

AQUASM Indiana

STANDARD DETAILS

DIRECTIONS FOR USE

1. THE ENTIRE SET OF FULL SIZE STANDARDS SHALL BE ATTACHED TO THE CONSTRUCTION DRAWINGS AND SHALL BE CONSIDERED PART THERETO. PARTIAL SET MAY BE USED FOR SMALL PROJECTS WHEN APPROVED BY AQUA INDIANA.
2. DETAILS PREPARED BY OUTSIDE SOURCES SHALL NOT BE INCLUDED IN THE CONSTRUCTION DRAWINGS WHEN SAID DETAILS COVER WORK WHICH IS COVERED BY AQUA INDIANA STANDARDS.
3. INDIVIDUAL AQUA INDIANA STANDARDS THAT DO NOT APPLY MAY BE CROSSED OUT BY DESIGN ENGINEER THROUGH THE PLACEMENT OF A SINGLE LARGE X OVER DETAIL. MINOR REFERENCE NOTATIONS MAY BE PLACED ADJACENT TO INDIVIDUAL STANDARD TITLES FOR COORDINATION. HOWEVER, THE STANDARDS THEMSELVES SHALL NOT BE MODIFIED IN ANY WAY.
4. DETAILS PREPARED BY OUTSIDE SOURCES COVERING WORK WHICH IS NOT COVERED BY AQUA INDIANA STANDARDS ARE THE SOLE RESPONSIBILITY OF THE DESIGN ENGINEER AND SHALL BE PLACED ON SHEETS OTHER THAN THE AQUA INDIANA STANDARDS SHEETS.

GENERAL NOTES

1. CONTRACTOR SHALL VERIFY THE EXACT LOCATION OF ALL EXISTING UTILITIES AT LEAST 48 HOURS PRIOR TO ANY CONSTRUCTION OR EXCAVATION. DURING CONSTRUCTION ALL UTILITIES SHALL BE ADEQUATELY SUPPORTED TO MINIMIZE DAMAGE. THE CONTRACTOR SHALL BE RESPONSIBLE FOR REPAIRING OR REPLACING DAMAGED UTILITIES TO THE SATISFACTION OF AQUA INDIANA AND THE OWNER OF THE AFFECTED UTILITY.
2. ALL CONSTRUCTION DRAWINGS SHALL BE SUBMITTED TO AQUA INDIANA IN ELECTRONIC FORMAT, CADD AND PDF. ALL COORDINATE DATA SHALL BE U.S. SURVEY FEET. ALL BENCHMARKS AND ELEVATIONS SHALL BE FROM STATE PLANE NAVD 1988 DATUM.
3. WHEREVER PROPRIETARY EQUIPMENT IS SPECIFIED, ALL PROPOSALS FOR SUBSTITUTION SHALL BE SUBMITTED IN WRITING TO AQUA INDIANA AND SHALL BE SUBJECT FOR REVIEW.
4. INSTALLATION OF OR PROVISIONS FOR THE INSTALLATION OF ALL UNDERGROUND UTILITIES INCLUDING SERVICE LATERALS TO BE PLACED UNDER PAVEMENT AREAS SHALL BE ESTABLISHED PRIOR TO THE CONSTRUCTION OF THE PAVEMENTS.
5. CONTRACTOR SHALL CONTACT AQUA INDIANA FOR ELECTRICAL STANDARDS, TERMS, AND CONDITIONS DURING PROJECT PLANNING AND AT LEAST 1 MONTH PRIOR TO CONSTRUCTION OR EXCAVATION.

DRAWING INDEX	
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6-14	SANITARY SEWER SPECIFICATIONS
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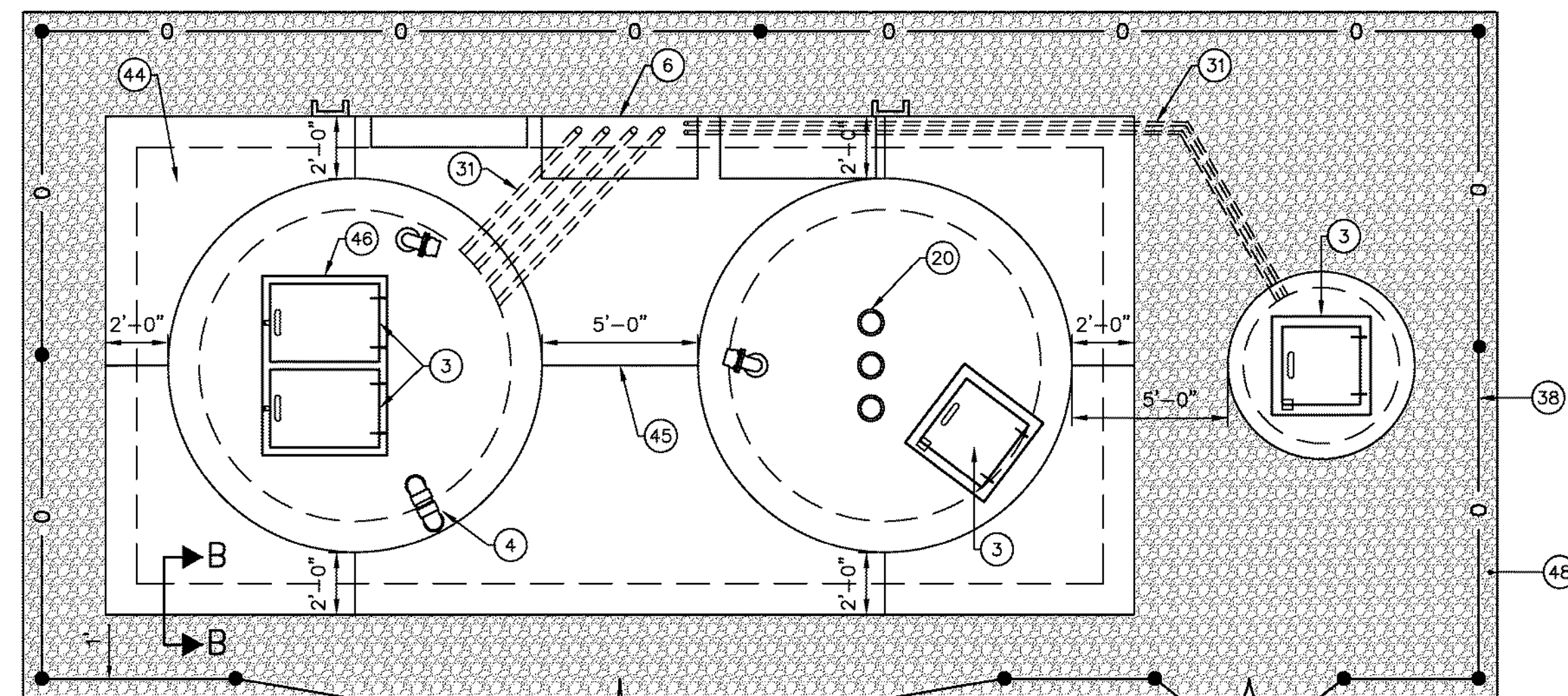
APPROVED BY



J. Shields, Jr.
 JAMES E. SHIELDS, JR.
 PROFESSIONAL ENGINEER No. PE10201333
 STATE OF INDIANA
 3/1/2021

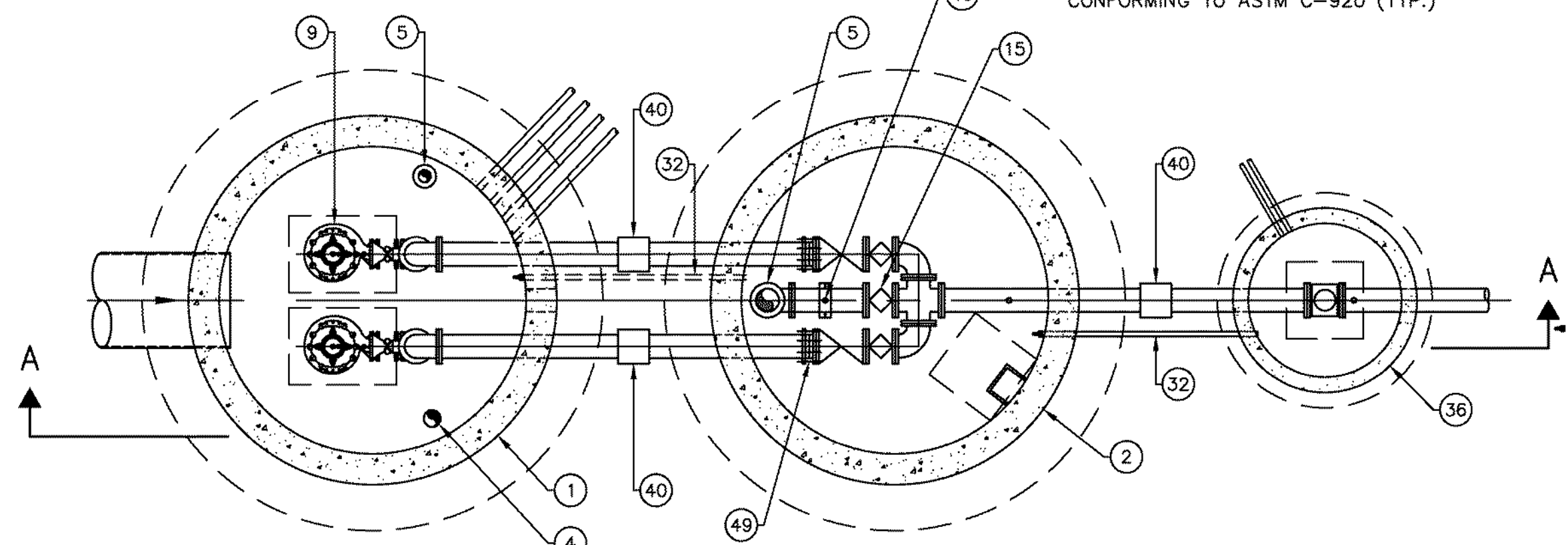
REVISIONS			
REVISION NO.	SHEET NO.	DESCRIPTION	DATE
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DATE OF ISSUANCE: 3/1/2021

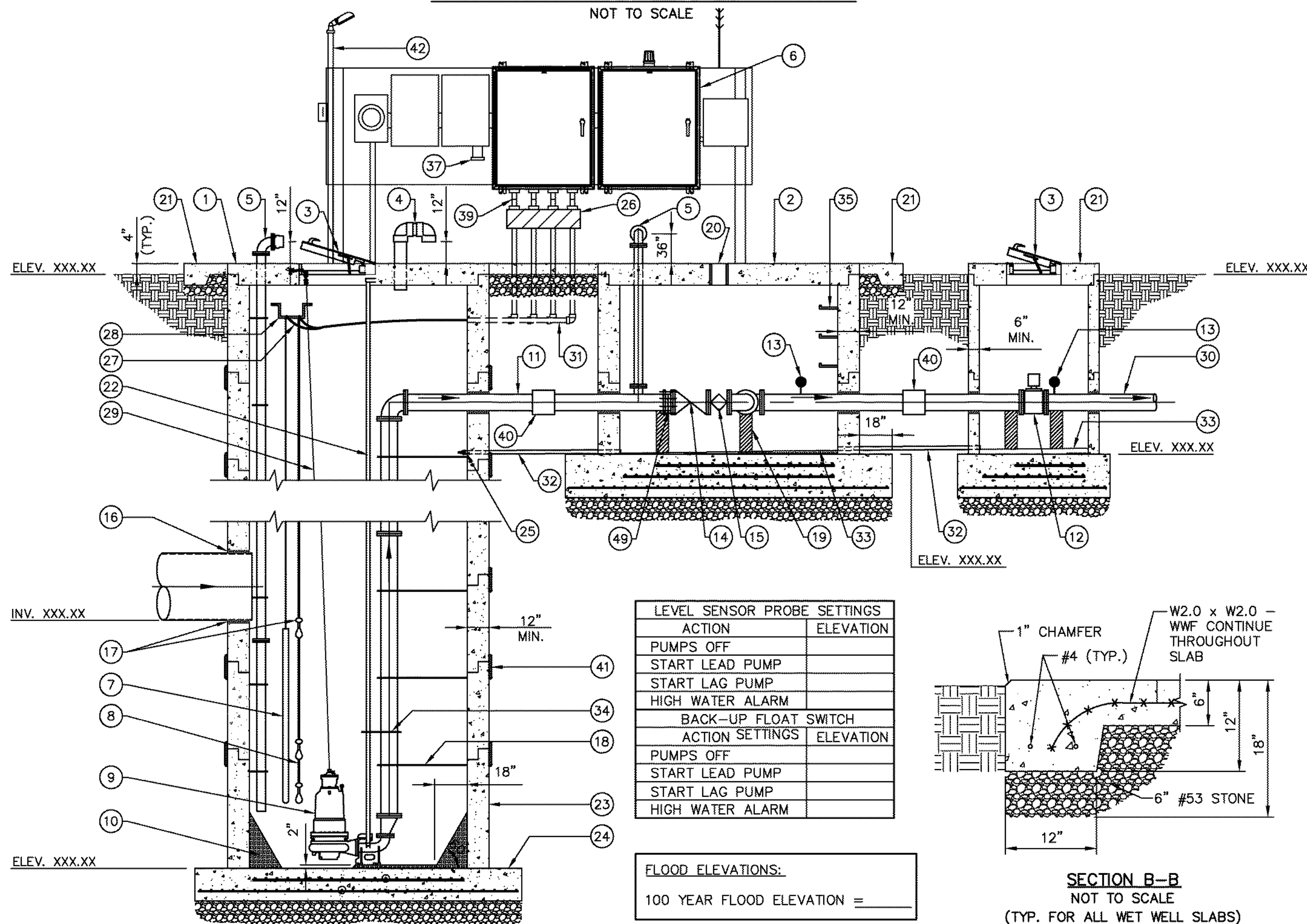


PLAN VIEW AT GRADE
NOT TO SCALE

NOTE:
APPLY PREFORMED JOINT MATERIAL BETWEEN ALL PRECAST STRUCTURES AND CAST IN PLACE CONCRETE. SEAL EXPANSION JOINTS WITH TREMFLEX SL JOINT SEALANT OR APPROVED EQUIVALENT CONFORMING TO ASTM C-920 (TYP.)



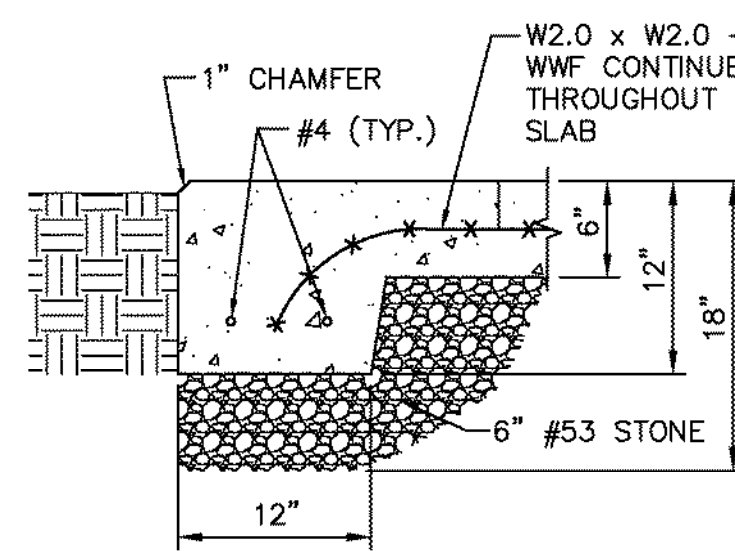
LIFT STATION PLAN VIEW BELOW TOP SLAB
NOT TO SCALE



LIFT STATION SECTION A-A
NOT TO SCALE

LEVEL SENSOR PROBE SETTINGS	
ACTION	ELEVATION
PUMPS OFF	
START LEAD PUMP	
START LAG PUMP	
HIGH WATER ALARM	
BACK-UP FLOAT SWITCH	
ACTION SETTINGS	ELEVATION
PUMPS OFF	
START LEAD PUMP	
START LAG PUMP	
HIGH WATER ALARM	

FLOOD ELEVATIONS:
100 YEAR FLOOD ELEVATION = _____



SECTION B-B
NOT TO SCALE
(TYP. FOR ALL WET WELL SLABS)

INFORMATION

AQUA DIVISION: _____
 COUNTY: _____ TOWNSHIP: _____
 SECTION: _____ TWP: _____ RANGE: _____
 PROJECT: _____
 LOCATION: _____
 STATION PIPE SIZE, INCHES: _____ FORCE MAIN TYPE: _____
 FORCE MAIN SIZE, INCHES: _____ LIFT STATION I.D.: _____
 FORCE MAIN LENGTH, FEET: _____

PUMP DATA

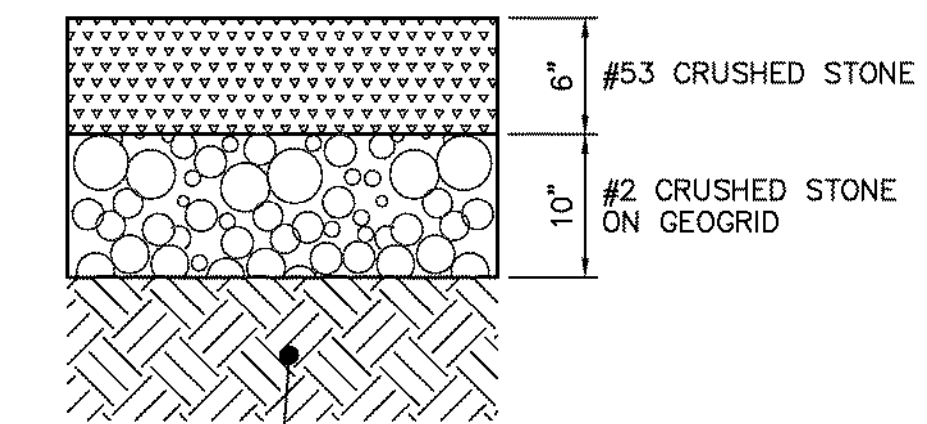
DISCHARGE SIZE: _____
 GPM: _____
 TDH: _____
 HP: _____
 RPM: _____
 VOLTAGE: _____
 PHASE: _____
 MODEL: _____
 IMPELLER SIZE: _____

GENERAL NOTES:

- PUMP CONTROL PANEL SHALL BE PROVIDED BY PUMP SUPPLIER AND SHALL BE COMPATIBLE WITH PUMP SYSTEM. THE PANEL SHALL CONTROL A DUPLEX SYSTEM.
- ALL PIPING IN AND BETWEEN WET WELL, VALVE VAULT, AND METER VAULT, SHALL BE DUCTILE IRON.
- DUCTILE IRON PIPE: A. SHALL CONFORM TO ANSI SPEC. A-21.51 B. SHALL CONFORM TO AWWA C-151. CURRENT REV. C. DUCTILE IRON PIPE SHALL BE PRESSURE CLASS 350 (MIN.)
- WET WELL HATCH SHALL BE COMPATIBLE WITH THE GUIDE RAIL SYSTEM AND SHALL BE LOCATED AS SHOWN SUCH THAT PUMPS CAN BE EASILY REMOVED FROM THE WET WELL. SAFETY GRATE SHALL ALLOW OBSERVATION OF WET WELL WHILE PREVENTING FALLS INTO WET WELL.
- MAINTAIN 24 INCHES BETWEEN ALL STRUCTURES, SLAB, AND FENCING.
- RESILIENT WEDGE VALVES SHALL BE OPERABLE FROM THE TOP SLAB. CONTRACTOR SHALL PROVIDE ONE (1) "TEE" HANDLED VALVE KEY TO MATCH RESILIENT WEDGE VALVE OPERATING NUTS.
- ALL PIPING, STRUCTURE EXCAVATION AND TRENCHES SHALL BE BACKFILLED WITH AN APPROVED STRUCTURAL BACKFILL.

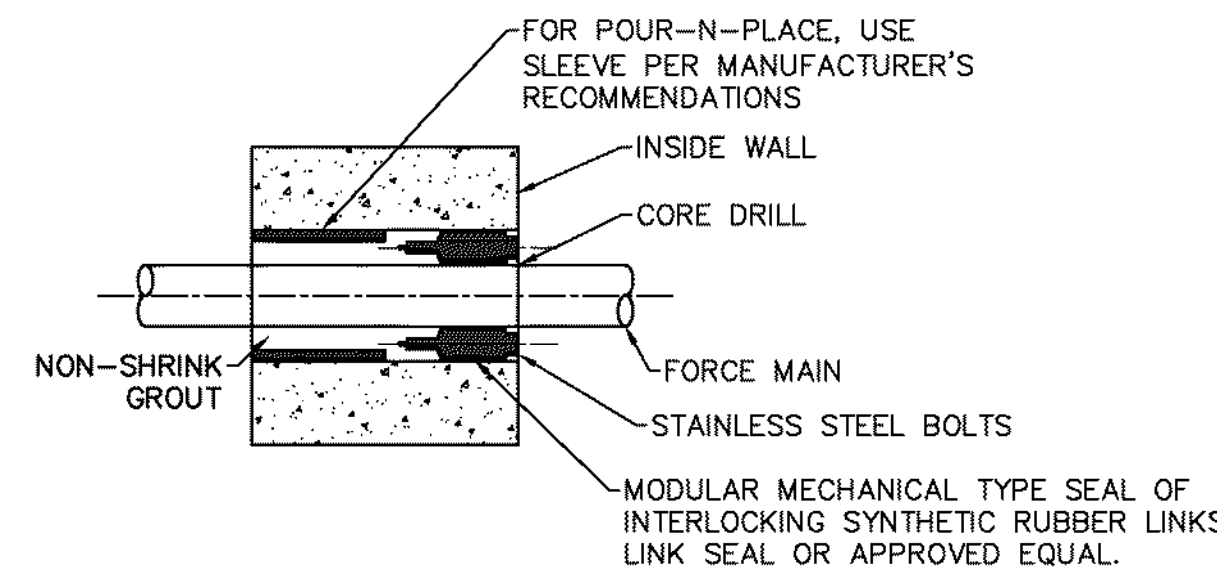
LIFT STATION KEY

- WET WELL MIN 60" DIAMETER
- VALVE VAULT, MIN 60" DIAMETER
- LOCKABLE ALUMINUM ACCESS HATCH WITH FALL PROTECTION, 36"x36" MIN.
- 6" DIP VENT WITH SCREEN AND PASSIVE ODOR CONTROL DEVICE (IF REQUESTED)
- 6-INCH D.I. BYPASS PIPE WITH D.I. 90° BEND & CAM AND GROOVE CONNECTION
- NEMA 4X STAINLESS STEEL CONTROL PANEL ON ALUMINUM MOUNTING PLATE WITH ALUMINUM CHANNEL POSTS. PANEL SHALL BE MIN. 5' FROM ANY OPENING OR OBSTRUCTION
- LEVEL DEVICE (PRESSURE TRANSDUCER)
- REDUNDANT FLOAT BACK-UP
- SUBMERSIBLE PUMP
- CONCRETE FILLETS
- FORCE MAIN, DUCTILE IRON, RESTRAINED JOINTS
- ELECTROMAGNETIC FLOW METER (IF REQUESTED)
- PRESSURE GAUGE
- CHECK VALVE
- RESILIENT WEDGE ISOLATION VALVE
- SEAL OPENING WITH LINK SEAL (TYP. ALL PIPE PENETRATIONS)
- LOWEST PIPE INVERT (HIGH ALARM ON)
- PIPE SUPPORT, PER DETAIL (TYP. 3 PER PIPE SECTION)
- PIPE SUPPORT, SEE DETAIL
- PENETRATION FOR VALVE OPERATION, REMOVABLE CAST IRON COVERS
- TOP OF STRUCTURE, MIN. 4", MAX. 12" ABOVE FINISH GRADE
- STAINLESS STEEL GUIDE RAIL
- MONOLITHIC BASE
- ANTI-FLOTATION EXTENSIONS (AS REQUIRED)
- BACKFLOW PREVENTER - TIDFLEX CHECK VALVE OR EQUAL
- VENTED JUNCTION BOX
- SEPARATE CONDUITS FOR EACH PUMP
- CABLE HANGER
- STAINLESS STEEL LIFTING CHAIN SIZED TO THE WEIGHT OF THE PUMP
- FORCE MAIN TRANSITION FITTING FROM DUCTILE IRON TO ALTERNATE MATERIAL
- PUMP CONDUIT TO JUNCTION BOX - PVC COATED RGS
- 2" PVC DRAIN PIPE, MAINTAIN 1/4" PER FOOT INTO WET WELL
- SLOPE FLOOR TO DRAIN 1/4" PER FOOT
- INTERMEDIATE GUIDE RAIL SUPPORT
- FIBERGLASS REINFORCED POLYPROPYLENE MANHOLE STEPS AT 16" ON CENTER
- METER VAULT, MIN. 60" DIAMETER (IF REQUESTED)
- PORTABLE GENERATOR CONNECTION
- 7" HIGH VINYL-COATED CHAIN LINK FENCE, VINYL-COATED POST, PRIVACY SLATS, 16 FOOT VEHICLE ACCESS GATE AND 3 FOOT MAN GATE
- EXPLOSION PROOF CONDUIT SEALS
- FLEXIBLE COUPLING (TYP.)
- EXTERNAL JOINT WRAP, MINIMUM 6" WIDTH (TYP.) INFI-SHIELD GATOR WRAP OR APPROVED EQUAL
- 1-1/2" DIA. 10 FOOT HIGH STANCHION MOUNTED LED LIGHT FIXTURE
- BYPASS PIPE 2-INCH DRAIN: STAINLESS STEEL SADDLE (2" TAP) WITH 2" BRONZE BALL VALVE, SCH 80 PVC PIPE DIRECTED TO SUMP (PIPE NOT SHOWN FOR CLARITY)
- CONCRETE APRON
- CONTROL JOINT (TYP.)
- SIZE PER PUMP MANUFACTURER
- 16" WIDE LOCKABLE GATE, 3" WIDE LOCKABLE MAN GATE LOCATION AS DIRECTED BY AQUA
- 1-FOOT WIDE STONE AROUND LIFT STATION FENCE (PER DETAIL)
- FLANGED COUPLING ADAPTER (TYP.)

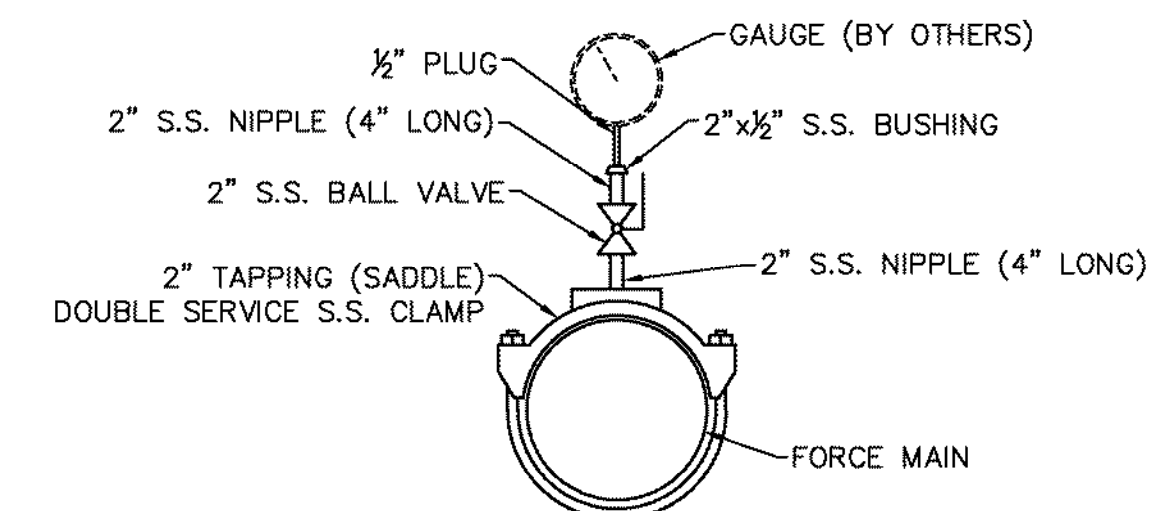


STONE DRIVE SECTION & STONE AROUND LIFT STATION
NOT TO SCALE

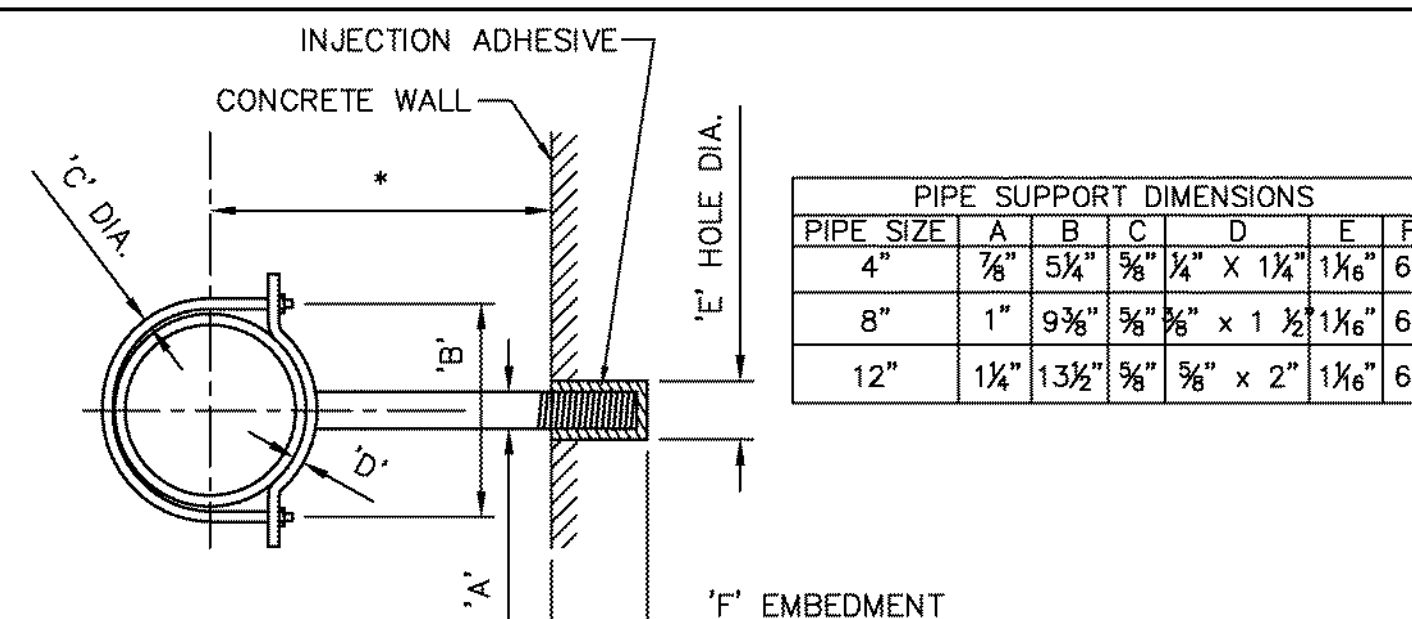
STONE DRIVE SECTION & STONE AROUND LIFT STATION
NOT TO SCALE



PIPE SLEEVE DETAIL FOR ALL WALL PENETRATIONS
NOT TO SCALE

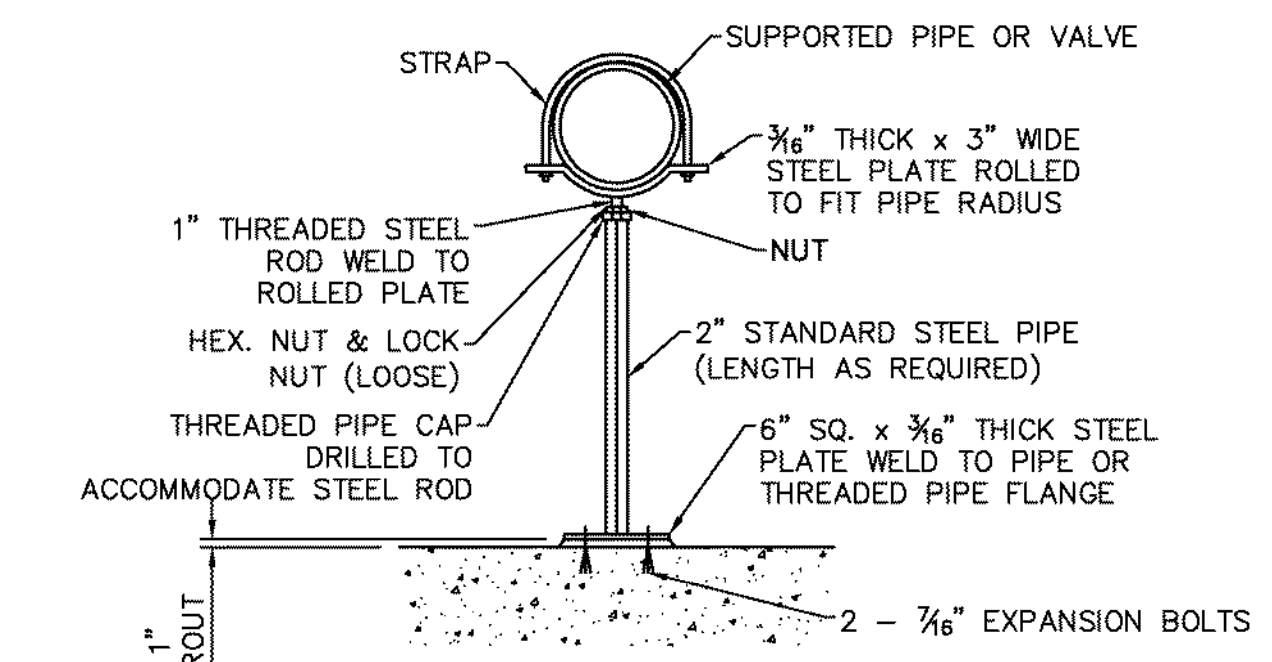


PRESSURE GAUGE TAP DETAIL (TYP.)
NOT TO SCALE



- PIPE SUPPORT NOTES:
- CONTRACTOR SHALL DETERMINE DIMENSION * PER PUMP MANUFACTURER'S INSTALLATION INSTRUCTIONS.
 - PIPE SUPPORTS SHALL BE CARBON STEEL, COATED WITH 14 MIL COAL TAR EPOXY.
 - INJECTION ADHESIVE SHALL BE HIT-HY 200 BY HILTI OR APPROVED EQUAL. INSTALL PER HILTI INSTALLATION INSTRUCTIONS FOR ROD INSTALLATION.
 - PIPE SUPPORT SHALL BE GRINNEL FIGURE 191 OR APPROVED EQUAL.

PIPE SUPPORT
NOT TO SCALE



- NOTES:
- PIPE SUPPORTS SHALL BE SPACED NOT MORE THAN 12'-0" ON CENTER.
 - PIPE TO BE SUPPORTED EACH SIDE OF VALVES, FLOW METERS, AND COUPLINGS.

ADJUSTABLE PIPE SUPPORT DETAIL
NOT TO SCALE



AQUA INDIANA
STATE SANITARY
SEWER STANDARDS
2021



James E. Shields 3/1/2021
CERTIFIED BY

ISSUANCE INDEX	
DATE:	1/4/2021
SANITARY STANDARDS	

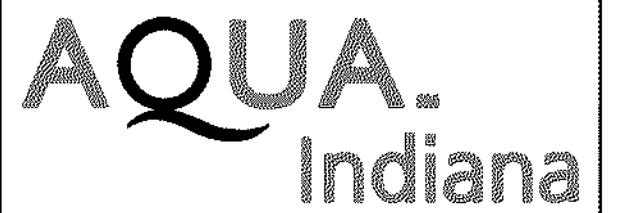
REVISION SCHEDULE		
NO.	DESCRIPTION	DATE

Project Number 2021

LIFT STATION
DETAILS

PLOT SCALE: 1:2,5849 EDIT DATE: 10/25/16 - 8:11 AM EDITED BY: JSHIELD DRAWING FILE: G:ENGINEERING\ENG-STANDARDS\2021 AQUA STANDARDS\AUTOCAD\201601964.LID\DS.01(R4).DWG

- c. POLYVINYL CHLORIDE AND CHLORINATED POLYVINYL CHLORIDE COMPOUNDS, CELL CLASS 12454 (PVC 1120).
- d. FOR ASTM D2241, THE MATERIAL SHALL CONFORM TO ASTM D1784, CELL CLASS 12454 AND HYDROSTATIC DESIGN STRESS OF 2000 PSI. THE MINIMUM PRESSURE CLASS/SDR RATING SHALL BE CLASS 200/SDR 21.
- e. FOR AWWA C900, THE MATERIAL SHALL HAVE A DESIGN BASIS OF 4000 PSI AND THE MINIMUM PRESSURE CLASS/DR RATING SHALL BE CLASS 200/DR 14.
- f. FOR AWWA C905, THE MATERIAL SHALL HAVE A HYDROSTATIC DESIGN BASIS OF 4000 PSI AND THE MINIMUM PRESSURE CLASS/DR RATING ACCEPTABLE SHALL BE CLASS 200/DR 21.
- g. PVC FORCE MAIN SHALL BE IN COMPLIANCE WITH AWWA C-900 FOR 4" THROUGH 12" AND AWWA C-905 FOR 14" AND GREATER.
- g. ALL PLASTIC PIPE AND COUPLINGS SHALL BEAR IDENTIFICATION MARKINGS IN ACCORDANCE WITH SECTION 2.5.2 AND 2.5.3 OF AWWA C-900, WHICH SHALL INCLUDE THE NATIONAL SANITATION FOUNDATION (NSF) SEAL OF APPROVAL. IN ADDITION, THE PLAIN END OF EACH PIPE LENGTH SHALL HAVE TWO (2) RINGS, ONE INCH (1") APART, PAINTED AROUND THE PIPE AT THE PROPER LOCATION TO ALLOW FIELD CHECKING OF THE CORRECT SETTING DEPTH OF THE PIPE IN THE BELL OR COUPLING.
- 2. JOINTS
 - a. JOINTS SHALL BE BELL END OR COUPLING PUSH-ON TYPE WITH JOINT RESTRAINTS AS NEEDED. JOINT RESTRAINTS SHALL BE MEGALUG STYLE MECHANICAL JOINTS FOR PVC PIPE AS MANUFACTURED BY EBAA IRON OR APPROVED EQUAL.
 - b. THE PUSH-ON JOINT AND JOINT COMPOUNDS SHALL MEET THE REQUIREMENTS FOR ASTM SPECIFICATION D-3139. JOINT FOR THE PLASTIC PIPE, USING FLEXIBLE ELASTOMERIC SEALS. THE JOINT SHALL BE DESIGNED SO AS TO PROVIDE FOR THE THERMAL EXPANSION AND CONTRACTION EXPERIENCED WITH A TOTAL TEMPERATURE CHANGE OF SEVENTY-FIVE (75) DEGREES F IN EACH JOINT OF PIPE. DETAILS OF THE JOINT DESIGN AND ASSEMBLY SHALL BE IN ACCORDANCE WITH JOINT MANUFACTURER'S STANDARD PRACTICE.
 - c. THE LUBRICANT SHALL HAVE NO DETERIORATING EFFECTS ON THE GASKET OR THE PIPE. THE LUBRICANT CONTAINERS SHALL BE LABELED WITH MANUFACTURER'S NAME.
 - d. THE GASKETS SEALING THE JOINT SHALL BE MADE OF RUBBER OF SPECIAL COMPOSITION HAVING A TEXTURE TO ASSURE A WATERTIGHT AND PERMANENT SEAL AND SHALL BE THE PRODUCT OF A MANUFACTURER HAVING AT LEAST FIVE (5) YEARS OF EXPERIENCE IN THE MANUFACTURE OF RUBBER GASKETS FOR PIPE JOINTS. THE GASKET SHALL BE A CONTINUOUS RING OF FLEXIBLE JOINT RUBBER OF A COMPOSITION AND TEXTURE WHICH IS RESISTANT TO COMMON INGREDIENTS OF SEWAGE, INDUSTRIAL WASTES AND GROUNDWATER AND WHICH WILL ENDURE PERMANENTLY UNDER THE CONDITIONS IMPOSED BY THIS SERVICE. THE GASKET SHALL CONFORM TO ASTM F-477. GASKETS SHALL MEET ALL APPLICABLE REQUIREMENTS OF ANSI STANDARD A-21.11.
- 3. FITTINGS
 - a. FITTINGS SHALL BE MANUFACTURED IN ONE PIECE OF INJECTION MOLDED PVC COMPOUND MEETING THE REQUIREMENTS OF ASTM D1784. FITTINGS SHALL BE DESIGNED TO WITHSTAND A MINIMUM OF 755 PSI QUICK BURST PRESSURE @ 73 DEGREES F IN ACCORDANCE WITH ASTM D1589.
 - b. FOR RESTRAINED JOINTS, FITTINGS SHALL BE RESTRAINED JOINT DUCTILE IRON FITTINGS CONFORMING TO AWWA C110 AND AWWA C111.
- 4. LOCATING TRACING WIRE
 - a. ALL PVC PIPE FOR PRESSURE SANITARY SEWER SHALL BE INSTALLED WITH TRACING WIRE. TRACING WIRE SHALL BE 10 AWG SOLID COPPER HIGH STRENGTH TRACER WIRE, CCS REINFORCED BY COPPERHEAD OR APPROVED EQUAL.
 - b. LOCATING TRACER WIRE SHALL BE BROUGHT TO SURFACE NO LESS THAN EVERY 500 L.F.
 - c. LOCATE WIRE SHALL BE TESTED FOR CONTINUITY PRIOR TO ACCEPTANCE.
- 5. MARKINGS
 - a. THE DATE OF MANUFACTURE, SHIFT CODE, CLASS OF PIPE, ASTM SPECIFICATION DESIGNATION ("PVC-C900"), SIZE OF PIPE, NAME OR TRADEMARK OF MANUFACTURER, AND IDENTIFICATION OF PLANT/LOCATION SHALL BE LEGIBLY MARKED ON THE OUTSIDE OF EACH PIPE SECTION IN ACCORDANCE WITH THE ASTM D-3034.
 - b. WHERE C900/905 IS USED FOR SEWER FORCE MAIN, IT SHALL BE GREEN IN COLOR TO DESIGNATE IT IS SEWER. ALTERNATELY, A PLASTIC TAPE "SEWER" COMPLYING WITH 327 IAC MAY BE INSTALLED.
- 6. CERTIFICATION
 - a. THE CONTRACTOR SHALL FURNISH, UPON REQUEST, CERTIFIED REPORTS STATING THAT INSPECTION AND SPECIFIED TESTS HAVE BEEN MADE AND THAT THE RESULTS THEREOF COMPLY WITH THE APPLICABLE STANDARDS.
- E. HIGH DENSITY POLYETHYLENE PIPE (HDPE)
 - 1. RESIN AND MATERIAL REQUIREMENTS
 - a. ALL MATERIAL SHALL BE MANUFACTURED FROM A PE 4710 RESIN LISTED WITH THE PLASTIC PIPE INSTITUTE (PPI) AS TR-4. THE RESIN MATERIAL SHALL MEET THE SPECIFICATIONS OF ASTM D 3350 WITH A MINIMUM CELL CLASSIFICATION OF 445474C. HDPE PIPE AND FITTINGS SHALL CONTAIN NO RECYCLED COMPOUNDS EXCEPT THAT GENERATED IN THE MANUFACTURER'S OWN PLANT FROM RESIN OF THE SAME SPECIFICATION FROM THE SAME RAW MATERIAL. HDPE PRODUCTS SHALL BE HOMOGENEOUS THROUGHOUT AND FREE OF VISIBLE CRACKS, HOLES, FOREIGN INCLUSIONS, VOIDS, OR OTHER INJURIOUS DEFECTS.
 - 2. PIPE
 - a. PIPE SHALL BE MADE OF HDPE MATERIAL WITH A MINIMUM MATERIAL DESIGNATION CODE OF PE4710 AND WITH A MINIMUM CELL CLASSIFICATION AS NOTED IN 2.01.A. THE POLYETHYLENE COMPOUND SHALL BE SUITABLY PROTECTED AGAINST DEGRADATION BY ULTRAVIOLET LIGHT BY MEANS OF CARBON BLACK OF NOT LESS THAN 2 PERCENT. THE MANUFACTURE OF THE HDPE RESIN SHALL CERTIFY THE CELL CLASSIFICATION INDICATED.
 - b. PIPE SIZES 3" AND LARGER SHALL HAVE A MANUFACTURING STANDARD OF ASTM F 714, WHILE PIPE SMALLER THAN 3" SHALL BE MANUFACTURED TO THE DIMENSIONAL REQUIREMENTS LISTED IN ASTM D 3035. DIMENSION RATIO (DR) AND OUTSIDE DIAMETER (IPS/DIPS) SHALL BE AS SPECIFIED ON PLANS.
 - c. PIPE SHALL MEET AWWA C901 (1/2" TO 3") OR AWWA C906 (4" TO 63"), AND SHALL BE LISTED AS MEETING NSF-61.
 - d. THE COLOR CODING SHALL BE PERMANENTLY CO-EXTRUDED STRIPES ON THE PIPE OUTSIDE SURFACE AS PART OF THE PIPE'S MANUFACTURING PROCESS. COLOR CODING SHALL BE AS FOLLOWS: SEWER - GREEN
- 3. JOINTS
 - a. HDPE PIPE SHALL BE JOINED INTO CONTINUOUS LENGTHS ON THE JOB SITE ABOVE GROUND. THE JOINING METHOD SHALL BE THE BUTT FUSION METHOD AND SHALL BE PERFORMED IN STRICT ACCORDANCE WITH THE PIPE MANUFACTURER'S RECOMMENDATIONS. ELECTROFUSION SHALL NOT BE USED EXCEPT AS NEEDED TO CONNECT ADJACENT DIRECTIONALLY DRILLED SECTIONS WHICH ARE TO BE CONNECTED IN THE TRENCH BOTTOM. MECHANICAL JOINT ADAPTERS ARE REQUIRED TO MECHANICALLY CONNECT THE HDPE PIPE TO THE MAIN LINE. JOINT RESTRAINT TO PREVENT AXIAL SEPARATION SHALL BE INCORPORATED INTO THE DESIGN OF THE SLEEVE OR COUPLING USED TO CONNECT HDPE PIPE PLAIN ENDS. INTERNAL PIPE WALL STIFFENERS MUST BE USED WHEN RESTRAINING HDPE. THE RESTRAINED COUPLING SYSTEM SHALL BE SERIES 4800 MANUFACTURED BY EBAA IRON, INC. OR AN APPROVED EQUAL.
- 4. FITTINGS
 - a. BUTT FUSION FITTINGS- FITTINGS SHALL BE MADE OF HDPE MATERIAL WITH A MINIMUM MATERIAL DESIGNATION CODE OF PE4710 AND WITH A MINIMUM CELL CLASSIFICATION AS NOTED IN 2.01.A. FITTINGS SHALL HAVE A MINIMUM PRESSURE RATING EQUAL TO OR GREATER THAN THE PIPE TO WHICH THEY ARE JOINED UNLESS OTHERWISE SPECIFIED ON THE PLANS OR ACCEPTED BY OWNER/ENGINEER. ALL FITTINGS SHALL MEET THE REQUIREMENTS OF AWWA C901 OR C906.
 - 1) MOLDED FITTINGS SHALL COMPLY WITH THE REQUIREMENTS OF ASTM D 3261.
 - 2) ALL FABRICATED ELBOWS, TEES, REDUCING TEES AND END CAPS SHALL BE PRODUCED AND MEET THE REQUIREMENTS OF ASTM F 2206, AS MANUFACTURED BY ISCO INDUSTRIES, INC OR OTHER APPROVED MANUFACTURER HOLDING AN ISO 9001 QUALITY SYSTEM CERTIFICATE. EACH FITTING WILL BE MARKED PER ASTM F 2206 SECTION 10 INCLUDING THE NOMINAL SIZE AND FITTING EDR, WHICH WILL MEET OR EXCEED THE PIPE DR IDENTIFIED FOR THE PROJECT. FABRICATED FITTINGS SHALL BE MANUFACTURED USING A MCELROY DATA LOGGER TO RECORD FUSION PRESSURE AND TEMPERATURE, AND SHALL BE STAMPED WITH UNIQUE JOINT NUMBER THAT CORRESPONDS TO THE JOINT REPORT. A GRAPHIC REPRESENTATION OF THE TEMPERATURE AND PRESSURE DATA FOR ALL FUSION JOINTS MADE PRODUCING FITTINGS SHALL BE MAINTAINED FOR A MINIMUM OF 5 YEARS AS PART OF THE QUALITY CONTROL AND WILL BE AVAILABLE UPON REQUEST OF OWNER. TEST RESULTS TO VALIDATE ASTM F 2206 SECTION 7.3 AND 9 SHALL BE PROVIDED TO OWNER OR OWNER'S REPRESENTATIVE UPON REQUEST.
 - 3) SOCKET FITTINGS SHALL MEET ASTM D 2683.
 - b. ELECTROFUSION FITTINGS - FITTINGS SHALL BE MADE OF HDPE MATERIAL WITH A MINIMUM MATERIAL DESIGNATION CODE OF PE 4710 AND WITH A MINIMUM CELL CLASSIFICATION AS NOTED IN 2.01.A. ELECTROFUSION FITTINGS SHALL HAVE A MANUFACTURING STANDARD OF ASTM F1055. FITTINGS SHALL HAVE A MINIMUM PRESSURE RATING EQUAL TO OR GREATER THAN THE PIPE TO WHICH THEY ARE JOINED UNLESS OTHERWISE SPECIFIED ON THE PLANS. FOR POTABLE WATER SYSTEMS, ALL ELECTROFUSION FITTINGS SHALL HAVE AWWA APPROVAL.
 - c. BOLTED CONNECTIONS- FLANGES AND MJ ADAPTERS SHALL BE FUSED ONTO THE PIPE AND HAVE A MINIMUM PRESSURE RATING EQUAL TO OR GREATER THAN THE PIPE UNLESS OTHERWISE SPECIFIED ON THE PLANS.
 - 1) METALLIC BACK-UP RINGS (VAN-STONE STYLE LAP JOINT FLANGES), SHALL HAVE A RADIUS ON THE INSIDE DIAMETER OF THE BORE SO AS TO BE COMPATIBLE WITH HDPE FLANGES. BACK UP RINGS SHALL HAVE BOLT PATTERN THAT WILL MATE WITH AWWA C207 CLASS D (GENERALLY KNOWN AS 150 POUND PATTERNS).
 - 2) WHERE SHOWN ON THE DRAWINGS, 4" AND LARGER TRANSITIONS TO MECHANICAL JOINT FITTINGS AND VALVES SHALL BE ACCOMPLISHED USING A MJ ADAPTER WITH KIT. THE D.I./HDPE MECHANICAL JOINT ADAPTER SHALL CONSIST OF AN HDPE MECHANICAL JOINT TRANSITION FITTING, RUBBER GASKET, A MECHANICAL JOINT BACKUP DRIVE RING, AND CORTEN MECHANICAL JOINT TEE BOLTS.
 - d. MECHANICAL FITTINGS: THE USE OF MECHANICAL COUPLING AND SADDLES SHALL BE APPROVED BY THE OWNER OR ENGINEER PRIOR TO INSTALLATION. MECHANICAL FITTINGS SHALL BE DESIGNED FOR USE AND COMPATIBLE WITH HDPE PIPE INCLUDING SS STIFFENERS WHEN REQUIRED BY MANUFACTURER. MECHANICAL FITTINGS SHALL HAVE A PRESSURE RATING EQUAL TO OR GREATER THAN THE PIPE.S.
- 5. MARKINGS
 - a. DURING THE EXTRUSION PRODUCTION, THE HDPE PIPE SHALL BE CONTINUOUSLY MARKED PER ASTM AND AWWA WITH DURABLE PRINTING WITH, AT A MINIMUM, THE FOLLOWING: NOMINAL PIPE SIZE, DIMENSION RATIO, PRESSURE RATING, TRADE NAME, MATERIAL CLASSIFICATION, CERTIFICATION BASES, AND DATE.
- 6. LOCATING TRACING WIRE
 - a. ALL HDPE PIPE FOR PRESSURE SANITARY SEWER SHALL BE INSTALLED WITH TRACING WIRE. TRACING WIRE SHALL BE 10 AWG SOLID COPPER HIGH STRENGTH TRACER WIRE, CCS REINFORCED BY COPPERHEAD OR APPROVED EQUAL.
 - b. LOCATING TRACER WIRE SHALL BE BROUGHT TO SURFACE NO LESS THAN EVERY 500 L.F.
 - c. LOCATE WIRE SHALL BE TESTED FOR CONTINUITY PRIOR TO ACCEPTANCE.
- 7. CERTIFICATION
 - a. THE CONTRACTOR SHALL FURNISH, UPON REQUEST, CERTIFIED REPORTS STATING THAT INSPECTION AND SPECIFIED TESTS HAVE BEEN MADE AND THAT THE RESULTS THEREOF COMPLY WITH THE APPLICABLE STANDARDS.
- F. PRESSURE TYPE PIPE COUPLINGS:
 - 1. TUBULAR-SLEEVE COUPLINGS:
 - 2. COUPLINGS SHALL MEET AWWA C219, WITH CENTER SLEEVE, GASKETS, END RINGS, AND BOLT FASTENERS.
 - 3. METAL, BOLTED, SLEEVE-TYPE, REDUCING OR TRANSITION COUPLINGS FOR JOINING UNDERGROUND PRESSURE PIPING.
 - 4. COUPLINGS SHALL MEET A 200-PSI MINIMUM PRESSURE RATING AND ENDS OF SAME SIZES OF THE MAIN LINE PIPING.
 - 5. CENTER-SLEEVE MATERIAL:
 - 6. SLEEVE SHALL BE STAINLESS STEEL.
 - 7. GASKET MATERIAL: GASKETS SHALL BE NATURAL OR SYNTHETIC RUBBER RESISTANT TO SEWAGE.
 - 8. METAL COMPONENT FINISH: FINISH SHALL BE A CORROSION-RESISTANT MATERIAL OR COATING.
- 2.5 RESILIENT WEDGE GATE VALVES
 - A. VALVES SHALL CONFORM TO THE LATEST REVISION OF AWWA STANDARD C515 COVERING RESILIENT SEATED GATE VALVES FOR WATER SUPPLY SERVICE.
 - B. THE VALVES SHALL HAVE A DUCTILE IRON BODY, BONNET, AND O-RING PLATE. THE WEDGE SHALL BE TOTALLY ENCAPSULATED WITH RUBBER.
 - C. THE SEALING RUBBER SHALL BE PERMANENTLY BONDED TO THE WEDGE PER ASTM D-429.
 - D. VALVES SHALL BE SUPPLIED WITH O-RING SEALS AT ALL PRESSURE RETAINING JOINTS. NO FLAT GASKETS SHALL BE ALLOWED.
 - E. THE VALVES SHALL BE NON-RISING STEM OPENING BY TURNING LEFT AND PROVIDED WITH 2" SQUARE OPERATING NUT OR A HANDWHEEL WITH THE WORD "OPEN" AND AN ARROW TO INDICATE THE DIRECTION TO OPEN.
 - F. STEMS SHALL BE CAST COPPER ALLOY WITH INTEGRAL COLLARS IN FULL COMPLIANCE WITH AWWA. ALL STEMS SHALL OPERATE WITH COPPER ALLOY STEM NUTS INDEPENDENT OF WEDGE AND OF STEM (IN NRS VALVES).
 - G. ALL STEMS SHALL HAVE TWO O-RINGS LOCATED ABOVE THE THRUST COLLAR AND ONE O-RING BELOW. STEM O-RINGS SHALL BE REPLACEABLE WITH VALVE FULLY OPENED AND SUBJECTED TO FULL PRESSURE.
 - H. THE STEMS ON 4"-20" SHALL HAVE A LOW TORQUE THRUST BEARING LOCATED ABOVE AND BELOW THE STEM COLLAR TO REDUCE FRICTION DURING OPERATION.
 - I. WATERWAY SHALL BE SMOOTH, UNOBSTRUCTED AND FREE OF ALL POCKETS, CAVITIES AND DEPRESSIONS IN THE SEAT AREA. VALVES 4" AND LARGER SHALL ACCEPT A FULL SIZE TAPPING CUTTER.
 - J. THE BODY, BONNET AND O-RING PLATE SHALL BE FUSION-BONDED EPOXY COATED, BOTH INTERIOR AND EXTERIOR ON BODY AND BONNET. EPOXY SHALL BE APPLIED IN ACCORDANCE WITH AWWA C550 AND BE NSF 61 CERTIFIED.
 - K. EACH GATE VALVE SHALL BE INSTALLED IN A VERTICAL POSITION WITH A ROADWAY TYPE VALVE BOX. GATE VALVES SET WITH VALVE BOXES SHALL BE PROVIDED WITH A 2-INCH SQUARE OPERATING NUT AND SHALL BE OPENED BY TURNING TO THE LEFT (COUNTER-CLOCKWISE). THERE SHALL BE A MAXIMUM 48" DEPTH OF VALVE OPERATING NUT. CONTRACTOR MUST USE EXTENSION STEMS, IF NECESSARY, TO RAISE OPERATOR NUT WITHIN 48" OF FINAL GRADE.
 - L. ALL BURIED GATE VALVES SHALL HAVE MECHANICAL JOINT ENDS.
 - M. PRIOR TO SHIPMENT FROM THE FACTORY, EACH VALVE SHALL BE TESTED BY HYDROSTATIC PRESSURE EQUAL TO THE REQUIREMENTS OF AWWA C515 (AND UL/FM WHERE APPLICABLE).
 - N. VALVES SHALL BE AS MANUFACTURED BY MUELLER, M&H, CLOW, AMERICAN VALVE & HYDRANT, KENNEDY, OR APPROVED EQUAL.
- 2.6 AIR RELEASE VALVES
 - A. VALVES SHALL BE INSTALLED AT THE HIGH POINTS OF THE FORCE MAIN OR AT LOCATIONS SELECTED BY THE ENGINEER. THIS WILL PERMIT DISCHARGING THE SURGE OF AIR FROM AN EMPTY LINE WHEN FILLING AND RELIEVE THE VACUUM WHEN DRAINING THE SYSTEM. VALVE SHALL ALSO RELEASE AN ACCUMULATION OF AIR WHEN THE SYSTEM IS UNDER PRESSURE. THIS SHALL BE ACCOMPLISHED IN A SINGLE VALVE BODY.
 - B. AN ISOLATION VALVE SHALL BE FURNISHED AND INSTALLED BETWEEN THE AIR RELEASE VALVE AND MAIN CONNECTION TO ISOLATE THE AIR RELEASE VALVE FROM THE SYSTEM. VALVE SHALL BE A FULL OPENING STAINLESS STEEL OR BRONZE BALL STYLE VALVE PROVIDED WITH THREADED CONNECTIONS AND BE INSTALLED USING STAINLESS STEEL PIPE.
 - C. AIR RELEASE VALVES SHALL BE COMBINATION AIR RELEASE VALVES (UNLESS OTHERWISE SPECIFIED BY STATE ENGINEER) AS MANUFACTURED BY A.R.I. OR OWNER APPROVED EQUAL. THE VALVE SHALL ALLOW AIR TO ESCAPE OUT OF THE LARGE ORIFICE WHEN AIR IS PRESENT AND CLOSE WHEN LIQUID ENTERS THE VALVE. WHEN THE VALVE IS CLOSED AND PRESSURIZED, THE SMALL AIR RELEASE ORIFICE WILL OPEN TO ALLOW SMALL POCKETS OF AIR TO ESCAPE AUTOMATICALLY AND INDEPENDENTLY OF THE LARGE ORIFICE. THE LARGE ORIFICE SHALL ALSO ALLOW AIR TO ENTER TO BREAK VACUUM. THE BODY



**AQUA INDIANA
STATE SANITARY
SEWER STANDARDS
2021**



J. Shields 1/4/2021
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**SANITARY SEWER
SPECIFICATIONS**

PLOT SCALE: 1:2,584.9 EDIT DATE: 10/26/16 - 11:28 AM EDITED BY: JSHELD DRAWING FILE: G:\ENGINEERING\ENG-STANDARDS\2021 AQUA STANDARDS\AUTOCAD\2016\01064\ULDS.DWG

ALLEY AND DRIVEWAY PAVING, CURBS, STORM SEWERS, DITCHES, HEADWALLS, GATE BASINS, SURFACE INLETS AND ALL OTHER IMPROVEMENTS THAT ARE DESIGNATED TO REMAIN IN PLACE. SUCH PROTECTION SHALL BE PROVIDED AS LONG AS NECESSARY TO PREVENT DAMAGE FROM THE CONTRACTOR'S OPERATIONS.

2. THE CONTRACTOR SHALL EXERCISE EVERY PRECAUTION TO PREVENT DAMAGE TO PROPERTY WITHIN AND OUTSIDE THE IMMEDIATE VICINITY OF THE WORK. THE CONTRACTOR SHALL RESTORE THE GROUND SURFACES, REPLACE OR REPAIR DRIVEWAYS, BUILDINGS, FENCES, RETAINING WALLS, CULVERTS, DRAINS, PAVING, SIDEWALKS, ETC., WHICH ARE REMOVED OR DAMAGED DURING CONSTRUCTION AND WHICH ARE DESIGNATED ON THE PLANS TO REMAIN IN PLACE.

C. PAVEMENT REMOVAL

1. ALL PAVEMENT CUTTING AND REMOVAL SHALL BE PERFORMED IN ACCORDANCE WITH THE REQUIREMENTS OF THE REGULATORY AGENCY RESPONSIBLE FOR THE MAINTENANCE OF THE ROADWAY.

D. MAINTENANCE OF ROADWAY ACCESS

1. ALL MAINTENANCE OF TRAFFIC SHALL BE IN ACCORDANCE WITH THE REQUIREMENTS OF THE REGULATORY AGENCY OR AUTHORITY IN CHARGE OF MAINTAINING THE SUBJECT ROADWAY.

2. THE CONTRACTOR SHALL NOT CLOSE OR OBSTRUCT ANY PORTION OF A PUBLIC STREET WITHOUT FIRST NOTIFYING IN WRITING THE APPROPRIATE REGULATORY ROADWAY AUTHORITY. THE CONTRACTOR SHOULD BE AWARE THAT THERE IS SUFFICIENT TIME ALLOWED FOR THE AUTHORITY TO REVIEW AND ACT ON THE CLOSURE REQUEST.

3. UNLESS CLOSURE IS APPROVED, STREETS, ROADS, PRIVATE WAYS AND WALKS SHALL BE MAINTAINED PASSABLE BY THE DEVELOPER'S CONTRACTOR AT ALL TIMES, AND THE CONTRACTOR SHALL BE RESPONSIBLE FOR THE ADEQUACY AND SAFETY OF PROVISIONS MADE.

4. TO PROTECT PERSONS FROM INJURY AND TO AVOID PROPERTY DAMAGE, ADEQUATE BARRICADES, CONSTRUCTION SIGNS, WARNING LIGHTS, AND GUARDS AS REQUIRED SHALL BE PLACED AND MAINTAINED DURING THE PROGRESS OF THE CONSTRUCTION WORK AND UNTIL IT IS SAFE TO USE THE CONSTRUCTION AREA FOR ITS NORMAL PURPOSES.

E. UTILITY PROTECTION

1. PRIOR TO PROCEEDING WITH EXCAVATION, THE CONTRACTOR SHALL INITIATE THE LOCATION OF ALL UTILITIES IN THE AREA TO AID IN LOCATING THEIR UNDERGROUND SERVICES. UPON LOCATION OF UTILITIES, THE CONTRACTOR SHALL USE CARE IN EXCAVATING NEAR EXISTING UTILITIES IN ORDER TO PROTECT THEM FROM DAMAGE.

F. DEVIATIONS FROM LINE AND GRADE DUE TO UNFORESEEN UNDERGROUND ISSUES

1. WHEREVER OBSTRUCTIONS ARE ENCOUNTERED DURING THE PROGRESS OF THE WORK AND INTERFERE TO SUCH AN EXTENT THAT AN ALTERATION IN THE PLAN IS REQUIRED, THE ENGINEER MAY REVISE THE PLANS AND REQUEST A DEVIATION FROM THE LINE AND GRADE OR ARRANGE WITH THE OWNERS OF THE STRUCTURES FOR THE REMOVAL, RELOCATION OR RECONSTRUCTION OF THE OBSTRUCTIONS. WHERE SEWER, GAS, WATER, TELEPHONE, ELECTRICAL OR OTHER EXISTING UTILITIES ARE AN IMPEDIMENT TO THE VERTICAL OR HORIZONTAL ALIGNMENT OF THE PROPOSED PIPE LINE, THE CONTRACTOR MUST ARRANGE WITH THE CONFLICTING UTILITY TO RELOCATE OR HAVE THE ENGINEER REVISE THE DRAWINGS TO AVOID THE CONFLICT. ALL CHANGES IN THE LINES OR GRADES ON THE PLANS MUST BE APPROVED BY THE UTILITY PRIOR TO CONTINUING CONSTRUCTION.

G. CONSTRUCTION IN EASEMENTS

1. IN EASEMENTS ACROSS PRIVATE PROPERTY, THE CONTRACTOR SHALL CONFINE ALL OPERATIONS TO THE EASEMENT AREA. IN GENERAL, THE EASEMENT AREA IS INTENDED TO PROVIDE REASONABLE ACCESS AND WORKING AREA FOR EFFICIENT OPERATION BY THE CONTRACTOR. WHERE ADEQUATE EASEMENT SPACE FOR EFFICIENT OPERATION IS NOT PROVIDED, THE CONTRACTOR SHALL ADJUST CONSTRUCTION METHODS TO COMPLETE THE WORK WITHIN THE EASEMENT OR WORK WITH THE UTILITY TO GRANT OR ACQUIRE ADDITIONAL EASEMENT.

H. MAINTENANCE OF EXISTING DRAINAGE FLOW

1. THE CONTRACTOR SHALL MAKE PROVISIONS FOR HANDLING AND MAINTAINING ALL FLOWS IN EXISTING CREEKS, DITCHES, SEWERS AND TRENCHES BY PIPES, FLUMES OR OTHER APPROVED METHODS AT ALL TIMES WHEN HIS OPERATIONS WOULD, IN ANY WAY, INTERFERE WITH THE NATURAL FUNCTIONING OF SAID CREEKS, DITCHES, SEWERS AND DRAINS.

2. NO STORM WATER SHALL BE PERMITTED IN THE SANITARY SEWER.

I. TRENCH DIMENSIONS

1. THE WIDTH OF TRENCHES IN EARTH FOR SEWER PIPE, LATERALS, AND OTHER STRUCTURES SHALL PROVIDE A TRENCH WIDTH OF APPROXIMATELY 1.25 TIMES THE OUTSIDE DIAMETER OF THE PIPE PLUS TWELVE (12") INCHES.

2. SIDEWALLS OF PIPE TRENCHES SHALL BE VERTICAL FROM THE BOTTOM OF THE TRENCH TO A POINT NOT LESS THAN TWELVE (12") INCHES ABOVE THE TOP OF THE PIPE. ABOVE THAT POINT, SIDEWALLS MAY BE BATTERED TO SUCH SLOPES AS DIRECTED ON THE PLANS TO MAINTAIN A SAFE WORKING ENVIRONMENT.

3. TRENCH SHEETING AND BRACING OR A TRENCH SHIELD OR BOX SHALL BE USED AS REQUIRED BY THE RULES AND REGULATIONS OF OSHA. THE BOTTOM OF THE TRENCH SHALL CONFORM TO THE DETAILS SHOWN ON THE APPROVED PLANS.

J. EARTH EXCAVATION

1. EARTH MATERIALS SHALL BE EXCAVATED SO THAT THE OPEN CUTS CONFORM TO THE LINES, GRADES AND DIMENSIONS SHOWN ON THE DRAWINGS.

2. AFTER THE TRENCH IS EXCAVATED TO GRADE, THE ENGINEER SHALL EXAMINE THE BASE AND DETERMINE WHETHER OR NOT IT IS SATISFACTORY FOR PIPE LAYING. IF THE BASE IS NOT SATISFACTORY, IT SHALL BE REMOVED AND REPLACED WITH CRUSHED STONE AS ORDERED BY THE ENGINEER. THE CRUSHED STONE SHALL BE #8 GRADATION AS SPECIFIED IN INDOT STANDARD SPECIFICATION, AND EXTEND A MINIMUM DEPTH OF SIX INCHES (6") BELOW THE BARREL OF

THE PIPE. SHOULD THE BASE STILL NOT BE SUITABLE FOR ADEQUATE SUPPORT OF THE PIPE (I.E. A BOILING OR QUICKSAND CONDITION, MUCK, ETC.), THE CONTRACTOR SHALL PROPOSE ALTERNATE METHODS OF SUITABLE CONSTRUCTION PRACTICES TO THE UTILITY FOR APPROVAL. THE UTILITY SHALL APPROVE ALTERNATE BASE STABILIZATION METHODS PRIOR TO COMMENCING LAYING OF PIPE IN THE TRENCH.

3. EXCAVATED EARTH MATERIALS THAT ARE SUITABLE FOR BACKFILLING MAY BE USED FOR BACKFILL WHEN ALLOWED BY THE APPROVED PLANS AND SPECIFICATIONS. THIS EXCAVATED MATERIAL MAY ONLY BE USED AS FINAL BACKFILL IN AREAS NOT SUBJECT TO TRAFFIC LOADING OR PAVEMENT, AND AS SHOWN ON THE PROJECT DRAWINGS AND DETAILS.

4. THE TRENCH AND TRENCH BOTTOM SHOULD BE CONSTRUCTED IN ACCORDANCE WITH ASTM D 2321 - SECTION 7. EMBEDMENT MATERIALS SHOULD BE CLASS I, CLASS II OR CLASS III MATERIALS AS DEFINED IN ASTM D 2321 - SECTION 6. THE USE OF CLASS IV AND/OR CLASS V MATERIALS FOR EMBEDMENT IS NOT RECOMMENDED AND SHOULD BE ALLOWED ONLY WITH THE APPROVAL OF THE ENGINEER. BEDDING OF THE PIPE SHOULD BE PERFORMED IN ACCORDANCE WITH ASTM D 2321 - SECTION 8. COMPACTION SHOULD BE AS SPECIFIED IN ASTM D 2321. DEVIATIONS FROM THE SPECIFIED COMPACTION SHALL BE APPROVED BY THE STATE UTILITY ENGINEER.

K. BORING AND JACKING

1. IF CALLED FOR ON THE DRAWINGS, BORING AND JACKING OF PIPE MAY BE REQUIRED. THE SAME STANDARDS FOR LINE AND GRADE IN OPEN CUT INSTALLATIONS APPLY TO BORING OR JACKING OF PIPE.

L. REMOVAL OF WATER

1. THE CONTRACTOR SHALL AT ALL TIMES DURING CONSTRUCTION PROVIDE AND MAINTAIN AMPLE MEANS AND DEVICES WITH WHICH TO REMOVE AND PROPERLY DISPOSE OF ALL WATER ENTERING THE EXCAVATIONS OR OTHER PARTS OF THE WORK AND SHALL KEEP THE EXCAVATIONS DRY UNTIL THE STRUCTURES TO BE BUILT THEREIN ARE COMPLETED OR CONNECTIONS TO EXISTING STRUCTURES ARE COMPLETED.

2. THE CONTRACTOR SHALL BE RESPONSIBLE TO PROVIDE ALL EQUIPMENT AND LABOR TO MAINTAIN BYPASS PUMPING DURING CONNECTIONS TO EXISTING STRUCTURES. THE CONTRACTOR SHALL MAINTAIN ADEQUATE PUMPING CAPACITY AT ALL TIMES TO PREVENT ANY SPILLS, OVERFLOWS, OR DISCHARGES FROM THE EXISTING SANITARY SYSTEM.

3.3 EMBEDMENT AND BACKFILL

A. PIPE EMBEDMENT AND COMPACTION

1. FOR THE PURPOSE OF THIS SPECIFICATION, PIPE SHALL INCLUDE THOSE MADE OF PVC, HDPE, DUCTILE IRON, AND OTHER MATERIALS APPROVED BY THE UTILITY.

2. ALL NON-RIGID PIPE SHALL BE BEDDED, HAUNCHED, AND INITIALLY BACKFILLED WITH #8 CRUSHED STONE OR #8 FRACTURED FACE AGGREGATE. THE PIPE BEDDING SHALL BE PLACED ON A PREPARED FLAT TRENCH BOTTOM. THE PIPE BEDDING SHALL EXTEND A MINIMUM OF SIX (6") INCHES OR ONE HALF (1/2) THE OUTSIDE PIPE DIAMETER TO A MAXIMUM OF EIGHT (8") BELOW THE PIPE. AFTER THE PIPE HAS BEEN PLACED TO GRADE AND LINE, THERE REMAINS A 4-INCH MINIMUM DEPTH OF MATERIAL BELOW THE PIPE BARREL AND A MINIMUM OF 3-INCHES BELOW THE BELL.

3. THIS SAME GRANULAR MATERIAL SHALL BE USED TO HAUNCH (AREA FROM THE TOP OF THE BEDDING TO THE SPRINGLINE OF THE PIPE) AND FOR INITIAL BACKFILL (AREA FROM THE HAUNCH TO TWELVE (12") INCHES ABOVE THE PIPE) ON BOTH SIDES OF THE PIPE FOR THE FULL TRENCH WIDTH.

4. ALL MATERIALS SHALL BE PLACED IN THE TRENCH IN NO MORE THAN SIX (6") INCH LAYERS. EACH LAYER SHALL BE LEVELED AND EVENLY DISTRIBUTED ON BOTH SIDES OF THE PIPE SO AS NOT TO DISTURB, DISPLACE OR DAMAGE THE PIPE AND SHALL BE THOROUGHLY COMPACTED. COMPACTION OF THE CRUSHED STONE SHALL BE ACCOMPLISHED BY HAND TAMPING OR WALKING IN THE MATERIAL. MATERIAL FOR HAUNCHING CAN BE COMPACTED BY MANUAL COMPACTION METHODS OR BY SHOVEL SLICING.

5. FINAL BACKFILL IS CONSIDERED TO BE ALL MATERIAL ABOVE AN ELEVATION THAT IS TWELVE (12") INCHES ABOVE THE TOP OF THE PIPE TO THE BOTTOM OF THE SURFACE RESTORATION (TOP SOIL PAVEMENTS, SIDEWALKS, ETC.) FOR THE FULL WIDTH OF THE TRENCH. ALL SANITARY SEWER PIPE SHALL BE BACKFILLED THE SAME DAY THAT IT IS INSTALLED. PRIOR TO USING HEAVY COMPACTION OR CONSTRUCTION EQUIPMENT DIRECTLY OVER THE PIPE, ENSURE THAT SUFFICIENT BACKFILL MATERIAL IS INSTALLED OVER THE PIPE TO PREVENT DAMAGE OR EXCESSIVE DEFLECTION. GRANULAR BACKFILL SHALL BE REQUIRED FOR ALL PIPE UNDER WALKS OR PAVEMENT.

6. COMPACTION OF FINAL BACKFILL IN AREAS SUBJECT TO TRAFFIC INFLUENCE OR PAVEMENT, WHICH ARE DEFINED AS BEING AREA SUBJECT TO ROUTINE VEHICLE USAGE SUCH AS ROADWAYS, ALLEYS, DRIVEWAYS, SIDEWALKS, ETC. SHALL BE PERFORMED ACCORDING TO THE LATEST REVISION OF THE ROADWAY REGULATORY AUTHORITY STANDARDS (STATE, COUNTY OR CITY). THE AREA OF TRAFFIC INFLUENCE IS NORMALLY CONSIDERED THE AREA WITHIN FIVE (5) FEET OF THE EDGE OF PAVEMENT, INCLUDING SHOULDERS AS MEASURED FROM THE OUTERMOST EDGE OF THE PIPE TRENCH CLOSEST TO THE EDGE OF THE TRAFFIC AREA. IT ALSO INCLUDES AREAS WITHIN A 1:1 SLOPE FROM THE EDGE OF THE TRAFFIC AREA, BASED UPON DEPTH AND DISTANCE, TAKEN FROM THE OUTER EDGE OF THE PIPE CLOSEST TO THE TRAFFIC. PLACEMENT AND COMPACTION OF THE FINAL BACKFILL SHALL BE IN ACCORDANCE WITH THE STANDARDS OF THE REGULATORY AGENCY HAVING JURISDICTION OVER THE ROADWAY.

7. PIPES INSTALLED IN AREAS NOT SUBJECT TO TRAFFIC INFLUENCE MAY BE BACKFILLED WITH SUITABLE EXCAVATED TRENCH SOIL MATERIALS. EXCAVATED TRENCH SOIL MATERIALS SHALL BE PLACED IN UNIFORM LAYERS, COMPACTED AS SPECIFIED, AND MOUND TO ACCOMMODATE SETTLEMENT DURING THE PROJECT DEVELOPMENT. EXCAVATED TRENCH MATERIAL FOR USAGE AS FINAL BACKFILL SHALL BE FREE FROM ROCKS (TWO INCHES IN DIAMETER OR GREATER), CONCRETE, ROOTS, STUMPS, LARGE AMOUNTS OF SOD OR ORGANIC MATTER, RUBBISH, FROZEN MATERIALS AND OTHER SIMILAR MATERIALS THAT MAY CAUSE EXCESSIVE SETTLEMENT. TO ALLOW FOR SETTLEMENT, THE SURFACE OF THE TRENCH SHALL GENERALLY BE LEFT IN A SLIGHTLY ROUNDED CONDITION.

8. HAUNCHING AND INITIAL BACKFILL SHOULD BE AS SPECIFIED IN ASTM D 2321 - SECTION 9 USING CLASS I, CLASS II OR CLASS III MATERIALS. MATERIALS USED AND COMPACTION SHALL BE AS SPECIFIED BY THE ENGINEER. IN CASES WHERE A COMPACTION OF 85 PERCENT STANDARD PROCTOR DENSITY IS NOT ATTAINABLE, THE DESIGNER MAY WISH TO INCREASE THE SDR OF THE PIPE TO PROVIDE ADEQUATE STIFFNESS. ASTM D 2321 - SECTION 11.2, MINIMUM COVER FOR LOAD APPLICATION, SECTION 11.3, USE OF COMPACTION EQUIPMENT AND SECTION 11.4, REMOVAL OF TRENCH PROTECTION, SHOULD APPLY UNLESS DIRECTED OTHERWISE BY THE STATE UTILITY ENGINEER.

B. STRUCTURES EMBEDMENT AND COMPACTION

1. FOR PURPOSES OF THIS SPECIFICATION, STRUCTURES SHALL INCLUDE BUT NOT BE LIMITED TO VAULTS AND MANHOLES, ITEMS SPECIFICALLY EXCLUDED FROM THIS DEFINITION OF "STRUCTURES" ARE PIPE, CONDUITS AND THEIR APPURTENANCES EXCEPT THOSE LISTED HEREIN.

2. STRUCTURE BACKFILLING AND COMPACTION SHALL COMPLY WITH THE REQUIREMENTS AS SPECIFIED FOR THE ADJACENT SANITARY SEWER.

3. ALL EXCAVATIONS SHALL BE BACKFILLED TO THE ORIGINAL SURFACE OF THE GROUND OR SUCH OTHER GRADE AS SHOWN ON THE PLANS. THE BACKFILLING SHALL BE PERFORMED AS SOON AS POSSIBLE AFTER CONCRETE, MORTAR AND PIPE JOINTS HAVE SUFFICIENT STRENGTH TO RESIST THE IMPOSED LOAD WITHOUT DAMAGE. ALL APPURTENANCES AND ATTACHMENTS TO STRUCTURE WALLS SHALL BE MADE AND ANY WALL COATINGS SHALL BE IN PLACE AND CURED PRIOR TO BACKFILLING AT THAT ELEVATION.

4. PRIOR TO BACKFILLING, ALL FORMWORK AND CONSTRUCTION DEBRIS WILL BE REMOVED. ANY FROZEN OR WET SUBSOIL WILL BE THAWED OR DRIED AND COMPACTED OR REMOVED PRIOR TO RECEIVING BACKFILL. DURING COLD SEASONS, GRADES RECEIVING BACKFILL WILL BE PROTECTED FROM FROST DURING THE WORK PROGRESS.

5. RAINFALL AND/OR GROUNDWATER TRAPPED IN THE EXCAVATION DURING BACKFILL OPERATIONS SHALL BE PUMPED OUT BY THE CONTRACTOR. EXCESSIVELY WET SOIL OR SOIL WHICH HAS ERODED INTO THE EXCAVATION SHALL BE REMOVED OR EXCAVATED AND RE-COMPACTED PRIOR TO PLACING ADDITIONAL BACKFILL MATERIAL.

6. OPENINGS IN STRUCTURES TO RECEIVE PIPE SHALL BE TEMPORARILY PLUGGED OR BULKHEADED DURING BACKFILL OPERATIONS. BACKFILL SHALL PROCEED TO AN ELEVATION LEVEL WITH THE INVERT OF THE PIPE. THE PIPE SHALL THEN BE BEDDED AND BACKFILLED IN ACCORDANCE WITH THE APPLICABLE DRAWING DETAILS AND SPECIFICATIONS.

C. TEMPORARY SURFACES SUBJECT TO TRAFFIC

1. THE CONTRACTOR SHALL OPEN STREETS TO TRAFFIC IMMEDIATELY AFTER COMPLETING THE BACKFILL OPERATION. THE CONTRACTOR SHALL ACCOMPLISH THIS BY INSTALLING THE COMPACTED AGGREGATE BASE IMMEDIATELY AFTER GRANULAR BACKFILL. WHEN TEMPORARY ASPHALT PAVEMENT IS REQUIRED THIS SHALL ALSO BE INSTALLED IMMEDIATELY. THE CONTRACTOR SHALL BE RESPONSIBLE FOR THE MAINTENANCE OF THE TEMPORARY SURFACE TO PROMOTE SAFETY OF THE TRAVELLING PUBLIC.

D. MAINTAINING TRENCH SURFACES

1. ALL SURFACE SETTLEMENT OF THE BACKFILL ALONG TRENCHES LOCATED BENEATH STREETS, ROADS, ALLEYS, DRIVEWAYS AND PARKING LOTS WHICH ARE SUBJECT TO TRAFFIC SHALL BE KEPT FILLED LEVEL WITH OR SLIGHTLY ABOVE THE ORIGINAL PAVED SURFACE AT ALL TIMES WITH COMPACTED AGGREGATE BASE MATERIAL UNTIL THE PERMANENT PAVEMENT IS SATISFACTORILY RESTORED. WHEN TEMPORARY ASPHALT PAVEMENT IS USED, DEPRESSIONS AND "POT HOLES" SHALL BE PROMPTLY FILLED WITH THE TEMPORARY ASPHALT MATERIAL. ATTENTION SHALL BE GIVEN BY THE CONTRACTOR TO THE TIMELY AND PROPER MAINTENANCE, LEVELING AND GRADING OF THE SURFACE OF ALL BACKFILLED TRENCHES, ESPECIALLY THOSE SUBJECT TO TRAFFIC AND ESPECIALLY FOLLOWING RAINS. THE SURFACE OF STREETS, ROADS AND ALLEYS SHALL BE MAINTAINED SMOOTH AND FREE OF RUTS AND WATER TRAPPING DEPRESSIONS BY PERIODIC BLADING, SCARIFYING; AND/OR FILLING SETTLED AREAS, RUTS, POCKETS, OR HOLES WITH COMPACTED AGGREGATE BASE MATERIAL OR TEMPORARY ASPHALT WHERE USED.

2. IN EXISTING RESIDENTIAL AREAS WHERE STONE AGGREGATE HAS BEEN TEMPORARILY USED TO RESTORE THE ROADWAY SURFACE, DUST PREVENTION MAY BE REQUIRED TO REDUCE THE EFFECT OF DUST UPON LOCAL RESIDENTS.

3. IN AREAS OUTSIDE OF THE INFLUENCE OF TRAFFIC, UNLESS OTHERWISE SPECIFIED, THE BACKFILL SHALL BE NEATLY ROUNDED OVER THE TRENCH TO A SUFFICIENT HEIGHT TO ALLOW FOR SETTLEMENT TO GRADE AFTER CONSOLIDATION. PRIOR TO THE ACCEPTANCE OF THE WORK, ANY SURFACE SETTLEMENT BELOW ORIGINAL GROUND SURFACE SHALL BE REFILLED AND RESTORED.

3.4 GRAVITY SANITARY SEWER PIPE INSTALLATION

A. DESCRIPTION

1. THIS SECTION ON THE LAYING OF SEWERS ADDRESSES NON-RIGID PIPE. POLYVINYL CHLORIDE (PVC), HDPE, EITHER AWWA C900/C905 OR SDR 35, 26 OR 21, PIPE SHALL BE CONSIDERED NON-RIGID OR FLEXIBLE CONDUITS.

2. ALL PIPES SHALL BE HANDLED, STORED AND INSTALLED ACCORDING TO THE MANUFACTURER'S RECOMMENDATIONS.

3. THE MINIMUM COVER FOR SANITARY SEWER SHALL BE FIVE (5) FEET. THE MAXIMUM ALLOWABLE DEPTH SHALL BE PER MANUFACTURER'S RECOMMENDATIONS AND SHALL BE BASED UPON THE BEDDING AND BACKFILL USED FOR THE INSTALLATION.

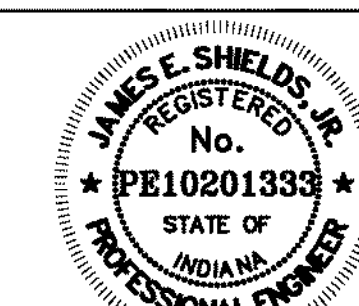
4. THE LEAST AMOUNT OF LATERAL COVER IS GENERALLY WHERE THE LATERAL CROSSES BELOW THE GUTTER OF THE STREET ON THE FAR SIDE OF THE ROAD. THE STATE UTILITY ENGINEER CALCULATES LATERAL COVER BY ASSUMING:

- a. THE LATERAL INVERT ELEVATION IS THE TOP OF PIPE ELEVATION OF THE MAIN LINE TO WHICH THE LATERAL CONNECTS.
b. THE LATERAL IS INSTALLED AT 1.00%.

5. SANITARY SEWERS SHALL BE CONSTRUCTED WITH A TEN (10) FOOT MINIMUM SEPARATION FROM AN EXISTING OR PROPOSED WATER MAIN AND/OR STORM SEWER, MEASURED HORIZONTALLY FROM THE



AQUA INDIANA STATE SANITARY SEWER STANDARDS 2021



Signature of James E. Shields, Inc. 3/1/2021 CERTIFIED BY

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REVISION SCHEDULE table with columns NO., DESCRIPTION, DATE. Multiple empty rows.

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SANITARY SEWER SPECIFICATIONS

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OUTSIDE EDGE OF THE SANITARY SEWER TO THE OUTSIDE EDGE OF THE WATER MAIN OR STORM SEWER. A VERTICAL SEPARATION OF A MINIMUM OF EIGHTEEN (18") INCHES, MEASURED VERTICALLY FROM THE OUTSIDE EDGE OF THE SANITARY SEWER TO THE OUTSIDE EDGE OF THE WATER MAIN OR STORM SEWER, MUST ALSO BE MAINTAINED. WHEN A SANITARY SEWER MAIN CROSSES A WATER MAIN OR STORM SEWER, IT SHALL CROSS AT AS NEARLY TO NINETY (90) DEGREES AS POSSIBLE BUT NOT LESS THAN FORTY-FIVE (45) DEGREES, MEASURED FROM THE CENTERLINES OF THE SANITARY SEWER AND WATER MAIN OR STORM SEWER. NO SANITARY MANHOLE SHALL BE LOCATED WITHIN EIGHT (8) FEET OF A WATER MAIN OR STORM SEWER, MEASURED FROM THE OUTSIDE EDGE OF THE SANITARY SEWER MANHOLE TO THE CLOSEST OUTSIDE EDGE OF THE WATER MAIN OR STORM SEWER.

6. WHERE REQUIRED HORIZONTAL AND/OR VERTICAL SEPARATION FROM WATER OR STORM SEWER LINES CANNOT BE MET, THE SEWER MATERIAL SHALL BE CONSTRUCTED OF PVC SDR 21 OR PVC AWWA C900/C905 PIPE FOR A DISTANCE OF TEN (10) FEET ON EITHER SIDE OF THE CROSSING POINT AND SHALL MEET THE REQUIREMENTS OF 327 IAC.

B. ALIGNMENT AND GRADE

- 1. ALL PIPE SHALL BE CONSTRUCTED BEGINNING FROM THE LOWEST POINT AND SHALL BEGIN AT EITHER A NEW STRUCTURE OR CONNECTION TO AN EXISTING STRUCTURE. CONSTRUCTION SHALL PROCEED TO THE LINES AND GRADES SHOWN ON THE APPROVED DRAWINGS. LINE AND GRADE BETWEEN MANHOLES SHALL BE MAINTAINED BY USE OF LASER.
2. THE UTILITY WILL NOT ACCEPT GRAVITY SEWER DESIGNED OR INSTALLED BELOW MINIMUM SLOPE AS SPECIFIED IN 327 IAC ARTICLE 3.
3. THE MINIMUM SLOPE OF END RUN GRAVITY SEWERS SHALL BE 1.00%. END RUN LENGTH SHALL BE MAXIMIZED TO REDUCE THE NUMBER OF MANHOLES. AN END RUN SEWER IS DEFINED AS FOLLOWS:
a. THE UPSTREAM MANHOLE HAS NO INFLUENT FLOWS FROM SEWERS, AND
b. A SEWER IS NOT PLANNED TO BE EXTENDED FROM THE UPSTREAM MANHOLE IN THE FUTURE.
4. THE CONTRACTOR SHALL VERIFY THE INITIAL STARTING ELEVATION FROM AT LEAST TWO (2) ESTABLISHED BENCHMARKS.

C. TRENCHING

- 1. GENERAL
a. EXCAVATION AND BACKFILLING SHALL BE PERFORMED ACCORDING TO THE EMBEDMENT AND BACKFILLING SECTION, SECTION 3.3 OF THESE SPECIFICATIONS.

D. PIPE LAYING

- 1. ALL PIPE, FITTINGS AND VALVES SHALL BE LOWERED CAREFULLY INTO THE TRENCH IN SUCH A MANNER AS TO PREVENT DAMAGE TO MATERIALS AND PROTECTIVE COATINGS AND LININGS. UNDER NO CIRCUMSTANCES SHALL GRAVITY SEWER MAIN MATERIALS BE DROPPED OR DUMPED INTO THE TRENCH. THE TRENCH SHALL BE DEWATERED PRIOR TO INSTALLATION OF THE PIPE.
2. EXAMINATION OF MATERIAL
a. ALL PIPE, FITTINGS AND VALVES AND OTHER APPURTENANCES SHALL BE EXAMINED CAREFULLY FOR DAMAGE AND OTHER DEFECTS IMMEDIATELY BEFORE INSTALLATION.
3. PIPE ENDS
a. ALL LUMPS, BLISTERS, AND EXCESS COATING SHALL BE REMOVED FROM THE SOCKET AND PLAIN ENDS OF EACH PIPE, AND THE OUTSIDE OF THE PLAIN END AND THE INSIDE OF THE BELL SHALL BE WIPED CLEAN AND DRY AND BE FREE FROM DIRT, SAND, GRIT OR ANY FOREIGN MATERIALS BEFORE THE PIPE IS LAID.
4. PIPE CLEANLINESS
a. FOREIGN MATERIAL SHALL BE PREVENTED FROM ENTERING THE PIPE WHILE IT IS BEING PLACED IN THE TRENCH.
5. PIPE PLACEMENT
a. AS EACH LENGTH OF PIPE IS PLACED IN THE TRENCH, THE JOINT SHALL BE ASSEMBLED AND THE PIPE BROUGHT TO CORRECT LINE AND GRADE. THE PIPE SHALL BE SECURED IN PLACE WITH SPECIFIED BACKFILL MATERIAL.
6. PIPE PLUGS
a. AT TIMES WHEN PIPE-LAYING IS NOT IN PROGRESS, THE OPEN ENDS OF PIPE SHALL BE CLOSED BY A WATERTIGHT PLUG. THE PLUG SHALL BE FITTED WITH A MEANS FOR VENTING. WHEN PRACTICAL, THE PLUG SHALL REMAIN IN PLACE UNTIL THE TRENCH IS PUMPED COMPLETELY DRY. CARE MUST BE TAKEN TO PREVENT PIPE FLOTATION, SHOULD THE TRENCH FILL WITH WATER.
b. PRIOR TO REMOVAL OF THE PLUG FOR EXTENDING THE LINE OR FOR ANY OTHER REASON, AIR AND/OR WATER PRESSURE IN THE LINE SHALL BE RELEASED.

E. JOINT ASSEMBLY

- 1. JOINTS SHALL BE ASSEMBLED IN ACCORDANCE WITH THE MANUFACTURER'S INSTRUCTIONS.
2. ASSEMBLY
a. AFTER PLACING A LENGTH OF PIPE IN THE TRENCH, THE MANUFACTURER'S LUBRICANT SHALL BE PROPERLY APPLIED. SPIGOT END SHALL THEN BE CENTERED IN THE BELL AND THE PIPE PUSHED HOME AND BROUGHT TO CORRECT LINE AND GRADE. PIPE AND FITTINGS WHICH DO NOT ALLOW A SUFFICIENT AND UNIFORM SPACE FOR JOINTS SHALL BE REMOVED AND REPLACED WITH PIPE OF PROPER DIMENSIONS TO INSURE SUCH UNIFORM SPACE. PRECAUTIONS SHALL BE TAKEN TO PREVENT DIRT FROM ENTERING THE JOINT SPACE.
3. PIPE CUTTING
a. CUTTING PIPE FOR INSERTION OF VALVES, FITTINGS, OR CLOSURE PIECES SHALL BE DONE IN CONFORMANCE RECOMMENDATIONS OF THE MANUFACTURER OF THE CUTTING EQUIPMENT. CUTTING SHALL BE DONE IN A SAFE, WORKMANLIKE MANNER WITHOUT CREATING DAMAGE TO THE PIPE LINING. AN OXYACETYLENE TORCH SHALL NOT BE USED.

b. CUT ENDS AND ROUGH EDGES SHALL BE GROUND SMOOTH, AND FOR PUSH-ON JOINT CONNECTIONS THE CUT END SHALL BE BEVELED BY METHODS RECOMMENDED BY THE MANUFACTURER.

3.5 PRESSURE PIPE INSTALLATION

A. DESCRIPTION

- 1. PRESSURE SEWER MAINS SHALL BE INSTALLED IN ACCORDANCE WITH AWWA/ASTM D-2774 STANDARDS AND MANUFACTURER'S RECOMMENDATIONS. IF ANY CONFLICT BETWEEN THESE STANDARDS AND MANUFACTURER'S RECOMMENDATIONS, THE MANUFACTURER'S RECOMMENDATIONS SHALL TAKE PRECEDENCE.

B. ALIGNMENT AND GRADE

- 1. THE PRESSURE SEWER MAINS SHALL BE LAID AND MAINTAINED TO LINES AND GRADES ESTABLISHED BY THE DRAWINGS, WITH FITTINGS AND VALVES AT THE REQUIRED LOCATIONS. VALVE OPERATING STEMS SHALL BE ORIENTED IN A MANNER TO ALLOW PROPER OPERATION.
2. CLEARANCE
a. WHEN CROSSING EXISTING PIPELINES OR OTHER STRUCTURES, ALIGNMENT AND GRADE MAY BE ADJUSTED AS NECESSARY, TO PROVIDE CLEARANCE AS REQUIRED BY FEDERAL, STATE, AND LOCAL REGULATIONS AND TO PREVENT FUTURE DAMAGE OR CONTAMINATION OF EITHER THE PIPELINES OR STRUCTURES.
3. DEPTH
a. THE MINIMUM VERTICAL COVER FOR SANITARY FORCE MAINS SHALL BE FOUR AND A HALF (4.5) FEET FROM GRADE TO THE CROWN OF THE PIPE. THE MAXIMUM ALLOWABLE DEPTH SHALL BE PER MANUFACTURER'S RECOMMENDATIONS AND SHALL BE BASED UPON THE BEDDING AND BACKFILL USED FOR THE INSTALLATION.
4. SLOPE
a. FORCE MAINS MUST BE DESIGNED AT A CONSTANT POSITIVE SLOPE FROM LOW POINTS AND CLEAN-OUTS TO AIR/VACUUM RELIEF VALVES.

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2. EXAMINATION OF MATERIAL
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5. PIPE PLACEMENT
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b. PRIOR TO REMOVAL OF THE PLUG FOR EXTENDING THE LINE OR FOR ANY OTHER REASON, AIR AND/OR WATER PRESSURE IN THE LINE SHALL BE RELEASED.

E. JOINT ASSEMBLY

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b. CUT ENDS AND ROUGH EDGES SHALL BE GROUND SMOOTH, AND FOR PUSH-ON JOINT CONNECTIONS THE CUT END SHALL BE BEVELED BY METHODS RECOMMENDED BY THE MANUFACTURER.

F. INSTALLATION BY HORIZONTAL DIRECTIONAL DRILLING (HDD)

- 1. EQUIPMENT
a. THE DIRECTIONAL DRILLING SYSTEM SHALL BE REMOTELY STEERABLE AND PERMIT ELECTRONIC MONITORING OF TUNNEL

DEPTH AND LOCATION. THE SYSTEM SHALL BE ABLE TO CONTROL THE DEPTH AND DIRECTION OF THE PIPE AND MUST BE ACCURATE TO +/- 2 INCHES.

b. THE SYSTEM SHALL UTILIZE A FLUID-CUTTING PROCESS, USING A LIQUID CLAY SUCH AS BENTONITE. THIS CLAY SHALL BE TOTALLY INERT AND CONTAIN NO RISK TO THE ENVIRONMENT.

c. THE LIQUID CLAY SHALL REMAIN IN THE BORE HOLE TO INCREASE THE STABILITY OF THE BORE HOLE AND TO PROVIDE A LUBRICANT TO REDUCE FRICTIONAL DRAG WHEN THE PIPE IS INSTALLED.

d. THE SPOILS SHALL BE RECOVERED BY USE OF A VACUUM SYSTEM MOUNTED ON A VEHICLE FOR REMOVAL OF THE SPOILS. SPOILS SHALL NOT BE DISCHARGED INTO SEWERS OR STORM DRAINS. THE CONTRACTOR IS RESPONSIBLE FOR DISPOSAL OF ALL SPOIL MATERIAL.

2. DRILLING PROCEDURE

- a. CONTRACTOR SHALL CALIBRATE THE DIRECTIONAL DRILLING HEAD LOCATOR AT THE START OF THE DAY AND AT EACH NEW DIRECTIONAL DRILLING OPERATION.
b. THE MAXIMUM DRILL ANGLE SHALL BE FIFTEEN DEGREES MEASURED PERPENDICULAR TO GRADE TO THE DESIGN DEPTH ELEVATION.
c. A PILOT HOLE SHALL BE DRILLED ON THE DRILL PATH WITH NO DEVIATIONS GREATER THAN 5% OF DEPTH OVER A LENGTH OF 100 FEET.
d. UPON SUCCESSFUL COMPLETION OF THE PILOT HOLE, CONTRACTOR WILL REAM THE DRILL HOLE TO A MINIMUM OF 25% GREATER THAN THE OUTSIDE DIAMETER OF THE INSTALLED PIPE USING THE APPROPRIATE TOOLS.
e. THREE STRANDS OF TRACER WIRE SHALL BE PULLED BACK WITH THE PIPE. THE WIRES SHALL BE INSTALLED ALONG THE PIPE, FASTENED SECURELY TO THE PIPE AT FIVE (5) FOOT INTERVALS, AND TERMINATING ABOVE GROUND WITH THE LEAD TAPED AROUND EACH STRUCTURE.
f. TEST/PRESSURE RELIEF HOLES (POTHOLES) DUG EVERY 25 FEET SHALL BE REQUIRED ALONG THE BORE ROUTE TO CONFIRM ALIGNMENT AND GRADE, AND TO RELIEVE SUBSURFACE PRESSURE.
g. AFTER THE PIPE HAS BEEN INSTALLED, ALLOW PIPE MANUFACTURER'S RECOMMENDED AMOUNT OF TIME, BUT NOT LESS THAN FOUR (4) HOURS, FOR COOLING AND RELAXATION DUE TO TENSILE STRESSING PRIOR TO HYDROSTATIC TESTING.

G. THRUST RESTRAINT

1. FITTINGS

- a. ALL PLUGS, CAPS, TEES, REDUCERS AND BENDS, UNLESS OTHERWISE SPECIFIED, SHALL BE PROVIDED WITH SUITABLY RESTRAINED JOINTS. VALVES ARE CONSIDERED DEAD ENDS AND SHALL BE RESTRAINED AS SUCH. SEE THRUST BLOCKING DETAIL ON AQUA INDIANA'S LIFT STATION DETAIL SHEET.
b. NO FITTINGS OF GREATER THAN FORTY-FIVE (45) DEGREES (1/8 BEND) CAN BE USED, EXCEPT WITHIN THE VALVE VAULT.

2. DESIGN

- a. THE DESIGN PRESSURE IS THE MAXIMUM PRESSURE TO WHICH THE PIPELINE WILL BE SUBJECTED, WITH CONSIDERATION GIVEN TO THE VULNERABILITY OF THE PIPE SOIL SYSTEM WHEN THE PRESSURE IS EXPECTED TO BE APPLIED. IN MOST CASES, THIS WILL BE THE TEST PRESSURE OF THE PIPE, APPLIED SHORTLY AFTER INSTALLATION, WHEN THE PIPE-SOIL SYSTEM IS NORMALLY MOST VULNERABLE.
b. FOR BURIED PIPELINES, THRUST RESTRAINT IS ACHIEVED BY TRANSFERRING THE THRUST FORCE TO THE SOIL STRUCTURE OUTSIDE THE PIPE. THE OBJECTIVE OF THE DESIGN IS TO DISTRIBUTE THE THRUST FORCES TO THE SOIL STRUCTURE IN SUCH A MANNER THAT JOINT SEPARATION WILL NOT OCCUR IN UNRESTRAINED JOINTS.
3. RESTRAINING MECHANISMS FOR PUSH-ON OR MECHANICAL JOINTS: TIE RODS, CLAMPS, OR OTHER COMPONENTS OF DISSIMILAR METAL SHALL BE PROTECTED AGAINST CORROSION BY HAND APPLICATION OF A SUITABLE COATING OR BY ENCASEMENT OF THE ENTIRE ASSEMBLY WITH 8-MIL LOOSE POLYETHYLENE FILM IN ACCORDANCE WITH ANSI/AWWA C105/A21.5.

a. GLANDS SHALL BE MANUFACTURED OF DUCTILE IRON CONFORMING TO ASTM A536- 80, GRADE 60-42-10. SET SCREWS SHALL BE HARDENED DUCTILE IRON. THESE DEVICES SHALL HAVE PRESSURE RATING WITH A SAFETY FACTOR OF 281. GLANDS SHALL BE LISTED WITH UL AND FACTORY MANUAL.

H. AIR RELIEF

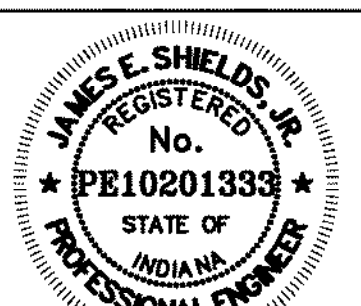
- 1. AIR RELIEF VALVES SHALL BE INSTALLED AT EVERY INTERMEDIATE APEX POINT WHERE AIR MAY ACCUMULATE IN THE FORCE MAIN.
2. EACH AIR RELIEF VALVE THAT EXHAUSTS ABOVE GROUND MUST BE EQUIPPED WITH AN EXHAUST PIPE EXTENDING TO A DOWNWARD FACING ELBOW COVERED WITH A CORROSION-RESISTANT, TWENTY-FOUR (24) MESH SCREENED OPENING AT AN ELEVATION OF EIGHTEEN (18") INCHES ABOVE GROUND.
3. AUTOMATIC AIR RELIEF VALVES SHALL NOT BE USED IN AREAS WITHIN THE ONE HUNDRED (100) YEAR FLOOD ELEVATION OR IN AREAS WHERE FLOODING MAY OCCUR UNLESS THEY ARE EQUIPPED WITH A DOWNWARD FACING EXHAUST PIPE COVERED WITH A CORROSION-RESISTANT, TWENTY-FOUR (24) MESH SCREENED OPENING AT AN ELEVATION OF EIGHTEEN (18) INCHES ABOVE THE GROUND SURFACE AND ABOVE THE ONE HUNDRED (100) YEAR FLOOD ELEVATION.
4. MANUALLY OPERATED AIR RELIEF VALVES SHALL BE USED IN AREAS WITHIN THE ONE HUNDRED (100) YEAR FLOOD PLAIN AND WHERE FLOODING MAY OCCUR.

I. FORCE MAIN DISCHARGE TO MANHOLES

- 1. IT IS RECOMMENDED THAT THE DISCHARGE BE ONE HUNDRED EIGHTY (180) DEGREES FROM THE EFFLUENT SEWER. IF THE DISCHARGE CANNOT BE ONE HUNDRED EIGHTY (180) DEGREES FROM THE EFFLUENT SEWER, THEN IT MUST BE CONSTRUCTED TWO (2) INCHES ABOVE THE TOP OF THE EFFLUENT PIPE, BUT NOT GREATER THAN TWO (2) FEET ABOVE THE INVERT OF THE EFFLUENT PIPE.
2. CHANNELS MUST BE PROVIDED IN THE MANHOLE FOR ALL FORCE MAIN DISCHARGES.
3. CHANNELS MUST BE THE SIZE OF THE EFFLUENT SEWER.
4. CHANNELS MUST BE STRAIGHT (NOT WITH A RADIUS) TO THE GREATEST EXTENT POSSIBLE.



AQUA INDIANA STATE SANITARY SEWER STANDARDS 2021



James E. Shields, Registered Professional Engineer, State of Indiana, No. PE10201333, 3/1/2021

ISSUANCE INDEX table with columns for DATE and SANITARY STANDARDS

REVISION SCHEDULE table with columns for NO., DESCRIPTION, and DATE

Project Number 2021

SANITARY SEWER SPECIFICATIONS

