

DELAWARE COUNTY, OHIO

THE PRESERVE AT SELDOM SEEN

PUMP STATION IMPROVEMENTS

2005

BENCH MARKS

SOURCE BENCH MARK:

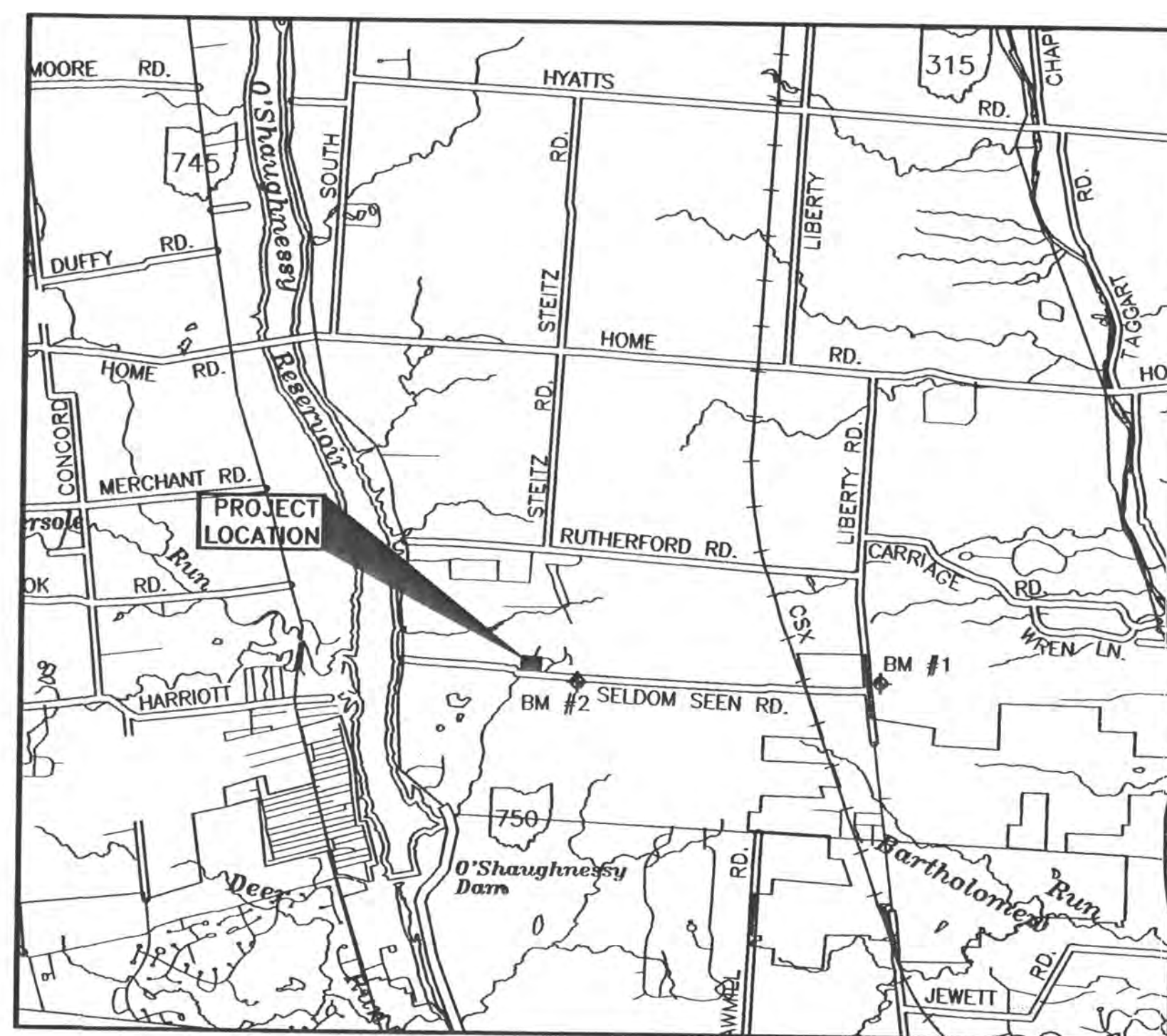
BM-1 - USGS BP IN CONCRETE MONUMENT #TT20TWC, 27' E. OF C/L OF LIBERTY ROAD & 9' N. OF C/L OF FIELD DRIVE E. @ C/L OF SELDOM SEEN ROAD EXTENDED E.

ELEV=929.76

MASTER BENCH MARK:

BM-2 - TOP OF A COTTON GIN SPIKE SET IN THE NORTH SIDE OF A POWER POLE, LOCATED SOUTH SIDE OF SELDOM SEEN ROAD, 200'± EAST OF THE SOUTHWEST PROPERTY CORNER.

ELEV=928.88



VICINITY MAP

SCALE: 1" = 4000'

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APPROVED BY:

APPROVED THIS 31 DAY OF MAY, 2005

Jack Smollen (ced)
DELAWARE COUNTY SANITARY ENGINEER

APPROVED THIS 9 DAY OF JUNE, 2005

Chris E. Bauman DWR
DELAWARE COUNTY ENGINEER

APPROVED THIS 18 DAY OF JULY, 2005

Glen A. Evan
DELAWARE COUNTY COMMISSIONER

APPROVED THIS 18 DAY OF JULY, 2005

Christopher W. Juel
DELAWARE COUNTY COMMISSIONER

APPROVED THIS 18 DAY OF JULY, 2005

DELAWARE COUNTY COMMISSIONER

OWNER / DEVELOPER

ROMANELLI & HUGHES
148 W. SCHROCK ROAD
WESTERVILLE, OH 43081

STANDARD DRAWINGS

THE DELAWARE COUNTY STANDARD DRAWINGS LISTED ON THIS PLAN SHALL BE CONSIDERED A PART THEREOF.

- 01 SEWER INSTALLATION
- 06 MANHOLE TYPE A
- 08 MANHOLE TYPE C MODIFIED

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THIS IS TO CERTIFY THAT GOOD ENGINEERING PRACTICES HAVE BEEN UTILIZED IN THE DESIGN OF THIS PROJECT AND THAT ALL MINIMUM STANDARDS AS DELINEATED IN THE DELAWARE COUNTY ENGINEERING AND SURVEYING STANDARDS FOR SUBDIVISION DEVELOPMENT HAVE BEEN MET, INCLUDING THOSE STANDARDS GREATER THAN MINIMUM WHERE, IN MY OPINION, THEY ARE NEEDED TO PROTECT THE SAFETY OF THE PUBLIC.



Richard K. Greenwood
RICHARD K. GREENWOOD
DATE

5/16/05
DATE

PREPARED BY:

R.D. Zande & Associates, Inc.
1500 Lake Shore Drive, Suite 100, Columbus, Ohio 43204
(614) 486-4383 1-800-340-2743
FAX (614)-486-4387

CHANGE ORDER SCHEDULE						
CHANGE	PREPARED	DATE	DESCRIPTION OF CHANGE	SHEET NO.	APPROVED	APP'D DATE
1		5-23-06	REVISED INVERTS & FLOAT ELEVATIONS.	4, 5	<i>J. Smollen</i>	5-25-06



GENERAL NOTES

THE COUNTY OF DELAWARE, 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.

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

THE SURFACES WITH WHICH THE RUBBER GASKET COMES IN CONTACT SHALL BE CLEANED THOROUGHLY JUST PRIOR TO ASSEMBLY.

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

COMMENCEMENT OF WORK
THE CONTRACTOR SHALL NOTIFY THE COUNTY ENGINEER PERMIT DEPARTMENT AT 740-833-2439 TO OBTAIN A DRIVEWAY PERMIT 48 HOURS PRIOR TO COMMENCING WORK ON THIS PROJECT, HOLIDAYS AND WEEKENDS EXCLUDED.

EXISTING UTILITIES
THE CONTRACTOR IS RESPONSIBLE FOR THE INVESTIGATION, LOCATION, SUPPORT, PROTECTION, AND RESTORATION OF ALL EXISTING UTILITIES AND APPURTENANCES WHETHER SHOWN ON THESE PLANS OR NOT. THE CONTRACTOR SHALL EXPOSE ALL UTILITIES OR STRUCTURES PRIOR TO CONSTRUCTION TO VERIFY THE VERTICAL AND HORIZONTAL EFFECT ON PROPOSED CONSTRUCTION. THE CONTRACTOR SHALL CALL TOLL FREE, THE OHIO UTILITIES PROTECTION SERVICE (1-800-362-2764) 72 HOURS PRIOR TO CONSTRUCTION AND SHALL NOTIFY ALL UTILITY COMPANIES AT LEAST 48 HOURS PRIOR TO WORK IN THE VICINITY OF THEIR UNDERGROUND LINES.

THE IDENTITY AND LOCATION OF THE EXISTING UNDERGROUND UTILITY FACILITIES KNOWN TO BE LOCATED IN THE CONSTRUCTION AREA HAVE BEEN SHOWN ON THE PLANS AS ACCURATELY AS PROVIDED BY THE OWNER OF THE UNDERGROUND UTILITY, THE COUNTY OF DELAWARE AND/OR ENGINEER ASSUME NO RESPONSIBILITY AS TO THE ACCURACY OF THE UNDERGROUND FACILITIES SHOWN ON THE PLANS.

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

Table with 3 columns: UTILITY, OWNER, TELEPHONE. Rows include WATER MAINS (DEL-CO WATER COMPANY, INC.), STORM SEWERS (DELAWARE COUNTY), SANITARY SEWERS (DELAWARE COUNTY), and TELEPHONE (AMERITECH).

THE CONTRACTOR SHALL BE RESPONSIBLE FOR NOTIFYING ALL RESIDENTS OF INTERRUPTION TO THEIR UTILITIES THAT WILL BE CAUSED BY CONSTRUCTION AT LEAST 24 HOURS IN ADVANCE.

SUPPORTING AND/OR PROTECTING EXISTING WATER LINES, GAS MAINS, TELEPHONE CONDUIT, STORM SEWERS, ETC., SHALL BE INCLUDED IN PAYMENT FOR THE VARIOUS CONTRACT ITEMS OF WORK.

ALL WORK REQUIRED FOR THE MAINTENANCE OF SERVICE OF EXISTING UTILITIES SHALL BE DONE BY, AND AT THE EXPENSE OF THE CONTRACTOR.

ALL MAINTENANCE, REPAIR AND/OR REPLACEMENT OF EXISTING UTILITIES SHALL BE IN ACCORDANCE WITH THE RULES AND REGULATIONS OF THE VARIOUS UTILITY COMPANIES HAVING JURISDICTION, ALL EXISTING STORM SEWERS, DRAINAGE DRAINS, AND OTHER SURFACE DRAIN PIPES, WHETHER SHOWN ON THE CONTRACT DRAWINGS OR NOT, REMOVED OR DAMAGED DURING CONSTRUCTION SHALL BE REPAIRED AND RECONNECTED BY THE CONTRACTOR AS DIRECTED BY THE ENGINEER, AT NO COST TO THE COUNTY.

IT IS ASSUMED THAT THERE ARE WATER AND GAS BRANCH LINES, ETC., SERVING EACH RESIDENCE. THE CONTRACTOR SHALL REPAIR AND REPLACE THESE UTILITIES IF DAMAGED AT NO COST TO THE COUNTY.

INSTALLATION
THE CONTRACTOR AND SUB-CONTRACTOR 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 THE SOLE RESPONSIBILITY OF THE CONTRACTOR AND SUB-CONTRACTOR TO INITIATE, MAINTAIN AND SUPERVISE ALL SAFETY REQUIREMENTS, PRECAUTIONS AND PROGRAMS IN CONNECTION WITH THE WORK.

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

FINISHED GRADE AT ALL SANITARY MANHOLES SHALL BE AT LEAST 6" BELOW TOP OF CASTING TO AVOID UNNECESSARY INFILTRATION INTO THE SANITARY SEWER SYSTEM.

THE IDENTITY AND LOCATION OF THE EXISTING UNDERGROUND UTILITY FACILITIES KNOWN TO BE LOCATED IN THE CONSTRUCTION AREA HAVE BEEN SHOWN ON THE PLANS AS ACCURATELY AS PROVIDED BY THE OWNER OF THE UNDERGROUND UTILITY, THE COUNTY OF DELAWARE AND/OR ENGINEER ASSUME NO RESPONSIBILITY AS TO THE ACCURACY OF THE UNDERGROUND FACILITIES SHOWN ON THE PLANS.

FINAL CONNECTION SHALL NOT BE MADE TO THE RECEIVING SANITARY SEWER SYSTEM UNTIL THE PHASE PROJECT HAS BEEN FULLY INSTALLED.

USE OF PREMISES
IN ADDITION TO DIRECT REQUIREMENTS OF THE CONTRACT SPECIFICATION, THE CONTRACTOR SHALL OBSERVE AND CONFORM TO THE SPECIFIC REQUIREMENTS OF ALL RIGHT-OF-WAY, INCLUDING EASEMENTS, COURT ENTRIES, RIGHT-OF-ENTRY, OR ACTION FILED IN COURT IN ACCORDANCE WITH THE CODE OF APPLICABLE GOVERNING AGENCY.

THE CONTRACTOR SHALL NOT TRESPASS UPON OR IN ANY WAY DISTURB PROPERTY ADJACENT TO THE STREET RIGHT-OF-WAY WITHOUT FIRST OBTAINING WRITTEN PERMISSION FROM THE OWNER TO DO SO. A COPY OF SUCH WRITTEN PERMISSION SHALL BE FURNISHED TO THE ENGINEER.

IF THE CONTRACTOR FINDS IT NECESSARY TO OBTAIN ADDITIONAL WORKING AREA, IT SHALL BE HIS RESPONSIBILITY FOR ITS ACQUISITION. ALL REQUIREMENTS LISTED UNDER THE "USE OF PREMISES" SHALL APPLY IF ADDITIONAL AREA IS OBTAINED.

THE CONTRACTOR SHALL, AT HIS OWN EXPENSE, RESTORE SUCH PROPERTY TO THE FULL SATISFACTION OF THE OWNER, AND SHALL OBTAIN FROM THE OWNER A WRITTEN RELEASE STATING THAT RESTORATION HAS BEEN SATISFACTORILY MADE. A COPY OF THE WRITTEN RELEASE SHALL BE FURNISHED TO THE ENGINEER.

THE CONTRACTOR SHALL NOT WASTE ANY EXCESS EARTH, STONE, OR OTHER EXCAVATED MATERIAL ON ANY PROPERTY WITHOUT FIRST OBTAINING WRITTEN PERMISSION OF THE OWNER OF THE PROPERTY AND SECURING THE APPROVAL OF THE ENGINEER. ONE COPY OF THE OWNER'S WRITTEN PERMISSION AND ONE COPY OF A WRITTEN RELEASE FROM THE OWNER STATING AT THE WORK HAS BEEN COMPLETED SATISFACTORILY, SHALL BE FURNISHED TO THE ENGINEER.

ALL ITEMS WITHIN THE STREET RIGHT-OF-WAY SHALL BE REMOVED, OR REMOVED AND REPLACED, OR RESTORED AS REQUIRED BY THE CONTRACT DRAWINGS AND DETAILED PROVISIONS, AS DIRECTED BY THE ENGINEER.

PROTECTION OF TREES
SPECIAL CARE SHALL BE TAKEN TO AVOID DAMAGES TO TREES AND THEIR ROOT SYSTEM. MACHINE EXCAVATION SHALL NOT BE USED WHEN, IN THE OPINION OF THE ENGINEER, IT WOULD ENDANGER TREE ROOTS. IN GENERAL, WHERE THE LINE OF TRENCH FALLS WITHIN THE LIMITS OF THE LIMB SPREAD, THE LEAVING OF HEADERS ACROSS THE TRENCH TO PROTECT ROOTS WILL BE REQUIRED. THE OPERATION OF ALL EQUIPMENT, PARTICULARLY WHEN EMPLOYING BOOMS; THE STORAGE OF MATERIALS; AND THE DEPOSITION OF EXCAVATION SHALL BE CONDUCTED IN THE MANNER WHICH WILL NOT HARM TREES, TRUNKS, BRANCHES OR THEIR ROOTS UNLESS SUCH TREES ARE DESIGNATED BY THE ENGINEER FOR REMOVAL.

LIFT 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 DRAWINGS, ANY MATERIALS 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 THE CONTRACTOR 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 BEGINNING ANY CONSTRUCTION ACTIVITIES THAT WILL DISTURB OR ENCROACH UPON EXISTING UTILITIES.

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

THE CONTRACTOR SHALL GRADE THE AREA AROUND THE LIFT STATION TO DRAIN SURFACE WATER AWAY FROM THE STRUCTURES.

ALL DISTURBED AREAS SHALL BE SEEDED AND MULCHED AFTER FINAL GRADING.

ALL GENERAL NOTES SHOWN ON THIS SHEET, SHALL BE CONSIDERED AS A REQUIREMENT FOR THE CONSTRUCTION WORK OF THE LIFT STATION.

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.

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

ELECTRICAL NOTES
THE CONTRACTOR SHALL PROVIDE ALL ELECTRICAL COMPONENTS AND DEVICES TO PROPERLY SERVE THE ELECTRICAL REQUIREMENTS OF THE LIFT STATION. ALL WORKMANSHIP, MATERIALS AND EQUIPMENT SHALL CONFORM TO THE OHIO BASIC BUILDING CODE, THE NATIONAL ELECTRICAL CODE, LOCAL BUILDING CODES AND ALL OTHER REGULATIONS BY AUTHORITIES HAVING JURISDICTIONAL RIGHTS FOR THE ENFORCEMENT OF CONSTRUCTION AND SAFETY STANDARDS. THE CONTRACTOR SHALL PAY THE COSTS OR FEES FOR ANY PERMITS OR AGENCY INSPECTION CHARGES ASSOCIATED WITH THE ELECTRICAL WORK.

ELECTRICAL SERVICE SHALL BE PROVIDED TO WITHIN APPROXIMATELY TEN (10) FEET OF THE PROPOSED LIFT STATION, TERMINATING AT THE CONTRACTOR'S POLE. ALL ELECTRICAL CONNECTION WORK SHALL BE PERFORMED BY THE LIFT STATION CONTRACTOR. THE COST FOR PURCHASING AND INSTALLING THE ELECTRIC METER SHALL BE AT THE CONTRACTOR'S EXPENSE. THE CONTRACTOR SHALL MAKE ALL ARRANGEMENTS AND PAY ALL FEES REQUIRED FOR MAKING THE PROPER CONNECTIONS TO THE COLUMBUS SOUTHERN POWER SERVICE WIRING.

A FEMALE RECEPTACLE FOR CONNECTION TO DELAWARE COUNTY'S PORTABLE EMERGENCY GENERATOR SHALL BE PROVIDED AT THE ELECTRICAL CONTROL PANEL. THE ELECTRICAL SERVICE RATING OF THE RECEPTACLE SHALL BE 200A, 460VAC. MANUFACTURER SHALL BE CROUSE-HINDS.

A MANUAL TRANSFER SWITCH SHALL BE PROVIDED TO TRANSFER LOADS FROM THE LINE SOURCE TO A PORTABLE EMERGENCY GENERATOR. THE SWITCH SHALL BE NON-FUSIBLE, 2 POLE, DOUBLE THROW, IN A NEMA 3R ENCLOSURE MOUNTED ON THE INSIDE OF THE STATION ENCLOSURE. MANUFACTURER SHALL BE SQUARE D CLASS OR APPROVED EQUAL.

PROVIDE AND INSTALL A LIGHTNING ARRESTOR PER DELAWARE COUNTY STANDARDS.

PUMP MONITORING EQUIPMENT SHALL BE MULTITRODE MONITOR PROP MODEL (MOPV PRO-3)

PUMP CONTROL EQUIPMENT SHALL BE MULTITRODE MODEL (MT2PC-3 DUPLEX)

LEVEL SENSING EQUIPMENT SHALL BE MULTITRODE (LEVEL SENSING PROBE)

THE TELEMETRY SYSTEM SOFTWARE SHALL BE MULTITRODE OUTPOST CONTROL AND MONITORING SOFTWARE.

ALL TELEMETRY COMPONENTS SHALL BE MOUNTED IN A NEMA 4X 316 STAINLESS STEEL ENCLOSURE WITH A FABRICATED BACK PANEL AND STRIP HEATER. THE TELEMETRY PANEL SHALL BE INSTALLED IN THE LIFT STATION ENCLOSURE AND MOUNTED NEAR THE PUMP CONTROL PANEL.

ALL PUMP MOTOR STARTERS SHALL BE SOLID STATE TYPE, SERIES SMC BY ALLEN-BRADLEY.

LIFT STATION SPECIFICATIONS

GENERAL
THE SCOPE OF WORK UNDER THIS CONTRACT INCLUDES FURNISHING AND INSTALLING THE LIFT STATION, COMPLETE AS SHOWN ON THE DRAWINGS AND AS SPECIFIED HEREIN.

ACCESS HATCH AND FRAME ASSEMBLY
THE WET WELL TOP SHALL BE FITTED WITH DOUBLE LEAF 48" x 36" HEAVY DUTY ACCESS HATCH AND PROPOSED MANHOLE TOP SLAB FITTED WITH 24" x 36" HEAVY DUTY ACCESS HATCH. BOTH HATCHES TO BE "SAFETY" BY FLYGT. EACH DOOR SHALL HAVE A HANDLE, A LATCH TO HOLD IT IN THE OPEN POSITION, AND LOCKABLE HASP. THE ACCESS COVERS, COVER FRAMES, AND TOP SLAB SHALL BE DESIGNED FOR A 300 P.S.F. LIVE LOAD. THE FRAME ASSEMBLIES SHALL BE PLACED IN THE CONCRETE WET WELL TOP WHEN IT IS POURED.

ALL HINGE MATERIALS SHALL BE STAINLESS STEEL.

PIPING
THE CONTRACTOR SHALL FURNISH AND INSTALL ALL PIPING, FITTINGS AND VALVES REQUIRED IN THE WET WELL AND VALVE VAULT AS SHOWN ON THE DRAWINGS. PIPE, FITTINGS AND VALVES SHALL BE FLANGED DUCTILE IRON CLASS 52 MINIMUM, CONFORMING TO AWWA C110, C150 AND C151. GASKETS SHALL BE FULL FACED RUBBER MEETING THE REQUIREMENTS OF AWWA C111.

PUMPS
FURNISH AND INSTALL TWO (2) SUBMERSIBLE PUMPS WITH DUPLEX CONTROLS AS MANUFACTURED BY FLYGT CORPORATION (MODEL NO. NP 3153-455). PUMPS SHALL BE PROVIDED BY A MUNICIPAL PROVIDER.

MOTORS AND RELATED ELECTRICAL EQUIPMENT SHALL BE EXPLOSION PROOF MEETING THE REQUIREMENTS OF THE NATIONAL ELECTRIC CODE FOR CLASS I, DIVISION 1, GROUP D ENVIRONMENTS.

PUMP IMPELLERS SHALL BE NON CLOG CAPABLE OF PASSING A 3-INCH SPHERE.

EACH PUMP SHALL HAVE A CAPACITY OF 215 GPM AT A TOTAL DYNAMIC HEAD AT 125 FEET. MOTORS SHALL BE 25 HP, 1760 RPM DESIGNED FOR OPERATION ON 460VAC, 3 PHASE, 60 Hz POWER. PUMP SHUT OFF HEAD SHALL BE 235 FEET (MIN). MOTOR SHALL BE NON-OVERLOADING OVER THE FULL RANGE OF PUMP CURVE. PUMP EFFICIENCY AT DESIGN FLOW SHALL EXCEED 45%.

MOTORS SHALL HAVE TWO (2) HEAVY DUTY BALL BEARINGS; DESIGN LIFE SHALL BE 50,000 HOURS (8-10) HEAVY DUTY BALL BEARINGS SHALL BE IMBEDDED IN EACH MOTOR WINDING TO STOP MOTOR IF WINDING EXCEEDS A TEMPERATURE OF 125°C; MOTOR TO BE RE-ENERGIZED WHEN TEMPERATURE RETURNS TO SAFE OPERATING TEMPERATURE. THE COMMON PUMP/ MOTOR SHAFT SHALL BE 416 STAINLESS STEEL.

PUMP VOLUTE CASES SHALL BE CAST IRON WITH 4" DISCHARGE FLANGE. WEARING SURFACES SHALL BE FITTED WITH REPLACEABLE BRONZE WEARING RINGS. PROVIDE EACH PUMP WITH A 4"x4" SLIDE-AWAY BASE ELBOW IF REQUIRED BY THE PUMP MANUFACTURER.

PUMP AND MOTOR CASTINGS SHALL BE HIGH TENSILE STRENGTH CAST IRON TREATED WITH PHOSPHATE AND CHROMATE RINSE. ALL FASTENERS, FOR EACH ASSEMBLED PUMP AND MOTOR UNIT, SHALL BE 302 STAINLESS STEEL.

POWER CABLES - EACH POWER CORD AND CONTROL CORD SHALL BE DOUBLE SEALED. THE POWER & CONTROL CONDUCTOR SHALL BE SINGLE STRAND BUSHING TO SEAL OUTER COMPOUND AND THEN CLAMPED IN PLACE WITH RUBBER SEAL BUSHING TO SEAL OUTER JACKET AGAINST LEAKAGE AND TO PROVIDE FOR STRAIN PULL. CORDS SHALL WITHSTAND A PULL OF 300 POUNDS. INSULATION OF POWER AND CONTROL CORDS SHALL BE TYPE SO, SOW, OR SOW-A. BOTH CONTROL AND POWER CORDS SHALL HAVE A GREEN CARRIER GROUND CONDUCTOR THAT ATTACHES TO THE MOTOR FRAME. CONTRACTOR SHALL FIELD MEASURE FOR REQUIREMENTS OF CABLE LENGTHS TO CONNECTION POINTS. NO FIELD SPLICING OF CABLES WILL BE ALLOWED.

SEALS - EACH MOTOR SHALL BE PROTECTED BY TWO (2) MECHANICAL SEAL ASSEMBLIES, IN TANDEM, WITH A SEAL CHAMBER BETWEEN THE SEALS. SEAL CHAMBERS SHALL BE OIL FILLED TO LUBRICATE SEAL FACES AND TO TRANSMIT HEAT FROM SHAFTS TO OUTER SHELLS. SEAL FACES SHALL BE CARBON AND CERAMIC AND LAPPED TO A FLATNESS OF ONE LIGHT BAND. LOWER SEAL FACES SHALL BE TUNGSTEN CARBIDE. A DOUBLE ELECTRODE SHALL BE MOUNTED IN THE SEAL CHAMBER TO DETECT ANY WATER ENTRY. THE WORK FAILURE TO VISIT THE SITE SHALL NOT RELIEVE THE CONTRACTOR FROM ANY RESPONSIBILITY IN THE PERFORMANCE OF THIS CONTRACT.

PUMP MONITORING SHALL BE PROVIDED AS DETAILED IN THE ELECTRICAL SPECIFICATIONS.

PUMP INSTALLATION
LIFT-OUT RAIL SYSTEM - PROVIDE TWO (2) PUMP SLIDE ASSEMBLY UNITS INCLUDING 4"x4" FLANGED ELBOWS AND MOUNTING BASES. THE DESIGN OF THIS SYSTEM SHALL BE SUCH THAT A MINIMUM UP OR DOWN FORCE, VIA LIFTING CHAINS, EXERTED BETWEEN THE STATIONARY BASE ELBOW AND THE PUMP DISCHARGE FLANGE WILL BE SUFFICIENT TO REMOVE OR PLACE THE PUMPS INTO PROPER POSITION FOR LEAK-PROOF OPERATION.

A SEAL PLATE SHALL BE ATTACHED TO EACH PUMP AND WITH AN "O" RING EMBEDDED IN MACHINED FACE TO MATE AGAINST BASE ELBOWS. TAPERED LUG CONNECTIONS SHALL ALLOW FOR POSITIVE LEAK-PROOF SEALS AS WELL AS EASY REMOVAL AND REPLACEMENT. PROVIDE TWO (2) PUMP CONNECTION UNITS.

TWO (2) RAIL PIPES SHALL BE USED TO GUIDE THE PUMP FROM THE SURFACE TO THE DISCHARGE BASE CONNECTION. THE GUIDE RAILS SHALL BE 2-INCH SCHEDULE 40 STAINLESS STEEL PIPE. THE WEIGHT OF THE PUMP SHALL BEAR SOLELY ON THE DISCHARGE BASE AND NOT ON THE GUIDE RAILS. RAIL SYSTEMS WHICH REQUIRE THE PUMP TO BE SUPPORTED BY LUGS WHICH MIGHT INTERFERE WITH THE FLOW OF SOLIDS INTO THE PUMP SUCTION WILL NOT BE CONSIDERED. THE GUIDE RAIL SHALL BE FIRMLY ATTACHED TO THE ACCESS HATCH FRAME. CONTRACTOR SHALL INSTALL AN INTERMEDIATE GUIDE FOR EACH PUMP AS DIRECTED BY THE MANUFACTURER.

AND ADEQUATE LENGTH OF 3/4" DIAMETER STAINLESS STEEL LIFTING CHAIN SHALL BE SUPPLIED FOR REMOVING EACH PUMP. THE CHAIN SHALL BE OF SUFFICIENT LENGTH AND SHALL INCLUDE AN ADEQUATE NUMBER OF LIFTING RINGS FOR EASY REMOVAL. PROVIDE AND INSTALL CHAIN FOR TWO (2) PUMP UNITS. CHAIN SHALL BE RATED AT 1000 (MIN) SAFE WORKING LOAD CAPACITY. LIFT EYES SHALL BE PROVIDED FOR ALL LIFT CHAINS.

OPERATION AND MAINTENANCE MANUALS: THREE (3) COPIES OF THE MANUFACTURER'S O & M MANUALS, FOR THE SPECIFIED PUMPS, SHALL BE DELIVERED TO THE OWNER TO FAMILIARIZE THEMSELVES WITH THE OPERATION OF THESE PUMPS.

PUMP CONTROLS
A 60° PROBE BY MULTITRODE (MODEL NO. 1.5/10/C) WITH 10 SENSORS SPACED AT 6" INTERVALS SHALL BE PROVIDED AND INSTALLED ACCORDING TO THE RECOMMENDED INSTALLATION IN THE WET WELL FOR THE CONTROL OF THE PUMPS AND ALARM AT THE LEVELS INDICATED ON THE PLANS. BACKUP FLOATS SHALL BE PROVIDED. THE BASE OF FAILURE OF THE MULTITRODE, AN APPROPRIATELY SIZED STAINLESS STEEL STRAIN RELIEF PUMP CORD, SHALL BE PROVIDED AND INSTALLED ON STAINLESS STEEL HOOPS ANCHORED NEAR THE HATCH SO THE PUMPS OR FLOAT MAY BE REMOVED WITHOUT ENTERING THE WET WELL.

A DUPLEX PUMP CONTROLLER IN A NEMA 12 STAINLESS STEEL PANEL SHALL BE MOUNTED IN THE BUILDING AS SHOWN ON THE DRAWINGS. IT SHALL CONTAIN A CIRCUIT BREAKER, MAGNETIC STARTER, HAND-OFF-AUTO SELECTOR SWITCH, ELAPSED TIME METER, AND SEAL LEAK INDICATING LIGHT FOR EACH PUMP. PROVIDE 1" PVC CONDUIT FROM THE JUNCTION BOX TO THE PANEL AND SEAL FITTINGS WHERE CONDUIT ENTERS THE PANEL. THE CONTROLLER SHALL CONTAIN AN ALTERNATOR RELAY TO ALTERNATE PUMPS ON EACH SUCCESSIVE PUMP CYCLE AND SHALL TURN ON THE SECOND (LAG) PUMP IF THE FIRST (LEAD) PUMP FAILS OR THE INFLOW EXCEEDS THE CAPACITY OF ONE PUMP.

EACH PUMPS POWER CABLE SHALL BE SUPPORTED FROM THE WET WELL BY BASKET WEAVE STAINLESS STEEL CABLE SUPPORT GRIPS (KELLUM GRIPS).

A 460VAC DUPLEX CONVENIENCE OUTLET WITH GROUND FAULT INTERRUPT PROTECTION SHALL BE PROVIDED.

LEVEL SENSOR CABLE SHALL BE INSTALLED IN A 1" PVC CONDUIT FROM THE LEVEL SENSOR HEAD TO THE JUNCTION BOX. PROVIDE SEAL FITTINGS WHERE CONDUIT ENTERS THE CONTROL PANEL.

EACH PUMP POWER CABLE SHALL BE INSTALLED IN A 2" PVC CONDUIT FROM THE WET WELL TO THE PUMP CONTROL PANEL. PROVIDE SEAL FITTINGS WHERE CONDUIT ENTERS THE CONTROL PANEL.

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

WET WELL: SIGN POSTS SHALL BE 4"x4" (NOMINAL) MEETING THE REQUIREMENTS OF ODOT CMS ITEM 710.14 x 7'-0" PRESSURE TREATED LUMBER

INSTALLATION
INSTALL POSTS ON OPPOSITE SIDES OF EACH STRUCTURE NEAR EACH ACCESS OPENING AS DIRECTED ON SITE BY THE ENGINEER. POSTS TO BE PLACED IN 6" DIAMETER HOLES AT DEPTHS OF 3.0' (MIN.) BELOW FINISHED GRADE. POSTS SHALL BE SET PLUMB, CENTERED IN HOLES WITH CONCRETE AROUND THEM TO WITHIN 6" FROM FINISHED GRADE.

SECURE EACH SIGN NEAR TOP OF POSTS THAT EXTEND 4' ABOVE FINISHED GRADE. USE 2-3/8"x37 COUPLING PLATED LAG SCREWS AND WASHERS FOR ATTACHMENT. SIGNS SHALL BE READABLE FROM SIDES FACING AWAY FROM STRUCTURES. A TOTAL OF TWO (2) SIGNS ARE REQUIRED AT EACH OF THE STRUCTURES.

VALVE CHAMBER: SIGNS SHALL BE SECURED TO BUILDING AT DOOR LOCATION.

PAINTING
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 PAINT MANUFACTURER'S RECOMMENDATIONS.

PAINT BRAND TYPES SHALL BE ICI DEVCO COATINGS (STATED); EQUIVALENT TYPES BY SHERWIN-WILLIAMS, DETROIT GRAPHITE, RUSTOLEUM OR EQUAL.

APPLICATION: PRIMING
PIPING - ONE (1) COAT OF (TAR STOP)
VALVES - ONE (1) COAT OF (RUST PENETRATING PRIMER NO. 622)
INTERIOR FINISH - ONE (1) COAT OF LATEX ENAMEL

FINISH COATS
BROWN COLOR, TWO (2) COATS OF (GLAMORTX ENAMEL)
INTERIOR, TWO (2) COATS OF LATEX ENAMEL, COLOR SELECTED BY COUNTY

PRESSURE GAUGES
PUMP PRESSURE GAUGES SHALL BE PROVIDED AND INSTALLED ON THE DISCHARGE LINES OF EACH PUMP FURNISHED AND PLACED ON THE PROJECT. LOCATIONS OF GAUGES SHALL BE ON TOPS OF THE HORIZONTAL DISCHARGE PIPING, INSIDE THE VALVE CHAMBER AND UPSTREAM FROM EACH CHECK VALVE.

GAUGE AND ACCESSORY REQUIREMENTS:

PRESSURE GAUGES SHALL BE SOLID FRONT, LIQUID FILLED GAUGES WITH CLEAR GLASS WINDOWS, BOTTOM 1/4" NPT OUTLET AND STAINLESS STEEL EXHAUST. ALL GAUGES SHALL BE DUAL-CALIBRATED IN FEET OF WATER AND PSIG. GAUGES SHALL BE 4 1/2" IN DIAMETER. ALL GAUGES SHALL BE FITTED WITH AN APPROVED IMPULSE DAMPENER. GAUGES SHALL BE NO. 12705L WITH NO. 1108S IMPULSE DAMPENER, BY ASHCOCK, OR APPROVED EQUAL BY U.S. GAUGE, H.O. TERRECO CO., HELICOID OF ROBERTSHAW.

PUMP DISCHARGE SIDE GAUGES SHALL HAVE FULL DIAL REGISTRATION FOR 0 TO 100 PSIG/0 TO 200 FEET.

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

ALL ASPECTS OF THE PUMP STATION OPERATION SHALL BE TESTED AND DOCUMENTED AS DETAILED IN THE ELECTRICAL SPECIFICATIONS WITHIN THE ELECTRICAL DRAWINGS.

HYDRAULIC POWERED GRINDER (MURFIN MONSTER) AS MANUFACTURED BY JWC ENVIRONMENTAL SHALL BE PROVIDED. THE INSTALLATION OF THE GRINDER SHALL INCLUDE A STAINLESS STEEL FRAME AND RETRIEVAL SYSTEM MOUNTED ON THE INTERIOR WALL OF THE WET WELL AT THE LEVEL OF THE INFLUENT LINE. ALL CONTROLS AND HYDRAULIC POWER SUPPLY WILL BE INSTALLED COMPLETE AS PART OF THE GRINDER INSTALLATION. APPROXIMATE NET WEIGHT OF GRINDER IS 330 LBS.

BYPASS PUMPING

THE CONTRACTOR SHALL USE BYPASS PUMPING TO MAINTAIN FLOW AROUND THE PROPOSED IMPROVEMENTS, TO COMPLETE THE WORK AS SPECIFIED. THE BYPASS SHALL BE MADE BY INSTALLING A NEW TYPE 'A' MANHOLE UPSTREAM FROM THE EXISTING WET WELL, PLUGGING THE DOWNSTREAM PIPE, AND PUMPING SEWAGE INTO A DOWNSTREAM FORCEMAIN CONNECTION. THE PUMP AND BYPASS LINES SHALL BE OF ADEQUATE CAPACITY AND SIZE TO HANDLE THE FLOW. BYPASS PUMPING, WHERE REQUIRED, SHALL CONTINUE UNTIL WORK IN THE SECTION OF SEWER INVOLVED HAS BEEN COMPLETED. UNDER NO CIRCUMSTANCES WILL DUMPING OF RAW SEWAGE ON PRIVATE PROPERTY OR CITY STREET BE ALLOWED. RAW SEWAGE SPILLED SHALL BE CLEANED AND DISINFECTED BY THE CONTRACTOR. IN NO CASE WILL BYPASS PUMPING BE PERFORMED AT TIMES OTHER THAN DURING HOURS OF INVESTIGATION, REHABILITATION, OR RECONSTRUCTION. REPAIR OF DAMAGE CAUSED BY SEWAGE BACKUP INTO HOMES OR BUSINESSES DUE TO NEGLIGENT OPERATING PROCEDURES OF THE CONTRACTOR SHALL BE THE SOLE RESPONSIBILITY OF THE CONTRACTOR. THE COST OF BYPASS PUMPING SHALL BE INCLUDED IN THE LUMP SUM BID ITEM FOR BYPASS PUMPING.

CONTRACTOR SHALL PROVIDE EMERGENCY STAND-BY POWER CAPABILITIES OR GAS MOTOR DRIVEN PUMP IN CASE OF PRIMARY POWER FAILURE

FOR INFORMATIONAL USE ONLY: DESIGN FLOWS WERE CALCULATED TO BE THE FOLLOWING IN CUBIC FEET PER SECOND (CFS): 0.48 (215 GPM)

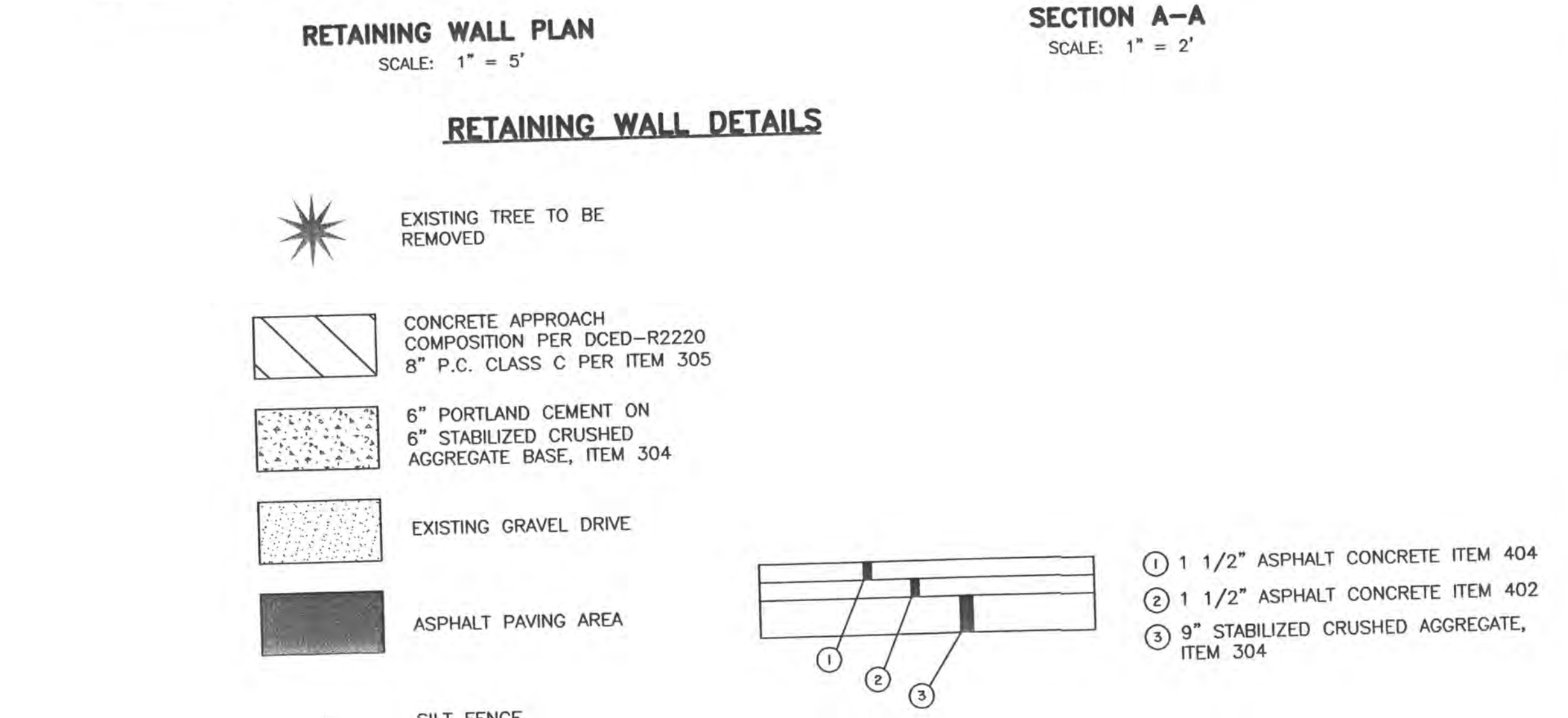
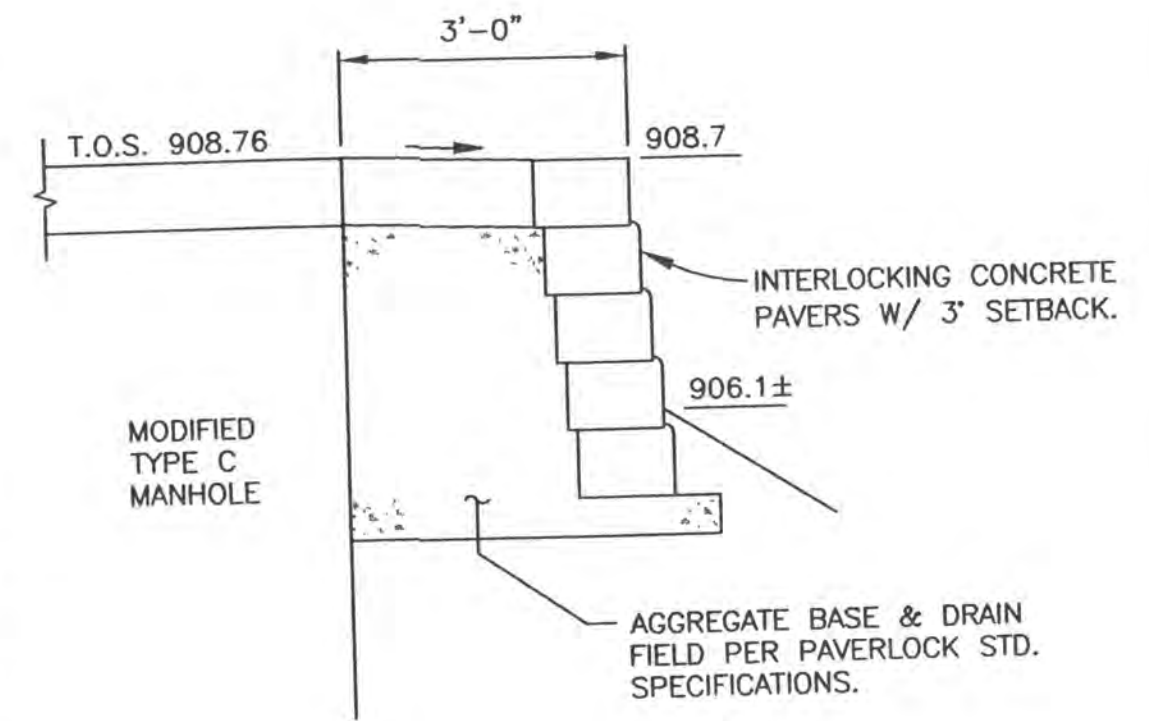
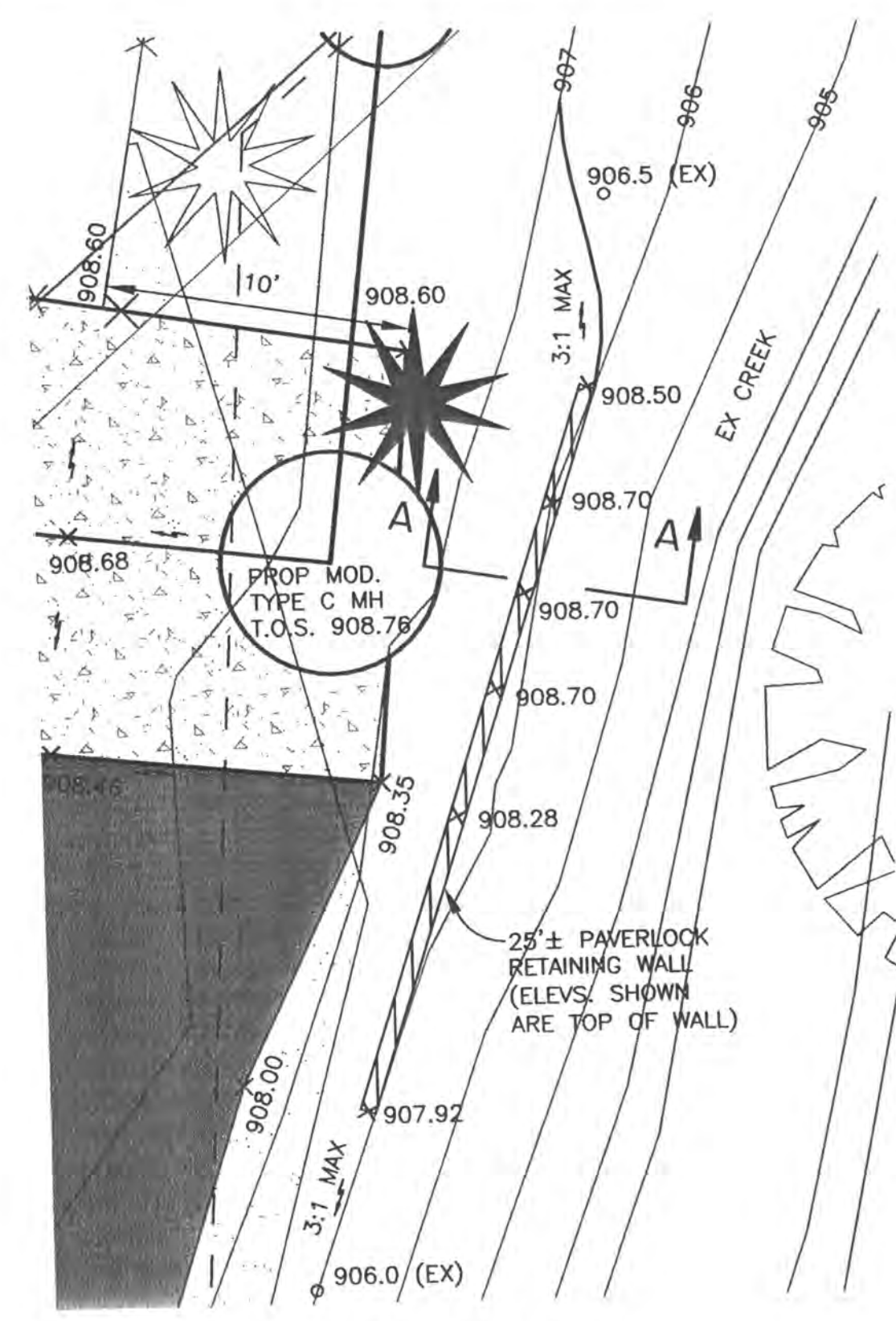
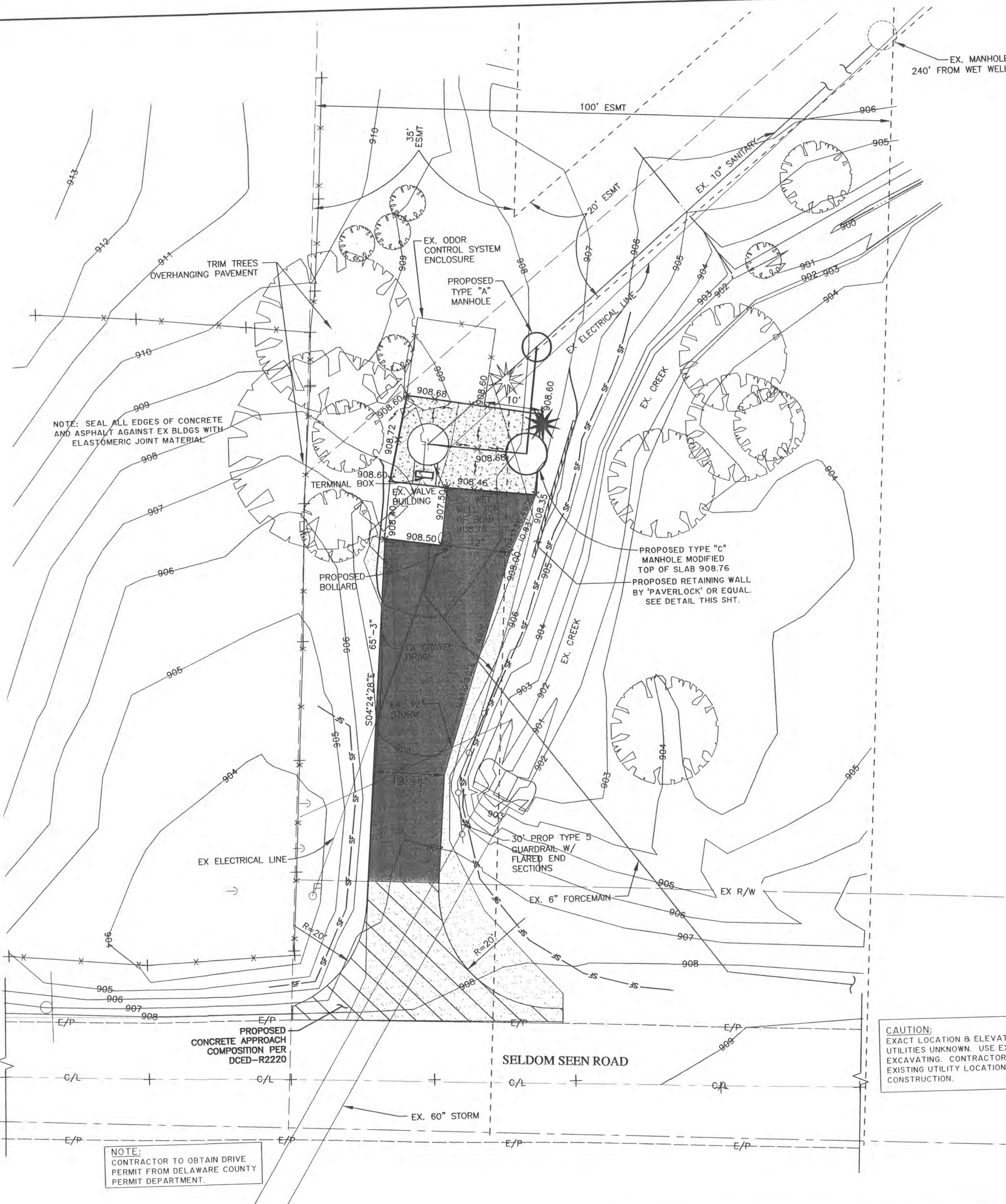
UNDERGROUND UTILITIES
Two Working Days
BEFORE YOU DIG
Call 800-362-2764 (Toll free)
OHIO UTILITIES PROTECTION SERVICE
NON-MEMBERS
MUST BE CALLED DIRECTLY

DELAWARE COUNTY, OHIO
THE PRESERVE
AT SELDOM SEEN
PUMP STATION IMPROVEMENTS
R.D. Zande & Associates, Inc.
1630 Lake Shore Drive, Suite 100, Columbus, Ohio 43204
(614) 486-4883 1-800-340-2764
FAX (614)-486-4387

SCALE: N/A

GENERAL NOTES

erikweisman P:\7118\dwg\Pump Station\03 of 10 Site Plan.dwg Layout1 JAN 26, 2005 3:27 PM



DELAWARE COUNTY, OHIO

THE PRESERVE

AT SELDOM SEEN

PUMP STATION IMPROVEMENTS

R.D. Zande & Associates, Inc.

1500 Lake Shore Drive, Suite 100, Columbus, Ohio 43204

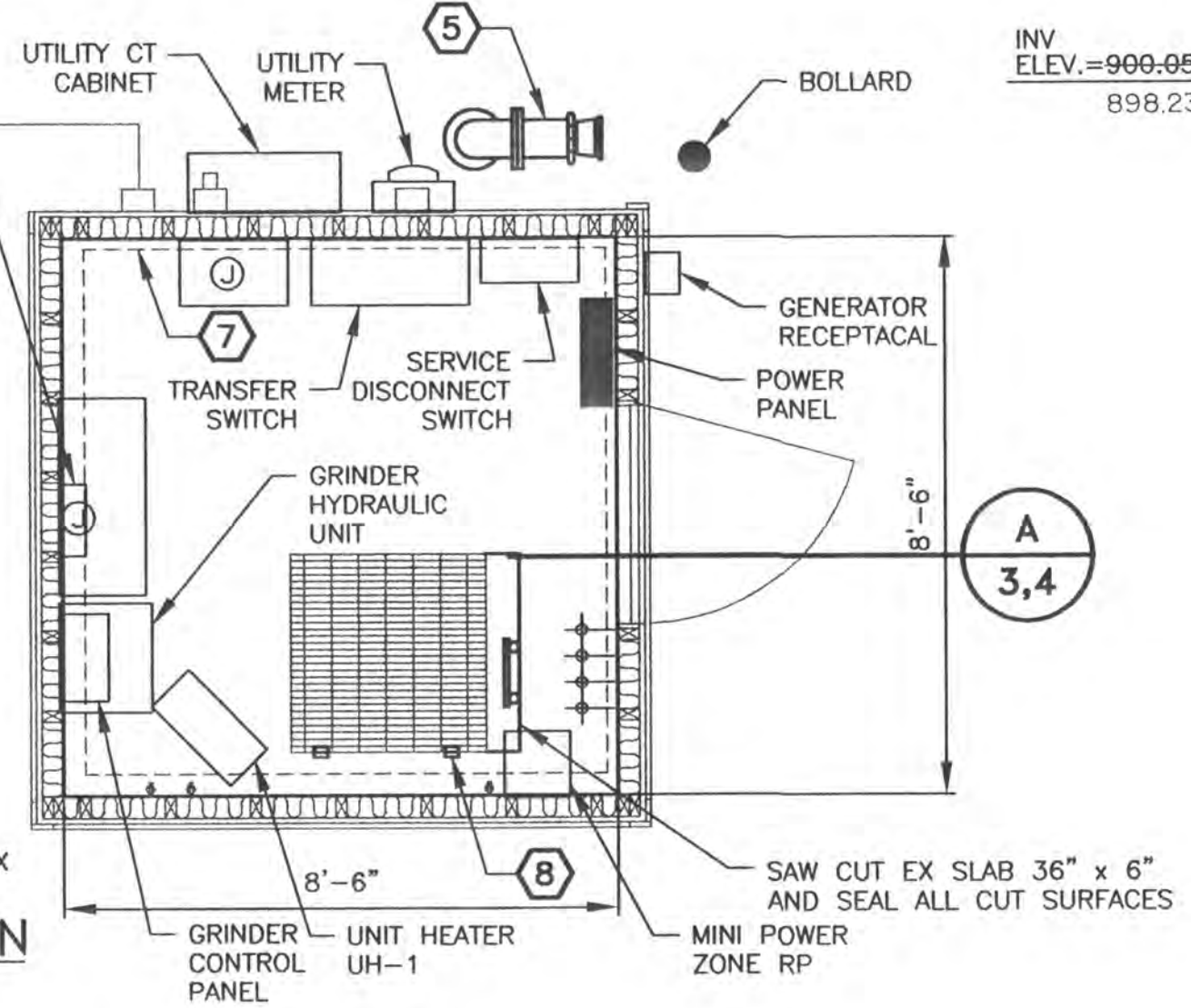
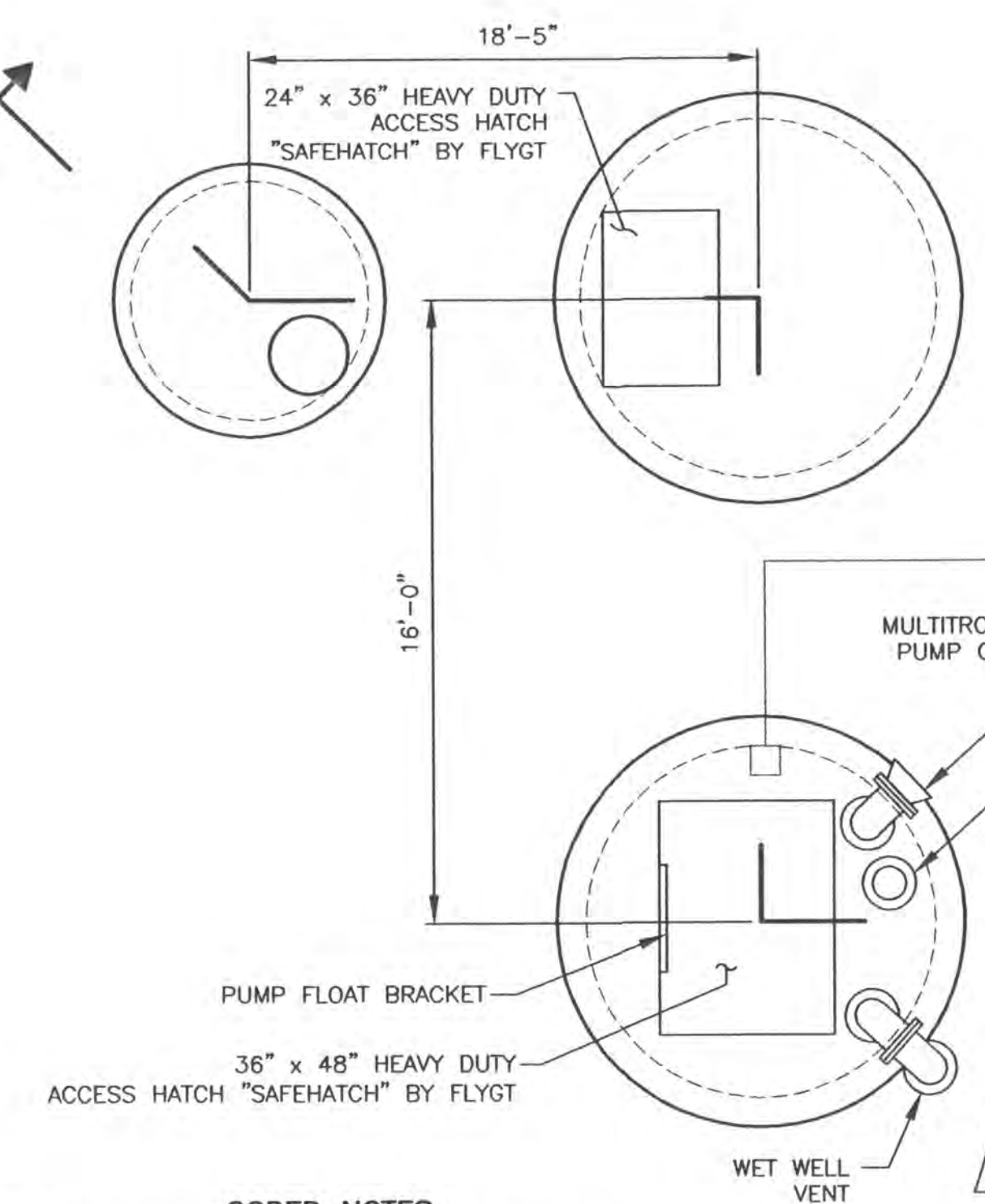
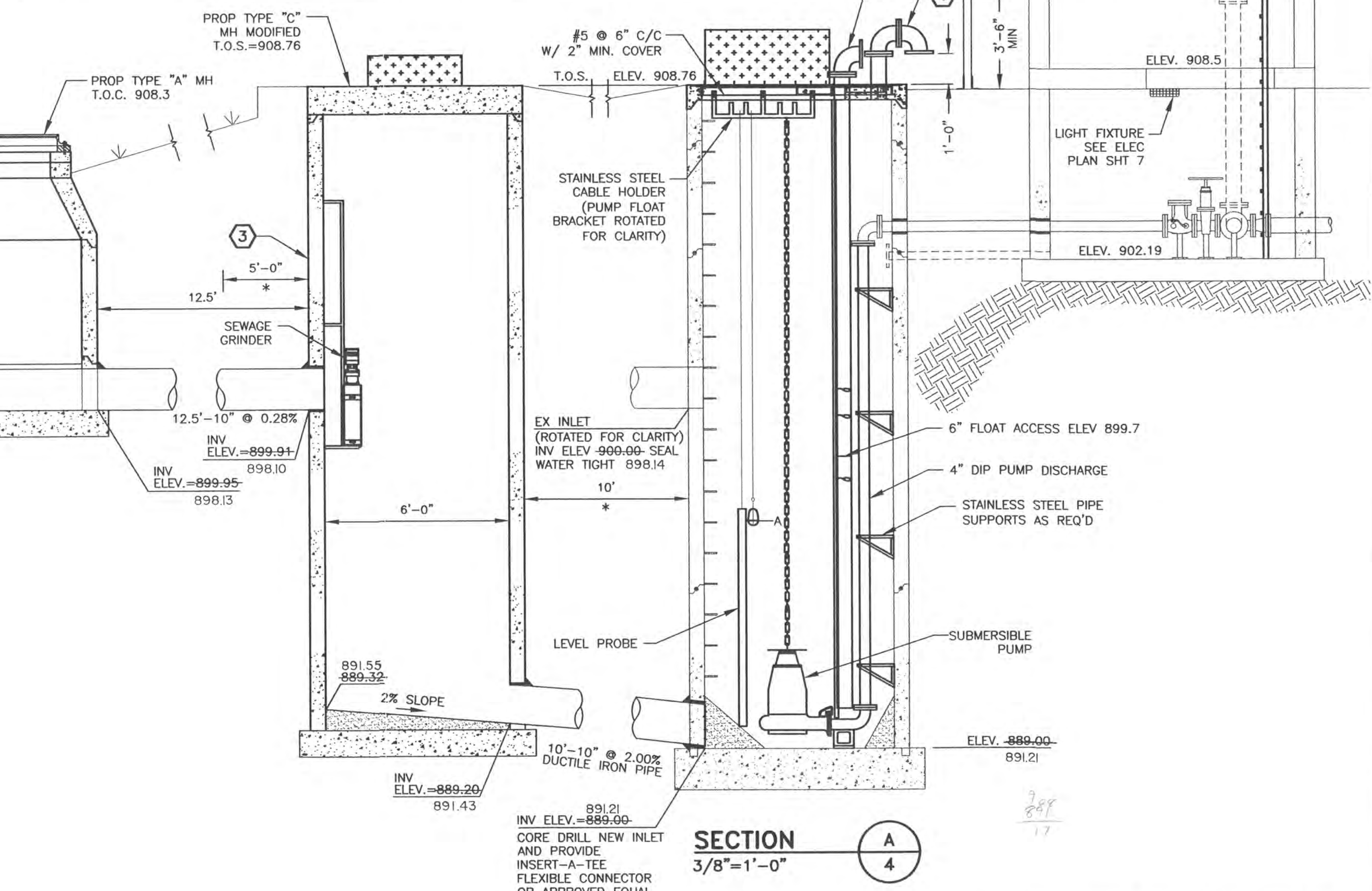
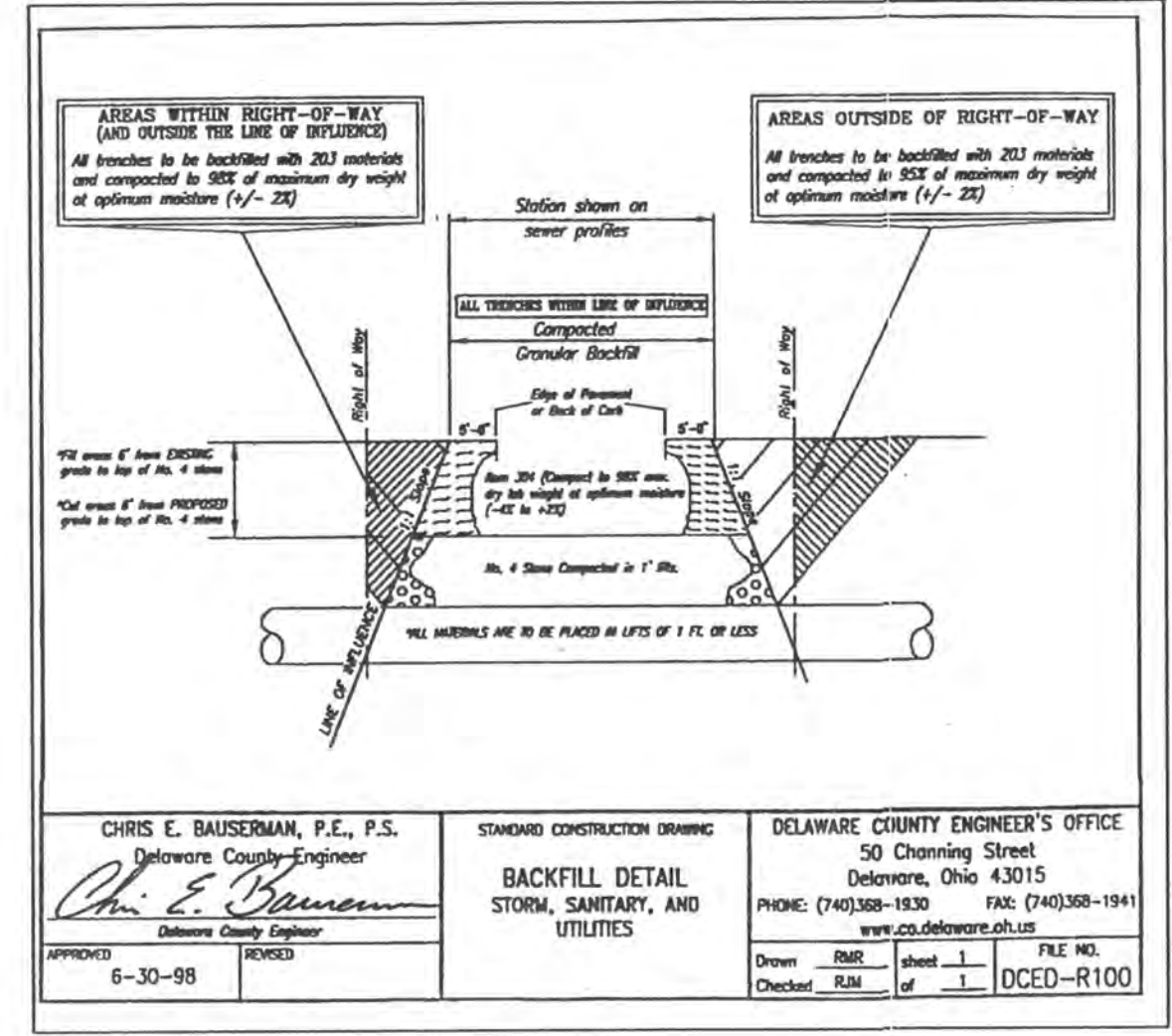
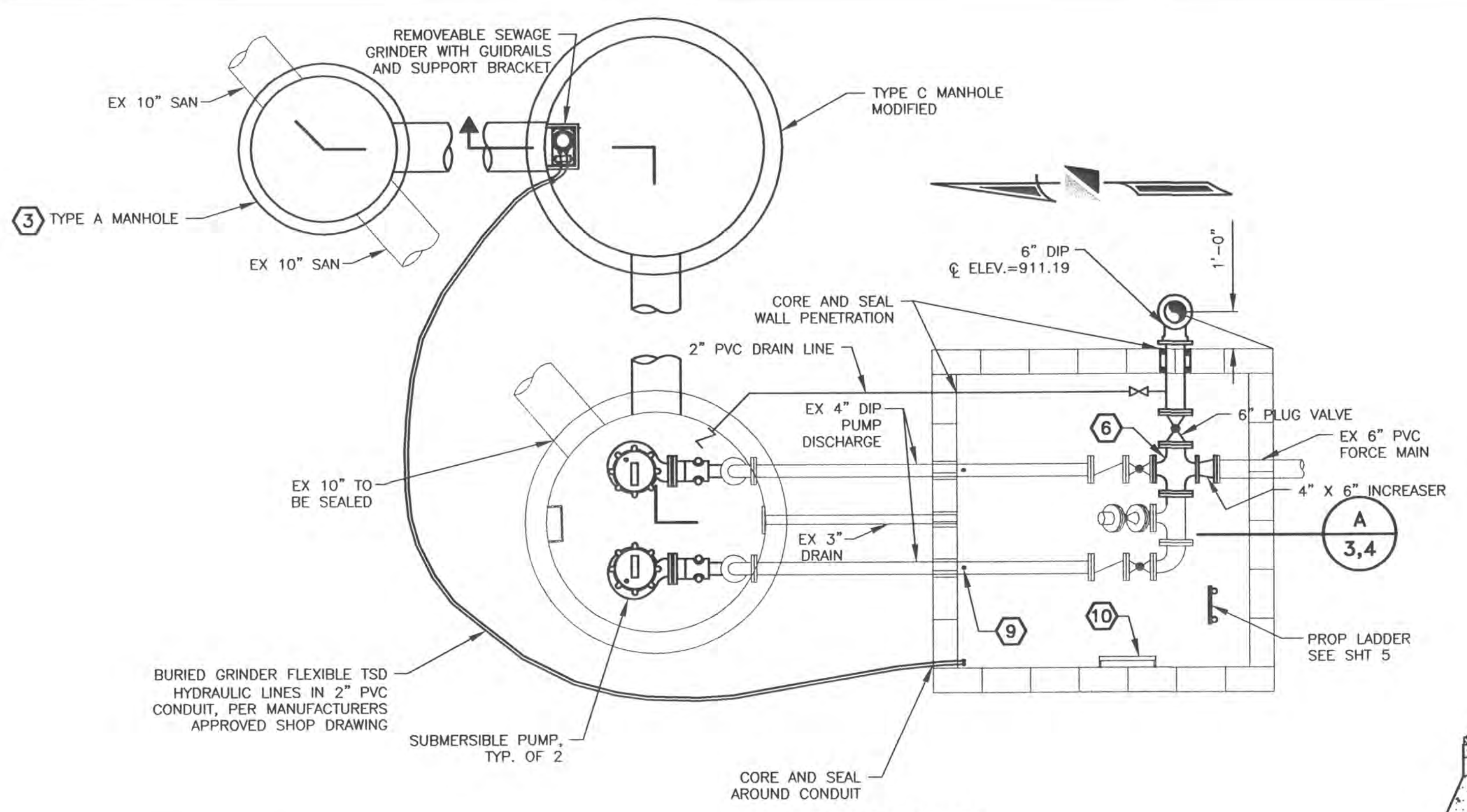
(614) 498-4888 1-800-340-2748

FAX (614)-498-4387

SCALE: 1" = 10'

SITE PLAN

3/12



- CODED NOTES**
- 1 6" DIP CONNECTION WITH BLIND FLANGE FOR FLOAT ACCESS DURING TEMPORARY PUMPING. TOP OF PIPE 8" ABOVE SLAB. TERMINATE PIPE 12" ABOVE WET WELL SLAB
 - 2 6" DIP CONNECTION WITH FEMALE QUICK DISCONNECT COUPLING AND CAM-LOC. C ELEV 909.7. TERMINATE PIPE 12" ABOVE WET WELL SLAB.
 - 3 CONTRACTOR TO INSTALL TYPE 'A' MANHOLE AND DISCHARGE PIPE CONNECTION PRIOR TO COMMENCEMENT OF WET WELL REHABILITATION. EXISTING PIPE TO BE CUT, MANHOLE BASE INSTALLED AND REPAIR PIECE TO BE SLID THROUGH MANHOLE WITH SOLID REPAIR COUPLER USED FOR CONNECTION. EFFLUENT PIPE FROM NEW MANHOLE TO BE SEALED WITH TEMPORARY INFLATABLE PLUG AT BOTH ENDS OF PIPE. BYPASS PUMP CONNECTION SHALL BE MADE ONLY TO DISCHARGE PIPE CONNECTION.
 - 4 WET WELL VENT WITH 1/4" SQUARE OPENING STAINLESS STEEL MESH SCREEN.

- 5 DISCHARGE PIPE CONNECTION C ELEV 911.33. PROVIDE 6" MALE QUICK DISCONNECT COUPLING. COVER TO BE CHAINED TO PIPE.
- 6 REMOVE EX TEE AND REPLACE WITH 4"x6" CROSS
- 7 INSTALL 5/8" GYPSUM BOARD OVER EXISTING FOIL BACKED FIBERGLASS INSULATION AND 2x4 WALL FRAMING. FINISH INTERIOR IN ACCORDANCE WITH GENERAL NOTES
- 8 PROVIDE HINGES AND LATCH FOR EXISTING GRATING. SEE DETAIL SHEET 5
- 9 REMOVE EXISTING PRESSURE GAGES AND REPLACE PER SPECIFICATION, TYP. OF 2
- 10 REMOVE EXISTING LADDER, REPLACE AS SHOWN IN DETAIL, SHEET 5.

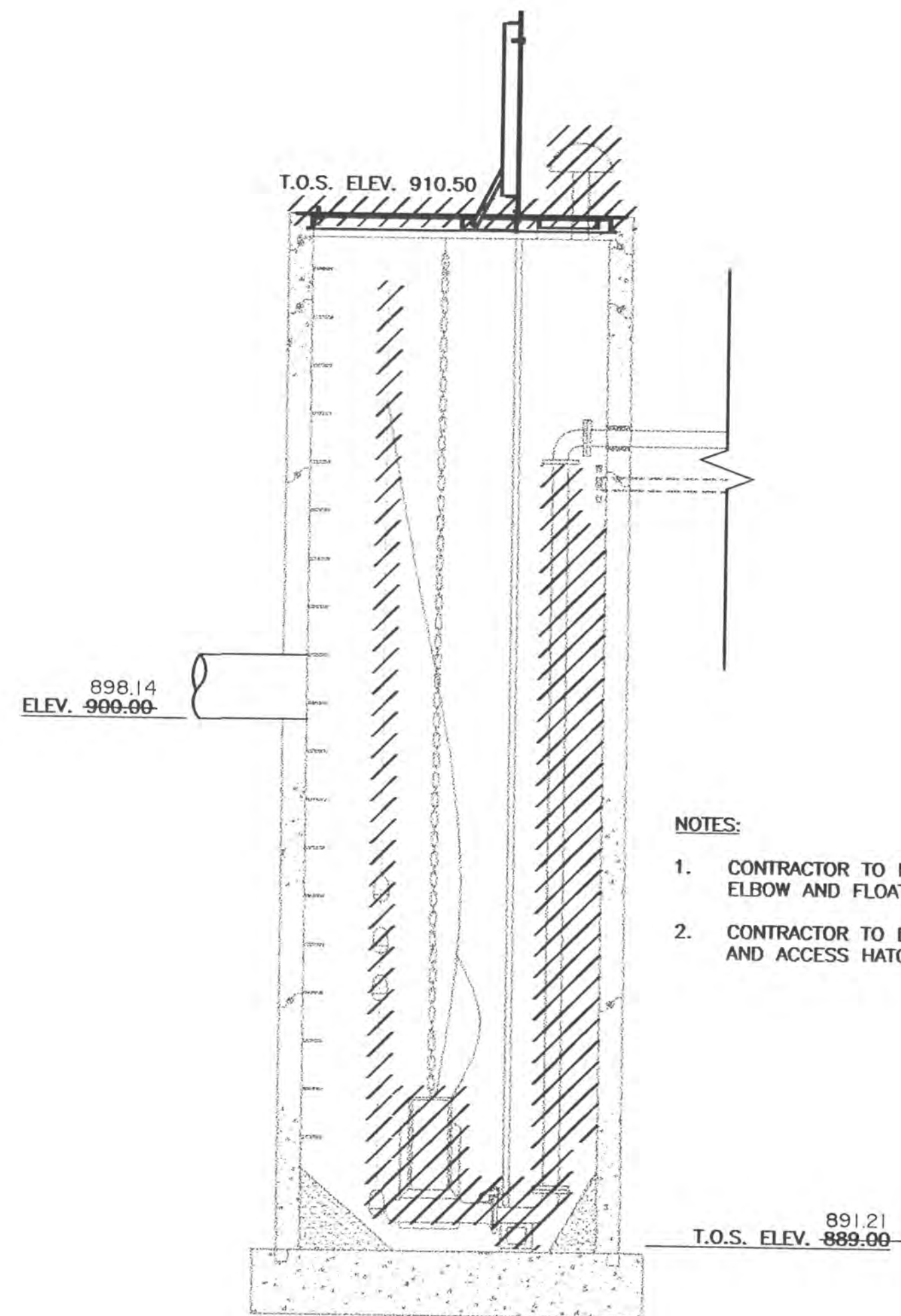
PUMP					PUMP CONTROL				
NO. OF PUMPS	TYPE	DESIGN		MOTOR		REMARKS	FLOAT	LEVEL PROBE	ELEV
		FLOW	TDH	HP	RPM				
2	SUB'M EXPLOSION PROOF 4" Ø DISCHARGE	220 GPM	125 FT	25 MAX.	1760 MAX.	NON-OVER LOADING FOR ALL POINTS ON THE CURVE FLYGT NP-3153-452	BACKUP FLOAT PUMP OFF		890.5-892.71
							PUMP OFF		891.0-893.21
							LEAD PUMP ON		896.2-898.41
							LAG PUMP ON		897.2-899.41
							ALARM ON		897.2-899.41
							BACKUP FLOAT PUMP ON		898.2-900.41

NOTES: ALUMINUM IN CONTACT WITH CONCRETE SHALL BE COVERED WITH A BITUMASTIC MATERIAL.

DELAWARE COUNTY, OHIO
THE PRESERVE AT SELDOM SEEN
PUMP STATION IMPROVEMENTS

R.D. Zande & Associates, Inc.
1650 Lake Shore Drive, Suite 100, Columbus, Ohio 43204
(614) 488-4283 T-800-340-3745
FAX (614)-488-4587

SCALE: AS NOTED
PUMP STATION

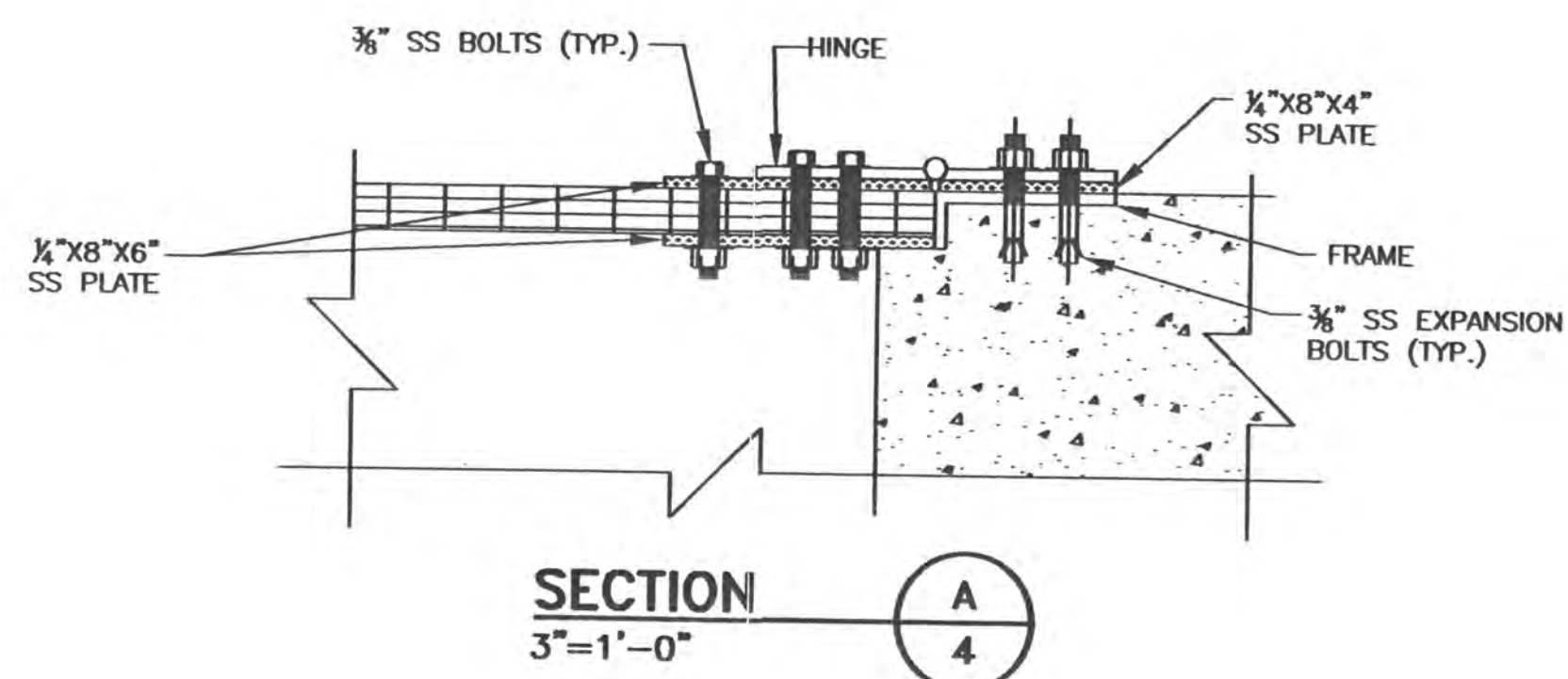


SECTION A
3/8"=1'-0"

DEMOLITION DETAIL

NOTES:

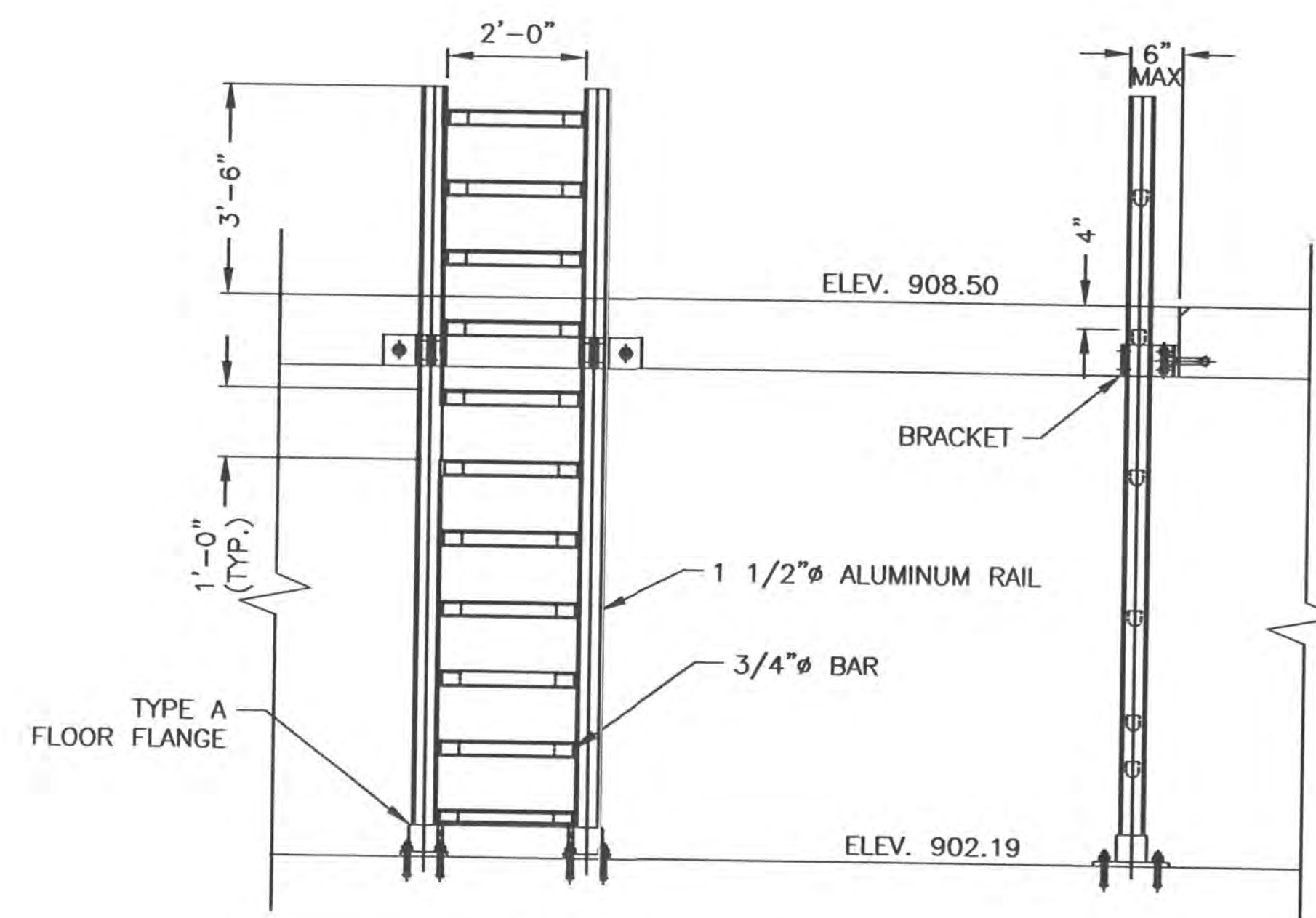
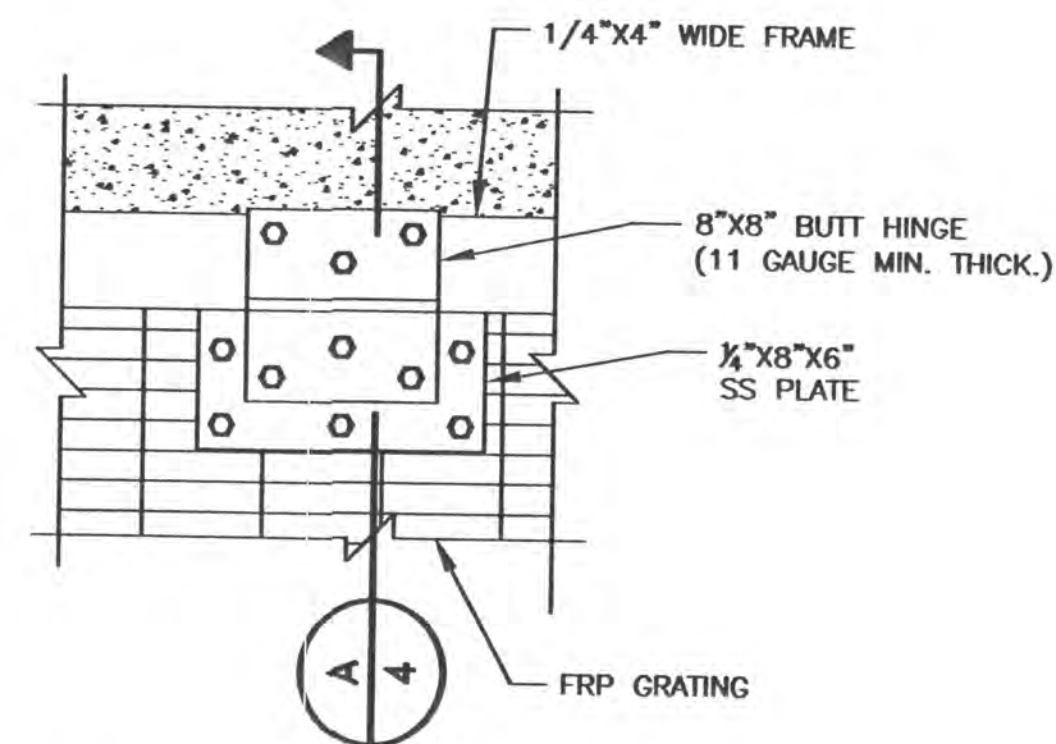
1. CONTRACTOR TO REMOVE EXISTING PUMPS, GUIDE RAILS, DISCHARGE ELBOW AND FLOATS. REMOVED ITEMS TO BE TURNED OVER TO COUNTY.
2. CONTRACTOR TO DEMOLISH TOP OF WET WELL CONCRETE SLAB, VENT AND ACCESS HATCH.



SECTION A
3"=1'-0"

GRATE HINGE DETAIL

1 1/2"=1'-0"



LADDER DETAIL
1/2"=1'-0"

△ REVISED STRUCTURE INVERTS.

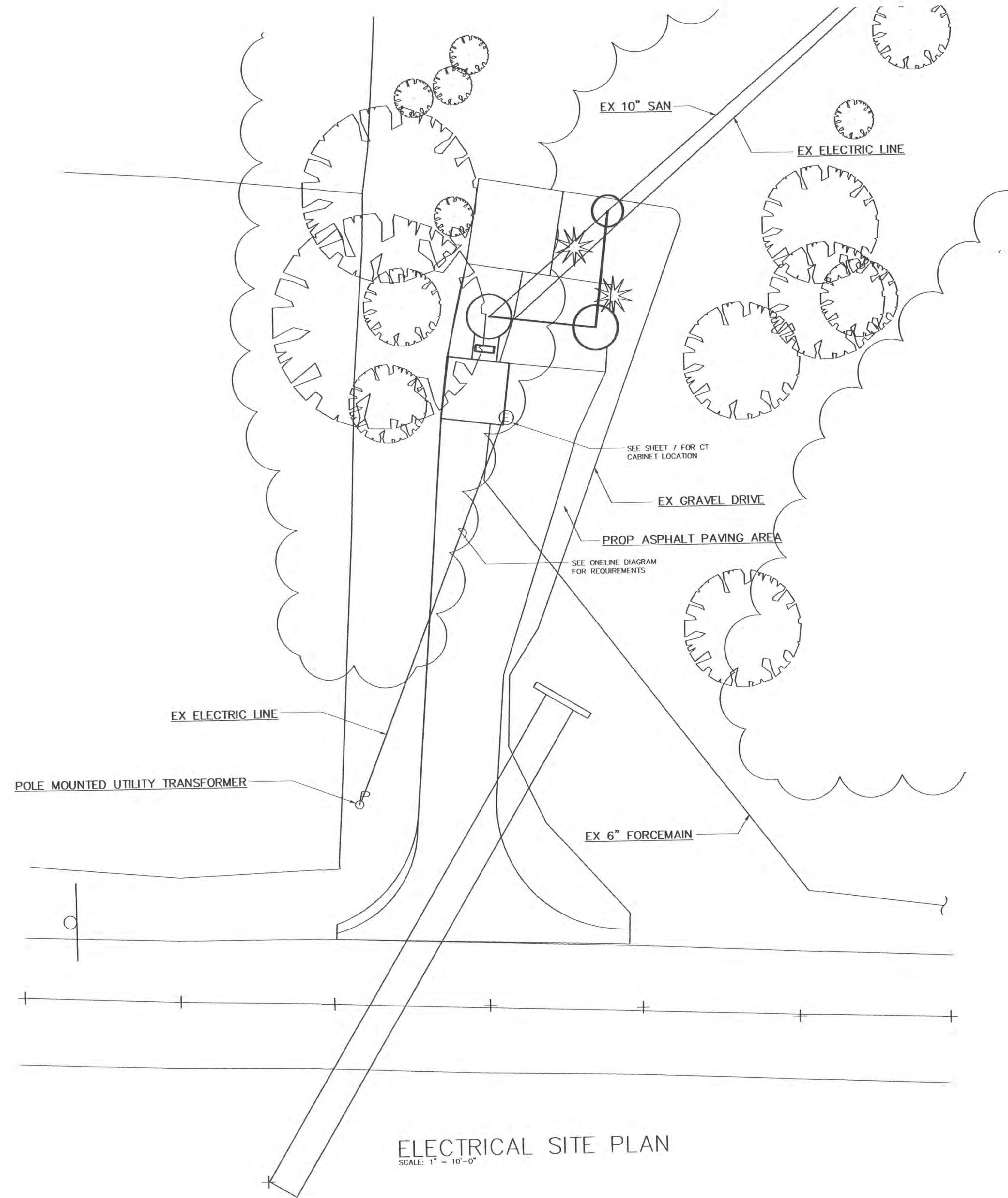
DELAWARE COUNTY, OHIO
THE PRESERVE
AT SELDOM SEEN
PUMP STATION IMPROVEMENTS

R.D. Zande & Associates, Inc.
1500 Lake Shore Drive, Suite 100, Columbus, Ohio 43204
(614) 498-4383 1-800-340-2743
FAX (614)-498-4387

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

erik@zand.com P:\V1718\dwg\Pump Station\05 of 10 Details.dwg Layout1 JAN 28, 2005 3:30 PM

irivellerman P:\7118\Gng\Pump Station\06 of 12 Elec Site Plan.dwg Layout FEB 14, 2005 11:10 AM



ELECTRICAL SITE PLAN
SCALE: 1" = 10'-0"

BENNETT ENGINEERING, INC.
Consulting Engineers
250 EAST HOME STREET
WESTERVILLE, OHIO 43081

PHONE (614) 818 3303
FAX (614) 818 3322

JOB NO. 2000-015
DESIGNED BY
MARK A. BENNETT P.E.
E-54451

DRAWN BY
MAB

CHECKED BY
MAB

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DELAWARE COUNTY, OHIO
THE PRESERVE
AT SELDOM SEEN
PUMP STATION IMPROVEMENTS

R.D. Zande & Associates, Inc.
1500 Lake Shore Drive, Suite 100, Columbus, Ohio 43204
(614) 488-4383 1-800-540-2743
FAX (614)-488-4387

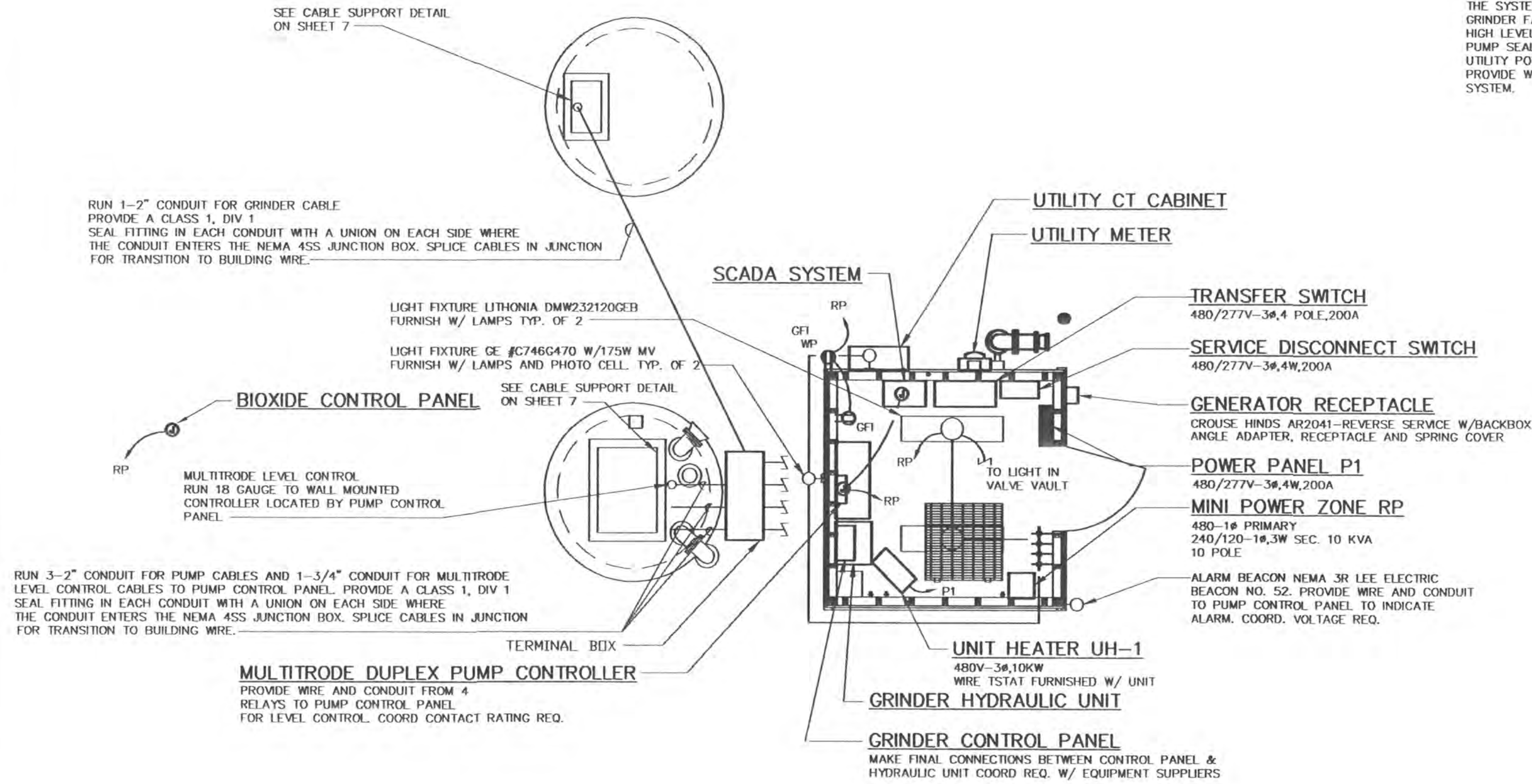
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ELECTRICAL SITE PLAN

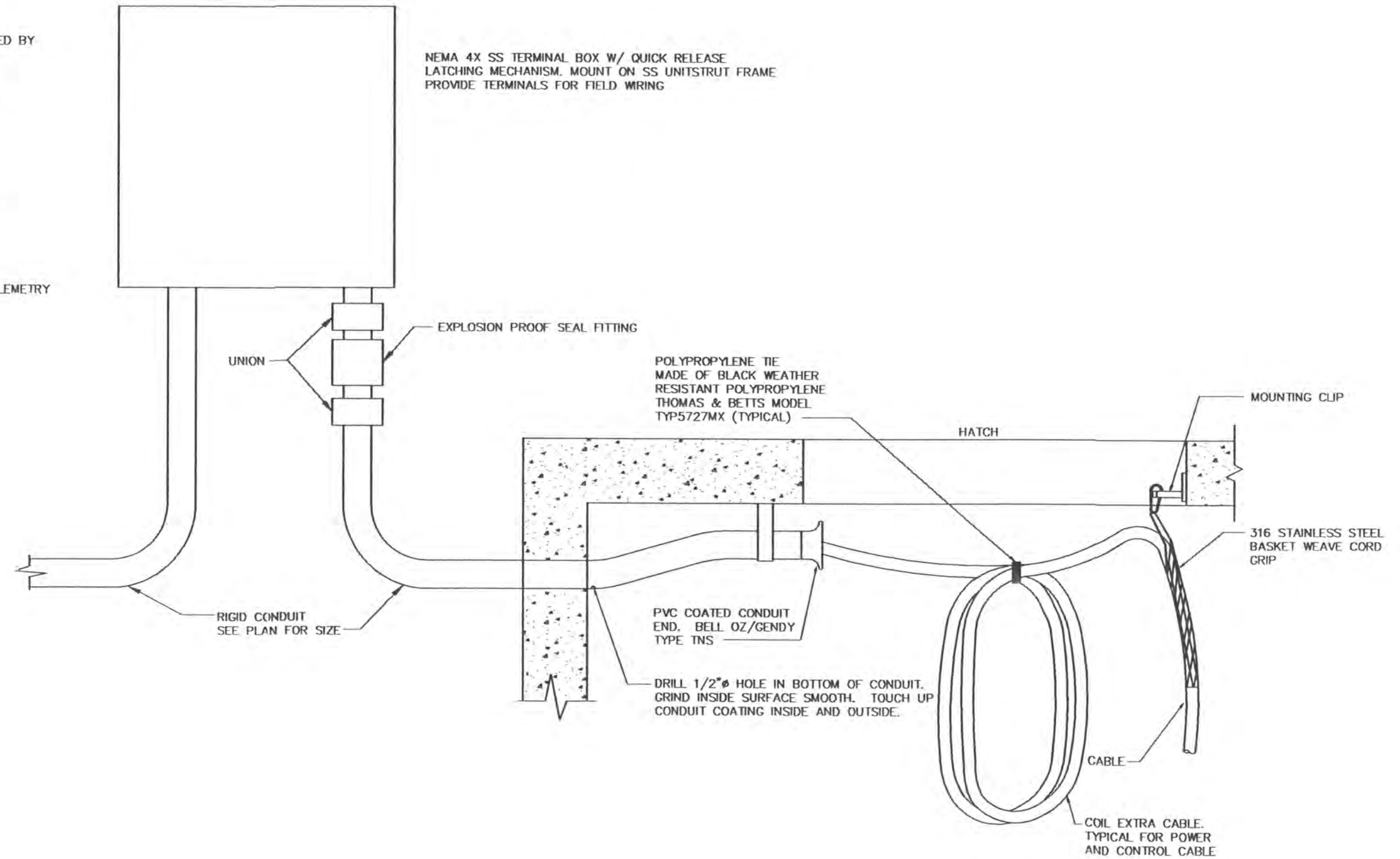
6
12

SCADA SYSTEM

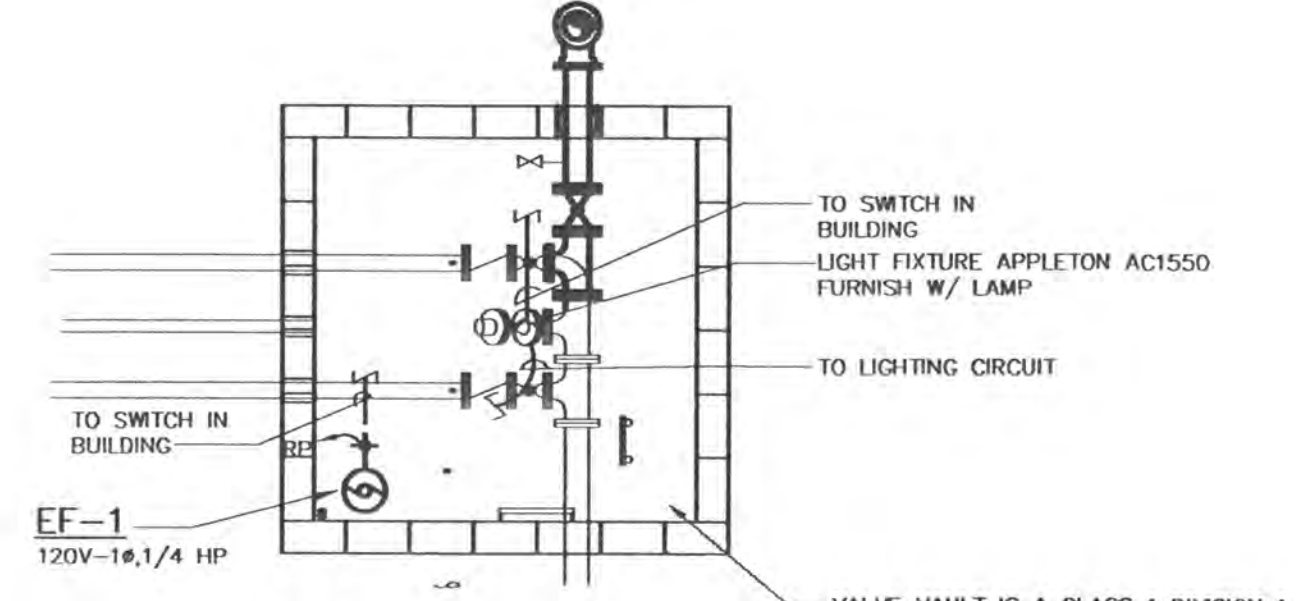
PROVIDE THE FOLLOWING TELEMETRY SYSTEM MANUFACTURED BY MULTITRODE
 1 - FRONT END PROCESSOR
 3 - STATUS INPUT/OUTPUT CARDS
 1 - METRICOM SPREAD SPECTRUM RADIO MODEL 20043
 1 - MODEM CARD
 1 - POWER SUPPLY FOR RTU
 1 - BATTERY BACK UP FOR RTU
 1 - STRIP HEATER FOR RTU
 ALL - CRYDOM RELAYS
 MOUNTED IN NEMA 4/12 STAINLESS STEEL ENCLOSURE
 1 - SIXTY FOOT POLE
 1 - OMNI ANTENNA, HELIAX, CONNECTOR AND START UP
 THE SYSTEM SHALL MONITOR THE FOLLOWING POINTS:
 GRINDER FAILURE
 HIGH LEVEL WET WELL
 PUMP SEAL LEAK
 UTILITY POWER FAILURE
 PROVIDE WIRE AND CONDUIT FROM EACH POINT TO THE TELEMETRY SYSTEM.



PUMP STATION ELECTRICAL PLAN
 SCALE: 1/4" = 1'-0"



CABLE SUPPORT DETAIL
 NOT TO SCALE



DRY WELL ELECTRICAL PLAN
 SCALE: 1/4" = 1'-0"

BENNETT ENGINEERING, INC.
 Consulting Engineers
 250 EAST HOME STREET WESTERVILLE, OHIO 43081
 PHONE (614) 818 3303 FAX (614) 818 3322

JOB NO. 2000-015
 DESIGNED BY MARK A. BENNETT P.E.
 DRAWN BY MAB
 CHECKED BY MAB

STATE OF OHIO
 MARK BENNETT
 E-54403
 PROFESSIONAL ENGINEER

DELAWARE COUNTY, OHIO
THE PRESERVE AT SELDOM SEEN
 PUMP STATION IMPROVEMENTS

R.D. Zande & Associates, Inc.
 1600 Lake Shore Drive, Suite 100, Columbus, Ohio 43204
 (614) 498-4383 1-800-340-2743
 FAX (614) 498-4387

SCALE: AS NOTED

ELECTRICAL PLANS & DETAILS

7/12

erik@samson-p1711818.dwg\Pump Station\07 of 12 Elec Details.dwg Layout1 Layout1 FEB 15, 2005 11:03 AM

SECTION 16010 - GENERAL PROVISIONS

PART 1 GENERAL

1.01 REFERENCE

A. The General Conditions and other Contract Documents as set forth in the foregoing pages are hereby incorporated into and become a part of the Specifications for work under this title, insofar as they apply hereto.

B. All Specifications under this Division Title are directed to and are the responsibility of the Electrical Contractor. Unless other trades or persons are specifically mentioned, "Electrical Contractor" is inferred and intended.

1.02 CONTRACT DRAWINGS

A. The Drawings accompanying these Specifications are complementary each to the other and what is called for by one shall be as if called for by both.

B. Consult all Contract Drawings which may affect the location of equipment, conduit and wiring and make minor adjustments in location to secure coordination.

C. Wiring layout is schematic and exact locations shall be determined by structural and other conditions. This shall not be construed to mean that the design of the system may be changed; it refers only to the exact locations of conduit and equipment to fit into the building as constructed and with the coordination of conduit and other equipment with piping and equipment included under other divisions of the Specifications.

D. Coordinate layout of work with other trades. Make minor adjustments in location required for coordination. Locations of structural systems, heating and plumbing lines shall take preference over locations of conduit lines where conflict occurs.

E. Other than minor adjustments shall be submitted to the Engineer for approval before proceeding with the work.

F. The location of outlets and switches shown on the Drawings is approximate, and the Engineer shall have the right to relocate any outlets or switches before they are installed without additional cost.

1.03 MANUFACTURER'S DRAWINGS

A. The Contractor shall submit to the Engineer for review, within six weeks after date of contract, six (6) copies of manufacturer's drawings and wiring diagrams. The Engineer will review Contractor's shop drawings and related submittals (as indicated below) with respect to the ability of the detailed work, when complete, to be a properly functioning integral element of the overall system designed by the Engineer. Before submitting a shop drawing or any related material to the Engineer, Contractor shall: review each such submission for conformance with the means, methods, techniques, sequences, and operations of construction, and safety precautions and programs incidental thereto, all of which are the sole responsibility of Contractor; approve each such submission before submitting it; and so stamp each such submission before submitting it. The Engineer shall assume that no shop drawing or related submittal comprises a variation unless Contractor advises Engineer otherwise via a written instrument which is acknowledged by Engineer in writing. The items, types of submittals and related material (if any) called for are indicated below:

ITEMS	TYPE	SUBMITTALS REQUIRED
Fuses		Catalog Cuts
Mini Power Zone & Panelboards		Shop Drawings
Transfer Switch		Shop Drawings
Telemetry System		Shop Drawings
Disconnect Switch		Shop Drawings
Lighting Fixtures		Shop Drawings
Transient Voltage	Surge Protection	Shop Drawings

B. The Engineer shall return shop drawings and related materials with comments provided that each submission has been called for and is stamped by Contractor as indicated above. The Engineer shall return without comment material not called for or which has not been approved by Contractor.

C. Engineer's review of Manufacturer's Drawings or Schedules shall not relieve the Contractor from responsibility for errors or omissions in Manufacturer's Drawings or Schedules and deviation from Engineer's Drawings or Specifications.

D. At the completion of the Job, before final payment is made, the Contractor shall submit six (6) copies of Manufacturer's "As-Built" Drawings.

1.04 JOB-SITE COPY OF DOCUMENTS

A. Maintain at the site, one copy of all Drawings, Specifications, Addenda, approved Shop Drawings, Change Orders and other modifications, in good order. The Drawings shall be marked to record all changes made during construction especially deviations made necessary to incorporate equipment different from base equipment specified. These shall be available to the Engineer. The Drawings marked to record all changes made during construction shall be delivered to the Engineer upon completion of the work. An additional set of Drawings will be furnished by the Engineer for this purpose upon request.

PART 2 PRODUCTS

2.01 MATERIALS

A. All materials shall be new and undeteriorated and of a quality not less than the minimum specified.

B. Materials and equipment for which there are Underwriters' Laboratories Standard requirements, listing and labels, shall have listing of Underwriters' Laboratories and be so labeled.

2.02 SUBSTITUTIONS

A. It is the intent of this article to make the Specification open in every respect to all available brands of material of equal quality during the period of bidding.

B. Bid shall be based on furnishing one of the brands of material and equipment mentioned in the Specifications. Submit, attached to the Bid, selected list of all material and equipment brands intended to be furnished if awarded the Contract. No change of brands shall be made after receipt of Bid and attached material brands list, unless approved in writing by the Engineer.

C. The Electrical Contractor is also invited to bid on any other equal or similar brands of material and equipment he may desire to furnish, or substitute, stating the difference in cost, if any. Other brands must be clearly stated on a substitution sheet. Be prepared to submit sample material within three (3) weeks after requested by the Engineer or Owner, and assume all transportation costs involved in shipment and return of samples. Lamps are to be sent with sample fixtures and fixtures are to be wired with cord and plug to facilitate lighting for appraisal. The Engineer shall decide the question of equality before the Contract is awarded.

D. Substitutions which are accepted shall be written into the Contract and no changes of brands shall be made after the Contract is signed unless approved in writing by the Engineer.

E. Refer to "Instructions to Bidders" regarding substitutions.

F. Where the Contractor furnishes equipment or material specified as equal or which is accepted as a substitution, he is responsible for all modifications required for his work, and work of all other trades to install the equipment and insure performance as originally specified.

2.03 QUANTITIES

A. Items may be referred to as singular or plural on the Drawings and in the Specifications. The Contractor is responsible for determining quantity of each item required.

PART 3 EXECUTION

3.01 INSTALLATION

A. Furnish and install all necessary hangers, supports, straps, boxes, fittings and other similar appurtenances not indicated on the Drawings but which are required for a complete and properly installed system consistent with the Architectural Treatment of the building.

B. Contractor shall inform himself fully regarding peculiarities and limitations of space available for installation of materials under this contract, and see that all equipment necessary to be reached from time to time for operation and maintenance are made easily accessible. Clearances, when possible, shall be greater than those required by code.

C. Working Clearances: At least 6'-6" clear headroom must be maintained in front of all electrical equipment. Provide at least 3'-6" for 480/277 volt and 3'-0" for 208/120 volt clear space in front of all electrical equipment as wide as the equipment with a minimum of 2'-6" wide. The same clearance shall be required at the rear of rear access equipment.

3.02 WORKMANSHIP

A. Electrical work shall meet or exceed the standards of installation and workmanship set forth in the latest edition of the National Electrical Contractors Association publication entitled NECA Standard of Installation, except as otherwise modified in these specifications or shown on the Drawings.

B. The Engineer reserves the right to direct the removal and replacement of any item which, in his opinion, does not present an orderly, neat or workmanlike appearance, provided that such item can be properly installed in an orderly way by methods usual in such work, or which does not comply with the contract drawings or these specifications. Perform such removals or replacements when directed in writing by the Engineer and at the Contractor's expense.

C. The Electrical Contractor, insofar as the work is concerned, shall at all times keep the premises in a neat and orderly condition, and at the completion of the work shall properly clean up and cart away debris and excess materials.

SECTION 16020 - WORK INCLUDED

PART 1 GENERAL

1.01 SCOPE

A. Furnish all materials, labor, tools, transportation, incidentals and appurtenances to the drawings in every detail and leave in working order all items of work called for herein and shown on the accompanying Drawings.

B. It is the intent that the ensuing work shall be complete in every respect and that any material or work not specifically mentioned or shown on the Drawings, but necessary to fully complete the work, shall be furnished.

1.02 COORDINATION OF PLANS AND SPECIFICATIONS

A. Contact the Engineer immediately if there is any question regarding the meaning or intent of either Plans or Specifications, or upon noticing any discrepancies or omissions in either Plans or Specifications.

PART 2 PRODUCTS

Not Applicable

PART 3 EXECUTION

3.01 SITE VISITATION

A. The Bidder 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.

3.02 SUPERVISION OF WORK

A. He shall have in charge of the work, at all times during construction, a competent superintendent with a large experience in the work to be done under this Specification.

B. Refer to the Specifications covering all branches of the work and keep fully informed of the progress of the general construction. Install all work that is concealed and built into the building in place in sufficient time to insure proper location without delays to the work of the other trades. Properly attend the work during the process of building-in to prevent misalignment and damage.

3.03 EXISTING WORK AND DEMOLITION

A. Locate existing utilities prior to beginning work. Reroute or replace existing utilities where necessary to permit installation of the work. Provide adequate means of protection during work operations. Repair existing utilities damaged during work operations to the satisfaction of the utility owner and at Contractor's expense.

B. Should uncharted or incorrectly charted piping or other utilities be encountered during work operations, notify the Engineer immediately for procedure directions. Cooperate with utility companies in maintaining active sewers and facilities in operation.

C. Suitably and adequately protect the existing work within, and immediately adjacent to, the new work areas from damage and injury during the process of installing the work under this Contract. Existing work that has been harmed, damaged or injured as a result of the Electrical Contractor's operations shall be repaired, restored or replaced at the Electrical Contractor's expense.

3.04 CUTTING AND PATCHING

A. Avoid cutting of concrete, masonry and other work by use of inserts and sleeves, and whenever necessary shall be done by the Electrical Contractor with such tools and methods as to prevent unnecessary damage to surrounding areas or equipment.

B. This Contractor shall give the General Contractor locations and sizes of all openings required for the installation of electrical equipment before walls, etc., are started. If it becomes necessary to cut into new work because of the failure of this Contractor to notify the General Contractor, then the General Contractor shall coordinate any necessary cutting by this Contractor. Patching shall be which at this Contractor's expense.

C. No cutting shall be done which will in any way reduce the structural strength of the building. Should such cutting be found necessary the Engineer must first be fully informed of, and consent to, the proposed operation.

D. All cutting through poured concrete slabs and walls shall be done with core drills. No jack hammers will be allowed.

E. Patching shall match existing surfaces in kind and finish and shall be done by the General Contractor at the Electrical Contractor's expense. This includes patching existing ceilings and floors where required and patching holes left by removal of existing conduits, bus duct, equipment, etc. See GENERAL CONDITIONS.

F. Repair of damages, by this Contractor, to newly patched and refinished areas shall be done by the General Contractor at this Contractor's expense in kind to match existing condition.

3.05 CLEANING AND PAINTING

A. All electrical equipment shall be kept dry and clean during the construction period. Control panels etc., shall be covered with fiberglass reinforced plastic sheeting as a minimum form of protection. Provide additional protection, if job conditions so require.

B. Interiors of all enclosures shall be thoroughly vacuumed, cleaned and all dirt and debris removed before installing trim or covers.

C. All finished surfaces of equipment furnished under this Contract shall be thoroughly cleaned of dirt and oil scratched or damaged surfaces shall be touched up with matching materials before final acceptance of the work. No exposed ferrous metal surfaces shall be left unpainted. Touch-up all galvanized, if scratched, with two coats of aluminum paint.

D. Prime and paint all steel hangers, boxes, straps, rods, etc. which are not provided with rust-protective finish or the protective finish is damaged in installation. Paint to be zinc chromate primer and aluminum bronze finish. This includes unfinished and mechanical spaces as well as "exposed to view" locations.

E. When all work is completed and all work has been satisfactorily tested and accepted by the Engineer, all fixtures, conduit and other exposed surfaces shall be thoroughly cleaned.

3.06 EXCAVATION AND BACKFILL

A. Provide all excavation and backfill necessary to get the work in place. Such excavation shall be carried to dimensions and depths indicated or as necessary for the proper installation and completion of the work.

B. Remove all form work and debris before backfill is placed. Backfill to be brought to proper elevation and shall be puddled, tamped and thoroughly compacted. Finished grade shall be replaced in kind, i.e., sod, gravel, blocktop, concrete, etc.

C. Surplus earth removed from excavations shall be removed from the site by this Contractor, unless the General Contractor requests that it be retained as fill to establish rough grades.

D. All excavated areas shall be barricaded and properly protected.

3.07 INTERRUPTION OF SERVICE AND OWNER'S OPERATION

A. The Electrical Contractor shall organize his work so that these alterations and additions shall cause a minimum of interference and disturbance to the Owner. Arrangements shall be made with the Owner and Engineer before interrupting service in any area. A written detailed method of interruption procedure indicating elapsed time required and time of interruption shall be prepared by the Electrical Contractor and submitted to the Engineer for approval 10 days before any interruption of service.

B. All interruptions of service shall be made when the load is at a minimum and shall be scheduled at the Owner's convenience. (Service interruptions will be scheduled for other than normal daytime working hours. The Electrical Contractor shall include necessary cost for overtime labor in all bids.)

C. At no time shall the Electrical Contractor or his employees normally working on the project leave the facility during a time when any normally live circuits or feeders are disconnected, without permission of the Engineer.

D. All materials, connections and equipment for temporary control or power wiring to maintain continuity of service during construction shall be provided by the Electrical Contractor. All loads normally supplied from the Electric Utility and those supplied from the Owner's engine generators are included in the above paragraph.

SECTION 16025 - CODES AND FEES

PART 1 GENERAL

1.01 CODES

A. All work performed under this Specification shall be done in accordance with the latest edition of the National Electrical Code as prepared and published by the National Fire Protection Association, National Electrical Safety Code, Standards of National Bureau of Fire Underwriters and any Federal, State Codes or Local Codes applying.

1.02 PERMITS AND FEES

A. Obtain and pay for all permits required by all laws and regulations or public authority having such jurisdiction. File drawings necessary to obtain permits.

B. The Electrical Contractor shall obtain and pay for all cost including metering required by the Power Company for service.

1.03 OHIO ENERGY CODE

A. All motors used in Mechanical Systems must comply with the requirements of the State of Ohio "Model Code for Energy Conservation".

B. All motors rated greater than 1000 watts shall have a power factor of not less than 85 under rated load conditions. Power factor of less than 85 shall be corrected to at least 90 under rated load conditions.

C. For motors up to and including 50 horsepower, the manufacturer shall provide motors with a power factor of not less than 85. If this is not possible, then the manufacturer shall provide and install power factor corrective devices to comply with this Code.

PART 2 PRODUCTS

Not Applicable

PART 3 EXECUTION

Not Applicable

SECTION 16030 - TESTS AND INSPECTIONS

PART 1 GENERAL

1.01 INSPECTIONS

A. Obtain all inspections required by all laws, ordinances, rules, regulations or public authority having jurisdiction and obtain certificates of such inspections and submit same to the Engineer. Pay all fees, charges and other expenses in connection therewith.

B. Before any electrical work is covered, the Engineer will inspect the electrical work completed at that time.

C. Final Inspection - When the Contractor determines all work is completed and working properly per the Contract Documents, he shall request a "Final" inspection by the Engineer in writing. If more than one reinspection is required after this final inspection, the Contractor shall bear all additional costs, including compensation for the Engineer's additional services made necessary thereby.

1.02 OBSERVATION REPORTS

A. During the course of construction, the Engineer will prepare "Observation Reports" with a list of items found to be in need of correction. All items listed shall be corrected by the Contractor. A space is provided on the form for the Contractor to note the completion of each item. All prior "Observation Report" items must be completed, the lists signed and returned to the Engineer prior to making the final inspection. After the final list is issued, the same procedure will apply.

1.03 TESTS

A. When the Engineer makes final inspection of all electrical work he will order tests performed as deemed necessary. These tests may include operation of lights and equipment, continuity of conduit system, grounding resistances and insulation resistances and checking out the operation of the various systems. This Contractor shall provide such assistance as required (including manpower and tools) to start and stop the various systems, etc. and simulate control sequences. The Contractor (not the Engineer) is responsible to turn on the systems and demonstrate they are operating properly.

B. All control systems, pump controls shall be checked out and tested by a qualified field representative of equipment vendor. A report shall be submitted to Engineer by vendor representative indicating results of such final check out and test.

1.04 UNACCEPTABLE WORK

A. Work shall be unacceptable when found to be defective or contrary to the Plans, Specifications, Codes specified or accepted standards of good workmanship.

B. The Contractor shall promptly correct all work found unacceptable by the Engineer whether observed before or after substantial completion and whether or not fabricated, installed or completed.

PART 2 PRODUCTS

Not Applicable

PART 3 EXECUTION

Not Applicable

SECTION 16030 - TESTS AND INSPECTIONS

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PART 2 PRODUCTS

Not Applicable

PART 3 EXECUTION

3.01 PERFORMANCE

A. Contractor, subcontractor, vendors, or manufacturer shall provide tests on the following equipment. Refer to the appropriate specification section for description of the tests. Telemetry Systems

3.02 PHASE ROTATION

A. Prove that all electrical equipment is connected for clockwise rotation (A-B-C).

3.03 LOAD BALANCE

A. Prove that loads are balanced across all phases.

B. Obtain optimum phase balance under full load condition by reconnection of panelboard feeders at the main switchboard. Any panelboards requiring circuit changes for balance shall reflect these changes in the panel directory and wire color identification. Color change can be made with colored tape at panel.

C. Pay special attention to prevent reverse rotation of motors during load balance and adjustments.

3.04 NEUTRAL-GROUND SEPARATION

A. Prove that the neutral and ground are separated, except as required by the National Electrical Code, at service entrance and transformer secondaries.

3.05 RESISTANCE AND CONTINUITY

A. Provide insulation resistance, grounding resistance, and ground continuity tests of feeders, branch circuits lightning protection system or equipment on demand.

3.06 CONTROL AND INTERLOCKING

A. Prove that motors and equipment operate as indicated in control and wiring diagrams and sequence of operation.

B. Prove that lighting, switchboard and miscellaneous controls operate as indicated in control and wiring diagrams and sequence of operation.

3.07 EQUIPMENT

A. Provide necessary electrical personnel and testing instruments as required to assist in testing of installation.

SECTION 16111 - CONDUITS

PART 1 GENERAL

1.01 SCOPE

A. Furnish and install all conduits, boxes, fittings, etc., for a complete raceway system.

B. See Section 16130 "Boxes"

PART 2 PRODUCTS

Not Applicable

PART 3 EXECUTION

2.01 CONDUIT - Rigid Metallic

A. All wiring including feeders, branch circuits and auxiliary wiring shall be run in rigid heavy wall conduit.

B. All steel conduit shall be galvanized and all conduit shall have the manufacturer's name and U.L. label attached to or stamped on each piece.

C. Each section of conduit furnished shall be straight, free from blisters and other defects and in 10'-0" lengths. Galvanizing shall be of such nature and so applied that it will not crack or flake when conduit is bent.

D. All conduit sizes stated herein or marked on the Drawings are minimum size and shall be no less than 3/4" unless otherwise noted.

2.02 CONDUIT FITTINGS - Metallic

A. All rigid conduit shall have threaded connections.

B. "Mineraloc" type supports and "Unistrut" type one bolt supports with square ends shall not be used at any location.

PART 3 EXECUTION

3.01 INSTALLATION

A. All rigid conduit entering cabinets, pull boxes, junction boxes or outlet boxes shall be secured with Myers hubs and ends bushed.

B. No more than four (4) 90 degree bends will be allowed in any one conduit run. Where more bends are necessary in any single run, a pull box shall be installed; pull boxes shall also be installed in long runs at a maximum separation of 100'-0".

C. All conduit shall be substantially supported by pipe straps or suitable clamps or hangers attached to the elements of the building structure to provide rigid installation; in no case shall conduit be attached or supported from adjoining pipe or installed in such a manner as to prevent the ready removal of other pipe for repairs.

D. Strap iron hangers and wire will not be approved for conduit support.

E. Conduit in earth either inside or outside of building shall be encased in a concrete envelope not less than 3" thick.

F. Where conduit runs across building expansion joints, or where necessary to compensate for thermal expansion or contraction provide expansion unions.

G. Exercise necessary precaution to prevent accumulation of water, dirt, or concrete in conduits during execution of electrical work. Conduit in which water or foreign material has been permitted to accumulate shall be thoroughly cleaned, or replaced where such accumulations cannot be removed.

H. All conduits must be kept dry and free of water or debris with approved pipe plugs or caps. Care shall be given that plugs or caps be installed before pouring of concrete.

I. Pull Wires

1. A pull wire shall be installed in all empty conduits. In dry locations, pull wire shall be No. 16 gauge galvanized iron or nylon pull cord.

2. Both ends of all pull wire shall be identified by means of labels or tags, reading "PULL WIRE" and shall be numbered to refer to the same pull wire.

J. Seal water and moisture tight, all conduits entering from outside the building.

SECTION 16120 - WIRE AND CABLE

PART 1 GENERAL

1.01 SCOPE

A. Furnish and install all wiring required to connect complete power, lighting, grounding, control, and auxiliary systems.

PART 2 PRODUCTS

2.01 STANDARDS

A. All conductors shall be stranded and of the AWG size and type shown on the Drawings. Where no size or type is shown, conductors shall not be less than #12 type THHN, THWN, THWN, or THW. All conductors shall be copper and have 600 volt insulation; be UL labeled and of American manufacturer.

B. All conductors shall be stranded unless otherwise noted and conform to the latest edition of the Underwriters' Laboratories, Inc., "Standard for Rubber Covered Wires and Cables" and the National Electrical Code.

C. No wire used for lighting or power shall be smaller than #12 AWG.

D. No wire used for control circuits shall be smaller than #14 AWG.

PART 3 EXECUTION

3.01 INSTALLATION

A. All conductors shall be continuous from box-to-box. No joints shall be permitted in the circuit other than in junction boxes or fixtures.

B. Equipment ground conductors shall be same insulation type as the associated circuit conductors.

C. All conductors of a circuit shall follow the same path through any openings in metal partitions within enclosure.

D. The ampacity of all conductors shall be at least as great as the rating of the fuse or circuit breaker on the line side of the conductors. Note the ampacity reduction required by Code when more than three conductors are placed in a raceway.

1. All conductors for distribution and control equipment terminations shall be based on full 75°C ampacity.

2. All conductors for appliance and utilization equipment terminations rated 100 amperes or less shall be based on 60°C ampacity.

E. Provide cable supports for vertical raceways per NEC Table 300-19 (c).

F. Wiring installed in separate conduits.

1. Power wiring.

2. Control wiring.

3. Auxiliary systems wiring.

G. Swab conduits free of moisture, dirt and grease before pulling wire. Care shall be exercised while installing wire in conduits so that conductor insulation will not be injured. No oils, grease or compounds other than Ideal "Wire Lube", "Yellow 77", or equal UL approved wire pulling lubricants shall be used for pulling in any conductors.

3.02 CONNECTIONS

A. All connections are to be made using pressure type terminals.

B. Where connections are to be made to devices or equipment under screw heads only, install insulated, crimp type spade clips on the wire ends before the connections are made.

C. Devices shall not be used as through connection points. Where through circuits are involved they shall be spliced in the box and a pigtail connected to the device.

D. Connectors shall contain only one wire unless they are listed for multiple conductors.

E. Joints in #10 and smaller wire shall be made using the following types of connectors: Minnesota Mining and Manufacturing "Scotch Lok", Ideal Industries, Inc. "Wing Nut", or Thomas and Betts Co. Type "PT". Connectors shall be used only within their range. Other threaded-on types of insulated connectors shall not be used.

F. Joints in #8 and larger wire or joints in any wires above the range of threaded-on connectors shall be made using pressure type mechanical connectors applied after wires are cleaned and then insulated using two (2) layers of "ScotchB" brand electrical insulation putty and covered by two (2) half-lapped layers of "Scotch 88", or Plymouth Signal Gray vinyl plastic electrical tape. Connectors can be installed and sealed against moisture by installing Raychem "TCS (indoor) or WCSM (exterior)" sealant coated heat shrink tubing.

3.03 WIRE COLOR CODE

A. The following color code shall be used:

	120/240 Volt	277/480 Volt
Phase A	Black	Brown
Phase B	Red	Orange
Phase C	Blue	Yellow
Neutral	White	Gray
Equipment Ground	Green	Green

B. Conductors No. 10 AWG or smaller shall have insulation colored as noted above.

C. Conductors No. 8 AWG or larger shall have insulation colored as noted above or colored tape, minimum size 1/2", wrapped twice around at the following points:

1) At each terminal

2) At each conduit entrance

3) At intervals not more than 12 inches apart in all boxes, panel lubs, switchboards, etc.

D. Equipment grounding conductors No. 8 AWG and larger shall be green or green tape applied in a continuous wrap where visible at panels and junction boxes, etc.

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BENNETT ENGINEERING, INC.
Consulting Engineers

250 EAST HOME STREET
WESTERVILLE, OHIO 43081

PHONE (614) 818-3303
FAX (614) 818-3322

STATE OF OHIO
MARK BENNETT
E-34451
REGISTERED PROFESSIONAL ENGINEER

JOB NO. 2000-015
DESIGNED BY
MARK A. BENNETT P.E.
DRAWN BY
MAB
CHECKED BY
MAB

DELAWARE COUNTY, OHIO

THE PRESERVE
AT SELDOM SEEN
PUMP STATION IMPROVEMENTS

R.D. Zande & Associates, Inc.
15609 State Drive, Suite 100, Columbus, Ohio 43244
(614) 488-4383 1-800-340-2743
FAX (614)-488-4387

SCALE: N/A

ELECTRICAL SPECIFICATIONS

9
12

3.04 MARKING

- A. All branch circuits shall be marked in the panelboard gutters. Markers shall indicate corresponding branch-circuit numbers.
B. All signal and control wires shall be marked at all termination points, such as cabinets, terminal boxes, equipment racks, control panels, consoles, etc.
C. The wire markers shall be Thomas and Betts vinyl tape type WM wrapped once around the wire and the adhesive sides placed together to form a flag.
D. These wire markers shall be installed when wire is pulled.

SECTION 16130 - BOXES AND PLATES

PART 1 GENERAL

1.01 SCOPE

- A. Furnish and install all outlet, junction, and pullboxes as indicated on the Drawings and as necessary to install the required conduit and wiring in a neat and workmanlike manner.
B. Furnish and install all outlet and junction box covers and wiring device plates.

PART 2 PRODUCTS

2.01 STANDARDS

- A. Pullboxes and junction boxes shall be in accordance with Code requirements and shall be Underwriters' Laboratories labeled.

2.02 BOXES FOR EXTERIOR WORK

- A. Boxes at exterior areas to be watertight and dust-tight with gasketed covers.

2.03 BOXES FOR EXPOSED WORK

- A. All boxes for exposed work shall be "TS" type with threaded hubs with rigid conduit riser (deep wiremold boxes).

2.04 PLATES AND COVERS

- A. Switch plates on flush and cast boxes shall be Sierra Nos. S-1N, S-2N, S-3N etc., as required, and shall be made of satin finish #302 stainless steel.
B. Duplex receptacle plates on flush and cast boxes shall be Sierra No. S-8N (P-8) satin finish #302 stainless steel.

- C. Plates for exposed outlets in unfinished spaces shall have Steel City Series RS-4" square galvanized surface covers for application required. Covers shall be raised 1/2" and edges fit flush with top of box.

- D. Special or engraved plates, as indicated on the Drawings, shall be Sierra #302 satin stainless steel (ivory plastic) for the application required. Letters shall be 3/16", engraved with black enamel fill.

- E. Plates of satin finish #302 stainless steel as manufactured by Slater may be furnished at this Contractor's option.

PART 3 EXECUTION

3.01 INSTALLATION

- A. All boxes shall be rigidly supported from building structure independent of the conduit system. Boxes cast into masonry or concrete are considered to be rigidly supported.
B. Close all unused and open knockouts with plugs of the proper size.

SECTION 16140 - WIRING DEVICES

PART 1 GENERAL

1.01 SCOPE

- A. Furnish and install all wiring devices where shown on the Drawings.
B. Wiring devices shall be furnished in strict accordance with the catalogue numbers and manufacturers listed in the Schedule which follows. Other special purpose devices shall be as specified on the Drawings.

PART 2 PRODUCTS

2.01 STANDARDS

- A. Single pole Switches - 20 amp, 120/277 volt
Hubbell - 1221-I
Arrow Hart - 1991-I
B. G.F.I. Receptacle - 20 Amp, 125 Volt - NEMA 5-20R
Hubbell - GF 5362-1 with S26 or P266 plate or WP-26 W.P. Cover

2.02 SUBSTITUTIONS

- A. The Electrical Contractor may furnish equal devices by P & S, Eagle or Woodhead.

PART 3 EXECUTION

3.01 INSTALLATION

- A. Install wiring devices in a neat and workmanlike manner.
B. Ground all receptacles in accordance with Article 250-74 of NEC and as indicated in the Grounding Section of this Specification.
C. Wiring devices specified are side and back wired type and shall be back wired.

SECTION 16164 - 480/277 VOLT LIGHTING PANELS

PART 1 GENERAL

1.01 SCOPE

- A. Furnish and install, as scheduled and shown on the Drawings, lighting panels for operation on 480/277 volt, 3 phase, 4-wire service.
B. Each panel shall be connected with a feeder as sized on the Drawings.

PART 2 PRODUCTS

2.01 STANDARDS

- A. The panels shall be Square D, Type NEHB, unless otherwise noted, with branch breakers as scheduled on the Drawings.
B. Park Ohio Electric or Cutler Hammer type S3 panels may be furnished at this Contractor's option.
C. All terminations shall be marked "75c only", "60/75c" or listed for use of 75c insulated conductors at full 75c ampacity.

2.02 CONSTRUCTION

- A. All bus bars shall be silver or tin plated copper.
B. Cabinets shall be of commercial galvanized sheet steel, code gauge and size, surface or flush mounted as called for in the Drawings. Flush panels shall be finished with prime coat only. Doors shall be fitted with chrome plated combination lock and catch, and all keyed alike.
Note: Tabs shall be 20" wide. Directory card and frame shall be inside panel door.
C. Directory card and frame inside panel door.
D. Neutral assembly shall have individual anti-torn solderless terminals, similar to Square D type PK, for connection of ultimate number of neutral wires.
E. Panel shall have a copper ground bar similar to neutral bar in number, size, and type of anti-torn solderless lugs. This ground bar shall be factory bonded to the tub in the gutter space opposite the main and the assembly shall have the screwdriver slots facing the front. The height of the panel tub may be higher than normal because of the ground bar.

2.03 CIRCUIT BREAKERS

- A. All circuit breakers shall be Square (D).
B. The branch breakers shall be type EHB rated 14,000 A.I.C. minimum, molded case, temperature compensated, quick-make, quick-break, with thermal-magnetic trip and permanently bolted to bus bars.
C. Breakers that are used to switch 277 volt fluorescent lighting shall be type SWD.
D. Breaker that feed heating, air conditioning and refrigeration equipment shall be listed "HACR" type.

PART 3 EXECUTION

3.01 INSTALLATION

- Directors cards shall be correctly filled in by typewriter for circuits as installed, before final payment is made.
C. Furnish and install identification nameplate that reads "CAUTION SERIES RATED SYSTEM" "IDENTICAL COMPONENT REPLACEMENT REQUIRED".
D. Additional identification shall be furnished as specified in Section 16195.

SECTION 16165 - MINI POWER CENTER

PART 1 GENERAL

1.01 SCOPE

- A. Furnish and install as indicated on the Plans, single 60 Hertz, dry type, air cooled, two winding, insulated, high efficiency, low sound level transformer and distribution panel as herein specified.
B. Transformers shall be rated for use with systems of 480 volts or below.

PART 2 PRODUCTS

2.01 STANDARDS

- A. Transformers shall be constructed in accordance with the latest standards of IEEE, ANSI, and NEMA.
B. Transformers and distribution center shall be Underwriters' Laboratories, Inc., approved and shall carry the U.L. Label. The Drawings shall show the Underwriters' Laboratories file numbers for both the insulated system approved and the transformer approved.
C. Transformers and distribution center shall be single phase or three phase Square D, Mini Power-Zent, Type MPZ or equal by Westinghouse, or Park Ohio (with ITE breakers).

2.02 TRANSFORMER CONSTRUCTION

- A. Coils shall use copper wire and have an Underwriters' Laboratory approved 220C insulation system and the average temperature rise shall not exceed 115C above a 40C maximum ambient with 100% of rated load connected on the secondary.
B. Cores shall be manufactured with a high grade, silicon steel. The core and coil assembly shall be mounted on vibration pads. The enclosure shall be provided with ventilated openings and/or be designed to prevent case temperatures not to exceed U.L. acceptable levels.
C. The terminal compartment shall be so designed to permit the use of 75c wire. All terminations shall be marked "75c only", "60/75c" or listed for use of 75c insulated conductors at full 75c ampacity.
D. Transformer KVA capacity and voltage shall be as shown on the Drawings. All transformers shall have 480 volt, three phase, 3-wire connected primaries and 208/120 volt, three phase, 4-wire connected secondaries. Transformers shall have two (2) 5 full capacity taps BN.
E. Design sound levels shall not exceed 45 db.

PART 3 EXECUTION

3.01 INSTALLATION

- A. All transformers shall be mounted on neoprene rubber vibration isolators which shall be flexible conduit. Vibration isolation pads shall be ribbed neoprene rubber, Consolidated Kinetics "NPD" or approved equal.
B. Directory cards shall be correctly filled by typewriter for circuits as installed, before final payment is made.
C. Furnish and install identification nameplate that reads "CAUTION SERIES RATED SYSTEM" "IDENTICAL COMPONENT REPLACEMENT REQUIRED".
D. Additional identification shall be furnished as specified in Section 16195.

SECTION 16170 - DISCONNECTS

PART 1 GENERAL

1.01 SCOPE

- A. The Electrical Contractor shall furnish and install heavy duty fusible disconnect or non-fusible disconnect switches where shown on the Drawings, in conformance with N.E.C. requirements for each unit of equipment.

PART 2 PRODUCTS

2.01 GENERAL REQUIREMENTS

- A. Switches shall be wall mounted in general purpose enclosure unless otherwise noted. They shall be NEMA heavy-duty type and shall have the rating, capacity and number of poles for the service concerned.
B. All switches have provisions for padlocking and shall be by the same manufacturer.
C. Fusible switches shall have Class R fuse clips.
Switches for use on motor circuits shall be horsepower rated.

PART 3 EXECUTION

3.01 INSTALLATION

- Switches shall be installed to provide code required clearance.

SECTION 16181 - FUSES

PART 1 GENERAL

1.01 SCOPE

- A. Provisions of this Section shall apply to all fuses and fused equipment of 600 volts or less as shown on the Drawings.
B. Furnish and install all fuses as described below.

PART 2 PRODUCTS

2.01 STANDARDS

- A. All fuses 600 amperes and below shall be UL Class RK-1, Bussmann "Lo-Peak" Type LPN/S-RK, Gould/Shawmut "Amp-Trip II" Type A2/GD-R or Littelfuse Type LLN/S-RK, unless otherwise noted.

PART 3 EXECUTION

3.01 SPARE FUSES

- A. Furnish one set of three spare fuses for each size and type of fuse used. Spare fuses shall be turned over to Owner.

3.02 VOLTAGE RATING

- A. All fuses shall have proper voltage rating for the system voltage in which they are fused.

SECTION 16195 - IDENTIFICATION

PART 1 GENERAL

1.01 SCOPE

- A. Each piece of service equipment and individual switches, all disconnects, starters, all exhaust fan manual starting switches, all power and lighting panels, all cabinets and pull boxes for auxiliary systems, such as telephone, shall be identified on the front cover or trim with its name and/or designation number or letter as shown on the Drawings and with the voltage available within the panel.

PART 2 PRODUCTS

2.01 GENERAL

- A. Identification shall be in the form of laminated plastic nameplates, black face, with the letters engraved into the white background, minimum 1/4" high. Plates shall be drilled on each end for sheet metal screw attachment. No "Dymo" or similar type type labels will be allowed.
B. The following is an example of the nameplate layout and wording.
Power Panel P1 480/277 volt, 3 phase, 4 wire, 400A

PART 3 EXECUTION

3.01 INSTALLATION

- A. Plastic nameplates shall be attached to face of electrical device by sheet metal screws. Locate plate so wording reads horizontally and plate does not obstruct other identification plates, latches or operators.

SECTION 16280 - SURGE PROTECTIVE DEVICES

PART 1 GENERAL

1.01 DESCRIPTION

- A. Furnish and install Surge Protective Device (SPD) units as shown on the Drawings and herein specified.

1.02 SUBMITTALS

A. For Review:

- 1. Product data sheets of all components;
2. All operating parameters including UL 1449 voltage category
3. Independent test data on maximum single and repetitive surge current.

B. To be included in Operation and Maintenance Manuals:

- 1. One copy of each approved submittal

1.03 MANUFACTURERS

A. Surge Protective Devices

- 1. Liebert Corporation
2. Current Technology Inc.
3. Advanced Protection Technologies
4. Cutler-Hammer

PART 2 PRODUCTS

2.01 SURGE PROTECTIVE DEVICES

- A. Surge Protective Device (SPD) units shall be self-contained, wall mountable, solid-state devices in a NEMA 12, enamelled steel enclosure with hinged door and locking handle.
B. SPD units shall consist of an engineered system to achieve suppression using one or more of the following components:
1. Doped selenium plates
2. Metal Oxide Varistors (MOV) in enclosed replaceable modules
3. Silicon Avalanche Diodes (SAD) in enclosed replaceable modules

- C. SPD unit components shall be arranged to operate bi-directionally, in parallel with the line, have sine-wave frequency characteristics, and have seven modes of protection as follows:
1. Each Phase: Line to Neutral
2. Each Phase: Line to Ground
3. Neutral - Ground

- D. SPD units shall be classified by U.L. with the following ratings:
Maximum Clamping Voltage L-N 400 volt 400
Maximum Clamping Voltage N-G 800 volt 800

- E. SPD units shall be capable of surviving the following surge current on a single impulse basis without performance degradation of more than 10:
1. SPD units located at Service Entrance Switchgear 120,000 amps per mode
2. SPD units located at Power Distribution Panels 80,000 amps per mode
3. SPD units located at downstream panelboards 60,000 amps per mode

- F. SPD units shall have Form C summary output contacts for remote monitoring capability.
G. SPD units shall have integral noise filtering of the following minimum attenuation level: 10 KHz through 100 MHz - 54 dB

- H. SPD units shall have integral diagnostic indicating lights.
I. SPD shall be listed in accordance with UL 1449 Second Edition to include Section 37.3 highest fault current category. SPD shall be UL 1283 listed. SPD shall be tested to ANSI C62.41 and C62.45 standards.

- J. SPD shall be modular in design. SPD for service entrance shall provide two modules per phase for redundant protection.
K. SPD shall include a fused disconnect switch or circuit breaker where a dedicated fused switch or circuit breaker is not furnished.

PART 3 EXECUTION

3.01 INSTALLATION

- A. Install surge suppressors where shown on the Drawings, and in accordance with manufacturer's written instructions.
B. Units shall be installed as close as possible to the equipment being protected (preferably closed nipples). Conductors and conduit shall be run horizontally directly from electrical equipment to surge suppressor enclosure.
C. Units shown as switchboard mounted shall be integral and mounted adjacent to the incoming line. SPD units shall be factory installed by the switchboard manufacturer.
D. Units shown in power distribution panels shall be cable connected and shall be factory installed by the panelboard manufacturer.
E. Units shown in lighting and appliance panelboards shall be bus mounted between the main and branch devices. SPD shall be factory installed by the panelboard manufacturer.

3.02 EQUIPMENT DEMONSTRATION

- A. After all system tests have been completed, schedule an instruction period with the Owner. Instruction to be provided by manufacturer's authorized field technician.
B. Instruction shall include:
1. Location of all components of the system and explanation of their function
2. Demonstration of equipment
3. Maintenance and repair procedures
4. Programming procedures
5. Review of documents in Record and Information Manuals

3.03 EXTENDED WARRANTY/SPARE PARTS

- A. Provide a five year extended warranty or a complete spare parts package in accordance with manufacturer's standard arrangement.

SECTION 16402 - UNDERGROUND ELECTRICAL SERVICE

PART 1 GENERAL

1.01 SCOPE

- A. Provide underground 480/277 volt, 3 phase, 4 wire electric service for lighting and power as supplied by American Electric Power Company (AEP). Contact person is Kirk Oehlman (614) 883-7931.
B. AEP the Power Company, shall furnish and install primary cable overhead line upgrade, meter, transformer grounding, transformer and all transformer connection. The Power Company shall also furnish the meter trim to the Electrical Contractor.

- C. The Electrical Contractor shall furnish and install the trenching, backfill secondary duct, CT cabinet and secondary conductors with lugs. The Contractor shall install the meters and fees charged by AEP associated with the electric service.

PART 2 PRODUCTS

2.01 GENERAL

- A. See Specification Sections pertaining to material and products used.

PART 3 EXECUTION

3.01 INSTALLATION (FOR TERMINAL POLE TRANSFORMERS)

- A. Run (1) 2" rigid conduit or concrete encased Schedule 40 PVC ducts each with 4 # 3/0 THW from the Power panel to the polemounted transformer. Run spare (1) 2" spare conduit. Cap spare conduit at 1'-0" above grade.

- B. All conductors shall extend 5' beyond weatherhead to facilitate connection by the Power Company. Coordinate work with the Power Company prior to installation.
C. The Electrical Contractor shall obtain and pay for any and all cost associated with the service upgrade and metering as required by the Power Company.
D. Furnish and install 2" conduit as required for Power Company metering.

SECTION 16451 - GROUNDING (WIRED SYSTEM)

PART 1 GENERAL

1.01 SCOPE

- A. Grounding of the service and service entrance equipment shall be in accordance with the National Electric Code.
B. All feeders and branch circuits over 100 volts shall include a Grounding Conductor sized in accordance with NEC Table 250-95, except not be smaller than #12 for power and lighting circuits and #14 for control circuits. All ground conductors shall be Green, or as specified under Section 16120, "WIRE AND CABLE".

- C. The Contractor shall, in the presence of the Engineer, test all system neutrals to prove they are free of grounds except at the source.
PART 2 PRODUCTS

2.01 GENERAL

- A. All ground clamps shall be Penn-Union "GRL" type or similar by O.Z. or Burndy.
B. All cable connections to ground rods shall be by "Cadweld", "Thermoweld", or "Helior" welding process by using recommended molds, compound and correct gas mixtures.
C. Conduit grounding type bushing shall be T & B Series 3870 with appropriate size ground wire terminal.

- D. Conduit for solitary ground conductors shall be rigid PVC non-metallic electrical conduit with U.L. label.
E. All panels shall be furnished with a copper ground bar similar to the neutral bar and having the same number, size and type of lugs. The ground bar shall be factory bonded to the panel tub above or below the neutral assembly, but shall not be in a gutter.
F. Enclosures, junction and pull boxes shall utilize a "panel" type ground bar or U.L. listed grounding lugs or screws, as the number of ground conductors dictates.

PART 3 EXECUTION

3.01 INSTALLATION

- A. Neutral shall be bonded to ground of service entrance through a 1/4" x 1/2" bonding jumper. From the service entrance ground run #1/0 to a driven ground system where shown on the Drawings. Driven ground system shall consist of one (3) 5/8" x 10'-0" copperweld ground rods spaced minimum 6'-0" on centers. Ground rods to be connected together by means of #3/0 AWG wire. All connections to ground rods shall be by specified welding process.
B. The ground conductor shall be connected to the neutral in only two locations - on the supply side of the service disconnect means per NEC-250-23 and on separately derived systems per NEC 250-26. Because the ground is lost through the transformer, it must be re-established by use of a grounding conductor, minimum size per NEC Table 250-94 (a), connecting the transformer secondary neutral point to the transformer enclosure and to the interior cold water system or to building structure ground.

- C. All solitary ground conductors shall be run in rigid PVC non-metallic conduit except 500 MCM and larger insulated cables may be run exposed on walls or ceilings of Equipment Rooms. Solitary ground conductors shall not be placed through metallic sleeves or conduits and shall be completely encircled by metallic hangers or supports.
D. All conduits entering switchboards and substations shall be bonded together with # 8 AWG wire connected to a conduit grounding bushing. These shall then be bonded to the ground bus in the equipment item.

- E. All enclosures, boxes, fixtures, receptacles, etc., shall be grounded by being securely bonded to the grounding conductor. Boxes, conduit, etc., shall not be used as part of the grounding "conductor" system.
F. Enclosures not requiring a ground bar shall have all ground conductors connected together and a pigtail the size of the largest conductor bonded to the enclosure with a single ground connector used for no other purpose.

- G. At each receptacle box, the ground conductor shall enter and connect, with normal wiring connector, to: 1) The ground pigtail to receptacle; 2) The ground pigtail to box ground screw; and 3) The outgoing ground conductor to next device, if not at end of run. Metal to metal contact between the device yoke and the outlet box is not acceptable as a bond for either surface mounted boxes or flush type boxes.

- H. Motor terminal boxes shall be grounded by the use of manufacturer-supplied ground lug or by drilling and tapping a hole for a ground screw. Remove paint prior to making the connection.
I. Lighting fixtures shall be grounded by the use of a manufacturer-supplied ground lug or pigtail or by the use of ground clips fastened on bare metal that is free of paint.

- J. Conduit system shall be electrically continuous. All locknuts shall cut through enameled or painted surfaces on enclosures. Where enclosures and non-current carrying metals are isolated from the conduit system, use bonding jumpers with approved clamps. Where reducing washers are used and where concentric or eccentric knockouts are not completely removed bonding bushings shall be required.

SECTION 16501 - LIGHTING FIXTURES

PART 1 GENERAL

1.01 SCOPE

- A. Contractor shall furnish and install lighting fixtures and lamps as indicated in Fixture Schedule shown on Drawings, and specified herein.
B. All lighting fixtures are indicated on the Drawings with an identifying letter and number, i.e., S-1, CL-2, R-5, etc. Refer to the Fixture Schedule on the Drawings which identifies the fixture in accordance with letter and number and indicates the type of mounting of the fixture in accordance with the Legend Section of the Schedule.

PART 2 PRODUCTS

2.01 STANDARDS

- A. Lighting fixtures scheduled on the Drawings are specified as standards for design, quality and appearance. Fixture of other manufacturers will be considered by the Engineer provided they are equal to or better than the standard. Reference: Section 16010, General Provisions.
B. Fixture materials given with the standard fixtures shall be maintained if alternate manufacturers are used, i.e., metal sides for metal sides, acrylic plastic louvers for acrylic plastic louvers, etc.

2.02 GENERAL

- A. Lamp sockets for bare tube fluorescent fixtures shall be spring loaded turret type.
B. Flush fixtures may be furnished with prewired feature provided they are U.L. approved for 75c wiring and the junction box capacity is sufficient for the circuit wiring requirements.

2.03 BALLASTS

- A. All large lamp ballasts of fluorescent fixtures shall be electronic non-dimming, rapid start CBM and L, approved and of the HEF type. They shall be sound rated "A", Class P, as manufactured by Advance, Mark V, Eta Industries, E2P type, or Megatek-Triad, B series.
1. All compact lamp ballasts shall be electronic, U.L. approved, high power factor, THD less than 10%, starting temperature of -5 degrees F and shall contain end of lamp life fault mode shutdown protection, Class P, energy saving, by Valmont Electric, Universal, or Advance.

- 2. Fluorescent ballasts for exterior locations designated on the Drawings shall be low temperature (0aF) magnetic ballasts manufactured by Valmont Electric, Universal, or Advance Company.

- B. All High Intensity Discharge (HID) ballasts shall be high power factor type, shall have fused primaries and have line starting current that is lower than the operating current. Current crest factor shall not exceed 1.8.
1. Mercury vapor - Valmont Electric Auto-Regulating, Halophane -CWA or Widelite - Regulating.
2. Metal Halide - Valmont Electric Auto-Regulating - Halophane - Peak Load or Widelite - Regulating.
3. High-pressure Sodium - Valmont Electric - Auto Regulating, Halophane -Lead or Widelite - Regulating.

2.04 LAMPS

- A. All lamp holders installed by the Electrical Contractor shall be furnished complete with new lamps of the size indicated on the Fixture Schedule.
B. Fluorescent lamps shall be T-8 octron 3500 K by General Electric, Sylvania or Philips.
C. Incandescent lamps shall be designed to operate on 125 volts.

- D. Mercury lamps shall be deluxe white color corrected. Mercury and HPS shall have 24000 hour life-rating. Metal halide lamps shall have 20,000 hour life rating (vertical) and 15,000 hours for all other mounting.
Lamp current crest factor shall not exceed 1.8 and shall be compatible with ballast being utilized. All HID lamps not enclosed shall be T-rated (self extinguishing).

- E. Lamps used during construction will be furnished by the Contractors requiring light and shall be removed from all fixtures shortly before the completion of the Contract.

PART 3 EXECUTION

3.01 GENERAL

- A. This Contractor shall inform the General Contractor of location and framing details necessary for the installation of flush ceiling fixtures and deliver to the General Contractor all frames of these fixtures so that they become a part of the ceiling construction. This Contractor shall verify the actual suspension system to be used and make all adjustments in fixture installation provisions required thereby.
B. Flush fixtures that have light leaks between the frame and ceiling shall have a gasket installed by this Contractor between the trim and the ceiling.

- C. Furnish all mounting straps, frames, rings and other accessories required for a complete lighting installation. Should any conflict occur with the building structure that will not allow proper installation of fixtures, the Engineer shall be contacted before proceeding.
D. No fixtures shall be installed until painting is completed. Fixtures with paint marks on them shall be replaced.

- E. All light fixtures shall be installed with centerlines symmetrical to the building, or at angles so designated by the plans. Fixtures not set thus shall be removed and reinstalled at this Contractor's expense.
F. Any fixtures scratched, bent, cracked or in any way damaged before acceptance by Owner shall be replaced at this Contractor's expense.

- G. All lamps shall be in working order at the time of final acceptance of the work by the Owner and Engineer.
H. All lighting fixtures are to be grounded on the interior of the fixture housing, on clean bare metal (free of paint), by

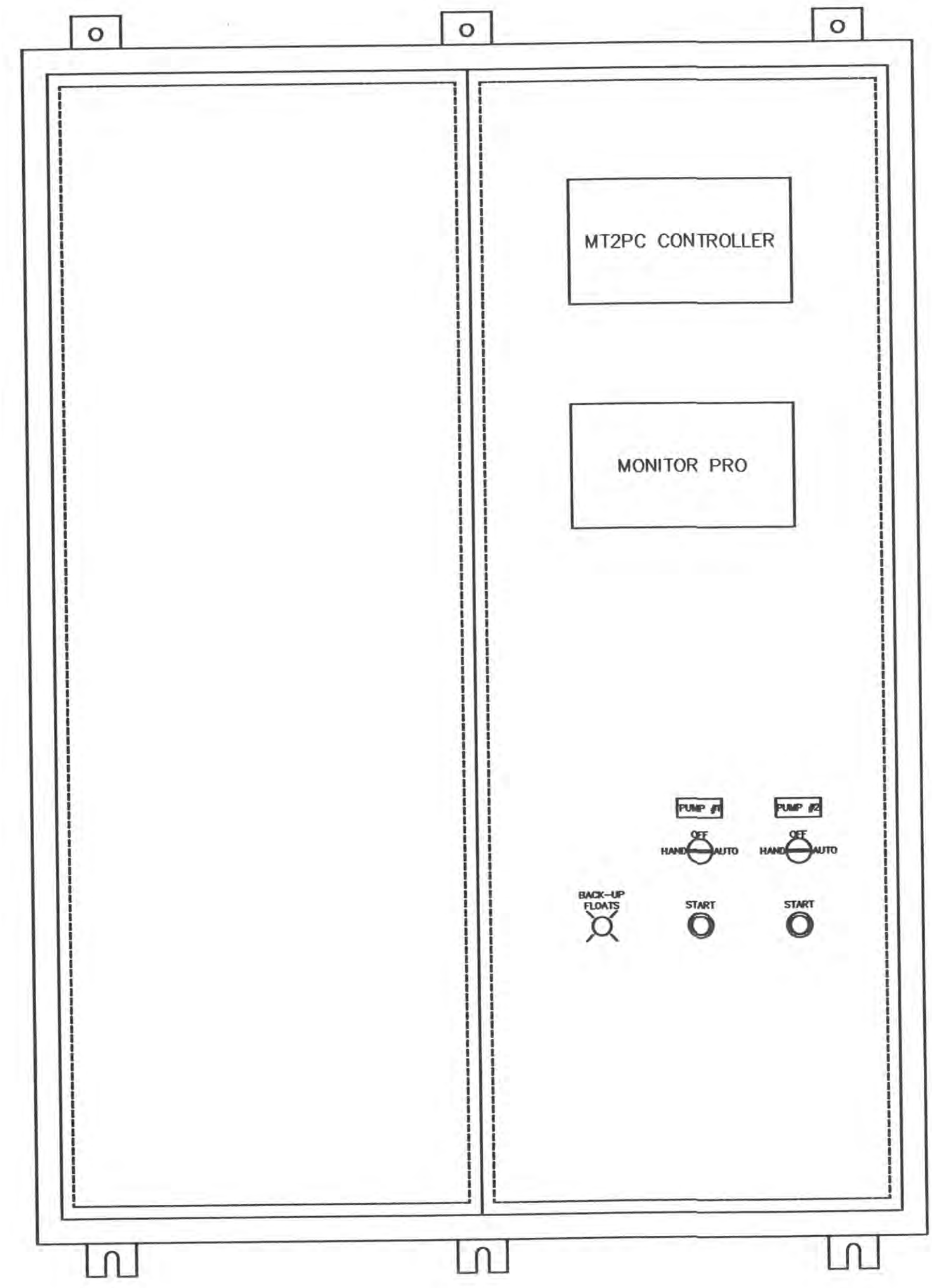
PUMP CONTROL PANEL COMPONENT DESCRIPTIONS

- PUMP CONTROL PANEL (CP-1):**
PROVIDE A NEMA 12 ENCLOSURE THAT IS UL, CSA, AND IEC APPROVED AND SIZED AS REQUIRED. PROVIDE ENCLOSURE COMPLETE WITH FULL SIZE SUB PANEL ENCLOSURE SHALL BE PROVIDED BY PUMP SUPPLIER. PROVIDE ENCLOSURE THAT IS FABRICATED FROM 14-GAUGE STEEL WITH THE FOLLOWING FEATURES:
A. CONTINUOUSLY WELDED AND GROUND SMOOTH SEAMS.
B. OIL-RESISTANT CONTINUOUSLY GASKETED DOORS.
C. 3-POINT LATCHING MECHANISM OPERATED BY AN OIL-TIGHT KEY LOCKING HANDLE.
D. HEAVY GAUGE CONTINUOUS HINGES.
E. REMOVABLE PRINT POCKET MOUNTED ON DOOR.
F. COLLAR STUDS FOR MOUNTING SUB PANEL.
G. GROUND STUD WELDED ON DOOR.
H. FINISH TO BE WHITE EPOXY POLYESTER COATED INSIDE AND ASH 61 HIGH SOLIDS RECOATABLE GRAY FINISH OUTSIDE.
I. SUB PANEL TO BE FULL SIZE OF ENCLOSURE AND CONSTRUCTED OF 10 OR 12-GAUGE STEEL WITH WHITE EPOXY POLYESTER COATED FINISH.
- DUPLEX PUMP CONTROLLER (DPC-1):**
PROVIDE A MULTITRODE LIQUID LEVEL CONTROL SYSTEM AND PROBE AS MANUFACTURED BY FLYGT. PROVIDE MULTITRODE MODEL NO. MT2PC DUPLEX PUMP CONTROLLER AND MULTITRODE PROBE WITH THE FOLLOWING FEATURES:
A. 120 VAC POWERED
B. HI INTENSITY LED'S (RED & GREEN)
C. LEVEL INDICATION AND PUMP/FAULT STATUS
D. MONITORING FOR FOUR LEVELS OF MOTOR FAULTS
E. MULTIPLE PUMP OPERATION
F. PUMP ALTERNATING CAPABILITY
G. MULTIPLE LEVEL INPUTS FROM MULTI-SENSOR PROBES, 4-20MA, BALL FLOATS
I. REMOVABLE FRONT KEYPAD FOR REMOTE MOUNTING
J. MULTITRODE PROBE WITH FOUR (4) SENSING RANGES (MIN.). LENGTH AS REQUIRED.
*PROVIDE SPARE DUPLEX PUMP CONTROLLER
- PUMP CONTROL MONITOR (PCM-1):**
PROVIDE A MONITOR PRO PUMP MONITORING SYSTEM AS MANUFACTURED BY FLYGT. PROVIDE FLYGT MODEL MONITOR PRO-3 WITH THE FOLLOWING FEATURES:
A. 120 VAC POWERED
B. FOUR (4) LINES BY FORTY (40) CHARACTER LCD DISPLAY.
C. SIX (6) DIGITAL INPUTS, TWO (2) ANALOG INPUTS
D. THREE (3) RELAY OUTPUTS
E. REMOVABLE FRONT KEYPAD FOR REMOTE MOUNTING
F. MONITORING FOR UP TO THREE PUMPS FOR:
1. OVER CURRENT
2. UNDER CURRENT
3. PHASE FAIL
4. PHASE ROTATION
5. MOTOR INSULATION TESTING
6. MOTOR GROUND SHORT PROTECTION
7. PUMP STARTS PER HOUR
8. FLOW RATE AND EFFICIENCY
9. HOURS RUN LAST AND TOTAL
10. DUAL POWER SUPPLY BACKUP
11. DATA LOGGER
12. RS232, RS422 AND RS485 COMMUNICATIONS
13. MODBUS PROTOCOL OPTION, CAPABLE OF COMMUNICATING WITH WESTERMAN TELEMETRY SYSTEM.
- PUMP INSULATION MONITOR (PI-IM, P2-IM):**
PROVIDE A SUBMEG MOTOR INSULATION-MONITORING DEVICE AS MANUFACTURED BY FLYGT. PROVIDE FLYGT AUTOMATIC MOTOR INSULATION MONITORING DEVICE COMPLETE WITH RELAY AND SOCKET WITH THE FOLLOWING FEATURES:
A. 120 VAC POWERED
B. "POWER ON" INDICATING LIGHT
C. "LOW MEG" INDICATING LIGHT
D. "500 VDC ON" INDICATING LIGHT
E. "MOTOR RESET" PUSHBUTTON
F. "MEG TEST" PUSHBUTTON
G. "EMERGENCY BYPASS" PUSHBUTTON
- PUMP LEAK/TEMPERATURE SWITCH (P1-LTS, P2-LTS):**
PROVIDE A MINICASS II PUMP MOTOR HIGH WINDING TEMPERATURE AND SEAL LEAKAGE MODULE AS MANUFACTURED BY FLYGT. PROVIDE FLYGT MINICASS II MODULES COMPLETE WITH SOCKETS AND THE FOLLOWING FEATURES:
A. 20 - 30 VAC POWERED
B. TWO CURRENT SENSING RELAYS, ONE UNDER CURRENT SENSING RELAY FOR OVER TEMPERATURE AND ONE OVER CURRENT SENSING RELAY FOR SEAL LEAKAGE
C. 12 VDC VOLTAGE OUTPUT TO SENSORS
D. YELLOW LED FOR SUPPLY VOLTAGE PRESENT
E. RED LED FOR OVER TEMPERATURE INDICATION
F. RED LED FOR SEAL LEAKAGE INDICATION
G. MANUAL RESET FOR WINDING OVER TEMPERATURE INTEGRAL WITH UNIT
H. AUTOMATIC RESET FOR SEAL LEAKAGE

- CIRCUIT BREAKER (CB-1, CB-2, CB-3):**
PROVIDE MOLDED CASE CIRCUIT BREAKERS WITH INVERSE TIME AND INSTANTANEOUS TRIPPING CHARACTERISTICS SIZE PER NEC REQUIREMENTS. ALL CIRCUIT BREAKERS SHALL HAVE GROUND FAULT PROTECTION WHERE INDICATED OR AS REQUIRED BY NEC. CIRCUIT BREAKERS SHALL BE OPERATED BY A TOGGLE-TYPE HANDLE AND SHALL HAVE A QUICK-MAKE/QUICK-BREAK OVER-CENTER SWITCHING MECHANISM THAT IS MECHANICALLY TRIP-FREE. AUTOMATIC TRIPPING OF THE BREAKER SHALL BE CLEARLY INDICATED BY THE HANDLE POSITION. CONTACTS SHALL BE NON-WELDING SILVER ALLOY, AND ARC EXTINCTION SHALL BE ACCOMPLISHED BY MEANS OF ARC CHUTES. A PUSH-TO-TRIP BUTTON ON THE FRONT OF THE CIRCUIT BREAKER SHALL PROVIDE A LOCAL MANUAL MEANS TO EXERCISE THE TRIP MECHANISM.
- CIRCUIT BREAKER HANDLE ACCESS:**
THE INNER DOOR SHALL BE PROVIDED WITH OPENINGS TO ALLOW THE SUBPANEL MOUNTED BREAKER HANDLES TO PROTRUDE THROUGH THE INNER DOOR. THE BREAKER TOGGLE-TYPE HANDLES SHALL BE OPERATED WITHOUT OPENING THE INNER DOOR.
- SMART MOTOR CONTROLLER (P1-SMC, P2-SMC):**
PROVIDE ALLEN BRADLEY BULLETIN 150 SMART MOTOR CONTROLLER / SMC DIALOG PLUS. PROVIDE SMC DIALOG PLUS UNITS THAT ARE PROPERLY SIZED FOR THE LOAD THEY ARE CONTROLLING. PROVIDE UNITS WITH THE FOLLOWING FEATURES:
A. 480 VAC RATED POWER CIRCUIT
B. 120 VAC RATED CONTROL CIRCUIT
C. MULTIPLE STARTING MODES
D. ELECTRONIC MOTOR OVERLOAD PROTECTION
E. METERING
F. BUILT-IN COMMUNICATION PORT
G. 2-LINE, 16 CHARACTER BACKLIT LCD DISPLAY
H. KEYPAD PROGRAMMABLE
I. 3 PROGRAMMABLE AUXILIARY CONTACTS
J. BYPASS CONTACTOR
K. ISOLATION CONTACTOR
- CONTROL POWER TRANSFORMER (CPT-1):**
PROVIDE A CONTROL POWER TRANSFORMER THAT IS SIZED PROPERLY TO SUPPLY 120VAC CONTROL POWER FOR THE PUMP CONTROL PANEL AND ITS ASSOCIATED EQUIPMENT. PROVIDE A TRANSFORMER THAT IS 480 VAC SINGLE PHASE PRIMARY, 120 VAC SINGLE PHASE SECONDARY.
- PUMP SELECTOR SWITCH (P1-SSI, P2-SSI):**
PROVIDE ALLEN BRADLEY MODEL 800T (NEMA 4) 3 POSITION MAINTAINED CONTACT NON-ILLUMINATED SELECTOR SWITCHES WITH CONTACTS RATED FOR 125 VAC OPERATION. PROVIDE SWITCHES COMPLETE WITH CONTACTS AS REQUIRED AND LEGEND PLATES ENGRAVED AS SHOWN ON THE CONTRACT DRAWINGS.
- BACK UP FLOAT SYSTEM IN OPERATION PILOT LIGHT (PL-BU):**
PROVIDE RED ALLEN BRADLEY MODEL 800T PILOT LIGHTS RATED FOR 125 VAC. PROVIDE COMPLETE UNIT WITH ENGRAVED LEGEND PLATES AS SHOWN ON THE CONTRACT DRAWINGS.
- MISC. CONTROL RELAYS:**
PROVIDE 120 VAC CONTROL RELAYS WITH DPDT CONTACTS RATED FOR 5 AMPS (MINIMUM) AT 120 VAC. PROVIDE RELAYS AS REQUIRED, COMPLETE WITH MOUNTING SOCKETS.
- PUMP CONTROL PANEL INTERIOR LIGHT:**
PROVIDE HOFFMAN LOW PROFILE 120 VAC FLUORESCENT LIGHT, OR APPROVED EQUAL. PROVIDE LIGHT COMPLETE WITH INTEGRALLY MOUNTED MANUAL SWITCH AND PROPERLY SIZED LAMP.
- A TWO-FLOAT BACK-UP LEVEL CONTROL SYSTEM SHALL BE INCLUDED TO ACT AS AN EMERGENCY BACK-UP LEVEL CONTROL SYSTEM IN THE EVENT THAT THE MAIN (DUPLEX) SYSTEM SHOULD FAIL. THE BACKUP SYSTEM WILL OPERATE WHEN THE PUMP SELECTOR SWITCHES ARE IN AUTO MODE. INDICATION SHALL BE PROVIDED ON THE CONTROL PANEL WHEN THE BACKUP FLOAT SYSTEM IS IN OPERATION AND A SIGNAL SHALL BE SENT TO THE TELEMETRY SYSTEM. THE BACK-UP LEVEL CONTROL SYSTEM WILL INCLUDE TWO ENCAPSULATED MERCURY FLOAT SWITCHES SUITABLE FOR SUSPENDING DIRECTLY INTO WET WELL. FURNISH FLOATS WITH REQUIRED LENGTH OF 16/2 SJO CORD. FLOATS SHALL BE UL APPROVED AND SUITABLE FOR OPERATING INTRINSICALLY SAFE RELAYS. PROVIDE FLAT STAINLESS STEEL MOUNTING BRACKETS FOR SUSPENDING FLOATS WITH CORD GRIPS INCLUDED.**
- ALL CONTROL PANEL COMPONENTS SHALL BE INTEGRATED TO FROM A COMPLETE AND FUNCTIONING SYSTEM.**
- INTERCONNECTION SCHEMATICS SHALL BE SUBMITTED WITH SHOP DRAWINGS THAT DETAIL HOW EACH COMPONENT IS WIRED AND CLEARLY INDICATE FACTORY AND FIELD WIRING REQUIREMENTS.**
- ALL PROGRAMMABLE SETTINGS SHALL BE SUBMITTED WITH SHOP DRAWINGS THAT DETAIL HOW THE SYSTEM WILL FUNCTION.**

CONTROL PANEL WIRING & FABRICATION REQUIREMENTS

- PROVIDE A NEW PUMP CONTROL PANEL, GRINDER CONTROLLER PANEL, AND SCADA SYSTEM PANEL CONSTRUCTED OF NEW AND UN-DETERIORATED PARTS AND COMPONENTS.
- PROVIDE PANEL SCHEMATICS AND PANEL LAYOUT DRAWINGS FOR EACH CONTROL PANEL SUPPLIED. ITEMS ON THE SCHEMATIC SHALL LABEL TO MATCH THE LABELS USED ON THE PANEL LAYOUT AND BILL OF MATERIAL. PROVIDE AN INTERNAL WIRING SCHEMATIC ON THE INTERIOR OF EACH CONTROL PANEL.
- PROVIDE WIRING INSIDE PANELS THAT IS NEATLY BUNDLED WITH WIRE TIES AND/OR RUN INSIDE PLASTIC WIRE TROUGHS. TERMINATE ALL DEVICE WIRING ON TERMINAL STRIPS WITH NO MORE THAN (2) TWO WIRES PER SCREW. PROVIDE 20% ADDITIONAL SPARE TERMINAL BLOCKS IN EACH PANEL. PROVIDE TERMINALS FOR INCOMING POWER AND NEUTRAL CONNECTIONS. PROVIDE ONE WIRED TERMINAL FOR EVERY (2) TWO FIELD DEVICES POWERED FROM THE SAME WIRE. PROVIDE ONE WIRED TERMINAL FOR EVERY (2) TWO FIELD DEVICES SHARING A COMMON NEUTRAL. PROVIDE SEPARATE TERMINALS FOR DC VOLTAGE / ANALOG SIGNAL WIRING. PROVIDE SPARE TERMINALS FOR SIGNAL CABLE SHIELD TERMINATIONS.
- PROVIDE ISOLATED SPACE INSIDE PANEL FOR INTRINSICALLY SAFE WIRING AS REQUIRED BY NEC AND MANUFACTURER'S RECOMMENDATION.
- LABEL ALL TERMINALS AND WIRES WITH INDIVIDUAL AND UNIQUE WIRE NUMBERS. PROVIDE INDUSTRIAL TYPE WIRE MARKERS, SUCH AS BRADY "WRAP AROUND" TYPE WIRE LABELS. PROVIDE LABELS WITH NUMBERS THAT ARE PRINTED, NOT HAND WRITTEN, ON EACH WIRE LABEL. PROVIDE NAMEPLATES WITH INDIVIDUAL DESIGNATIONS FOR ALL CONTROL RELAYS, BREAKERS, FUSES, AND OTHER MISCELLANEOUS EQUIPMENT MOUNTED INSIDE PANELS. PROVIDE SUFFICIENT WIRING SO THAT ALL DOORS MAY BE FULLY OPENED FOR PANEL ACCESS WITHOUT HAVING TO DISCONNECT ANY WIRING, TERMINAL BLOCKS, ETC. DESIGN INTERIOR OF PANELS SO THAT ALL DEVICES, WIRING, TERMINAL BLOCKS, ETC., ARE EASILY ACCESSIBLE FOR MAINTENANCE AND TESTING.
- PROVIDE UL LISTED TYPE MTW WIRE WITH 600V INSULATION, MINIMUM SIZE #18 AWG COPPER FOR DC VOLTAGE / ANALOG SIGNAL WIRING, UNLESS NOTED OTHERWISE ON THE DRAWINGS. KEEP ALL DC VOLTAGES/ ANALOG SIGNAL WIRING SEPARATE FROM 120V WIRING.
- PROVIDE UL LISTED TYPE MTW WIRE WITH 600V INSULATION, MINIMUM SIZE #16 AWG COPPER FOR 120 VAC PANEL WIRING.
- COLOR CODE ALL 120 AC PANEL WIRING AS DETAILED IN THE ELECTRICAL SPECIFICATIONS TO IDENTIFY IT SEPARATELY FROM ANALOG SIGNAL AND COMMUNICATIONS WIRING, AND KEEP 120 VAC WIRING IN SEPARATE WIRING TROUGHS FROM ALL OTHER WIRING. PANELS ARE ARRANGED SUCH THAT ALL WIRING FROM THE TERMINAL BLOCKS TO THE FIELD IS SEPARATED FROM THAT WIRING WITHIN THE PANEL. MAINTAIN THIS SEGREGATION.
- PROVIDE PANELS THAT ARE FACTORY WIRED AND TESTED PRIOR TO SHIPMENT SO THAT FIELD INSTALLATION WILL CONSIST ONLY OF SETTING PANELS IN PLACE AND MAKING FINAL FIELD CONNECTIONS.
- PROVIDE AN INSTALL ALL SWITCHES, PILOT LIGHTS, AND OTHER PANEL DEVICES AS SPECIFIED HEREIN OR AS NOTED ON THE DRAWINGS.
- PROVIDE AND INSTALL ALL PLUG-IN CONTROL RELAYS IN CONTROL PANELS AS NOTED ON THE DRAWINGS.
- SIZE FUSE IN THE PANEL
- PROVIDE ORIGINAL AND (3) THREE SPARE FUSES FOR EACH TYPE AND
- MOUNT SUB PANEL AS INDICATED ON THE DRAWINGS.



PUMP CONTROL PANEL FRONT DOOR LAYOUT
SCALE: NOT TO SCALE
NOTE: MAXIMUM 36" WIDE

CONTROL PANEL INSTALLATION REQUIREMENTS

- WIRE ALL POWER AND DEVICES TO THE CONTROL PANELS AS DETAILED ON THE CONTRACT DRAWINGS.
- CLEARLY IDENTIFY AND MARK ALL CONDUITS ENTERING AND LEAVING THE CONTROL PANELS AS TO THEIR DESTINATION.
- KEEP ALL FIELD WIRING NEAT AND BUNDLED INSIDE THE CONTROL PANELS. ALL FIELD WIRING SHALL BE CONTAINED IN WIREWAY PROVIDED WITHIN THE CONTROL PANELS.
- TAKE CARE TO KEEP CONDUIT FILINGS FROM ENTERING PANELS WHEN INSTALLING CONDUITS.
- PROVIDE 3/4" PLYWOOD MOUNTING BOARD ON WALL WHERE PANELS ARE MOUNTED.

PUMP CONTROL OPERATIONAL DESCRIPTION

- THE PUMP CONTROL PANEL (CP-1) SHALL CONTROL TWO WASTEWATER LIFT PUMPS. THE SEQUENCE OF OPERATION WITH FEATURES REQUIRED FOR OPERATION, SAFETY & MONITORING SHALL INCLUDE, BUT NOT BE LIMITED TO, THE FOLLOWING:
- EACH PUMP SHALL BE CONTROLLED BY A "HAND-OFF-AUTO" SELECTOR SWITCH AND A DUPLEX PUMP CONTROLLER.
 - A SELECTOR SWITCH AND START PUSHBUTTON SHALL BE PROVIDED FOR EACH PUMP. THE SELECTOR SWITCH WILL CONTROL THE PUMP IN THE FOLLOWING MANNER. IN THE "OFF" POSITION, THE PUMP WILL NOT RUN. IN THE "HAND" POSITION, THE PUMP WILL RUN WHEN THE START PUSHBUTTON IS PRESSED UNTIL THE SELECTOR SWITCH IS TURNED TO THE "OFF" POSITION. PROCESS INTERLOCKS SUCH AS LEVEL SWITCHES AND DUPLEX CONTROLLER WILL BE BYPASSED WHEN IN HAND MODE. SAFETY INTERLOCKS SUCH AS WINDING TEMP, SEAL FAILURE, PUMP OVERLOAD WILL FUNCTION IN HAND MODE. IN THE "AUTO" POSITION THE PUMP WILL RUN BASED ON THE SIGNALS FROM THE DUPLEX PUMP CONTROLLER.
 - A SINGLE DUPLEX PUMP CONTROLLER SHALL BE PROVIDED TO CONTROL THE TWO PUMPS. THE DUPLEX PUMP CONTROLLER SHALL PROVIDE THE FOLLOWING CONTROL BASED ON A MULTI-POINT LEVEL PROBE. PUMP CONTROLLER SHALL ACCEPT INPUTS FROM A MULTI-POINT PROBE (10 POINTS). THE CONTROLLER WILL BE ABLE TO SELECT 4 SIGNALS TO USE AS CONTROL POINTS AS DESCRIBED BELOW. THE FOLLOWING SEQUENCE SHALL BE USED TO CONTROL THE PUMPS:
LEVEL 1: LOW LEVEL (ALL PUMPS OFF)
LEVEL 2: LEAD PUMP ON
LEVEL 3: LAG PUMP ON
LEVEL 4: HIGH LEVEL ALARM
- NOTE: ELEVATIONS FOR LEVELS ARE SHOWN ON "PUMP STATION PLAN VIEW & CROSS SECTION".
- THE TWO-FLOAT BACK-UP LEVEL CONTROL SYSTEM SHALL CONTROL THE PUMPS IN THE FOLLOWING MANNER:
FLOAT 1 - BOTH PUMPS ON (SET 1 FT. ABOVE LEVEL 3 NOTED ABOVE)
FLOAT 2 - BOTH PUMPS OFF (SET 1 FT. BELOW LEVEL 1 NOTED ABOVE)
 - MOTOR STARTERS SHALL BE "SOFT START" AND SHALL BE PROGRAMMED FOR INTERACTIVE PUMP CONTROL TO HELP ELIMINATE FLUID SURGES DURING STARTING AND STOPPING. THE MOTOR STARTERS SHALL BE ISOLATED FROM THE PUMP MOTORS WHEN THE INSULATION MONITOR IS IN ITS TEST CYCLE.

BENNETT ENGINEERING, INC.
Consulting Engineers
250 EAST HOME STREET
WESTERWILLE, OHIO 43081
PHONE (614) 818 3303
FAX (614) 818 3322

JOB NO. 2000-015
DESIGNED BY
MARK A. BENNETT P.E.
DRAWN BY
MAB
CHECKED BY
MAB

STATE OF OHIO
REGISTERED PROFESSIONAL ENGINEER
MARK BENNETT
E-54451

DELAWARE COUNTY, OHIO
THE WOODS
ON SELDOM SEEN
PUMP STATION IMPROVEMENTS

R.D. Zande & Associates, Inc.
1500 Lake Shore Drive, Suite 100 Columbus, Ohio 43204
(614) 486-4383 1-800-340-2743
FAX (614)-486-4387

SCALE: AS NOTED

ELECTRICAL SPECIFICATIONS & DETAILS

11/12

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MECHANICAL SPECIFICATIONS

I. GENERAL CONDITIONS

A. GENERAL

- EXCEPT AS SPECIFIED TO THE CONTRARY, THIS CONTRACT SHALL INCLUDE FURNISHING, INSTALLING, CONNECTING AND OPERATION OF ALL EQUIPMENT WHICH IS PART OF MECHANICAL SYSTEMS.
- GENERAL AND SPECIAL CONDITIONS OF AIA (AMERICAN INSTITUTE OF ARCHITECTS) AND OWNER'S GENERAL REQUIREMENTS SHALL APPLY UNLESS NOTED OTHERWISE.
- THE REQUIREMENTS SET FORTH UNDER "GENERAL CONDITIONS", "MODIFICATIONS TO GENERAL CONDITIONS" AND "SPECIAL CONDITIONS" ARE A PART OF THIS CONTRACT.
- THIS CONTRACT SHALL INCLUDE A VISIT TO THE JOB SITE AND TAKE INTO CONSIDERATION MECHANICAL, ELECTRICAL AND GENERAL TRADE WORK IN PLACE AND WORK TO BE PUT INTO PLACE PRIOR TO BIDDING, REROUTING OF DUCTWORK, PIPING AND EQUIPMENT, AS REQUIRED TO MEET THIS WORK SHALL BE ACCOMPLISHED AT NO ADDITIONAL COST TO THE OWNER.
- ALL MOTORS FOR SUCH EQUIPMENT (IF AND WHERE SPECIFIED ON DRAWINGS) SHALL BE FURNISHED AND INSTALLED AS PART OF THIS CONTRACT. CONTROLS FOR SUCH MOTORS SHALL BE FURNISHED UNDER THIS CONTRACT AND INSTALLATION OF CONTROLS AND ALL ELECTRICAL WIRING, NOT SHOWN ON ELECTRICAL DRAWINGS, SHALL BE PERFORMED UNDER THIS CONTRACT.

B. SUBSTITUTIONS AND MISCELLANEOUS EQUIPMENT

- THE BIDDING OF THIS WORK WILL CONTEMPLATE THE USE OF EQUIPMENT AND MATERIALS EXACTLY AS SPECIFIED HEREIN. WHERE ONE OR MORE NAMES OF MANUFACTURERS ARE MENTIONED ANY ONE MAY BE UTILIZED.
- SUBSTITUTIONS WILL NOT BE ACCEPTED.
- MISCELLANEOUS ITEMS NECESSARY TO COMPLETE THE PIPING SYSTEMS SUCH AS FITTING, HANGERS, ETC., CAN BE OF ANY RECOGNIZED MANUFACTURER PROVIDED THESE ITEMS MEET MINIMUM STANDARDS AS SET BY THE ENGINEER.

C. ORDINANCES, PERMITS CERTIFICATES AND OWNER REQUIREMENTS

- ALL WORK UNDER THIS CONTRACT SHALL BE INSTALLED IN FULL ACCORDANCE WITH THE OWNER'S REQUIREMENTS, ALL LAWS, ORDINANCES AND ALL REGULATIONS OF THE STATE, COUNTY, AND MUNICIPALITY WHICH IN ANY WAY AFFECTS THIS WORK. THE ARCHITECT WILL OBTAIN THE GENERAL BUILDING, MECHANICAL, ELECTRICAL AND PLUMBING PERMITS. ANY OTHER PERMITS AND CERTIFICATES OF INSPECTION REQUIRED FOR THE PROJECT WILL BE OBTAINED BY THE CONTRACTOR PERFORMING THE WORK. FEES WILL BE INCLUDED IN THE BID PRICE. ALL WORK SHALL ALSO BE INSTALLED IN ACCORDANCE WITH REGULATIONS OF THE FIRE UNDERWRITERS HAVING JURISDICTION AND LOCAL UTILITIES. CONTRACTOR SHALL ALSO SECURE ANY PERMITS OR PAY ANY FEES TO THE LOCAL UTILITY COMPANIES FOR THE WORK REQUIRED.

D. DRAWINGS

- MECHANICAL DRAWINGS ARE DIAGRAMMATIC AND ARE INTENDED TO SHOW THE APPROXIMATE LOCATION OF OUTLETS, EQUIPMENT AND PIPING.
- THE EXACT LOCATION OF OUTLETS, EQUIPMENT AND PIPING MAY BE CHANGED FROM TIME TO TIME AS WORK PROGRESSES. UNDER THIS CONTRACT ALL LOCATIONS SHALL BE VERIFIED WITH ALL TRADES AND THAT THEY ARE ACCORDING TO THE LATEST INFORMATION AVAILABLE. SHOULD THIS NOT BE DONE THE WORK WILL BE CHANGED AT NO ADDITIONAL EXPENSE TO THE OWNER.
- THE OWNER RESERVES THE RIGHT TO MAKE MINOR CHANGES IN LOCATIONS OF EQUIPMENT OR PIPING ARRANGEMENTS UP TO THE TIME OF ROUGH-IN WITHOUT ADDITIONAL COSTS.
- THE DRAWINGS AND SPECIFICATIONS ARE INTENDED TO SUPPLEMENT EACH OTHER AND ANY MATERIALS OR LABOR CALLED FOR IN ONE SHALL BE FURNISHED EVEN THOUGH NOT MENTIONED IN BOTH. ANY MATERIAL OR LABOR WHICH IS NEITHER SHOWN ON THE DRAWINGS NOR CALLED FOR IN THE SPECIFICATIONS BUT WHICH IS OBVIOUSLY NECESSARY TO COMPLETE THE WORK AND WHICH IS USUALLY INCLUDED IN WORK OF A SIMILAR CHARACTER SHALL BE FURNISHED UNDER THIS CONTRACT.

E. SHOP DRAWINGS

- AS PART OF THE WORK INCLUDED UNDER EACH MECHANICAL SECTION, WITHOUT CAUSING ANY DELAY IN WORK, SHOP DRAWINGS OF ALL EQUIPMENT AND MATERIAL SHALL BE SUBMITTED FOR ENGINEER'S REVIEW.
- SUBMITTALS SHALL INCLUDE WIRING DIAGRAMS, PERFORMANCE CURVES AND DATA SPECIFIC TO THIS PROJECT AND BEAR CONTRACTOR'S APPROVAL STAMP CERTIFYING THAT HE HAS VERIFIED CONFORMANCE TO THE CONTRACTUAL DOCUMENTS.
- IN THE ENGINEER'S REVIEW OF SHOP DRAWINGS, REVIEW IS FOR CONFORMANCE WITH THE GENERAL DESIGN CONCEPT AND ARRANGEMENT ONLY. COMMENTS, CORRECTIONS OR MARKINGS DO NOT CONSTITUTE WAIVER OF THE CONTRACT DOCUMENTS REQUIREMENTS, DIMENSIONS, QUANTITIES AND COORDINATION ARE THE RESPONSIBILITY OF THE CONTRACTOR.

F. CLEANING UP

- UNLESS OTHERWISE NOTED, ALL EXCESS MATERIALS AND DEBRIS CAUSED BY THIS WORK SHALL BECOME THE PROPERTY OF THE CONTRACTOR AND PROMPTLY BE REMOVED FROM THE SITE. ALL FIXTURES AND EQUIPMENT INSTALLED SHALL BE THOROUGHLY CLEANED WEEKLY. ALL MOTORS AND EQUIPMENT SHALL BE COVERED OR OTHERWISE PROTECTED FROM CONSTRUCTION DUST AND DEBRIS. NO EQUIPMENT OTHER THAN THOSE DESIGNED TO BE EXPOSED TO INCLEMENT WEATHER.

G. CUTTING AND PATCHING

- CUTTING FOR OPENINGS, WHEN NECESSARY, SHALL BE DONE BY THIS CONTRACTOR WITH SUCH TOOLS AND METHODS AS TO PREVENT UNNECESSARY DAMAGE TO SURROUNDING AREAS OR EQUIPMENT.
- PATCHING SHALL MATCH EXISTING SURFACES IN KIND AND FINISH, AND SHALL BE DONE BY THE GENERAL CONTRACTOR.
- NO STRUCTURAL MEMBER WILL BE CUT INTO WITHOUT THE EXPRESSED PERMISSION OF THE OWNER'S REPRESENTATIVE.

H. GUARANTEE

- ALL LABOR AND MATERIALS FURNISHED UNDER THIS CONTRACT SHALL BE GUARANTEED FOR A PERIOD OF ONE (1) YEAR FROM THE DATE OF FINAL ACCEPTANCE BY THE OWNER WHICH WILL COMMENCE UPON THE FINAL INSPECTION BY THE ENGINEER. DURING THIS TIME, ALL LEAKS, CORRECTION OF ALL FAILURES TO SUCH MATERIAL AND THE CORRECTION OF ALL DISCREPANCIES WITH DRAWING CODE AND THE SPECIFICATIONS SHALL BE DONE UNDER THIS CONTRACT AT NO ADDITIONAL EXPENSE TO THE OWNER.

I. RECORD DRAWINGS

- THE CONTRACTOR SHALL KEEP AN ACCURATE RECORD OF ALL DEVIATIONS FROM CONTRACT DRAWINGS AND SPECIFICATIONS. HE SHALL NEATLY AND CORRECTLY ENTER IN COLORED PENCIL ANY DEVIATIONS ON DRAWINGS. AT COMPLETION OF THE PROJECT DELIVER DRAWINGS TO OWNER'S REPRESENTATIVE.

III. HVAC

J. EXHAUST DUCTWORK AND ACCESSORIES

- DUCTWORK AND ACCESSORIES SHALL BE FABRICATED AND INSTALLED IN STRICT ACCORDANCE WITH THE 2" W.C. TABLE IN THE LATEST EDITION OF "SMACNA EXCEPT AS HEREIN NOTED AND/OR AS DETAILED ON THE DRAWINGS.

- FIBERGLASS DUCT BOARD SHALL NOT BE UTILIZED. DUCTWORK, PLENUM, ETC. ALL DUCTWORK SHALL BE CONSTRUCTED OF ALUMINUM.

- VANED ELBOWS ARE TO UTILIZE DOUBLE THICKNESS VANES WITH THE ELBOW HEAL RADIUSED THE SAME AS THE TURNING VANE. ELBOW CHECKS ARE TO BE MINIMUM OF 3". VANED ELBOWS ARE NOT TO BE UTILIZED IN DUCTWORK WHERE VELOCITY EXCEEDS 2000 FPM.

- RADIUS ELBOWS, 1/3 RADIUS OR FULL RADIUS ARE TO BE UTILIZED EXCEPT WITHIN 20' OF AN AIR OUTLET. 1/3 RADIUS ELBOWS SHALL HAVE A TURNING VANE ONE GAGE HEAVIER THAN DUCT CONSTRUCTION.

- ALL DUCTWORK DIMENSIONS INDICATED ON PLANS ARE CLEAR INSIDE DIMENSIONS.

- FLEXIBLE CONNECTIONS TO ALL EQUIPMENT SHALL BE MADE WITH 3" WIDE DOUBLE NEOPRENE COATED FLAME RETARDANT FIBER GLASS FLEXIBLE CONNECTION. FLEXIBLE TO HAVE A MINIMUM OF 24" GAGE, 3" WIDE SHEET METAL COLLARS PERMANENTLY ATTACHED TO EACH SIDE.

- MITERED OFFSETS GREATER THAN 30" IN EITHER DIRECTION SHALL NOT BE PERMITTED.

- CHANGES IN DUCT SIZES SHALL BE MADE BY UNIFORM TAPER SECTION WITH A MAXIMUM INCLUDED ANGLE OF DIVERGENCE OF 15".

K. EXHAUST FAN

- SUPPLY OR EXHAUST FANS SHALL BE THE BELT DRIVEN MODEL BSI CENTRIFUGAL SQUARE INLINE TYPE.

- FANS SHALL BE TESTED IN ACCORDANCE WITH AMCA 211 AND AMCA 311 TEST CODES FOR AIR MOVING DEVICES AND SHALL BE GUARANTEED BY THE MANUFACTURER TO DELIVER RATED PUBLISHED PERFORMANCE LEVELS. FANS SHALL BE LICENSED TO BEAR THE AMCA CERTIFIED RATINGS SEAL FOR BOTH SOUND AND AIR. FANS SHALL BE CULUS LISTED FOR ELECTRICAL.

- UNIT EXTERIOR SHALL BE CONSTRUCTED OF HEAVY GAUGE GALVANIZED STEEL. THE FAN HOUSING SHALL BE SQUARE IN SHAPE AND READILY ATTACHABLE TO DUCTWORK. UNIT SIDE PANELS SHALL BE REMOVABLE FOR EASY ACCESS FOR MAINTENANCE AND SERVICE. SIDE PANELS SHALL BE REMOVABLE TO PROVIDE A 90-DEGREE SIDE DISCHARGE. THE POWER ASSEMBLY SHALL BE REMOVABLE AS A COMPLETE MODULE THROUGH THE SIDE ACCESS PANEL. FAN HOUSINGS SHALL HAVE UNIVERSAL MOUNTING BRACKETS TO ACCOMMODATE HORIZONTAL OR VERTICAL INSTALLATIONS.

- FAN WHEELS SHALL BE OF THE NON-OVERLOADING CENTRIFUGAL BACKWARD INCLINED TYPE, CONSTRUCTED OF ALUMINUM AND CONTAINING A MATCHING INLET VENTURI FOR OPTIMUM UNIT PERFORMANCE. WHEELS SHALL BE STATICALLY AND DYNAMICALLY BALANCED.

- FAN SHAFTS SHALL BE PRECISION GROUND AND POLISHED. SHAFTS SHALL HAVE A FIRST CRITICAL SPEED OF AT LEAST 125% OF THE FAN'S MAXIMUM OPERATING SPEED.

- BEARINGS SHALL BE OF THE ONE-PIECE, PILLOW BLOCK TYPE WITH LUBRICABLE ZERO FITTINGS. BEARINGS SHALL BE DESIGNED FOR AIR HANDLING SERVICE WITH A MINIMUM L-10 LIFE IN EXCESS OF 100,000 HOURS; L-50 500,000 HOURS AT THE MAXIMUM CATALOGUED OPERATING SPEED. BEARING MOUNTING PLATE SHALL HAVE SELF-ALIGNING TABS FOR EXACT LOCATING AND ALIGNMENT OF BEARINGS.

- DRIVES SHALL BE SIZED FOR A MINIMUM OF 150% OF DRIVEN HORSEPOWER. MACHINED, CAST IRON MOTOR SHEAVES SHALL BE ADJUSTABLE FOR FINAL SYSTEM BALANCING. THE BELT AND PILLOW BLOCK BALL BEARINGS SHALL BE PROTECTED FROM THE AIRSTREAM BY AN ENCLOSURE.

- MOTORS SHALL BE OF THE HEAVY-DUTY BALL BEARING TYPE, CLOSELY MATCHED TO THE FAN LOAD. A DISCONNECT SWITCH SHALL BE FACTORY INSTALLED AND WIEDED TO THE FAN MOTOR AS STANDARD. MOTOR SHALL BE MOUNTED ON THE OUTSIDE OF THE UNIT, ISOLATED FROM THE AIRSTREAM. ALL MOTORS SHALL BE UL AND/OR CSA RECOGNIZED. BELT DRIVE FANS SHALL BEAR THE AMCA RATINGS SEAL FOR AIR AND SOUND PERFORMANCE. FANS AND MOTORS SHALL CARRY THE UL AND/OR CSA LISTING MARK. FANS SHALL BEAR A PERMANENTLY ATTACHED NAMEPLATE DISPLAYING MODEL AND SERIAL NUMBER OF THE UNIT FOR FUTURE IDENTIFICATION.

- FAN SHALL INCLUDE BACKDRAFT DAMPER, MOTOR COVER, INSULATED HOUSING, MOUNTING BRACKETS AND VIBRATION ISOLATORS. FAN SHALL BE SPARK RESISTANT CONSTRUCTION (TYPE B).
- EXHAUST FANS BY AEROMOT OR HARTZELL OF THE SAME TYPE AND MEETING SPECIFIED REQUIREMENTS, MAY BE FURNISHED AT THE CONTRACTOR'S OPTION.

L. LOUVERS

- HEAVY DUTY, DRAINABLE BLADE TYPE STATIONARY LOUVERS SHALL BE AEROLITE K6776, 6" DEEP OF 12 GAUGE (.081") EXTRUDED ALUMINUM WITH 1/2" ALUMINUM MESH BRASSSCREEN INSIDE. MAXIMUM BLADE SPACING SHALL BE 3-1/2". LOUVERS SHALL BE CERTIFIED TO BE WEATHERTIGHT WHEN HANDLING CFM'S INDICATED. FOR COMPARISON PURPOSES, A 4'-0" X 4'-0" LOUVER MUST HAVE A MINIMUM FREAREA OF 866 SQ. FT. AND A MAXIMUM PRESSURE DROP OF 0.15" AT 1100 FPM THROUGH FREE AREA (INTAKE). WATER PENETRATION SHALL BE NO MORE THAN 0.003 OUNCES OF WATER PER SQUARE FOOT OF FREE AREA WHEN TESTED FOR 15 MINUTES AT 1100 FPM PER AMCA STANDARD 500. LOUVERS SHALL HAVE AMCA CERTIFIED RATING SEAL. PROVIDE DATA WITH SUBMITTALS. LOUVERS TO HAVE CONTINUOUS BLADE APPEARANCE.

- LOUVERS AND DAMPERS BY GREENIECK, LOUVERS AND DAMPERS, INC., ARROW UNITED, RUSON OR AMERICAN WARNING OF THE SAME TYPE AND MEETING SPECIFIED REQUIREMENTS, MAY BE FURNISHED AT THE CONTRACTOR'S OPTION.

- STATIONARY LOUVERS TO BE INSTALLED BY THIS CONTRACTOR. CAULK ALL AROUND LOUVERS WITH GUN GRADE "SONOLASTIC" SEALANT. CAULKING SHALL BE APPLIED WITH A HAND GUN AND WORK SHALL BE LEFT NEAT AND CLEAN.

- FINISH TO BE KYNAR 500, COLOR APPROVED BY THE OWNER.

- CAULK COLOR TO MATCH LOUVER FINISH AS CLOSELY AS POSSIBLE.

- INSTALL LOUVERS AS RECOMMENDED BY MANUFACTURER.

EQUIPMENT NOTES

UH-1

HORIZONTAL ELECTRIC UNIT HEATER, QMARK MODEL MUH-10-4, 34.1 MBH, 650 CFM, 10 KW, 12.0 AMPS, 1/30 HP FAN MOTOR, 480V, 3Ø, 2 STAGE BUILT-IN THERMOSTAT, POWER DISCONNECT SWITCH, AND HORIZONTAL CEILING SWIVEL BRACKET.

EF-1

TWIN CITY MODEL BSI-090, 300 CFM, 1/2" STATIC PRESSURE, 1379 RPM, 3,791 TIP SPEED, 309 OUTLET VELOCITY, 8.2 SONES, 0.08 BHP, 1/4 HP, 120V, 1Ø, GRAVITY DAMPER, SPRING ISOLATORS. FAN SHALL BE RUN CONTINUOUSLY.

HVAC NOTES

- PIPING AND DUCT LAYOUT IS ONLY SCHEMATIC. EXACT LOCATION OF PIPES AND DUCTS TO BE COORD. ON JOB W/BLDG. STRUCTURE, AND WORK OF OTHER CONTRS.
- NOTIFY GENERAL CONTRACTOR OF SIZE AND LOCATION OF ALL RECESSES AND OPENINGS REQUIRED FOR HVAC WORK.
- INSTALL MANUAL BALANCING DAMPERS AS SHOWN AND AS REQUIRED FOR PROPER BALANCING OF AIR HANDLING SYSTEMS.
- COORDINATE ALL DUCT LOCATIONS WITH GENERAL CONTR. PROVIDE ADDITIONAL OFFSETS AS REQUIRED.

CODED NOTES

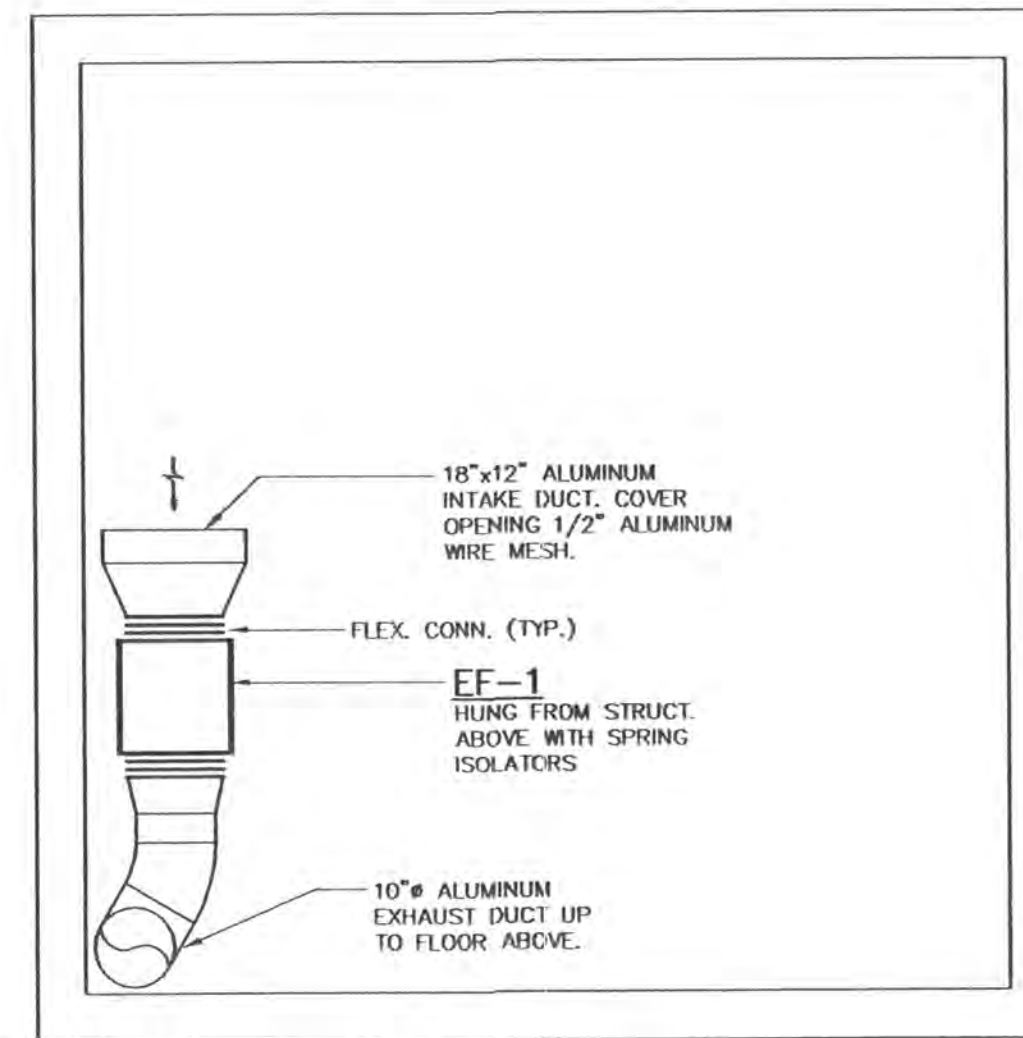
- ELECTRICAL EQUIPMENT BY THE ELECTRICAL CONTR.
- UNIT HEATER TO BE MOUNTED AS HIGH AS POSSIBLE. COORDINATE EXACT LOCATION OF THE UNIT WITH THE ADJACENT ELECTRICAL EQUIPMENT TO MAINTAIN ALL NEC REQUIRED CLEARANCES.
- LOUVER TO BE FURNISHED AND INSTALLED BY THE HVAC CONTRACTOR. LOUVER SHALL BE SEALED WEATHERTIGHT. COLOR SELECTION OF THE LOUVER BY THE OWNER.
- OPEN FLOOR GRATE BY THE GENERAL CONTRACTOR TO PERMIT AIR TO FLOW FROM THE UPPER LEVEL TO THE LOWER LEVEL.

MECHANICAL LEGEND

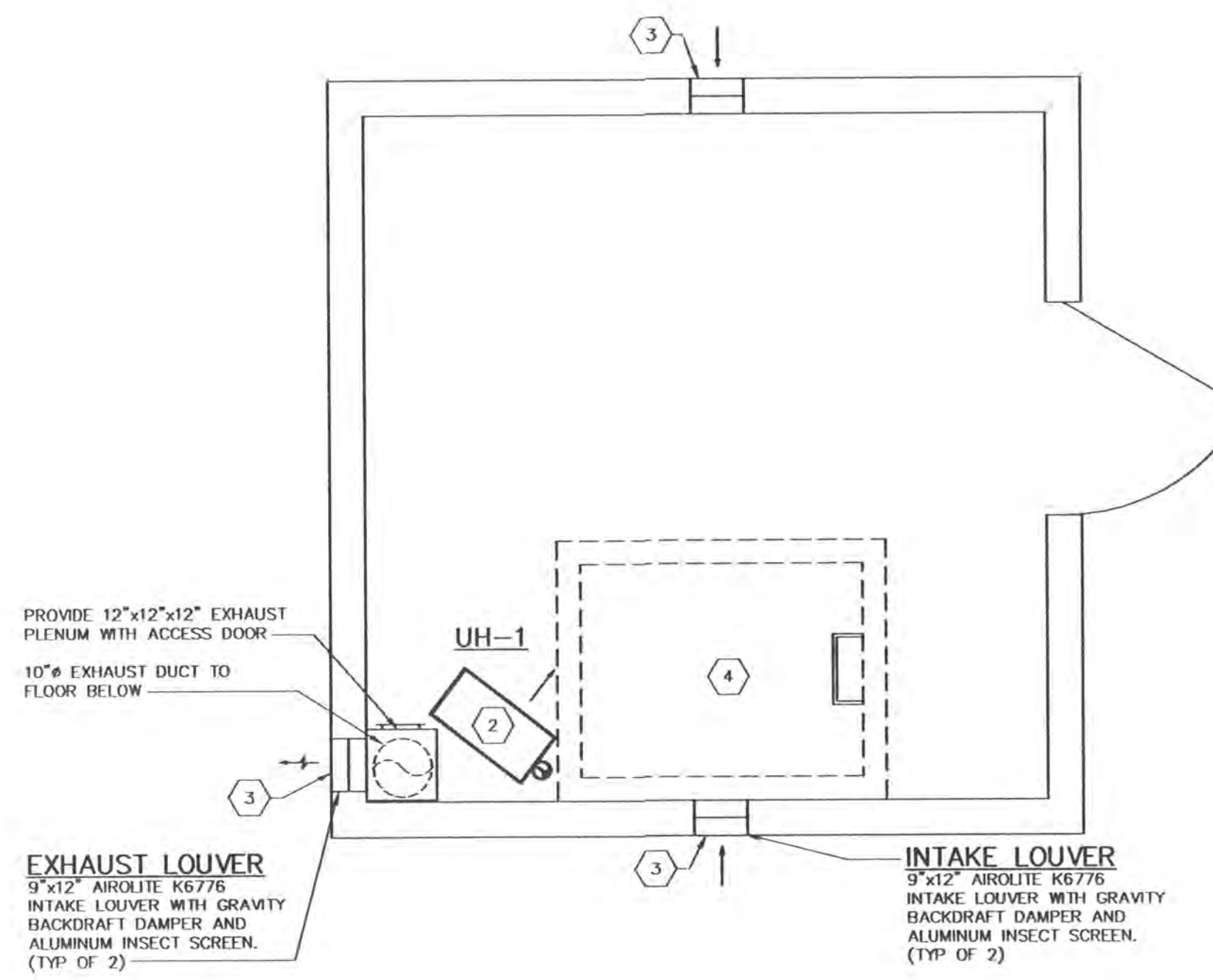
SYMBOL	DESCRIPTION	SYMBOL	DESCRIPTION
CW	DOMESTIC COLD WATER LINE	— —	PIPE UNION
CWR	CHILLED WATER RETURN	— —	Y-TYPE STRAINER
CWS	CHILLED WATER SUPPLY	— —	COMB. BALANCE & STOP VALVE
D	DRAIN LINE	— —	GATE VALVE (SCREWED BODY)
G	GAS LINE	— —	BALL VALVE
HG	HOT GAS LINE	— —	CHECK VALVE
HW	DOMESTIC HOT WATER LINE	— —	GAS COCK OR BALANCE VALVE
LQ	LIQUID LINE	— —	FLOOR OR AREA DRAIN
SAN	SANITARY LINE	— —	THERMOSTAT
SUCT	SUCTION LINE	— —	CONNECT TO EXISTING
V	VENT LINE	— —	THRU FLOOR AS SHOWN
—●—	PENDANT TYPE SPRINKLER HEAD	— —	JANITOR OR SHOWER TRIM
—○—	UPRIGHT TYPE SPRINKLER HEAD	— —	SUPPLY DUCT UP
—○—	P-TRAP (PLAN VIEW)	— —	SUPPLY DUCT DOWN
—X—	HOSE BIBB	— —	R.A., O.A., OR EXH. DUCT UP
—	EXISTING WORK TO REMAIN	— —	R.A., O.A., OR EXH. DUCT DOWN
—	EXISTING WORK TO BE REMOVED	— —	ROUND DUCT
—	HEATING WATER RETURN	— —	ELBOW WITH TURNING VANES
—	HEATING WATER SUPPLY	— —	MAN. DAMPER
—	PIPE FLANGES	— —	SPIN-IN FITTING WITH BALANCE DAMPER
—	45° BOOT BRANCH TAKEOFF	— —	

MECHANICAL ABBREVIATIONS

AB.	ABOVE	INV. ELEV.	INVERT ELEVATION
A.D.	ACCESS DOOR	J.R.	JANITOR RECEPTOR
BTM.	BOTTOM	LAV.	LAVATORY
BLDG.	BUILDING	MAN. DPR.	MANUAL DAMPER
C.G.	CEILING	MECH.	MECHANICAL
CONC.	CONCRETE	M. A.	MIXED AIR
C.O.	CLEANOUT	O.A.	OUTSIDE AIR
CONN.	CONNECT	PLBG.	PLUMBING
CONTR.	CONTRACTOR	REG.	REGISTER
DTL.	DETAIL	REDD.	REQUIRED
DIFF.	DIFFUSER	R.A.	RETURN AIR
DN.	DOWN	RM.	ROOM
ELEC.	ELECTRICAL	S.A.	SUPPLY AIR
EXH.	EXHAUST	SH.T.MTL.	SHEET METAL
EXIST.	EXISTING	S & R	SUPPLY & RETURN
E.W.C.	ELECTRIC WATER COOLER	S.S.	SERVICE SINK
FLEX.	FLEXIBLE	TYP.	TYPICAL
FLR.	FLOOR	T.C.C.	TEMP. CONTROL CONTRACTOR
F.D.	FLOOR DRAIN	UR.	URNAL
FURN.	FURNISH	V.T.R.	VENT THRU ROOF
GR.	GRILLE	VB. ISOL.	VIBRATION ISOLATION
H.B.	HOSE BIBB	W/	WITH
HTR.	HEATER	W.C.	WATER CLOSET



HVAC DRY WELL PLAN
SCALE: 1/2" = 1'-0"



HVAC FLOOR PLAN
SCALE: 1/2" = 1'-0"

H5039501

PRATER
Engineering Associates, Inc.

6130 Wilcox Road
Dublin, Ohio 43016

(614) 766 4896
FAX: (614) 766 2354

DESIGNED BY: RKB
DRAWN BY: RKB
CHECKED BY: TP
JOB NO.: 04198

DELAWARE COUNTY, OHIO

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HVAC PLANS AND DETAILS

12
12

