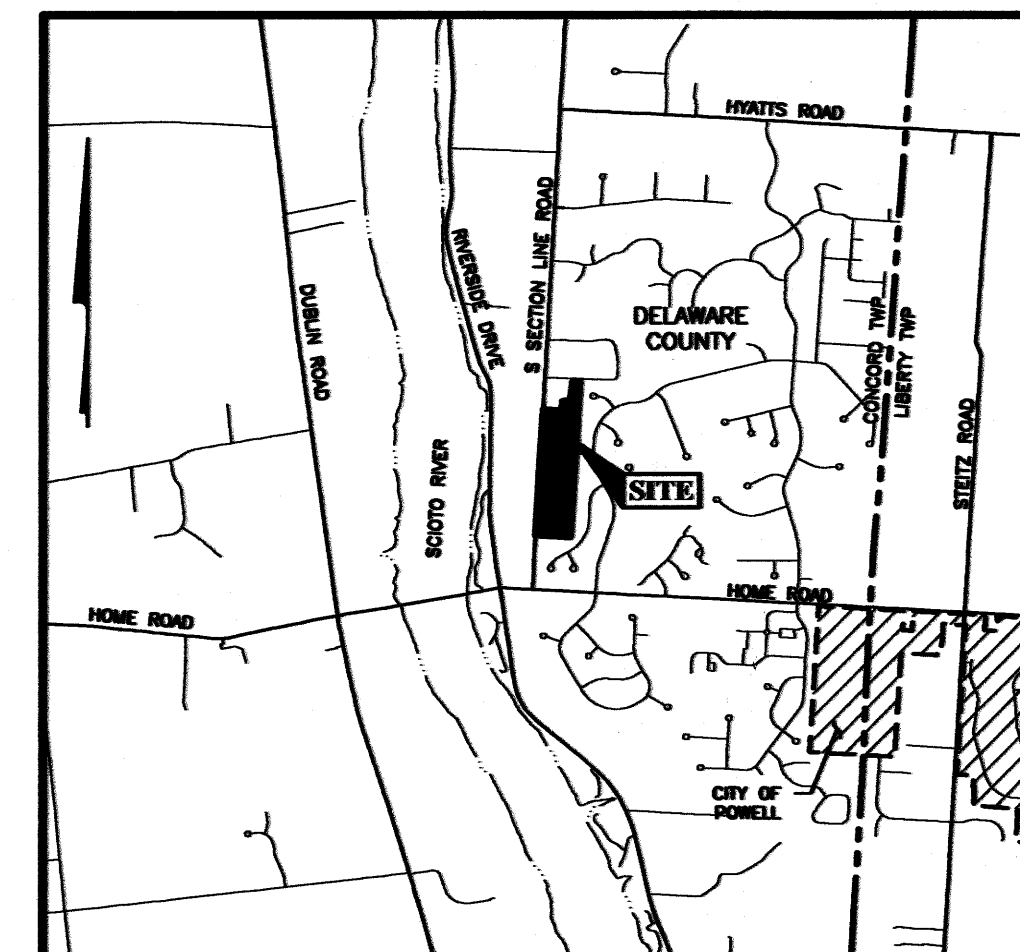


# FARM LOTS 17 & 32, QUARTER TOWNSHIP 2, TOWNSHIP 3, RANGE 19 UNITED STATES MILITARY LANDS CONCORD TOWNSHIP, DELAWARE COUNTY, OHIO SANITARY SEWER IMPROVEMENTS FOR COURTYARDS AT SOUTH SECTION LINE ROAD PUMP STATION AND FORCE MAIN 2016



VICINITY MAP  
Not to Scale

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Fax: (614) 775-4866

**DELAWARE COUNTY APPROVAL**

The signatures below signify only concurrence with the general purpose and location of the proposed improvement. All technical details remain the responsibility of the Professional Engineer who prepared and certified these plans.

Approved this 15<sup>th</sup> day of December, 2016 *M. A. Brown*  
Delaware County Sanitary Engineer

Approved this 19<sup>th</sup> day of Jan., 2016 *Chris Roseman, Jr.*  
Delaware County Engineer

Approved this \_\_\_\_\_ day of \_\_\_\_\_, 2016 \_\_\_\_\_  
County Commissioner

Approved this \_\_\_\_\_ day of \_\_\_\_\_, 2016 *Bob Lewis*  
County Commissioner

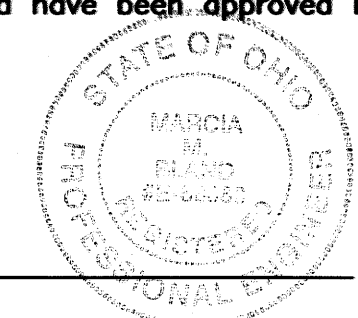
Approved this \_\_\_\_\_ day of \_\_\_\_\_, 2016 *Gay Mead*  
County Commissioner

Sheets 10 to 21 are work product performed by Others. EMH&T does not represent or warrant work provided on these sheets.

**ENGINEER'S CERTIFICATION**

This is to certify that good engineering practices have been utilized in the design of this project and that all of the minimum standards for Delaware County have been met, including those standards greater than minimum where, in my opinion, they are needed to protect the safety of the public. Any variances to the above standards are consistent with sound engineering practice and are not detrimental to the public safety and convenience. These variances have been listed herein and have been approved by the Delaware County Sanitary Engineer.

*Marcia M. Bland*  
Registered Engineer No. \_\_\_\_\_



10/4/16  
Date

**BENCH MARKS**  
(NAVD 1988)

GPS HORIZONTAL AND VERTICAL NOTES

**Source BM**  
**OPUS/NGS Horizontal**  
The coordinates shown on this map are based on the Ohio State Plane Coordinate System, North Zone, NAD 83 (2011). Said coordinates originated from a field traverse which was tied (referenced) to said coordinate system by positional solutions derived by the National Geodetic Survey's Online Positioning Users Service software using GPS observations at traverse control points numbered 201, 202, 203, 204, 205, 221, 222, 223, 224, 225, 226 and observations of selected CORS base stations in the National Spatial Reference System. The grid to ground scale factor (0.999985469792203) was applied at the location of point number 221.

**OPUS/NGS Vertical**  
The elevations shown are based on the North American Vertical Datum of 1988. Said elevations originated from positional solutions derived independently from GPS observations at traverse control points 201, 202, 203, 204, 205, 221, 222, 223, 224, 225, 226 and observations of selected CORS base stations in the National Spatial Reference System and processed by the National Geodetic Survey's Online Positioning User Service Software and the GEOD12A model. Elevations from said traverse control points were then transferred by conventional leveling procedures to the permanent benchmarks listed hereon.

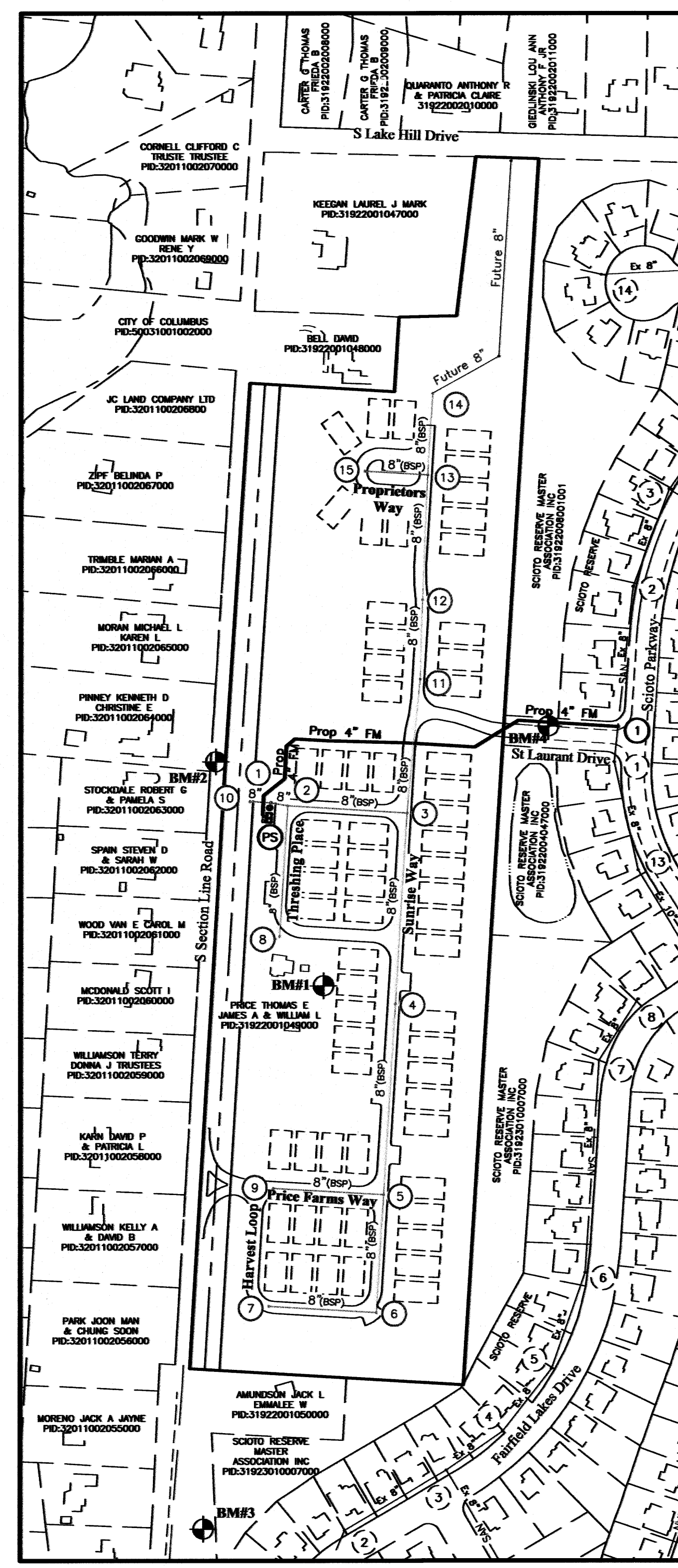
- BM#1** Railroad spike in a wooden power pole located 20 feet southwest of a wooden barn's southwest corner at South Section Line Road Residence 7337.  
Elev = 900.26 (NAVD 1988)
- BM#2** Chiseled "X" on the southeast flange bolt of a fire hydrant located between 7296 & 7258 South Section Line Road. Being on the west side of South Section Line Road.  
Elev = 895.55 (NAVD 1988)
- BM#3** West rim of a storm manhole located between second and third utility poles north of the intersection of South Section Line Road and Home Road. Being on the east side of South Section Line Road.  
Elev = 893.01 (NAVD 1988)
- BM#4** Chiseled square on the northwest corner of a storm curb inlet located on the north side of St Laurent Drive and 60 feet northeast of GPS control point number 221.  
Elev = 900.13 (NAVD 1988)

**STANDARD CONSTRUCTION DRAWINGS**

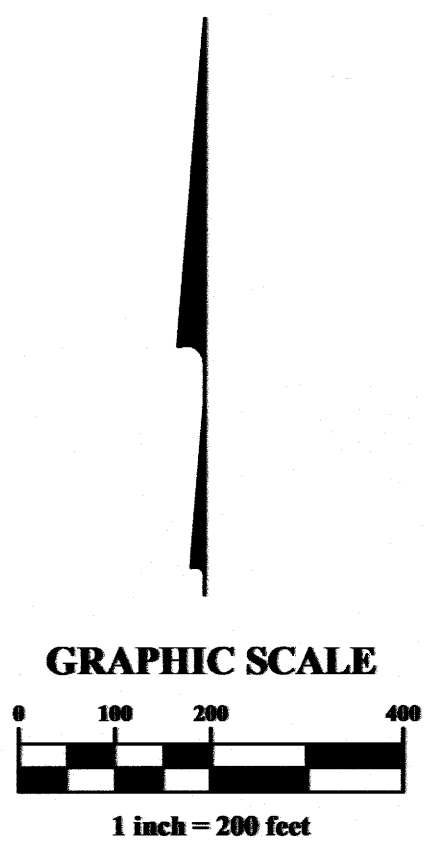
The Standard Drawings listed on these plans shall be considered a part thereof: "Preliminary Standard Plans and Specifications for Construction of Sanitary Facilities in Delaware County, Ohio"

Delaware County			
1	15	25	DCED-R100
5	20	31	
6	23	34	
14	24		

CHANGE ORDER SCHEDULE						
CHANGE	PREPARED	DATE OF CHANGE	DESCRIPTION OF CHANGE	SHEET NO.	APPROVED	DATE OF APPROVAL



INDEX MAP  
Scale: 1" = 200'



GRAPHIC SCALE  
1 inch = 200 feet

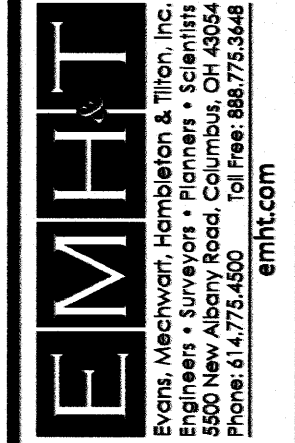


- DRAWING SET STATUS**
- PRELIMINARY ENGINEERING SET
  - COUNTY REVIEW SET
  - CONSTRUCTION DOCUMENT SET
  - AS-CONSTRUCTED DOCUMENT SET

MARK	DATE	DESCRIPTION	REVISIONS

EPCON COMMUNITIES

FARM LOTS 17 & 32, QUARTER TOWNSHIP 2, TOWNSHIP 3, RANGE 19  
UNITED STATES MILITARY LANDS  
CONCORD TOWNSHIP, DELAWARE COUNTY, OHIO  
SANITARY SEWER IMPROVEMENTS  
FOR  
COURTYARDS AT SOUTH SECTION LINE ROAD  
PUMP STATION AND FORCE MAIN  
TITLE SHEET



DATE	OCTOBER, 2016
SCALE	As Noted
JOB NO.	2014-1653
SHEET	1 / 21

**GENERAL NOTES**

THE COUNTY OF DELAWARE REQUIREMENTS, TOGETHER WITH THE SPECIFICATIONS OF THE STATE OF OHIO, DEPARTMENT OF TRANSPORTATION, INCLUDING ALL SUPPLEMENTS THERETO, SHALL GOVERN ALL CONSTRUCTION ITEMS THAT ARE A PART OF THIS PLAN. THE CONTRACTOR SHALL REFER TO THE "STANDARD PLANS AND SPECIFICATIONS FOR CONSTRUCTION OF SANITARY FACILITIES IN DELAWARE COUNTY, OHIO" FOR ALL NECESSARY CONSTRUCTION DETAILS AND SPECIFICATIONS.

APPROVAL OF THESE PLANS IS CONTINGENT UPON ALL REQUIRED SANITARY SEWER EASEMENTS BEING APPROVED BY THE COUNTY AND RECORDED PRIOR TO CONSTRUCTION.

THE CONTRACTOR SHALL NOTIFY THE COUNTY SANITARY ENGINEER'S OFFICE FORTY EIGHT (48) HOURS PRIOR TO CONSTRUCTION.

ANY MODIFICATIONS TO THE WORK AS SHOWN ON THESE DRAWINGS MUST HAVE PRIOR WRITTEN APPROVAL BY THE DELAWARE COUNTY SANITARY ENGINEER.

THE CONTRACTOR AND SUBCONTRACTOR SHALL BE SOLELY RESPONSIBLE FOR COMPLYING WITH ALL FEDERAL, STATE AND LOCAL SAFETY REQUIREMENTS, TOGETHER WITH EXERCISING PRECAUTIONS AT ALL TIMES FOR THE PROTECTION OF PERSONS (INCLUDING EMPLOYEES) AND PROPERTY. IT IS ALSO THE SOLE RESPONSIBILITY OF THE CONTRACTOR AND SUBCONTRACTOR TO INITIATE, MAINTAIN AND SUPERVISE ALL SAFETY REQUIREMENTS, PRECAUTIONS AND PROGRAMS IN CONNECTION WITH THE WORK.

SEWER TRENCHES SHALL BE DEWATERED TO 2" BELOW BELL OF PIPE PRIOR TO INSTALLATION OF PIPE.

ROOF DRAINS, FOUNDATION DRAINS AND OTHER CLEAN WATER CONNECTIONS TO THE SANITARY SEWER SYSTEM ARE PROHIBITED ON THIS PROJECT.

ANY FIELD TILE DISTURBED DURING CONSTRUCTION SHALL BE REPLACED AS DIRECTED BY THE DELAWARE COUNTY SANITARY ENGINEER WITH PVC PIPE SPANNING THE TRENCH. THE TRENCH SHALL BE FILLED WITH COMPACTED GRANULAR BACKFILL.

THE CONTRACTOR SHALL INCLUDE FOR PAYMENT THE COST OF REMOVAL AND DISPOSAL OF ALL TREES, BRUSH AND STUMPS WITHIN THE WORK LIMITS OF THE PROJECT. NO TREES OR BRUSH SHALL BE REMOVED WITHOUT PRIOR APPROVAL OF THE ENGINEER.

THE CONTRACTOR SHALL OBTAIN ALL NECESSARY PERMITS.

BACKFILLING IS PER DELAWARE COUNTY ENGINEER STANDARD DRAWING DCED-R100 (SHEET 4). THE COST FOR ALL COMPACTED BACKFILL SHALL BE INCLUDED IN THE PRICE BID FOR THE VARIOUS ITEMS.

WHEREVER A WATER MAIN AND SEWER MUST CROSS, THE WATER MAIN SHALL BE SUCH AN ELEVATION THAT CROWN OF THE SEWER IS AT LEAST 1.5 FEET MINIMUM, MEASURED BETWEEN THE OUTSIDE PIPE WALLS, BELOW THE BOTTOM OF THE WATER MAIN.

THE SANITARY SEWER SHALL BE TESTED BY THE EXFILTRATION METHOD. ALLOWABLE LEAKAGE SHALL NOT EXCEED 100 GALLONS PER INCH OF PIPE DIAMETER PER MILE OF PIPE PER 24 HOURS. CONTRACTOR SHALL COOPERATE WITH DELAWARE COUNTY SANITARY ENGINEER AND PROVIDE ALL NECESSARY EQUIPMENT TO PERFORM SEWER TEST.

WHEN PVC PIPE IS USED A DEFLECTION TEST SHALL BE PERFORMED. PIPE DEFLECTION SHALL NOT EXCEED 5% IF TESTED AFTER 30 DAYS, OR 7.5% IF TESTED AFTER 90 DAYS FROM THE TRENCH BEING BACKFILLED TO FINISHED GRADE. THE METHOD OF TESTING SHALL BE SUBJECT TO APPROVAL OF THE DELAWARE COUNTY SANITARY ENGINEER. IF RIGID BALLS OR MANDRELS ARE USED TO TEST THE PIPE DEFLECTION, NO MECHANICAL PULLING DEVICES SHALL BE USED. ANY LINES WHICH FAIL THE TEST MUST BE REPAIRED AND RETESTED.

FINAL CONNECTION SHALL NOT BE MADE TO THE RECEIVING SANITARY SEWER SYSTEM UNTIL THE PROJECT HAS BEEN FULLY INSTALLED, TESTED, AND APPROVAL HAS BEEN GRANTED BY THE DELAWARE COUNTY SANITARY ENGINEER.

THE DELAWARE COUNTY SANITARY ENGINEER'S OFFICE SHALL HAVE AUTHORITY OVER ALL SANITARY SEWER ITEMS ASSOCIATED WITH THIS PLAN.

CONSTRUCTION ENTRANCE SHALL BE INSTALLED PER THE EROSION PLAN PRIOR TO SEWER CONSTRUCTION.

A PRE-CONSTRUCTION MEETING SHALL BE HELD 14 DAYS PRIOR TO CONSTRUCTION, AND DELAWARE COUNTY REGIONAL SEWER DISTRICT, AMONG OTHERS, SHALL BE CONTACTED.

PIPE SPECIFICATION FOR THE PLAN IMPROVEMENTS SHALL BE IN ACCORDANCE WITH THE FOLLOWING:

- FORCE MAIN (TRENCHED): DUCTILE IRON PIPE AS PER AWWA C151 CL 53. MECHANICAL AND PUSH-ON JOINTS SHALL BE AS PER AWWA C111.
- FORCE MAIN (TRENCHED): PVC PIPE AS PER AWWA C900 OR AWWA C905, MINIMUM SDR 21. JOINTS SHALL BE AS PER ASTM D3139.

ALL EXISTING INVERTS ALONG WITH THE PROPOSED TOP OF CASTING ELEVATIONS SHALL BE VERIFIED BY THE CONTRACTOR PRIOR TO CONSTRUCTION OF THE SEWER.

THE CONTRACTOR SHALL MAKE ALLOWANCE IN HIS BID FOR POSSIBLE ADJUSTMENT OF LEVEL OF MANHOLE TOPS AND SHALL RECEIVE NO ADDITIONAL COMPENSATION BECAUSE OF ANY SUCH ADJUSTMENTS THAT ARE REQUIRED TO BE MADE.

ALL MANHOLE LIDS SHALL BE IN ACCORDANCE WITH DELAWARE SANITARY STANDARD DRAWING #34, PLATEN LID WITH DELAWARE COUNTY LOGO.

**SITE VISIT**

THE CONTRACTOR SHALL PERFORM FIELD RECONNAISSANCE TO BECOME ACQUAINTED WITH THE EXISTING SITE CONDITIONS AND THE POTENTIAL AFFECTS UPON THE WORK SCOPE. ANY PERFORMANCE OF ADDITIONAL SITE SUBSURFACE INVESTIGATIONS (TEST HOLES) SHALL BE COORDINATED IN ADVANCE WITH THE OWNER AS WARRANTED. EXCAVATED MATERIAL SHALL BE REPLACED IN A CONTROLLED MANNER TO MINIMIZE IMPACT ON FIELD EARTHWORK OPERATIONS.

**RIGHTS-OF-WAY**

IN ADDITION TO DIRECT REQUIREMENTS OF THE CONTRACT SPECIFICATIONS, THE CONTRACTOR SHALL OBSERVE AND CONFORM TO THE SPECIFIC REQUIREMENTS OF ALL RIGHTS-OF-WAY INCLUDING EASEMENTS, COURT ENTRIES, RIGHTS-OF-ENTRY OR ACTION FILED IN COURT IN ACCORDANCE WITH THE CODE OF APPLICABLE GOVERNING AGENCY. THE COST OF THE OPERATIONS NECESSARY TO FULFILL SUCH REQUIREMENTS SHALL BE INCLUDED IN THE PRICE BID FOR THE SANITARY SEWER IMPROVEMENTS.

**CONSTRUCTION LAYOUT**

ALL CONSTRUCTION LAYOUT STAKES FOR THE SANITARY SEWER REFERENCED AS A PART OF THIS PLAN IMPROVEMENT SHALL BE PROVIDED BY THE OWNER'S REPRESENTATIVE.

THE CONTRACTOR SHALL CAREFULLY PRESERVE BENCH MARKS, PROPERTY CORNERS, REFERENCE POINTS, STAKES AND OTHER SURVEY REFERENCE MONUMENTS OR MARKERS. IN CASE OF WILLFUL OR CARELESS DESTRUCTION, THE CONTRACTOR SHALL BE RESPONSIBLE FOR RESTORATIONS. RESETTling OF MARKERS SHALL BE PERFORMED BY AN OHIO PROFESSIONAL SURVEYOR AS APPROVED BY THE ENGINEER.

**EXISTING UTILITIES**

THE IDENTITY AND LOCATION OF THE EXISTING UNDERGROUND UTILITY FACILITIES KNOWN TO BE LOCATED IN THE CONSTRUCTION AREA, AS PROVIDED BY THE OWNER OF THE UNDERGROUND UTILITY, HAVE BEEN SHOWN ON THE PLANS AS ACCURATELY AS POSSIBLE.

DELAWARE COUNTY AND/OR THE ENGINEER ASSUMES NO RESPONSIBILITY TO THE ACCURACY OR THE DEPTHS OF THE UNDERGROUND FACILITIES SHOWN ON THE PLANS.

INVESTIGATION, LOCATION, SUPPORT, PROTECTION AND RESTORATION OF ALL EXISTING UTILITIES AND APPURTENANCES SHALL BE THE RESPONSIBILITY OF THE CONTRACTOR. THIS WORK INCLUDES MAINTENANCE OF ADEQUATE DEPTH ON ALL EXISTING UTILITY FACILITIES. THE CONTRACTOR IS RESPONSIBLE TO IDENTIFY AND COORDINATE FIELD STAKEOUT OF ALL LOCATIONS OF POSSIBLE GRADE CONFLICTS WITH EXISTING UTILITIES PRIOR TO CONSTRUCTION. THE COST OF THIS WORK SHALL BE INCLUDED IN THE BID PRICE FOR THE SANITARY SEWER IMPROVEMENTS.

THE CONTRACTOR SHALL BE RESPONSIBLE FOR COORDINATING THE RELOCATION AND/OR PROTECTION OF ANY UTILITIES AS REQUIRED BY THE PLAN WITH THE OWNER OF THE AFFECTED UTILITY.

PRIVATE UTILITY MANHOLES WITHIN THE LIMITS OF THE WORK SHALL BE READJUSTED TO GRADE BY THE RESPECTIVE UTILITY.

UTILITY POLES WITHIN THE INFLUENCE OF THE UTILITY OPERATIONS SHALL BE REINFORCED BY THE UTILITY COMPANY PRIOR TO THESE CONSTRUCTION ACTIVITIES. NOTIFICATION OF THE UTILITY COMPANY PRIOR TO CONSTRUCTION SHALL BE THE RESPONSIBILITY OF THE CONTRACTOR.

THE FOLLOWING UTILITIES AND OWNERS ARE LOCATED WITHIN THE WORK LIMITS OF THIS PROJECT AND DO NOT SUBSCRIBE TO A REGISTERED UNDERGROUND UTILITY PROTECTION SERVICE:

UTILITY	CONTACTING AGENT	TELEPHONE
SANITARY SEWER FACILITIES:	DELAWARE COUNTY SANITARY ENGINEER 50 CHANNING STREET DELAWARE, OH 43015	(740)833-2240
WATER FACILITIES:	DEL-CO WATER COMPANY 6773 OLENTANGY RIVER ROAD DELAWARE, OH 43015	(740)548-7746
STORM SEWER FACILITIES:	DELAWARE COUNTY 50 CHANNING STREET DELAWARE, OH 43015	(740)833-2400
ELECTRIC:	AMERICAN ELECTRIC POWER BRENT GATES 850 TECH CENTER DRIVE GAHANNA, OH 43230	(614)883-6802
GAS:	COLUMBIA GAS ROBERT COLDWELL 1600 DUBLIN ROAD COLUMBUS, OH 43215	(614)481-1057
TELEPHONE:	FRONTIER COMMUNICATIONS COURTNEY MURPHY 1300 COLUMBUS SANDUSKY ROAD MARION, OH 43302	(614)369-0826
CABLE:	TIME WARNER CABLE RAY MAUER 3760 INTERCHANGE DRIVE COLUMBUS, OH 43204	(614)481-5262

**TRAFFIC**

ALL TRAFFIC CONTROL DEVICES SHALL BE FURNISHED, ERECTED, MAINTAINED AND REMOVED BY THE CONTRACTOR IN ACCORDANCE WITH THE "OHIO MANUAL OF UNIFORM TRAFFIC CONTROL DEVICES FOR CONSTRUCTION AND MAINTENANCE OPERATIONS", COPIES OF WHICH ARE AVAILABLE FROM THE OHIO DEPARTMENT OF TRANSPORTATION, BUREAU OF TRAFFIC, 400 E. WILLIAM STREET, DELAWARE, OHIO 43015.

ALL PERMANENT TRAFFIC CONTROLS NOT IN CONFLICT WITH THE TEMPORARY TRAFFIC CONTROLS SHALL BE MAINTAINED THROUGHOUT THIS PROJECT BY THE CONTRACTOR. PERMANENT TRAFFIC CONTROLS MAY BE TEMPORARILY RELOCATED, AS APPROVED BY THE ENGINEER. THE CONTRACTOR SHALL ASSUME ALL LIABILITY FOR MISSING, DAMAGED AND IMPROPERLY PLACED SIGNS.

THE CONTRACTOR SHALL BE RESPONSIBLE FOR THE REINSTALLATION AND/OR REPLACEMENT OF ALL PERMANENT TRAFFIC CONTROL DEVICES DAMAGED OR REMOVED DURING THE CONSTRUCTION. PERMANENT TRAFFIC CONTROL NO LONGER IN CONFLICT WITH TEMPORARY TRAFFIC CONTROL SHALL BE REPLACED IMMEDIATELY.

INGRESS AND EGRESS SHALL BE MAINTAINED AT ALL TIMES TO PUBLIC AND PRIVATE PROPERTY.

PAYMENT FOR ALL TRAFFIC MAINTENANCE ITEMS SHALL BE INCLUDED WITHIN THE PRICE BID FOR THE SANITARY SEWER IMPROVEMENTS.

**SOILS REPORT**

REFERENCE IS MADE TO SUBSURFACE INVESTIGATIONS PREPARED BY GEOTECHNICAL CONSULTANTS, INC., DATED JULY 3, 2014, FOR THE DEVELOPMENT SITE. THE RECOMMENDATIONS PRESENTED ARE PROVIDED AS A PART OF THE SPECIFICATIONS FOR THE IMPROVEMENT WORK. THE RECOMMENDATIONS SERVE AS THE PROJECT GUIDELINES AND ARE NOT INTENDED TO LIMIT THE DESIGN OR THE WORK PRODUCT.

**ROCK EXCAVATION**

THIS WORK SHALL BE DEFINED IN ACCORDANCE WITH THE DELAWARE COUNTY SPECIFICATIONS. REFERENCE THE SOILS REPORT FOR DISCUSSION OF GENERAL GEOTECHNICAL EVALUATION.

THE CONTRACTOR SHALL EXAMINE THE SOILS REPORT PRIOR TO BIDDING TO DETERMINE IF ANY ROCK OR SHALE EXCAVATION WILL BE REQUIRED.

UNSUITABLE AND SURPLUS MATERIAL, INCLUDING ROCK AND SHALE, SHALL BE DISPOSED OF IN ACCORDANCE WITH THE "DISPOSAL OF EXCESS EXCAVATION AND TOPSOIL MATERIALS" NOTES.

COST FOR THE ABOVE WORK SHALL BE INCLUDED IN THE PRICE BID FOR ITEM SPEC - ROCK EXCAVATION.

**SITE CLEARING**

CLEARING & GRUBBING MAY BE REQUIRED AS A PART OF THIS CONTRACT IMPROVEMENT WORK. THIS WORK SHALL BE INCLUDED AS PART OF THE OVERALL CLEARING WORK FOR THE COURTYARD AT PRICE FARMS SITE IMPROVEMENTS.

THE CONTRACTOR SHALL FIELD REVIEW THE EXTENT OF SITE CLEARING WITH THE OWNER AND/OR ENGINEER. NO CLEARING SHALL BE PERFORMED UNTIL FORMAL AUTHORIZATION HAS BEEN OBTAINED FROM THE OWNER.

ESTABLISHMENT OF THIS WORK SHALL INCLUDE THE OFFSITE REMOVAL AND DISPOSAL OF ALL STUMPS AND CLEARING DEBRIS UNLESS OTHERWISE DIRECTED BY THE OWNER.

**TEMPORARY SOIL EROSION AND SEDIMENT CONTROL**

EROSION AND SEDIMENTATION CONTROL HAS BEEN ESTABLISHED THROUGHOUT THE PROJECT

LIMITS AS A PART OF THE STORMWATER POLLUTION PREVENTION PLAN PREPARED FOR THE COURTYARDS AT SOUTH SECTION LINE ROAD PHASE 1 & 2 SITE IMPROVEMENTS PLAN. GENERAL MAINTENANCE OF THE EXISTING EROSION AND SEDIMENTATION CONTROL FEATURES SHALL BE THE OBLIGATION OF THE EARTHWORK CONTRACTOR.

THE SITE UTILITY CONTRACTOR SHALL BE RESPONSIBLE FOR SUPPLEMENTING AND/OR REPLACING SITE EROSION AND SEDIMENTATION CONTROL AS REQUIRED TO ACCOMMODATE INSTALLATION OF THE SANITARY SEWER. TEMPORARY REMOVAL OF THE EROSION AND SEDIMENTATION CONTROL FEATURES SHALL BE COORDINATED WITH THE CONSTRUCTION MANAGER.

EROSION AND SEDIMENT CONTROL MEASURES ARE REQUIRED AS A PART OF THIS PROJECT. EROSION AND SEDIMENT CONTROL MEASURES SPECIFIC TO THIS SITE MAY BE FOUND ON THE SITE IMPROVEMENTS PLAN.

LAND-DISTURBING ACTIVITIES MUST COMPLY WITH ALL PROVISIONS OF DELAWARE COUNTY. ALL LAND-DISTURBING ACTIVITIES SHALL BE SUBJECT TO INSPECTION AND SITE INVESTIGATION BY DELAWARE COUNTY AND THE OHIO EPA. FAILURE TO COMPLY WITH THESE REGULATIONS IS SUBJECT TO LEGAL ENFORCEMENT ACTION.

THE DELAWARE COUNTY SANITARY ENGINEER'S OFFICE SHALL RECEIVE A COPY OF THE SWPPP THAT HAS BEEN APPROVED BY THE GOVERNING STORMWATER AUTHORITY (I.E. DELAWARE COUNTY ENGINEER'S OFFICE, CITY OF POWELL, VILLAGE OF SUNBURY, ETC.) PRIOR TO THE PRECONSTRUCTION MEETING FOR THE SANITARY SEWER. ADDITIONAL EROSION AND SEDIMENTATION CONTROLS MAY BE REQUIRED AT THE DISCRETION OF THE DELAWARE COUNTY SANITARY ENGINEER BEFORE AND/OR DURING CONSTRUCTION ACTIVITIES.

**DEWATERING**

ALL EXCAVATION, CONSTRUCTION, AND BACKFILL OF PIPES AND STRUCTURES TO BE CONSTRUCTED UNDER THIS CONTRACT SHALL BE CONSTRUCTED UNDER DRY CONDITIONS. THE CONTRACTOR SHALL MAINTAIN ALL EXCAVATIONS IN A DEWATERED, WORKABLE CONDITION, AND PROPER DEWATERING MEASURES SHALL BE TAKEN AS DICTATED BY FIELD CONDITIONS. IN ORDER TO MINIMIZE UNSTABLE SUBGRADE CONDITIONS IN TRENCH BOTTOMS, WATER LEVELS SHALL BE LOWERED A MINIMUM OF 2 FEET BELOW THE PLANNED EXCAVATION LEVELS. THE CONTRACTOR SHALL SUBMIT A DEWATERING PLAN TO THE DESIGN ENGINEER AND THE SANITARY ENGINEER FOR REVIEW AND APPROVAL PRIOR TO ANY CONSTRUCTION OR DEWATERING ACTIVITIES.

THE CONTRACTOR IS RESPONSIBLE TO PROVIDE ALL DEWATERING OPERATIONS AS REQUIRED TO ACCOMPLISH THE PROPOSED CONSTRUCTION OPERATIONS. REFERENCE THE SOILS REPORT FOR GROUND WATER CONSIDERATIONS.

INSTALLATION OF ANY WELL, WELL POINT, PIT OR OTHER DEVICE USED FOR THE PURPOSE OF REMOVING GROUNDWATER FROM AN AQUIFER SHALL BE IN ACCORDANCE WITH THE APPLICABLE REQUIREMENTS OF THE OHIO DEPARTMENT OF NATURAL RESOURCES.

IT IS THE CONTRACTOR'S RESPONSIBILITY TO ENSURE THAT TURBID WATER ENCOUNTERED WITHIN THE UTILITY TRENCH SHALL BE MANAGED APPROPRIATELY ON SITE. ALL TURBID WATER SHALL BE PUMPED INTO A SEDIMENT CONTROL STRUCTURE SUCH AS A SEDIMENT TRAP OR BASIN.

THE USE OF FILTER BAGS IS NOT PERMITTED WITHOUT A DETAILED SITE LAYOUT AND VEGETATIVE BUFFERS. A FIFTY FOOT (50') MINIMUM VEGETATIVE BUFFER BETWEEN THE FILTER BAG AND A STORMWATER CONVEYANCE SYSTEM MUST BE PRESENT IN ORDER TO USE FILTER BAGS AS A SEDIMENT CONTROL FEATURE DURING DEWATERING OPERATIONS. FILTER BAGS USED ON SITE SHALL REQUIRE ADDITIONAL SEDIMENT CONTROL FEATURES IN ORDER TO PROPERLY MANAGE THE TURBID WATER ASSOCIATED WITH TRENCH DEWATERING ACTIVITIES.

THE CONTRACTOR SHALL CONTACT THE ENGINEER FOR CONSULTATIVE SERVICES PRIOR TO TRENCH DEWATERING OPERATIONS.

THE CONTRACTOR SHALL BE RESPONSIBLE TO PLACE AND MAINTAIN THE NECESSARY SEDIMENT CONTROL MEASURES TO FILTER THE DEWATERING DISCHARGE. COST FOR THE ABOVE SHALL BE INCLUDED IN THE BID PRICE FOR THE VARIOUS SANITARY SEWER IMPROVEMENTS.

THE CONTRACTOR SHALL PROVIDE POTABLE WATER TO THE NEARBY RESIDENCE(S) IF DURING CONSTRUCTION OF THE PROJECT, THE WATER WELLS BELONGING TO THE RESIDENCE(S) ARE DE-WATERED. IF THE WELL IS UNABLE TO BE RECOMMISSIONED, A TAP TO A WATERLINE SHALL BE PROVIDED IF AVAILABLE OR A ANOTHER WELL DUG, AT NO COST TO THE RESIDENT(S), ENGINEER, OWNER OR THE COUNTY.

COST FOR THE ABOVE WORK SHALL BE INCLUDED IN THE PRICE BID FOR ITEM SPEC - DEWATERING.

**MAINTAIN DRAINAGE**

THE FLOW IN ALL SEWERS, DRAINS, FIELD TILES AND WATERCOURSES ENCOUNTERED SHALL BE MAINTAINED BY THE CONTRACTOR AT HIS EXPENSE, AND WHENEVER SUCH WATERCOURSES AND DRAINS ARE DISTURBED OR DESTROYED DURING THE PROSECUTION OF THE WORK, THEY SHALL BE RESTORED BY THE CONTRACTOR AT HIS OWN COST AND EXPENSE TO A CONDITION SATISFACTORY TO THE CONSTRUCTION MANAGER.

**REPLACEMENT OF TILE AND STORM SEWER**

ALL DRAIN TILE AND STORM SEWERS DAMAGED, DISTURBED, OR REMOVED AS A RESULT OF THE CONTRACTOR'S OPERATIONS SHALL BE REPLACED WITH PVC PIPE SPANNING THE TRENCH, MAINTAINING THE SAME GRADIENT AS EXISTING. THE DRAIN TILE AND/OR STORM SEWER SHALL BE CONNECTED TO THE CURB SUBDRAIN, STORM SEWER SYSTEM OR PROVIDED WITH AN OUTLET INTO THE ROADWAY DITCH AS APPLICABLE. DELAWARE COUNTY SHALL BE CONTACTED IMMEDIATELY. REPLACED DRAIN TILE/STORM SEWER SHALL BE LAID ON COMPACTED BEDDING EQUAL IN DENSITY TO SURROUNDING STRATUM AND BACKFILLED WITH COMPACTED GRANULAR MATERIAL. COST OF THIS WORK TO BE INCLUDED IN THE PRICE BID FOR THE VARIOUS SANITARY SEWER IMPROVEMENTS.

**NON-RUBBER TIRED VEHICLES**

NON-RUBBER TIRED VEHICLES SHALL NOT BE MOVED ON PUBLIC STREETS, PRIVATE ROADWAYS OR PARKING LOTS. NO EXCEPTIONS SHALL BE GRANTED.

**STORAGE OF EQUIPMENT AND MATERIALS**

NO MATERIALS OR EQUIPMENT SHALL BE STORED WITHIN THE RIGHT-OF-WAY OR WITHIN ONE HUNDRED (100) FEET OF ANY INTERSECTING STREET OR DRIVEWAY. COMPLIANCE WITH THESE REQUIREMENTS ALONG WITH ADDITIONAL PROVISIONS OF THE CONTRACT SPECIFICATIONS SHALL NOT IN ANY WAY RELIEVE THE CONTRACTOR OF HIS LEGAL RESPONSIBILITIES OR LIABILITIES FOR THE SAFETY OF THE PUBLIC. THE CONTRACTOR SHALL INDICATE HIS INTENT WITH REGARD TO STORAGE OF MATERIAL AT THE PRE-CONSTRUCTION MEETING.

**CONVENIENCE FACILITIES**

THE CONTRACTOR SHALL FURNISH AND MAINTAIN SANITARY CONVENIENCE FACILITIES FOR THE WORKMEN AND INSPECTORS FOR THE DURATION OF THE WORK. COST SHALL BE INCLUDED IN THE PRICE BID FOR THE VARIOUS SANITARY SEWER IMPROVEMENTS.

**FORCE MAIN TESTING**

FORCE MAINS SHALL BE TESTED IN ACCORDANCE WITH SECTION 5.2 OF THE STANDARD PLANS AND SPECIFICATIONS FOR CONSTRUCTION OF SANITARY FACILITIES IN DELAWARE COUNTY, OHIO. AIR TESTING FOR CONCRETE SEWER MANHOLES SHALL CONFORM TO THE TEST PROCEDURES DESCRIBED IN ASTM C1244.

**DISPOSAL OF EXCESS EXCAVATION AND TOPSOIL MATERIAL**

THE CONTRACTOR SHALL DISPOSE OF ALL EXCESS EXCAVATION AND TOPSOIL MATERIAL, INCLUDING ROCK, SHALE AND OTHER UNSUITABLE MATERIAL, OFF THE PROJECT PREMISES AT A LOCATION ARRANGED BY THE CONTRACTOR AND IN ACCORDANCE WITH ODOT ITEM 203. ALL MATERIALS TO BE DISPOSED OF OFF-SITE MUST BE DISPOSED OF IN AN ENVIRONMENTALLY SOUND MANNER IN ACCORDANCE WITH LOCAL, STATE, AND FEDERAL REGULATIONS. NO EXCESS MATERIALS ARE TO BE DISPOSED OF IN ANY WETLAND, FLOODPLAIN, OR OTHER ENVIRONMENTALLY SENSITIVE AREAS. EROSION CONTROL MEASURES AT THE DISPOSAL SITE MUST BE INSTALLED AND MAINTAINED UNTIL DISPOSAL IS COMPLETE AND THE DISPOSAL SITE PERMANENTLY STABILIZED. FOR DISPOSAL OUTSIDE THE LIMITS OF THE PROJECT, THE CONTRACTOR SHALL PROVIDE A COPY OF THE SIGNED, WRITTEN AGREEMENT BETWEEN THE CONTRACTOR AND THE OFF-SITE LANDOWNER BEFORE SUCH DISPOSAL OCCURS. THIS WRITTEN AGREEMENT SHALL CLEARLY STATE THE PURPOSE OF THE AGREEMENT AND INDICATE THE LANDOWNER'S PERMISSION FOR SUCH USE. THE ACQUISITION OF THIS SITE IS THE CONTRACTOR'S RESPONSIBILITY. THE CONTRACTOR SHALL BE RESPONSIBLE FOR OBTAINING ALL PERMITS.

COST FOR THE ABOVE WORK SHALL BE INCLUDED IN THE PRICE BID FOR THE VARIOUS ITEMS.

ESTIMATE OF QUANTITIES			
ITEM	QUANTITY	UNIT	DESCRIPTION
202	100	SF	CONCRETE WALK REMOVED
608	255	SF	4" CONCRETE WALK
608	1	EA	CURB RAMP INCLUDING DETECTABLE WARNING
604	1	EA	MANHOLE, TYPE A (DWG#6), EPOXY COATED
SPEC	854	LF	4" FORCE MAIN, TRENCHED
SPEC	1	EA	8' DIA. WET WELL, COMPLETE
SPEC	1	LS	CONTROL BUILDING, COMPLETE
SPEC	1	LS	BIOXIDE TANK, CONTAINMENT STRUCTURE, AND FENCE, COMPLETE
SPEC	1	LS	ROCK EXCAVATION
SPEC	1	LS	DEWATERING
202	1	LS	CLEARING AND GRUBBING
SPEC	4	EA	REMOVE AND REPLACE TREE
SPEC	1	LS	ELECTRIC SERVICE, COMPLETE
SPEC	1	EA	AIR/VACUUM RELEASE VALVE, COMPLETE
659	265	SY	SEEDING & MULCHING (ALONG ST. LAURANT DRIVE)
207	1	LS	SEDIMENTATION AND EROSION CONTROL

[A] ALL SANITARY MANHOLES SHALL BE STAMPED "DELAWARE COUNTY REGIONAL SEWER DISTRICT". ALL WATERTIGHT MANHOLES SHALL HAVE A T-GASKET AND CONCEALED PICK HOLES. ALL SANITARY MANHOLES SHALL BE NEENAH R-1762 WITH "DELAWARE COUNTY REGIONAL SEWER DISTRICT" CAST IN THE MANHOLE PER NEENAH STANDARD DRAWING NF-1762 T13. ALL MANHOLES DEEPER THAN 12' REQUIRE A CONCRETE BASE.

REVISIONS

MARK	DATE	DESCRIPTION

EPCON COMMUNITIES

FARM LOTS 17 & 32, QUARTER TOWNSHIP 2, TOWNSHIP 3, RANGE 19  
UNITED STATES MILITARY LANDS  
CONCORD, OHIO  
SANITARY SEWER IMPROVEMENTS

COURTYARDS AT SOUTH SECTION LINE ROAD  
FOR  
PUMP STATION AND FORCE MAIN  
GENERAL NOTES, DETAILS & QUANTITIES



DATE  
DECEMBER, 2016

SCALE  
As Noted

JOB NO.  
2014-1653

SHEET  
2 / 23

**PUMP STATION GENERAL NOTES**

THE CONTRACTOR SHALL COMPLY WITH THE MATERIAL AND CONSTRUCTION REQUIREMENTS OF THE DELAWARE COUNTY DOCUMENT ENTITLED STANDARD PLANS AND SPECIFICATIONS FOR CONSTRUCTION OF SANITARY FACILITIES. THE CONTRACTOR SHALL OBTAIN ANY AND ALL PERMITS REQUIRED BY THE BOARD OF HEALTH AND PAY ALL PERMIT FEES.

THE CONTRACTOR SHALL FURNISH ALL MATERIALS, LABOR, TOOLS, TRANSPORTATION, INCIDENTALS AND APPURTENANCES TO COMPLETE IN EVERY DETAIL AND LEAVE IN WORKING ORDER ALL ITEMS OF WORK CALLED FOR AND/OR SHOWN ON THE ACCOMPANYING DRAWINGS. ANY MATERIAL OR WORK NOT SPECIFICALLY MENTIONED OR SHOWN ON THE DRAWINGS, BUT NECESSARY TO COMPLETE THE WORK, SHALL BE FURNISHED.

THE CONTRACTOR IS REQUIRED TO VISIT THE SITE AND FULLY INFORM HIMSELF CONCERNING ALL CONDITIONS AFFECTING THE SCOPE OF THE WORK. FAILURE TO VISIT THE SITE SHALL NOT RELIEVE HIM FROM ANY RESPONSIBILITY IN THE PERFORMANCE OF THIS CONTRACT.

THE CONTRACTOR SHALL INVESTIGATE AND LOCATE ALL EXISTING UTILITIES AND NOTIFY ALL UTILITY COMPANIES A MINIMUM OF 48 HOURS PRIOR TO CONSTRUCTION.

THE CONTRACTOR SHALL PROVIDE 6" OF SAND OR GRIT LEVELING BASE, DEPENDING ON SUBSURFACE CONDITIONS, UNDER EACH CONCRETE STRUCTURE FOLLOWED BY A MINIMUM OF 6" COMPACTED GRANULAR FILL.

CONTRACTOR SHALL GRADE AREA TO DRAIN SURFACE WATER AWAY FROM PUMP STATION. MINIMUM GRADE SHALL BE 1% ON IMPERVIOUS SURFACES AND 2% OTHERWISE.

ROOF DRAINS, FOUNDATION DRAINS, AND OTHER CLEAN WATER CONNECTIONS TO THE SANITARY SYSTEM ARE PROHIBITED.

ALL GENERAL NOTES ON SHEET 2 ARE TO BE HEREBY CONSIDERED FOR THE CONSTRUCTION WORK OF THE WASTEWATER PUMP STATION, WHERE APPLICABLE.

**PUMP STATION SPECIFICATIONS**

**GENERAL**

SCOPE OF WORK: WORK UNDER THIS SECTION INCLUDES FURNISHING AND INSTALLING THE PUMP STATION, COMPLETE AS SHOWN ON THE DRAWINGS AND AS SPECIFIED HEREIN.

**WET WELL**

A. THE WET WELL SHALL BE CONSTRUCTED OF PRE-CAST CONCRETE SECTIONS MEETING THE REQUIREMENTS OF ASTM C478 AND C-76.

B. ALL RUBBER RING JOINTS SHALL COMPLY WITH ASTM C443.

**PIPING**

THE CONTRACTOR SHALL SUPPLY AND INSTALL ALL PIPING AND VALVES REQUIRED IN THE VALVE ROOM AS SHOWN ON THE DRAWINGS. FLANGED JOINT-DUCTILE IRON PIPE SHALL BE CLASS 53 CONFORMING TO AWWA C-110, C-150 AND C-151 W/ RUBBER GASKETS PER C-111.

**PUMPS** - (EXPLOSION PROOF MOTORS & ELECTRICAL ITEMS ARE REQUIRED PER CLASS 1, DIV. 1 GROUP D REQUIREMENTS.)

A. FURNISH AND INSTALL TWO (2) SUBMERSIBLE PUMPS AS CALLED FOR ON THE DRAWINGS AND AS SPECIFIED HEREIN. PUMPS SHALL BE MODEL NP 3085 SH 3 AS MANUFACTURED BY FLYGT. PROVIDE IN 460V-3 PHASE.

**PUMP CONTROLS**

A. LEVEL CONTROLS:  
MULTITRODE CAPACITANCE PROBE SHALL BE MOUNTED INSIDE THE WET WELL, ALONG WITH ONE (1) BACK UP NON MERCURY FLOAT SWITCHES. THE PROBE SHALL BE SUSPENDED AT THE PROPER DEPTH TO CONTROL THE ALL PUMPS OFF LEVEL, LEAD PUMP ON LEVEL, HIGH WATER ALARM LEVEL AND STANDBY PUMP ON LEVEL.

B. CONTROL PANEL:  
REFER TO CONTROL PANEL DESCRIPTION AND DETAILS, INCLUDED HEREIN, FOR A COMPLETE DESCRIPTION OF THE REQUIREMENTS FOR THE CONTROL PANEL MATERIALS AND INSTALLATION.

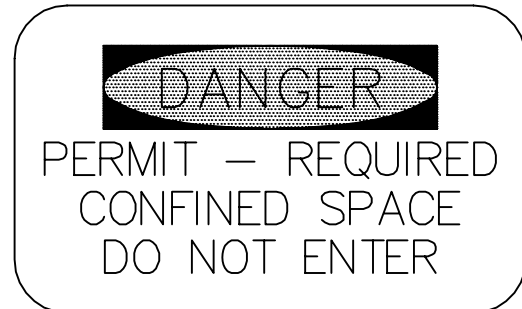
**CONFINED SPACE ENTRY SIGNS**

A. CONFINED SPACE ENTRY SIGNS SHALL BE PROVIDED AND INSTALLED AT BOTH SIDES OF ENTRY DOORS AT THE FOLLOWING LOCATIONS:

- 1. WET WELL
- 2. VALVE CHAMBER

B. SIGNS SHALL MEET THE REQUIREMENTS OF ITEM 630 (ODOT) AND BE AS FOLLOWS:

- 1. SIGN MATERIAL SHALL BE 0.063" THICK ALUMINUM.
- 2. PAINT COLORS SHALL BE RED AND BLACK ON WHITE, NON-REFLECTIVE.
- 3. APPROXIMATE SIGN SIZE: 11"x 16" WIDE.
- 4. TEXT AND STYLE: AS FOLLOWS:



**PAINTING**

A. ALL VALVE CHAMBER PIPING AND VALVES SHALL BE PAINTED (EXCEPT FLANGES AND MACHINED EDGES). ALL PAINTING PREPARATIONS AND APPLICATION SHALL BE IN ACCORDANCE WITH STANDARD PRACTICE AND PER POINT MANUFACTURER'S RECOMMENDATIONS.

B. PAINT BRAND TYPE SHALL BE SHERWIN-WILLIAMS. PRIMER - COPOXY SHOP PRIMER 3.0-5.0 DRY MILS. FINISH COAT - MACROPOXY 646 4-6 DRY MILS. COLOR TO BE APPROVED BY DELAWARE COUNTY SANITARY ENGINEER.

- C. APPLICATION:
  - 1. PRIMING
    - a. PIPING - ONE (1) COAT
    - b. VALVES - ONE (1) COAT
  - 2. FINISH COATS - TWO (2) COATS

**STARTUP**

A. THE CONTRACTOR SHALL ARRANGE AND CONDUCT A PUMP STATION START-UP MEETING WITH THE SANITARY ENGINEER PRIOR TO DISCHARGE OF SEWERAGE TO PUMP STATION.

B. ALL ASPECTS OF THE PUMP STATION OPERATION SHALL BE TESTED AND DOCUMENTED.

**SHOP DRAWINGS**

SHOP DRAWINGS SHALL BE PROVIDED TO THE DESIGN ENGINEER AND TO THE SANITARY ENGINEER FOR REVIEW AND EVALUATION. PUMP STATION EQUIPMENT AND WELL CHAMBERS SHALL NOT BE ORDERED FOR DELIVERY WITHOUT APPROVAL BY BOTH THE DESIGN ENGINEER AND THE SANITARY ENGINEER.

**CONTROL PANEL DESCRIPTION**

A. CONTROL PANEL SHALL BE PROVIDED AS SPECIFIED. REFER TO SHEET 11/23 FOR ELECTRICAL NOTES AND CONTROL PANEL DETAILS.

**SHOP DRAWINGS AND SUBMITTAL INFORMATION:**

- THE SUBMITTED INFORMATION SHALL INCLUDE THE FOLLOWING:
  - 1. ELECTRICAL SCHEMATICS WITH SEQUENCE OF OPERATIONS
  - 2. DIMENSIONED COMPONENT LAYOUT OF INNER-DOOR AND BACK PANEL
  - 3. BILL OF MATERIALS
  - 4. MANUFACTURERS COMPONENT CATALOG SHEETS
  - 5. PROGRAMMING DOCUMENTATION FOR THE TELEMETRY SYSTEM SHALL BE PROVIDED TO THE COUNTY BY THE SUPPLIER OF SAID SYSTEM.

**C. COMPLIANCE**

THE CONTROL PANEL MUST COMPLY WITH THE NATIONAL ELECTRIC CODE INCLUDING A LISTING OF THE PANEL SHORT CIRCUIT PROTECTION AND ARC FLASH HAZARD WARNING SIGNS.

**WET WELL TESTING**

A. ALL LIQUID RETENTION STRUCTURES SHALL BE MADE WATERTIGHT AND SHALL BE TESTED BY FILLING WITH LIQUID TO 6" BELOW THE TOP OF THE TANK.

B. BACKFILL SHALL NOT BE PLACED AROUND THE LIQUID RETENTION STRUCTURES UNTIL THE LEAKAGE TEST IS COMPLETED TO THE SATISFACTION OF THE SANITARY ENGINEER.

C. THE CONTRACTOR SHALL PROVIDE ALL LABOR, TOOLS, MATERIALS, AND EQUIPMENT NECESSARY TO PERFORM THE LEAKAGE TEST AS WELL AS TO REPAIR ANY LEAKS. THE CONTRACTOR SHALL ALSO PROVIDE ALL LABOR, TOOLS, MATERIALS, AND EQUIPMENT NECESSARY TO CONVEY THE LIQUID USED FOR THE TESTING. PAYMENT FOR THE LIQUID SHALL BE MADE AS DEFINED IN THE CONTRACT DOCUMENTS.

D. THE CONTRACTOR SHALL PROVIDE AND INSTALL ALL TEMPORARY AND WATERTIGHT PIPE PLUGS AND BULKHEADS AS REQUIRED TO PERFORM THE LEAKAGE TEST. THE PIPE PLUGS AND BULKHEADS SHALL REMAIN PLACE FOR THE DURATION OF THE TEST, AND BE REMOVED UPON SUCCESSFUL COMPLETION OF THE TEST.

E. THE CONTRACTOR SHALL PERFORM THE LEAKAGE TEST TO COMPLY GENERALLY WITH ANSI/AWWA D110 AS FOLLOWS:

- 1. FILL THE LIQUID RETENTION STRUCTURE WITH LIQUID TO THE REQUIRED LEVEL AND ALLOW THE LIQUID TO REMAIN FOR A PERIOD OF 24 HOURS.
- 2. RECORD THE LEVEL OF THE LIQUID AFTER 24 HOURS.
- 3. OVER THE NEXT 72 HOURS, MEASURE THE DROP IN THE LIQUID LEVEL AT EACH 24 HOUR INTERVAL TO DETERMINE THE LIQUID VOLUME LOSS FOR COMPARISON WITH THE ALLOWABLE LEAKAGE.
- 4. EVAPORATION LOSSES SHALL BE MEASURED OR CALCULATED BY THE CONTRACTOR DURING EACH 24 HOUR PERIOD, AND DEDUCTED FROM THE MEASURED LOSS TO DETERMINE NET LIQUID LOSS DURING EACH 24 HOURS PERIOD.

F. THE STRUCTURE WILL PASS THE LEAKAGE TEST BY MEETING THE FOLLOWING CRITERIA:

- 1. THE NET LIQUID LOSS FOR THE LAST 24 HOUR PERIOD FOR THE 72 HOUR TEST SHALL NOT EXCEED 0.2% OF THE LIQUID RETENTION STRUCTURE VOLUME CAPACITY.
- 2. VISIBLE LEAKAGE OF WATER SHALL NOT BE PERMITTED. ALL VISIBLE LEAKS SHALL BE REPAIRED.
- 3. DURING THE 72 HOUR TEST PERIOD, THE CONTRACTOR SHALL REPAIR ALL LEAKS AS OUTLINED IN THIS SECTION AND AS REQUIRED TO MEET THE NET LIQUID LOSS CRITERIA.
- 4. IF THE MEASURED LEAKAGE EXCEEDS THE MAXIMUM ALLOWABLE, THE LEAKAGE TEST SHALL BE EXTENDED TO A MINIMUM OF 120 HOURS AS REQUIRED TO COMPLETE AND SATISFY THE NET LIQUID LOSS CRITERIA.

REVISIONS

MARK	DATE	DESCRIPTION

EPCON COMMUNITIES

FARM LOTS 17 & 32, QUARTER TOWNSHIP 2, TOWNSHIP 3, RANGE 19  
UNITED STATES MILITARY LANDS  
CONCORD, OHIO  
FOR  
SANITARY SEWER IMPROVEMENTS

COURTYARDS AT SOUTH SECTION LINE ROAD  
PUMP STATION AND FORCE MAIN

PUMP STATION NOTES



DATE

DECEMBER, 2016

SCALE

None

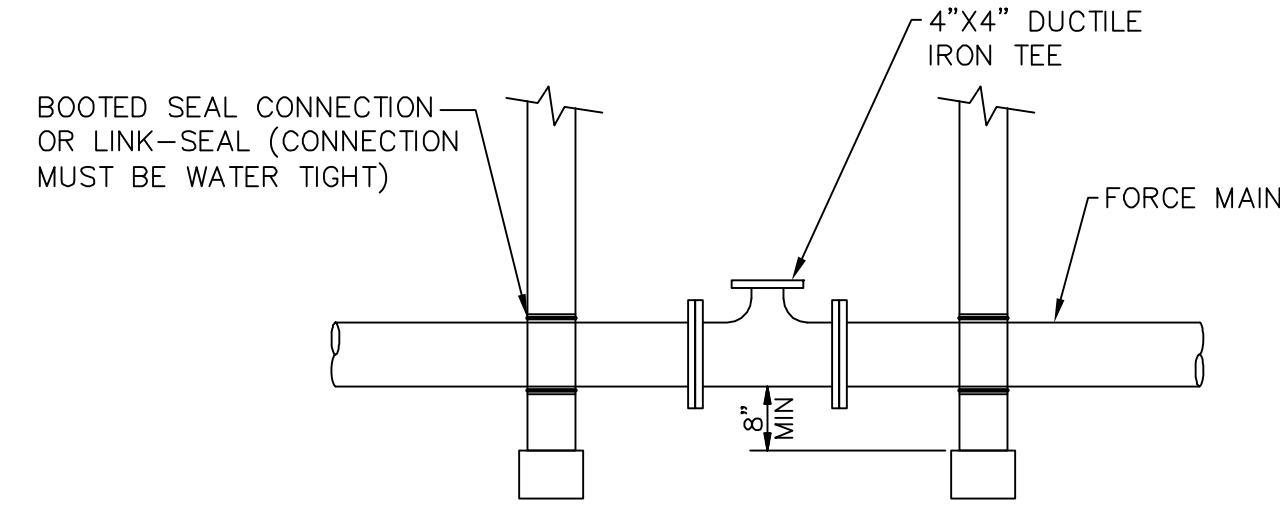
JOB NO.

2014-1653

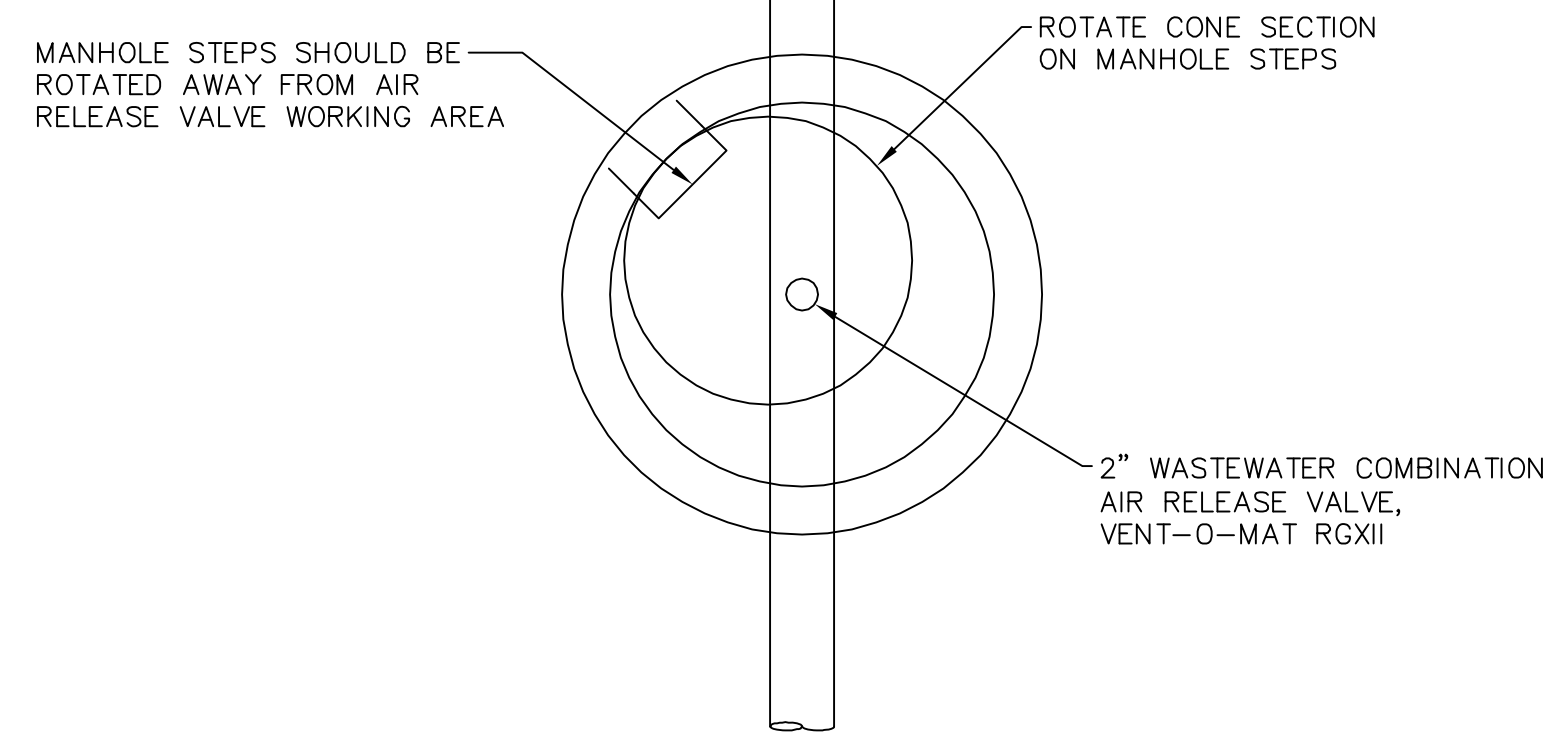
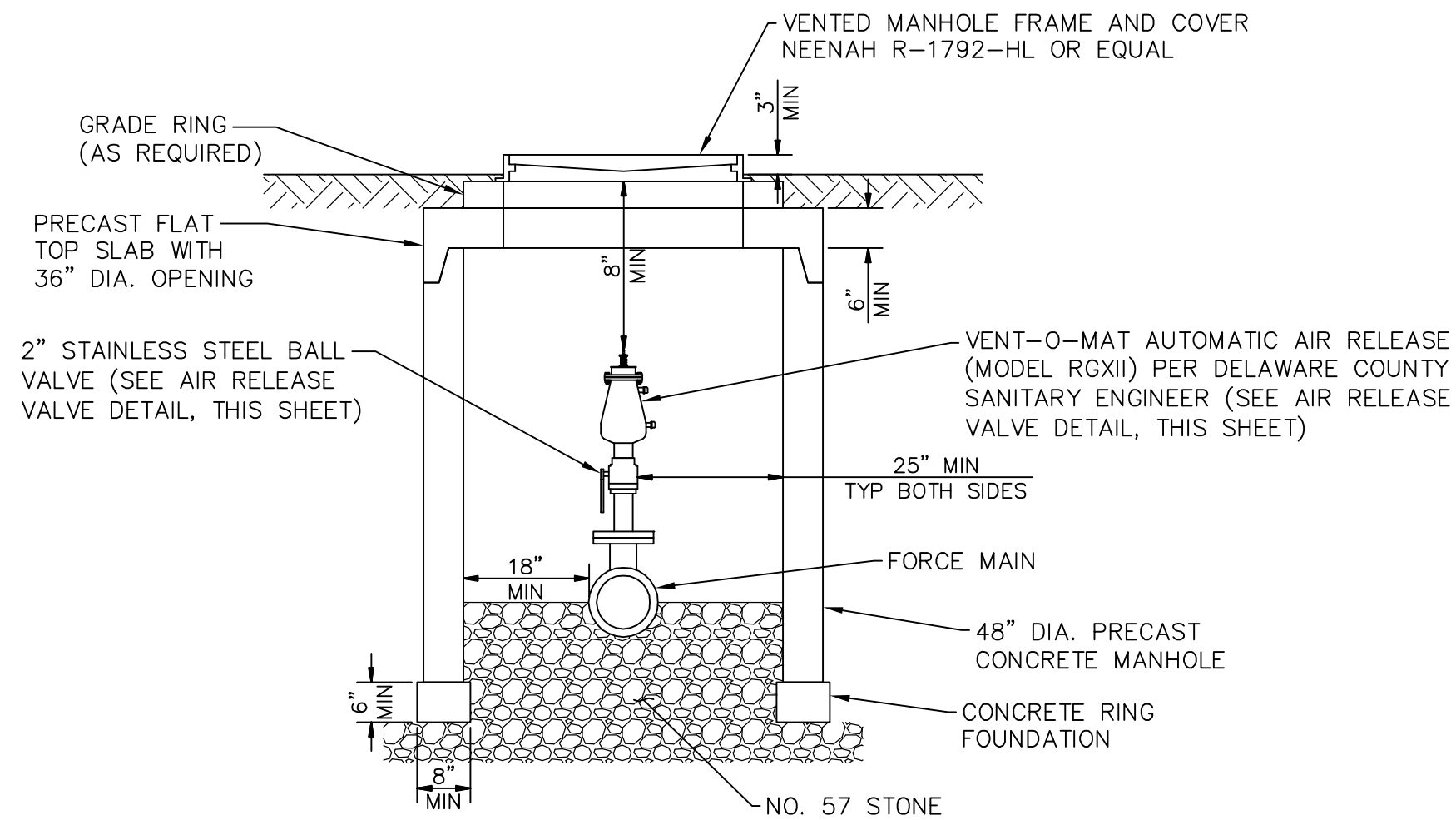
SHEET

3 / 23

**TYPICAL FORCE MAIN CONNECTION**



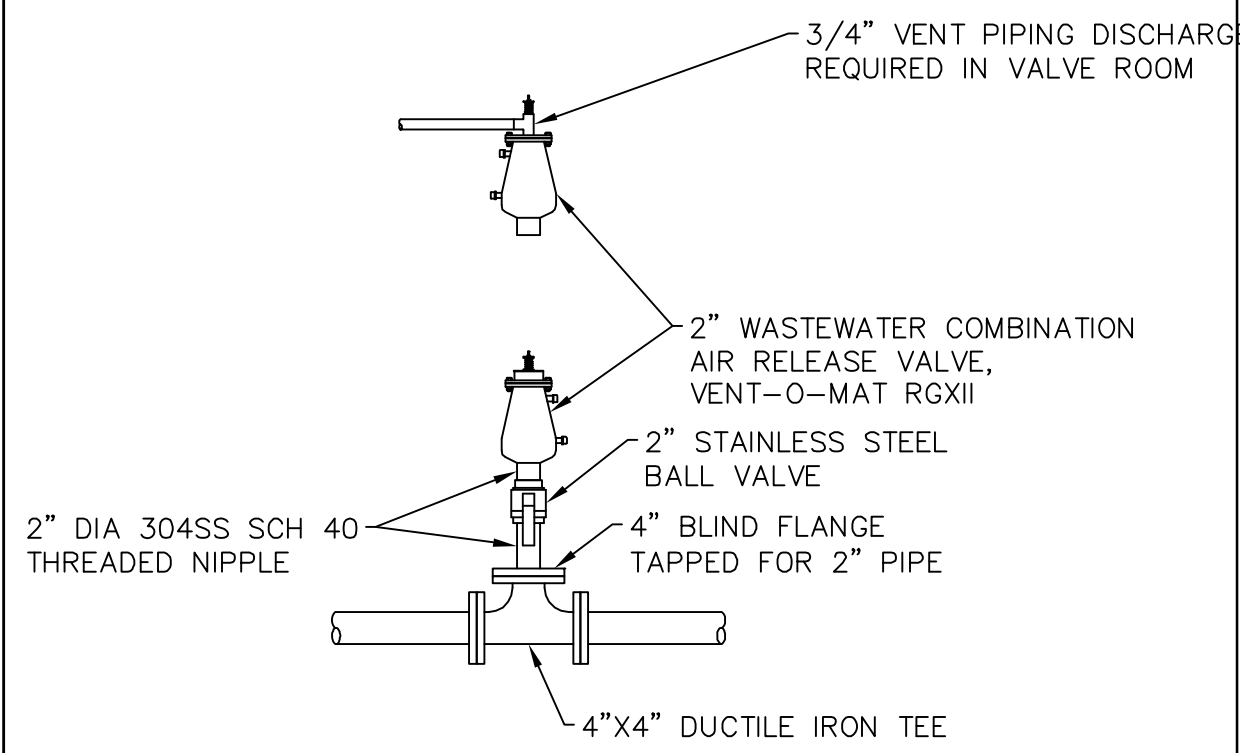
THE AIR RELEASE VALVE SHALL BE AN AUTOMATIC SEWAGE AIR VALVE WITH A 2" INLET AND BACK FLUSHING ACCESSORIES VENT-O-MAT MODEL RGXII.



**TYPICAL AUTOMATIC AIR RELEASE VALVE MANHOLE**  
SCALE: NONE

**MANHOLE NOTES**

1. PROVIDE PRECAST CONCRETE STRUCTURE PER ASTM C-478, EXCEPT MINIMUM WALL THICKNESS SHALL BE EQUAL TO ASTM C-76 WALL B. JOINTS SHALL CONFORM TO ASTM C-443. CONTRACTOR SHALL FURNISH SHOP DRAWINGS TO THE DESIGN ENGINEER AND THE SANITARY ENGINEER FOR APPROVAL PRIOR TO FABRICATION. REVIEWED FOR DIMENSIONAL CONFORMANCE ONLY.
2. STRUCTURE SHALL BE SET ON A GRANULAR BASE AS SHOWN ON THE DETAILS.
3. DESIGN OF WALL THICKNESS AND REINFORCING TO BE PROVIDED BY PRECAST MANUFACTURER.



**TYPICAL AUTOMATIC AIR RELEASE VALVE**  
SCALE: NONE

**STORM, SEWER, OR UTILITY LINE CROSSING THE ROAD**

**STORM, SEWER, OR UTILITY LINE PARALLEL TO ROAD INSIDE OF R/W**

**STORM, SEWER, OR UTILITY LINE PARALLEL TO ROAD OUTSIDE OF R/W**

**NOTES:**

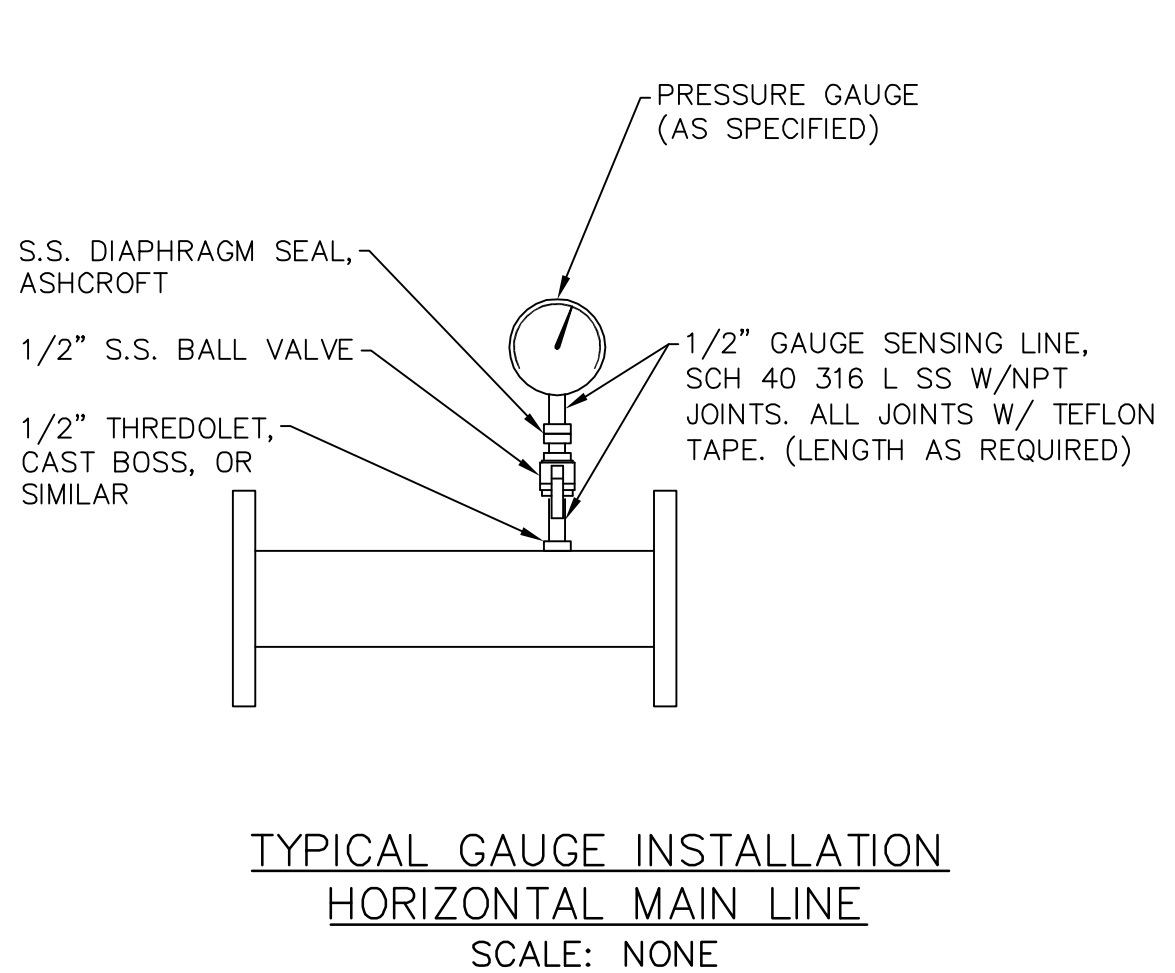
TRENCH WIDTHS 12" AND GREATER:  
FOR TRENCH WIDTHS 12" OR GREATER, USE COMPACTED GRANULAR MATERIAL AS SHOWN IN THE DETAILS ABOVE.

TRENCH WIDTHS LESS THAN 12":  
FOR TRENCH WIDTHS LESS THAN 12" LOCATED WITHIN THE R/W OR THE PROPERTY LINE OF INFLUENCE, AS SHOWN ABOVE, USE ODOT ITEM 613, LOW STRENGTH MORTAR BACKFILL, TYPE 2, OR CDC ITEM 613, FLOWABLE CONTROLLED DENSITY FILL, TYPE II.

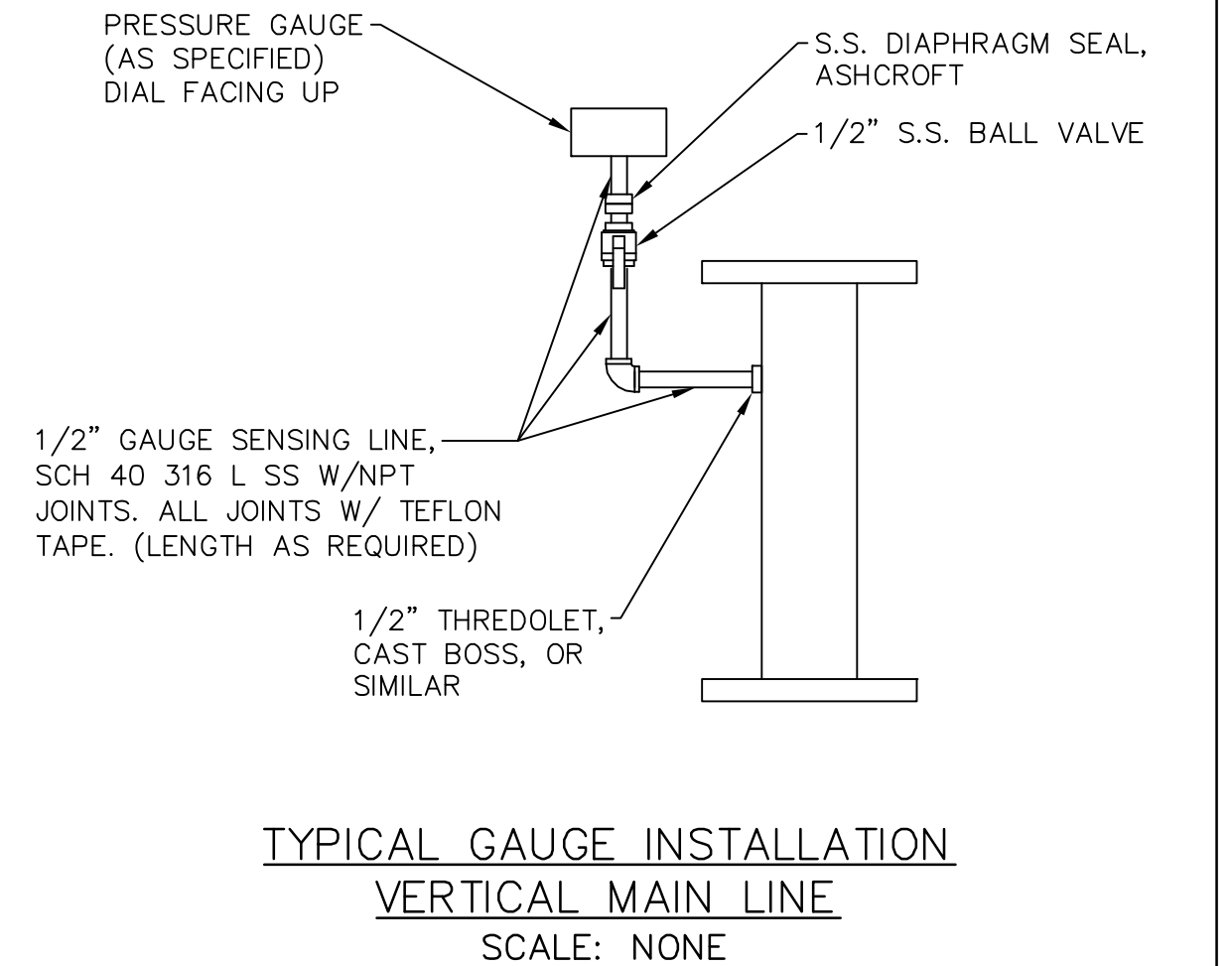
MINIMUM CASING PIPE REQUIREMENTS FOR UTILITIES WHEN REQUIRED:  
1. PRESSURIZED 12" DIA. OR LESS - C900  
2. PRESSURIZED GREATER THAN 12" DIA. - C3005  
3. NON-PRESSURIZED - SDR21 OR SCHEDULE 40

\*\* FOR CUT SITUATIONS OUTSIDE OF THE R/W, NATIVE SOILS MAY BE USED FOR BACKFILL AS LONG AS 85% COMPACTION IS MET. TESTING IS REQUIRED FOR THE LAST 9 FEET OF FILL BEING PLACED AND MAY BE REQUIRED FOR ALL TRENCH BACKFILL AT THE DISCRETION OF THE ENGINEER.

<p>CHRIS E. BAUSERMAN, P.E., P.S. Delaware County Engineer</p> <p>Delaware County Engineer 1 22 2008</p>	<p>STANDARD CONSTRUCTION DRAWING BACKFILL DETAIL STORM, SANITARY, AND UTILITIES</p> <p>11-28-2015</p>	<p>DELAWARE COUNTY ENGINEER'S OFFICE 50 Channing Street Delaware, Ohio 43015 Phone: (740)833-2400 Fax: (740)833-2399 www.co.delaware.oh.us</p> <p>Drawn: EM sheet: 1 of 1 Checked: JP of 1 DCED R100</p>
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**TYPICAL GAUGE INSTALLATION HORIZONTAL MAIN LINE**  
SCALE: NONE



**TYPICAL GAUGE INSTALLATION VERTICAL MAIN LINE**  
SCALE: NONE

**TYPICAL SEWER INSTALLATION**  
DETAIL DRAWING

**\* NOTE:**  
SEE STANDARD SPECIFICATIONS FOR MINIMUM TRENCH WIDTHS

TRACER WIRE SHALL BE INSTALLED WITH THE FORCE MAIN IMPROVEMENTS. ACCESS SHALL BE PROVIDED WITHIN AIR RELEASE MANHOLES.

NOT TO SCALE

REVISIONS	
DATE	COMMENTS

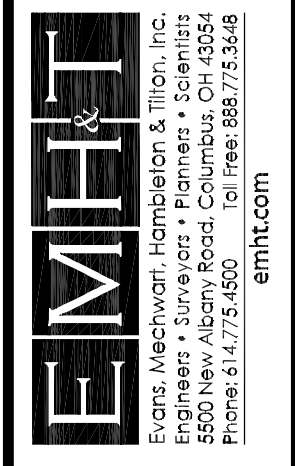
**DELAWARE COUNTY REGIONAL SEWER DISTRICT**  
JACK SMELKER, COUNTY SANITARY ENGINEER  
50 CHANNING STREET DELAWARE, OH 43015  
PHONE: 740-833-2240 FAX: 740-833-2239  
MAY, 2004 www.co.delaware.oh.us

DELaware COUNTY 1808  
Drawing # 01

MARK	DATE	DESCRIPTION

**EPCON COMMUNITIES**

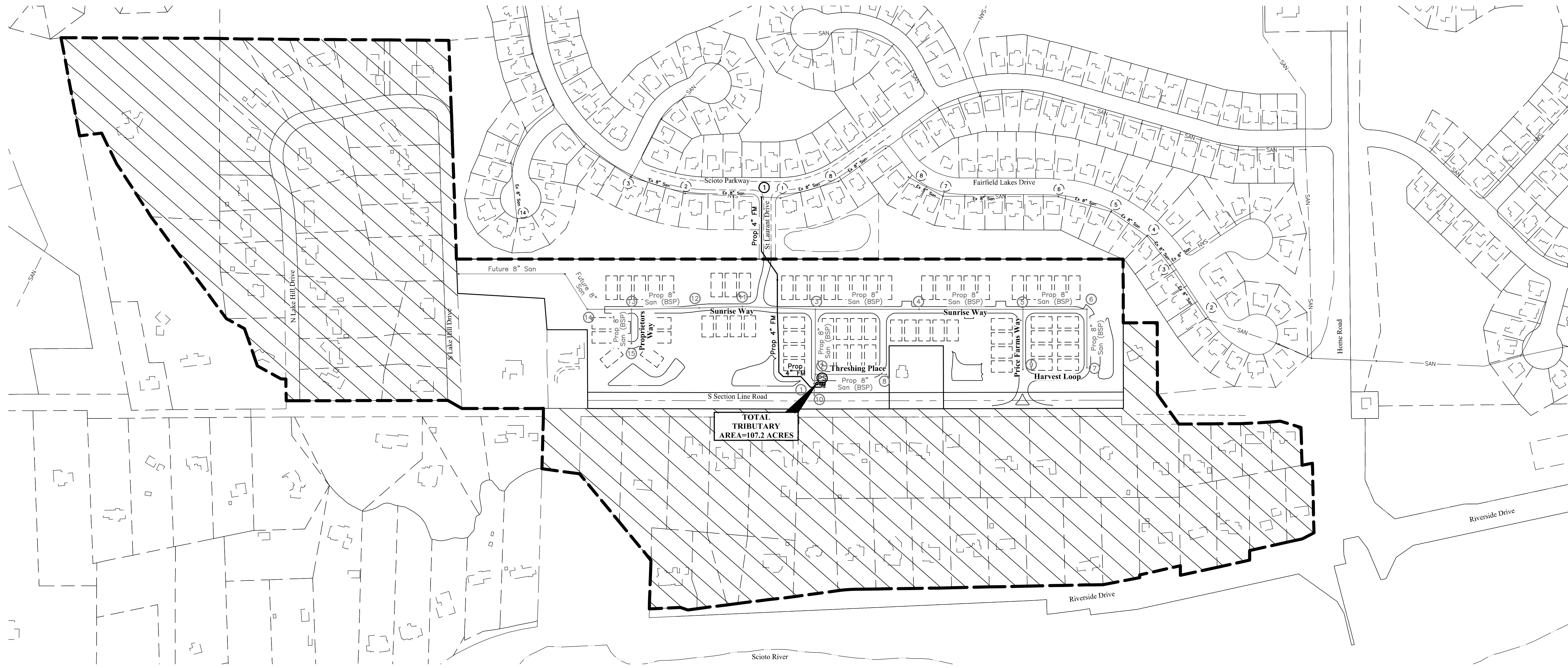
FARM LOTS 17 & 32, QUARTER TOWNSHIP 2, TOWNSHIP 3, RANGE 19  
UNITED STATES MILITARY LANDS, DELAWARE COUNTY, OHIO  
CONCERNING SEWER IMPROVEMENTS  
FOR  
**COURTYARDS AT SOUTH SECTION LINE ROAD  
PUMP STATION AND FORCE MAIN**

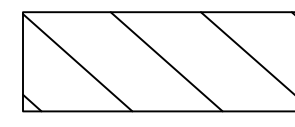


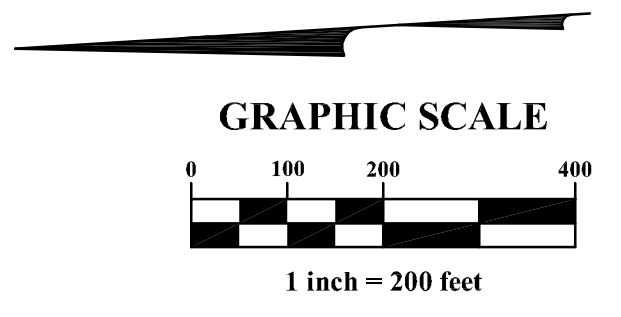
DATE	DECEMBER, 2016
SCALE	As Noted
JOB NO.	2014-1653
SHEET	4 / 23

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 PUMP STATION SERVICE AREA  
(BASEMENT SERVICE MAY NOT BE POSSIBLE FOR ALL PARCELS IN THIS AREA)

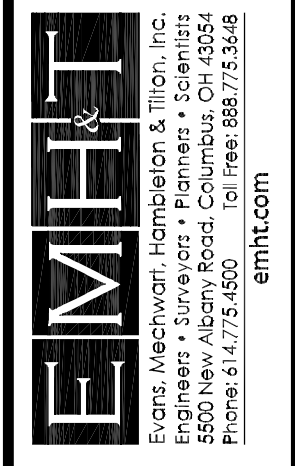


MARK	DATE	DESCRIPTION	REVISIONS

**EPCON COMMUNITIES**

**COURTYARDS AT SOUTH SECTION LINE ROAD  
PUMP STATION AND FORCE MAIN**  
SANITARY SEWER TRIBUTARY AREA MAP

FARM LOTS 17 & 32, QUARTER TOWNSHIP 2, TOWNSHIP 3, RANGE 19  
UNITED STATES MILITARY LANDS  
CONCORD, OHIO  
FOR  
SANITARY SEWER IMPROVEMENTS

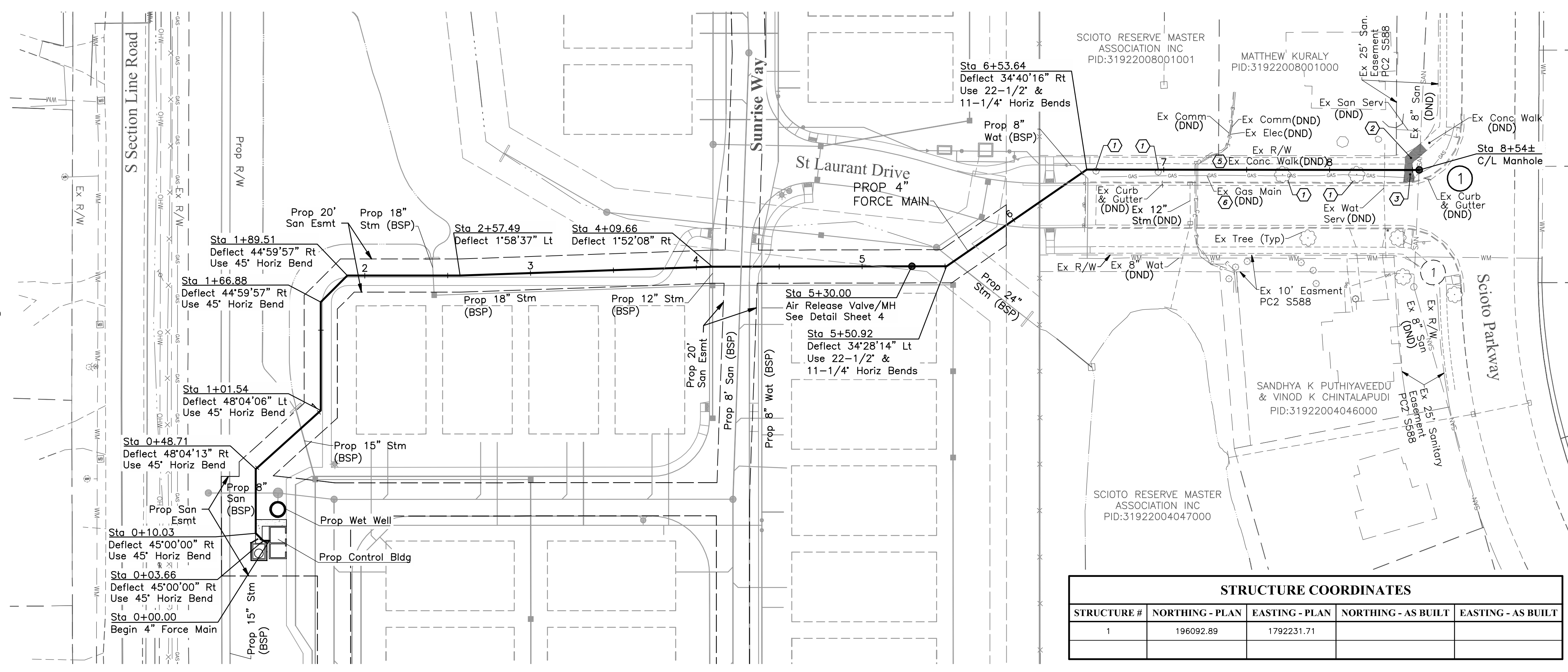
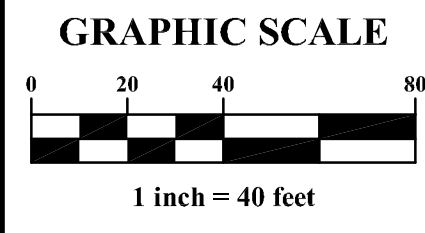


DATE  
**DECEMBER, 2016**

SCALE  
**1" = 200'**

JOB NO.  
**2014-1653**

SHEET  
**5 / 23**



STRUCTURE COORDINATES				
STRUCTURE #	NORTHING - PLAN	EASTING - PLAN	NORTHING - AS BUILT	EASTING - AS BUILT
1	196092.89	1792231.71		

**EASEMENT REFERENCE**

COUNTY NO.	COUNTY RECORDER		GRANTOR
	VOLUME	PAGE	

**NOTES:**

- \* Compacted Backfill per COC Item 911, compacted to 95% of maximum dry weight at optimum moisture content (±2%). See Detail DCED-R100 on Sheet 4.
- \*\* Compacted Backfill per COC Item 911, compacted to 98% of maximum dry weight at optimum moisture content (±2%) in 1-foot lifts. Backfill shall be tested by a Registered Soils Engineer approved by the Owner. If 98% compaction cannot be achieved, Compacted Granular Backfill shall be substituted per Detail DCED-R100 on Sheet 4.
- \*\*\* Compacted Granular Backfill per COC Item 912 at water main & storm sewer crossings. See Detail DCED-R100 on Sheet 4.

Denoted thus:

All fills are to be placed a minimum of 5' above the proposed force main prior to the start of construction.

Denoted thus:

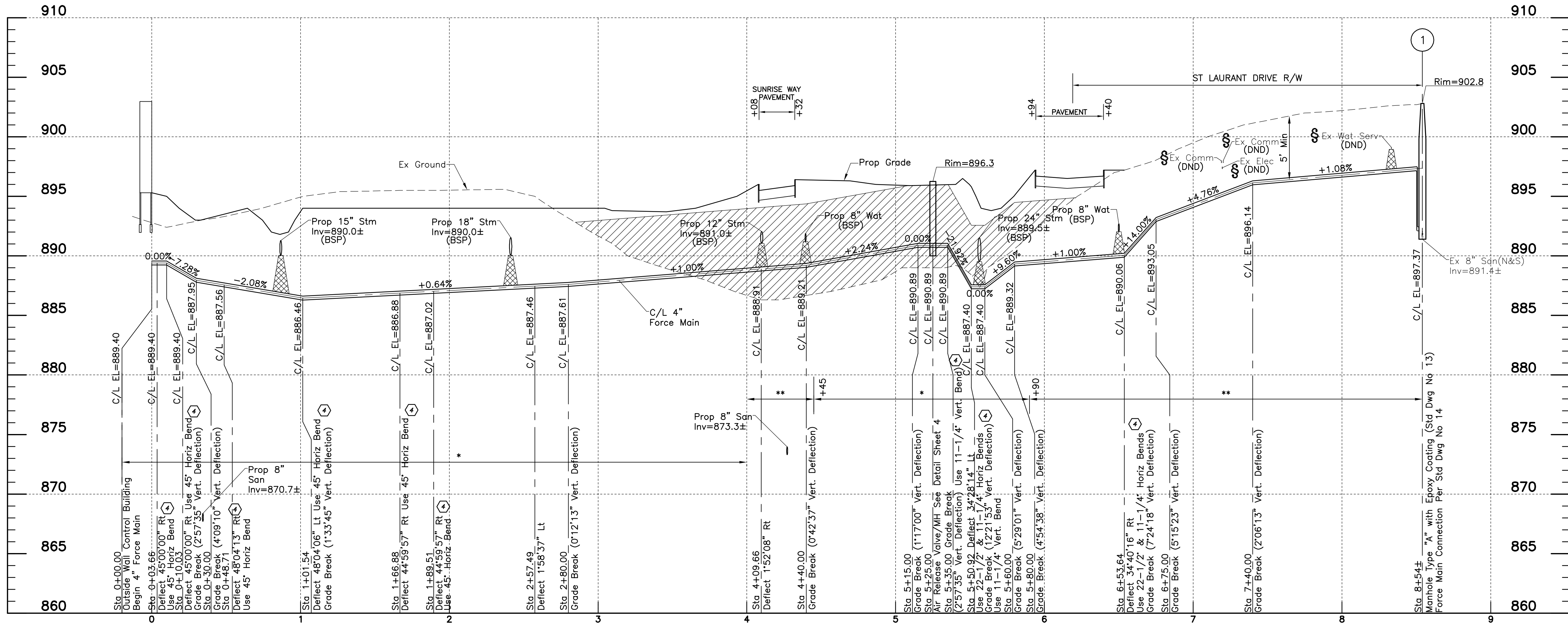
§ Contractor to verify elevation and location of existing utility by potholing before construction.

All sanitary sewers shall have a minimum separation of 10 feet horizontally and 18 inches vertically (outside edge to outside edge) from any existing or proposed water main and storm sewer line/structures.

All Manhole lids shall be stamped "Delaware County Regional Sewer District". All watertight lids shall have a T-gasket with concealed pick holes.

All manholes deeper than 12' require a concrete base.

(BSP) By Separate Plan  
(DND) Do Not Disturb



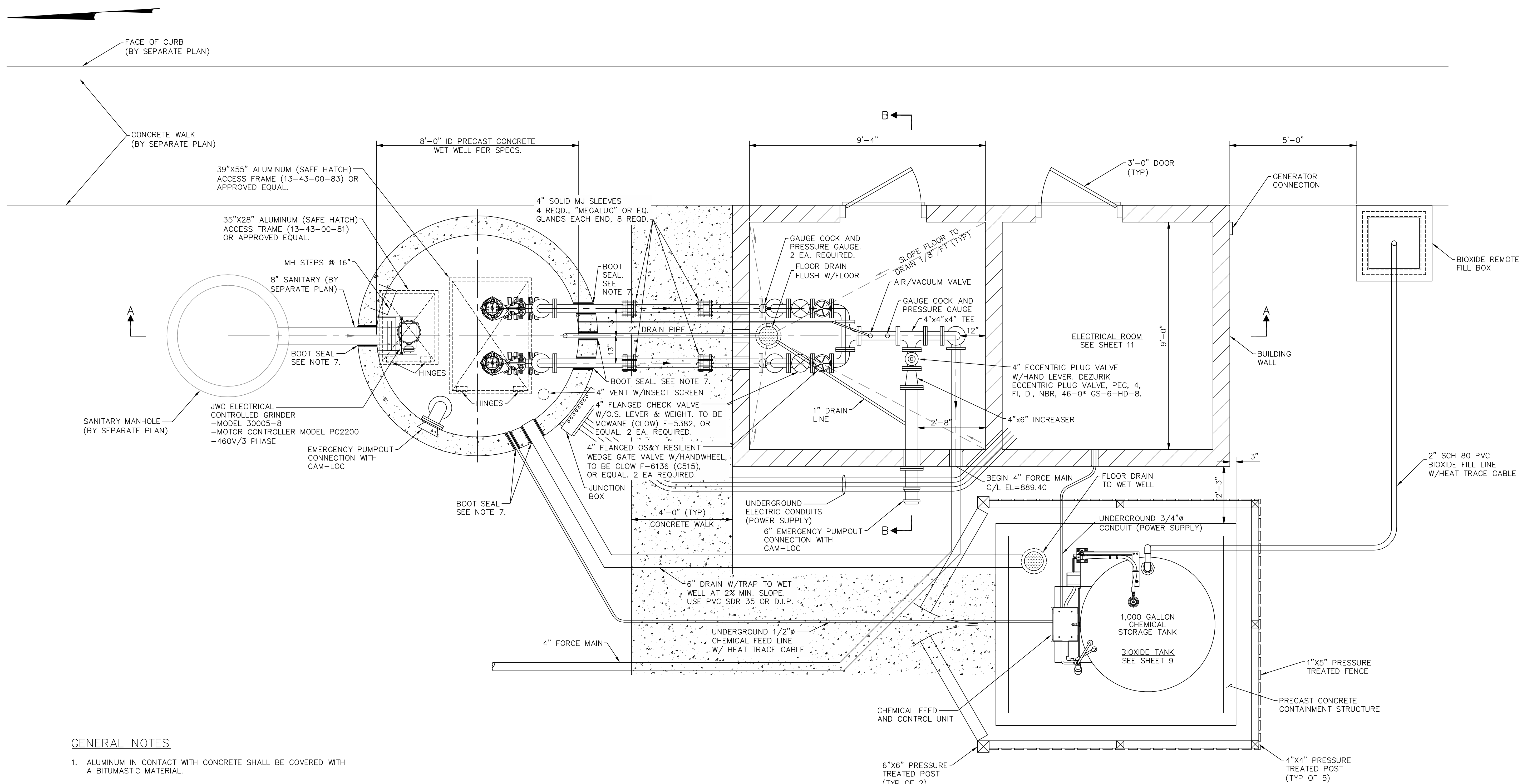
- KEY NOTES**
- Remove and replace existing tree.
  - Remove and replace 4" concrete walk.
  - Remove and replace curb ramp and detectable warning.
  - Provide Concrete Backing per DCSE Dwg. Nos. 23 and/or 24.
  - Contractor shall protect existing sidewalk. Any portions of the walk disturbed during the construction of the force main shall be restored by the Contractor at no additional cost to the project.
  - Existing gas main shall be fully protected/supported during construction. Cost to be included under the various items.

REVISIONS  
 MARK DATE DESCRIPTION  
 EPCON COMMUNITIES  
 FARM LOTS 17 & 32, QUARTER TOWNSHIP 2, TOWNSHIP 3, RANGE 19, UNITED STATES MILITARY LANDS, CONCORD, OHIO  
 SANITARY SEWER IMPROVEMENTS  
 COURTYARDS AT SOUTH SECTION LINE ROAD PUMP STATION AND FORCE MAIN  
 FORCE MAIN PLAN AND PROFILE  
 DATE: DECEMBER, 2016  
 SCALE: Horiz: 1" = 40', Vert: 1" = 5'  
 JOB NO.: 2014-1653  
 SHEET: 6 / 23



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PLAN VIEW  
SCALE: 1/2"=1'-0"

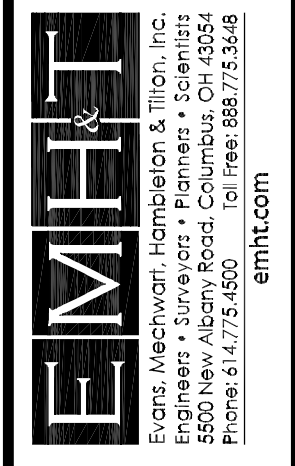
**GENERAL NOTES**

1. ALUMINUM IN CONTACT WITH CONCRETE SHALL BE COVERED WITH A BITUMASTIC MATERIAL.
2. THE CONTRACTOR SHALL BE RESPONSIBLE FOR ANTI-FLOTATION METHODS NEEDED DURING CONSTRUCTION UNTIL EARTH BACKFILL IS PROPERLY AND COMPLETELY PLACED.
3. ALL UNDERGROUND PIPING SHALL BE CONSTRUCTED BELOW BUILDING FOOTERS.
4. USE OF NONCONDUCTIVE GRATING IS REQUIRED BY THE ELECTRIC CODE.
5. UTILIZE SWEEPS ONLY (NO ELBOWS) FOR CONDUIT DIRECTIONAL CHANGES.
6. ALL HARDWARE REQUIRED FOR INSTALLATION SHALL BE STAINLESS STEEL.
7. ALL PIPE/MANHOLE JOINTS TO BE FLEXIBLE, WATERTIGHT CONSTRUCTION PER ASTM C-923 STANDARDS.
8. ALL OPENINGS BETWEEN ELECTRIC CONDUITS AND WETWELL SHALL BE SEALED WITH AN APPROPRIATE HYDROPHILIC (SWELLING) WATERSTOP.

MARK	DATE	DESCRIPTION

EPCON COMMUNITIES

FARM LOTS 17 & 32, QUARTER TOWNSHIP 2, TOWNSHIP 3, RANGE 19  
UNITED STATES MILITARY LANDS  
CONCORD, OHIO  
FOR  
SANITARY SEWER IMPROVEMENTS  
**COURTYARDS AT SOUTH SECTION LINE ROAD  
PUMP STATION AND FORCE MAIN**  
PUMP STATION DETAILS



DATE  
DECEMBER, 2016

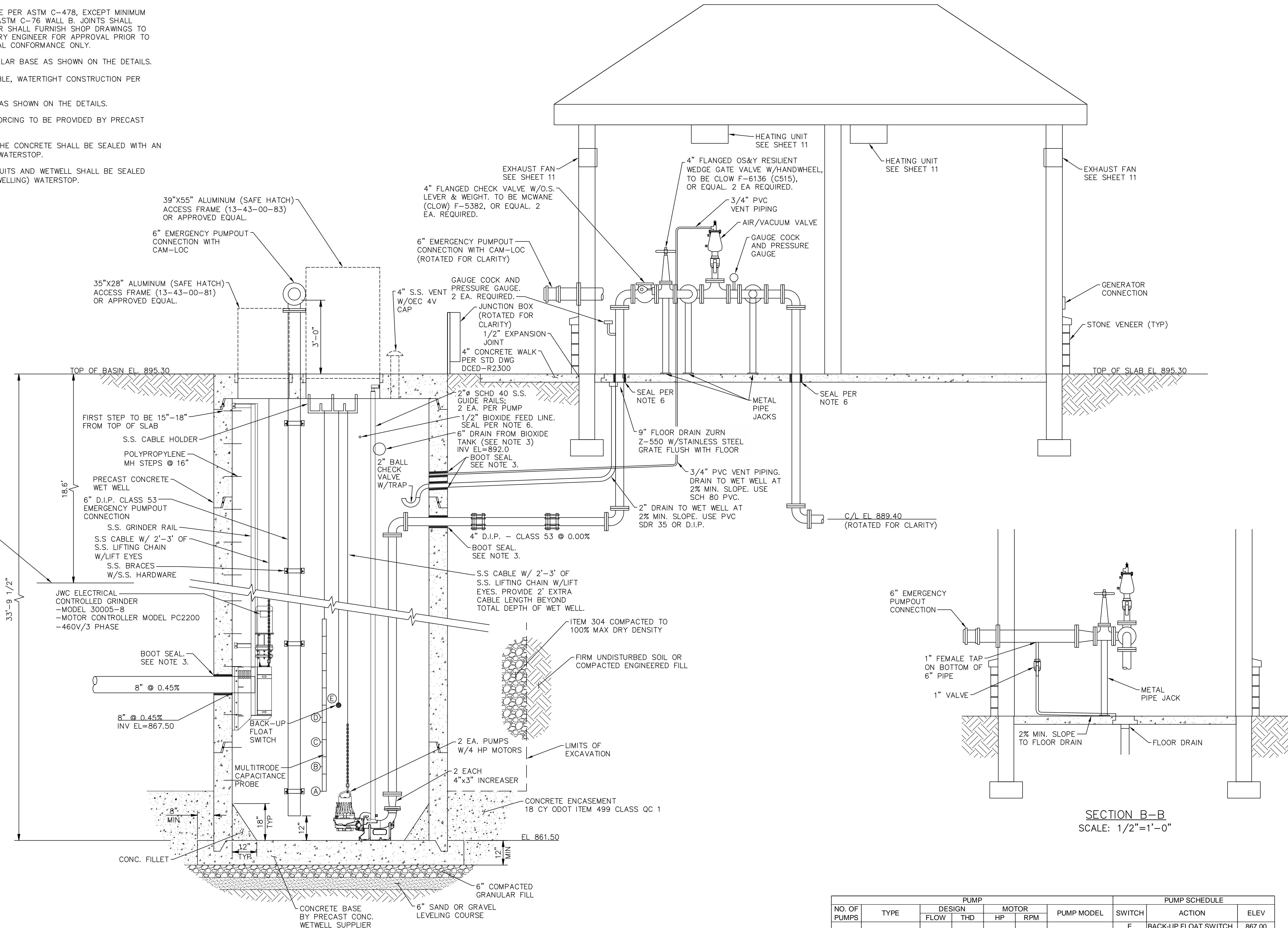
SCALE  
As Noted

JOB NO.  
2014-1653

SHEET  
7 / 23

WET WELL NOTES

1. PROVIDE PRECAST CONCRETE STRUCTURE PER ASTM C-478. EXCEPT MINIMUM WALL THICKNESS SHALL BE EQUAL TO ASTM C-76 WALL B. JOINTS SHALL CONFORM TO ASTM C-443. CONTRACTOR SHALL FURNISH SHOP DRAWINGS TO THE DESIGN ENGINEER AND THE SANITARY ENGINEER FOR APPROVAL PRIOR TO FABRICATION. REVIEWED FOR DIMENSIONAL CONFORMANCE ONLY.
2. STRUCTURE SHALL BE SET ON A GRANULAR BASE AS SHOWN ON THE DETAILS.
3. ALL PIPE/WETWELL JOINTS TO BE FLEXIBLE, WATERTIGHT CONSTRUCTION PER ASTM C-923 STANDARDS.
4. PROVIDE CONCRETE FILLET ON BOTTOM AS SHOWN ON THE DETAILS.
5. DESIGN OF WALL THICKNESS AND REINFORCING TO BE PROVIDED BY PRECAST MANUFACTURER.
6. OPENING BETWEEN PIPE/CONDUIT AND THE CONCRETE SHALL BE SEALED WITH AN APPROPRIATE HYDROPHILIC (SWELLING) WATERSTOP.
7. ALL OPENINGS BETWEEN ELECTRIC CONDUITS AND WETWELL SHALL BE SEALED WITH AN APPROPRIATE HYDROPHILIC (SWELLING) WATERSTOP.



NO. OF PUMPS	TYPE	PUMP		MOTOR		PUMP MODEL	PUMP SCHEDULE		
		DESIGN FLOW	THD	HP	RPM		SWITCH	ACTION	ELEV
2	SUBMERSIBLE EXPLOSION PROOF 3" DISCHARGE	128 GPM	45.6 FT.	4 HP	3415	NP 3085 SH 3-ADAPTIVE 256 IMPELLER 116MM	E	BACK-UP FLOAT SWITCH	867.00
							D	STAND BY PUMP "ON"	866.50
							C	ALARM "ON"	865.50
							B	LEAD PUMP "ON"	864.50
							A	PUMPS "OFF"	863.50

REVISIONS

MARK	DATE	DESCRIPTION

EPCON COMMUNITIES

FARM LOTS 17 & 32, QUARTER TOWNSHIP 2, TOWNSHIP 3, RANGE 19  
UNITED STATES MILITARY LANDS  
CONCORD, OHIO  
FOR SANITARY SEWER IMPROVEMENTS

**COURTYARDS AT SOUTH SECTION LINE ROAD  
PUMP STATION AND FORCE MAIN**

PUMP STATION DETAILS



DATE  
DECEMBER, 2016

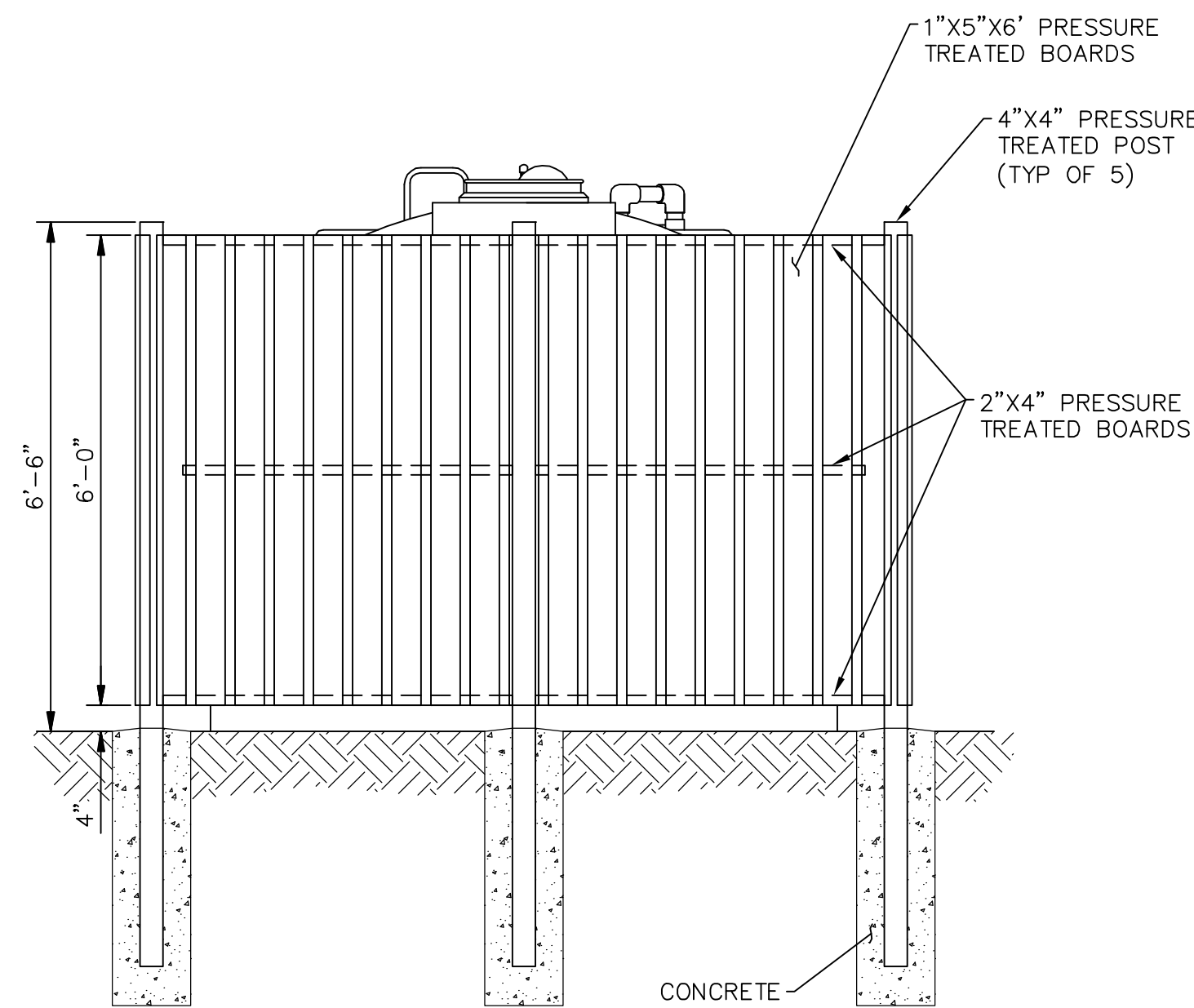
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JOB NO.  
2014-1653

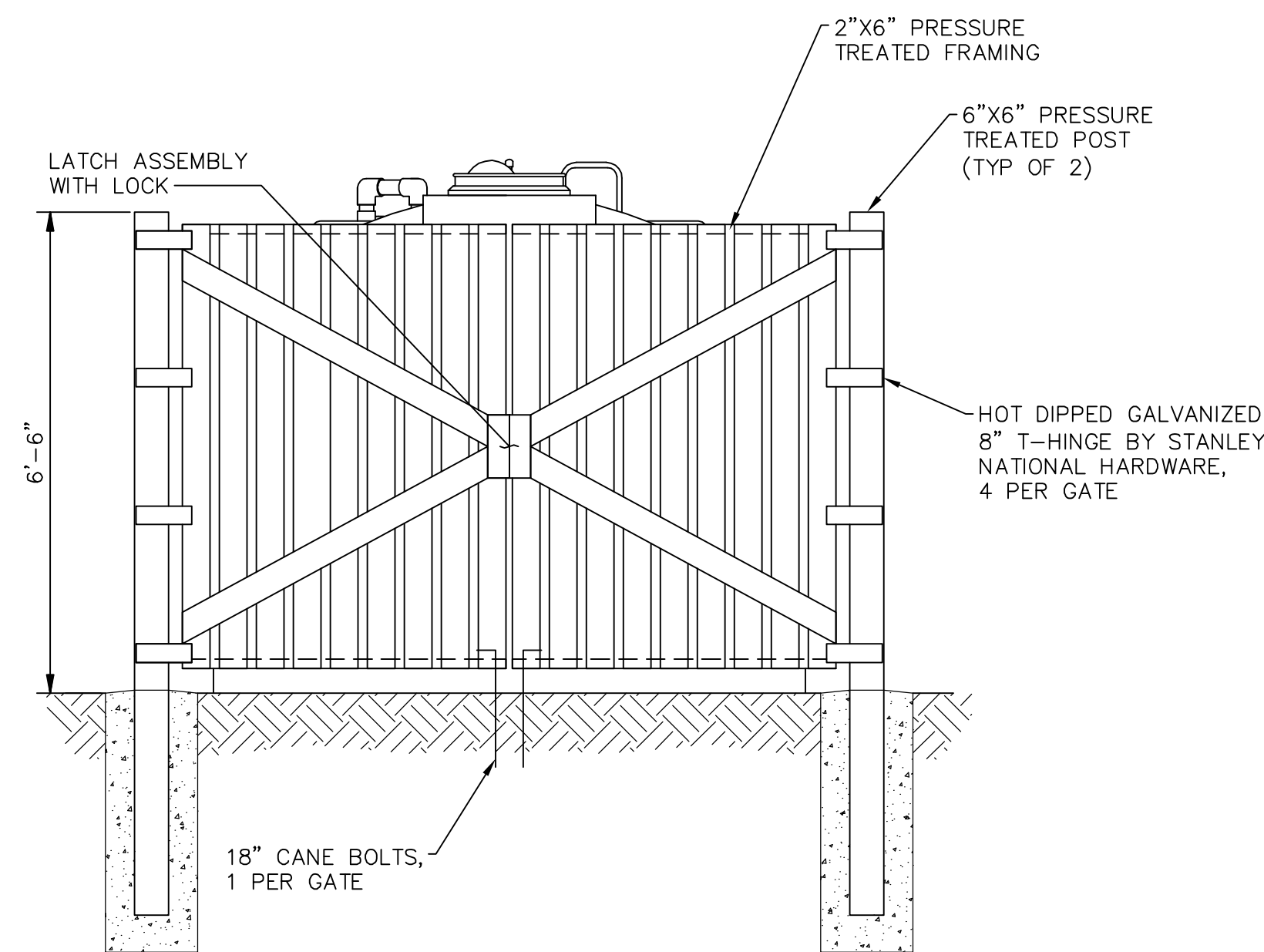
SHEET  
8 / 23

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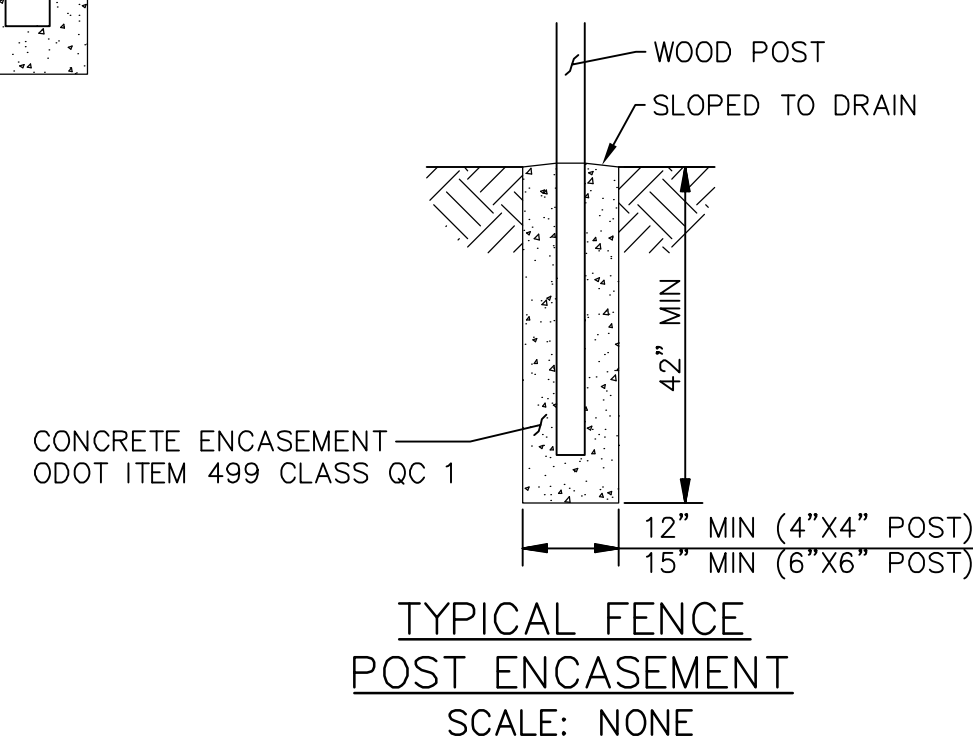




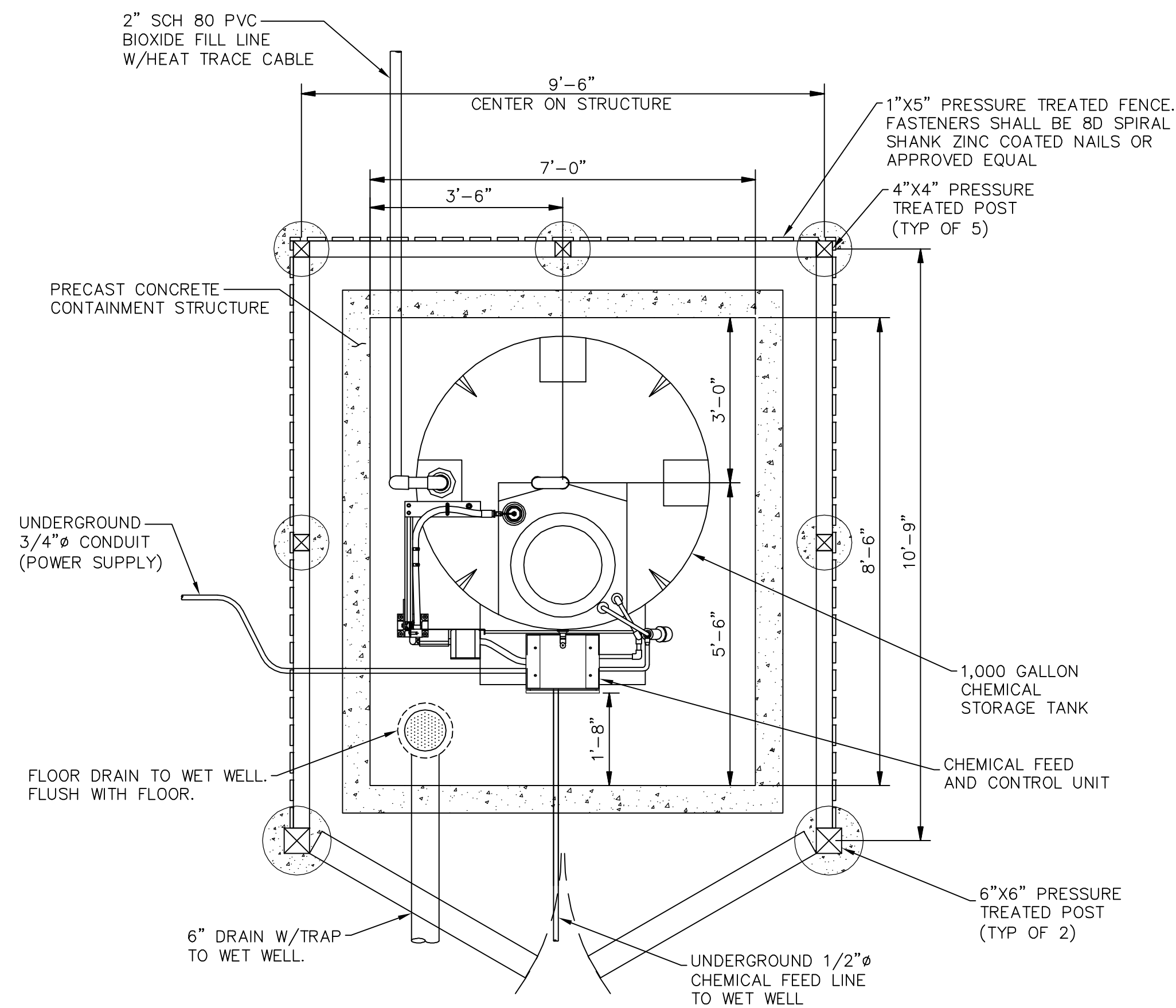
FENCE DETAIL  
SCALE: 1/2"=1'-0"



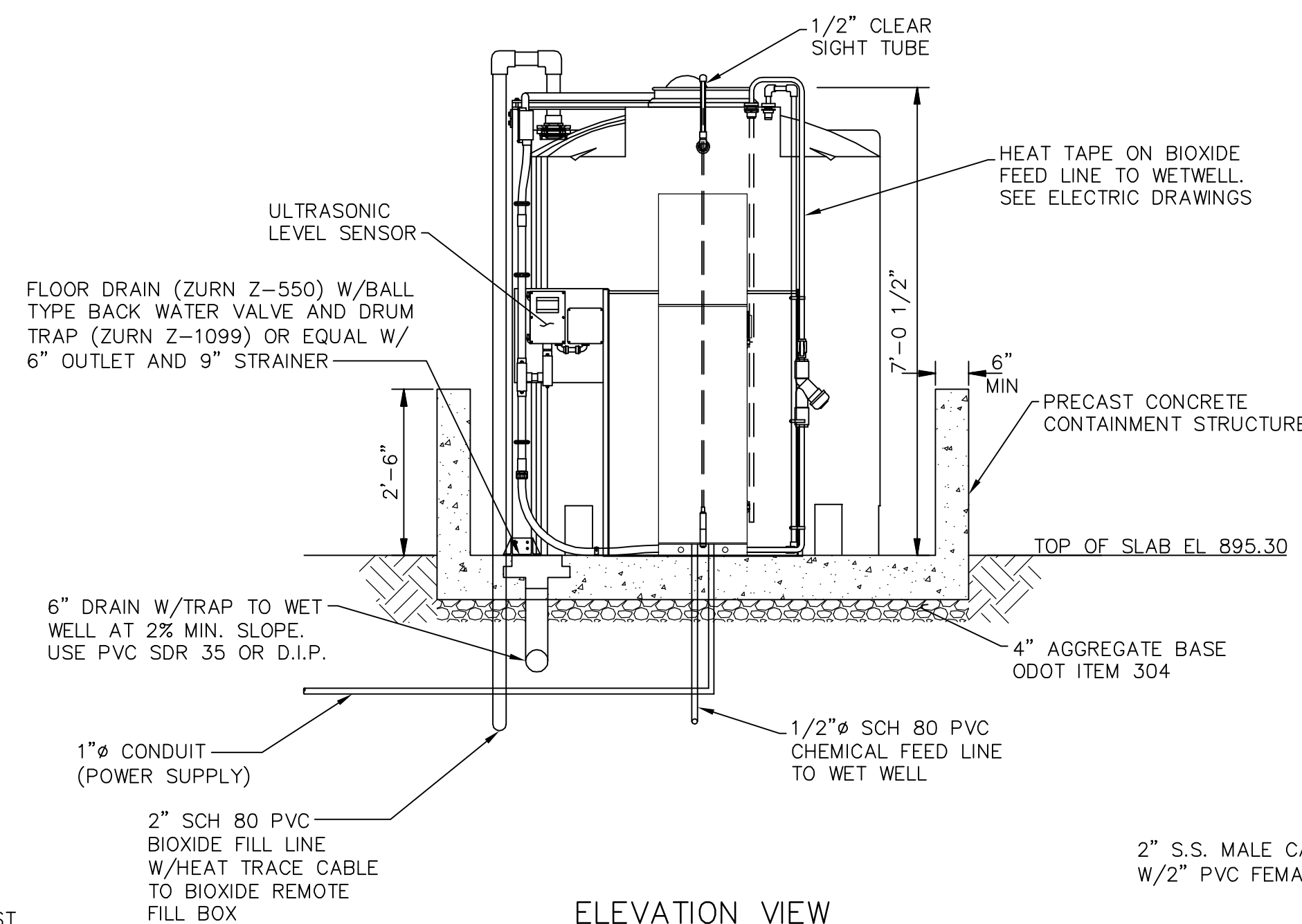
GATE DETAIL  
SCALE: 1/2"=1'-0"



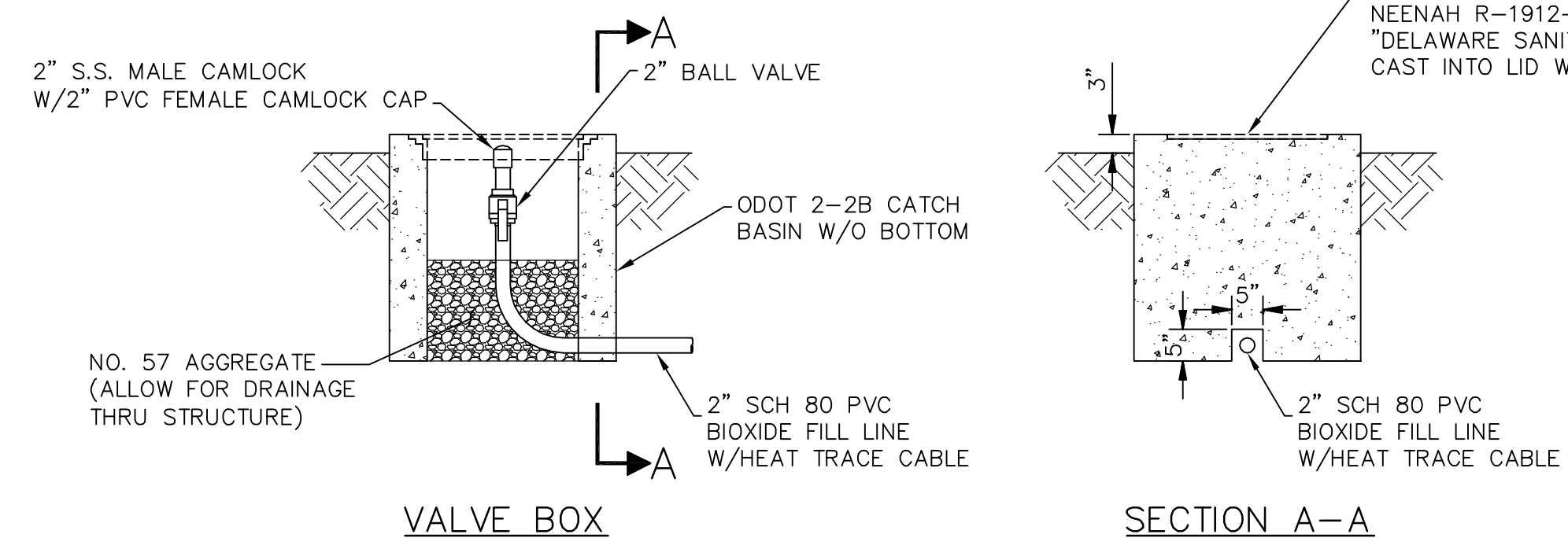
TYPICAL FENCE  
POST ENCASEMENT  
SCALE: NONE



PLAN VIEW  
SCALE: 1/2"=1'-0"



ELEVATION VIEW  
SCALE: 1/2"=1'-0"



VALVE BOX

SECTION A-A

BIOXIDE REMOTE FILL BOX DETAIL  
SCALE: NONE

GENERAL NOTES

1. CONTRACTOR TO FURNISH CONCRETE PAD WITH ALL IN-SLAB PIPING AND CONDUIT.
2. ALL PIPING AND APPURTENANCES SHALL BE PVC, SCH 80, UNLESS OTHERWISE NOTED.
3. ALL ELECTRICAL CONDUIT AND WIRING BY CONTRACTOR.
4. UTILIZE SWEEPS ONLY (NO ELBOWS) FOR CONDUIT DIRECTIONAL CHANGES.
5. CONTRACTOR TO FURNISH AND INSTALL ALL NECESSARY SLAB OPENINGS, SLEEVES AND SEALANT.
6. CONTRACTOR TO FURNISH AND INSTALL ALL NECESSARY HANGERS, SUPPORTS AND BLOCKING FOR PIPING.
7. ALL HARDWARE REQUIRED FOR INSTALLATION SHALL BE STAINLESS STEEL, FURNISHED AND INSTALLED BY CONTRACTOR.
8. CONTRACTOR TO SUBMIT SHOP DRAWINGS OF SUPPLEMENTAL STANDARD DETAILS FOR CHEMICAL FEED UNIT, CALIBRATION PEDESTAL, PIPING SUPPORT, STORAGE TANK, LEVEL GAUGE AND VARIOUS OTHER COMPONENTS.
9. TWO COATS OF WEATHERPROOFING SEALER SHALL BE APPLIED TO ALL WOOD SURFACES.
10. ALL WOOD SHALL BE PRESSURE TREATED OR CEDAR.
11. CONTRACTOR SHALL SUBMIT A SHOP DRAWING OF THE BIOXIDE GATE TO DELAWARE COUNTY FOR APPROVAL.
12. GATE SHALL BE EQUIPPED WITH AN APPROVED PADLOCK WITH A DOUBLE LOCKING BOLT, A FIVE PIN TUMBLER, A LAMINATED STEEL CASE, A BRASS CYLINDER, AND SHALL BE RUST PROOF. TWO KEYS SHALL BE FURNISHED WITH EACH PADLOCK.

BIOXIDE CONTAINMENT STRUCTURE NOTES

1. PROVIDE PRECAST CONCRETE STRUCTURE PER ASTM C-478, EXCEPT MINIMUM WALL THICKNESS SHALL BE EQUAL TO ASTM C-76 WALL B. JOINTS SHALL CONFORM TO ASTM C-443. CONTRACTOR SHALL FURNISH SHOP DRAWINGS TO THE DESIGN ENGINEER AND THE SANITARY ENGINEER FOR APPROVAL PRIOR TO FABRICATION. REVIEWED FOR DIMENSIONAL CONFORMANCE ONLY.
2. STRUCTURE SHALL BE SET ON A GRANULAR BASE AS SHOWN ON THE DETAILS.
3. ALL OPENINGS BETWEEN PIPES/CONDUITS AND THE STRUCTURE SHALL BE SEALED WITH AN APPROPRIATE HYDROPHILIC (SWELLING) WATERSTOP.
4. SLOPE STRUCTURE BOTTOM TO PROVIDE POSITIVE SLOPE TO THE FLOOR DRAIN.
5. DESIGN OF WALL THICKNESS AND REINFORCING TO BE PROVIDED BY PRECAST MANUFACTURER.

MARK	DATE	DESCRIPTION

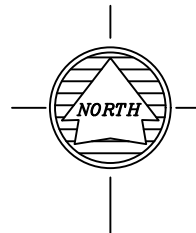
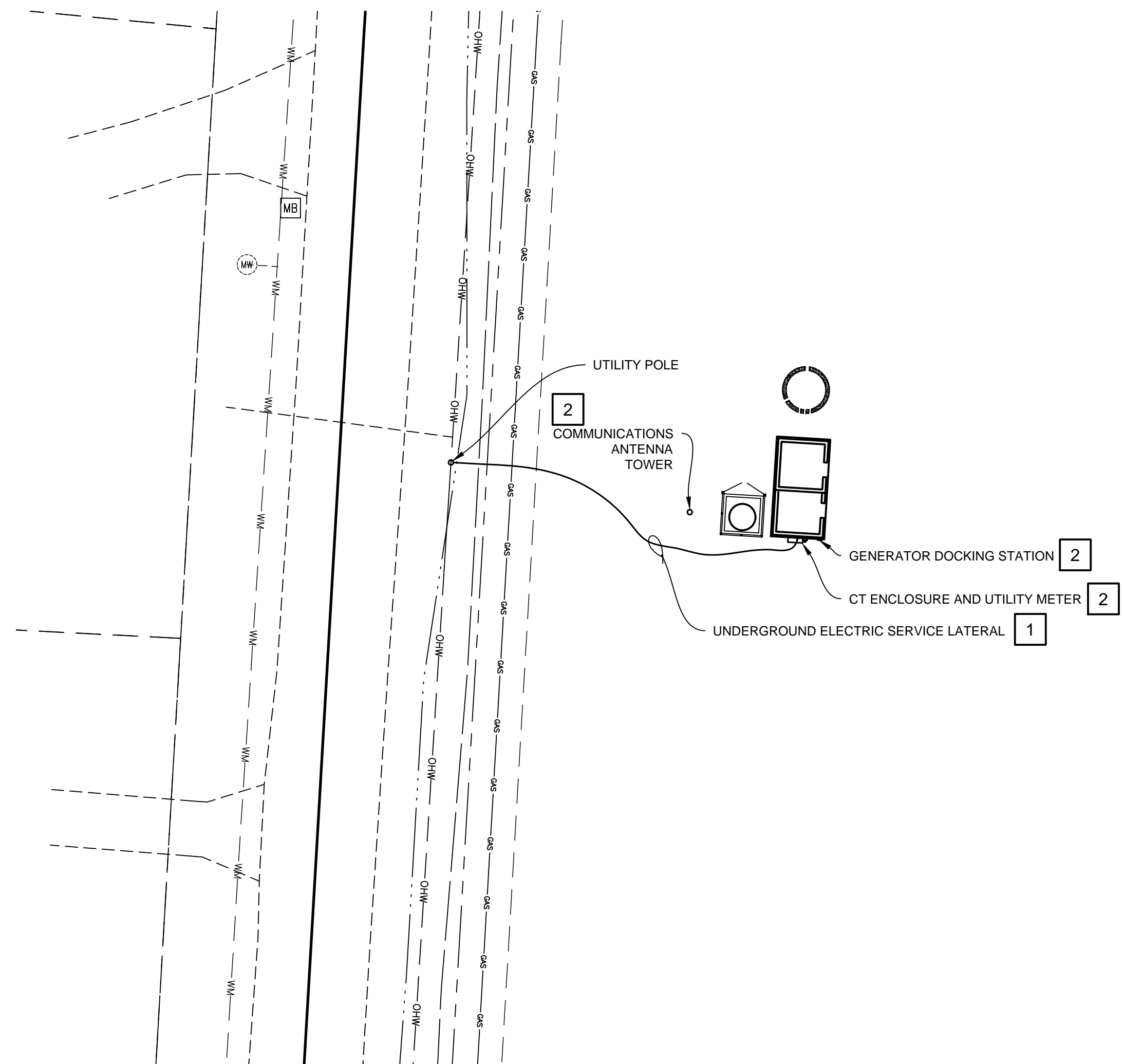
EPCON COMMUNITIES

FARM LOTS 17 & 32, QUARTER TOWNSHIP 2, TOWNSHIP 3, RANGE 19  
UNITED STATES MILITARY LANDS  
CONCORD, OHIO  
FOR  
SANITARY SEWER IMPROVEMENTS  
COURTYARDS AT SOUTH SECTION LINE ROAD  
PUMP STATION AND FORCE MAIN  
BIOXIDE NOTES AND DETAILS



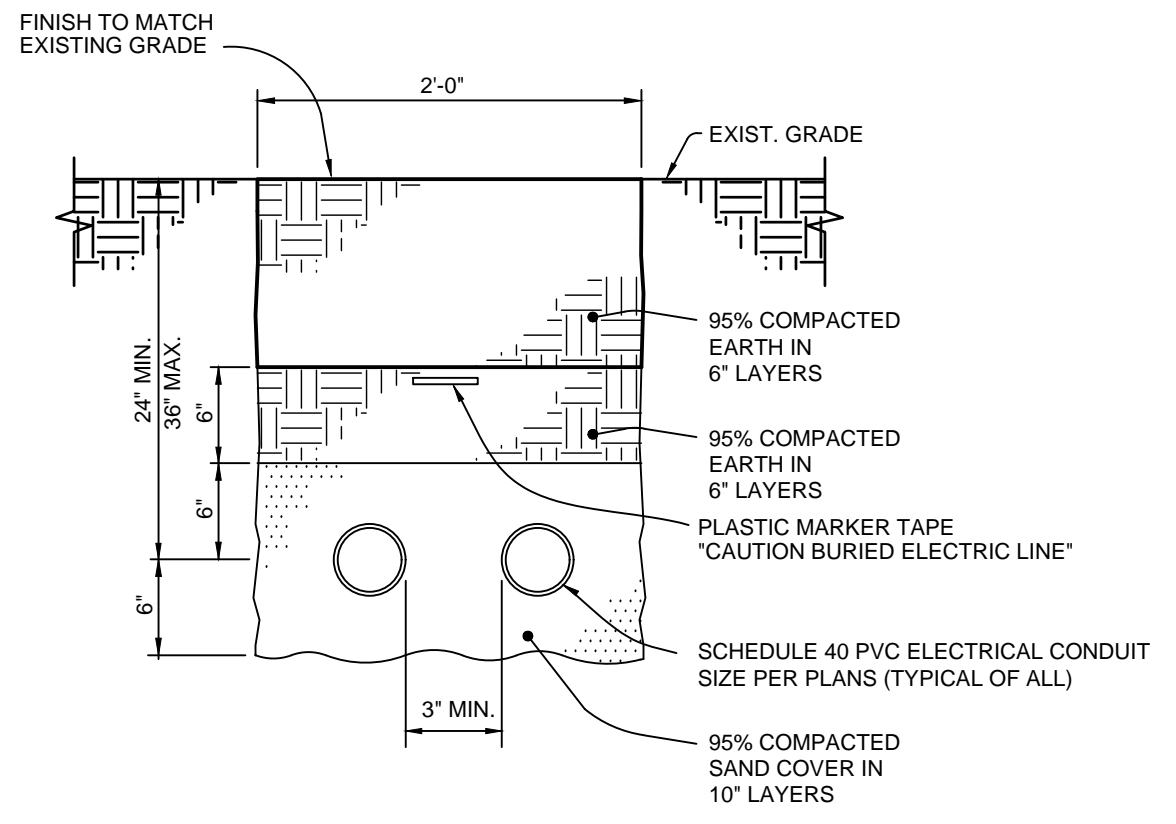
DATE	DECEMBER, 2016
SCALE	As Noted
JOB NO.	2014-1653
SHEET	9 / 23

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**ELECTRICAL SITE PLAN**

SCALE: 1" = 20'



**ELECTRICAL TRENCH DETAIL**

SCALE: NONE

**GENERAL ELECTRICAL NOTES:**

1. THE ELECTRICAL CONTRACTOR SHALL:
  - 1.1. PERFORM ALL WORK SHOWN ON THE DRAWINGS OR REQUIRED TO PROVIDE A COMPLETE INSTALLATION, READY FOR THE OWNER'S USE;
  - 1.2. FURNISH ALL LABOR, MATERIAL, SERVICES AND SKILLED SUPERVISION NECESSARY FOR THE CONSTRUCTION;
  - 1.3. TEST AND ADJUST ALL CIRCUITS AND ELECTRICAL EQUIPMENT SPECIFIED, SHOWN OR NOTED ON THE DRAWINGS.
2. ELECTRICAL CONTRACTOR SHALL SECURE ALL ELECTRICAL PERMITS AS REQUIRED, MAKE ALL NECESSARY APPLICATIONS AND COORDINATE WORK WITH THE LOCAL ELECTRICAL UTILITY COMPANY, INCLUDING METER INSTALLATION, SERVICE ENTRANCE, ETC. FOR A COMPLETE ELECTRICAL INSTALLATION.
3. CONTRACTOR SHALL CONTACT OHIO UTILITIES PROTECTION SERVICE (OUPS) TWO WORKING DAYS PRIOR TO ANY FIELD WORK AT (800)-362-2764. CONTRACTOR SHALL CONTACT ANY NON-OUPS MEMBER UTILITIES DIRECTLY.
4. ALL WORK SHALL BE DONE IN ACCORDANCE WITH ALL LOCAL, STATE AND NATIONAL CODES.
5. ELECTRICAL CONTRACTOR SHALL VISIT SITE AND FAMILIARIZE HIMSELF WITH THE EXISTING CONDITIONS AND WORK TO BE DONE. ELECTRICAL CONTRACTOR SHALL CAREFULLY CHECK PLANS OF ALL DISCIPLINES; THESE ELECTRICAL DRAWINGS ARE TO BE USED AS A GUIDE. ELECTRICAL CONTRACTOR SHALL ASSUME RESPONSIBILITY FOR A COMPLETE AND FUNCTIONING SYSTEM.
6. ALL ITEMS SHALL BE NEW UNLESS OTHERWISE NOTED.
7. ELECTRICAL CONTRACTOR SHALL MAKE ALL NECESSARY WIRING AND CONNECTIONS TO ALL EQUIPMENT FURNISHED BY OTHERS AS NOTED OR SHOWN.
8. INSTALL ALL EQUIPMENT IN ACCORDANCE WITH MANUFACTURER'S SPECIFICATIONS, DETAILS AND DESIGN. EQUIPMENT CALLED OUT BY CERTAIN MANUFACTURERS IS INTENDED TO CREATE A STANDARD. EQUALS WILL BE ACCEPTED UPON APPROVAL.
9. PROVIDE FLEXIBLE CONNECTIONS OF SHORT LENGTH FOR EQUIPMENT SUBJECT TO VIBRATION OR MOVEMENT AND FOR ALL MOTORS. USE LIQUID-TIGHT FLEXIBLE CONDUIT IN WET LOCATIONS. PROVIDE A SEPARATE GROUND CONDUCTOR WITHIN ALL FLEXIBLE CONNECTIONS.
10. PROVIDE AND INSTALL ELECTRICAL DISCONNECTS, CIRCUIT BREAKERS, ETC. SPECIFIED OR REQUIRED.
11. ALL GROUNDING SHALL BE PER NEC ARTICLE 250. PROVIDE SEPARATE GREEN GROUND CONDUCTOR WITH ALL CIRCUITS.
12. UNLESS NOTED OTHERWISE, ALL NEW WIRING SHALL BE COPPER WITH THHN-THWN-2 INSULATION, MINIMUM SIZE #12 AWG. ALL NEW ABOVE GROUND CONDUITS SHALL BE STAINLESS RIGID STEEL (U.N.O), MINIMUM 3/4". ALL NEW UNDERGROUND CONDUITS SHALL BE SCH. 40 PVC OR HDPE, MINIMUM 1".
13. PROVIDE PULL STRING IN ALL EMPTY CONDUITS.
14. FINAL LOCATION OF ALL DEVICES SHALL BE COORDINATED WITH CIVIL ENGINEERING PLANS, LAYOUTS AND SPECIFICATIONS.
15. PUMP PACKAGE IS PROVIDED BY OTHERS. THE ELECTRICAL CONTRACTOR IS RESPONSIBLE TO MAKE ALL POWER AND CONTROL WIRING FIELD CONNECTIONS. COORDINATE REQUIREMENTS WITH PUMP PACKAGE SUPPLIER PRIOR TO COMMENCING WORK.
16. WHERE STAINLESS STEEL OR PVC COATED RIGID CONDUIT IS NOTED FOR USE UNDERGROUND, PVC CONDUIT MAY BE SUBSTITUTED, AS LONG AS TRANSITIONS TO PVC COATED OR OTHER ARE MADE PRIOR TO EMERGENCE FROM UNDERGROUND.

**LEGEND:**

- SWITCH LEG WIRING
- CIRCUIT HOME RUN, LABEL INDICATES PANEL AND CIRCUIT NUMBER.
- 240V RECEPTACLE, COORDINATE EXACT TYPE AND NEMA CONFIGURATION.
- NEMA 5-20R, 20A, 125V AC STRAIGHT BLADE DUPLEX RECEPTACLE WITH GROUND FAULT CIRCUIT INTERRUPTER (GFCI) PROTECTION.
- EXHAUST FAN.
- DOOR SWITCH.
- 1X4 FLUORESCENT SURFACE MOUNT FIXTURE W/ WRAP-AROUND PRISMATIC LENS, (2)32W, T8 LAMPS.
- EXTERIOR WALL-MOUNTED LIGHT FIXTURE, (1)42W, CFL LAMPS, POLYCARBONATE LENS.
- EMERGENCY LIGHT WEATHER-PROOF REMOTE HEAD.
- EMERGENCY BATTERY BACK-UP WITH TWO EMERGENCY LIGHTS. WHERE INSTALLED IN EXTERIOR APPLICATIONS, PROVIDE BATTERY UNIT MOUNTED HIGH ON INTERIOR WALL WITH TWO REMOTE HEADS RATED FOR WET LOCATIONS. PROVIDE SUFFICIENT CAPACITY TO POWER ONE (1) EXTERIOR REMOTE HEAD.
- SINGLE-POLE TOGGLE SWITCH, 120V, 20A, WITH WALL PLATE.
- HEAVY DUTY WALL MOUNTED PHOTO SENSOR, WEATHERPROOF, 120V, 1800 WATT, SWIVEL MOUNTED, INTERMATIC K4221C OR EQUAL.
- HEAVY DUTY WALL MOUNTED OUTDOOR WALL MOUNTED OCCUPANCY SENSOR, 120V, 1000 WATT, WEATHERPROOF, PIR, 200", COMMERCIAL GRADE. LEVITON PS200-10W OR EQUAL.

**ELECTRICAL INSTALLATION NOTES:**

1. PROVIDE (2)-2" CONDUITS IN ELECTRICAL TRENCH FROM CT CABINET TO UTILITY POLE. PROVIDE CONDUCTORS IN ONE CONDUIT (CAP AND MAINTAIN OTHER CONDUIT WITH A PULLSTRING FOR SPARE), TURN UP CONDUITS AT POLE AND MAKE CONNECTION TO UTILITY SERVICE. COORDINATE EXACT LOCATION AND REQUIREMENTS WITH UTILITY COMPANY PRIOR TO ROUGH-IN. REFER TO SINGLE LINE DIAGRAM FOR ADDITIONAL INFORMATION. REFERENCE ELECTRICAL TRENCH DETAILS, THIS SHEET.
2. PROVIDE AND INSTALL ALL ELECTRICAL SERVICE, DISTRIBUTION, AND CONTROLS EQUIPMENT, PANELS, DEVICES, AND WIRING AS SHOWN OR NOTED. REFERENCE SINGLE LINE DIAGRAM, ELECTRICAL TRENCH DETAIL (THIS SHEET), AND SPECIFICATIONS.

MARK	DATE	DESCRIPTION

**EPCON COMMUNITIES**

FARM LOTS 17 & 32, QUARTER TOWNSHIP 2, TOWNSHIP 3, RANGE 19  
 UNITED STATES MILITARY LANDS  
 CONCORD TOWNSHIP, DELAWARE COUNTY, OHIO  
 SANITARY IMPROVEMENTS  
 FOR  
**COURTYARDS AT SOUTH SECTION LINE ROAD**  
**PUMP STATION AND FORCE MAIN**  
 ELECTRICAL SITE PLAN

**EMHT**  
 Evans, Meacham, Henselton & Thon, Inc.  
 5000 New Albany Road, Columbus, OH 43254  
 Phone: 614.775.6500 Fax: 614.775.3448  
 emht.com

DATE  
**DECEMBER, 2016**

SCALE

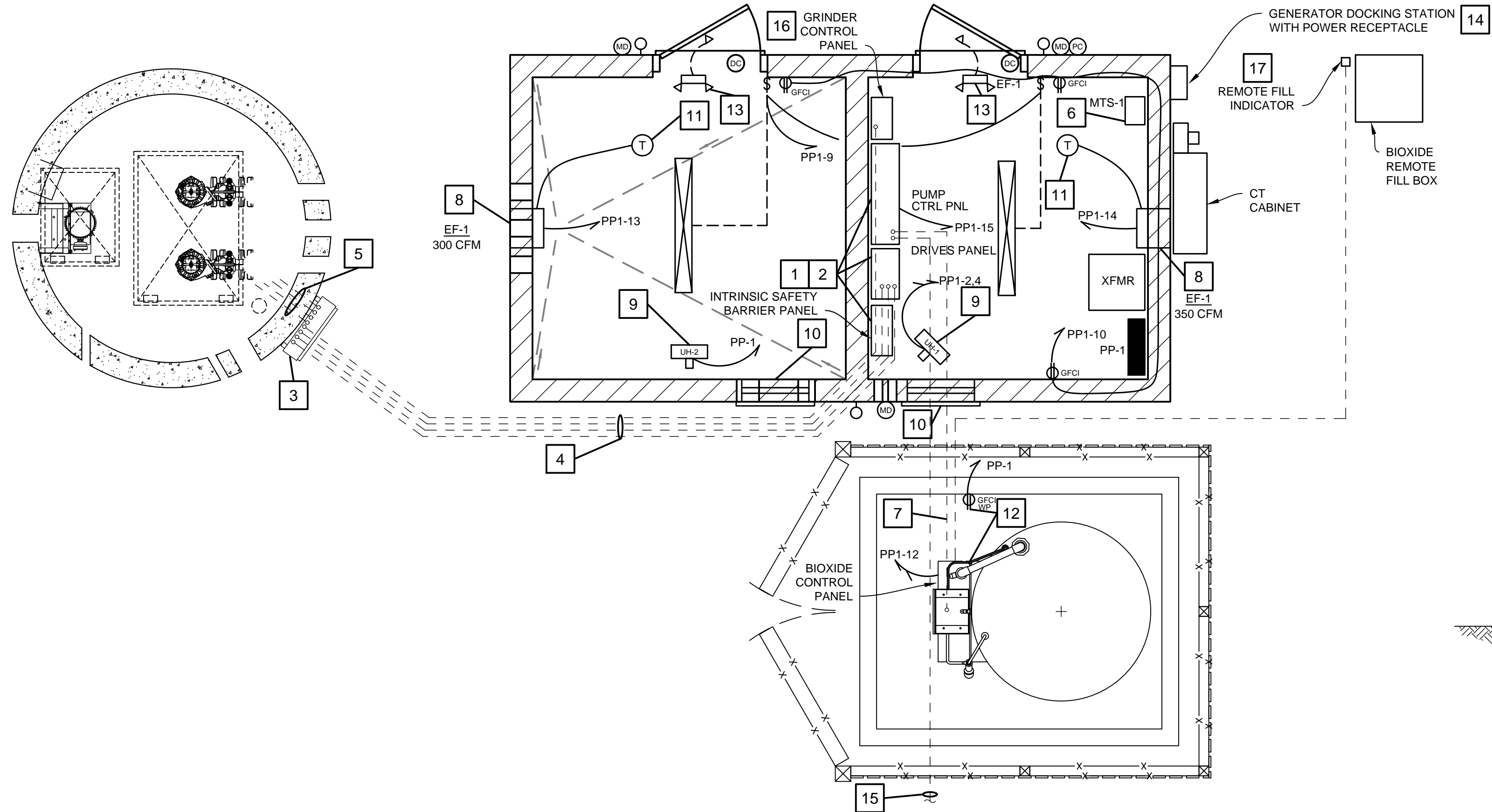
JOB NO.  
 2014-1653

SHEET  
**10 / 23**



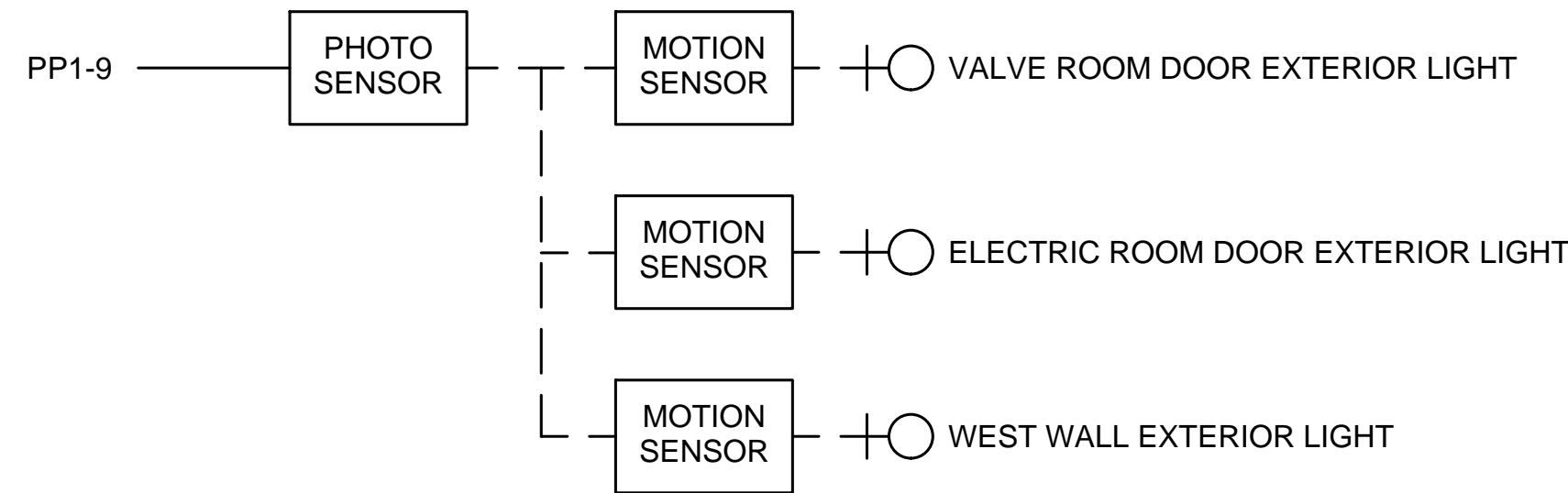
1785 S. METRO PARKWAY  
 COLUMBUS, OH 43240  
 WWW.TRI-TECH.COM  
 TRITECH PROJECT NO. 18221A

897.306.1630  
 800.334.1630



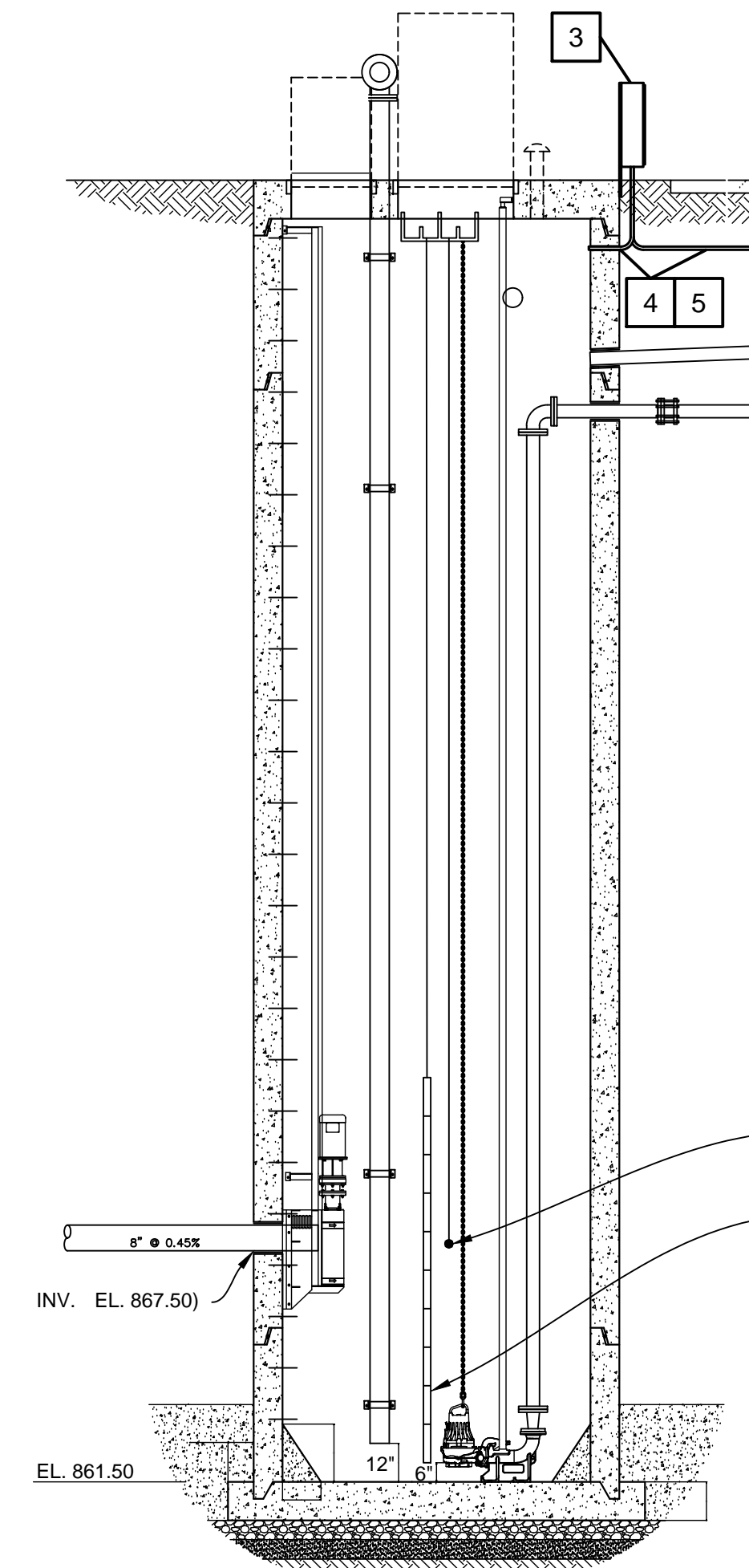
**GRADE LEVEL ELECTRIC POWER PLAN**

SCALE: 3/8" = 1' - 0"



**EXTERIOR BUILDING LIGHTING CONTROL**

NO SCALE



**ELECTRICAL PROFILE**

SCALE: NONE

**ELECTRICAL INSTALLATION NOTES:**

- CONNECT ALL POWER AND CONTROL WIRING FOR CAPACITANCE PROBE AND FLOAT SWITCH TO INPUTS IN CONTROL PANEL. COORDINATE CONDUIT ENTRY INTO PUMP STATION AND CONNECTION REQUIREMENTS TO CONTROL PANEL WITH EQUIPMENT MANUFACTURER.
- PROVIDE AND INSTALL CONTROL PANEL WITH 120V ALARM LIGHT AND AUTOMATIC RESET SILENCE SWITCH PER SPECIFICATIONS. PROVIDE AND INSTALL DRIVES PANEL. ALL DISCONNECTS IN DRIVES PANEL SHALL HAVE LOCKABLE OPERATORS ACCESSIBLE WITHOUT OPENING ENCLOSURE; ROTARY DISCONNECTS ARE ACCEPTABLE FOR THIS PURPOSE. COORDINATE EXACT LOCATION WITH OWNER PRIOR TO ROUGH-IN.
- PROVIDE AND INSTALL A NEMA 4X, STAINLESS STEEL ENCLOSURE WITH WIRE TERMINALS FOR ACCESSIBLE TERMINATION OF PUMP LEADS, CAPACITANCE PROBE CONNECTIONS, AND FLOAT SWITCH CONNECTION AT THE WET WELL. THE ENCLOSURE DEPICTED MEASURES 36"H x 24"W x 6"D. IT IS THE RESPONSIBILITY OF THE ELECTRICAL CONTRACTOR TO SIZE THE ENCLOSURE TO ALLOW FOR THE PUMP CABLES AS WELL AS ALL OTHER CABLING AND WIRING. MOUNT ON 1-5/8" STAINLESS STEEL UNISTRUT POSTS THAT ARE CAST INTO CONCRETE OR BOLTED TO THE WET WELL CONCRETE CASING.
- ROUTE STAINLESS STEEL RIGID CONDUITS TO UNDERGROUND AS SHOWN. SIZE ACCORDING TO N.E.C., MINIMUM SIZE IS 3/4". VERIFY ROUTING WITH OWNER AND ALL OTHER TRADES IN ORDER TO AVOID INTERFERENCES. NOTE: QUANTITY OF CONDUITS SHOWN ON PLAN IS NOT NECESSARILY ACCURATE.
- ROUTE STAINLESS STEEL RIGID CONDUITS FROM TERMINAL ENCLOSURE DOWN INTO THE WET WELL, THROUGH SIDE WALL OF WET WELL. ROUTE ALL WIRING FROM THE WET WELL THROUGH THESE CONDUITS. ROUTE PUMP MOTOR CABLES EACH THROUGH A SEPARATE DEDICATED CONDUIT, SIZED TO ALLOW EASY REPLACEMENT OF THE PUMP. ROUTE THE FLOAT SWITCH THROUGH A DEDICATED CONDUIT, SIZED TO ALLOW EASY REPLACEMENT. ROUTE THE CAPACITANCE PROBE CABLE THROUGH A DEDICATED CONDUIT, SIZED TO ALLOW EASY REPLACEMENT. PROVIDE SEAL-OFF FITTINGS IN EACH CONDUIT BETWEEN THE TERMINATION ENCLOSURE AND THE WET WELL. INSTALL SEALING COMPOUND PER MANUFACTURER'S INSTRUCTIONS AFTER ALL WIRING IS IN PLACE AND HAS BEEN THOROUGHLY TESTED. NOTE: QUANTITY OF CONDUITS SHOWN ON PLAN IS NOT NECESSARILY ACCURATE.
- PROVIDE NEW DOUBLE THROW SERVICE ENTRANCE RATED SWITCH, EQUAL TO SQUARE "D" DT363 WITH NEUTRAL ASSEMBLY, SERVICE GROUNDING ASSEMBLY, 100A CLASS RK1 FUSES, AND AUXILIARY SWITCH POSITION CONTACTS. PROVIDE PERMANENT NAMEPLATE FOR SWITCH WHICH READS: "THIS SWITCH HAS A SOLID NEUTRAL. IF PORTABLE GENERATOR NEUTRAL IS BONDED TO GROUND, DISCONNECT BOND PRIOR TO CONNECTING TO THIS SWITCH."
- PROVIDE AND INSTALL (1) 1" STAINLESS STEEL RIGID CONDUIT FROM THE BIOXIDE CONTROL PANEL TO THE PUMP STATION CONTROL PANEL WITH LOW LEVEL ALARM WIRING.
- PROVIDE AND INSTALL (2) GREENHECK MODEL SE1-12-432-VG EXHAUST FAN WITH BACKDRAFT DAMPER MODEL WD-320 OR APPROVED EQUAL. COORDINATE MOUNTING HEIGHT AND LOCATION WITH OTHER TRADES PRIOR TO ROUGH-IN.
- PROVIDE AND INSTALL (2) MARKEL MODEL HF1B5103N ELECTRIC FAN FORCED UNIT HEATER WITH FACTORY MANUFACTURED MOUNTING BRACKETS AND HARDWARE, OR APPROVED EQUAL.
- PROVIDE AND INSTALL (2) GREENHECK MODEL ECD-601 24"W X 16"H COMBINATION DRAINABLE BLADE LOUVER AND DAMPER. PROVIDE WITH MOTORIZED ACTUATOR. COORDINATE WITH ARCHITECT FOR LOUVER COLOR.
- PROVIDE HEATING/COOLING THERMOSTAT TO ENERGIZE FAN WHEN ROOM TEMPERATURE EXCEEDS 80°F AND OPEN INTAKE DAMPER. THERMOSTAT SHALL ENERGIZE UNIT HEATER WHEN ROOM TEMPERATURE IS BELOW 60°F.
- PROVIDE AND INSTALL SELF REGULATING HEAT TRACE ALONG ENTIRE LENGTH OF ALL ABOVE GROUND CHEMICAL FEED PIPING.
- CONNECT EMERGENCY LIGHT TO LOCAL LIGHTING CIRCUIT AHEAD OF ALL SWITCHING.
- PROVIDE AND INSTALL A STAINLESS STEEL NEMA 4X ENCLOSURE WITH WIRE TERMINALS FOR CONNECTION TO MANUAL TRANSFER SWITCH EMERGENCY INPUT. PROVIDE WITH 100A, 600V PIN AND SLEEVE REVERSE SERVICE POWER RECEPTACLE, APPLETON ADR1034-RS, COOPER CROUSE-HINDS AR1041 S22, OR APPROVED EQUAL.
- PROVIDE AND INSTALL CONDUIT AND WIRING TO COMMUNICATIONS TOWER (NOT SHOWN ON PLAN).
- INSTALL CONTROL PANEL PROVIDED BY GRINDER SUPPLIER.
- PROVIDE AND INSTALL (1) 1" STAINLESS STEEL RIGID CONDUIT FROM THE BIOXIDE CONTROL PANEL TO THE REMOTE FILL INDICATOR WITH SIGNAL WIRING.

MARK	DATE	DESCRIPTION

REVISIONS

EPCON COMMUNITIES  
 FARM LOTS 17 & 32, QUARTER TOWNSHIP 2, TOWNSHIP 3, RANGE 19  
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 CONCORD TOWNSHIP, DELAWARE COUNTY, OHIO  
 SANITARY IMPROVEMENTS  
 FOR  
**COURTYARDS AT SOUTH SECTION LINE ROAD**  
**PUMP STATION AND FORCE MAIN**  
 ELECTRIC POWER PLAN AND PROFILE

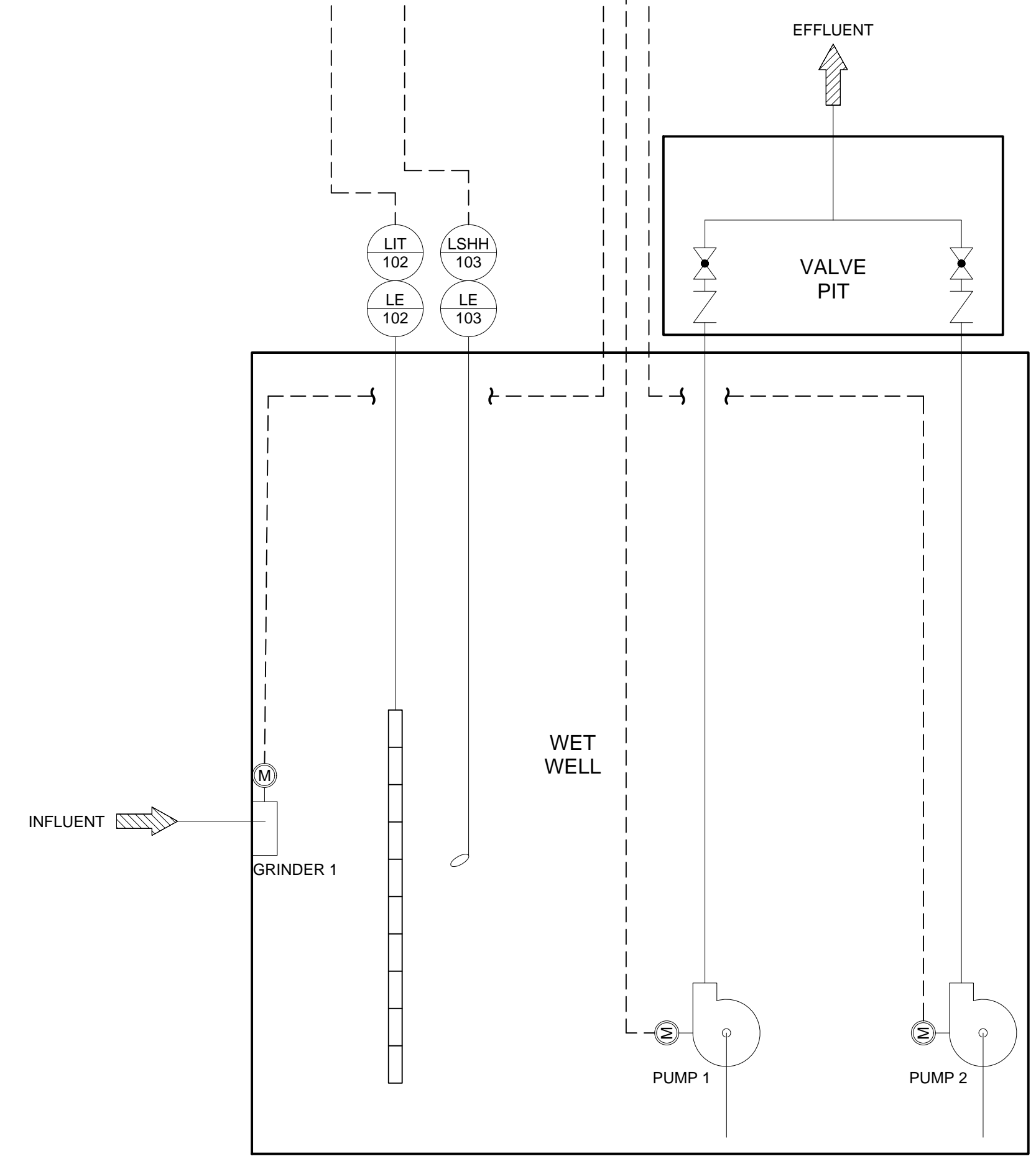
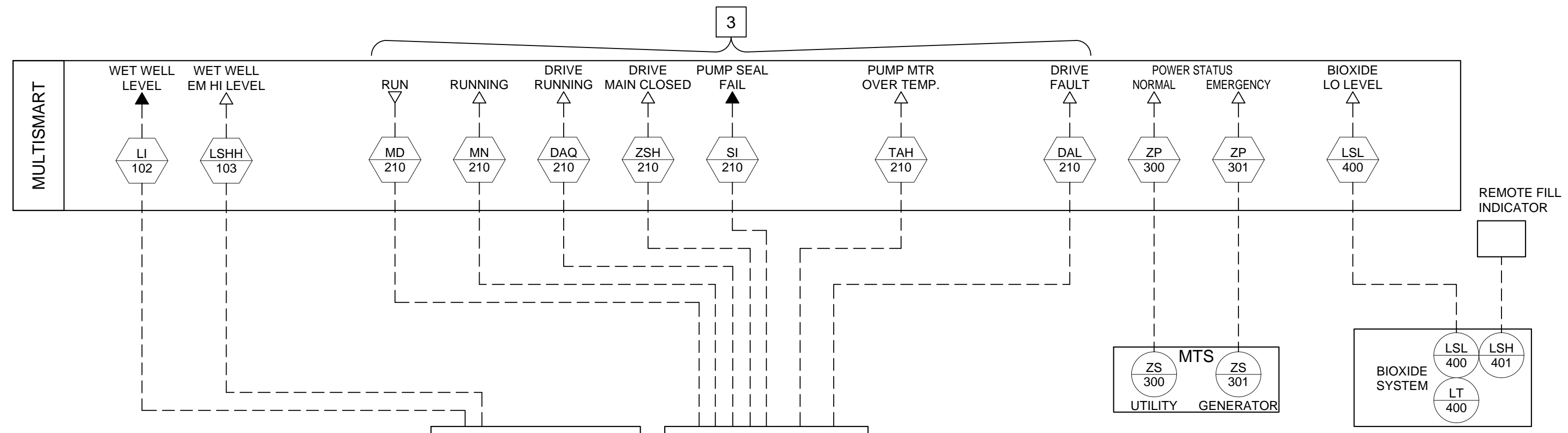
DATE  
 DECEMBER, 2016

SCALE

JOB NO.  
 2014-1653

SHEET  
 11 / 23

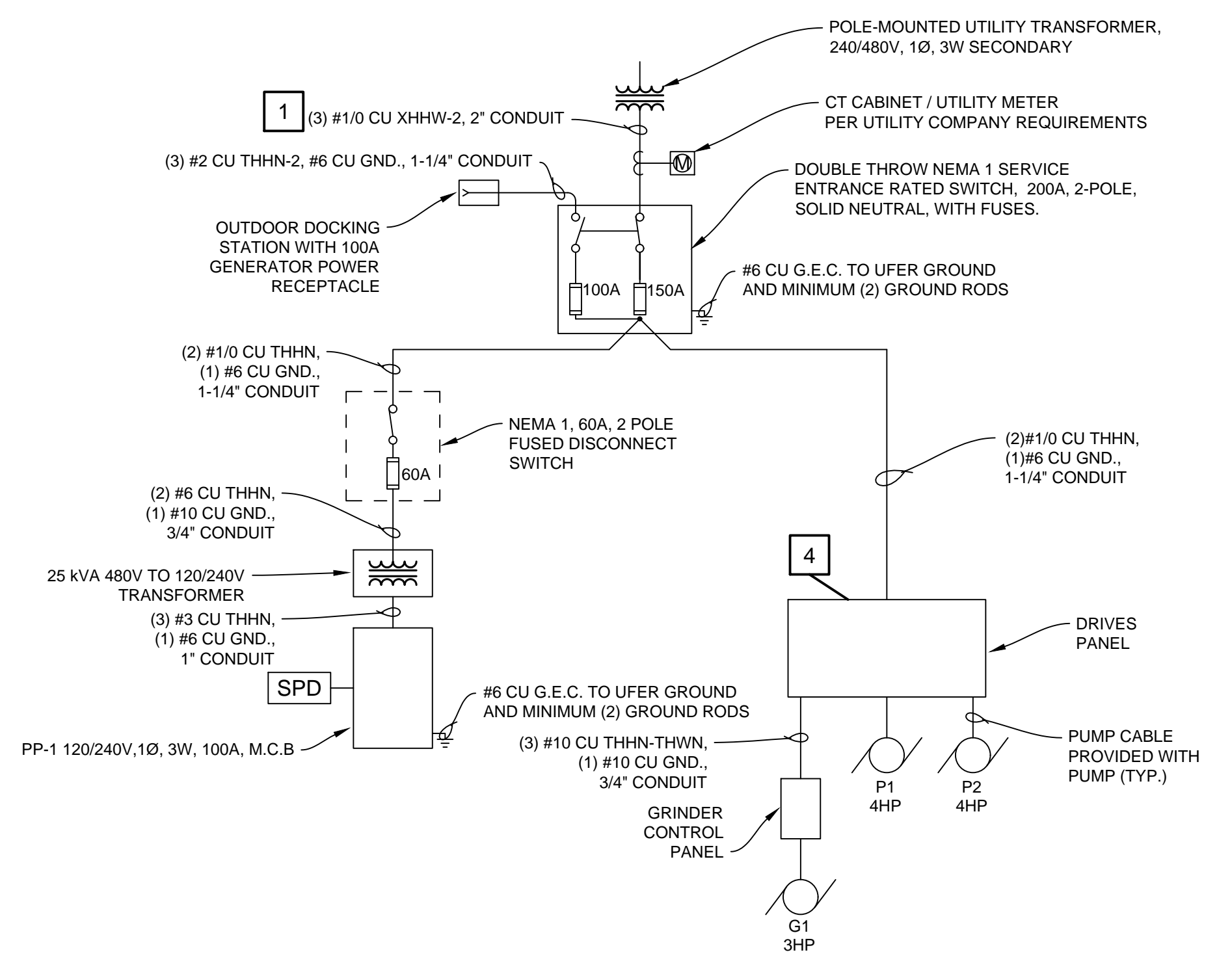
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**PUMP STATION P&ID**  
SCALE: NONE

**ELECTRICAL INSTALLATION NOTES:**

- PROVIDE (2)-2" CONDUITS IN ELECTRICAL TRENCH FROM CT CABINET TO UTILITY POLE. PROVIDE CONDUCTORS IN ONE CONDUIT (CAP AND MAINTAIN OTHER CONDUIT WITH A PULLSTRING FOR SPARE). TURN UP CONDUITS AT POLE AND MAKE CONNECTION TO UTILITY SERVICE. COORDINATE EXACT LOCATION AND REQUIREMENTS WITH UTILITY COMPANY PRIOR TO ROUGH-IN. REFER TO SINGLE LINE DIAGRAM FOR ADDITIONAL INFORMATION. REFER TO ELECTRICAL TRENCH DETAIL.
- PROVIDE AND INSTALL ALL ELECTRICAL SERVICE, DISTRIBUTION, AND CONTROLS EQUIPMENT, PANELS, DEVICES, AND WIRING AS SHOWN OR NOTED. REFERENCE SINGLE LINE DIAGRAM, ELECTRICAL PROFILE AND SPECIFICATIONS.
- PUMP 1 SHOWN. PUMP 2 AND GRINDER ARE SIMILAR.
- PROVIDE AND INSTALL AN ISOLATION CONTACTOR AHEAD OF EACH DRIVE, TO BE CONTROLLED BY A SEQUENTIAL TIMER CIRCUIT. THE CONTACTORS SHALL BE STAGED ON IN 10 SECOND INTERVALS AND THEN REMAIN ON WHENEVER THE POWER IS RESTORED.



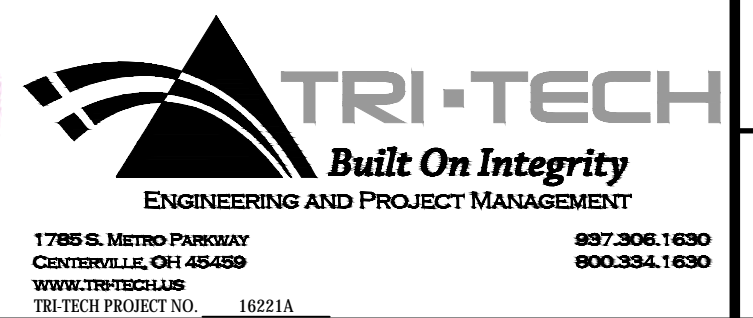
**2 ELECTRICAL SINGLE-LINE DIAGRAM**  
NO SCALE

CKT NO	BRKR	DESCRIPTION	TAG NO	CONNECTED			LOAD (W/CALC)		Comments
				A	B	DF	A	B	
1	30/2	SURGE PROTECTION DEVICE		0.00	0.00	1.00	0.00	0.00	
3									
5	20/2	VALVE ROOM UH-2		1.65	1.65	1.00	1.65	1.65	
7									
9	20/1	LIGHTING		0.23		1.25	0.29	1.65	
11	20/1	RECEPTACLE, BIOXIDE HEAT TRACE			0.13	1.00	0.36	0.13	
13	20/1	VALVE ROOM EF-1		0.36		1.00	0.36	1.00	
15	20/1	SCADA / PUMP CONTROL PANEL			0.50	1.00	0.50	0.50	
17	20/1	SPARE					0.00	0.00	
19	20/1	SPARE					0.00	0.00	
2	20/2	ELECTRIC ROOM UH-1		1.65		1.00	1.65	1.65	
4					1.65	1.00		1.65	
6	20/1	SPARE				1.00	0.00	0.00	
8	20/1	SPARE				1.00	0.00	0.00	
10	20/1	INTERIOR RECEPTACLES		0.54		1.00	0.54	1.00	
12	20/1	BIOXIDE CONTROL PANEL			0.50	1.00	0.50	0.50	
14	20/1	ELECTRIC ROOM EF-1		0.36		1.00	0.36	1.00	
16	20/1	SPARE					0.00	0.00	
18	20/1	SPARE					0.00	0.00	
20	20/1	SPARE					0.00	0.00	

ALL PANELBOARD EQUIPMENT IS SPECIFIED USING SQ.D MODEL NUMBERS.

Total Kw (CONNECTED)	4.79	Total Kw (Calculated)	4.85
Total Amps (CONNECTED)	39.92	Total Amps (Calculated)	40.40

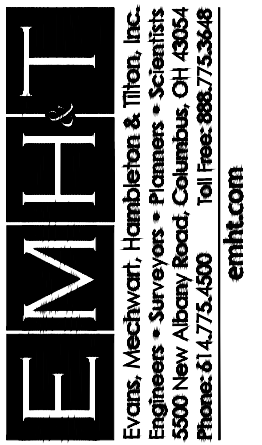
**PANEL SCHEDULE**  
SCALE: NONE



MARK	DATE	DESCRIPTION

**EPCON COMMUNITIES**

FARM LOTS 17 & 32, QUARTER TOWNSHIP 2, TOWNSHIP 3, RANGE 19  
UNITED STATES MILITARY LANDS  
CONCORD TOWNSHIP, DELAWARE COUNTY, OHIO  
SANITARY IMPROVEMENTS  
FOR  
**COURTYARDS AT SOUTH SECTION LINE ROAD**  
**PUMP STATION AND FORCE MAIN**  
PUMP STATION P&ID AND ELECTRICAL SINGLE LINE



DATE  
DECEMBER, 2016

SCALE

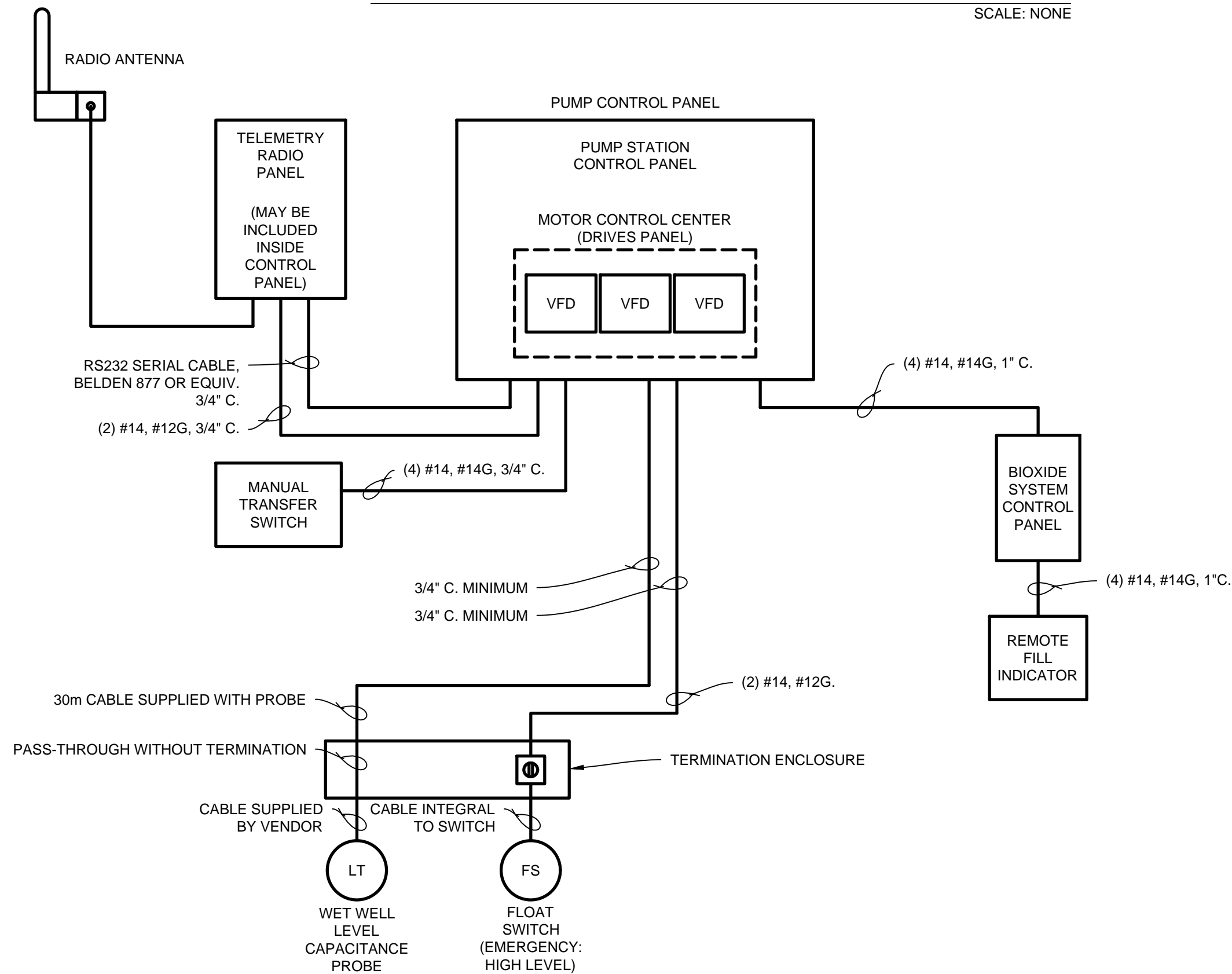
JOB NO.  
2014-1653

SHEET  
12 / 23



### PUMP STATION NETWORK DIAGRAM

SCALE: NONE

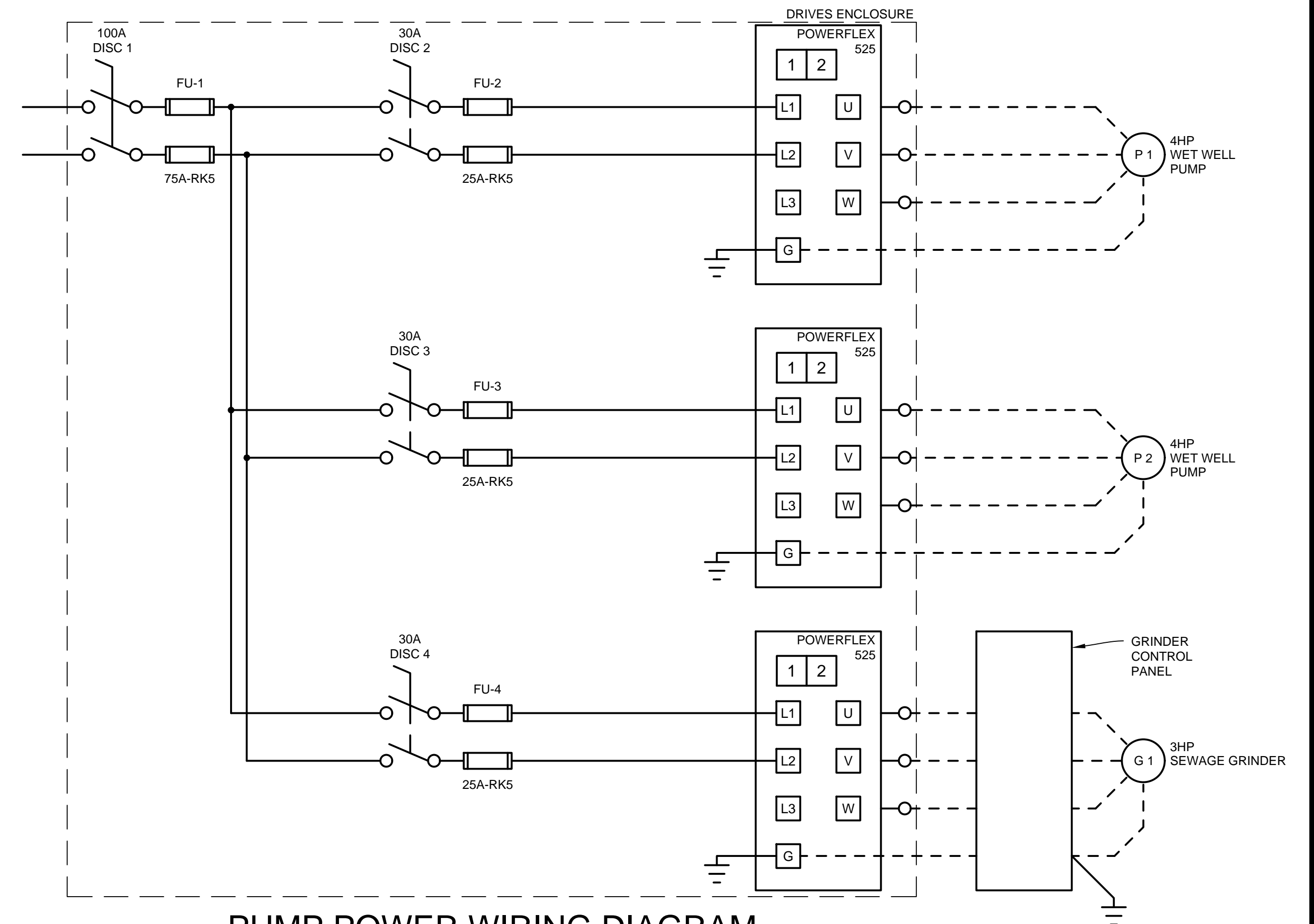


### CONTROLS DIAGRAM

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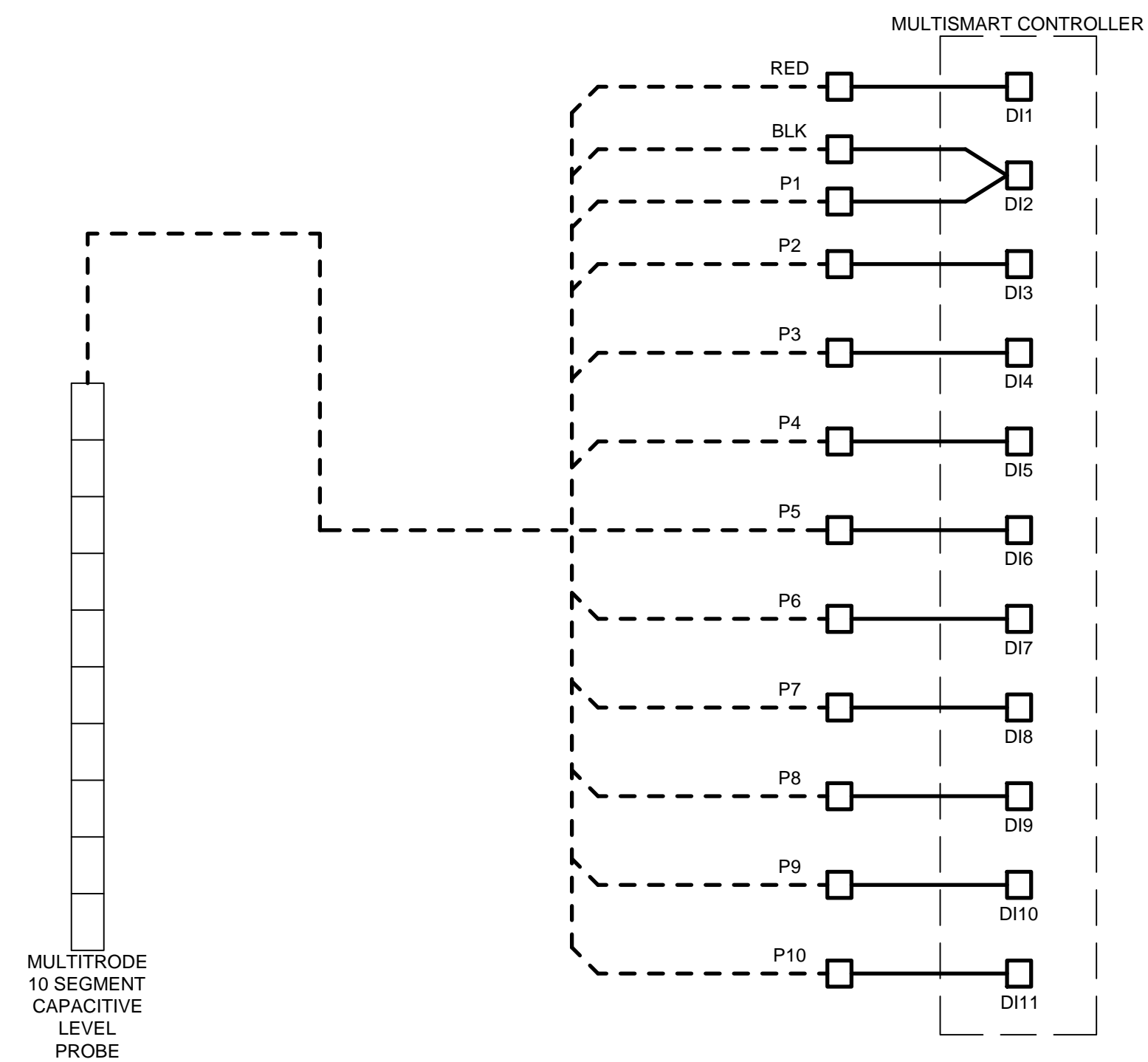
#### ELECTRICAL INSTALLATION NOTES:

- DRIVE SHALL BE CONFIGURED FOR 480V, 1Ø INPUT AND 480V, 3Ø OUTPUT.
- MANUFACTURER RECOMMENDS THIS DRIVE BE SIZED FOR A 10 HP MOTOR AS IT IS DERATED FOR 1Ø INPUT.



### PUMP POWER WIRING DIAGRAM

SCALE: NONE



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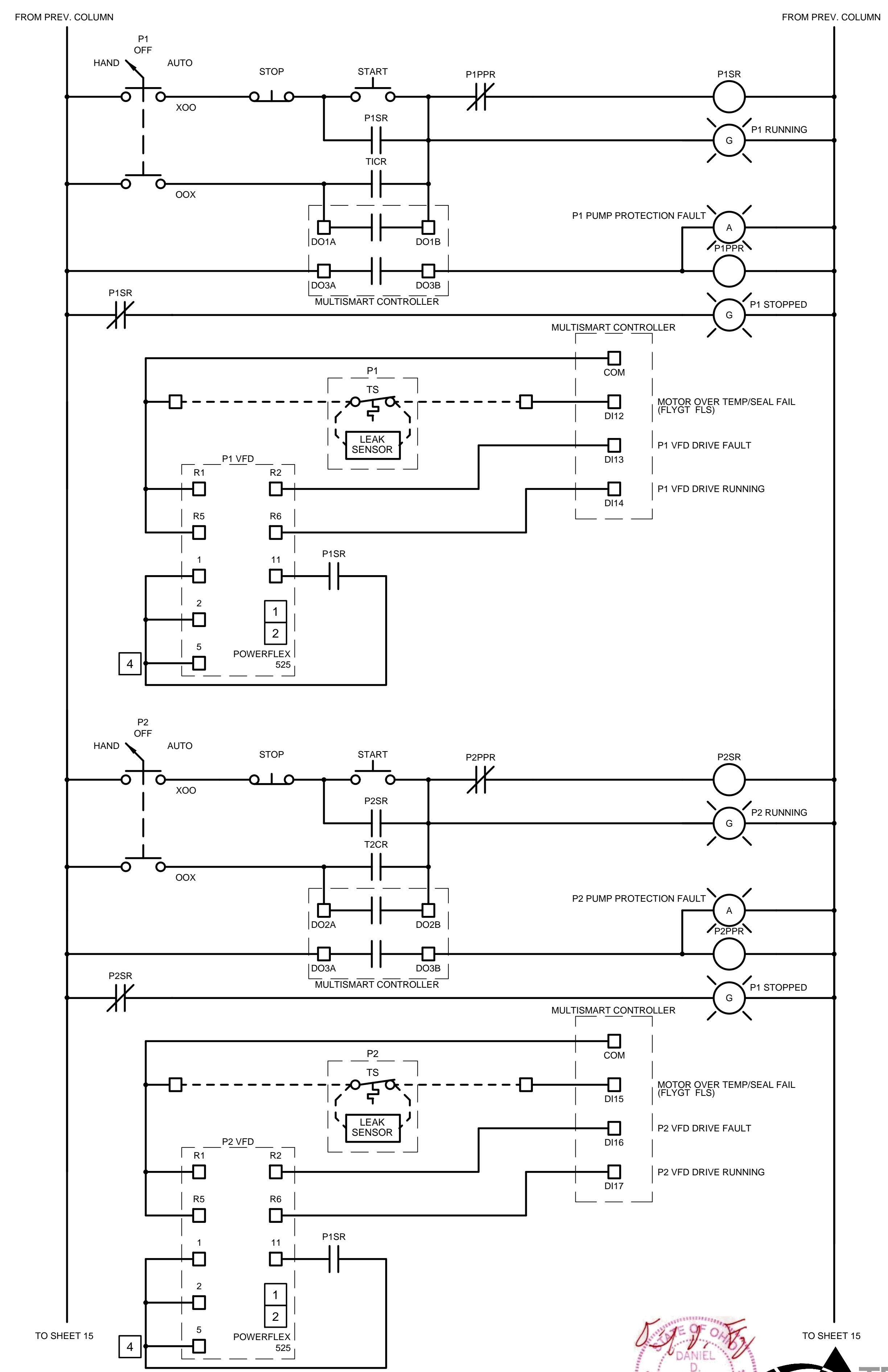
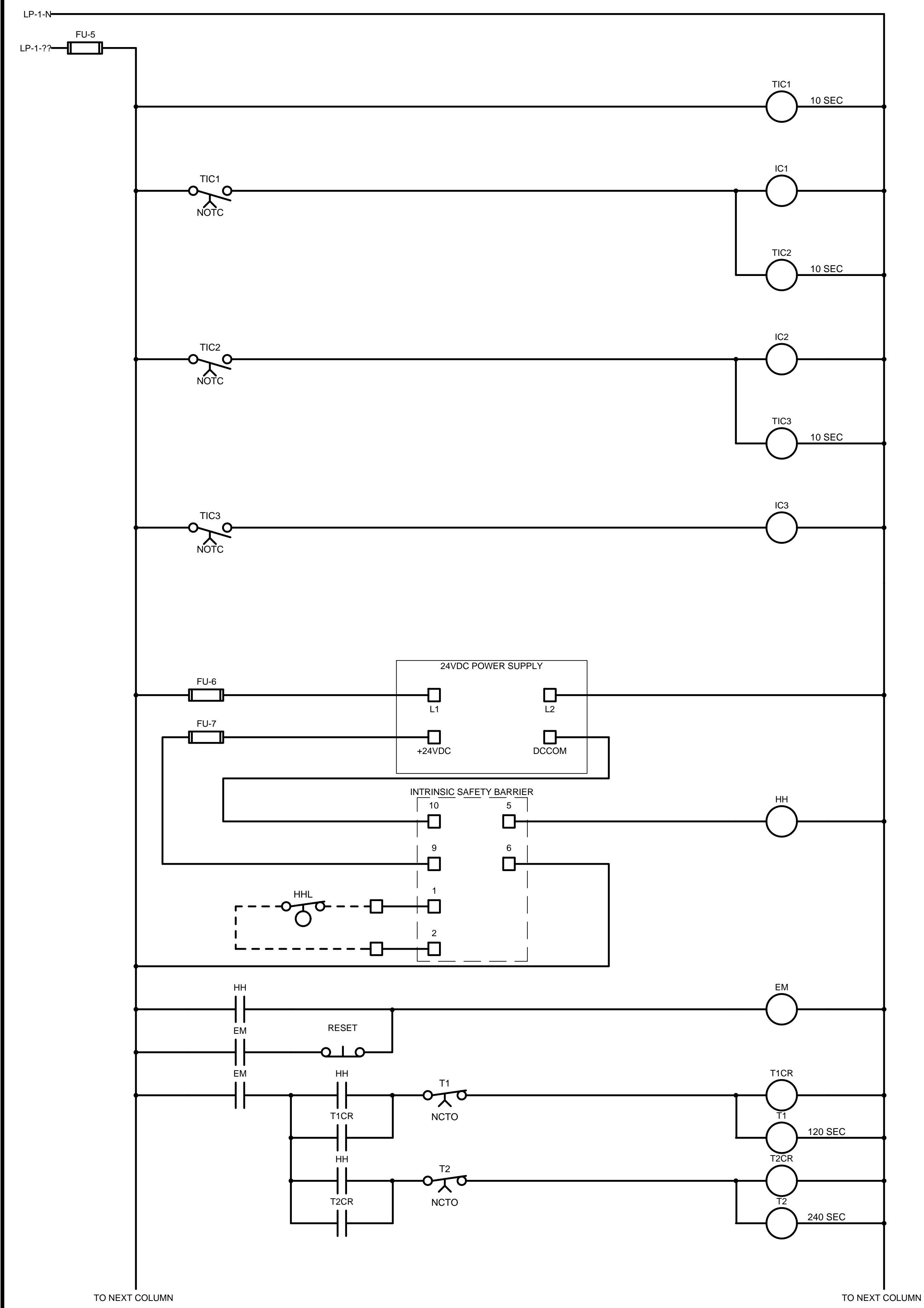
MARK	DATE	DESCRIPTION

REVISIONS

EPCON COMMUNITIES  
 FARM LOTS 17 & 32, QUARTER TOWNSHIP 2, TOWNSHIP 3, RANGE 19  
 UNITED STATES MILITARY LANDS  
 CONCORD TOWNSHIP, DELAWARE COUNTY, OHIO  
 SANITARY IMPROVEMENTS  
 FOR  
**COURTYARDS AT SOUTH SECTION LINE ROAD**  
**PUMP STATION AND FORCE MAIN**  
 CONTROL DIAGRAMS

**EMHT**  
 Evans, Meacham, Henshaw & Thon, Inc.  
 5300 New Albany Road, Columbus, OH 43254  
 Phone: 614.775.6500 Fax: 614.775.3448  
 emht.com

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JOB NO.	2014-1653
SHEET	13 / 23



**PUMP CONTROL WIRING DIAGRAM**

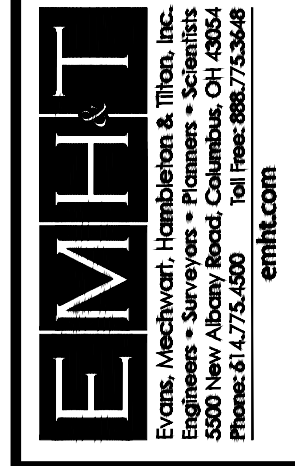
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MARK	DATE	DESCRIPTION

**EPCON COMMUNITIES**

**COURTYARDS AT SOUTH SECTION LINE ROAD  
PUMP STATION AND FORCE MAIN  
CONTROL DIAGRAMS**

FARM LOTS 17 & 32, QUARTER TOWNSHIP 2, TOWNSHIP 3, RANGE 19  
UNITED STATES MILITARY LANDS  
CONCORD TOWNSHIP, DELAWARE COUNTY, OHIO  
SANITARY IMPROVEMENTS

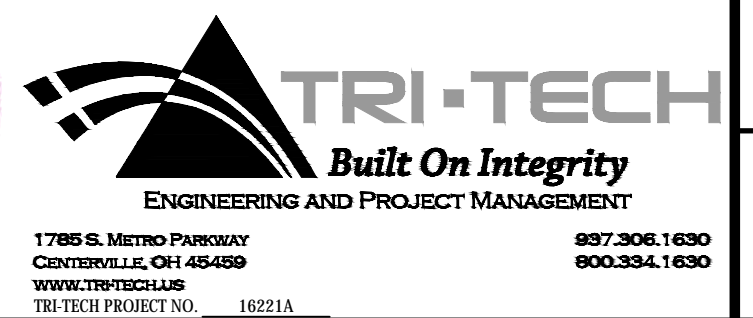


DATE  
**DECEMBER, 2016**

SCALE

JOB NO.  
**2014-1653**

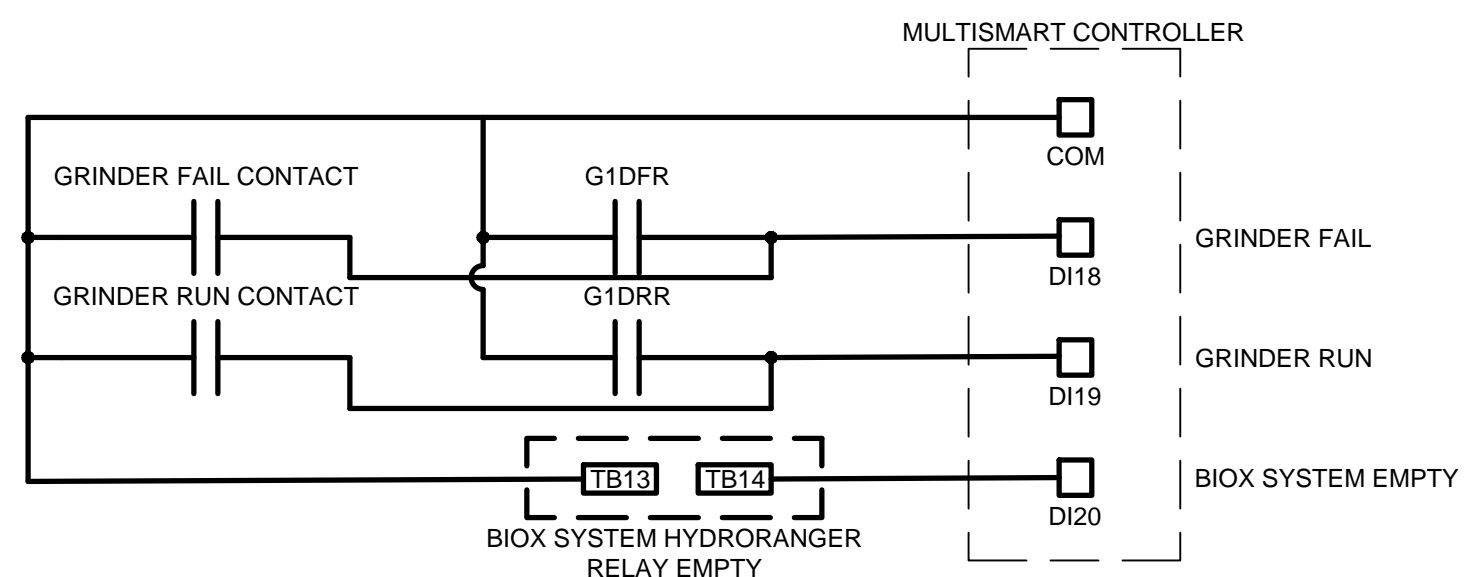
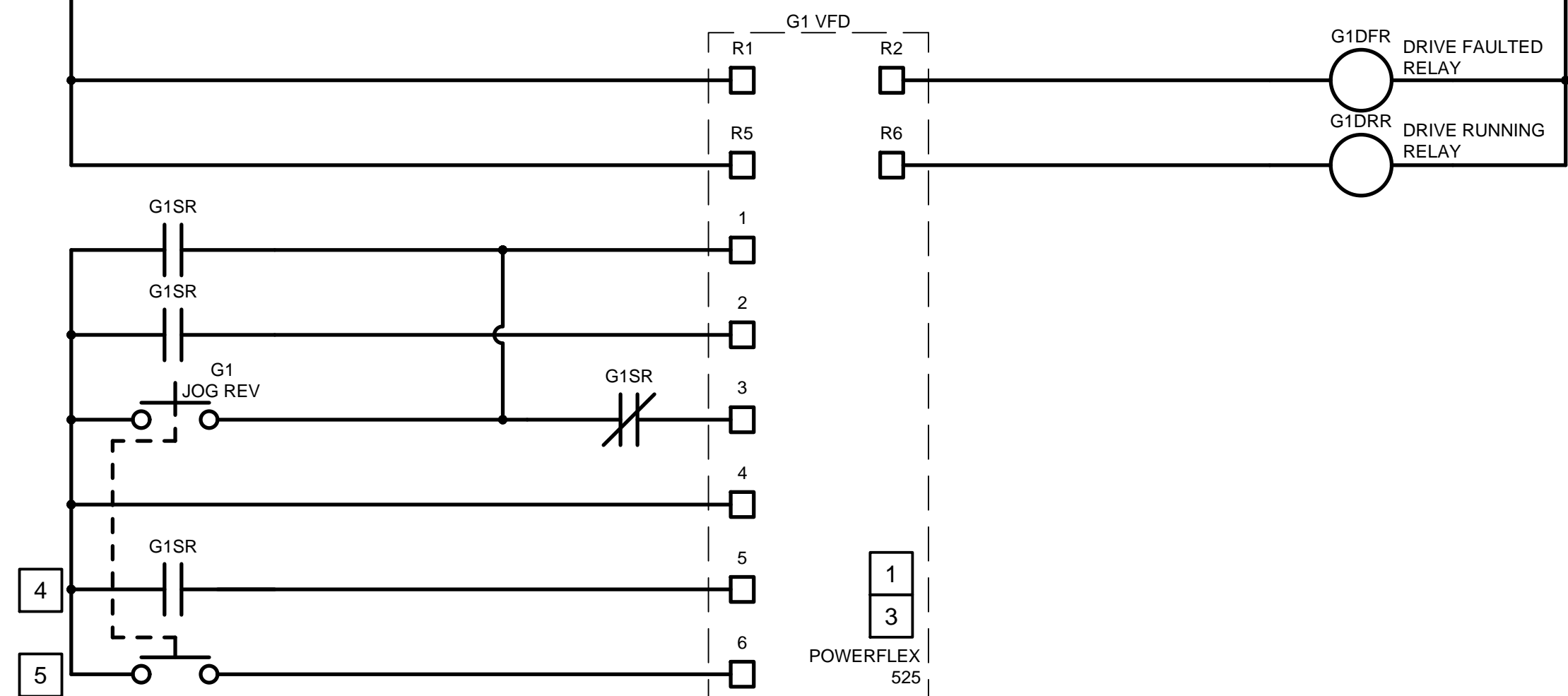
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**14/23**



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FROM SHEET14

FROM SHEET14



**ELECTRICAL INSTALLATION NOTES:**

1. DRIVE SHALL BE CONFIGURED FOR 240V, 1Ø INPUT AND 240V, 3Ø OUTPUT.
2. MANUFACTURER RECOMMENDS THIS DRIVE BE SIZED FOR A 15 HP MOTOR AS IT IS DERATED 33% FOR 1Ø INPUT.
3. MANUFACTURER RECOMMENDS THIS DRIVE BE SIZED FOR A 10 HP MOTOR AS IT IS DERATED 33% FOR 1Ø INPUT.
4. SET PARAMETER FOR A PRESET RUN FREQUENCY OF 60HZ.
5. SET PARAMETER FOR A PRESET JOG FREQUENCY OF 30HZ.

REVISIONS

MARK	DATE	DESCRIPTION

EPCON COMMUNITIES

FARM LOTS 17 & 32, QUARTER TOWNSHIP 2, TOWNSHIP 3, RANGE 19  
 UNITED STATES MILITARY LANDS  
 CONCORD TOWNSHIP, DELAWARE COUNTY, OHIO  
 SANITARY SEWER IMPROVEMENTS  
 FOR  
**COURTYARDS AT SOUTH SECTION LINE ROAD  
 PUMP STATION AND FORCE MAIN**  
 CONTROL DIAGRAMS

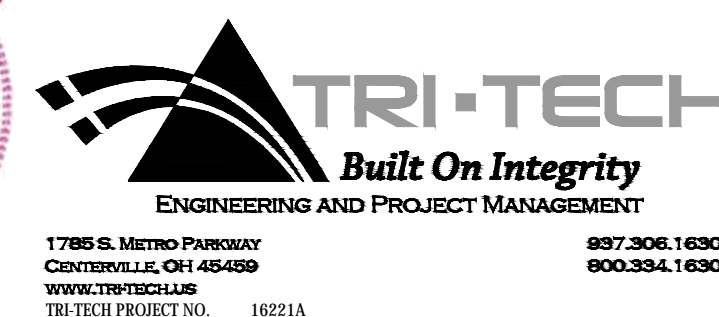


DATE  
 DECEMBER, 2016

SCALE

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 2014-1653

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 15/23



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SECTION 26 05 29  
HANGERS AND SUPPORTS FOR ELECTRICAL SYSTEMS - CONTINUED

PART 3 EXECUTION  
3.01 INSTALLATION

- A. Install products in accordance with manufacturer's instructions.
- B. Install support and attachment components in a neat and workmanlike manner in accordance with NECA 1.
- C. Install anchors and fasteners in accordance with ICC Evaluation Services, LLC (ICC-ES) evaluation report conditions of use where applicable.
- D. Provide independent support from building structure. Do not provide support from piping, ductwork, or other systems.
- E. Unless specifically indicated or approved by Engineer, do not provide support from suspended ceiling support system or ceiling grid.
- F. Unless specifically indicated or approved by Engineer, do not provide support from roof deck.
- G. Do not penetrate or otherwise notch or cut structural members without approval of Structural Engineer.
- H. Equipment Support and Attachment:
  - 1. Use metal fabricated supports or supports assembled from metal channel (strut) to support equipment as required.
  - 2. Use metal channel (strut) secured to studs to support equipment surface-mounted on hollow stud walls when wall strength is not sufficient to resist pull-out.
  - 3. Use metal channel (strut) to support surface-mounted equipment in wet or damp locations to provide space between equipment and mounting surface.
  - 4. Securely fasten floor-mounted equipment. Do not install equipment such that it relies on its own weight for support.
- I. Conduit Support and Attachment: Also comply with Section 26 05 34.
- J. Box Support and Attachment: Also comply with Section 26 05 37.
- K. Interior Luminaire Support and Attachment: Also comply with Section 26 51 00.
- L. Preset Concrete Inserts: Use manufacturer provided closure strips to inhibit concrete seepage during concrete pour.
- M. Secure fasteners according to manufacturer's recommended torque settings.
- N. Remove temporary supports.

3.02 FIELD QUALITY CONTROL

- A. Inspect support and attachment components for damage and defects.
- B. Repair cuts and abrasions in galvanized finishes using zinc-rich paint recommended by manufacturer. Replace components that exhibit signs of corrosion.
- C. Correct deficiencies and replace damaged or defective support and attachment components.

END OF SECTION

SECTION 26 05 34  
CONDUIT

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Galvanized steel rigid metal conduit (RMC).
- B. Aluminum rigid metal conduit (RMC).
- C. Intermediate metal conduit (IMC).
- D. PVC-coated galvanized steel rigid metal conduit (RMC).
- E. Flexible metal conduit (FMC).
- F. Liquidtight flexible metal conduit (LFMC).
- G. Electrical metallic tubing (EMT).
- H. Rigid polyvinyl chloride (PVC) conduit.
- I. Conduit fittings.
- J. Accessories.

1.02 RELATED REQUIREMENTS

- A. Section 26 05 26 - Grounding and Bonding for Electrical Systems.
  - 1. Includes additional requirements for fittings for grounding and bonding.
- B. Section 26 05 29 - Hangers and Supports for Electrical Systems.
- C. Section 26 05 53 - Identification for Electrical Systems: Identification products and requirements.
- D. Section 26 21 00 - Low-Voltage Electrical Service Entrance: Additional requirements for electrical service conduits.

1.03 SUBMITTALS

- A. Project Record Documents: Record actual routing for conduits installed underground and conduits 2 inch (53 mm) trade size and larger.

1.04 QUALITY ASSURANCE

- A. Conform to requirements of NFPA 70.

PART 2 PRODUCTS

2.01 CONDUIT APPLICATIONS

- A. Do not use conduit and associated fittings for applications other than as permitted by NFPA 70 and product listing.
- B. Unless otherwise indicated and where not otherwise restricted, use the conduit types indicated for the specified applications. Where more than one listed application applies, comply with the most restrictive requirements. Where conduit type for a particular application is not specified, use galvanized steel rigid metal conduit.
- C. Underground:
  - 1. Under Slab on Grade: Use galvanized steel rigid metal conduit, intermediate metal conduit (IMC), PVC-coated galvanized steel rigid metal conduit, or rigid PVC conduit.
  - 2. Exterior, Direct-Buried: Use PVC-coated galvanized steel rigid metal conduit or rigid PVC conduit.
  - 3. Where rigid polyvinyl (PVC) conduit is provided, transition to PVC-coated galvanized steel rigid metal conduit where emerging from underground.
  - 4. Where rigid polyvinyl (PVC) conduit larger than 2 inch (53 mm) trade size is provided, use PVC-coated galvanized steel rigid metal conduit elbows or concrete encased PVC elbows for bends.
  - 5. Where steel conduit is installed in direct contact with earth where soil has a resistivity of less than 2000 ohm-centimeters or is characterized as severely corrosive based on soils report or local experience, use corrosion protection tape to provide supplementary corrosion protection or use PVC-coated galvanized steel rigid metal conduit.
  - 6. Where steel conduit emerges from concrete into soil, use corrosion protection tape to provide supplementary corrosion protection for a minimum of 4 inches (100 mm) on either side of where conduit emerges or use PVC-coated galvanized steel rigid metal conduit.
- D. Concealed Within Masonry Walls: Use galvanized steel rigid metal conduit, intermediate metal conduit (IMC), or electrical metallic tubing (EMT).
- E. Concealed Within Hollow Stud Walls: Use galvanized steel rigid metal conduit, intermediate metal conduit (IMC), or electrical metallic tubing (EMT).
- F. Interior, Damp or Wet Locations: Use galvanized steel rigid metal conduit or intermediate metal conduit (IMC).
- G. Exposed, Interior, Not Subject to Physical Damage: Use galvanized steel rigid metal conduit, intermediate metal conduit (IMC), or electrical metallic tubing (EMT).
- H. Exposed, Exterior: Use PVC-coated galvanized steel rigid metal conduit or aluminum rigid metal conduit.
- I. Concealed, Exterior, Not Embedded in Concrete or in Contact With Earth: Use galvanized steel rigid metal conduit or intermediate metal conduit (IMC).
- J. Hazardous (Classified) Locations: Use galvanized steel rigid metal conduit, intermediate metal conduit (IMC), aluminum rigid metal conduit, or PVC-coated galvanized steel rigid metal conduit.
- K. Connections to Vibrating Equipment:
  - 1. Dry Locations: Use flexible metal conduit.
  - 2. Damp, Wet, or Corrosive Locations: Use liquidtight flexible metal conduit.

2.02 CONDUIT REQUIREMENTS

- A. Electrical Service Conduits: Also comply with Section 26 21 00.
- B. Fittings for Grounding and Bonding: Also comply with Section 26 05 26.
- C. Provide all conduit, fittings, supports, and accessories required for a complete raceway system.
- D. Provide products listed, classified, and labeled as suitable for the purpose intended.
- E. Minimum Conduit Size, Unless Otherwise Indicated:
  - 1. Branch Circuits: 1/2 inch (16 mm) trade size.
  - 2. Branch Circuit Homeruns: 3/4 inch (21 mm) trade size.
  - 3. Control Circuits: 1/2 inch (16 mm) trade size.
  - 4. Underground, Interior: 3/4 inch (21 mm) trade size.
  - 5. Underground, Exterior: 1 inch (27 mm) trade size.
- F. Where conduit size is not indicated, size to comply with NFPA 70 but not less than applicable minimum size requirements specified.

2.03 GALVANIZED STEEL RIGID METAL CONDUIT (RMC)

- A. Description: NFPA 70, Type RMC galvanized steel rigid metal conduit complying with ANSI C80.1 and listed and labeled as complying with UL 6.
- B. Fittings:
  - 1. Non-Hazardous Locations: Use fittings complying with NEMA FB 1 and listed and labeled as complying with UL 514B.
  - 2. Hazardous (Classified) Locations: Use fittings listed and labeled as complying with UL 1203 for the classification of the installed location.
  - 3. Material: Use steel or malleable iron.
  - 4. Connectors and Couplings: Use threaded type fittings only. Threadless set screw and compression (gland) type fittings are not permitted.

2.04 ALUMINUM RIGID METAL CONDUIT (RMC)

- A. Description: NFPA 70, Type RMC aluminum rigid metal conduit complying with ANSI C80.5 and listed and labeled as complying with UL 6A.
- B. Fittings:
  - 1. Non-Hazardous Locations: Use fittings complying with NEMA FB 1 and listed and labeled as complying with UL 514B.
  - 2. Hazardous (Classified) Locations: Use fittings listed and labeled as complying with UL 1203 for the classification of the installed location.
  - 3. Material: Use aluminum.
  - 4. Connectors and Couplings: Use threaded type fittings only. Threadless set screw and compression (gland) type fittings are not permitted.

2.05 INTERMEDIATE METAL CONDUIT (IMC)

- A. Description: NFPA 70, Type IMC galvanized steel intermediate metal conduit complying with ANSI C80.6 and listed and labeled as complying with UL 1242.
- B. Fittings:
  - 1. Non-Hazardous Locations: Use fittings complying with NEMA FB 1 and listed and labeled as complying with UL 514B.
  - 2. Hazardous (Classified) Locations: Use fittings listed and labeled as complying with UL 1203 for the classification of the installed location.
  - 3. Material: Use steel or malleable iron.
  - 4. Connectors and Couplings: Use threaded type fittings only. Threadless set screw and compression (gland) type fittings are not permitted.

2.06 PVC-COATED GALVANIZED STEEL RIGID METAL CONDUIT (RMC)

- A. Description: NFPA 70, Type RMC galvanized steel rigid metal conduit with external polyvinyl chloride (PVC) coating complying with NEMA RN 1 and listed and labeled as complying with UL 6.
- B. Exterior Coating: Polyvinyl chloride (PVC), nominal thickness of 40 mil (1.02 mm).
- C. PVC-Coated Fittings:
  - 1. Manufacturer: Same as manufacturer of PVC-coated conduit to be installed.
  - 2. Non-Hazardous Locations: Use fittings listed and labeled as complying with UL 514B.
  - 3. Hazardous (Classified) Locations: Use fittings listed and labeled as complying with UL 1203 for the classification of the installed location.
  - 4. Material: Use steel or malleable iron.
  - 5. Exterior Coating: Polyvinyl chloride (PVC), minimum thickness of 40 mil (1.02 mm).
- D. PVC-Coated Supports: Furnish with exterior coating of polyvinyl chloride (PVC), minimum thickness of 15 mil (0.38 mm).

2.07 FLEXIBLE METAL CONDUIT (FMC)

- A. Description: NFPA 70, Type FMC standard wall steel flexible metal conduit listed and labeled as complying with UL 1, and listed for use in classified firestop systems to be used.
- B. Fittings:
  - 1. Description: Fittings complying with NEMA FB 1 and listed and labeled as complying with UL 514B.
  - 2. Material: Use steel or malleable iron.

2.08 LIQUIDTIGHT FLEXIBLE METAL CONDUIT (LFMC)

- A. Description: NFPA 70, Type LFMC polyvinyl chloride (PVC) jacketed steel flexible metal conduit listed and labeled as complying with UL 360.
- B. Fittings:
  - 1. Description: Fittings complying with NEMA FB 1 and listed and labeled as complying with UL 514B.
  - 2. Material: Use steel or malleable iron.

2.09 ELECTRICAL METALLIC TUBING (EMT)

- A. Description: NFPA 70, Type EMT steel electrical metallic tubing complying with ANSI C80.3 and listed and labeled as complying with UL 797.
- B. Fittings:
  - 1. Description: Fittings complying with NEMA FB 1 and listed and labeled as complying with UL 514B.
  - 2. Material: Use steel or malleable iron.
  - 3. Connectors and Couplings: Use compression (gland) or set-screw type.
    - a. Do not use indenter type connectors and couplings.
  - 4. Damp or Wet Locations (where permitted): Use fittings listed for use in wet locations.

2.10 RIGID POLYVINYL CHLORIDE (PVC) CONDUIT

- A. Description: NFPA 70, Type PVC rigid polyvinyl chloride conduit complying with NEMA TC 2 and listed and labeled as complying with UL 651; Schedule 40 unless otherwise indicated, Schedule 80 where subject to physical damage; rated for use with conductors rated 90 degrees C.
- B. Fittings:
  - 1. Manufacturer: Same as manufacturer of conduit to be connected.
  - 2. Description: Fittings complying with NEMA TC 3 and listed and labeled as complying with UL 651; material to match conduit.

2.11 ACCESSORIES

- A. Corrosion Protection Tape: PVC-based, minimum thickness of 20 mil (0.51 mm).
- B. Conduit Joint Compound: Corrosion-resistant, electrically conductive; suitable for use with the conduit to be installed.
- C. Solvent Cement for PVC Conduit and Fittings: As recommended by manufacturer of conduit and fittings to be installed.
- D. Pull Strings: Use nylon cord with average breaking strength of not less than 200 pound-force (890 N).
- E. Sealing Compound for Sealing Fittings: Listed for use with the particular fittings to be installed.
- F. Modular Seals for Conduit Penetrations: Rated for minimum of 40 psig; Suitable for the conduits to be installed.

PART 3 EXECUTION

3.01 EXAMINATION

- A. Verify that field measurements are as shown on drawings.
- B. Verify that mounting surfaces are ready to receive conduits.
- C. Verify that conditions are satisfactory for installation prior to starting work.

3.02 INSTALLATION

- A. Install products in accordance with manufacturer's instructions.
- B. Install conduit in a neat and workmanlike manner in accordance with NECA 1.
- C. Install galvanized steel rigid metal conduit (RMC) in accordance with NECA 101.
- D. Install aluminum rigid metal conduit (RMC) in accordance with NECA 102.
- E. Install intermediate metal conduit (IMC) in accordance with NECA 101.
- F. Install PVC-coated galvanized steel rigid metal conduit (RMC) using only tools approved by the manufacturer.
- G. Install rigid polyvinyl chloride (PVC) conduit in accordance with NECA 111.
- H. Conduit Routing:
  - 1. Unless dimensioned, conduit routing indicated is diagrammatic.
  - 2. When conduit destination is indicated and routing is not shown, determine exact routing required.
  - 3. Arrange conduit to maintain adequate headroom, clearances, and access.
  - 4. Arrange conduit to provide no more than the equivalent of four 90 degree bends between pull points.
  - 5. Arrange conduit to provide no more than 150 feet (46 m) between pull points.
- I. Conduit Support:
  - 1. Secure and support conduits in accordance with NFPA 70 and Section 26 05 29 using suitable supports and methods approved by the authority having jurisdiction.
  - 2. Provide independent support from building structure. Do not provide support from piping, ductwork, or other systems.
  - 3. Use conduit strap to support single surface-mounted conduit.
    - a. Use clamp back spacer with conduit strap for damp and wet locations to provide space between conduit and mounting surface.
  - 4. Use metal channel (strut) with accessory conduit clamps to support multiple parallel surface-mounted conduits.
- J. Connections and Terminations:
  - 1. Use approved zinc-rich paint or conduit joint compound on field-cut threads of galvanized steel conduits prior to making connections.
  - 2. Where two threaded conduits must be joined and neither can be rotated, use three-piece couplings or split couplings. Do not use running threads.
  - 3. Use suitable adapters where required to transition from one type of conduit to another.
  - 4. Provide drip loops for liquidtight flexible conduit connections to prevent drainage of liquid into connectors.
  - 5. Terminate threaded conduits in boxes and enclosures using threaded hubs or double lock nuts for dry locations and raintight hubs for wet locations.
  - 6. Where spare conduits stub up through concrete floors and are not terminated in a box or enclosure, provide threaded couplings equipped with threaded plugs set flush with finished floor.
  - 7. Provide insulating bushings or insulated throats at all conduit terminations to protect conductors.
  - 8. Secure joints and connections to provide maximum mechanical strength and electrical continuity.
- K. Penetrations:
  - 1. Do not penetrate or otherwise notch or cut structural members, including footings and grade beams, without approval of Structural Engineer.
  - 2. Make penetrations perpendicular to surfaces unless otherwise indicated.
  - 3. Provide sleeves for penetrations as indicated or as required to facilitate installation. Set sleeves flush with exposed surfaces unless otherwise indicated or required.
  - 4. Conceal bends for conduit risers emerging above ground.
  - 5. Seal interior of conduits entering the building from underground at first accessible point to prevent entry of moisture and gases.

- 6. Provide suitable modular seal where conduits penetrate exterior wall below grade.
- 7. Where conduits penetrate waterproof membrane, seal as required to maintain integrity of membrane.
- 8. Make penetrations for roof-mounted equipment within associated equipment openings and curbs where possible to minimize roofing system penetrations. Where penetrations are necessary, seal as indicated or as required to preserve integrity of roofing system and maintain roof warranty. Include proposed locations of penetrations and methods for sealing with submittals.

L. Underground Installation:

- 1. Minimum Cover, Unless Otherwise Indicated or Required:
  - a. Underground, Exterior: 24 inches (610 mm).
  - b. Under Slab on Grade: 12 inches (300 mm) to bottom of slab.
- 2. Provide underground warning tape in accordance with Section 26 05 53 along entire conduit length for service entrance where not concrete-encased.

- M. Concrete Encasement: Where conduits not otherwise embedded within concrete are indicated to be concrete-encased, provide concrete with minimum concrete cover of 3 inches (76 mm) on all sides unless otherwise indicated.

- N. Hazardous (Classified) Locations: Where conduits cross boundaries of hazardous (classified) locations, provide sealing fittings located as indicated or in accordance with NFPA 70.

- O. Conduit Movement Provisions: Where conduits are subject to movement, provide expansion and expansion/deflection fittings to prevent damage to enclosed conductors or connected equipment. This includes, but is not limited to:
  - 1. Where conduits cross structural joints intended for expansion, contraction, or deflection.
  - 2. Where conduits are subject to earth movement by settlement or frost.

- P. Condensation Prevention: Where conduits cross barriers between areas of potential substantial temperature differential, provide sealing fitting or approved sealing compound at an accessible point near the penetration to prevent condensation. This includes, but is not limited to:
  - 1. Where conduits pass from outdoors into conditioned interior spaces.
  - 2. Where conduits pass from unconditioned interior spaces into conditioned interior spaces.

- Q. Provide pull string in all empty conduits and in conduits where conductors and cables are to be installed by others. Leave minimum slack of 12 inches (300 mm) at each end.

- R. Provide grounding and bonding in accordance with Section 26 05 26.

3.03 FIELD QUALITY CONTROL

- A. Repair cuts and abrasions in galvanized finishes using zinc-rich paint recommended by manufacturer. Replace components that exhibit signs of corrosion.
- B. Where coating of PVC-coated galvanized steel rigid metal conduit (RMC) contains cuts or abrasions, repair in accordance with manufacturer's instructions.
- C. Correct deficiencies and replace damaged or defective conduits.

3.04 CLEANING

- A. Clean interior of conduits to remove moisture and foreign matter.

3.05 PROTECTION

- A. Immediately after installation of conduit, use suitable manufactured plugs to provide protection from entry of moisture and foreign material and do not remove until ready for installation of conductors.

END OF SECTION

SECTION 26 05 37  
BOXES

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Outlet and device boxes up to 100 cubic inches (1,650 cu cm), including those used as junction and pull boxes.
- B. Cabinets and enclosures, including junction and pull boxes larger than 100 cubic inches (1,650 cu cm).
- C. Boxes for hazardous (classified) locations.
- D. Underground boxes/enclosures.

1.02 ADMINISTRATIVE REQUIREMENTS

- A. Coordination:
  - 1. Coordinate the work with other trades to avoid placement of ductwork, piping, equipment, or other potential obstructions within the dedicated equipment spaces and working clearances for electrical equipment required by NFPA 70.
  - 2. Coordinate arrangement of electrical equipment with the dimensions and clearance requirements of the actual equipment to be installed.
  - 3. Coordinate minimum sizes of boxes with the actual installed arrangement of conductors, clamps, support fittings, and devices, calculated according to NFPA 70.
  - 4. Coordinate minimum sizes of pull boxes with the actual installed arrangement of connected conduits, calculated according to NFPA 70.
- B. Coordinate the placement of boxes with millwork, furniture, device, equipment, etc. installed under other sections or by others.
- 6. Coordinate the work with other trades to preserve insulation integrity.
- 7. Coordinate the work with other trades to provide walls suitable for installation of flush-mounted boxes where indicated.
- 8. Notify Engineer of any conflicts with or deviations from the contract documents. Obtain direction before proceeding with work.

1.03 SUBMITTALS

- A. Project Record Documents: Record actual locations for outlet and device boxes, pull boxes, cabinets and enclosures, floor boxes, and underground boxes/enclosures.
- B. Maintenance Materials: Furnish the following for Owner's use in maintenance of project.
  - 1. Keys for Lockable Enclosures: Two of each different key.

1.04 QUALITY ASSURANCE

- A. Conform to requirements of NFPA 70.

PART 2 PRODUCTS

2.01 BOXES

- A. General Requirements:
  - 1. Do not use boxes and associated accessories for applications other than as permitted by NFPA 70 and product listing.
  - 2. Provide all boxes, fittings, supports, and accessories required for a complete raceway system and to accommodate devices and equipment to be installed.
  - 3. Provide products listed, classified, and labeled as suitable for the purpose intended.
  - 4. Where box size is not indicated, size to comply with NFPA 70 but not less than applicable minimum size requirements specified.
  - 5. Provide grounding terminals within boxes where equipment grounding conductors terminate.
- B. Outlet and Device Boxes Up to 100 cubic inches (1,650 cu cm), Including Those Used as Junction and Pull Boxes:
  - 1. Use sheet-steel boxes for dry locations unless otherwise indicated or required.
  - 2. Use 304 stainless steel for damp or wet locations unless otherwise indicated or required; furnish with compatible weatherproof gasketed covers.
  - 3. Use cast iron boxes or cast aluminum boxes where exposed galvanized steel rigid metal conduit or exposed intermediate metal conduit (IMC) is used.
  - 4. Use cast aluminum boxes where aluminum rigid metal conduit is used.
  - 5. Use nonmetallic boxes where exposed rigid PVC conduit is used.
  - 6. Use suitable concrete type boxes where flush-mounted in concrete.
  - 7. Use suitable masonry type boxes where flush-mounted in masonry walls.
  - 8. Use raised covers suitable for the type of wall construction and device configuration where required.
  - 9. Use shallow boxes where required by the type of wall construction.
  - 10. Do not use "through-wall" boxes designed for access from both sides of wall.
  - 11. Sheet-Steel Boxes: Comply with NEMA OS 1, and list and label as complying with UL 514A.
  - 12. Cast Metal Boxes: Comply with NEMA FB 1, and list and label as complying with UL 514A; furnish with threaded hubs.
  - 13. Nonmetallic Boxes: Comply with NEMA OS 2, and list and label as complying with UL 514C.
  - 14. Boxes for Supporting luminaires and Ceiling Fans: Listed as suitable for the type and weight of load to be supported; furnished with fixture stud to accommodate mounting of luminaire where required.
- 15. Boxes for Ganged Devices: Use mutigang boxes of single-piece construction. Do not use field-connected gangable boxes.
- 16. Minimum Box Size, Unless Otherwise Indicated:
  - a. Wiring Devices (Other Than Communications Systems Outlets): 4 inch square by 1-1/2 inch deep (100 by 38 mm) trade size.
- 17. Wall Plates: Comply with Section 26 27 26.

- C. Cabinets and Enclosures, Including Junction and Pull Boxes Larger Than 100 cubic inches (1,650 cu cm):
  - 1. Comply with NEMA 250, and list and label as complying with UL 50 and UL 50E, or UL 508A.
  - 2. NEMA 250 Environment Type, Unless Otherwise Indicated:
    - a. Indoor Clean, Dry Locations: Type 1, painted steel.
    - b. Outdoor Locations: Type 4X, stainless steel.
  - 3. Junction and Pull Boxes Larger Than 100 cubic inches (1,650 cu cm):
    - a. Provide screw-cover or hinged-cover enclosures unless otherwise indicated.
    - b. Boxes 6 square feet (0.56 sq m) and Larger: Provide sectionalized screw-cover or hinged-cover enclosures.
- 4. Cabinets and Hinged-Cover Enclosures, Other Than Junction and Pull Boxes:
  - a. Provide lockable hinged covers, all locks keyed alike unless otherwise indicated.
  - b. Back Panels: Painted steel, removable.
  - c. Terminal Blocks: Provide voltage/current ratings and terminal quantity suitable for purpose indicated, with 25 percent spare terminal capacity.
- 5. Finish for Painted Steel Enclosures: Manufacturer's standard grey unless otherwise indicated.

- D. Boxes for Hazardous (Classified) Locations: Listed and labeled as complying with UL 1203 for the classification of the installed location.
- E. Underground Boxes/Enclosures:
  - 1. Description: In-ground, open bottom boxes furnished with flush, non-skid covers with legend indicating type of service and stainless steel tamper resistant cover bolts.
  - 2. Size: As indicated on drawings.
  - 3. Depth: As required to extend below frost line to prevent frost upheaval, but not less than 12 inches (300 mm).
  - 4. Provide logo on cover to indicate type of service.
  - 5. Applications:
    - a. Sidewalks and Landscaped Areas Subject Only to Occasional Nondeliberate Vehicular Traffic: Use polymer concrete enclosures, with minimum SCTE 77, Tier 8 load rating.
    - b. Parking Lots, in Areas Subject Only to Occasional Nondeliberate Vehicular Traffic: Use polymer concrete enclosures, with minimum SCTE 77, Tier 15 load rating.
    - c. Do not use polymer concrete enclosures in areas subject to deliberate vehicular traffic.
  - 6. Polymer Concrete Underground Boxes/Enclosures: Comply with SCTE 77.
    - a. Combination fiberglass/polymer concrete boxes/enclosures are acceptable.

PART 3 EXECUTION

3.01 INSTALLATION

- A. Install products in accordance with manufacturer's instructions.
- B. Perform work in a neat and workmanlike manner in accordance with NECA 1 and, where applicable, NECA 130, including mounting heights specified in those standards where mounting heights are not indicated.
- C. Arrange equipment to provide minimum clearances in accordance with manufacturer's instructions and NFPA 70.
- D. Unless otherwise indicated, provide separate boxes for line voltage and low voltage systems.
- E. Unless otherwise indicated, boxes may be surface-mounted where exposed conduits are indicated or permitted.
- F. Box Locations:
  - 1. Locate boxes as required for devices installed under other sections or by others.
  - 2. Locate junction and pull boxes as indicated, as required to facilitate installation of conductors, and to limit conduit length and/or number of bends between pulling points in accordance with Section 26 05 34.
- G. Box Supports:
  - 1. Secure and support boxes in accordance with NFPA 70 and Section 26 05 29 using suitable supports and methods approved by the authority having jurisdiction.
  - 2. Provide independent support from building structure except for cast metal boxes (other than boxes used for fixture support) supported by threaded conduit connections in accordance with NFPA 70. Do not provide support from piping, ductwork, or other systems.
- H. Install boxes plumb and level.
- I. Install boxes as required to preserve insulation integrity.
- J. Underground Boxes/Enclosures:
  - 1. Install enclosure on gravel base, minimum 6 inches (150 mm) deep.
  - 2. Flush-mount enclosures located in concrete or paved areas.
  - 3. Mount enclosures located in landscaped areas with top at 1 inch (25 mm) above finished grade.
  - 4. Install additional bracing inside enclosures in accordance with manufacturer's instructions to minimize box sidewall deflections during backfilling. Backfill with cover bolted in place.
- K. Install permanent barrier between ganged wiring devices when voltage between adjacent devices exceeds 300 V.
- L. Close unused box openings.
- M. Install blank wall plates on junction boxes and on outlet boxes with no devices or equipment installed or designated for future use.
- N. Provide grounding and bonding in accordance with Section 26 05 26.

3.02 CLEANING

- A. Clean interior of boxes to remove dirt, debris, plaster and other foreign material.

3.03 PROTECTION

- A. Immediately after installation, protect boxes from entry of moisture and foreign material until ready for installation of conductors.

END OF SECTION

SECTION 26 05 53  
IDENTIFICATION FOR ELECTRICAL SYSTEMS

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Electrical identification requirements.
- B. Identification nameplates and labels.
- C. Wire and cable markers.
- D. Voltage markers.
- E. Underground warning tape.
- F. Warning signs and labels.

PART 2 PRODUCTS

2.01 IDENTIFICATION REQUIREMENTS

- A. Identification for Equipment:
  - 1. Use identification nameplate to identify each piece of electrical distribution and control equipment and associated sections, compartments, and components.
  - 2. Service Equipment:
    - a. Use identification nameplate to identify each service disconnecting means.
    - b. Use identification label at each piece of service equipment to identify the available fault current and the date calculations were performed.
  - 3. Emergency System Equipment:
    - a. Use identification nameplate or voltage marker to identify emergency system equipment in accordance with NFPA 70.
    - b. Use identification nameplate at each piece of service equipment to identify type and location of on-site emergency power sources.
    - c. Use identification nameplate to identify emergency operating instructions for emergency system equipment.
    - 4. Use voltage marker to identify highest voltage present for each piece of electrical equipment.
    - 5. Use identification label or handwritten text using indelible marker on inside of door at each fused switch to identify required NEMA fuse class and size.
    - 6. Use identification label or handwritten text using indelible marker on inside of door at each motor controller to identify nameplate horsepower, full load amperes, code letter, service factor, voltage, and phase of motor(s) controlled.
    - 7. Arc Flash Hazard Warning Labels: Use warning labels to identify arc flash hazards for electrical equipment, such as switchboards, panelboards, industrial control panels, meter socket enclosures, and motor control centers that are likely to require examination, adjustment, servicing, or maintenance while energized.
      - a. Minimum Size: 3.5 by 5 inches (89 mm by 127 mm).
      - b. Legend: Include orange header that reads "WARNING", followed by the word message "Arc Flash and Shock Hazard: Appropriate PPE Required. Do not operate controls or open covers without appropriate personal protection equipment. Failure to comply may result in injury or death; Refer to NFPA 70E for minimum PPE requirements" or approved equivalent.
- B. Identification for Conductors and Cables:
  - 1. Color Coding for Power Conductors 600 V and Less: Comply with Section 26 05 19.
  - 2. Use identification nameplate or identification label to identify color code for ungrounded and grounded power conductors inside door or enclosure at each piece of feeder or branch-circuit distribution equipment when premises has feeders or branch circuits served by more than one nominal voltage system.
  - 3. Use wire and cable markers to identify circuit number or other designation indicated for power, control, and instrumentation conductors and cables at the following locations:
    - a. At each source and load connection.
    - b. Within boxes when more than one circuit is present.
    - c. Within equipment enclosures when conductors and cables enter or leave the enclosure.
- C. Identification for Raceways:
  - 1. Use voltage markers to identify highest voltage present for accessible conduits at maximum intervals of 20 feet (6.1 m).
  - 2. Use underground warning tape to identify underground raceways.
- D. Identification for Boxes:
  - 1. Use voltage markers to identify highest voltage present.
- E. Identification for Devices:
  - 1. Wiring Device and Wallplate Finishes: Comply with Section 26 27 26.

REVISIONS

MARK DATE DESCRIPTION

EPCCOM COMMUNITIES

FARM LOTS 17 & 32, QUARTER TOWNSHIP 2, TOWNSHIP 3, RANGE 19  
UNITED STATES MILITARY LANDS  
CONCORD TOWNSHIP, DELAWARE COUNTY, OHIO  
SUNSHINE MEMORIAL ELEMENTARY SCHOOL  
FOR  
COURTYARDS AT SOUTH SECTION LINE ROAD  
PUMP STATION AND FORCE MAIN  
ELECTRICAL SPECIFICATIONS

**EMT**  
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5000 New Albany Road, Columbus, OH 43254  
Phone: 614-775-6500 Fax: 614-775-3348  
emt.com

DATE  
DECEMBER, 2016

SCALE

JOB NO.  
2014-1653

SHEET  
17/23

DANIEL D. FRYE  
REGISTERED PROFESSIONAL ENGINEER  
7/Dec/2016

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SECTION 26 05 53  
IDENTIFICATION FOR ELECTRICAL SYSTEMS - CONTINUED

2.02 IDENTIFICATION NAMEPLATES AND LABELS

- A. Identification Nameplates:
1. Materials:
a. Indoor Clean, Dry Locations: Use plastic nameplates.
b. Outdoor Locations: Use plastic, stainless steel, or aluminum nameplates suitable for exterior use.
2. Plastic Nameplates: Two-layer or three-layer laminated acrylic or electrically non-conductive phenolic with beveled edges; minimum thickness of 1/16 inch (1.6 mm); engraved text.
3. Stainless Steel Nameplates: Minimum thickness of 1/32 inch (0.8 mm); engraved or laser-etched text.
4. Aluminum Nameplates: Anodized; minimum thickness of 1/32 inch (0.8 mm); engraved or laser-etched text.
5. Mounting Holes for Mechanical Fasteners: Two, centered on sides for sizes up to 1 inch (25 mm) high; Four, located at corners for larger sizes.
B. Identification Labels:
1. Materials: Use self-adhesive laminated plastic labels; UV, chemical, water, heat, and abrasion resistant.
2. Text: Use factory pre-printed or machine-printed text. Do not use handwritten text unless otherwise indicated.
C. Format for Equipment Identification:
1. Minimum Size: 1 inch (25 mm) by 2.5 inches (64 mm).
2. Legend:
a. Equipment designation or other approved description.
3. Text: All capitalized unless otherwise indicated.
4. Minimum Text Height:
a. Equipment Designation: 1/2 inch (13 mm).
5. Color:
a. Normal Power System: White text on black background.
b. Emergency Power System: White text on red background.
D. Format for General Information and Operating Instructions:
1. Minimum Size: 1 inch (25 mm) by 2.5 inches (64 mm).
2. Legend: Include information or instructions indicated or as required for proper and safe operation and maintenance.
3. Text: All capitalized unless otherwise indicated.
4. Minimum Text Height: 1/4 inch (6 mm).
5. Color: Black text on white background unless otherwise indicated.
E. Format for Caution and Warning Messages:
1. Minimum Size: 2 inches (51 mm) by 4 inches (100 mm).
2. Legend: Include information or instructions indicated or as required for proper and safe operation and maintenance.
3. Text: All capitalized unless otherwise indicated.
4. Minimum Text Height: 1/2 inch (13 mm).
5. Color: Black text on yellow background unless otherwise indicated.
F. Format for Control Device Identification:
1. Minimum Size: 3/8 inch (10 mm) by 1.5 inches (38 mm).
2. Legend: Load controlled or other designation indicated.
3. Text: All capitalized unless otherwise indicated.
4. Minimum Text Height: 3/16 inch (5 mm).
5. Color: Black text on clear background.

2.03 WIRE AND CABLE MARKERS

- A. Markers for Conductors and Cables: Use wrap-around self-adhesive vinyl cloth, wrap-around self-adhesive vinyl self-laminating, heat-shrink sleeve, plastic sleeve, plastic slip-on, or vinyl split sleeve type markers suitable for the conductor or cable to be identified.
B. Markers for Conductor and Cable Bundles: Use plastic marker tags secured by nylon cable ties.
C. Legend: Power source and circuit number or other designation indicated.
D. Text: Use factory pre-printed or machine-printed text, all capitalized unless otherwise indicated.
E. Minimum Text Height: 1/8 inch (3 mm).
F. Color: Black text on white background unless otherwise indicated.

2.04 VOLTAGE MARKERS

- A. Markers for Conduits: Use factory pre-printed self-adhesive vinyl, self-adhesive vinyl cloth, or vinyl snap-around type markers.
B. Markers for Boxes and Equipment Enclosures: Use factory pre-printed self-adhesive vinyl or self-adhesive vinyl cloth type markers.
C. Minimum Size:
1. Markers for Equipment: 1 1/8 by 4 1/2 inches (29 by 110 mm).
2. Markers for Conduits: As recommended by manufacturer for conduit size to be identified.
3. Markers for Pull Boxes: 1 1/8 by 4 1/2 inches (29 by 110 mm).
4. Markers for Junction Boxes: 1/2 by 2 1/4 inches (13 by 57 mm).
D. Legend:
1. Markers for Voltage Identification: Highest voltage present.
E. Color: Black text on orange background unless otherwise indicated.

2.05 UNDERGROUND WARNING TAPE

- A. Materials: Use full-backed detectable type polyethylene tape suitable for direct burial, unless otherwise indicated.
B. Full-backed Detectable Type Tape: 3 inches (76 mm) wide, with minimum thickness of 5 mil (0.1 mm), unless otherwise required for proper detection.
C. Legend: Type of service, continuously repeated over full length of tape.
D. Color:
1. Tape for Buried Power Lines: Black text on red background.
2. Tape for Buried Communication, Alarm, and Signal Lines: Black text on orange background.

2.06 WARNING SIGNS AND LABELS

- A. Comply with ANSI Z535.2 or ANSI Z535.4 as applicable.
B. Warning Signs:
1. Materials:
a. Indoor Dry, Clean Locations: Use factory pre-printed rigid plastic or self-adhesive vinyl signs.
b. Outdoor Locations: Use factory pre-printed rigid aluminum signs.
2. Rigid Signs: Provide four mounting holes at corners for mechanical fasteners.
3. Minimum Size: 7 by 10 inches (178 by 254 mm) unless otherwise indicated.
C. Warning Labels:
1. Materials: Use factory pre-printed or machine-printed self-adhesive polyester or self-adhesive vinyl labels; UV, chemical, water, heat, and abrasion resistant; produced using materials recognized to UL 969.
2. Machine-Printed Labels: Use thermal transfer process printing machines and accessories recommended by label manufacturer.
3. Minimum Size: 2 by 4 inches (51 mm by 102 mm) unless otherwise indicated.

PART 3 EXECUTION

3.01 INSTALLATION

- A. Install products in accordance with manufacturer's instructions.
B. Install identification products to be plainly visible for examination, adjustment, servicing, and maintenance. Unless otherwise indicated, locate products as follows:
1. Surface-Mounted Equipment: Enclosure front.
2. Flush-Mounted Equipment: Inside of equipment door.
3. Free-Standing Equipment: Enclosure front; also enclosure rear for equipment with rear access.
4. Elevated Equipment: Legible from the floor or working platform.
5. Interior Components: Legible from the point of access.
6. Conduits: Legible from the floor.
7. Boxes: Outside face of cover.
8. Conductors and Cables: Legible from the point of access.
9. Devices: Outside face of cover.
C. Install identification products centered, level, and parallel with lines of item being identified.
D. Secure nameplates to exterior surfaces of enclosures using stainless steel screws and to interior surfaces using self-adhesive backing or epoxy cement.
E. Install self-adhesive labels and markers to achieve maximum adhesion, with no bubbles or wrinkles and edges properly sealed.
F. Install underground warning tape above buried lines with one tape per trench at 3 inches (75 mm) below finished grade.
G. Secure rigid signs using stainless steel screws.
H. Mark all handwritten text, where permitted, to be neat and legible.

3.02 FIELD QUALITY CONTROL

- A. Replace self-adhesive labels and markers that exhibit bubbles, wrinkles, curling or other signs of improper adhesion.

SECTION 26 09 23  
LIGHTING CONTROL DEVICES

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Outdoor motion sensors.
B. Outdoor photo controls.

1.02 SUBMITTALS

- A. Product Data: Include ratings, configurations, standard wiring diagrams, dimensions, colors, service condition requirements, and installed features.
B. Field Quality Control Reports.
C. Operation and Maintenance Data: Include detailed information on device programming and setup.
D. Project Record Documents: Record actual installed locations and settings for lighting control devices.

PART 2 PRODUCTS

2.01 LIGHTING CONTROL DEVICES - GENERAL REQUIREMENTS

- A. Provide products listed, classified, and labeled as suitable for the purpose intended.
B. Unless specifically indicated to be excluded, provide all required conduit, wiring, connectors, hardware, components, accessories, etc. as required for a complete operating system.

2.02 OUTDOOR MOTION SENSORS

- A. Description: Factory-assembled wet location listed device suitable for wall or ceiling/leaves mounting, with integral swivel for field adjustment of coverage, capable of detecting motion for automatic control of load indicated.
B. Sensor Technology: Passive Infrared (PIR) designed to detect occupancy by sensing movement of thermal energy between zones.
C. Operation: Unless otherwise indicated, motion sensor to turn load on when motion is detected and to turn load off when no motion is detected during an adjustable turn-off delay time interval.
D. Turn-Off Delay: Field adjustable, with time delay settings available up to 15 minutes.
E. Integral Photocell: For dusk to dawn operation.
F. Manual Override: Activated by switching power off to unit and then back on.
G. Load Rating: 1,000 W incandescent and fluorescent load at 120 V ac.
H. Coverage: Capable of detecting motion within a distance of 50 feet (15 m) at a mounting height of 8 feet (2.4 m), with a field of view of 270 degrees.

2.03 OUTDOOR PHOTO CONTROLS

- A. Stem-Mounted Outdoor Photo Controls:
1. Description: Direct-wired photo control unit with threaded conduit mounting stem and field-adjustable swivel base, listed and labeled as complying with UL 773A.
2. Housing: Weatherproof, impact resistant polycarbonate.
3. Photo Sensor: Cadmium sulfide.
4. Provide external sliding shield for field adjustment of light level activation.
5. Light Level Activation: 1 to 5 footcandles (10.8 to 53.8 lux) turn-on and 3 to 1 turn-off to turn-on ratio with delayed turn-off.
6. Voltage: As required to control the load indicated on the drawings.
7. Failure Mode: Fails to the on position.
8. Load Rating: As required to control the load indicated on the drawings.

PART 3 EXECUTION

3.01 INSTALLATION

- A. Perform work in a neat and workmanlike manner in accordance with NECA 1 and, where applicable, NECA 130, including mounting heights specified in those standards unless otherwise indicated.
B. Coordinate locations of outlet boxes provided under Section 26 05 37 as required for installation of lighting control devices provided under this section.
C. Install lighting control devices in accordance with manufacturer's instructions.
D. Unless otherwise indicated, connect lighting control device grounding terminal or conductor to branch circuit equipment grounding conductor and to outlet box with bonding jumper.
E. Install lighting control devices plumb and level, and held securely in place.
F. Where required and not furnished with lighting control device, provide wall plate in accordance with Section 26 27 26.
G. Where applicable, install lighting control devices and associated wall plates to fit completely flush to mounting surface with no gaps and rough opening completely covered without strain on wall plate. Repair or reinstall improperly installed outlet boxes or improperly sized rough openings. Do not use oversized wall plates in lieu of meeting this requirement.
H. Outdoor Photo Control Locations:
1. Where possible, locate outdoor photo controls with photo sensor facing north. If north facing photo sensor is not possible, install with photo sensor facing east, west, or down.
2. Locate outdoor photo controls so that photo sensors do not face artificial light sources, including light sources controlled by the photo control itself.
I. Install outdoor photo controls so that connections are weatherproof. Do not install photo controls with conduit stem facing up in order to prevent infiltration of water into the photo control.

3.02 FIELD QUALITY CONTROL

- A. Inspect each lighting control device for damage and defects.
B. Test occupancy sensors to verify proper operation, including time delays and ambient light thresholds where applicable. Verify optimal coverage for entire room or area. Record test results in written report to be included with submittals.
C. Test outdoor photo controls to verify proper operation, including time delays where applicable.
D. Correct wiring deficiencies and replace damaged or defective lighting control devices.

3.03 ADJUSTING

- A. Adjust devices and wall plates to be flush and level.
B. Adjust position of outdoor motion sensors to achieve optimal coverage as required.
C. Adjust external sliding shields on outdoor photo controls under optimum lighting conditions to achieve desired turn-on and turn-off activation as indicated or as directed by Engineer.

3.04 CLOSEOUT ACTIVITIES

- A. Demonstration: Demonstrate proper operation of lighting control devices to Engineer, and correct deficiencies or make adjustments as directed.

END OF SECTION

SECTION 26 21 00  
LOW-VOLTAGE ELECTRICAL SERVICE ENTRANCE

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Electrical service requirements.

1.02 DEFINITIONS

- A. Service Point: The point of connection between the facilities of the serving utility and the premises wiring as defined in NFPA 70, and as designated by the Utility Company.

1.03 ADMINISTRATIVE REQUIREMENTS

- A. No later than two weeks following date of the Agreement, notify Utility Company of anticipated date of service.
B. Coordination:
1. Verify the following with Utility Company representative:
a. Utility Company requirements, including division of responsibility.
b. Exact location and details of utility point of connection.
c. Utility easement requirements.
d. Utility Company charges associated with providing service.
2. Coordinate the work with other trades to avoid placement of other utilities or obstructions within the spaces dedicated for electrical service and associated equipment.
3. Coordinate arrangement of service entrance equipment with the dimensions and clearance requirements of the actual equipment to be installed.
4. Notify Engineer of any conflicts with or deviations from the contract documents. Obtain direction before proceeding with work.
C. Arrange for Utility Company to provide permanent electrical service. Prepare and submit documentation required by Utility Company.
D. Utility Company charges associated with providing permanent service to be paid by Owner.
E. Preinstallation Meeting: Convene one week prior to commencing work of this section to review service requirements and details with Utility Company representative.
F. Scheduling:
1. Arrange for inspections necessary to obtain Utility Company approval of installation.

1.04 SUBMITTALS

- A. Project Record Documents: Record actual locations of equipment and installed service routing.
B. Preinstallation Meeting: Convene one week prior to commencing work of this section to review service requirements and details with Utility Company representative.

1.05 QUALITY ASSURANCE

- A. Comply with the following:
1. IEEE C2 (National Electrical Safety Code).
2. NFPA 70 (National Electrical Code).
3. The requirements of the Utility Company.

PART 2 PRODUCTS

2.01 ELECTRICAL SERVICE REQUIREMENTS

- A. Provide new electrical service consisting of all required conduits, conductors, equipment, metering provisions, supports, accessories, etc. as necessary for connection between Utility Company point of supply and service entrance equipment.
B. Electrical Service Characteristics: As indicated on drawings.
C. Utility Company: To be determined by Contractor.
D. Division of Responsibility: Per Utility Company requirements.
E. Products Furnished by Contractor: Comply with Utility Company requirements.

PART 3 EXECUTION

3.01 EXAMINATION

- A. Verify that field measurements are as shown on drawings.
B. Verify that ratings and configurations of service entrance equipment are consistent with the indicated requirements.
C. Verify that conditions are satisfactory for installation prior to starting work.

3.02 PREPARATION

3.03 INSTALLATION

- A. Install products in accordance with manufacturer's instructions and Utility Company requirements.
B. Perform work in a neat and workmanlike manner in accordance with NECA 1.
C. Arrange equipment to provide minimum clearances and required maintenance access.
D. Provide required support and attachment components in accordance with Section 26 05 29.
E. Provide grounding and bonding for service entrance equipment in accordance with Section 26 05 26.
F. Identify service entrance equipment, including main service disconnect(s) in accordance with Section 26 05 53.

3.04 PROTECTION

- A. Protect installed equipment from subsequent construction operations.

END OF SECTION

SECTION 26 22 00  
LOW-VOLTAGE TRANSFORMERS

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. General purpose transformers.

1.02 SUBMITTALS

- A. Product Data: Include voltage, kVA, impedance, tap configurations, insulation system class and rated temperature rise, efficiency, sound level, enclosure ratings, outline and support point dimensions, weight, required clearances, service condition requirements, and installed features.
B. Field Quality Control Test Reports.
C. Project Record Documents: Record actual locations of transformers.

PART 2 PRODUCTS

2.01 TRANSFORMERS - GENERAL REQUIREMENTS

- A. Description: Factory-assembled, dry type transformers for 60 Hz operation designed and manufactured in accordance with NEMA ST 20 and listed, classified, and labeled as suitable for the purpose intended.
B. Unless noted otherwise, transformer ratings indicated are for continuous loading according to IEEE C57.96 under the following service conditions:
1. Altitude: Less than 3,300 feet (1,000 m).
2. Ambient Temperature:
a. Greater than 10 kVA: Not exceeding 104 degrees F (40 degrees C).
b. Less than 10 kVA: Not exceeding 77 degrees F (25 degrees C).
C. Core: High grade, non-aging silicon steel with high magnetic permeability and low hysteresis and eddy current losses. Keep magnetic flux densities substantially below saturation point, even at 10 percent primary overvoltage. Tightly clamp core laminations to prevent plate movement and maintain consistent pressure throughout core length.
D. Impregnate core and coil assembly with non-hydroscopic thermo-setting varnish to effectively seal out moisture and other contaminants.
E. Basic Impulse Level: 10 kV.
F. Ground core and coil assembly to enclosure by means of a visible flexible copper grounding strap.
G. Isolate core and coil from enclosure using vibration-absorbing mounts.
H. Nameplate: Include transformer connection data, ratings, wiring diagrams, and overload capacity based on rated winding temperature rise.

2.02 GENERAL PURPOSE TRANSFORMERS

- A. Description: Self-cooled, two winding transformers listed and labeled as complying with UL 506 or UL 1561; ratings as indicated on the drawings.
B. Insulation System and Allowable Average Winding Temperature Rise:
1. Less than 15 kVA: Class 180 degrees C insulation system with 115 degrees C average winding temperature rise.
2. 15 kVA and Larger: Class 220 degrees C insulation system with 150 degrees C average winding temperature rise.
C. Coil Conductors: Continuous aluminum windings with terminations brazed or welded.
D. Winding Taps:
1. Less than 3 kVA: None.
2. 3 kVA through 15 kVA: Two 5 percent full capacity primary taps below rated voltage.
3. 15 kVA through 300 kVA: Two 2.5 percent full capacity primary taps above and four 2.5 percent full capacity primary taps below rated voltage.
4. 500 kVA and Larger: Two 2.5 percent full capacity primary taps above and two 2.5 percent full capacity primary taps below rated voltage.
E. Energy Efficiency: Comply with 10 CFR 431, Subpart K.
F. Sound Levels: Standard sound levels complying with NEMA ST 20.
G. Mounting Provisions:
1. Less than 15 kVA: Suitable for wall mounting.
2. 15 kVA through 75 kVA: Suitable for wall or floor mounting.
3. Larger than 75 kVA: Suitable for floor mounting.
H. Transformer Enclosure: Comply with NEMA ST 20.
1. Environment Type per NEMA 250: Unless otherwise indicated, as specified for the following installation locations:
a. Indoor clean, dry locations: Type 2.
b. Outdoor locations: Type 3R.
2. Construction: Steel.
a. Less than 15 kVA: Totally enclosed, non-ventilated.
b. 15 kVA and Larger: Ventilated.
3. Finish: Manufacturer's standard grey, suitable for outdoor installations.
4. Provide lifting eyes or brackets.

PART 3 EXECUTION

3.01 INSTALLATION

- A. Perform work in a neat and workmanlike manner in accordance with NECA 1.
B. Install transformers in accordance with manufacturer's instructions.
C. Install transformers in accordance with NECA 409 and IEEE C57.94.
D. Use flexible conduit, under the provisions of Section 26 05 34, 2 feet (600 mm) minimum length, for connections to transformer case. Make conduit connections to side panel of enclosure.
E. Arrange equipment to provide minimum clearances as specified on transformer nameplate and in accordance with manufacturer's instructions and NFPA 70.
F. Provide grounding and bonding in accordance with Section 26 05 26.
G. Remove shipping braces and adjust bolts that attach the core and coil mounting bracket to the enclosure according to manufacturer's recommendations in order to reduce audible noise transmission.
H. Where not factory-installed, install lugs sized as required for termination of conductors as shown on the drawings.

3.02 FIELD QUALITY CONTROL

- A. Inspect and test in accordance with NETA ATS, except Section 4.

3.03 ADJUSTING

- A. Measure primary and secondary voltages and make appropriate tap adjustments.
B. Adjust tightness of mechanical and electrical connections to manufacturer's recommended torque settings.

END OF SECTION

SECTION 26 24 16  
PANELBOARDS

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Lighting and appliance panelboards.
B. Overcurrent protective devices for panelboards.

1.02 SUBMITTALS

- A. Product Data: Provide manufacturer's standard catalog pages and data sheets for panelboards, enclosures, overcurrent protective devices, and other installed components and accessories.
B. Shop Drawings: Indicate outline and support point dimensions, voltage, main bus ampacity, overcurrent protective device arrangement and sizes, short circuit current ratings, conduit entry locations, conductor terminal information, and installed features and accessories.
C. Project Record Documents: Record actual installed locations of panelboards and actual installed circuiting arrangements.

PART 2 PRODUCTS

2.01 PANELBOARDS - GENERAL REQUIREMENTS

- A. Provide products listed, classified, and labeled as suitable for the purpose intended.
B. Unless otherwise indicated, provide products suitable for continuous operation under the following service conditions:
1. Altitude: Less than 6,600 feet (2,000 m).
2. Ambient Temperature:
a. Panelboards Containing Circuit Breakers: Between 23 degrees F (-5 degrees C) and 104 degrees F (40 degrees C).
C. Mains: Configure for top or bottom incoming feed as indicated or as required for the installation.
D. Branch Overcurrent Protective Devices: Replaceable without disturbing adjacent devices.
E. Bussing: Sized in accordance with UL 67 temperature rise requirements.
1. Provide solidly bonded equipment ground bus in each panelboard, with a suitable lug for each feeder and branch circuit equipment grounding conductor.
F. Conductor Terminations: Suitable for use with the conductors to be installed.
G. Enclosures: Comply with NEMA 250, and list and label as complying with UL 50 and UL 50E.
1. Environment Type per NEMA 250: Unless otherwise indicated, as specified for the following installation locations:
a. Indoor Clean, Dry Locations: Type 1.
b. Outdoor Locations: Type 3R.
2. Boxes: Galvanized steel unless otherwise indicated.
a. Provide wiring gutters sized to accommodate the conductors to be installed.

- 3. Fronts:
a. Fronts for Surface-Mounted Enclosures: Same dimensions as boxes.
b. Fronts for Flush-Mounted Enclosures: Overlap boxes on all sides to conceal rough opening.
c. Finish for Painted Steel Fronts: Manufacturer's standard grey unless otherwise indicated.
4. Lockable Doors: All locks keyed alike unless otherwise indicated.

- H. Future Provisions: Prepare all unused spaces for future installation of devices including bussing, connectors, mounting hardware and all other required provisions.
I. Load centers are not acceptable.

2.02 LIGHTING AND APPLIANCE PANELBOARDS

- A. Description: Panelboards complying with NEMA PB 1, lighting and appliance branch circuit type, circuit breaker type, and listed and labeled as complying with UL 67; ratings, configurations and features as indicated on the drawings.
B. Conductor Terminations:
1. Main and Neutral Lug Material: Aluminum, suitable for terminating aluminum or copper conductors.
2. Main and Neutral Lug Type: Mechanical.
C. Bussing:
1. Phase Bus Connections: Arranged for sequential phasing of overcurrent protective devices.
2. Phase and Neutral Bus Material: Aluminum.
3. Ground Bus Material: Aluminum.
D. Circuit Breakers: Thermal magnetic bolt-on type unless otherwise indicated.
E. Enclosures:
1. Provide surface-mounted or flush-mounted enclosures as indicated.
2. Provide clear plastic circuit directory holder mounted on inside of door.

2.03 OVERCURRENT PROTECTIVE DEVICES

- A. Molded Case Circuit Breakers:
1. Description: Quick-make, quick-break, over center toggle, trip-free, trip-indicating circuit breakers listed and labeled as complying with UL 489, and complying with FS W-C-375 where applicable; ratings, configurations, and features as indicated on the drawings.
2. Interrupting Capacity:
a. Provide circuit breakers with interrupting capacity as required to provide the short circuit current rating as required by the available fault current, but not less than
1) 10,000 rms symmetrical amperes at 240 VAC or 208 VAC.
b. Fully Rated Systems: Provide circuit breakers with interrupting capacity not less than the short circuit current rating indicated.
3. Conductor Terminations:
a. Provide mechanical lugs unless otherwise indicated.
b. Lug Material: Aluminum, suitable for terminating aluminum or copper conductors.
4. Thermal Magnetic Circuit Breakers: For each pole, furnish thermal inverse time tripping element for overload protection and magnetic instantaneous tripping element for short circuit protection.
5. Multi-Pole Circuit Breakers: Furnish with common trip for all poles.

PART 3 EXECUTION

3.01 INSTALLATION

- A. Install products in accordance with manufacturer's instructions.
B. Install panelboards securely, in a neat and workmanlike manner in accordance with NECA 1 (general workmanship), NECA 407 (panelboards), and NEMA PB 1.1.
C. Arrange equipment to provide minimum clearances in accordance with manufacturer's instructions and NFPA 70.
D. Provide required supports in accordance with Section 26 05 29.
E. Install panelboards plumb.
F. Mount panelboards such that the highest position of any operating handle for circuit breakers or switches does not exceed 79 inches (2000 mm) above the floor or working platform.
G. Provide grounding and bonding in accordance with Section 26 05 26.
H. Install all field-installed branch devices, components, and accessories.
I. Provide filler plates to cover unused spaces in panelboards.

3.02 FIELD QUALITY CONTROL

- A. Inspect and test in accordance with NETA ATS, except Section 4.
B. Molded Case Circuit Breakers: Perform inspections and tests listed in NETA ATS, Section 7.6.1.1 for all main circuit breakers and circuit breakers larger than 20 amperes. Tests listed as optional are not required.
C. Test GFCI circuit breakers to verify proper operation.
D. Correct deficiencies and replace damaged or defective panelboards or associated components.

END OF SECTION

SECTION 26 27 17  
EQUIPMENT WIRING

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Electrical connections to equipment.

PART 2 PRODUCTS

2.01 EQUIPMENT CONNECTIONS

- A. Electrical requirements shown on drawings.

PART 3 EXECUTION

3.01 ELECTRICAL CONNECTIONS

- A. Make electrical connections in accordance with equipment manufacturer's instructions.
B. Make conduit connections to equipment using flexible conduit. Use liquidtight flexible conduit with watertight connectors in damp or wet locations.
C. Connect heat producing equipment using wire and cable with insulation suitable for temperatures encountered.
D. Provide receptacle outlet to accommodate connection with attachment plug.
E. Provide cord and cap where field-supplied attachment plug is required.
F. Install suitable strain-relief clamps and fittings for cord connections at outlet boxes and equipment connection boxes.
G. Install disconnect switches, controllers, control stations, and control devices to complete equipment wiring requirements.
H. Install terminal block jumpers to complete equipment wiring requirements.
I. Install interconnecting conduit and wiring between devices and equipment to complete equipment wiring requirements.

END OF SECTION

SECTION 26 27 26  
WIRING DEVICES

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Wall switches.
B. Receptacles.
C. Wall plates.

1.02 SUBMITTALS

- A. Project Record Documents: Record actual installed locations of wiring devices.

PART 2 PRODUCTS

2.01 WIRING DEVICE APPLICATIONS

- A. Provide wiring devices suitable for intended use and with ratings adequate for load served.
B. For single receptacles installed on an individual branch circuit, provide receptacle with ampere rating not less than that of the branch circuit.
C. Provide weather resistant GFCI receptacles with specified weatherproof covers for receptacles installed outdoors or in damp or wet locations.

2.02 WIRING DEVICE FINISHES

- A. Provide wiring device finishes as described below unless otherwise indicated.
B. Wiring Devices Installed in Unfinished Spaces: White with galvanized steel wall plate.
C. Wiring Devices Installed in Wet or Damp Locations: White with specified weatherproof cover.



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TRI-TECH PROJECT NO. 1821A

Table with columns: MARK, DATE, DESCRIPTION, REVISIONS

EPCON COMMUNITIES

FARM LOTS 17 & 32, QUARTER TOWNSHIP 2, TOWNSHIP 3, RANGE 19  
UNITED STATES MILITARY LANDS  
CONCORD TOWNSHIP, DELAWARE COUNTY, OHIO  
SANITARY SEWER MAINS  
FOR  
COURTYARDS AT SOUTH SECTION LINE ROAD  
PUMP STATION AND FORCE MAIN  
ELECTRICAL SPECIFICATIONS

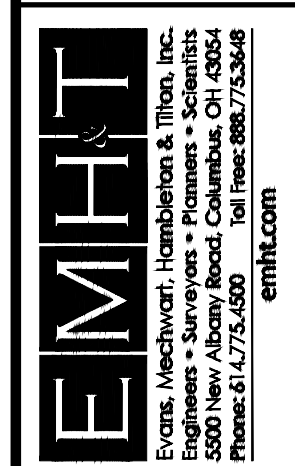


Table with columns: DATE, SCALE, JOB NO., SHEET

18/23

SECTION 26 27 26  
WIRING DEVICES - CONTINUED

- 2.03 WALL SWITCHES
A. Wall Switches - General Requirements: AC only, quiet operating, general-use snap switches with silver alloy contacts, complying with NEMA WD 1 and NEMA WD 6, and listed as complying with UL 20 and where applicable, FS W-S-896; types as indicated on the drawings.
1. Wiring Provisions: Terminal screws for side wiring and screw actuated binding clamp for back wiring with separate ground terminal screw.
B. Standard Wall Switches: Industrial specification grade, 20 A, 120/277 V with standard toggle type switch actuator and maintained contacts; single pole single throw, double pole single throw, three way, or four way as indicated on the drawings.
2.04 RECEPTACLES
A. Receptacles - General Requirements: Self-grounding, complying with NEMA WD 1 and NEMA WD 6, and listed as complying with UL 498, and where applicable, FS W-C-596; types as indicated on the drawings.
1. Wiring Provisions: Terminal screws for side wiring or screw actuated binding clamp for back wiring with separate ground terminal screw.
2. NEMA configurations specified are according to NEMA WD 6.
B. Convenience Receptacles:
1. Standard Convenience Receptacles: Industrial specification grade, 20A, 125V, NEMA 5-20R; single or duplex as indicated on the drawings.
2. Weather Resistant Convenience Receptacles: Industrial specification grade, 20A, 125V, NEMA 5-20R, listed and labeled as weather resistant type complying with UL 498 Supplement SE suitable for installation in damp or wet locations; single or duplex as indicated on the drawings.
C. GFCI Receptacles:
1. GFCI Receptacles - General Requirements: Self-testing, with feed-through protection and light to indicate ground fault tripped condition and loss of protection; listed as complying with UL 943, class A.
2. Standard GFCI Receptacles: Industrial specification grade, duplex, 20A, 125V, NEMA 5-20R, rectangular decorator style.
3. Weather Resistant GFCI Receptacles: Industrial specification grade, duplex, 20A, 125V, NEMA 5-20R, rectangular decorator style, listed and labeled as weather resistant type complying with UL 498 Supplement SE suitable for installation in damp or wet locations.

- 2.05 WALL PLATES
A. Wall Plates: Comply with UL 514D.
1. Configuration: One piece cover as required for quantity and types of corresponding wiring devices.
2. Size: Standard, \_\_\_\_\_
3. Screws: Metal with slotted heads finished to match wall plate finish.
B. Nylon Wall Plates: Smooth finish, high-impact thermoplastic.
C. Galvanized Steel Wall Plates: Rounded corners and edges, with corrosion resistant screws.
D. Weatherproof Covers for Lamp Locations: Gasketed, thermoplastic, with self-closing hinged cover and corrosion-resistant screws; listed as suitable for use in wet locations with cover closed.
E. Weatherproof Covers for Wet Locations: Gasketed, thermoplastic, with hinged lockable cover and corrosion-resistant screws; listed as suitable for use in wet locations while in use with attachment plugs connected and identified as extra-dry type.

- PART 3 EXECUTION
3.01 INSTALLATION
A. Perform work in a neat and workmanlike manner in accordance with NECA 1 and, where applicable, NECA 130, including mounting heights specified in those standards unless otherwise indicated.
B. Coordinate locations of outlet boxes provided under Section 26 05 37 as required for installation of wiring devices provided under this section.
1. Mounting Heights: Unless otherwise indicated, as follows:
a. Wall Switches: 48 inches (1.2 m) above finished floor.
b. Receptacles: 18 inches (450 mm) above finished floor or 6 inches (150 mm) above counter.
C. Install wiring devices in accordance with manufacturer's instructions.
D. Install permanent barrier between ganged wiring devices when voltage between adjacent devices exceeds 300 V.
E. Where required, connect wiring devices using pigtail not less than 6 inches (150 mm) long. Do not connect more than one conductor to wiring device terminals.
F. Connect wiring devices by wrapping conductor clockwise 3/4 turn around screw terminal and tightening to proper torque specified by the manufacturer. Where present, do not use push-in pressure terminals that do not rely on screw-actuated binding.
G. Unless otherwise indicated, connect wiring device grounding terminal to branch circuit equipment grounding conductor and to outlet box with bonding jumper.
H. Provide GFCI receptacles with integral GFCI protection at each location indicated. Do not use feed-through wiring to protect downstream devices.
I. Install wiring devices plumb and level with mounting yoke held rigidly in place.
J. Install wall switches with OFF position down.
K. Install vertically mounted receptacles with grounding pole on top and horizontally mounted receptacles with grounding pole on left.
L. Install wall plates to fit completely flush to wall with no gaps and rough opening completely covered without strain on wall plate. Repair or reinstall improperly installed outlet boxes or improperly sized rough openings. Do not use oversized wall plates in lieu of meeting this requirement.
M. Install blank wall plates on junction boxes and on outlet boxes with no wiring devices installed or designated for future use.
3.02 FIELD QUALITY CONTROL
A. Inspect each wiring device for damage and defects.
B. Operate each wall switch with circuit energized to verify proper operation.
C. Test each receptacle to verify operation and proper polarity.
D. Test each GFCI receptacle for proper tripping operation according to manufacturer's instructions.
E. Correct wiring deficiencies and replace damaged or defective wiring devices.

END OF SECTION
SECTION 26 29 23
VARIABLE-FREQUENCY MOTOR CONTROLLERS

- PART 1 GENERAL
1.01 SECTION INCLUDES
A. Variable frequency controllers.
1.02 SUBMITTALS
A. Product Data: Provide catalog sheets showing voltage, controller size, ratings and size of switching and overcurrent protective devices, short circuit ratings, dimensions, and enclosure details.
PART 2 PRODUCTS
2.01 DESCRIPTION
A. Variable Frequency Controllers: Enclosed controllers suitable for operating the indicated loads, in conformance with requirements of NEMA ICS 7. Select unspecified features and options in accordance with NEMA ICS 3.1.
1. Employ microprocessor-based inverter logic isolated from power circuits.
2. Employ pulse-width-modulated inverter system.
3. Design for ability to operate controller with motor disconnected from output.
4. Design to attempt five automatic restarts following fault condition before locking out and requiring manual restart.
B. Enclosures: NEMA 250, Type 1, suitable for equipment application in places accessible only to qualified personnel.
2.02 OPERATING REQUIREMENTS
A. Rated Input Voltage: 480 volts, single phase, 60 Hertz.
1. VFD shall be capable of converting single phase 480V input power to three phase output power.
B. Motor Nameplate Voltage: 460 volts, three phase, 60 Hertz.
C. Volts Per Hertz Adjustment: Plus or minus 10 percent.
D. Current Limit Adjustment: 60 to 110 percent of rated.
E. Acceleration Rate Adjustment: 0.5 to 30 seconds.
F. Deceleration Rate Adjustment: 1 to 30 seconds.
G. Input Signal: 4 to 20 mA DC.
2.03 COMPONENTS
A. Display: Provide integral digital display to indicate output voltage, output frequency, and output current.
B. Furnish HAND-OFF-AUTOMATIC selector switch and manual speed control.
C. Control Power Source: Separate circuit.
D. Safety Interlocks: Furnish terminals for remote contact to inhibit starting under both manual and automatic mode.
E. Control Interlocks: Furnish terminals for remote contact to allow starting in automatic mode.

- PART 3 EXECUTION
3.01 INSTALLATION
A. Install in accordance with NEMA ICS 7.1 and manufacturer's instructions.
B. Tighten accessible connections and mechanical fasteners after placing controller.
3.02 ADJUSTING
A. Make final adjustments to installed controller to assure proper operation of load system. Obtain performance requirements from installer of driven loads.
3.03 CLOSEOUT ACTIVITIES
A. Demonstrate operation of controllers in automatic and manual modes.

END OF SECTION

SECTION 26 36 00
TRANSFER SWITCHES

- PART 1 GENERAL
1.01SECTION INCLUDES
A. Transfer switches for low-voltage (600 V and less) applications and associated accessories:
1. Manual transfer switches.
2. Includes service entrance rated transfer switches.
1.02SUBMITTALS
A. Product Data: Provide manufacturer's standard catalog pages and data sheets for each product, including ratings, configurations, dimensions, finishes, weights, service condition requirements, and installed features.
B. Shop Drawings: Include dimensioned plan views and sections indicating locations of system components, required clearances, and field connection locations. Include system interconnection schematic diagrams showing all factory and field connections.
C. Project Record Documents: Record actual locations of system components, installed circuiting arrangements and routing, and final equipment settings.
PART 2 PRODUCTS
2.01 MANUFACTURERS
A. Transfer Switches - Basis of Design: Square D Heavy Duty Double Throw Service Entrance Rated Switch.
B. Products other than basis of design are subject to compliance with specified requirements and prior approval of Engineer. By using products other than basis of design, Contractor accepts responsibility for costs associated with any necessary modifications to related work, including any design fees.
2.02 TRANSFER SWITCHES
A. Provide complete power transfer system consisting of all required equipment, conduit, boxes, wiring, supports, accessories, system programming, etc. as necessary for a complete operating system that provides the functional intent indicated.
B. Provide products listed, classified, and labeled as suitable for the purpose intended.
C. Manual Transfer Switch:
1. Voltage: As indicated on the drawings.
2. Ampere Rating: As indicated on the drawings.
3. Neutral Configuration: Solid neutral (unswitched), except as indicated.
4. Load Served: As indicated on the drawings.
5. Primary Source: As indicated on the drawings.
6. Alternate Source: As indicated on the drawings.
D. Comply with NEMA ICS 10 Part 1, and list and label as complying with UL 1008 for the classification of the intended application (e.g. emergency, optional standby).
E. Load Classification: Classified for total system load (any combination of motor, electric discharge lamp, resistive, and tungsten lamp loads with tungsten lamp loads not exceeding 30 percent of the continuous current rating) unless otherwise indicated or required.
F. Service Conditions: Provide transfer switches suitable for continuous operation at indicated ratings under the service conditions at the installed location.
G. Enclosures:
1. Environment Type per NEMA 250: Unless otherwise indicated, as specified for the following installation locations:
a. Indoor Clean, Dry Locations: Type 1 or Type 12.
b. Outdoor Locations: Type 3R or Type 4.
2. Finish: Manufacturer's standard unless otherwise indicated.
H. Short Circuit Current Rating:
1. Withstand and Closing Rating: Provide transfer switches, when protected by the supply side overcurrent protective devices to be installed, with listed withstand and closing rating not less than the available fault current at the installed location as indicated on the drawings.
I. Manual Transfer Switches:
1. Description: Transfer switches with manually initiated transfer between sources; mechanically operated and mechanically held.
J. Service Entrance Rated Transfer Switches:
1. Furnished with integral disconnecting and overcurrent protective device on the primary/normal source and with ground-fault protection where indicated.
2. Listed and labeled as suitable for use as service equipment according to UL 869A.

- PART 3 EXECUTION
3.01 EXAMINATION
A. Verify that field measurements are as shown on the drawings.
B. Verify that the ratings and configurations of transfer switches are consistent with the indicated requirements.
C. Verify that rough-ins for field connections are in the proper locations.
D. Verify that mounting surfaces are ready to receive transfer switches.
E. Verify that conditions are satisfactory for installation prior to starting work.
3.02 INSTALLATION
A. Perform work in a neat and workmanlike manner in accordance with NECA 1.
B. Install transfer switches in accordance with manufacturer's instructions.
C. Arrange equipment to provide minimum clearances and required maintenance access.
D. Provide required support and attachment in accordance with Section 26 05 29.
E. Install transfer switches plumb and level.
F. Provide grounding and bonding in accordance with Section 26 05 26.
G. Identify transfer switches and associated system wiring in accordance with Section 26 05 53.
3.03 PROTECTION
A. Protect installed transfer switches from subsequent construction operations.

END OF SECTION
SECTION 26 43 00
SURGE PROTECTIVE DEVICES

- PART 1 GENERAL
1.01 SECTION INCLUDES
A. Surge protective devices for branch panelboard locations.
1.02 SUBMITTALS
A. Product Data: Include detailed component information, voltage, surge current ratings, repetitive surge current capacity, voltage protection rating (VPR) for all protection modes, maximum continuous operating voltage (MCOV), nominal discharge current (I-n), short circuit current rating (SCCR), connection means including any required external overcurrent protection, enclosure ratings, outline and support point dimensions, weight, service condition requirements, and installed features.
B. Shop Drawings: Include wiring diagrams showing all factory and field connections with wire and circuit breaker/fuse sizes.
C. Project Record Documents: Record actual connections and locations of surge protective devices.
PART 2 PRODUCTS
2.01 SURGE PROTECTIVE DEVICES - GENERAL REQUIREMENTS
A. Description: Factory-assembled surge protective devices (SPDs) for 60 Hz service; listed, classified, and labeled as suitable for the purpose intended; system voltage as indicated on the drawings.
B. Protected Modes:
1. Single Split Phase Systems: L-N, L-G, N-G, L-L.
C. UL 1449 Voltage Protection Ratings (VPRs):
1. 240/120V System Voltage: Not more than 1,000 V for L-N, L-G, and N-G modes and 1,200 V for L-L mode.
D. UL 1449 Maximum Continuous Operating Voltage (MCOV): Not less than 115% of nominal system voltage.
E. Enclosure Environment Type per NEMA 250: Unless otherwise indicated, as specified for the following installation locations:
F. Mounting for Field-installed, Externally Mounted SPDs: Unless otherwise indicated, as specified for the following locations:
1. Provide surface-mounted SPD where mounted in non-public areas or adjacent to surface-mounted equipment.
2.02 SURGE PROTECTIVE DEVICES FOR BRANCH PANELBOARD LOCATIONS
A. Unless otherwise indicated, provide field-installed, externally mounted SPDs.
B. List and label as complying with UL 1449, Type 1 or Type 2.
C. Provide SPDs utilizing field-replaceable modular or non-modular protection circuits.
D. Surge Current Rating: Not less than 60 kA per mode/120 kA per phase.
E. Repetitive Surge Current Capacity: Not less than 2,000 impulses.
F. UL 1449 Nominal Discharge Current (I-n): 20 kA.
G. UL 1449 Short Circuit Current Rating (SCCR): Not less than the available fault current at the installed location as indicated on the drawings.
H. Diagnostics:
1. Protection Status Monitoring: Provide indicator lights to report the protection status.
2. Alarm Notification: Provide indicator light and audible alarm to report alarm condition. Provide button to manually silence audible alarm.

- PART 3 EXECUTION
3.01 INSTALLATION
A. Perform work in a neat and workmanlike manner in accordance with NECA 1.
B. Install SPD in accordance with manufacturer's instructions.
C. Arrange equipment to provide minimum clearances in accordance with manufacturer's instructions and NFPA 70.

- D. Provide conductors with minimum ampacity as indicated on the drawings, as required by NFPA 70, and not less than manufacturer's recommended minimum conductor size.
E. Install conductors between SPD and equipment terminations as short and straight as possible, not exceeding manufacturer's recommended maximum conductor length. Breaker locations may be reasonably rearranged in order to provide leads as short and straight as possible. Twist conductors together to reduce inductance.
F. Do not energize SPD until bonding of neutral and ground for service entrance and separately derived systems is complete in accordance with Section 26 05 26 where applicable. Replace SPDs damaged by improper or missing neutral-ground bond.
G. Disconnect SPD prior to performing any high potential testing. Replace SPDs damaged by performing high potential testing with SPD connected.

END OF SECTION
SECTION 26 51 00
INTERIOR LIGHTING

- PART 1 GENERAL
1.01 SECTION INCLUDES
A. Interior luminaires.
B. Emergency lighting units.
C. Ballasts and drivers.
D. Lamps.
1.02 SUBMITTALS
A. Product Data: Provide manufacturer's standard catalog pages and data sheets including detailed information on luminaire construction, dimensions, ratings, finishes, mounting requirements, listings, service conditions, photometric performance, installed accessories, and ceiling compatibility; include model number nomenclature clearly marked with all proposed features.
B. Project Record Documents: Record actual connections and locations of luminaires and any associated remote components.
PART 2 PRODUCTS
2.01 LUMINAIRE TYPES
A. Furnish products as indicated in luminaire schedule included on the drawings.
2.02 LUMINAIRES
A. Provide products that comply with requirements of NFPA 70.
B. Provide products that are listed and labeled as complying with UL 1598, where applicable.
C. Provide products listed, classified, and labeled as suitable for the purpose intended.
D. Unless otherwise indicated, provide complete luminaires including lamp(s) and all sockets, ballasts, reflectors, lenses, housings and other components required to position, energize and protect the lamp and distribute the light.
E. Unless specifically indicated to be excluded, provide all required conduit, boxes, wiring, connectors, hardware, supports, trims, accessories, etc. as necessary for a complete operating system.
F. Provide products suitable to withstand normal handling, installation, and service without any damage, distortion, corrosion, fading, discoloring, etc.
G. Fluorescent Luminaires:
1. Provide ballast disconnecting means complying with NFPA 70 where required.
2.03 EMERGENCY LIGHTING UNITS
A. Description: Emergency lighting units complying with NFPA 101 and all applicable state and local codes, and listed and labeled as complying with UL 924.
B. Operation: Upon interruption of normal power source or brownout condition exceeding 20 percent voltage drop from nominal, solid-state control automatically switches connected lamps to integral battery power for minimum of 90 minutes of rated emergency illumination, and automatically recharges battery upon restoration of normal power source.
C. Battery:
1. Size battery to supply all connected lamps, including emergency remote heads where indicated.
D. Diagnostics: Provide power status indicator light and accessible integral test switch to manually activate emergency operation.
E. Provide low-voltage disconnect to prevent battery damage from deep discharge.
2.04 BALLASTS AND DRIVERS
A. Ballasts - General Requirements:
1. Provide ballasts containing no polychlorinated biphenyls (PCBs).
2. Minimum Efficiency/Efficacy: Provide ballasts complying with all current applicable federal and state ballast efficiency/efficacy standards.
B. Fluorescent Ballasts:
1. All Fluorescent Ballasts: Unless otherwise indicated, provide high frequency electronic ballasts complying with ANSI C82.11 and listed and labeled as complying with UL 935.
a. Input Voltage: Suitable for operation at voltage of connected source, with variation tolerance of plus or minus 10 percent.
b. Total Harmonic Distortion: Not greater than 20 percent.
c. Power Factor: Not less than 0.95.
d. Thermal Protection: Listed and labeled as UL Class P, with automatic reset for integral thermal protectors.
e. Sound Rating: Class A, suitable for average ambient noise level of 20 to 24 decibels.
f. Lamp Compatibility: Specifically designed for use with the specified lamp, with no visible flicker.
g. Lamp Operating Frequency: Greater than 20 kHz, except as specified below.
h. Lamp Current Crest Factor: Not greater than 1.7.
i. Provide automatic restart capability to restart replaced lamp(s) without requiring resetting of power.
j. Surge Tolerance: Capable of withstanding characteristic surges according to IEEE C62.41.2, location category A.
k. Electromagnetic Interference/Radio Frequency Interference (EMI/RFI) Limits: Comply with FCC requirements of 47 CFR 15, for Class A, non-consumer application.
l. Ballast Marking: Include wiring diagrams with lamp connections.
2. Non-Dimming Fluorescent Ballasts:
a. Lamp Starting Method:
1) T8 Lamp Ballasts: Instant start unless otherwise indicated.
b. Lamp Starting Temperature: Capable of starting standard lamp(s) at a minimum of 0 degrees F (-18 degrees C), and energy saving lamp(s) at a minimum of 60 degrees F (16 degrees C) unless otherwise indicated.

- 2.05 LAMPS
A. Lamps - General Requirements:
1. Unless explicitly excluded, provide new, compatible, operable lamps in each luminaire.
2. Verify compatibility of specified lamps with luminaires to be installed. Where lamps are not specified, provide lamps per luminaire manufacturer's recommendations.
3. Minimum Efficiency: Provide lamps complying with all current applicable federal and state lamp efficiency standards.
4. Color Temperature Consistency: Unless otherwise indicated, for each type of lamp furnish products which are consistent in perceived color temperature. Replace lamps that are determined by the Engineer to be inconsistent in perceived color temperature.
B. Compact Fluorescent Lamps: Wattage and bulb type as indicated, with base type as required for luminaire.
1. Average Rated Life: Not less than 10,000 hours for an operating cycle of three hours per start.
C. Linear Fluorescent Lamps: Wattage and bulb type as indicated, with base type as required for luminaire.
1. T8 Linear Fluorescent Lamps:
a. Average Rated Life: Not less than 20,000 hours for an operating cycle of three hours per start.

- PART 3 EXECUTION
3.01 INSTALLATION
A. Coordinate locations of outlet boxes provided under Section 26 05 37 as required for installation of luminaires provided under this section.
B. Install products according to manufacturer's instructions.
C. Install luminaires securely, in a neat and workmanlike manner, as specified in NECA 1 (general workmanship), NECA 500 (commercial lighting), and NECA 502 (industrial lighting).
D. Install luminaires plumb and square and aligned with building lines and with adjacent luminaires.
E. Install accessories furnished with each luminaire.
F. Bond products and metal accessories to branch circuit equipment grounding conductor.
G. Emergency Lighting Units:
1. Unless otherwise indicated, connect unit to unswitched power from same circuit feeding normal lighting in same room or area. Bypass local switches, contractors, or other lighting controls.
H. Install lamps in each luminaire.

END OF SECTION



SECTION 26 56 00
EXTERIOR LIGHTING

- PART 1 GENERAL
1.01SECTION INCLUDES
A. Exterior luminaires.
B. Ballasts.
C. Lamps.
1.02 SUBMITTALS
A. Product Data: Provide manufacturer's standard catalog pages and data sheets including detailed information on luminaire construction, dimensions, ratings, finishes, mounting requirements, listings, service conditions, photometric performance, weight, effective projected area (EPA), and installed accessories; include model number nomenclature clearly marked with all proposed features.
B. Project Record Documents: Record actual connections and locations of pole foundations, luminaires, and any pull or junction boxes.
PART 2 PRODUCTS
2.01 LUMINAIRE TYPES
A. Furnish products as indicated in luminaire schedule included on the drawings.
2.02 LUMINAIRES
A. Provide products that comply with requirements of NFPA 70.
B. Provide products that are listed and labeled as complying with UL 1598, where applicable.
C. Provide products listed, classified, and labeled as suitable for the purpose intended.
D. Unless otherwise indicated, provide complete luminaires including lamp(s) and all sockets, ballasts, reflectors, lenses, housings and other components required to position, energize and protect the lamp and distribute the light.
E. Unless specifically indicated to be excluded, provide all required conduit, boxes, wiring, connectors, hardware, poles, foundations, supports, trims, accessories, etc. as necessary for a complete operating system.
F. Provide products suitable to withstand normal handling, installation, and service without any damage, distortion, corrosion, fading, discoloring, etc.
G. Provide luminaires listed and labeled as suitable for wet locations unless otherwise indicated.
2.03 BALLASTS
A. All Ballasts:
1. Provide ballasts containing no polychlorinated biphenyls (PCBs).
2. Minimum Efficiency/Efficacy: Provide ballasts complying with all current applicable federal and state ballast efficiency/efficacy standards.
B. Fluorescent Ballasts: Unless otherwise indicated, provide high frequency electronic ballasts complying with ANSI C82.11 and listed and labeled as complying with UL 935.
1. Input Voltage: Suitable for operation at voltage of connected source, with variation tolerance of plus or minus 10 percent.
2. Total Harmonic Distortion: Not greater than 20 percent.
3. Power Factor: Not less than 0.95.
4. Thermal Protection: Listed and labeled as UL Class P, with automatic reset for integral thermal protectors.
5. Sound Rating: Class A, suitable for average ambient noise level of 20 to 24 decibels.
6. Lamp Compatibility: Specifically designed for use with the specified lamp, with no visible flicker.
7. Lamp Operating Frequency: Greater than 20 kHz, except as specified below.
8. Lamp Current Crest Factor: Not greater than 1.7.
9. Lamp Wiring Method:
a. Programmed Start Ballasts: Provide parallel or series/parallel wired where available; otherwise series wired is acceptable.
10. Lamp Starting Method:
a. Compact Fluorescent Lamp Ballasts: Programmed start unless otherwise indicated.
11. Lamp Starting Temperature: Capable of starting standard lamp(s) at a minimum of 0 degrees F (-18 degrees C) unless otherwise indicated.
12. Provide automatic restart capability to restart replaced lamp(s) without requiring resetting of power.
13. Provide end of lamp life automatic shut down circuitry for T5 and smaller diameter lamp ballasts.
14. Surge Tolerance: Capable of withstanding characteristic surges according to IEEE C62.41.2, location category A.
15. Electromagnetic Interference/Radio Frequency Interference (EMI/RFI) Limits: Comply with FCC requirements of 47 CFR 15, for Class A, non-consumer application.
16. Ballast Marking: Include wiring diagrams with lamp connections.
2.04 LAMPS
A. Lamps - General Requirements:
1. Unless explicitly excluded, provide new, compatible, operable lamps in each luminaire.
2. Verify compatibility of specified lamps with luminaires to be installed. Where lamps are not specified, provide lamps per luminaire manufacturer's recommendations.
3. Minimum Efficiency: Provide lamps complying with all current applicable federal and state lamp efficiency standards.
4. Color Temperature Consistency: Unless otherwise indicated, for each type of lamp furnish products which are consistent in perceived color temperature. Replace lamps that are determined by the Engineer to be inconsistent in perceived color temperature.
B. Compact Fluorescent Lamps: Wattage and bulb type as indicated, with base type as required for luminaire.
1. Average Rated Life: Not less than 10,000 hours for an operating cycle of three hours per start.

END OF SECTION
SECTION 40 91 02.02
LEVEL MEASUREMENT

- PART 1 - GENERAL
1.01 RELATED DOCUMENTS
A. General Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 1 specification sections, apply to this section.
1.02 DESCRIPTION OF WORK
A. General: The Contractor shall provide the labor, tools, equipment, and materials necessary to install level measurement equipment in accordance with the Contract Drawings and as specified herein.
B. Types: The types of equipment specified in this section include the following:
1. Multi point probe.
2. Float switches.
1.03 QUALITY ASSURANCE
A. Codes and Standards: Perform all work associated with level measurement equipment in compliance with applicable requirements of governing agencies having jurisdiction and in accordance with these plans and as specified herein.
1. National Electrical Manufacturers Association (NEMA) Compliance.
2. National Electrical Code (NEC) Compliance.
3. Underwriters Laboratories, Inc. (UL) Compliance and Labeling: Comply with provisions of UL safety standards pertaining to level measurement equipment. Provide products and components which have been UL listed and labeled.
B. Qualifications:
1. Manufacturer's Qualifications: Firms regularly engaged in manufacturing of level measurement equipment whose products have been in satisfactory use in similar service for not less than 3 years.
2. Installer's Qualifications: Qualified with at least 5 years of successful installation experience on projects with level measurement equipment similar to that required for this project.
1.04 SUBMITTALS
A. General: Furnish manufacturer's product data, test reports, and material certifications as required.
B. Materials List: Submit a list of materials giving quantities, manufacturer's name, and catalog numbers.
C. Wiring Diagrams: Submit wiring diagrams showing all connections for all equipment furnished under this section.
D. Calibrations: Furnish two certified copies of calibrations.

Table with 2 columns: MARK, DATE, DESCRIPTION, REVISIONS

EPCON COMMUNITIES

COURTYARDS AT SOUTH SECTION LINE ROAD
PUMP STATION AND FORCE MAIN
ELECTRICAL / CONTROL SPECIFICATIONS

EMHT
Evans, Meacham, Henshaw & Thon, Inc.
5000 New Albany Road, Columbus, OH 43254
Phone: 614.275.4500 Fax: 614.275.3348 emht.com

DATE
DECEMBER, 2016
SCALE
JOB NO.
2014-1653

SHEET
19/23



SECTION 40 91 02.02  
LEVEL MEASUREMENT - CONTINUED

1.05 DELIVERY, STORAGE, AND HANDLING

A. Packing and Shipping. Deliver equipment properly packaged and mounted on pallets or skids to facilitate handling of heavy items. Utilize factory fabricated type containers or wrappings for components which protect equipment from damage.

1.06 SPECIAL WARRANTY

A. General. The Contractor shall retain the services of factory trained service personnel to provide repair services for instruments for 1 year commencing with the time the system equipment is complete and including all repair and replacement parts needed during warranty period.

PART 2 - PRODUCTS

2.01 LEVEL SENSING DEVICE

- A. Multi Point Probe
  - 1. The probe shall be constructed from uPVC 32mm tubing with moulded sensor units at regular intervals along the probe. Each sensor unit will be PVC injected to prohibit ingress of moisture, and the sensor material will be Avesta SMO254 stainless steel.
  - 2. Mounting
    - a. The probe will be mounted in a turbulent area of the wet well, suspended on its own cable and connected to a 6mm stainless steel hook which would hang from a 30mm stainless steel angle containing a polyurethane squeeze pad positioned in the opening into the wet well, so that the probe can be removed without entering the wet well.
      - 1) The squeeze will have a 30mm hole and slot, enabling the probe to be pulled through and cleaned.
      - 2) Probe cable shall be run in a separate conduit away from any high voltage cables.
  - 3. Sensors
    - a. 10 sensors will be spaced along the length of the probe assembly, and each will be individually connected to a correspondingly numbered PVC/PVC 7.5mm flexible cable.
    - b. The moulded sensor unit will contain two Avesta sensors mounted on opposite sides of sensor unit. Each Avesta sensor will be 24mm high and no wider than 2mm, and will protrude from the surface of the PVC.
    - c. The probe shall be pressure injected with an epoxy resin to encapsulate all internal components and connections to form a rigid, homogenous unit.
    - d. Each sensor unit containing the two Avesta sensors will be rotated 90 degrees to the previous sensor unit to eliminate tracking between sensors.
  - 4. Cable
    - a. The cable will be encoded with number and text along the entirety of the cable and at intervals not greater than 200mm, for identification. This cable will be dark blue in colour, with the cores light blue.
    - b. The flexible cables shall be capable of supporting the weight of the probe and cable, without the need for additional support.
    - c. The cable shall be secured to the top of the probe by a synthetic rubber compression fitting.
  - 5. The probe shall be covered by the manufacturer's ten year warranty (conditions may apply).
- B. Back up float switches
  - 1. One mechanical control float switches shall be supplied with the control panel in order to operate the backup float circuitry, plus one spare (total two)
    - a. Mechanically activated, snap-action contacts
    - b. No mercury
    - c. High impact corrosion resistant polypropylene or stainless steel housing
    - d. UL listed for use in non-potable water and sewage
    - e. Five-year limited warranty
  - 2. Component shall be SJE-Rhombus, MillipgMaster™ or approved equal.

PART 3 - EXECUTION

3.01 EXAMINATION

- A. Verification of Conditions. Prior to all work of this section, carefully inspect the installed work of all other trades and verify that all such work is complete to the point where this installation may properly commence.
- B. Discrepancies. In the event any discrepancies are discovered, immediately notify the Engineer/Architect in writing. Do not proceed with installation in areas of discrepancy until all such discrepancies have been fully resolved.

3.02 PREPARATION

- A. Protection
  - 1. All equipment and materials shall be packaged at the factory to protect each item from damage during shipment and storage.
  - 2. Provide blocking and cushioning materials to prevent damage during shipment.
  - 3. Provide temporary lifting lugs on shipping package as needed.
  - 4. Include approximately 1 pint of touch-up paint for each finish color in shipment.
- B. Surface Preparation. The work shall be carefully laid out in advance. Where cutting, drilling, etc. of floors, walls, ceilings, or other surfaces is necessary, this work shall be carefully done. Any damage to building, piping, or equipment shall be repaired by skilled mechanics of the trades involved, and at no additional cost to the Owner.

3.03 INSTALLATION

- A. General
  - 1. Install equipment as indicated in accordance with manufacturer's written instructions and in compliance with recognized industry practices.
  - 2. Mount instruments so that they may be readily approached and easily serviced.
  - 3. Level Measurement Installation.
    - a. Coordinate the installation of level sensing devices with the process equipment and Contract drawings.
    - b. Install manufacturer's supplied cable between level element and transmitter. If flexible conduit is not provided or where conditions dictate, furnish and install rigid conduit sized according to manufacturer's recommendations.
    - c. Install ground references as required for the application.
- B. FIELD QUALITY CONTROL

- A. Inspection. Upon completion of this portion of the work, the Contractor shall provide for services of a qualified representative of the manufacturer to inspect and approve installation.
- B. Tests. Upon completion of all inspections and prior to acceptance by Owner, perform field tests outlined in the "Instrumentation Systems Basic Requirements" section.
- C. Demonstration. When all required tests have been performed and final approval has been given, a qualified representative of the supplier shall thoroughly demonstrate to Owner's personnel operation and maintenance of all items installed under this section.

END OF SECTION

SECTION 40 95 13.01  
PUMP STATION CONTROL PANELS

PART 1 - GENERAL

1.01 SECTION INCLUDES

A. This section includes all elements required to furnish and install a complete electrical control system to control, operate, and display information as indicated in the plans and specifications. The control system shall include all equipment, devices, wiring, and incidental materials to operate the system and display or relay information in accordance with these specifications. The intention of this section is to secure a complete control system that will operate equipment in accordance with narratives and requirements indicated in the plans, specifications, and manufacturer's literature for the equipment installed. All circuits and devices for protection of installed equipment shall be included in the lump sum bid.

1.02 SCOPE OF WORK

A. The contractor shall furnish and install with each pump station, one control panel. The pump station control panel shall house the complete electrical system to operate the pump station. The control panel shall be manufactured by a UL certified panel facility and shall meet all UL698A standards (Industrial control equipment with circuit extensions into hazardous locations). All components shall be UL recognized or listed including those supplied by the pump manufacturer and the control panel shall house all necessary controls including circuit breakers, and other equipment specified herein. The enclosure(s) shall be built to meet NEMA ratings (Controls compartment), (Service and MCC compartments), and shall in all respects conform to the National Electric Code and all other state and local codes which may apply.

1.03 DEFINITIONS

- A. AIC - Amps Interrupting Current is the maximum current that is produced upon a fault to ground or a fault between phases.
- B. Arc Flash - An electrical explosion that can occur when there is an uncontrolled conduction of electrical current to ground or to another phase. An Arc Flash occurs very rapidly and produces intense heat and energy that can harm personnel and destroy equipment.
- C. Control Compartment - A compartment or enclosure in the control panel assembly that contains all control components of the pump station including the PLC (controller), communications and other devices.
- D. FLA - Full Load Amps
- E. GFCI - Ground Fault Circuit Interrupter
- F. GPM - Gallons Per Minute
- G. HMI - Human Machine Interface
- H. HOA - Hand-Off-Auto operator switch
- I. KW - Kilowatts (power)
- J. MCC - Motor Control Center
- K. MCC Compartment - A compartment or enclosure in the control panel assembly that contains components related to motor starting. Some components include variable frequency drives, pump breakers, the control power transformer, and the voltage monitor.
- L. Service Compartment - A compartment or enclosure in the control panel assembly that contains service entrance or incoming power feeder equipment for the station. Some components include main incoming terminal blocks, main service or incoming feeder circuit breaker, and phase monitor and other protective devices.
- M. PID - Proportional Integral and Derivative
- N. PID Mode - A mode in the controller that keeps a constant wet well level by varying the pump speed.
- O. PLC - Programmable Logic Controller
- P. Skirt Compartment - A vented compartment, enclosure, or wireway under the control panel assembly that is reserved for routing of cables into various compartments.

- Q. UPS - Uninterruptable Power Supply
- R. VFD - Variable Frequency Drive

1.04 REFERENCES

- A. ANSI/NFPA® 70 - National Electrical Code® (NEC®)
- B. IEC 61000 - Electromagnetic Compatibility
- C. NEMA 250 - Enclosures for Electrical Equipment
- D. NEMA ICS7 - Industrial Control and Systems Adjustable Speed Drives
- E. UL® 50 - Enclosures for Electrical Equipment
- F. UL 98 - Disconnect Switches
- G. UL 507 - Electric Fans
- H. UL 508 - Industrial Control Equipment
- I. UL 508C - Power Conversion Equipment
- J. UL 698A - Circuit extension into hazardous locations
- K. UL 991 - Safety Tests
- L. IEEE-519 - Harmonic Levels
- M. NFPA 70E - National Fire Protection Association

1.05 SUBMITTALS

- A. Shop Drawings
  - 1. The Engineer reserves the right to approve or disapprove any and all equipment based upon evaluation. Approval for fabrication and installation will be made only after submittal and review of all shop contract documents. The information required for approval shall include the following items and be provided to the Engineer for approval.
    - a. Electrical schematics
    - b. Enclosure dimensional drawings
    - c. Complete layout drawing with dimensions
    - d. Environmental calculations in MCC compartment
    - e. Environmental calculations in Control compartment
    - f. Manufacturer data sheet for all components
    - g. Complete bill of material
    - h. User operating manual
    - i. Installation instructions
    - j. 2 year warranty certificate
- B. All submittals shall be made in electronic PDF format, in addition to any other format required by other specification sections.

1.06 SUBSTITUTIONS

A. The Engineer will consider proposals for substitution of materials, equipment, methods and services only when proposals are accompanied by full and technical data and all other information required by the Engineer for the proposed substitution. Substitution of materials, equipment, methods and/or services is not allowed unless such substitution has been specifically approved by the Engineer. The Contractor shall allow 15 days for approval after receipt by the Engineer.

1.07 QUALITY ASSURANCE

- A. Control panel
  - 1. Control panel shall be manufactured in a UL508A facility and be UL certified to manufacture panels with UL698A intrinsically safe components.
  - 2. Factory shall conduct full operational tests with appropriate voltage applied to the panel.

1.08 DELIVERY, HANDLING, STORAGE

A. All materials relating to this section individually and as completed panels shall be handled as fragile equipment and stored only inside closed buildings and protected from moisture entry. All openings shall be continuously sealed until the moment that connections thereto are actually made.

1.09 WARRANTY

A. Warranty: 24 Months from date of manufacture. The warranty shall apply to being free of defects in material and workmanship.

PART 2 - PRODUCTS

2.01 ENCLOSURE

A. The enclosure shall be one freestanding enclosure consisting of four different compartments within one footprint, or one assembly of four separate enclosures mounted on a common support frame with all enclosures connected flush or with pipe nipples.

2.02 COMPARTMENT REQUIREMENTS

- A. The Service compartment shall house the main service power components.
- B. The MCC compartment shall house the motor starter components.
- C. The Control compartment shall house all controls associated with the panel. The maximum voltage within this compartment is to be 120vac.
- D. The Cable entrance compartment is a nonrated vented compartment that provides an area for the entry of cables from the wet well. All cables with the exception of line power will come through the cable entrance compartment.
- E. Conduit and mounting template - A drawing shall be provided with each enclosure to provide anchoring locations and conduit locations entering the enclosure. This drawing shall be available at the time of conduit and foundation layout.

2.03 ENCLOSURE CONSTRUCTION

- A. All compartments are fabricated as one complete unit with singular common separation walls resulting in one complete enclosure, or as separate enclosures connected flush or with pipe nipples and mounted on a common frame. The NEMA Type rating integrity of each compartment or enclosure shall be maintained at all times from the factory manufactured enclosure through final installation.
- B. The entire panel enclosure when mounted indoors shall be NEMA 12, painted steel.
- C. Interior wall construction: all common walls shall consist of one sheet of painted steel with a minimum 16-gauge thickness, or 14-gauge where any dimension is greater than 24 inches.
- D. Interior mounting: all mounting plates, hinges and other components mounted onto the enclosure walls shall be held in place by stainless steel studs.
- E. Exterior door handles to be steel powder coated black. Door handles to be fully lockable and able to accommodate a #21 Master padlock. Each door handle must be NEMA Type rated to maintain the rating of the associated compartment.
- F. Exterior door hinges shall be continuous steel piano type hinges.
- G. Mechanical door stops to be mounted on the Control and MCC compartment doors to secure the door in the open position at 110 degrees. Door may be closed by manually lifting up on the door stop arm. They shall be located at the bottom of each cabinet door.
- H. A fold out aluminum 3-ring binder shall hold the Electrical schematic and all job specific documentation. All documentation shall be laminated.
- I. Back panels shall be constructed of painted or stainless steel, 12-gauge minimum. Back panels to have 1/2" mounting hole at a minimum at each corner. Back panels are to be mounted to the enclosure with a minimum of 3/8" studs and nuts.
- J. The Control compartment shall have a dead front inner door for mounting the controller, indicators, and switches. The inner door shall be constructed out of 12-gauge steel, minimum. The door shall be mounted to the enclosure via a continuous steel piano hinge. Two twist lock latches are to be used to secure the inner door in the closed position. The latches are to be T-handle type constructed from polyamide-6 nylon plastic 30% glass reinforced material or material of equal durability. They shall be mountable through square holes to prevent rotation of the entire mechanism.

2.04 GENERAL ENCLOSURE REQUIREMENTS

- A. The reduction of the Arc Flash potential shall be reduced by isolating high voltage into specific compartments.
- B. The Service and MCC compartments may contain components that operate at a voltage that is capable of creating an Arc Flash condition. Personnel Protection Equipment (PPE) is required. Accessibility should be limited to qualified electricians only.
- C. The Control compartment only contains control voltage (maximum of 120vac). Minimal Personnel Protection Equipment (PPE) is required for operators and maintenance personnel. See NFPA 70E for proper PPE requirements.
- D. All penetrations through compartments shall be performed to maintain the NEMA Type ratings of each individual compartment.
- E. The enclosure shall be constructed so that no screws or bolt heads are visible when viewed from any external portion of the enclosure.
- F. Punch cutouts for instruments and other devices shall be cut, punched, or drilled and smoothly finished with rounded edges.
- G. No holes shall be drilled in the top (rain cap) of the cabinet.
- H. Electrical schematic shall be permanently affixed to inside of the outer door of the Control and MCC compartments. The schematic shall resist water and prevent removal and discoloration from heat, gasses, and ultraviolet light.

2.05 SERVICE COMPARTMENT COMPONENT AND REQUIREMENTS

- A. Main service entrance termination
  - 1. The main service entrance or incoming feeder conductors shall be terminated onto lugs mounted at the bottom of the Service compartment. The lugs shall be aluminum compression type and shall be rated for both aluminum and copper wire terminations. The lugs shall be sized to accommodate the wire size of service entrance or incoming feeder conductors.
- B. Main Circuit Breaker
  - 1. The main circuit breaker shall be a thermal-magnetic molded case circuit breaker rated to 600V and sized according to the NEC and the load requirements of the control panel. It shall be mounted in the compartment with a lockable handle mechanism mounted on the Service compartment door or surrounding flange.
- C. Surge Arrestor
  - 1. A surge arrester shall be connected to the load side of the main circuit breaker. It shall be mounted behind a protective cover on which the main service entrance or incoming feeder termination lugs are mounted.
- D. Surge Capacitor
  - 1. A surge capacitor shall be connected to the load side of the main circuit breaker. It shall be mounted behind a protective cover on which the main service entrance or incoming feeder termination lugs are mounted.
- E. Phase Monitor
  - 1. The phase loss monitor shall be supplied from the load side of the main disconnect. It shall monitor the voltage of each phase and provide a dry contact closure upon phase loss, phase reversal, overvoltage or under voltage condition. Monitor shall have an adjustable reset delay.

2.06 MCC COMPARTMENT COMPONENT AND REQUIREMENTS

- A. Voltage indicator
  - 1. A voltage indicator shall be mounted on the door of the MCC compartment to provide a warning that high energy circuits are energized and voltage is present on each phase. The voltage indicator warns against the potential danger of electric shock, Arc Flash and/or Arc Blast conditions inside the cabinet.
- B. Door interlock
  - 1. An electromechanical door interlock shall prevent access into the MCC compartment unless the main power is disconnected. The MCC compartment door interlock mechanism is powered through a two-pole circuit breaker in the MCC compartment. A defester mechanism shall be provided, or the main power must be able to be connected while the MCC compartment door is already opened by a qualified electrician with appropriate PPE.
- C. Pump circuit breakers
  - 1. Pump circuit breakers shall be thermal-magnetic molded case breakers. Individual pump circuit breakers shall be sized according to the VFD manufacturer, NEC and the FLA of the pump.
- D. Control transformer primary circuit breaker
  - 1. The control power circuit breaker shall be sized according to the rating of the primary windings of the control power transformer. The line side of the circuit breaker shall be supplied from a tap from the load side of the main circuit breaker. It shall be DIN rail mounted and adjacent to the MCC Compartment door interlock circuit breaker.
- E. Door interlock circuit breaker
  - 1. MCC compartment door interlock circuit breaker shall be a two-pole 10-amp circuit breaker and supplied from a tap from the load side of the main circuit breaker. It shall be DIN rail mounted and adjacent to the control power circuit breaker.
- F. Control power transformer
  - 1. A control power transformer is only required on stations that do not provide 120 volts to a service neutral.
- G. Line reactors
  - 1. A line reactor shall be connected to the input of each VFD power circuit. The line reactor shall be located in the MCC compartment and selected according VFD manufacturer and the motor FLA. One line reactor shall be installed per VFD to provide a reduction of harmonics.
- H. Variable Frequency Drives
  - 1. VFD's shall be located in the MCC compartment and connected to the load side of a dedicated line reactor.
  - 2. VFD's Requirement are to follow specification as stated in this Section.
- I. Environmental Control
  - 1. MCC Compartment shall be furnished with insulation, air conditioner, exhaust fans, and/or ventilation louvers as necessary to maintain environmental conditions inside the compartment suitable for its components.
  - 2. A thermostat shall be mounted in the MCC compartment and operate the fans or air conditioner on rising internal temperature. The thermostat shall be mounted in the lower half of the MCC compartment in order to avoid short cycling.
  - 3. All environmental control components shall be selected to maintain the NEMA rating of the MCC compartment.
  - 4. Heat load calculations and other calculations used to select the environmental control equipment shall be included with equipment submittals.
- J. Pump Terminal Blocks
  - 1. The terminal blocks for motor lead terminations shall be mounted on an angled and raised bracket to provide easy access for field wiring terminations.
- K. MCC/Control compartment interconnecting seal barrier
  - 1. A cable barrier shall be installed that provides isolation between the MCC compartment and the Control compartment. The barrier shall be used to maintain a NEMA Type 3R rating in the MCC compartment and a NEMA Type 4X rating in the Control compartment. All control cables shall pass through the barrier.

2.07 CONTROLS COMPARTMENT COMPONENT AND REQUIREMENTS

- A. Operator Interface Terminal (OIT)
  - 1. 320x240 minimum resolution backlit LED display
  - 2. Memory: minimum 256 MB RAM
  - 3. NEMA 4 display rating
  - 4. Manufacturer: Multismart pump station manager by Multitrode
- B. Pump Controller
  - 1. Programmability
    - a. The pump controller shall provide user ready automatic control of pumps with an intuitive HMI interface. The pump controller shall contain pre-designed operational parameters that are selected and configured via the OIT.
  - 2. Minimum Features
    - a. Pump control of up to six pumps, including pump grouping and pump alternation.
    - b. Intelligent Hand-Off-Auto control.
    - c. Level set point adjustment for pump activation, deactivation and station level alarms.
    - d. Level device input capability shall include: 4-20mA analog signal, conductive probe or floats.
    - e. Redundant level device input capability with automatic input fault control (input device switching).
    - f. Selectable charge (fill) or discharge (empty) modes.
    - g. Pre-configured station optimization features including: maximum pump off time, maximum pump run time, maximum starts per hour, inter-pump start and stop time delays, maximum pump run time, blocked pump detection, well washer control capability, well clean out control capability, pump operation control (profile programming) capability.
    - h. Locked level alarm function to indicate a level device fault.
    - i. Pump alternation modes.
    - j. Pump decommissioning.
    - k. Up to six unique user defined profiles of set points shall be available to control pumps during specific site conditions or events.
    - l. Datalogger for user-defined faults and events.
    - m. Supply voltage monitoring and supply fault management.
    - n. Monitoring of DC power supply, battery voltage, and internal controller temperature.
    - o. Energy, power, and pump efficiency monitoring.
    - p. Motor protection features including: current monitoring for each pump, over- and under-current trip, ground/earth fault, current phase imbalance fault, 12t fault, and insulation resistance testing for motor windings.
    - q. Flow measurement: calculated flow via liquid level draw down data.
    - r. VFD speed control capability.
    - s. Fault module capability as follows: pump hold out function, automatic restart function after fault condition is no longer present, manual reset of fault required (if user intervention of fault reset is selected).
    - t. Remote control via remote telemetry monitoring including security.
    - u. SD/USB ports shall be available for the following operations: firmware upgrades, save and load pump controller configuration, download data logs, export or import modbus and DNP3 points list.
  - 3. Functionality
    - a. Pump mode: For each pump, operator shall have one hand-off-auto switch to locally start and stop each pump. Control from the pump controller shall be disabled if the physical selector switch is not in the auto position. In remote auto, pump shall operate as described in the automatic sequence below. Pump shutdown alarms shall be active regardless of the selected mode. Any time a pump is returned from hand or off to auto, pump shall transition to remote automatic mode, e.g. from power failure, and become available to be called to run by the controller.
    - 4. Automatic Control
      - a. In automatic mode, lead pump operation shall be initiated when wet well level exceeds lead pump set point. Under normal circumstances, the level will then drop and the pump operation stops when the level drops below the pumps off set point.
      - b. In the event of a failure of the lead pump, the level will rise above the lead pump set point to the alarm set point, at which point a lead pump failed alarm shall be generated, and then to the lag pump set point. At this time the lag pump shall be started and continue to run until the level drops below the pumps off set point.
      - c. The operator shall have the ability to enable and disable automatic pump role alternation.
      - d. In the event of a controller or level transmitter failure, emergency backup floats will attempt to start and stop both pumps (one at a time) on a hardwood basis. Any faults that can be detected by logic shall be generated, e.g. level sensor failure, high high level set point activated, emergency pumping circuit activated.
    - 5. All level set points for operation and alarms shall be adjustable from the display or remotely, meaning the user can choose what levels trigger each condition.
    - 6. All monitoring and alarm signals shown with contract drawings shall be displayed on the display and remotely for monitoring and troubleshooting purposes. All alarms shall be programmed to latch upon alarm condition, and shall require acknowledgement either at the display or remotely in order to reset the alarm.
  - 7. Communications
    - a. Physical - The pump controller shall include the following data communication ports:
      - 1) Two ethernet ports (10 Mb/s)
      - 2) Two RS232 ports (115 Kbs)
      - 3) Two RS485 ports (115 Kbs)
      - 4) USB device port
      - 5) SD card port
    - b. Communications Types - The pump controller shall support the following communication types:
      - 1) TCP/IP
      - 2) UDP
      - 3) RS232
      - 4) RS485
      - 5) Private radio over RS232
      - 6) PSTN
      - 7) Wireless LAN
      - 8) Cellular data via integral PPPM module

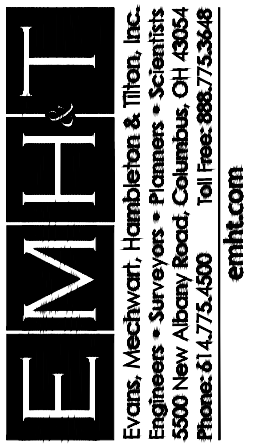
- 9) Cellular voice
- c. Communications Protocols
  - 1) DNP3 (master and slave, level 2 compliant), including: change of state monitoring, native date/time and quality stamps for each data point, event buffering for different classes of data, support for multiple masters and slaves to be configured on the unit, and DNP security (for securing communications between master station and RTU).
  - 2) Modbus (master and slave), including: modbus TCP, modbus RTU, modbus ASCII, and support for multiple masters and slaves.
- d. Manufacturer
  - a. Multismart by Multitrode
- C. Radio Communications Equipment
  - 1. Radio Modem
    - a. 902-928 unlicensed spread spectrum frequency hopping transceiver.
    - b. RS232 data interface
    - c. GE MDS Transnet 900 series
  - 2. Power Supply
    - a. Provide and install 24Vdc power supply with current rating appropriate for the radio unit. Install power supply in the pump station controller/telemetry panel. Power supply shall be powered from the UPS circuit originating in the pump station controller/telemetry panel.
    - b. Manufacturer: Phoenix Contact
  - 3. Antenna and Accessories
    - a. 6-Element aluminum Yagi antenna with 9 dB gain.
    - b. For 900 MHz systems, factory tuned to 915 MHz.
    - c. With stainless steel hardware.
    - d. MYA-9156 produced by Maxrad or approved equal.
    - e. Watertight cable LMR-400-DB produced by Times Microwave Systems or approved equal.
    - f. Miscellaneous connectors to connect antenna to radio while maintaining watertight integrity throughout cable.
    - g. All connections to be soldered to cable to prevent loosening of cable from connector and signal degradation over time.
    - h. Antenna mast to be galvanized steel and capped at top end.
  - 4. Surge Protection
    - a. Frequency range of surge protector 125 MHz to 1000 MHz.
    - b. Less than 220 micro-joules of throughput energy.
    - c. IS-B50LN-C2 produced by Polyphaser Corporation or approved equal.
  - D. Application Programming
    - 1. Provide all required application programming and/or configuration for a fully functional pump station controller as shown on the drawings and as specified herein.
    - 2. Supply Operator Interface Terminal (OIT) application programming and/or configuration to provide control of the pump station controller/telemetry panel locally. The OIT shall provide complete monitoring and control of all equipment at the pump station. At a minimum OIT programming/configuration shall include monitoring and control of:
      - a. Running / stopped / alarm status of all pumps, including individual alarms and manual or automatic status control for each pump.
      - b. Automatic / lead / lag switching for each pump.
      - c. Emergency pumping circuit activated.
      - d. Wet well levels.
      - e. Grinder status and alarm.
      - f. Odor control system (bioxide) status, level (if used), and alarm.
      - g. AC power status.
      - h. Intuition detection.
      - i. Status of the radio connection to Olenlangy Environmental Control Center. This shall be accomplished by monitoring a free-running counter programmed at the OECC.
    - 3. All application programming features described above shall also be programmed to be available from the OECC via radio telemetry link.
  - E. DC Power Supply/UPS
    - 1. The power supply shall convert 120 Vac to 24 Vdc power for control circuits and supply an uninterrupted 24Vdc power via a battery if 120Vac is lost. The power supply shall have dual output: One 24Vdc output for the control circuitry, the other for charging the battery.
    - 2. The power supply shall have the following characteristics:
      - a. Output minimum 155 watts
      - b. Over current protection
      - c. Over voltage protection
      - d. DC voltage adjustment
      - e. Short circuit protection
  - F. Battery
    - 1. The battery backup power shall consist of two 12 VDC batteries configured in series to provide an output voltage of 24 VDC. A fuse link shall be installed in the circuit between each battery to provide overload protection. The batteries shall have a minimum rating of 7 amp hours.
  - G. Over Temperature and Seal Fan Monitoring Relay
    - 1. The relay shall be compatible with the pump that is installed in the wet well.
    - 2. There shall be one relay per pump that is present in the system.
    - 3. The relay shall have the following requirements:
      - a. Molded relay bezel to allow for door mounting.
      - b. Power on light.
      - c. Over temperature and Seal Leak light. Color: Red.
      - d. Selector switch for Auto or Manual mode. This switch shall allow the user to select between automatic or manual reset of the heat sensor fault.
      - e. Provide an over temperature reset pushbutton for Manual reset mode.
      - f. Seal fan sensitivity to be adjustable between 4.7K ohm to 100K ohm via an adjustable potentiometer.
  - H. Intrinsically safe barrier
    - 1. The intrinsic safety barriers shall be DIN rail mounted and located in a UL approved isolated Safety Barrier location. The intrinsic safety barriers shall be used to limit the amount of energy available to all level sensing circuits in the wet well in order to prevent sparking.
      - a. Analog IS barrier
      - b. Back up float switches IS barrier
  - I. Control circuit breakers
    - 1. The control circuit breakers shall be located in the Control compartment and used to protect all 120 volt and 24 volt circuits. The 120 volt circuit breakers shall be supplied by the secondary side of the control transformer (unless 120 volts is available from the main electrical service).
    - 2. There shall be six single pole control circuit breakers as follows:
      - a. Main control power
      - b. Fan
      - c. GFI Receptacle
      - d. Heater
      - e. Control wiring
      - f. 24vdc Power supply
  - J. Control Relays
    - 1. Control relays shall have the following characteristics:
      - 2. 4 pole, 8 A, 1/3 hp (IEC rating = 6 A)
      - 3. Coil: 120 VAC or 24 VAC
      - 4. DIN rail mounting
      - 5. Terminal screw type socket
      - 6. Voltage rating: 300 volts
      - 7. Mechanical status flag
      - 8. Pilot light indicating status
      - 9. Manual operator
      - 10. Protection module mounted in base (diode, RC circuit or varistor)
      - 11. Metal hold down clip

REVISIONS

MARK DATE DESCRIPTION

EPCON COMMUNITIES

FARM LOTS 17 & 32, QUARTER TOWNSHIP 3, RANGE 19  
UNITED STATES MILITARY LANDS  
CONCORD TOWNSHIP, DELAWARE COUNTY, OHIO  
SUNSHINE MEMORIAL ELEMENTS  
FOR  
COURTYARDS AT SOUTH SECTION LINE ROAD  
PUMP STATION AND FORCE MAIN  
CONTROL SPECIFICATIONS



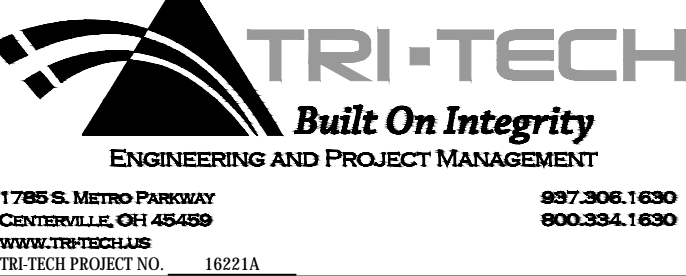
DATE  
DECEMBER, 2016

SCALE

JOB NO.  
2014-1653

SHEET

20/23



7/Dec/2016

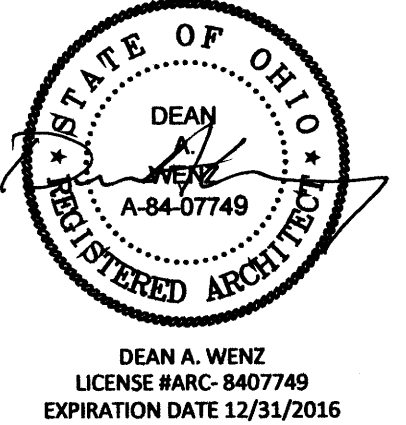


GENERAL NOTES	
1.	ALL WORK SHALL COMPLY WITH APPLICABLE STATE AND LOCAL BUILDING CODES, AND THE BUILDING STANDARDS REFERENCED THEREIN.
2.	ALL WORK SHALL CONFORM TO THE HIGHEST LEVELS OF THE APPROPRIATE INDUSTRY STANDARDS FOR CUSTOM WORK.
3.	ALL WORK TO BE COORDINATED AND SCHEDULED BY THE OWNER.
4.	PLAN DIMENSIONS ARE TO FACE OF ROUGH FRAMING OR MASONRY UNLESS NOTED OTHERWISE. DIMENSIONS TO EXTERIOR WALLS INCLUDE 7/16" EXT. SHEATHING, ROUNDED TO THE NEAREST 1/4".
5.	FINISH FLOOR ELEVATION @ FIRST FLOOR LEVEL IS SET AT 100'-0". SEE SITE PLAN FOR ACTUAL FIRST FLOOR ELEVATION @ EACH BUILDING.
6.	ALL COLORS AND FINISHES, NOT SPECIFIED HEREIN, TO BE SELECTED BY THE OWNER.

GENERAL BUILDING INFORMATION
THIS BUILDING IS A PUMP STATION DESIGNED TO ENCOMPASS A VALVE VAULT AND CONTROL ROOM.

CODE REVIEW INFORMATION	
GOVERNING BUILDING CODE:	2011 OHIO BUILDING CODE
USE GROUP CLASSIFICATION:	U - UTILITY
CONSTRUCTION TYPE:	VB, COMBUSTIBLE, UNPROTECTED NO AUTOMATIC FIRE PROTECTION SYSTEM
ALLOWABLE STORIES:	1 STORY
NUMBER OF STORIES:	1 STORY
ALLOWABLE BUILDING HEIGHT:	40 FEET
BUILDING HEIGHT:	15 FEET TO AVERAGE HEIGHT OF HIGHEST ROOF SURFACE
ALLOWABLE BUILDING AREA:	5200 SF
FIRST FLOOR AREA:	144 SF TOTAL AREA FLOOR
TOTAL BUILDING AREA:	144 SF

GENERAL SPECIFICATIONS																																					
<p><b>GENERAL</b></p> <p>1. THE STRUCTURE IS DESIGNED TO BE SELF-SUPPORTING AND STABLE AFTER THE BUILDING IS FULLY COMPLETE. IT IS SOLELY THE CONTRACTOR'S RESPONSIBILITY TO INSURE THE SAFETY OF THE BUILDING AND ITS COMPONENT PARTS DURING ERECTION. THIS INCLUDES THE ADDITION OF TEMPORARY BRACINGS OR GUYS THAT MIGHT BE NECESSARY.</p> <p>2. IT IS SOLELY THE CONTRACTOR'S RESPONSIBILITY TO FOLLOW ALL APPLICABLE SAFETY CODES AND REGULATIONS DURING ALL PHASES OF CONSTRUCTION.</p> <p>3. THIS STRUCTURE IS DESIGNED TO RESIST THE FOLLOWING MINIMUM UNIFORMLY DISTRIBUTED LIVE LOADS:</p> <table border="1"> <tr> <td>ROOF</td> <td>25 PSF (GROUND SNOW LOAD)</td> </tr> <tr> <td>CEILING JOISTS (LOW SLOPE/NO STORAGE)</td> <td>10 PSF</td> </tr> <tr> <td>WIND</td> <td>40 MPH (3 SECOND GUST), EXP. B</td> </tr> </table> <p><b>CONCRETE</b></p> <p>1. STRUCTURAL CONCRETE:</p> <table border="1"> <tr> <td>FOOTINGS, INTERIOR SLABS</td> <td>FC = 3000 PSI</td> </tr> <tr> <td>EXPOSED WALLS, GARAGE SLABS AND EXTERIOR SLABS ON GRADE</td> <td>FC = 4000 PSI (5%-1% ENTRAINED AIR)</td> </tr> <tr> <td>ALL DEFORMED REINFORCING BARS</td> <td>FY = 60,000 PSI</td> </tr> </table> <p>2. CONCRETE TO BE MIXED AND PLACED PER ACI SPECIFICATIONS.</p> <p><b>MASONRY</b></p> <p>A. MASONRY WORK SHALL CONFORM TO THE LATEST EDITION OF THE "NATIONAL CONCRETE MASONRY ASSOCIATION".</p> <p>B. MASONRY LOAD-BEARING MASONRY UNITS SHALL MEET THE REQUIREMENTS OF ASTM C90.</p> <p>C. MORTAR SHALL BE TYPE S IN ACCORDANCE WITH ASTM C-270 AND HAVE A MINIMUM COMPRESSIVE STRENGTH OF 1800 PSI IN 28 DAYS, AND GROUT SHALL HAVE A MINIMUM COMPRESSIVE STRENGTH OF 2500 PSI IN 28 DAYS.</p> <p><b>ASPHALT SHINGLES</b></p> <p>1. SHINGLE PACKAGING SHALL BEAR A LABEL TO INDICATE COMPLIANCE TO:</p> <p>ASPHALT SHINGLES SHALL BE TESTED IN ACCORDANCE WITH ASTM D 7158. SHINGLES SHALL MEET THE CLASSIFICATION REQUIREMENTS FOR THE APPROPRIATE MAXIMUM BASIC WIND SPEED:</p> <table border="1"> <tr> <td>MAXIMUM BASIC WIND SPEED</td> <td>CLASSIFICATION REQUIREMENT PER ASTM D 7158</td> </tr> <tr> <td>40 MPH</td> <td>D, 6 OR H</td> </tr> <tr> <td>100 MPH</td> <td>6 OR H</td> </tr> <tr> <td>110 MPH</td> <td>6 OR H</td> </tr> </table> <p><b>STRUCTURAL LUMBER</b></p> <p>1. JOISTS, BEAMS, RAFTERS, AND 2 x 6 STUDS ARE TO BE A MINIMUM GRADE OF SPRUCE-PINE-FIR (SOUTH) NO. 2, WITH THE FOLLOWING MINIMUM PROPERTIES:</p> <table border="1"> <tr> <td>FB = 150 PSI</td> </tr> <tr> <td>FV = 10 PSI</td> </tr> <tr> <td>FC = 325 PSI (PERPENDICULAR)</td> </tr> <tr> <td>FC = 475 PSI (PARALLEL)</td> </tr> <tr> <td>E = 1,000,000 PSI</td> </tr> </table> <p>2. 2 x 4 STUDS, UNLESS NOTED OTHERWISE, ARE TO BE A MINIMUM GRADE OF HEM-FIR STUD GRADE, WITH THE FOLLOWING MINIMUM PROPERTIES:</p> <table border="1"> <tr> <td>FB = 675 PSI FT</td> </tr> <tr> <td>FV = 75 PSI</td> </tr> <tr> <td>FC = 405 PSI (PERPENDICULAR)</td> </tr> <tr> <td>FC = 800 PSI</td> </tr> <tr> <td>E = 1,200,000 PSI</td> </tr> </table> <p>3. UNLESS SPECIFICALLY SHOWN OTHERWISE, DESIGN, FABRICATION AND ERECTION SHALL BE GOVERNED BY THE LATEST REVISIONS OF:</p> <p>NATIONAL DESIGN SPECIFICATION FOR WOOD CONSTRUCTION PRODUCT STANDARD PS-1-89 FOR CONSTRUCTION AND INDUSTRIAL PLYWOOD</p> <p>APA PRF-108 FOR STRUCTURAL USE PANELS, OR PS 2-42 FOR WOOD-BASED STRUCTURAL USE PANELS</p> <p>APA RESIDENTIAL CONSTRUCTION GUIDE</p> <p>4. TRUSSES, STRUCTURAL COMPOSITE LUMBER, STRUCTURAL GLUE-LAMINATED MEMBERS, AND JOISTS SHALL BE SUPPORTED LATERALLY AS REQUIRED BY THE MANUFACTURER.</p> <p>5. ANY DRILLING OR NOTCHING OF THE WALL TOP PLATE SHALL BE IN COMPLIANCE WITH THE BUILDING CODE.</p> <p><b>MISCELLANEOUS</b></p>	ROOF	25 PSF (GROUND SNOW LOAD)	CEILING JOISTS (LOW SLOPE/NO STORAGE)	10 PSF	WIND	40 MPH (3 SECOND GUST), EXP. B	FOOTINGS, INTERIOR SLABS	FC = 3000 PSI	EXPOSED WALLS, GARAGE SLABS AND EXTERIOR SLABS ON GRADE	FC = 4000 PSI (5%-1% ENTRAINED AIR)	ALL DEFORMED REINFORCING BARS	FY = 60,000 PSI	MAXIMUM BASIC WIND SPEED	CLASSIFICATION REQUIREMENT PER ASTM D 7158	40 MPH	D, 6 OR H	100 MPH	6 OR H	110 MPH	6 OR H	FB = 150 PSI	FV = 10 PSI	FC = 325 PSI (PERPENDICULAR)	FC = 475 PSI (PARALLEL)	E = 1,000,000 PSI	FB = 675 PSI FT	FV = 75 PSI	FC = 405 PSI (PERPENDICULAR)	FC = 800 PSI	E = 1,200,000 PSI	<p>1. USE ONE LINE OF SOLID BLOCKING OR CROSS BRIDGINGS AT 8'-0" O/C FOR CEILING JOISTS. USE SOLID BLOCKING AT BEARINGS.</p> <p>2. FRAMING LUMBER IN CONTACT WITH CONCRETE OR MASONRY, OR EXPOSED TO THE EXTERIOR SHALL BE PRESERVATIVE-PRESSURE TREATED.</p> <p>3. ANY WOOD, INCLUDING EXTERIOR SHEATHING, WITHIN 8' OF FINISHED GRADE SHALL BE PRESERVATIVE-PRESSURE TREATED OR PVC EQUIVALENT.</p> <p>4. WALL COVERINGS, BACKING MATERIALS, AND THEIR ATTACHMENTS SHALL BE CAPABLE OF RESISTING WIND LOADS IN ACCORDANCE WITH THE FOLLOWING TABLES:</p> <p>A. SEISMIC DESIGN CATEGORIES</p> <p>B. WEATHERING PROBABILITY MAP FOR CONCRETE</p> <p>5. AN APPROVED WATER-RESISTIVE BARRIER SHALL BE APPLIED OVER SHEATHING OF ALL EXTERIOR WALLS. SUCH MATERIAL SHALL BE APPLIED HORIZONTALLY, WITH THE UPPER LAYER LAPPED OVER THE LOWER LAYER NOT LESS THAN 2". WHERE JOINTS OCCUR, BARRIER SHALL BE LAPPED NOT LESS THAN 6". THE BARRIER SHALL BE CONTINUOUS TO THE TOP OF THE WALL, AND TERMINATED AT PENETRATIONS AND BUILDING APPENDAGES IN A MANNER TO MEET THE REQUIREMENTS OF THE EXTERIOR WALL ENVELOPE.</p> <p><b>STRUCTURAL STEEL</b></p> <p>1. ANCHOR BOLTS AND OTHER BOLTS EXCEPT AS MAY BE NOTED: ASTM A307.</p> <p>2. STRUCTURAL STEEL TO BE ASTM A36 WITH A SHOP COAT OF RUST-INHIBITIVE PAINT, EXCEPT FOR CORROSION-RESISTANT STEEL, AND STEEL TREATED WITH COATINGS TO PROVIDE CORROSION RESISTANCE.</p> <p>3. STEEL BELOW GRADE TO BE PROTECTED BY A MINIMUM OF 3" OF CONCRETE OR 4" OF MASONRY.</p> <p>4. COLLUMS SHALL BE RESTRAINED TO PREVENT LATERAL DISPLACEMENT AT THE BOTTOM END. COLLUMS SHALL NOT BE LESS THAN 8" DIAMETER, SCHEDULE 40 PIPE, MANUFACTURED IN ACCORDANCE WITH ASTM A 53 GRADE B, OR APPROVED EQUIVALENT.</p> <p>5. STEEL LINTELS SHALL BE SHOP COATED WITH A RUST-INHIBITIVE PAINT, EXCEPT FOR LINTELS MADE OF CORROSION-RESISTANT STEEL, OR STEEL TREATED WITH COATINGS TO PROVIDE CORROSION RESISTANCE. THE ALLOWABLE SPAN SHALL NOT EXCEED THE FOLLOWING VALUES, WITH THE LONG LEG OF THE ANGLE IN THE VERTICAL POSITION:</p> <table border="1"> <tr> <td>ANGLE SIZE</td> <td>NO STORY ABOVE</td> <td>ONE STORY ABOVE</td> </tr> <tr> <td>3" x 3" x 1/4"</td> <td>6'-0"</td> <td>4'-6"</td> </tr> </table> <p><b>CONNECTIONS &amp; FASTENERS</b></p> <p>1. ROOF TRUSSES TO SUPPORTING TOP PLATES OR BEAMS - USE HURRICANE TIES, EQUAL TO SIMPSON HS, WITH ALL NAIL HOLES FILLED; ONE PER TRUSS END.</p> <p>2. ROOF SHEATHING TO TRUSSES-- USE 8D NAILS AT 6" O/C AT PANEL EDGES AND 12" O/C AT INTERMEDIATE SUPPORTS.</p> <p>3. FASTENERS AND CONNECTORS IN CONTACT WITH PRESERVATIVE-TREATED WOOD AND FIRE-RETARDANT-TREATED WOOD SHALL BE OF:</p> <p>HOT DIPPED ZINC-COATED GALVANIZED STEEL</p> <p>STAINLESS STEEL</p> <p>SILICON BRONZE</p> <p>COPPER</p> <p><b>TRUSS NOTES</b></p> <p>1. LUMBER AS REQUIRED BY THE TRUSS MANUFACTURER, MINIMUM GRADE TO BE SYP NO. 2, KD 15 PERCENT MC.</p> <p>2. CONNECTIONS: ALL INTERNAL TRUSS CONNECTIONS ARE TO BE DESIGNED BY THE TRUSS MANUFACTURER. CONNECTORS SHALL BE DEFORMED PLATE TYPE, OF MINIMUM 20 GAUGE GALVANIZED STEEL SHEET. ALL JOINTS ARE TO BE DESIGNED USING METHODS AS SET FORTH IN TPI STANDARDS 1416.</p> <p>3. HANGERS: ALL TRUSS TO TRUSS HANGERS ARE TO BE DESIGNED AND SUPPLIED BY THE TRUSS SUPPLIER.</p> <p>4. SPECIFICATIONS AND REFERENCE STANDARDS: UNLESS SPECIFICALLY SHOWN OTHERWISE, DESIGN, FABRICATION, ERECTION, HANDLING AND BRACING REQUIREMENTS ARE TO BE GOVERNED BY THE LATEST REVISIONS OF:</p> <p>NATIONAL DESIGN SPECIFICATIONS FOR STRESS-GRADE LUMBER AND ITS FASTENINGS</p> <p>TIMBER CONSTRUCTION STANDARDS</p> <p>DESIGN SPECIFICATIONS FOR LIGHT METAL PLATE CONNECTED WOOD TRUSSES</p> <p>TRUSS PLATE INSTITUTE PUBLICATION-BTM BRACING WOOD TRUSSES</p> <p>COMMENTARY AND RECOMMENDATIONS</p>	ANGLE SIZE	NO STORY ABOVE	ONE STORY ABOVE	3" x 3" x 1/4"	6'-0"	4'-6"
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REVISIONS		
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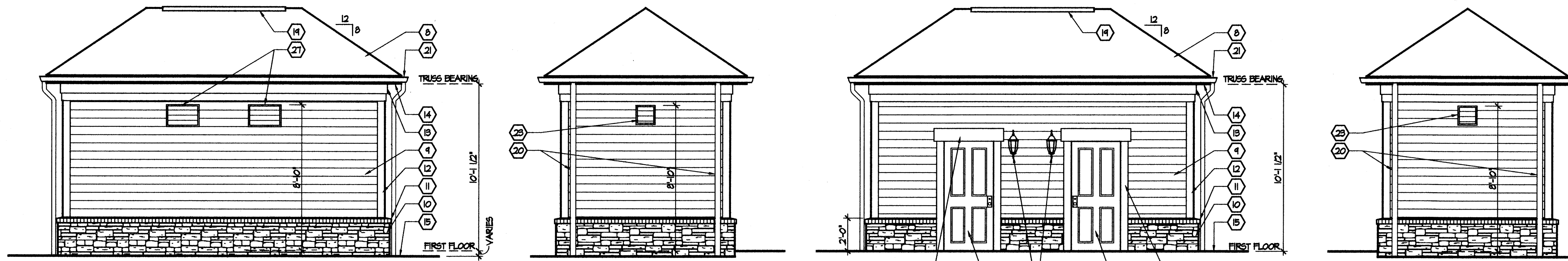
EPCON COMMUNITIES

FARM LOTS 17 & 18, QUARTER TOWNSHIP 2, TOWNSHIP 3, RANGE 19  
UNITED STATES MILITARY LANDS  
CONCORD TOWNSHIP, DELAWARE COUNTY, OHIO  
SANITARY SEWER IMPROVEMENTS

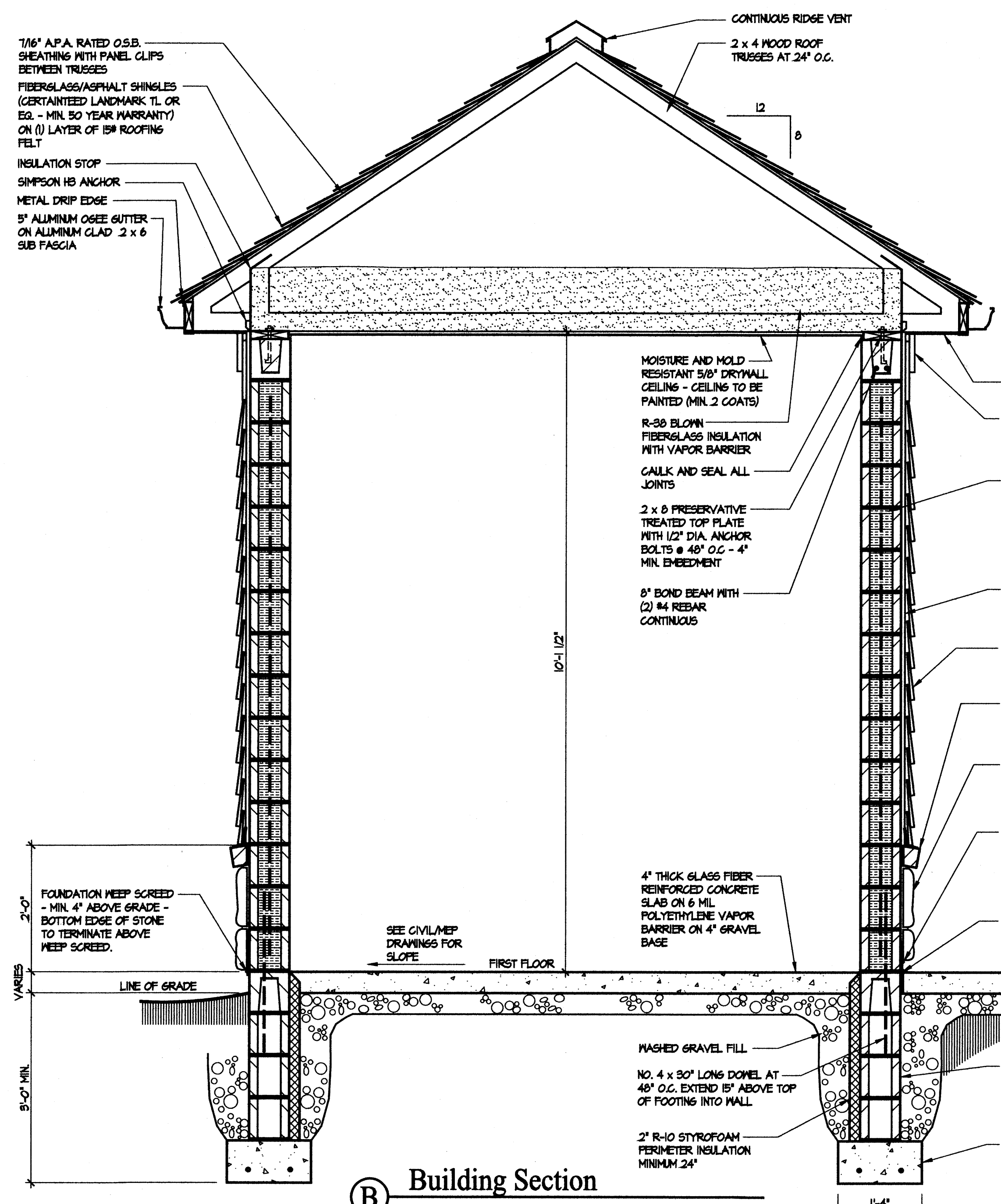
**THE COURTYARDS AT PRICE FARMS  
PUMP STATION AND FORCE MAIN**

DEAN A. WENZ  
ARCHITECTS  
2485 E. MAIN STREET  
BIRMINGHAM, OHIO 43019  
(614) 239-8488  
FAX (614) 239-9888

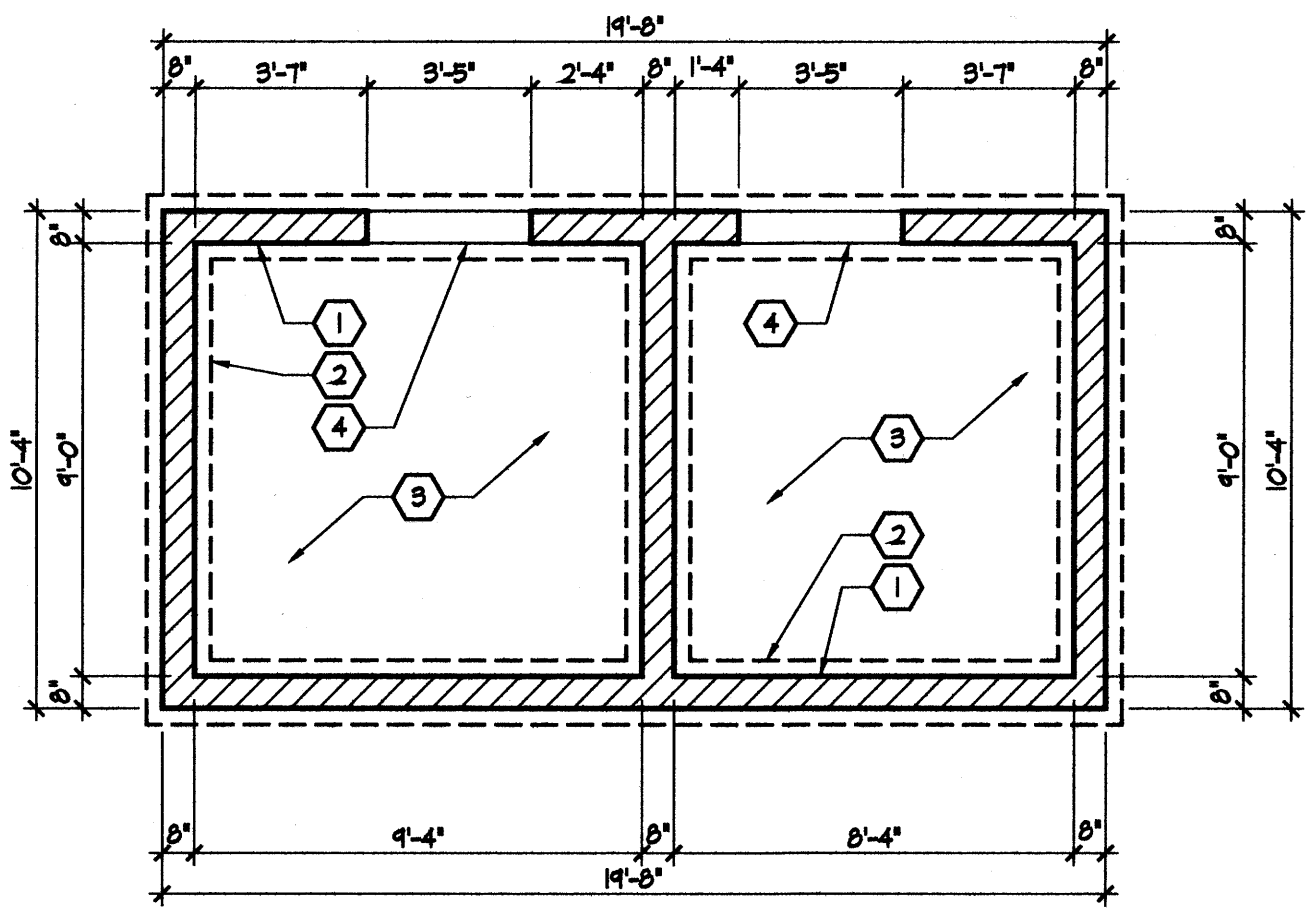
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JOB NO.	2014-1653
SHEET	20 / 21



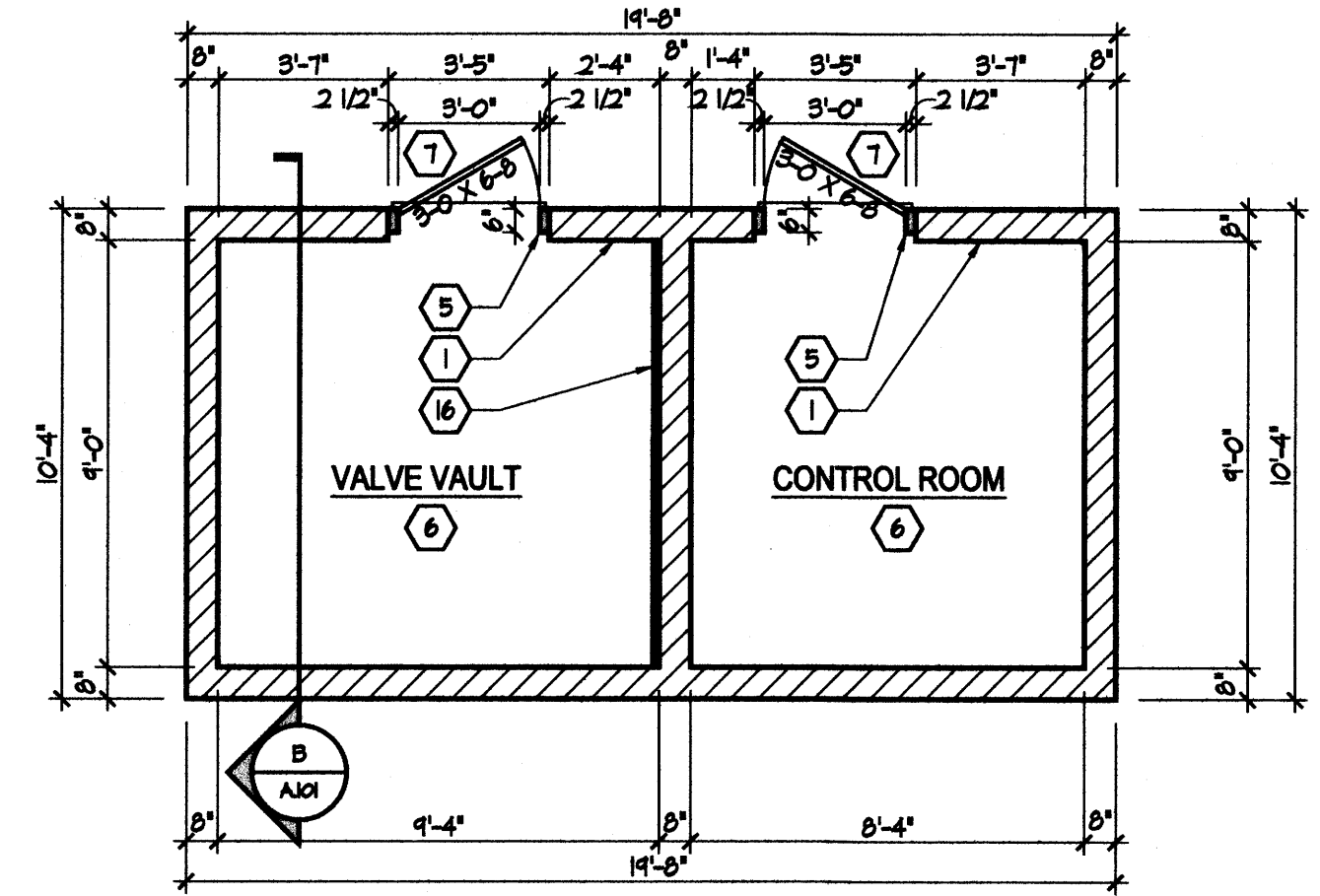
**A Exterior Elevations**  
Scale: 1/4" = 1'-0"



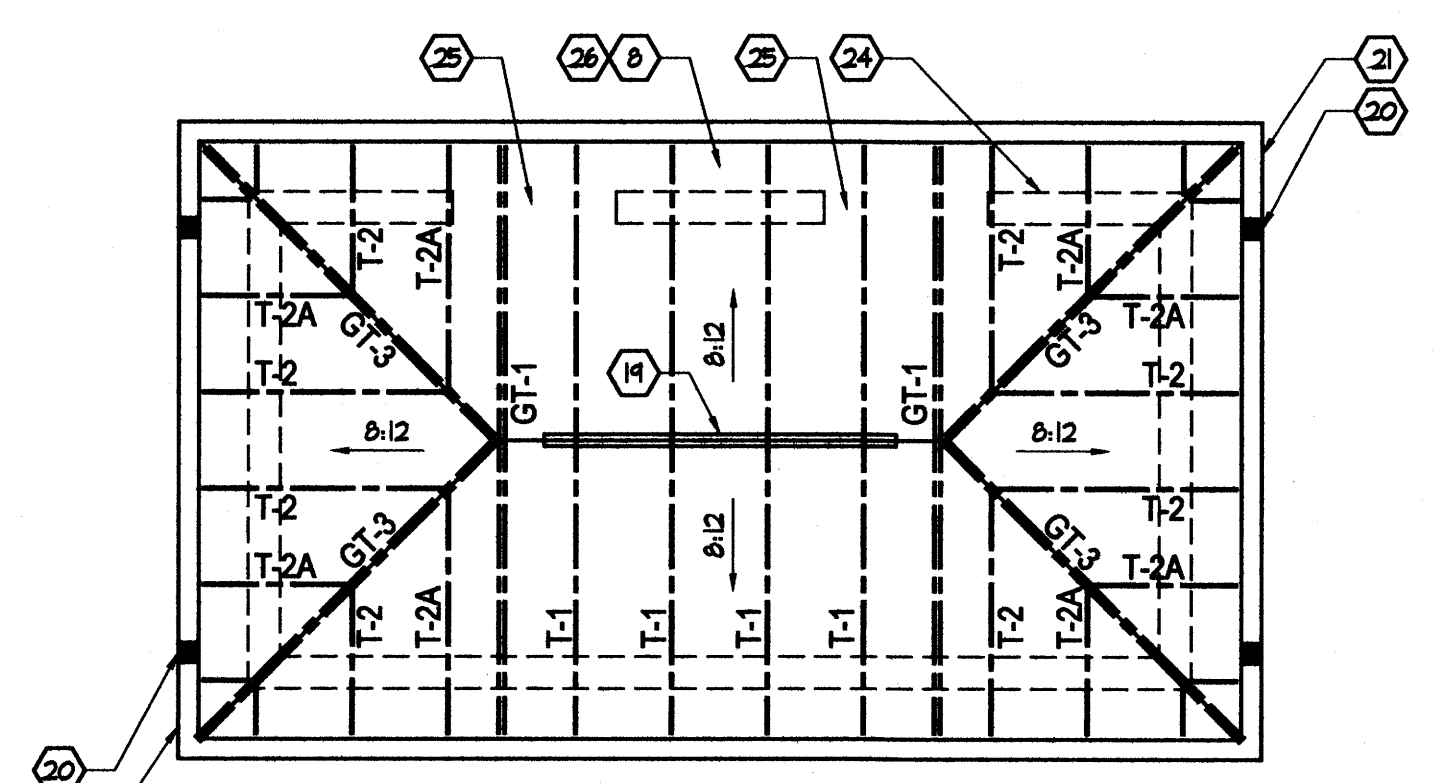
**B Building Section**  
Scale: 3/4" = 1'-0"



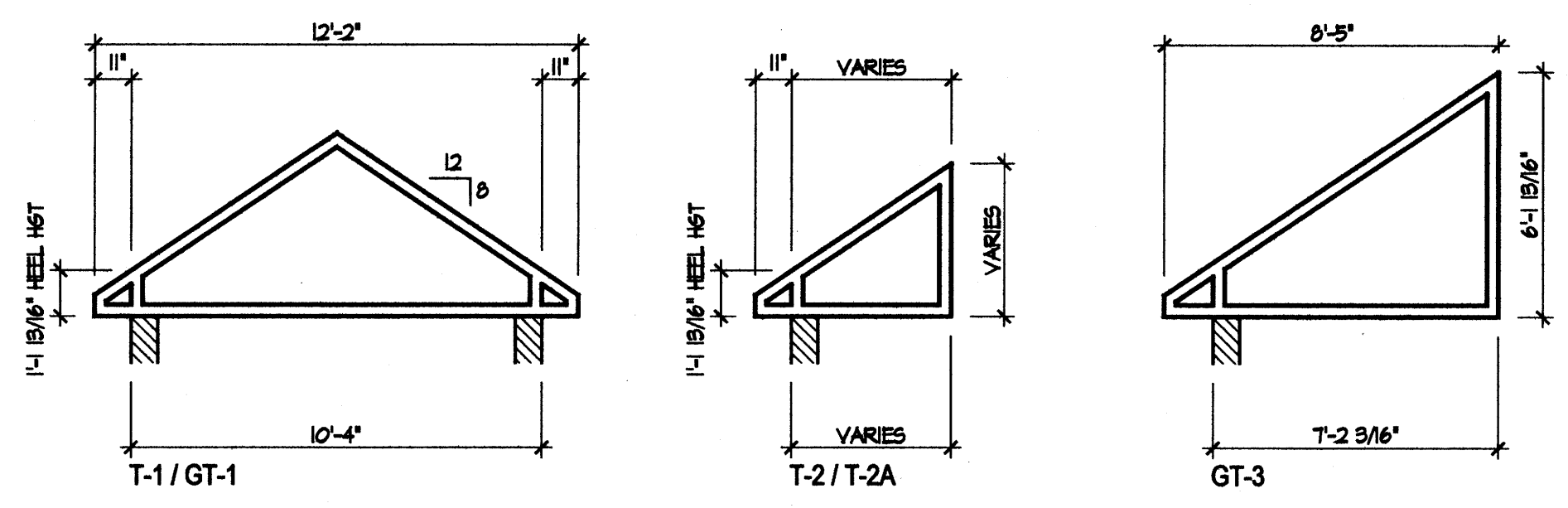
**Foundation Plan**  
Scale: 1/4" = 1'-0"



**First Floor Plan**  
Scale: 1/4" = 1'-0"



**Roof Plan / Roof Framing Plan**  
Scale: 1/4" = 1'-0"



**Roof Truss Profiles**  
Scale: 1/4" = 1'-0"

TRUSS DESIGNATION LEGEND	
T-X	COMMON ROOF TRUSS
GT-X	MULTI-PLY GIRDER TRUSS

- CODED NOTES**  
(PUMP STATION SHEET ONLY)
- 8" THICK CONCRETE BLOCK FOUNDATION/FIRST FLOOR WALL. SEE WALL SECTION FOR HEIGHT & REQUIRED REINFORCING.
  - 8" DEEP x 16" WIDE CONCRETE FOOTING WITH (2) #5 REBAR CONTINUOUS. MAINTAIN BOTTOM OF FOOTING A MINIMUM 36" BELOW FINISH GRADE AND TOP OF FOOTING SET 12" BELOW FINISHED FLOOR - TYPICAL.
  - 4" GLASS FIBER REINFORCED CONCRETE FLOOR SLAB OVER 6 MIL POLYETHYLENE VAPOR BARRIER AND 4" GRAVEL BASE - TYPICAL.
  - HOLD DOWN FOUNDATION AS NEEDED AT DOORS TO ACCEPT FLOOR SLAB.
  - EXTERIOR STUD WALL - 2 X 6 WOOD STUDS AS NEEDED AT DOORS WITH 1/16" O.S.B. SHEATHING ON EXTERIOR SURFACES AND 1/8" BUILDERS PAPER ON 1/16" 1 X STRIP P.T. FURRING @ 24" O.C. TO ACCEPT SIDING & TRIM.
  - PUMP STATION TO HAVE 5/8" WATER RESISTANT DRYWALL ON CEILING - SEE WALL SECTION.
  - PRE-HUNG INSULATED METAL ENTRY DOOR - PAINTED. 3' X 5' X 1/4" STEEL ANGLE HEADER WITH 3" BEARING AT EACH END. PROVIDE DEADBOLT AND LATCH LOCK.
  - ASPHALT SHINGLE ROOFING ON 1 LAYER OF 1/2" ROOFING FELT. PROVIDE KEYSWARD AT ALL EAVES (2'-0" MIN. FROM INSIDE EDGE OF EXTERIOR WALL) INSTALLED BELOW SHINGLE ROOFING.
  - PRE-PRIMED COMPOSITION LAP SIDING BY LOUISIANA PACIFIC (OR EQUAL). PROVIDE 1 X STRIP P.T. FURRING @ 24" O.C. TO ACCEPT SIDING.
  - CULTURED STONE VENEER. COLOR, STYLE, MORTAR COLOR, COURSE & JOINT STYLE TO BE SELECTED BY THE OWNER.
  - SLOPED BRICK ROWLOCK BELT COURSE - SEE WALL SECTION.
  - 5/4" x 6" CORNER TRIM ON P.T. BACKER - RIP ONE SIDE TO ACHIEVE 5/12" DIMENSION EACH SIDE OF CORNER.
  - 5/4" x 6" FRIEZE BOARD TRIM ON 1 X 12 ON P.T. BACKER - SEE WALL SECTION.
  - VENTED ALUMINUM SOFFIT PANEL - SEE BUILDING SECTION THIS SHEET FOR MORE DETAILS.
  - APPROXIMATE LINE OF GRADE - TO BE COORDINATED WITH BUILDER PRIOR TO START OF CONSTRUCTION.
  - THIS WALL TO HAVE MOISTURE RESISTANT DRYWALL ON 2X4 P.T. STUDS LAID FLAT @ 16" O.C. - PAINTED (MIN. 2 COATS) WITH ALL JOINTS CALKED.
  - 5/4 x 6 TRIM ON P.T. BACKER.
  - 2 X 10 TRIM ON P.T. BACKER WITH 2 GAP FLASHING.
  - CONTINUOUS RIDGE VENT LOCATION - AIR VENT CRV 100 (OR SIMILAR).
  - DOWNPOUT LOCATION (8" X 4") WITH SPLASH BLOCK - CONNECT TO STORM SEWER.
  - 5" ALUMINUM OSEB GUTTER ON 2 X 6 ALUMINUM CLAD WOOD SUB FASCIA.
  - EXTERIOR LIGHT FIXTURE - MOUNT TOP @ T-4" AFF.
  - FAN AND DAMPER - SEE ELECTRICAL PLAN FOR DETAILS.
  - INDICATES LINE OF PERIMETER MALL BELOW - TYPICAL.
  - SEE FIRST FLOOR PLAN FOR ALL HEADER SIZES.
  - 1/16" O.S.B. ROOF SHEATHING - TYPICAL. ALL ROOF AREAS - PROVIDE PLYWOOD CLIPS AT JOINTS BETWEEN TRUSSES SPACED GREATER THAN 16" O.C.
  - LOUVER - SEE ELECTRICAL PLAN FOR DETAILS.

- GENERAL NOTES**
- SEE CIVIL ENGINEERING AND MEP SHEETS FOR ALL DETAILS RELATED TO VALVE VAULT AND CONTROL ROOM.
  - SLOPE FLOOR IN VALVE VAULT AS SHOWN ON CIVIL ENGINEERING DRAWINGS.
  - PLAN AND FOUNDATION DIMENSIONS ARE TO FACE OF CONCRETE BLOCK. EXTERIOR WALL DIMENSIONS FOR WOOD STUDS INCLUDE THICKNESS OF SHEATHING.
  - HOLD DOWN TOP OF FOUNDATION WALL 8" AT ALL ENTRY DOORS TO ALLOW FOR EXTENSION OF FLOOR SLAB UNDER THE DOOR THRESHOLDS.
  - GENERAL CONTRACTOR TO COORDINATE ALL SLAB AND WALL PENETRATIONS - SEE CIVIL ENGINEERING DRAWINGS FOR DETAILS.
  - CONCRETE CONTRACTOR - SEE CIVIL ENGINEERING DRAWINGS FOR SIDEWALKS.
  - REFER TO SITE LAYOUT PLAN FOR BUILDING LOCATIONS AND ORIENTATIONS.
  - SOIL BEARING CAPACITY ASSUMED TO BE 2500 PSF AND SHALL BE VERIFIED BY SOILS ENGINEER PRIOR TO PLACEMENT OF BUILDING FOUNDATION. CONSULT ARCHITECT WHEN INADEQUATE SOIL CAPACITIES ARE FOUND.
  - ALL WOOD IN CONTACT WITH CONCRETE OR MASONRY, OR EXPOSED TO THE EXTERIOR SHALL BE PRESERVATIVE PRESSURE TREATED.
  - ALUMINUM IN CONTACT WITH CONCRETE SHALL BE COVERED WITH A BITUMASTIC MATERIAL.

REVISIONS	MARK	DATE	DESCRIPTION

**EPCON COMMUNITIES**

**THE COURTYARDS AT PRICE FARMS**  
**PUMP STATION AND FORCE MAIN**

FARM LOTS 17 & 32, QUARTER TOWNSHIP 2, TOWNSHIP 3, RANGE 19  
UNITED STATES MILITARY LANDS  
CONCORD TOWNSHIP, DELAWARE COUNTY, OHIO  
SANTARY SEWER IMPROVEMENTS

**DEAN A. WENZ**  
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DATE: NOVEMBER, 2016

SCALE:  

JOB NO.: 2014-1653

SHEET: 21 / 21