTRIC CODE, ARTICLE 500, 501 AND 504, AND PER STATE, LOCAL AND OSHA REGULATIONS.
3. DUKE ENERGY HAVING AUTHORITY OF JURISDICTION HAS AUTHORIZED TO EXTEND THE ELECTRICAL HAZARDOUS AREA CLASSIFICATION PAST THE FENCE. DUKE ENERGY TO MEET THE NATURAL GAS SAFETY COMPLIANCE.

0 10' 20'
SCALE IN FEET

BURNS & McDONNELL ENGINEERING COMPANY, INC.
STATE LICENSE # COA2155?

REF. DWG(S) PNG-G-004-0001043

NO.	DATE	REVISION(S) DESCRIPTION	BY	CHK	APPD
0	01-08-2021	ISSUED FOR CONSTRUCTION	MCR	MCH	YBK

DESCRIPTION		APPROVALS		
AREA CODE	-	DATE	INITIALS	REGIONAL ENGINEER
ACCOUNT NUMBER	AW2128			
PROJECT NUMBER	1880115	DATE	INITIALS	MGR TECH REC & STD
DRAWING BY	MCR			
STATION ID	S0868O1	DATE	INITIALS	PRINCIPAL ENGINEER
CHECKER INITIALS	MCH	01/08/2021	YBK	

STATE OF OHIO
YEVGENIY KHISLAVSKIY
E-84164
REGISTERED PROFESSIONAL ENGINEER
PROFESSIONAL ENGIARCH STAMP

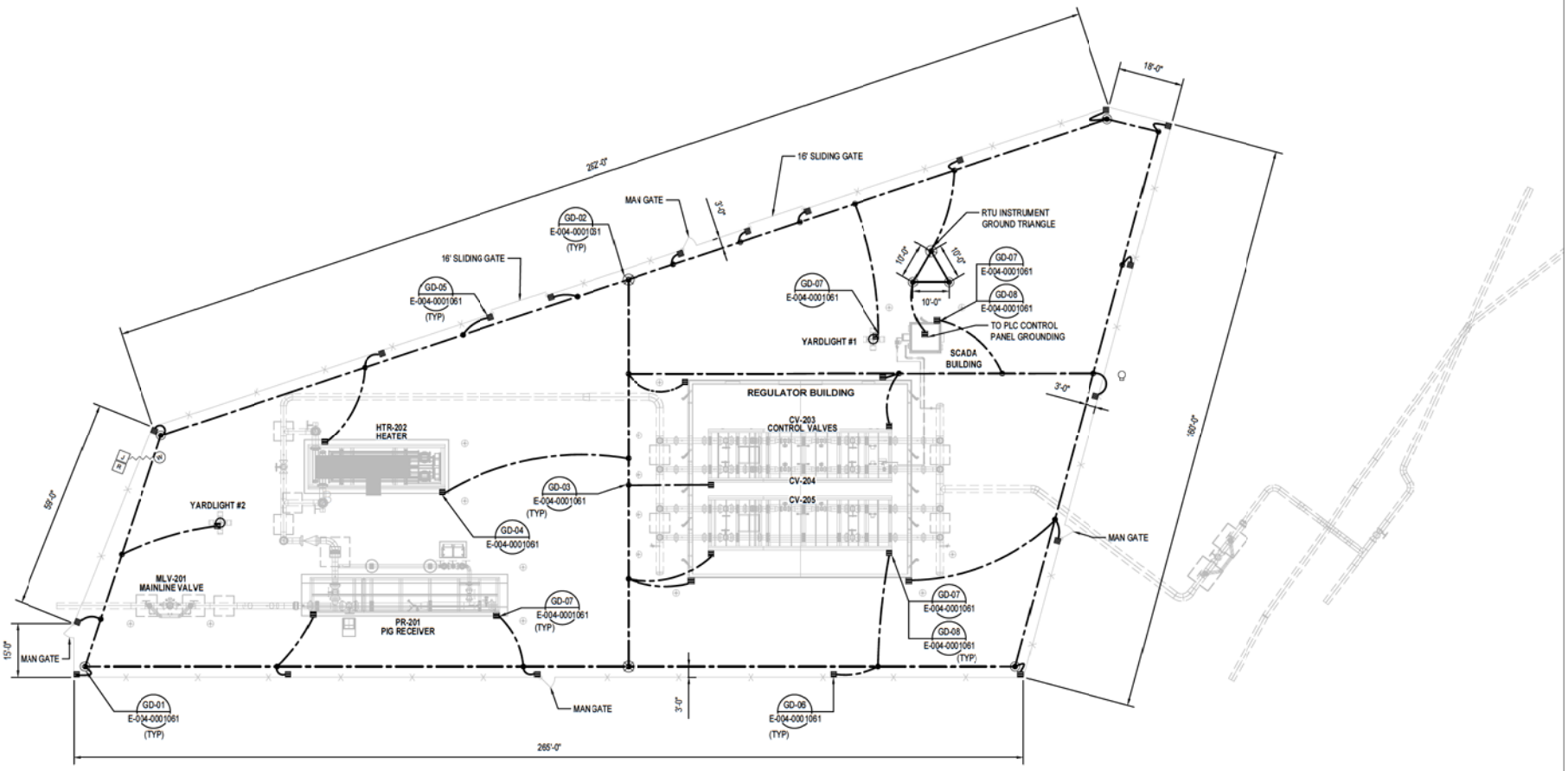
DUKE ENERGY

C350 PROJECT
NORWOOD C350 STATION
HAZARDOUS AREA CLASSIFICATION PLAN

HAMILTON COUNTY, OHIO

SHEET(S)	55 OF 68
DWG SCALE	1" = 10'
DWG DATE	07/17/2019
	SUPERSEDED
DRAWING NUMBER	PNG -E-004-0001056
REVISION	0

DISCIPLINE / RESOURCE CENTER / LINE NUMBER



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 OF 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.
4. FOR MORE INFORMATION ON SCADA BUILDING, SEE VENDOR DRAWING# 20.4211.

0 15' 30'
SCALE IN FEET

REF. DWG(S) PNG-G-004-0001043

BURNS & McDONNELL ENGINEERING COMPANY, INC.
STATE LICENSE # COA:01557

STATE OF OHIO
YEVGENIY KHISLAVSKIY
E-84164
REGISTERED
PROFESSIONAL ENGINEER
PROFESSIONAL ENGINEER STAMP

NO.	DATE	REVISION(S) DESCRIPTION	BY	CHK	APPD
0	01-08-2021	ISSUED FOR CONSTRUCTION	MCR	MCH	YBK

DESCRIPTION	
AREA CODE	-
ACCOUNT NUMBER	AW2128
PROJECT NUMBER	1880115
DRAWING BY	MCR
STATION ID	S0868O1
CHECKER INITIALS	MCH

APPROVALS	DATE	INITIALS
REGIONAL ENGINEER		
MGR TECH REC & STD		
PRINCIPAL ENGINEER	01/08/2021	YBK

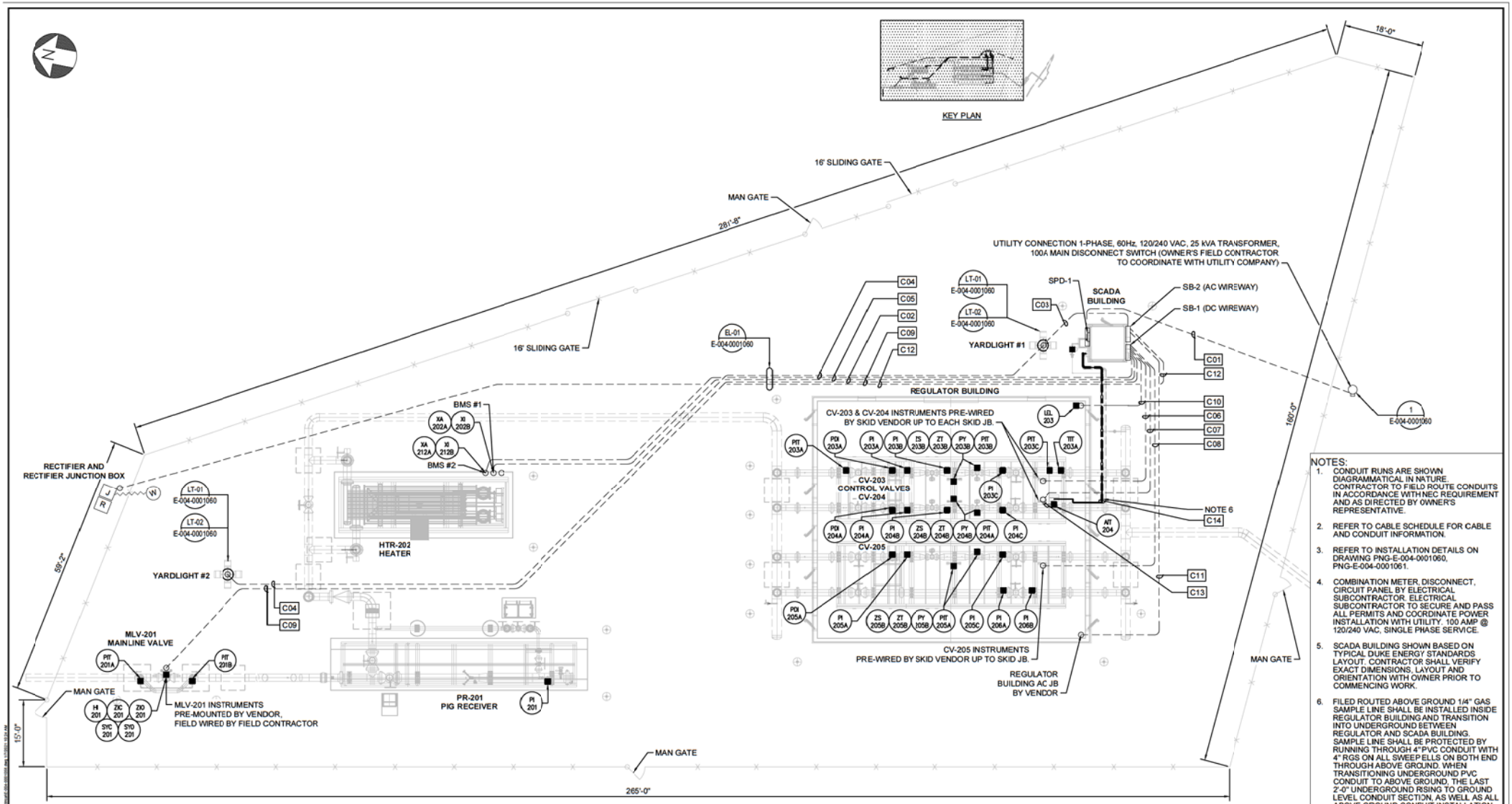
DUKE ENERGY

C350 PROJECT
NORWOOD C350 STATION
ELECTRICAL GROUNDING PLAN

HAMILTON COUNTY, OHIO

SHEET(S) 56 OF 68	DWG SCALE 1" = 15'
DWG DATE 06/11/2018	SUPERSEDED —
DRAWING NUMBER	REVISION
PNG -E-004-0001057	0

DISCIPLINE / RESOURCE CENTER / LINE NUMBER



NOTES:

1. CONDUIT RUNS ARE SHOWN DIAGRAMMATICAL 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-004-0001060, PNG-E-004-0001061.
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. SCADA BUILDING SHOWN BASED ON TYPICAL DUKE ENERGY STANDARDS LAYOUT. CONTRACTOR SHALL VERIFY EXACT DIMENSIONS, LAYOUT AND ORIENTATION WITH OWNER PRIOR TO COMMENCING WORK.
6. FILED ROUTED ABOVE GROUND 1/4" GAS SAMPLE LINE SHALL BE INSTALLED INSIDE REGULATOR BUILDING AND TRANSITION INTO UNDERGROUND BETWEEN REGULATOR AND SCADA BUILDING. SAMPLE LINE SHALL BE PROTECTED BY RUNNING THROUGH 4"PVC CONDUIT WITH 4" RGS ON ALL SWEEP ELLS ON BOTH END THROUGH ABOVE GROUND. WHEN TRANSITIONING UNDERGROUND PVC CONDUIT TO ABOVE GROUND, THE LAST 2'-0" UNDERGROUND RISING TO GROUND LEVEL CONDUIT SECTION, AS WELL AS ALL ABOVE GROUND CONDUIT INSTALLATION SHALL BE PVC COATING RGS.
7. FOR MORE INFORMATION ON SCADA BUILDING, SEE VENDOR DRAWING# 20.4213.

0 5' 10' 20'
SCALE IN FEET

BURNS & McDONNELL ENGINEERING COMPANY, INC.
STATE LICENSE # COA:01557

STATE OF OHIO — YEVGENIY KHISLAVSKIY — E-84164 — REGISTERED PROFESSIONAL ENGINEER
PROFESSIONAL ENGINEER STAMP

NO.	DATE	REVISION(S) DESCRIPTION	BY	CHK	APPD
0	01-08-2021	ISSUED FOR CONSTRUCTION	MCR	MCH	YBK

DESCRIPTION		APPROVALS		
AREA CODE	-	DATE	INITIALS	REGIONAL ENGINEER
ACCOUNT NUMBER	AW2128			
PROJECT NUMBER	1880115	DATE	INITIALS	MGR TECH REC & STD
DRAWING BY	MCR			
STATION ID	S0868O1	DATE	INITIALS	PRINCIPAL ENGINEER
CHECKER INITIALS	MCH	01/08/2021	YBK	

DUKE ENERGY

C350 PROJECT
NORWOOD C350 STATION
CONDUIT AND INSTRUMENT PLOT PLAN

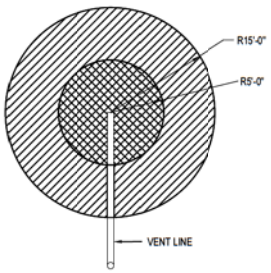
HAMILTON COUNTY, OHIO

REF. DWG(S) PNG-G-004-0001043

SHEET(S) 57 OF 68	DWG SCALE 1" = 10'
DWG DATE 07/17/2019	SUPERSEDED

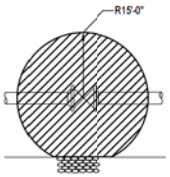
DRAWING NUMBER	REVISION
PNG -E-004-0001058	0

DISCIPLINE / RESOURCE CENTER / LINE NUMBER



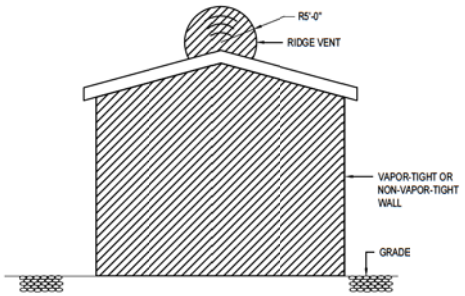
DETAIL AC–001
SCALE: N.T.S.

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



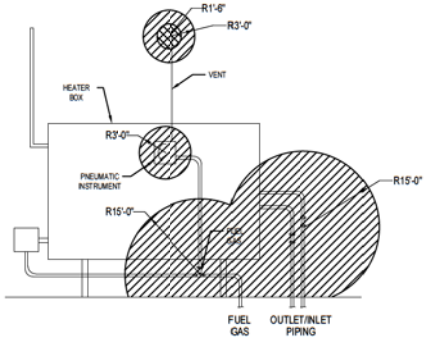
DETAIL AC–003
SCALE: N.T.S.

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



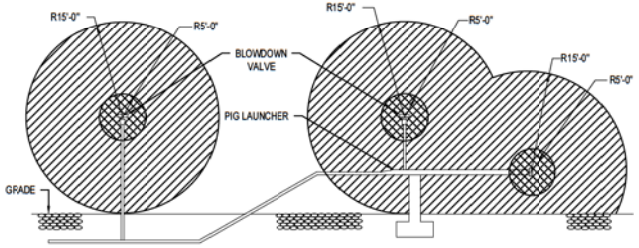
DETAIL AC–006
SCALE: N.T.S.

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



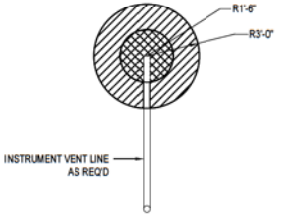
DETAIL AC–011
SCALE: N.T.S.

(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 100-5)
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
ENGINEERING COMPANY, INC.
STATE LICENSE # COA:01557

STATE OF OHIO
YEVGENIY KHISLAVSKIY
E-84164
REGISTERED
PROFESSIONAL ENGINEER
PROFESSIONAL ENGINEER STAMP

NO.	DATE	REVISION(S) DESCRIPTION	BY	CHK	APPD
0	01-08-2021	ISSUED FOR CONSTRUCTION	MCR	MCH	YBK

DESCRIPTION	
AREA CODE	-
ACCOUNT NUMBER	AW2128
PROJECT NUMBER	1880115
DRAWING BY	MCR
STATION ID	S0868O1
CHECKER INITIALS	MCH

APPROVALS	DATE	INITIALS
REGIONAL ENGINEER		
MGR TECH REC & STD		
PRINCIPAL ENGINEER	01/08/2021	YBK

DUKE ENERGY

C350 PROJECT
NORWOOD C350 STATION
HAZARDOUS AREA CLASSIFICATION DETAILS

HAMILTON COUNTY, OHIO

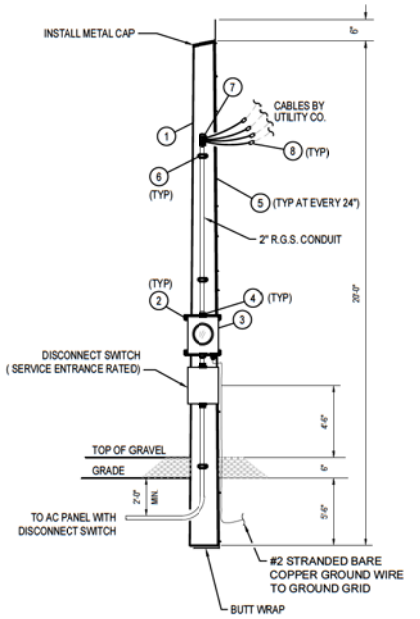
REF. DWG(S) PNG-G-004-0001043

SHEET(S)	DWG SCALE
58 OF 68	AS NOTED
DWG DATE 07/11/2019	SUPERSEDED

DRAWING NUMBER	REVISION
PNG -E-004-0001059	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



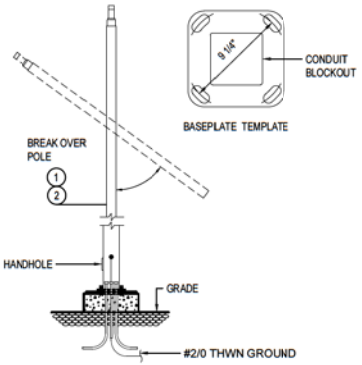
NOTES:
1. CONTRACTOR SHALL RUN 2" EMPTY R.G.S. CONDUIT WITH PULL WIRE TO UTILITY POWER SUPPLY POLE, TERMINATE CONDUIT 5'-0" ABOVE GRADE. UTILITY COMPANY WILL FURNISH AND PULL WIRE.

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

DETAIL 1
SCALE: N.T.S.

POLE / METER INSTALLATION FOR OVERHEAD POWER SUPPLY

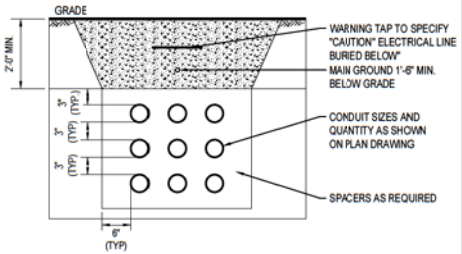
ITEM	QTY.	DESCRIPTION
1	1	SQUARE HINGED STEEL POLE, 20' TALL, W/4" TENON, 6RD. LUG, 9 1/4" BOLT CIRCLE, 3/4" DIA. BOLTS, VALMONT #DSF10-400F200, W/P2
2	1	LOWERING WINCH VALMONT #M136 (ONLY ONE NEEDED PER SITE)



NOTES:
1. REFER TO STRUCTURAL DETAILS FOR FOUNDATION DESIGN
2. LIGHT POLE IS BREAK OVER POLE. CONTRACTOR SHALL INSTALL LIGHT POLE WITH 20' 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

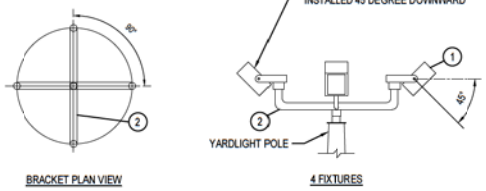


NOTES:
1. RESTORE SURFACE (GRADE) TO EXISTING CONDITIONS.
2. FOR PAVEMENT REPLACEMENT, THICKNESS OF ALL REPLACEMENT COURSES SHALL BE EQUAL TO EXISTING BUT ASPHALTIC CONCRETE SHALL NOT BE LESS THAN 2 INCHES AND AGGREGATE BASE COURSE SHALL NOT BE LESS THAN 6 INCHES. EXISTING PAVEMENT TO BE REMOVED SHALL 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 FIXTJRE

NOTES:
1. BILL OF MATERIALS SHALL BE AS DESCRIBED IN DETAIL OR APPROVED EQUAL BY OWNER PRIOR TO INSTALLATION.

BURNS & McDONNELL ENGINEERING COMPANY, INC.
STATE LICENSE # COA:01557

STATE OF OHIO
YEVGENIY KHISLAVSKIY
E-84164
REGISTERED
PROFESSIONAL ENGINEER
PROFESSIONAL ENG/ARCH STAMP

NO.	DATE	REVISION(S) DESCRIPTION	BY	CHK	APPD
0	01-08-2021	ISSUED FOR CONSTRUCTION	MCR	MCH	YBK

DESCRIPTION	
AREA CODE	-
ACCOUNT NUMBER	AW2128
PROJECT NUMBER	1880115
DRAWING BY	MCR
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APPROVALS	DATE	INITIALS
REGIONAL ENGINEER		
MGR TECH REC & STD		
PRINCIPAL ENGINEER	01/08/2021	YBK

DUKE ENERGY

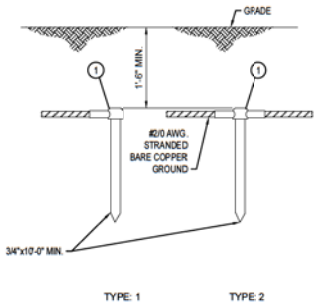
C350 PROJECT
NORWOOD C350 STATION
ELECTRICAL DETAILS: MISCELLANEOUS
HAMILTON COUNTY, OHIO

REF. DWG(S) PNG-G-004-0001043

SHEET(S) 59 OF 68	DWG SCALE AS NOTED
DWG DATE 07/11/2019	SUPERSEDED —

DRAWING NUMBER: PNG -E-004-0001060 | 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



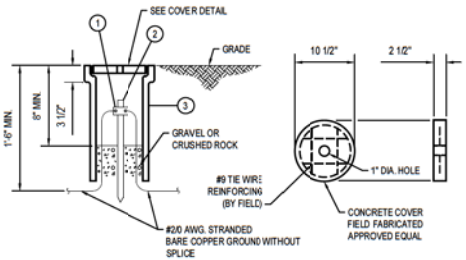
TYPE: 1 TYPE: 2

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" VITRIFIEDCLAY PIPE



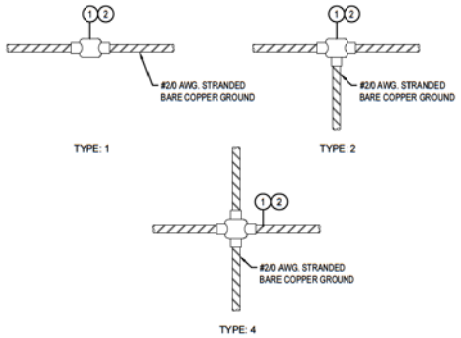
GROUND WELL ASSEMBLY COVER DETAIL

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 8CS-1 (OR) BCS-2 (OR) BCS-4

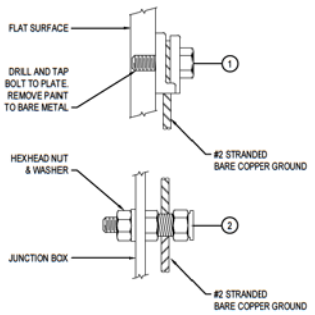


NOTES:

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# G24C-12
2	1	GROUNDING, SERVIT POST BURNDY# KC23

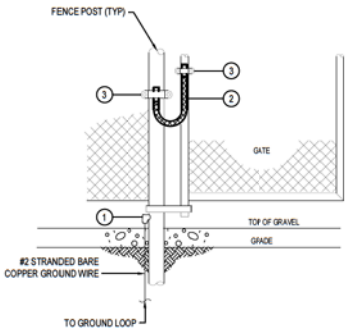


DETAIL GD-04
SCALE: N.T.S.
EQUIPMENT GROUNDING

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. THE GROUNDING SYSTEM IS SHOWN DIAGRAMMATICALLY SO THAT APPROXIMATE ROUTING OF GROUNDING CONDUCTORS AND LOCATIONS OF TAPS, WELLS AND GROUND RODS CAN BE ACCOMPLISHED.
4. WHERE GROUNDING CONDUCTORS ARE ROUTED EXPOSED, THEY MUST BE SECURED MINIMUM EVERY 24".
5. BILL OF MATERIALS SHALL BE AS DESCRIBED IN DETAIL OR APPROVED EQUAL BY OWNER PRIOR TO INSTALLATION.

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

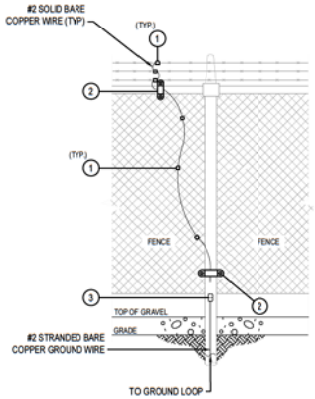


NOTES:

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

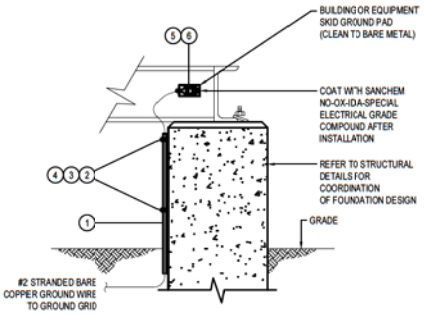


NOTES:

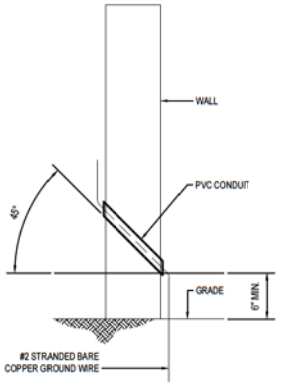
1. #6 WIRE SHALL BE LOOPED THROUGH GROUND WIRE CLAMPS AND FENCE CLAMPS TO KEEP WIRE SPLICES TO A MINIMUM.
2. REFERENCE BURNDY CATALOG FOR COMPLETE MODEL NO.

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 YA26ZLN
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 ENGINEERING COMPANY, INC.
STATE LICENSE # COA:01557

STATE OF OHIO
YEVGENIY KHISLAVSKIY
E-84164
REGISTERED
PROFESSIONAL ENGINEER
PROFESSIONAL ENGINEER STAMP

NO.	DATE	REVISION(S) DESCRIPTION	BY	CHK	APPD
0	01-08-2021	ISSUED FOR CONSTRUCTION	MCR	MCH	YBK

DESCRIPTION	
AREA CODE	-
ACCOUNT NUMBER	AW2128
PROJECT NUMBER	1880115
DRAWING BY	MCR
STATION ID	S0868O1
CHECKER INITIALS	MCH

APPROVALS		
DATE	INITIALS	
		REGIONAL ENGINEER
		MGR TECH REC & STD
01/08/2021	YBK	PRINCIPAL ENGINEER

DUKE ENERGY

C350 PROJECT
NORWOOD C350 STATION
ELECTRICAL DETAILS: GROUNDING

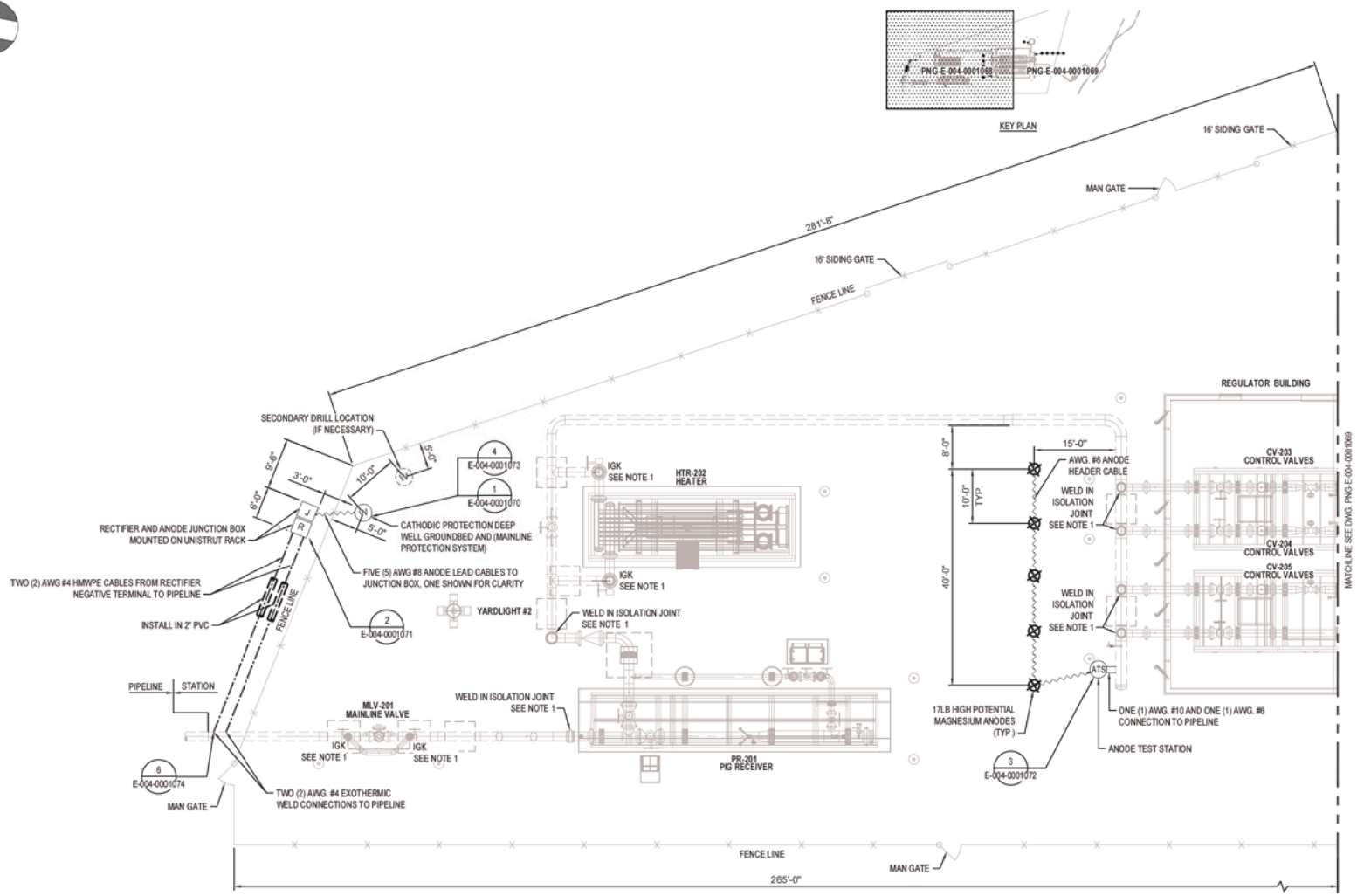
HAMILTON COUNTY, OHIO

REF. DWG(S) PNG-G-004-0001043

SHEET(S) 60 OF 68	DWG SCALE AS NOTED
DWG DATE 07/11/2019	SUPERSEDED —

DRAWING NUMBER	REVISION
PNG -E-004-0001061	0

DISCIPLINE / RESOURCE CENTER / LINE NUMBER



PLAN VIEW

SCALE: AS NOTED BELOW

NOTE:

1. INSTALL ISOLATION PROTECTION PER DWG. PNG-E-004-001073, DETAIL 5

LEGEND:

- R — RECTIFIER
- J — ANODE JUNCTION BOX
- W — CATHODIC PROTECTION ANODE DEEP WELL
- ATS — ANODE TEST STATION
- 17 LB MAGNESIUM ANODE

0 10' 20'
SCALE IN FEET

REF. DWG(S) PNG-G-004-0001043

BURNS & McDONNELL ENGINEERING COMPANY, INC.
STATE LICENSE # COA:01557

STATE OF OHIO
CHAD A BACON
PE.85438
REGISTERED PROFESSIONAL ENGINEER
1/8/2021
PROFESSIONAL ENGIARCH STAMP

NO.	DATE	REVISION(S) DESCRIPTION	BY	CHK	APPD
0	01-08-2021	ISSUED FOR CONSTRUCTION	MCR	FFO	CAB

DESCRIPTION	
AREA CODE	
ACCOUNT NUMBER	AW2128
PROJECT NUMBER	1880115
DRAWING BY	MCR
STATION ID	S0868O1
CHECKER INITIALS	FFO

APPROVALS	DATE	INITIALS	
			REGIONAL ENGINEER
			MGR. TECH REC & STD
	01/08/2021	CAB	PRINCIPAL ENGINEER

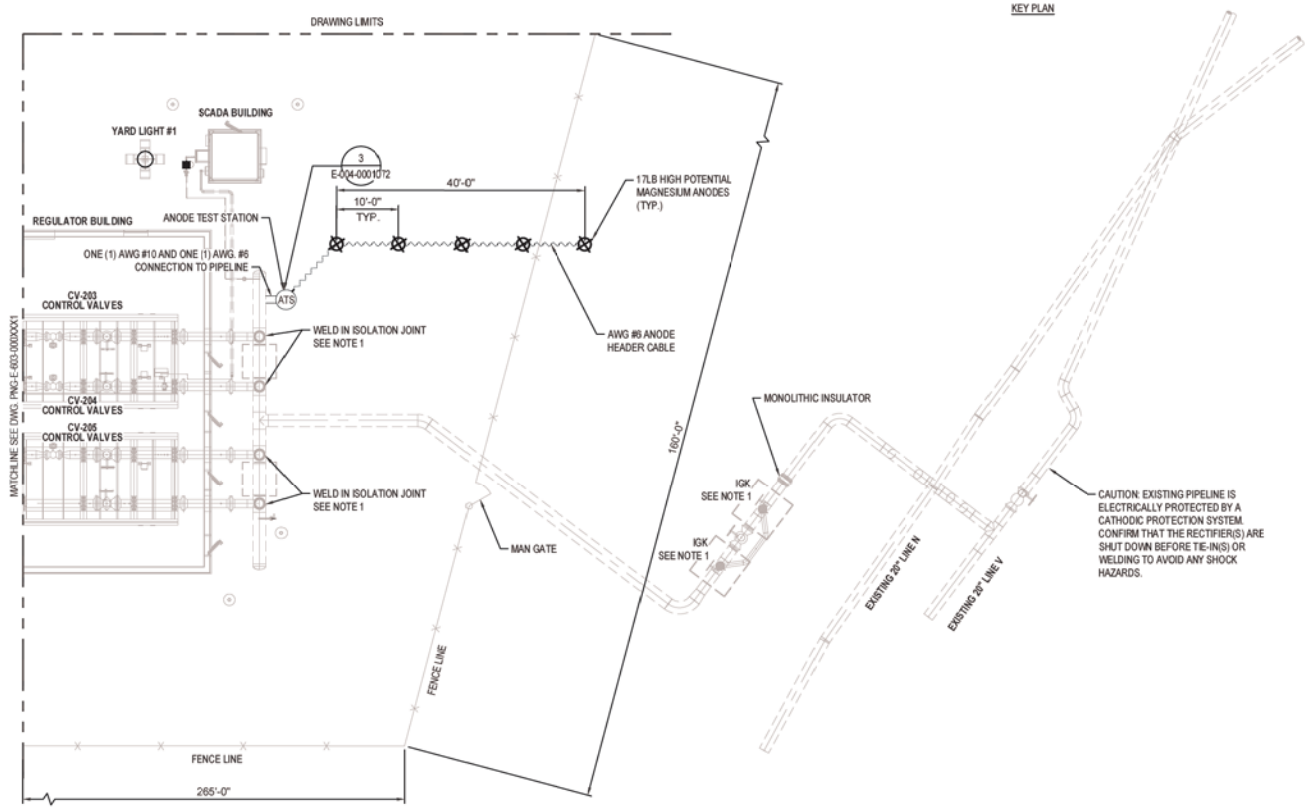
DUKE ENERGY

C350 PROJECT
NORWOOD C350 STATION
CATHODIC PROTECTION SITE PLAN 1

HAMILTON COUNTY, OHIO

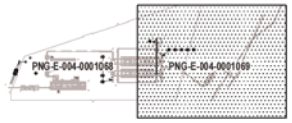
SHEET(S) 61 OF 68	DWG SCALE 1" = 10'
DWG DATE 05/04/2020	SUPERSEDED
DRAWING NUMBER	REVISION
PNG -E-004-0001068	0

DISCIPLINE / RESOURCE CENTER / LINE NUMBER



PLAN VIEW

SCALE: AS NOTED BELOW



KEY PLAN

NOTE:

1. INSTALL ISOLATION PROTECTION PER DWG. PNG-E-004-001073, DETAIL 5

LEGEND:

- R — RECTIFIER
- J — ANODE JUNCTION BOX
- W — CATHODIC PROTECTION ANODE DEEP WELL
- ATS — ANODE TEST STATION
- ⊠ — 17 LB MAGNESIUM ANODE

0 10' 20'
SCALE IN FEET

REF. DWG(S) PNG-G-004-0001043

BURNS & McDONNELL ENGINEERING COMPANY, INC.
STATE LICENSE # COA:01557

STATE OF OHIO
CHAD A BACON
PE.85438
REGISTERED PROFESSIONAL ENGINEER
1/8/2021
PROFESSIONAL ENG/ARCH STAMP

NO.	DATE	REVISION(S) DESCRIPTION	BY	CHK	APPD
0	01-08-2021	ISSUED FOR CONSTRUCTION	MCR	FFO	CAB

DESCRIPTION	
AREA CODE	
ACCOUNT NUMBER	AW2128
PROJECT NUMBER	1880115
DRAWING BY	MCR
STATION ID	S0868O1
CHECKER INITIALS	FFO

APPROVALS	DATE	INITIALS	
			REGIONAL ENGINEER
			MGR TECH REC & STD
	01/08/2021	CAB	PRINCIPAL ENGINEER

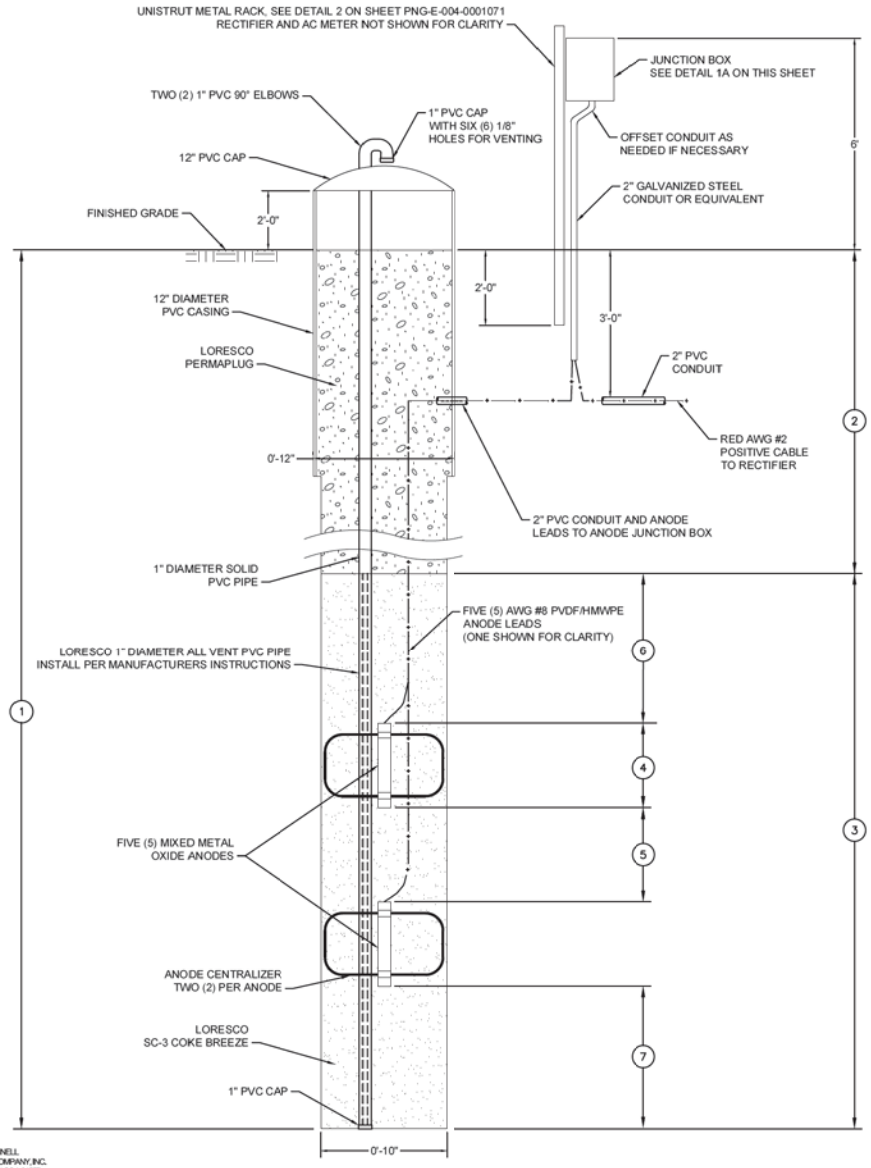
DUKE ENERGY

C350 PROJECT
NORWOOD C350 STATION
CATHODIC PROTECTION SITE PLAN 2

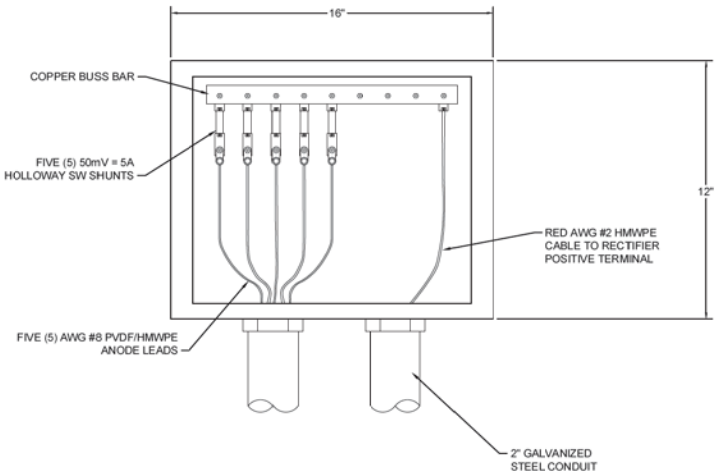
HAMILTON COUNTY, OHIO

SHEET(S) 62 OF 68	DWG SCALE 1" = 10'
DWG DATE 05/04/2020	SUPERSEDED
DRAWING NUMBER	REVISION
PNG -E-004-0001069	0

DISCIPLINE / RESOURCE CENTER / LINE NUMBER



DEEP WELL GROUNDBED
DETAIL 1
SCALE: NOT TO SCALE



ANODE JUNCTION BOX
DETAIL 1A
SCALE: NOT TO SCALE

NORWOOD STATION DEEP WELL DIMENSIONS	
1. TOTAL WELL DEPTH	180'
2. INACTIVE COLUMN LENGTH	100'
3. ACTIVE COLUMN LENGTH	80'
4. ANODE LENGTH	19.7"
5. DISTANCE BETWEEN ANODES	12'
6. DISTANCE FROM TOP OF ACTIVE COLUMN TO FIRST ANODE	12'
7. DISTANCE FROM BOTTOM OF ACTIVE COLUMN TO LAST ANODE	12'
N. NUMBER OF ANODES	5

BURNS & McDONNELL
ENGINEERING COMPANY, INC.
STATE LICENSE # COA:01557

STATE OF OHIO
CHAD A
BACON
PE.85438
REGISTERED
PROFESSIONAL ENGINEER
1/8/2021
PROFESSIONAL ENG/ARCH STAMP

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CHECKER INITIALS	FFO

APPROVALS		
DATE	INITIALS	
		REGIONAL ENGINEER
		MGR TECH REC & STD
01/08/2021	CAB	PRINCIPAL ENGINEER

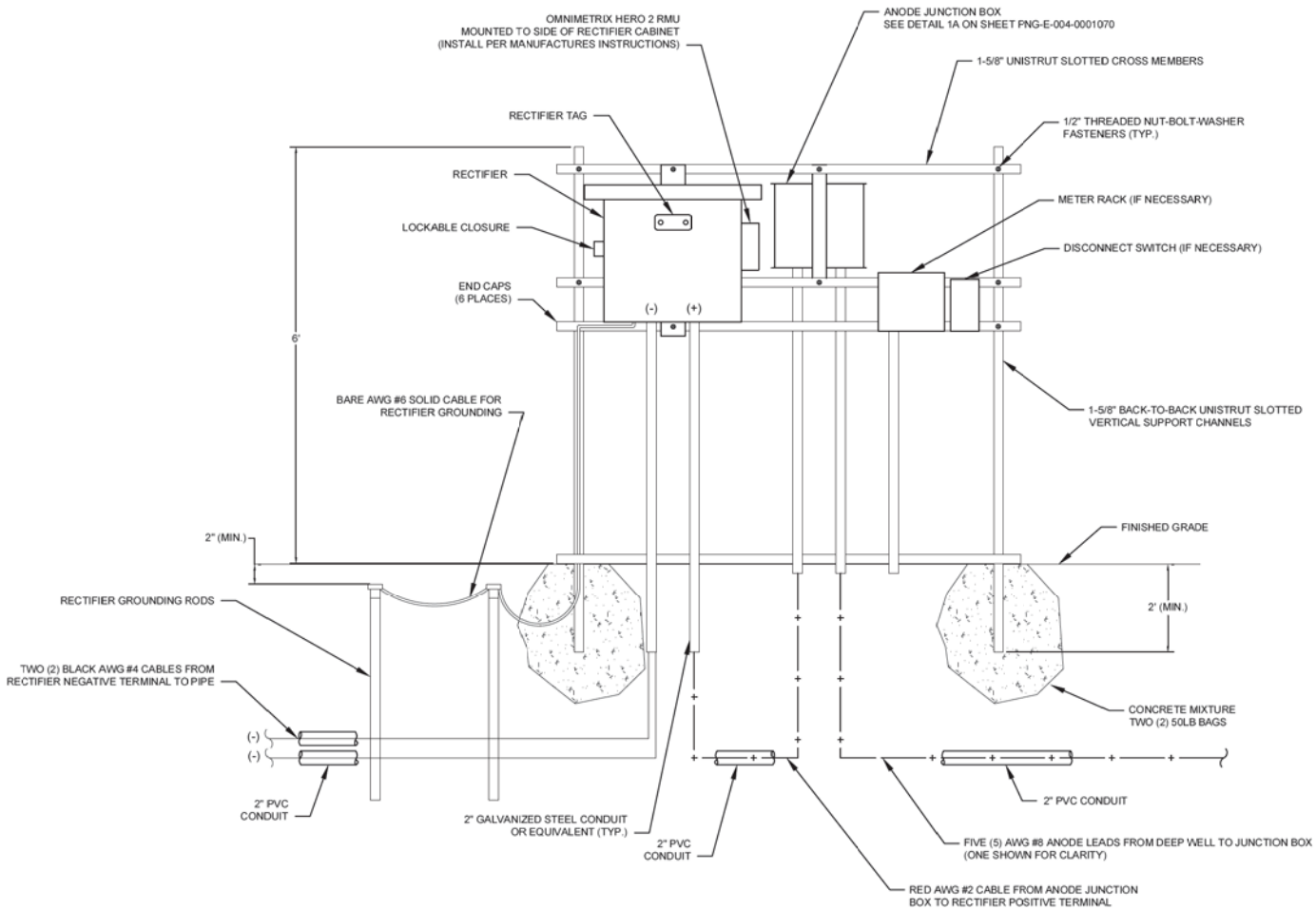
DUKE ENERGY

C350 PROJECT
NORWOOD C350 STATION
CP DEEP WELL GROUNDBED
HAMILTON COUNTY, OHIO

REF. DWG(S) PNG-G-004-0001043

SHEET(S) 63 OF 68	DWG SCALE NONE
DWG DATE 06/10/2020	SUPERSEDED

DRAWING NUMBER: PNG -E-004-0001070
REVISION: 0
DISCIPLINE / RESOURCE CENTER / LINE NUMBER



STEEL FRAME MOUNTED RECTIFIER
DETAIL 2
SCALE: NOT TO SCALE

BURNS & McDONNELL
ENGINEERING COMPANY, INC.
STATE LICENSE # COA:01557

STATE OF OHIO
CHAD A BACON
PE.85438
REGISTERED PROFESSIONAL ENGINEER
1/8/2021
PROFESSIONAL ENG/ARCH STAMP

NO.	DATE	REVISION(S) DESCRIPTION	BY	CHK	APPD
0	01-08-2021	ISSUED FOR CONSTRUCTION	MCR	FFO	CAB

DESCRIPTION	
AREA CODE	
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STATION ID	S0868O1
CHECKER INITIALS	FFO

APPROVALS	DATE	INITIALS
REGIONAL ENGINEER		
MGR TECH REC & STD		
PRINCIPAL ENGINEER	01/08/2021	CAB

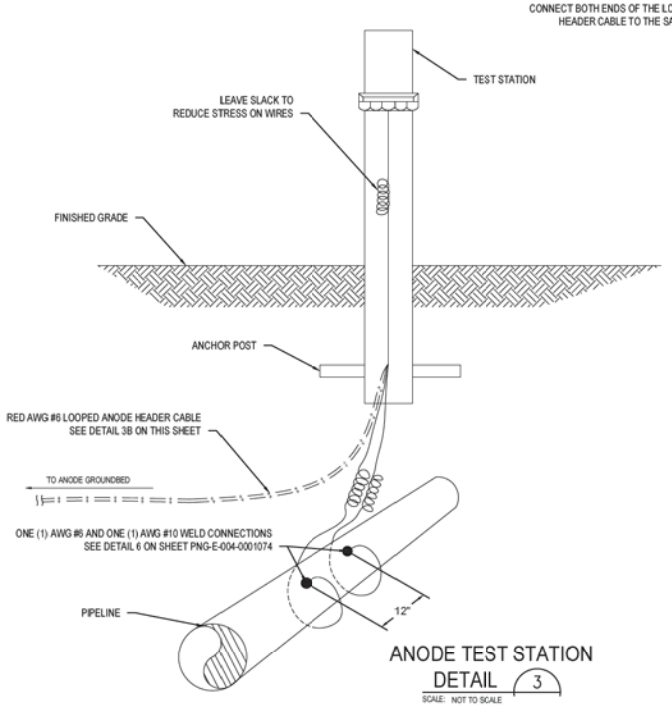
DUKE ENERGY

C350 PROJECT
NORWOOD C350 STATION
RECTIFIER
HAMILTON COUNTY, OHIO

REF. DWG(S) PNG-G-004-0001043

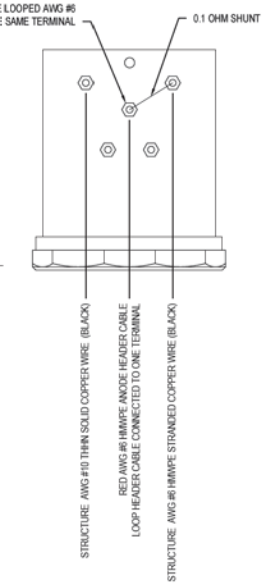
SHEET(S) 64 OF 68	DWG SCALE NONE
DWG DATE 05/04/2020	SUPERSEDED

DRAWING NUMBER: PNG -E-004-0001071
REVISION: 0
DISCIPLINE / RESOURCE CENTER / LINE NUMBER



ANODE TEST STATION DETAIL 3

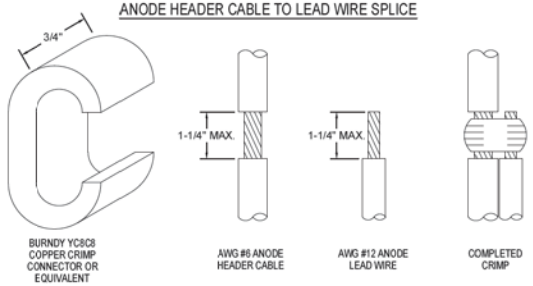
SCALE: NOT TO SCALE

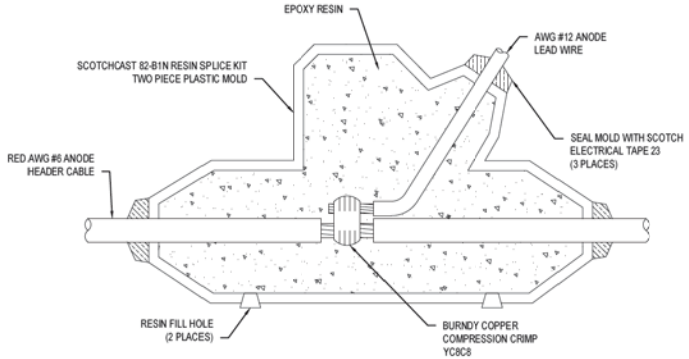


TEST STATION HEAD DETAIL 3A

SCALE: NOT TO SCALE

ANODE HEADER CABLE TO LEAD WIRE SPLICE

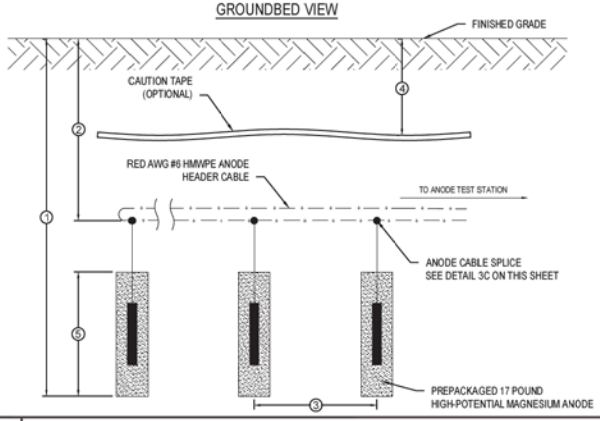




ANODE CABLE SPLICE DETAILS DETAIL 3C

SCALE: NOT TO SCALE

GROUNDBED VIEW

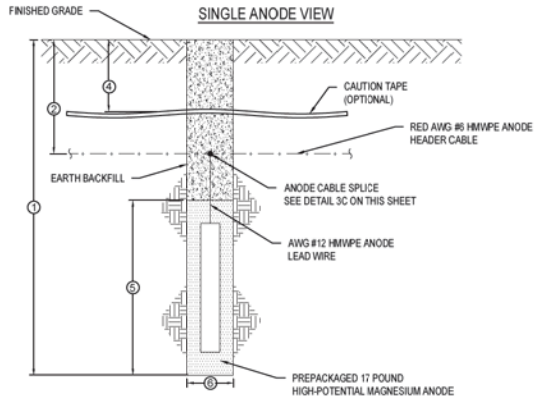


ANODE GROUNDBED SPECIFICATIONS		
1.	ANODE DEPTH	7-FT
2.	CABLE DEPTH	3-FT
3.	DISTANCE BETWEEN ANODES	10-FT
4.	WARNING TAPE DEPTH	2-FT
5.	PREPACKAGED ANODE LENGTH	29-IN
6.	PREPACKAGED ANODE DIAMETER	6.5-IN
7.	TOTAL NUMBER OF ANODES	5 PER GROUNDBED

GALVANIC ANODE GROUNDBED DETAIL 3B

SCALE: NOT TO SCALE

SINGLE ANODE VIEW



BURNS & McDONNELL ENGINEERING COMPANY, INC. STATE LICENSE # COA:01557

STATE OF OHIO — CHAD A BACON — PE.85438 — REGISTERED PROFESSIONAL ENGINEER — 1/8/2021

PROFESSIONAL ENGIARCH STAMP

NO.	DATE	REVISION(S) DESCRIPTION	BY	CHK	APPD
0	01-08-2021	ISSUED FOR CONSTRUCTION	MCR	FFO	CAB

DESCRIPTION	
AREA CODE	
ACCOUNT NUMBER	AW2128
PROJECT NUMBER	1880115
DRAWING BY	MCR
STATION ID	S0868O1
CHECKER INITIALS	FFO

APPROVALS	DATE	INITIALS	
			REGIONAL ENGINEER
			MGR TECH REC & STD
	01/08/2021	CAB	PRINCIPAL ENGINEER

DUKE ENERGY

C350 PROJECT
NORWOOD C350 STATION
ANODE TEST STATION

HAMILTON COUNTY, OHIO

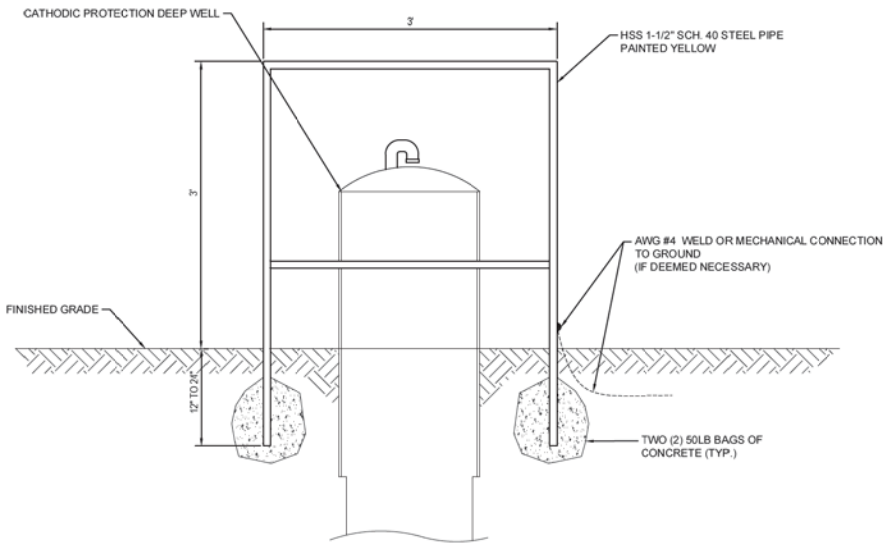
REF. DWG(S) PNG-G-004-0001043

SHEET(S) 65 OF 68 | DWG SCALE NONE

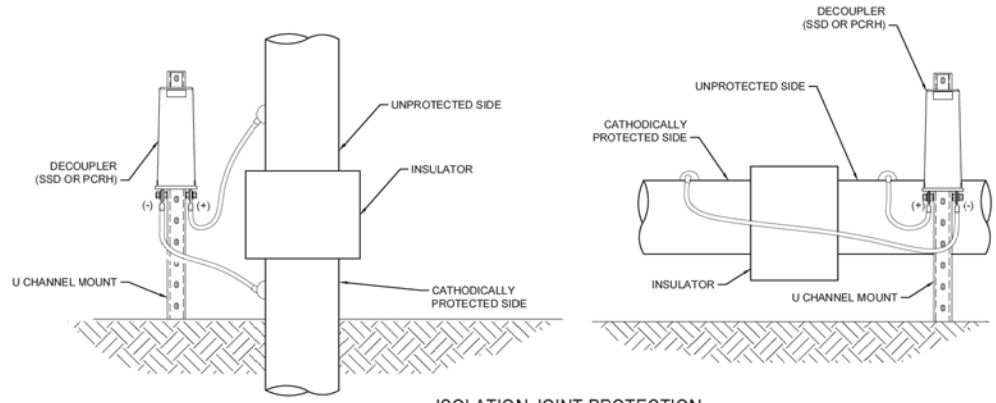
DWG DATE 05/04/2020 | SUPERSEDED

DRAWING NUMBER: PNG -E-004-0001072 | REVISION: 0

DISCIPLINE / RESOURCE CENTER / LINE NUMBER



PROTECTIVE BOLLARDS
DETAIL 4
SCALE: NOT TO SCALE



ISOLATION JOINT PROTECTION
DETAIL 5
SCALE: NOT TO SCALE

INSTALLATION NOTES:

1. AT LOCATIONS WHERE ONE SIDE OF THE FLANGE IS CATHODICALLY PROTECTED AND THE OPPOSITE SIDE OF THE FLANGE IS UNPROTECTED, CONNECT NEGATIVE TERMINAL OF DECOUPLER TO CATHODICALLY PROTECTED SIDE OF FLANGE.
2. MINIMIZE DISTANCE BETWEEN DECOUPLER AND ISOLATION JOINT TO KEEP WIRE LENGTH AS SHORT AS POSSIBLE.
3. INSTALL SSD IN CLASS 1, DIV 2 LOCATIONS
4. INSTALL PCRH IN CLASS 1, DIV 1 LOCATIONS

BURNS & McDONNELL
ENGINEERING COMPANY, INC.
STATE LICENSE # COA:01557

STATE OF OHIO
CHAD A BACON
PE.85438
REGISTERED PROFESSIONAL ENGINEER
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MGR TECH REC & STD		
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DUKE ENERGY

C350 PROJECT
NORWOOD C350 STATION
BOLLARDS & ISOLATION JOINT PROTECTION
HAMILTON COUNTY, OHIO

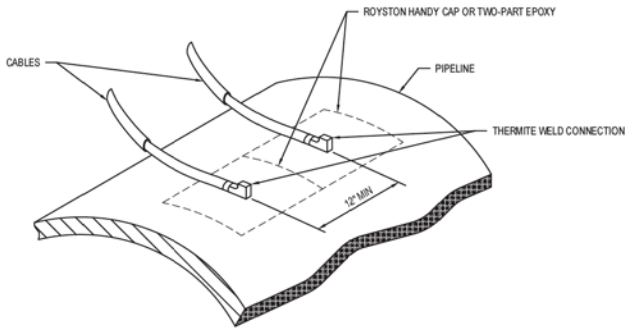
REF. DWG(S) PNG-G-004-0001043

SHEET(S) 66 OF 68	DWG SCALE NONE
DWG DATE 05/04/2020	SUPERSEDED

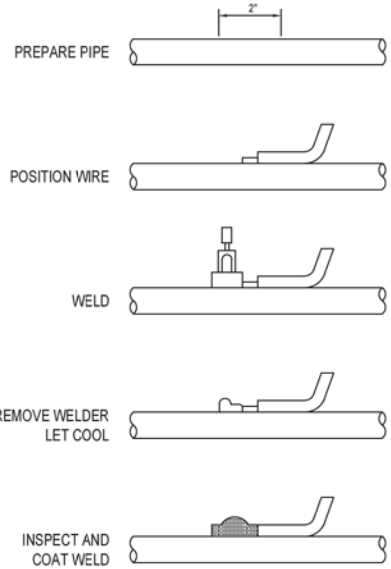
DRAWING NUMBER	REVISION
PNG -E-004-0001073	0

DISCIPLINE / RESOURCE CENTER / LINE NUMBER

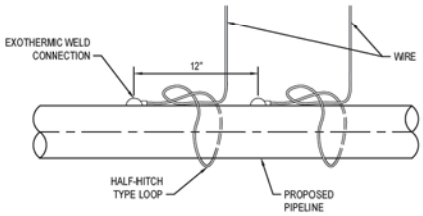
CABLE TO PIPELINE CONNECTIONS



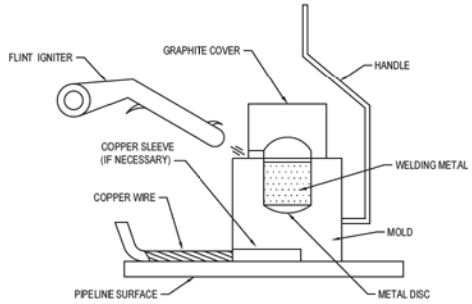
WELDING PROCEDURE



CABLE ROUTING DETAIL



WELDING MOLD SET UP



STEPS FOR PREPARING PIPELINE SURFACE

1. REMOVE A 2" SQUARE SECTION OF COATING, FILE SURFACE TO BRIGHT METAL AND DRY.
2. PIPE MUST BE TESTED FOR WALL LAMINATIONS PRIOR TO WELDING. ULTRASONIC WALL THICKNESS MEASUREMENTS MUST BE TAKEN AT THE LOCATION OF ALL WELDS, TO VERIFY ADEQUATE WALL THICKNESS.
3. WRAP TEST WIRE AROUND THE PIPE OR LEAVE ENOUGH SLACK ON THE WIRE TO REDUCE STRAIN ON WELD. NEVER WRAP CASING WIRE AROUND PIPELINE.
4. STRIP INSULATION FROM WIRE, SLIP ON COPPER SLEEVE (#10 WIRE AND SMALLER) AND CRIMP. PLACE WIRE AGAINST METAL SURFACE.
5. PLACE PREPARED WELDER OVER WIRE AND HOLD FIRMLY WHILE MAKING CONNECTION. APPLY SPARK TO SIDE OF WELDER WITH FLINT GUN.
6. REMOVE MOLD AND LET COOL.
7. AFTER WELD HAS COOLED, HIT WELD SEVERAL TIMES WITH HAMMER TO ENSURE WELD IS INTACT.
8. PROTECT WELDMENT AS REQUIRED.

STEPS FOR PREPARING WELDER

1. PLACE METAL DISC IN BOTTOM OF GRAPHITE MOLD.
2. OPEN CARTRIDGE AND POUR CHARGE IN MOLD. USE MAXIMUM 15 GRAM CHARGE.
3. SQUEEZE BASE OF CARTRIDGE AND REMOVE STARTING POWDER.
4. CLOSE COVER AND PLACE WELDER OVER WIRE.

EXOTHERMIC WELDING DETAIL 6

SCALE: NOT TO SCALE

BURNS & McDONNELL
ENGINEERING COMPANY, INC.
STATE LICENSE # COA:01557

STATE OF OHIO
CHAD A BACON
PE.85438
REGISTERED PROFESSIONAL ENGINEER
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DUKE ENERGY

C350 PROJECT
NORWOOD C350 STATION
EXOTHERMIC WELDING

HAMILTON COUNTY, OHIO

REF. DWG(S) PNG-G-004-0001043

SHEET(S) 67 OF 68	DWG SCALE NONE
DWG DATE 05/04/2020	SUPERSEDED
DRAWING NUMBER	REVISION
PNG -E-004-0001074	0

DISCIPLINE / RESOURCE CENTER / LINE NUMBER

CATHODIC PROTECTION BILL OF MATERIALS

ITEM NO	EST QTY	UOM	AS-BUILT QTY	DESCRIPTION	MAXIMO PART X	NOTES	MODEL NO	MATERIAL SOURCE
				CAD WELDS & CONNECTIONS				
1	3	PKG		CA-15 WELD METAL (20/PACK)	NON-STOCK	WELD METAL, CABLE TO PIPE CONNECTIONS	CA-15	ERICO
2	1	EA		CAHAA-1L, AWG #4 STRANDED CABLE WELDER	NON-STOCK	AWG #4 CABLE TO PIPE CONNECTION	CAHAA-1L	ERICO
3	1	EA		CAHAA-1H, AWG #6 STRANDED CABLE WELDER	NON-STOCK	AWG #6 CABLE TO PIPE CONNECTION	CAHAA-1H	ERICO
4	2	EA		CAB-133-1H, ADAPTER SLEEVE FOR AWG #10, FOR USE IN AWG #6 WELDER	NON-STOCK	AWG #10 CABLE TO PIPE CONNECTION	CAB-133-1H	ERICO
5	1	EA		FLINT IGNITOR FOR THERMITE WELDING, T320	NON-STOCK	CADWELD IGNITOR	T320	ERICO
6	6	EA		ROYSTON HANDY CAP	1552880	CABLE TO PIPE WELD PROTECTION		ROYSTON
7	1	EA		TC 7000 EPOXY COATING, TWO PART	NON-STOCK	CABLE TO PIPE WELD PROTECTION	TC 7000	TAPECOAT
8	10	EA		BURNDY YC8C8 COPPER CRIMP	NON-STOCK	ANODE HEADER CABLE TO ANODE LEAD CRIMP	YC8C8	BURNDY
9	10	EA		82-B1N RESIN SPLICE KIT	NON-STOCK	HEADER CABLE TO ANODE LEAD SPLICE KIT	82-B1N	3M
10	2	EA		SUPER 88 TAPE, 66FT ROLL	NON-STOCK	HEADER CABLE TO ANODE SPLICE PROTECTION		3M
11	2	EA		SCOTCH 23 HIGH VOLTAGE TAPE	NON-STOCK	HEADER CABLE TO ANODE SPLICE PROTECTION		3M
				WIRE				
12	200	FT		BLACK AWG #10, THHN COATED SOLID COPPER WIRE	NON-STOCK	TEST STATION TO PIPE CONNECTION		GENERIC
13	200	FT		BLACK AWG #6, HMWPE COATED STRANDED COPPER WIRE	NON-STOCK	TEST STATION TO PIPE CONNECTION		GENERIC
14	450	FT		RED AWG #6, HMWPE COATED STRANDED COPPER WIRE	NON-STOCK	ANODE HEADER CABLE		GENERIC
15	50	FT		BARE AWG #6 SOLID COPPER WIRE	NON-STOCK	RECTIFIER GROUNDING CONNECTION		GENERIC
16	350	FT		BLACK AWG #4, HMWPE COATED STRANDED COPPER WIRE	NON-STOCK	RECTIFIER TO PIPE CONNECTION		GENERIC
17	150	FT		BLACK AWG #2, HMWPE COATED STRANDED COPPER WIRE	NON-STOCK	ISOLATION JOINT PROTECTION		GENERIC
18	50	FT		RED AWG #2, HMWPE COATED STRANDED COPPER WIRE	NON-STOCK	ANODE JUNCTION BOX TO RECTIFIER POSITIVE TERMINAL CONNECTION		GENERIC
				TEST STATIONS & JUNCTION BOXES				
19	2	EA		BIG FINK 5 TERMINAL TEST STATION WITH 3" DIA. SUPPORT POST, 6' HEIGHT, YELLOW POST, YELLOW TEST HEAD	1555422	CP TEST STATION	300-BSC-Y/Y	COTT
20	2	EA		COTT SHUNT RED - 0.1 OHM, 2 AMP	NON-STOCK	ANODE TEST STATION SHUNT		COTT
21	1	EA		12" H X 16" W GALVANIZED ENCLOSURE WITH ONE (1) COPPER BUSS BAR, FIVE (5) 50 MV = 5 A HOLLOWAY SW SHUNTS, FIVE (5) KA-4C CIRCUIT LUGS FOR AWG #8 CABLE, ONE (1) KPA-25 HEADER LUG FOR AWG #2 CABLE, TWO(2) 2" STEEL CONDUIT POSTS	NON-STOCK	DEEP WELL ANODE JUNCTION BOX		UNIVERSAL
				DEEP WELL				
22	AS REQ	EA		SOLID PVC CASING, 12" DIA. X 20' LENGTHS, BELL ENDS	NON-STOCK	DEEP WELL PASSIVE ZONE PVC CASING		GENERIC
23	4	EA		ALL-VENT 1" DIA. PVC PIPE, 20' LENGTHS	NON-STOCK	DEEP WELL ACTIVE ZONE VENT PIPE		LORESCO
24	10	EA		10" VENTRALIZER (CENTRALIZER), TWO PER ANODE	NON-STOCK	ANODE CENTRALIZER	VENTRALIZER	ELTECH
25	1	EA		12" DIA. PVC CAP	NON-STOCK	DEEP WELL CAP		GENERIC
26	5	EA		1" DIA. SOLID PCV PIPE, 20' LENGTHS	NON-STOCK	DEEP WELL PASSIVE ZONE VENT PIPE		GENERIC
27	2	EA		1" DIA. PVC CAP	NON-STOCK	VENT PIPE CAP		GENERIC
28	20	EA		1" DIA. PVC COUPLINGS	NON-STOCK	VENT PIPE COUPLINGS		GENERIC
29	2	EA		1" DIA. 90 DEGREE SOLID PVC ELBOWS	NON-STOCK	VENT PIPE ELBOWS		GENERIC
30	AS REQ	FT		2" PVC CONDUIT, 20' LENGTHS	NON-STOCK	RECTIFIER/ANODE CABLE CONDUIT		GENERIC
				RECTIFIER				
31	1	EA		24V/10A AIR-COOLED RECTIFIER, TYPE: ASAI2410AACR WITH 50 MV = 10 A HOLLOWAY SW SHUNT, HOT DIPPED	NON-STOCK	RECTIFIER	ASAI5015AACR	UNIVERSAL
32	1	EA		OMNIMETRIX HERO 2 RMU	NON-STOCK	REMOTE MONITORING UNIT	HERO 2	OMNIMETRIX
33	2	EA		CONDUIT RIDGED STEEL, 2", 20' LENGTHS	NON-STOCK	RECTIFIER/JUNCTION BOX CABLE CONDUIT		GENERIC
34	8	EA		GALVANIZED STEEL CLAMPS, 2"	NON-STOCK	RECTIFIER/JUNCTION BOX CABLE CONDUIT		GENERIC
35	8	EA		LOCKNUTS, 2"	NON-STOCK	RECTIFIER/JUNCTION BOX CABLE CONDUIT		GENERIC
36	8	EA		INSULATING HUB, 2"	NON-STOCK	RECTIFIER/JUNCTION BOX CABLE CONDUIT		GENERIC
37	4	EA		GROUND ROD, 5/8" X 8' COPPER	NON-STOCK	RECTIFIER GROUNDING		GENERIC
38	4	EA		GROUND ROD CLAMP, 5/8"	NON-STOCK	RECTIFIER GROUNDING		GENERIC
39	4	EA		CONCRETE, 50LB BAG	NON-STOCK	RECTIFIER/JUNCTION RACK FOUNDATION		GENERIC
40	2	EA		1-5/8" X 3-1/4", 12 GAGE BACK-TO-BACK SLOTTED UNISTRUT, 8-FT LENGTHS	NON-STOCK	RECTIFIER RACK, VERTICAL MEMBERS	P1001T	UNISTRUT
41	4	EA		1-5/8" X 1-5/8", 12 GAGE SLOTTED UNISTRUT, 6-FT LENGTHS	NON-STOCK	RECTIFIER RACK, HORIZONTAL MEMBER	P1000T	UNISTRUT
42	6	EA		1-5/8" WHITE PLASTIC END CAPS	NON-STOCK	RECTIFIER RACK END CAPS	P2860	UNISTRUT
43	1	PKG		1/2" HEX BOLT, 1-1/2" LENGTH (50/BOX)	NON-STOCK	RECTIFIER RACK FASTENERS		GENERIC
44	1	PKG		1/2" FLAT WASHER (50/BOX)	NON-STOCK	RECTIFIER RACK FASTENERS		GENERIC
45	1	PKG		1/2" HEX NUT (50/BOX)	NON-STOCK	RECTIFIER RACK FASTENERS		GENERIC
				ANODES & BACKFILL				
46	10	EA		PACKAGED ULTRAMAG 17D3 HIGH POTENTIAL MAGNESIUM ANODE, 10FT AWG #12 CABLE	1552969	GALVANIC ANODES	17D3	FARWEST
47	5	EA		MIXED METAL OXIDE TUBULAR ANODE, 1" DIA. X 20" LENGTH WITH 220' AWG #8 PVDF/HMWPE CABLE	NON-STOCK	DEEP WELL ANODES	2.5/50	DE NORA
48	70	EA		LORESCO SC-3 (50LB BAGS)	NON-STOCK	DEEP WELL ACTIVE ZONE BACKFILL	SC-3	LORESCO
49	110	EA		LORESCO PERMAPLUG (50LB BAGS)	NON-STOCK	DEEP WELL PASSIVE ZONE BACKFILL	PERMAPLUG	LORESCO
				ISOLATION JOINT PROTECTION				
50	12	EA		SOLID STATE DECOUPLER	NON-STOCK	ISOLATION JOINT PROTECTION (CLASS 1, DIV 2)	SSD-2/2-5.0-100-R	DAIRYLAND
51	4	EA		PCRH	NON-STOCK	ISOLATION JOINT PROTECTION (CLASS 1, DIV 1)	PCRH-5KA-BCD	DAIRYLAND
52	4	EA		ACL KIT	NON-STOCK	PCRH LEAD KIT	ACL - "X"	DAIRYLAND
53	2	EA		AP KIT	NON-STOCK	PCRH ADAPTER PLATES FOR FLANGE/IGK LOCATIONS	AP - "D"	DAIRYLAND
54	16	EA		U-CHANNEL POST WITH ANCHOR, 6'	NON-STOCK	DECOUPLER MOUNTING		GENERIC
				INSULATORS				
55	1	EA		INSULATOR, MONOLITHIC, WELD, 20" NPS, FORGED STL, ASTM A105, CLASS 600, ASME B16.11, PIPE PUP STYLE, API 5L	1557522	MONOLITHIC INSULATOR		SYPRISTECHOL

NOTE: CONTRACTOR SHALL PROVIDE AND INSTALL ALL MISCELLANEOUS PARTS TO COMPLETE PROJECT PER CONTRACT DRAWINGS, CONTRACT SPECIFICATIONS, ELECTRICAL CODES, STATE AND LOCAL CODES AND STANDARDS, AND LOCAL ELECTRICAL DISTRIBUTION COMPANY REQUIREMENTS. PARTS INCLUDE, BUT ARE NOT LIMITED TO, WIRING AND MOUNTING MATERIALS, METER SOCKET, DISCONNECT EQUIPMENT, ENCLOSURES, TRANSIENT VOLTAGE SURGE SUPPRESSORS, AC MAIN BUSS TERMINATION, CIRCUIT BREAKERS, AND OTHER ELECTRICAL EQUIPMENT REQUIRED. ACTUAL LENGTH WIRING IS DEPENDENT ON DISTANCE FROM INSTALLATION.

BURNS & McDONNELL
ENGINEERING COMPANY, INC.
STATE LICENSE # COA:01557

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DUKE ENERGY

C350 PROJECT
NORWOOD C350 STATION
CATHODIC PROTECTION BOM

HAMILTON COUNTY, OHIO

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SHEET(S)	68 OF 68
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DWG DATE	05/04/2020
	SUPERSEDED
DRAWING NUMBER	PNG -E-004-0001076
REVISION	0

DISCIPLINE / RESOURCE CENTER / LINE NUMBER