

# REGIONAL SEWER DISTRICT MONTGOMERY COUNTY, INDIANA STANDARD CONSTRUCTION DETAILS AND SPECIFICATIONS

**DIRECTIONS FOR USE**

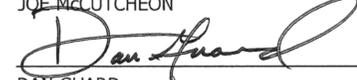
1. THE ENTIRE SET OF FULL SIZE STANDARDS SHALL BE ATTACHED TO THE CONSTRUCTION DRAWINGS AND SHALL BE CONSIDERED PART THERETO. PARTIAL SET MAY BE USED FOR SMALL PROJECTS WHEN APPROVED BY THE MONTGOMERY COUNTY REGIONAL SEWER BOARD.
2. DETAILS PREPARED BY OUTSIDE SOURCES SHALL NOT BE INCLUDED IN THE CONSTRUCTION DRAWINGS WHEN SAID DETAILS COVER WORK WHICH IS COVERED BY MCRSD STANDARDS.
3. INDIVIDUAL MCRSD 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 TILES 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 MCRSD STANDARDS ARE THE SOLE RESPONSIBILITY OF THE DESIGN ENGINEER AND SHALL BE PLACED ON SHEETS OTHER THAN THE MCRSD 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 THE MCRSD AND THE OWNER OF THE AFFECTED UTILITY.

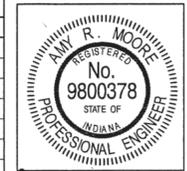
DRAWING INDEX	
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01	DIRECTIONS FOR USE, GENERAL NOTES
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06	PRESSURE SEWERS
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08	MICELLANEOUS AND GRINDER STATION
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MONTGOMERY COUNTY REGIONAL SEWER DISTRICT  
BOARD OF DIRECTORS

  
 TERRY HOCKERSMITH  
  
 BRAD MONTS  
  
 MARK DAVIDSON  
  
 JOE McCUTCHEON  
  
 DAN GUARD

DIRECTORY: F:\2013\13-3041 Mont Co RSD On-call\Sanitary Standard Details\CAD\  
 FILE: 13-3041 MCRSD Details.dwg  
 DIMSCALE: 1/8"=1'-0"  
 PLOTTED BY: JMowery  
 DATE: Aug 16, 2019 - 4:04pm

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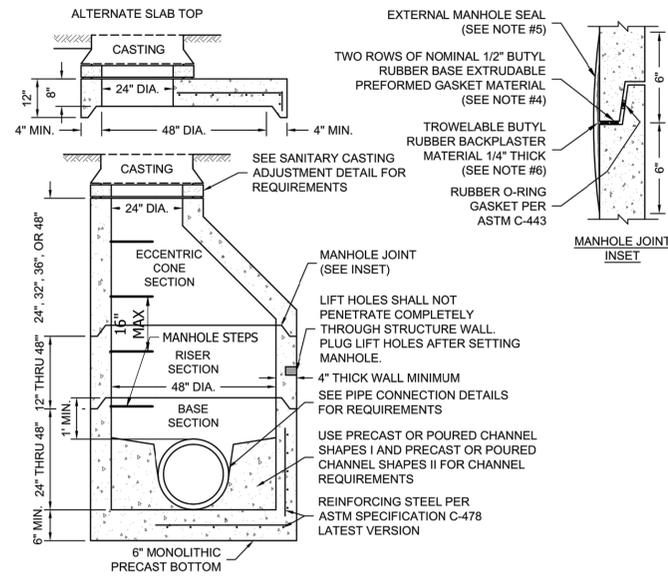


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MONTGOMERY COUNTY SEWER DISTRICT

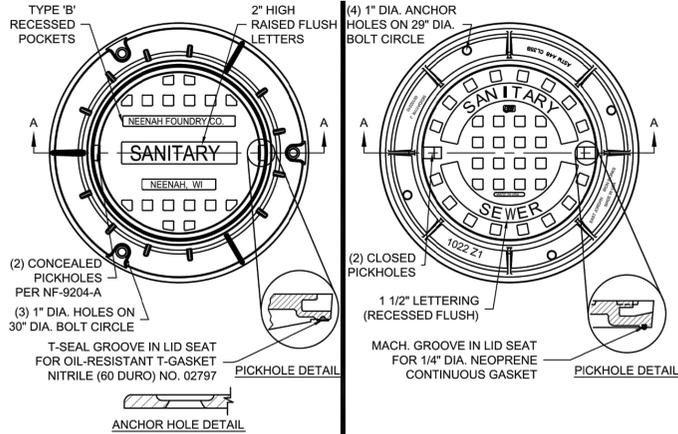
TITLE SHEET

HORIZONTAL SCALE	AS NOTED
VERTICAL SCALE	AS NOTED
SHEETS	01 of 12
PROJECT	13-3041



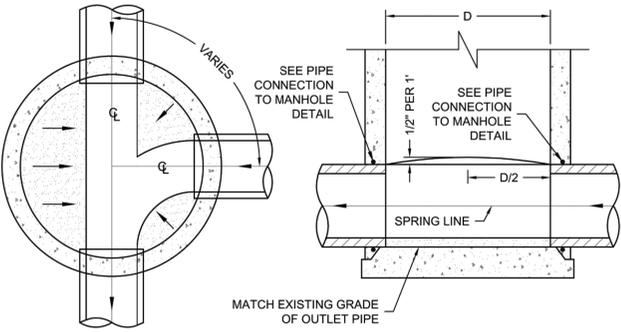
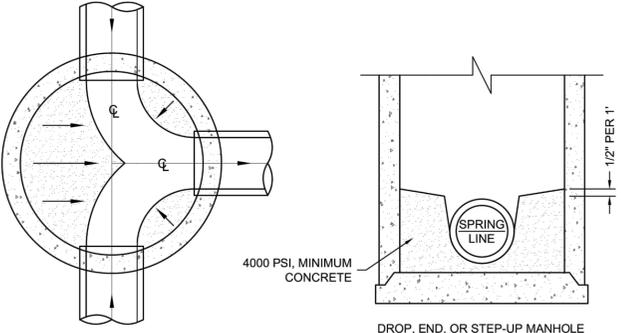
- NOTES:**
1. THE BASE SHALL BE PLACED ON COMPACTED FRACTURED FACE STONE, 6" MINIMUM.
  2. THE INSIDE WALL DISTANCE BETWEEN OPENINGS SHALL BE A MINIMUM OF 6".
  3. USE RU 106 RUB'RNK LTM AS MANUFACTURED BY HENRY CO., KENT-SEAL NO. 2 AS MANUFACTURED BY HAMILTON-KENT OR EZ-STICK BUTYL-RUBBER-BASED PREFORMED FLEXIBLE SEALANT AS MANUFACTURED BY PRESS-SEAL.
  4. APPLY TROWELABLE BUTYL RUBBER BACK PLASTER MATERIAL 1/4" THICK (WHEN DRY) FROM 6" ABOVE TO 6" BELOW JOINTS. USE TROWELABLE EZ-STICK #3, AS MANUFACTURED BY PRESS-SEAL GASKET CORP.
  5. EXTERNAL MANHOLE JOINT SEAL SHALL CONSIST OF A SHEET OF PLASTIC VISQUEEN.
  6. SEE DETAIL, SHEET 3, FOR MANHOLE STEPS

**48" SANITARY MANHOLE**



- NOTES:**
1. ASTM A48-83 CLASS NO. 35
  2. ALL BEARING SURFACES TO BE MACHINED
- FRAME AND SOLID LID**  
NEENAH R-1772 W/"SANITARY" LETTERED, SOLID LID (SANITARY APPLICATION ONLY)
- NOTES:**
1. ASTM A48-83 CLASS NO. 35
  2. ALL BEARING SURFACES TO BE MACHINED
- FRAME AND SOLID LID**  
EAST JORDAN 1022Z1 W/1020AHDGS "SANITARY SEWER" LETTERED, SOLID LID (SANITARY APPLICATION ONLY)

**24" SANITARY CASTING**

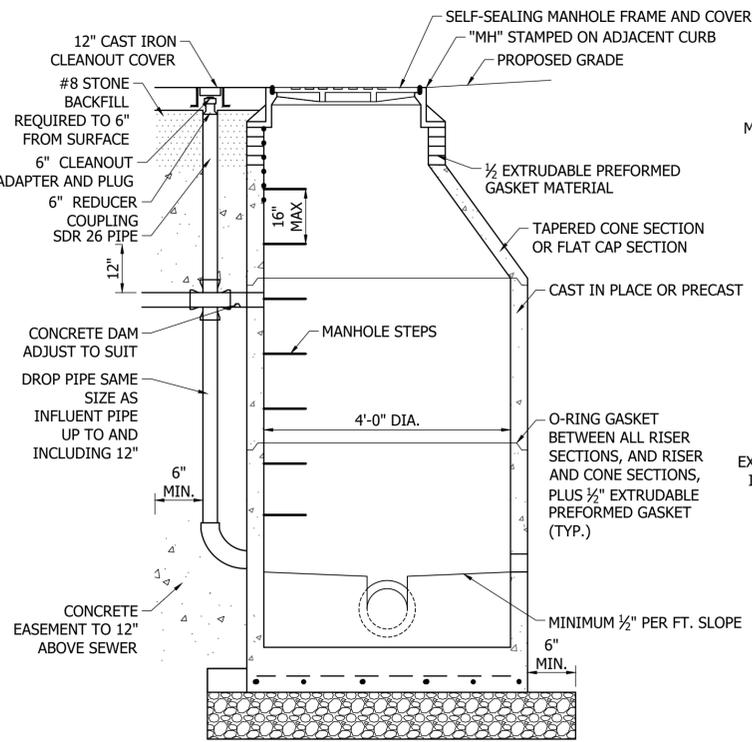


- NOTES:**
1.  $\epsilon$  OF ALL PIPES TO INTERSECT  $\epsilon$  OF MANHOLE. INVERTS TO BE POURED UNDER DRY PIPE CONDITIONS.
  2. WHEN INCREASING PIPE DIAMETER BY 6" OR LESS, CROWN ELEVATIONS SHALL MATCH AT  $\epsilon$  OF MANHOLE.
  3. WHEN INCREASING PIPE DIAMETER BY MORE THAN 6", SPRING LINES SHALL MATCH AT  $\epsilon$  OF MANHOLE.

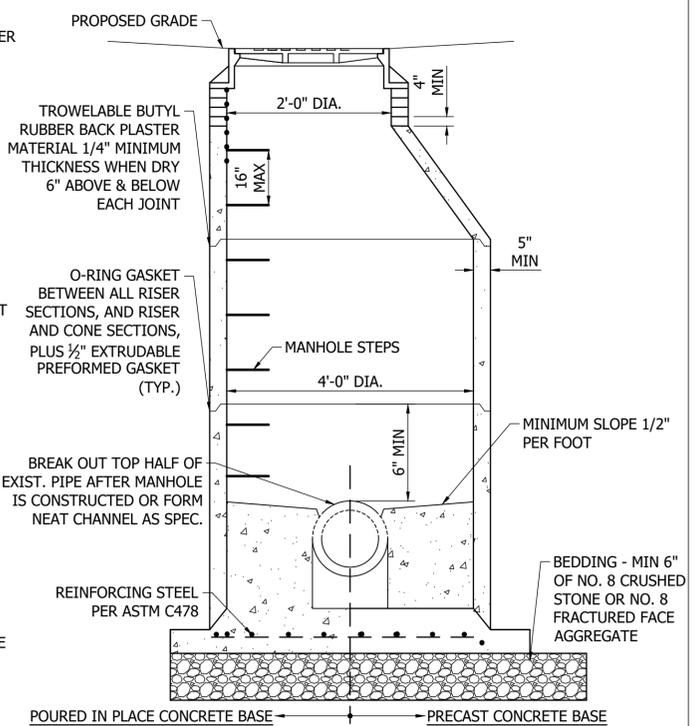
**POURED CHANNEL SHAPES I**

**POURED CHANNEL SHAPES II**

SANITARY SEWER  
BENCH SLOPE = 1/8" PER FT.

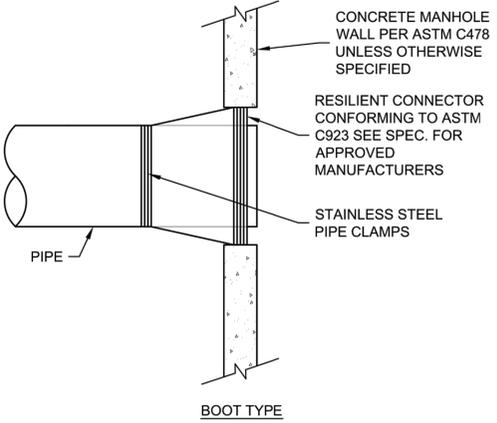


**DROP CONNECTION FOR MANHOLES - OUTSIDE**

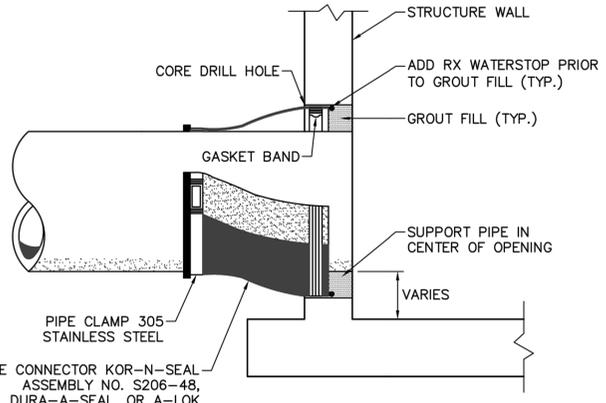


**DOGHOUSE MANHOLE**

- NOTES:**
1. DOGHOUSE OPENING MAY ONLY BE USED WHEN PLACING A NEW MANHOLE OVER AN EXISTING LINE; OTHERWISE, THE OPENING MUST BE CAST. SIZE, LOCATION AND ANGLE OF ENTRY SHOULD BE AS REQUIRED BY THE PLANS.
  2. OPENINGS IN THE PRECAST UNITS ARE TO BE A 4" MINIMUM TO 8" MINIMUM LARGER THAN THE OUTSIDE DIAMETER OF THE PROPOSED PIPE.



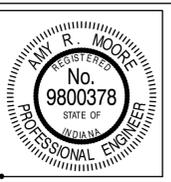
**PIPE CONNECTION TO MANHOLE - BOOT**



**NEW CONNECTION TO EXISTING MANHOLE**

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 DIMSCALE: 1/8" = 1'-0"  
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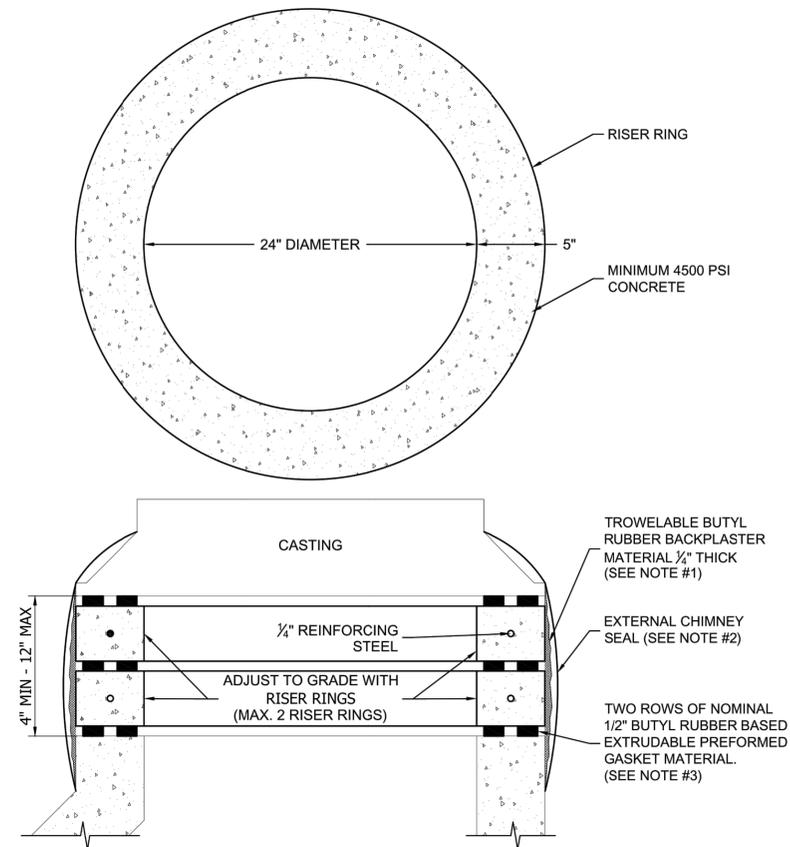


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MONTGOMERY COUNTY SEWER DISTRICT	
<b>SANITARY SEWER DETAILS STRUCTURES</b>	

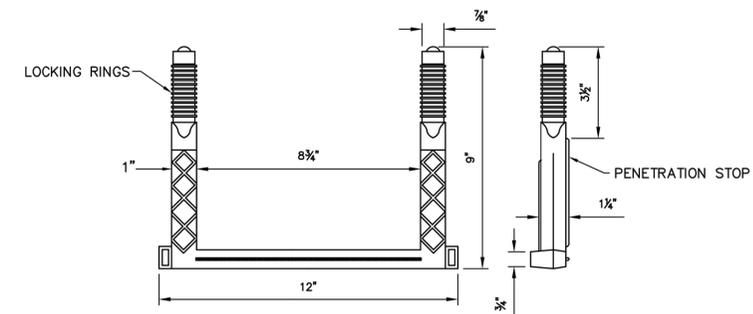
HORIZONTAL SCALE	AS NOTED
VERTICAL SCALE	AS NOTED
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DIRECTORY: F:\2013\13-3041 Mont Co RSD On-call\Sanitary Standard Details\CAD\  
 FILE: 13-3041 MCRSD Details.dwg  
 DIMSCALE: 1/4" = 1" LSCALE: 0.5  
 PLOTTED BY: JMooney  
 DATE: Aug 16, 2019 - 4:04pm



- NOTES:**
1. APPLY TROWELABLE BUTYL RUBBER BACKPLASTER MATERIAL 1/4" THICK (WHEN DRY) OVER RISER RINGS FROM 6" ABOVE TO 6" BELOW RISER RING JOINTS. USE TROWELABLE EZ-STICK #3, AS MANUFACTURED BY PRESS-SEAL GASKET CORP.
  2. EXTERNAL CHIMNEY SEAL SHALL CONSIST OF A HEAT-SHRINKING WRAP-AROUND SLEEVE (USE WRAPIDSEAL AS MANUFACTURED BY CANUSA) OR EXTERNAL CHIMNEY SEAL (AS MANUFACTURED BY CRETEX).
  3. USE RU 106 RUB'RNEK LTM AS MANUFACTURED BY HENRY CO., KENT-SEAL NO. 2 AS MANUFACTURED BY HAMILTON-KENT OR EZ-STICK BUTYL-RUBBER-BASED PREFORMED FLEXIBLE SEALANT AS MANUFACTURED BY PRESS-SEAL.

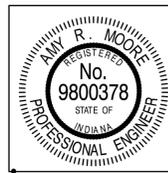
**SANITARY CASTING ADJUSTMENT**



- NOTES:**
1. TO BE INSTALLED WITH NON-SHRINK MORTAR OR EPOXY GROUT.
  2. STEPS SHALL NOT BE SITUATED DIRECTLY ABOVE INLET OR OUTLET PIPES.

**FIBERGLASS REINFORCED POLYPROPYLENE MANHOLE STEPS**

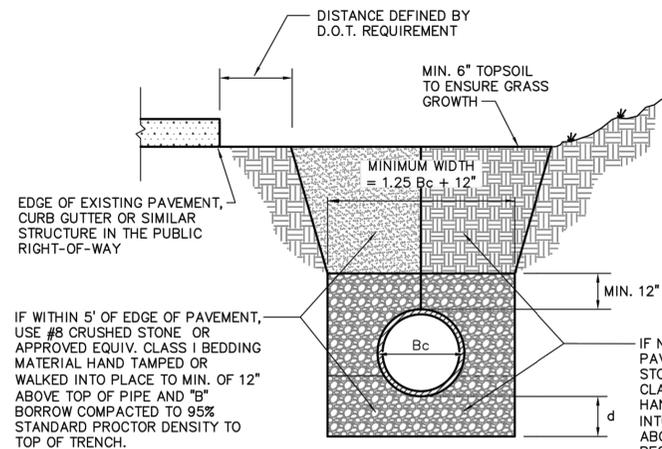
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MONTGOMERY COUNTY SEWER DISTRICT	
<b>SANITARY SEWER DETAILS STRUCTURES</b>	

HORIZONTAL SCALE	
AS NOTED	
VERTICAL SCALE	
AS NOTED	
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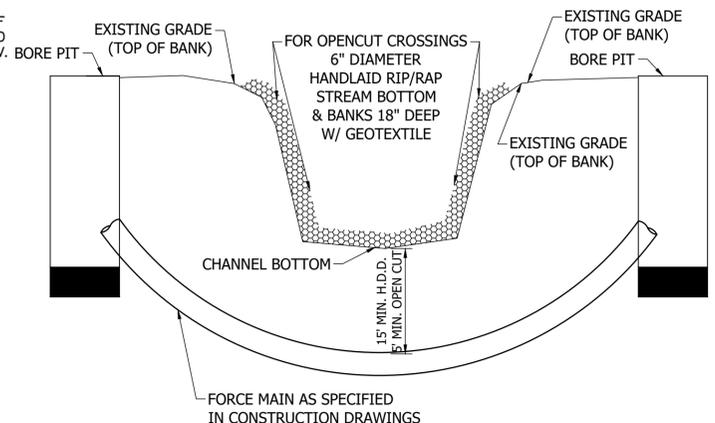
LEGEND

B<sub>c</sub> = OUTSIDE DIAMETER  
 D = INSIDE DIAMETER  
 d = DEPTH OF BEDDING MATERIAL BELOW PIPE

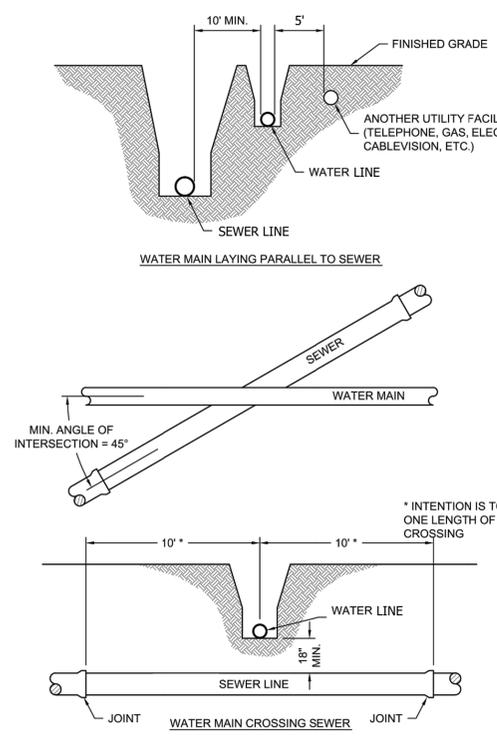
NOTE:  
 ALL INITIAL BACKFILL SHALL BE INSTALLED IN 6" TO 12" BALANCED LIFTS.  
 A MINIMUM 9" OF CLEARANCE SHALL BE PROVIDED ON EACH SIDE OF THE INSTALLED PIPE.

DEPTH OF BEDDING MATERIAL BELOW PIPE	
D	d (MIN)
27" & SMALLER	8
30" TO 60"	8
66" & LARGER	8

PLASTIC PIPE (PVC & HDPE) BEDDING DETAIL

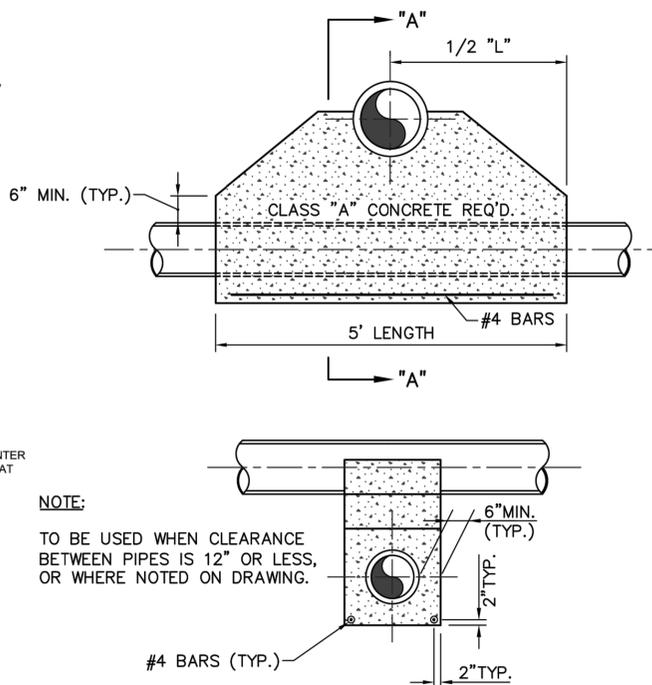


STREAM CROSSING - FORCE MAIN



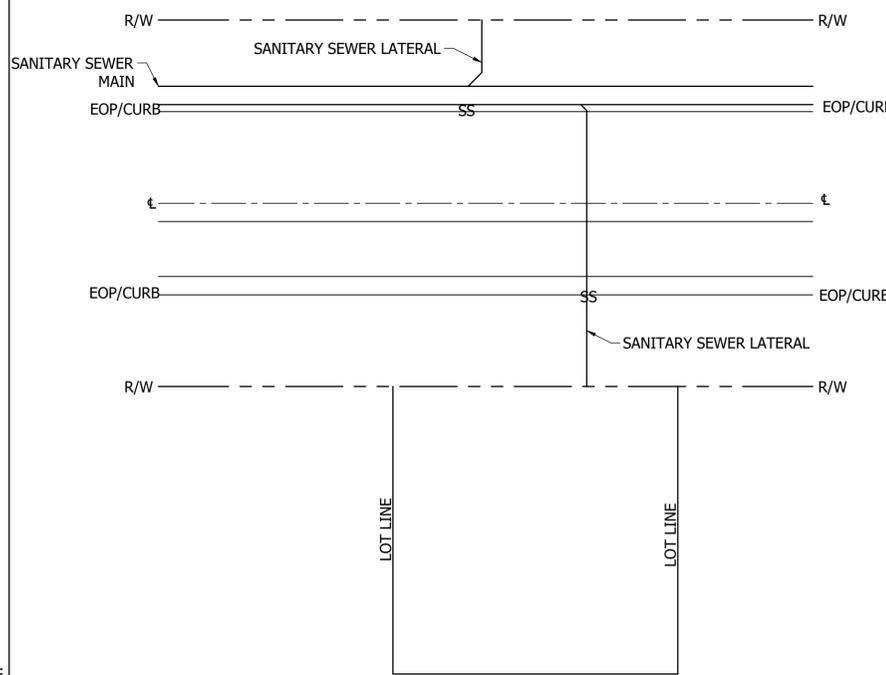
NOTES:  
 1. WATER MAIN SHALL NOT BE LOCATED IN THE SAME TRENCH AS SANITARY SEWERS.  
 2. SEPARATION OF 5 FT. HORIZONTAL WITH ANY UTILITY REQUIRED.  
 3. 5" MINIMUM DEPTH OF COVER ON WATER MAIN.  
 4. PREFERENCE IS FOR THE WATER MAIN TO BE LOCATED ABOVE ALL SEWERS.

SEWER AND WATER MAIN SEPARATION

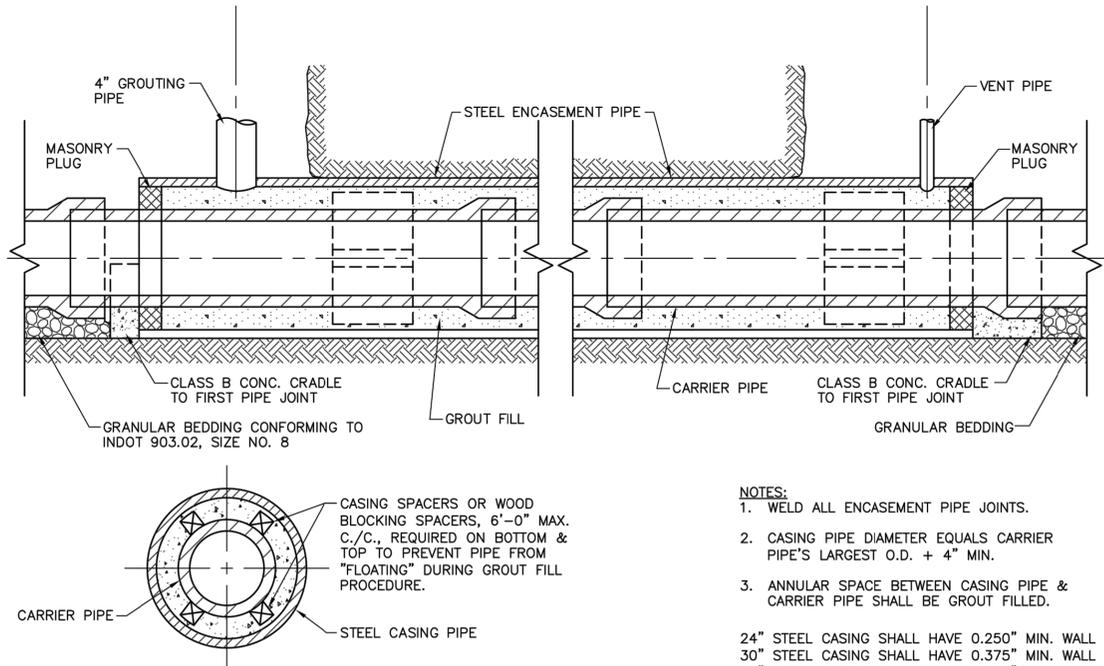


NOTE:  
 TO BE USED WHEN CLEARANCE BETWEEN PIPES IS 12" OR LESS, OR WHERE NOTED ON DRAWING.

SECTION "A - A"  
 CONCRETE SADDLE DETAIL



LATERAL MARKING LOCATION

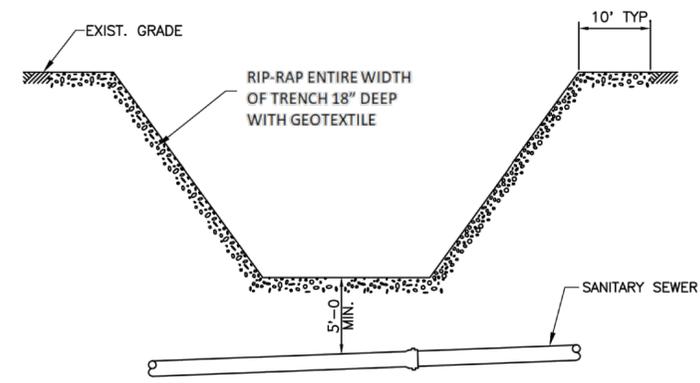


SINGLE CARRIER PIPE

NOTES:  
 1. WELD ALL ENCASEMENT PIPE JOINTS.  
 2. CASING PIPE DIAMETER EQUALS CARRIER PIPE'S LARGEST O.D. + 4" MIN.  
 3. ANNULAR SPACE BETWEEN CASING PIPE & CARRIER PIPE SHALL BE GROUT FILLED.

24" STEEL CASING SHALL HAVE 0.250" MIN. WALL THICKNESS  
 30" STEEL CASING SHALL HAVE 0.375" MIN. WALL THICKNESS  
 36" STEEL CASING SHALL HAVE 0.375" MIN. WALL THICKNESS  
 42" STEEL CASING SHALL HAVE 0.375" MIN. WALL THICKNESS

HORIZONTAL BORING DETAIL

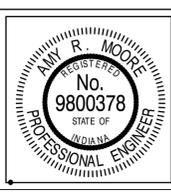


NOTES:  
 1) PROVIDE EROSION CONTROL MEASURES FOR ALL AREAS DISTURBED BY CONSTRUCTION.  
 2) ALL PIPES, FITTINGS, & RIP-RAP TO BE INCLUDED IN THE COST OF THE MAIN IN PLACE.  
 3) RIP-RAP ALL GRAVITY SEWER CROSSINGS.

TYPICAL DITCH & CULVERT CROSSING DETAIL

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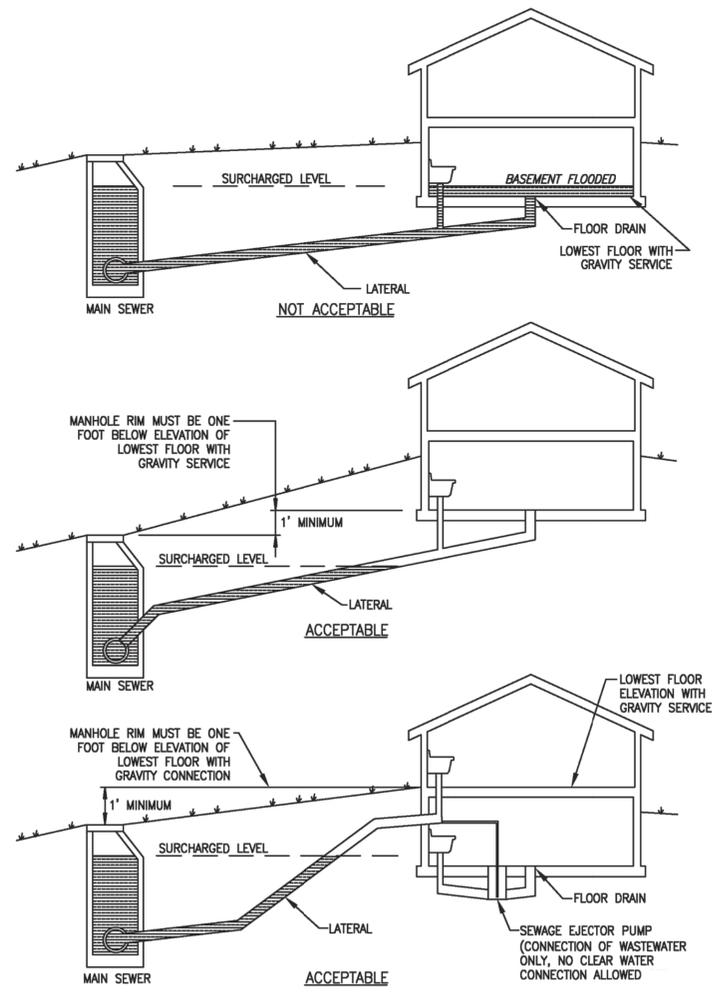


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MONTGOMERY COUNTY SEWER DISTRICT

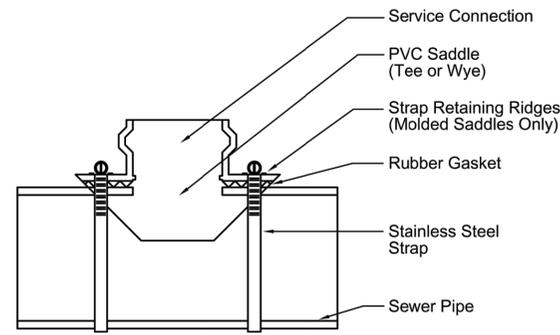
SANITARY SEWER DETAILS  
 PIPE INSTALLATION

HORIZONTAL SCALE	AS NOTED
VERTICAL SCALE	AS NOTED
SHEETS	04 of 12
PROJECT	13-3041



NOTE:  
1. BOTH DOWNSTREAM AND UPSTREAM MANHOLES SHALL APPLY

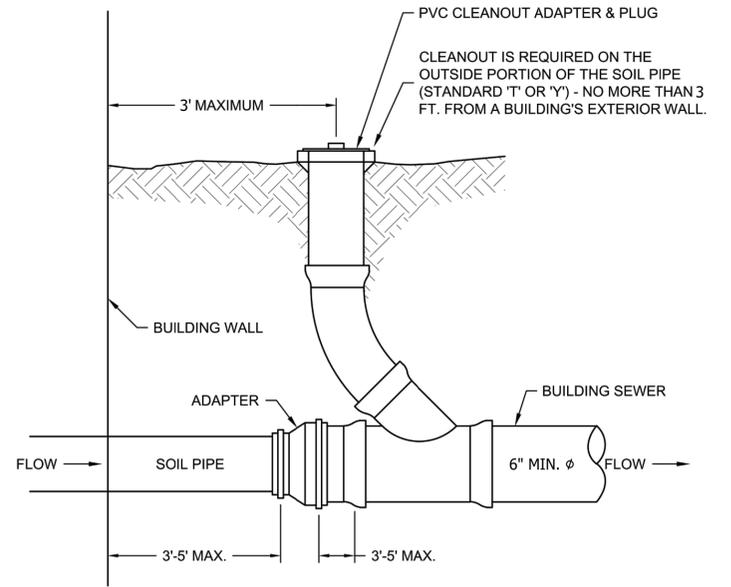
**MINIMUM ELEVATION FOR GRAVITY CONNECTION DETAIL**



**Saddle Installation**

1. Place Saddle on Pipe in the Desired Location. Draw the Hole Size by Placing Marking Pencil Inside the Branch Opening and Marking Pipe.
2. Cut 1/4" Outside the Line. Remove Coupon from Inside of Pipe. Scrape any Burrs that Appear Around the Hole.
3. Place Saddle on Pipe to Assure that the Pipe Opening is Large Enough to Prevent Obstruction. Enlarge Hole as Necessary.

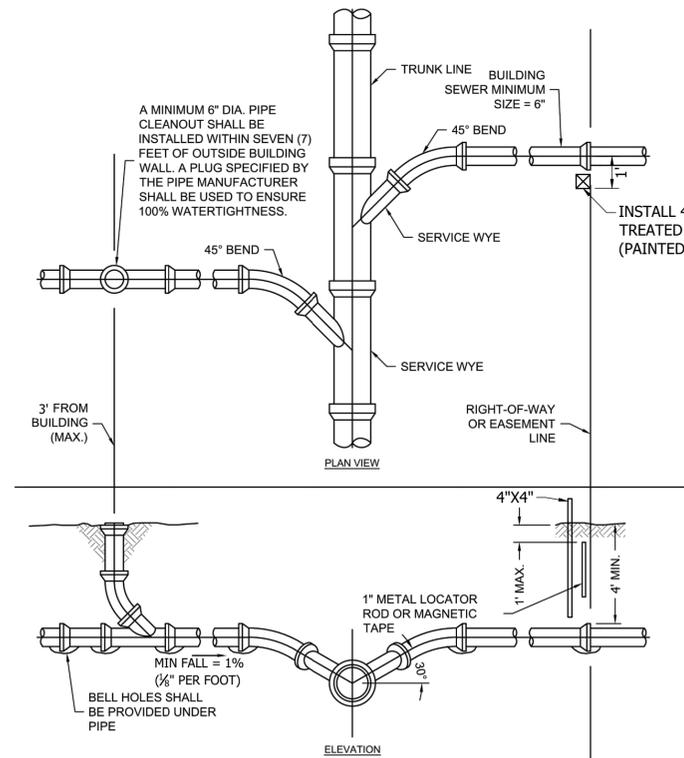
**SADDLE CONNECTION**



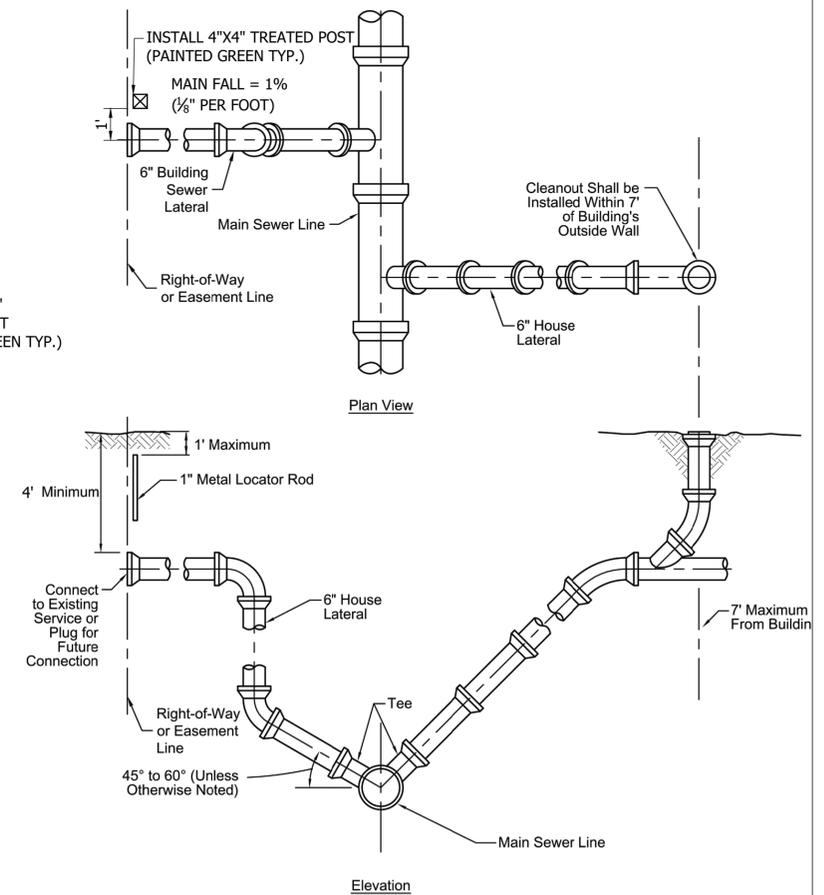
1. INSTALL CLEANOUT AT MAXIMUM 100 FEET SPACING OR ALL CHANGES OF DIRECTION.
2. WHEN CLEANOUT IS LOCATED IN PAVED AREA, INSTALL FLUSH WITH PAVEMENT USING CLEANOUT CASTING, SHEET 07, AND SURROUNDED BY 6" CONCRETE PAD.

**BUILDING ADAPTOR AND CLEANOUT**

Notes:  
1. Minimum Lateral Slope: 1/8" Per Foot

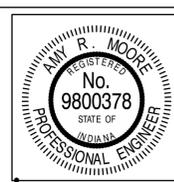


**SHALLOW SERVICE CONNECTION (< 15' DEEP)**



**DEEP SERVICE CONNECTION (≥ 15' DEEP)**

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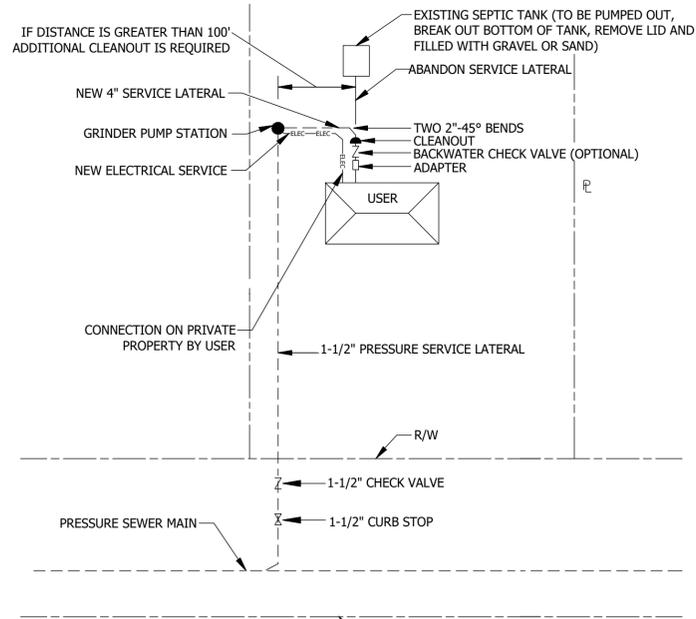
**MONTGOMERY COUNTY SEWER DISTRICT**

**SANITARY SEWER DETAILS**

**GRAVITY SERVICE CONNECTIONS**

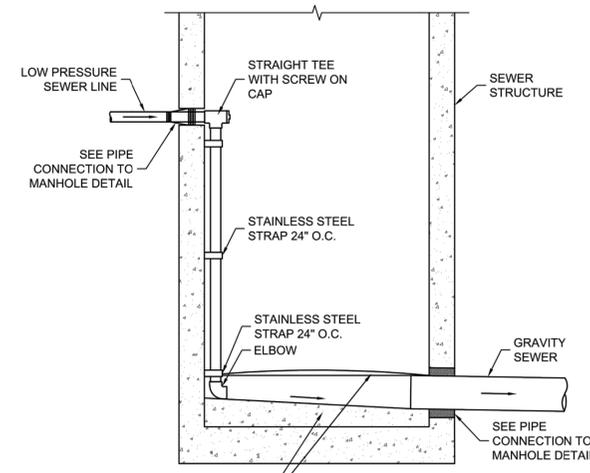
HORIZONTAL SCALE	AS NOTED
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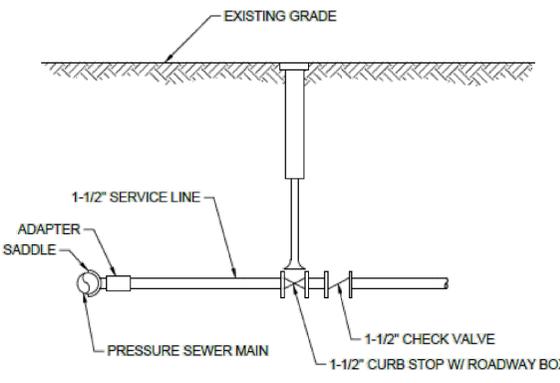
- NOTES:**
1. NORMAL SLOPE OF SERVICE LATERALS SHALL BE 1% ON GRAVITY SERVICES AND 2% ON LOW PRESSURE, WHERE POSSIBLE. MINIMUM GRAVITY SERVICE LATERAL SHALL BE 4". CONTRACTOR SHALL MATCH THE SIZE OF THE EXISTING SERVICE LATERAL DISCHARGING FROM THE PROPERTY.
  2. SERVICE LATERAL SHALL BE INSPECTED AND APPROVED BEFORE EXCAVATION IS BACKFILLED.
  3. A BACKWATER CHECK VALVE MAY BE INSTALLED ON EACH SERVICE LATERAL.
  4. SEPTIC FINGER SYSTEM TO BE ABANDONED IN PLACE.

**TYPICAL GRINDER PUMP STATION LAYOUT & TAP PLAN**

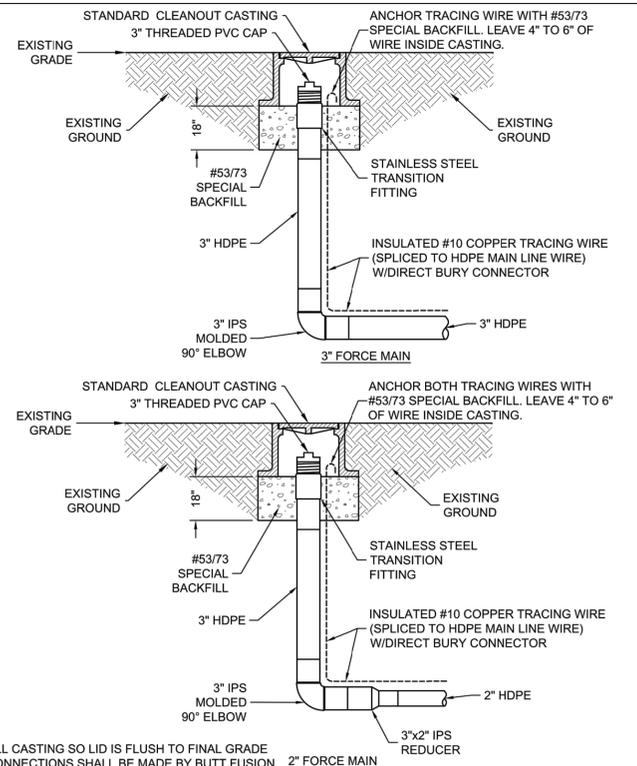


INVERT/BENCH SLOPED FOR PROPER DRAINAGE (SEE POURED CHANNEL SHAPES DETAILS)  
**NOTE:** DISCHARGE SHALL BE NO MORE THAN 4" FROM CHANNEL INVERT

**LOW PRESSURE COLLECTION SYSTEM DISCHARGE**

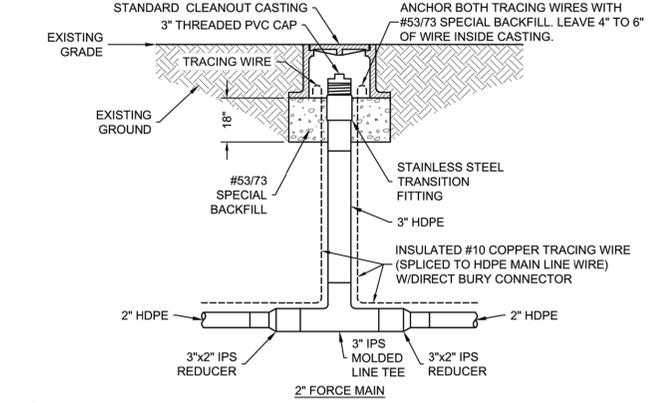
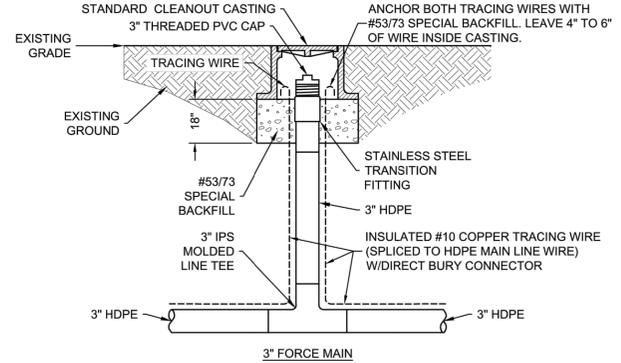


**PRESSURE SERVICE CONNECTION DETAIL**



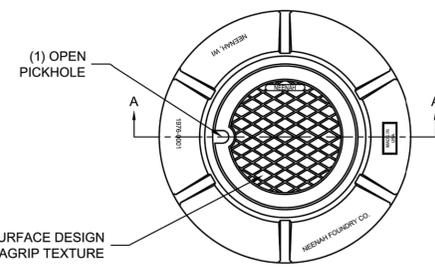
- NOTE:**
1. INSTALL CASTING SO LID IS FLUSH TO FINAL GRADE
  2. ALL CONNECTIONS SHALL BE MADE BY BUTT FUSION

**LOW PRESSURE FORCEMAIN CLEANOUT TERMINAL**



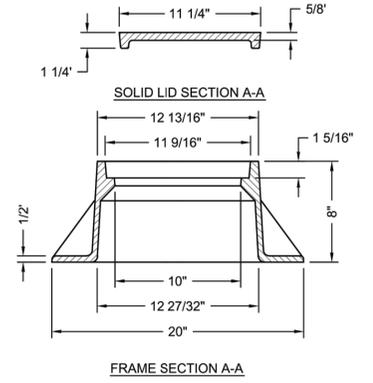
- NOTES:**
1. INSTALL CASTING SO LID IS FLUSH TO FINAL GRADE
  2. ALL CONNECTIONS SHALL BE MADE BY BUTT FUSION

**LOW PRESSURE FORCE MAIN CLEANOUT INLINE**

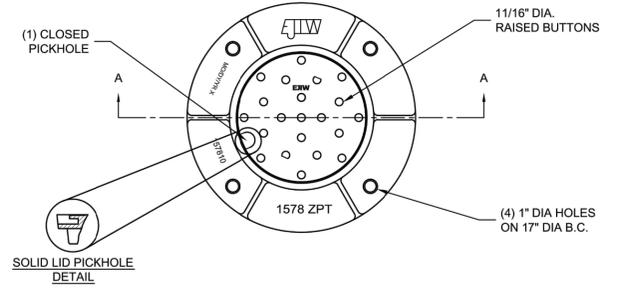


- NOTES:**
1. ASTM A48-83 CLASS 35B
  2. ALL BEARING SURFACES TO BE MACHINED

**FRAME AND SOLID LID NEENAH R-1976 FRAME & SOLID LID**



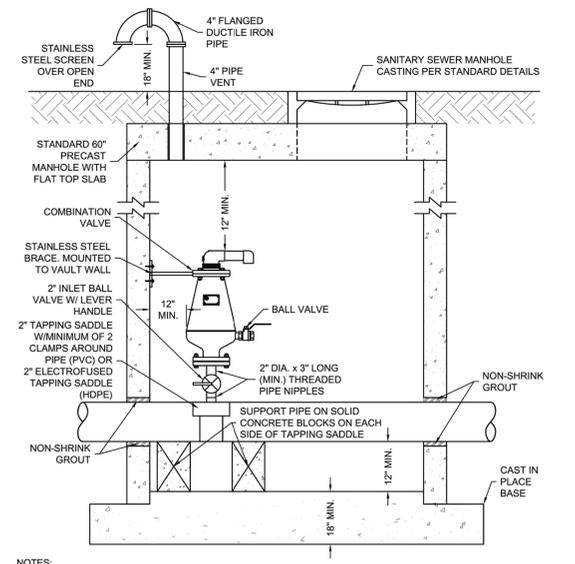
**12" CLEANOUT CASTING**



- NOTES:**
1. ASTM A48-83 CLASS 35B
  2. ALL BEARING SURFACES TO BE MACHINED

**FRAME AND SOLID LID EAST JORDAN 1578 FRAME & SOLID LID**

**12" CLEANOUT CASTING**

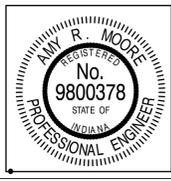


- NOTES:**
1. CONTRACTOR SHALL BE RESPONSIBLE FOR BRACING VALVE TO PREVENT ANY TYPE OF MOVEMENT.
  2. CONTRACTOR SHALL INSTALL COMBINATION VALVE OFFSET FROM CENTER OF STRUCTURE AND ON OPPOSITE SIDE OF MANHOLE ACCESS TO PROVIDE UNIMPEDED ACCESS TO STRUCTURE.
  3. WEIGHT OF COMBINATION VALVE SHALL NOT BE SUPPORTED BY THE FORCE MAIN PIPE.
  4. PROJECT ENGINEER SHALL PROVIDE VALVE MODEL AND SIZE.
  5. MINIMUM CLEARANCE OF STRUCTURE SHALL BE 0 FT. FROM FLOOR TO STRUCTURE CEILING.
  6. CONTRACTOR SHALL BE SOLELY RESPONSIBLE FOR CONTROLLING MEANS, METHODS, TECHNIQUES, SEQUENCES, AND PROCEDURES FOR CONSTRUCTION AND IS THEREFORE RESPONSIBLE FOR CONTROLLING THE QUALITY OF WORK.

**SANITARY SEWER AIR RELEASE STRUCTURE**

DIRECTORY: F:\2013\13-3041 Mont Co RSD On-call\Sanitary Standard Details(CAD)  
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MONTGOMERY COUNTY SEWER DISTRICT	
SANITARY SEWER DETAILS	
PRESSURE SEWERS	

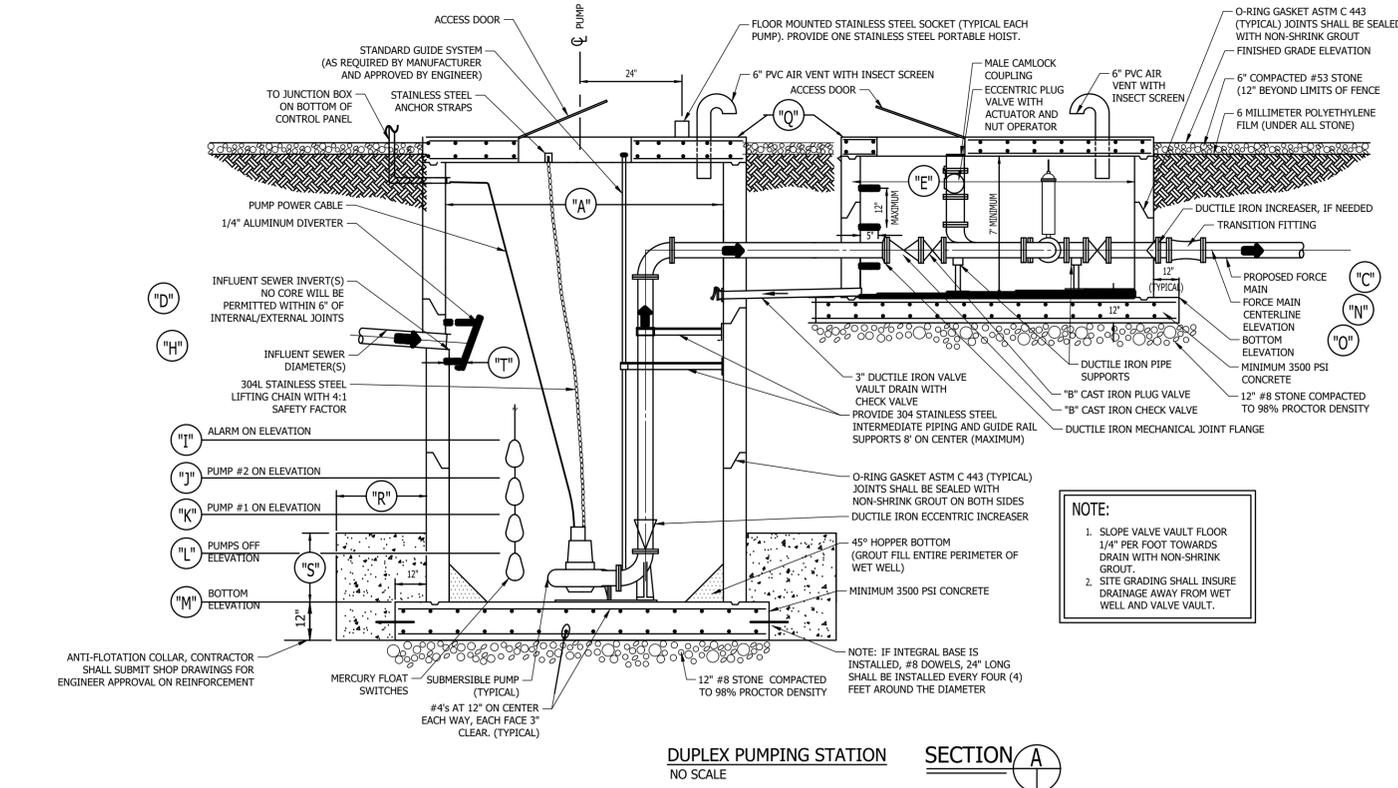
HORIZONTAL SCALE	AS NOTED
VERTICAL SCALE	AS NOTED
SHEETS	06 of 12
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**GENERAL NOTES**

- ACTUAL LIFT STATION DIMENSIONS, CONTROL SETTINGS, AND PUMP SELECTION TO BE AS INDICATED BY THE DESIGN ENGINEER'S CERTIFICATION.
  - PUMPS "A" AND "B" SHALL BE IDENTICAL, CENTRIFUGAL, SUBMERSIBLE, SOLIDS HANDLING, NON-CLOG DESIGN CAPABLE OF HANDLING 3 INCH SPHERE SOLIDS, FIBROUS MATERIAL, SLUDGE, AND MATERIAL FOUND IN TYPICAL RAW SEWAGE. FIT REPLACEABLE BRONZE WEAR RING TO VOLUTE. PUMPS SHALL BE HYDROMATIC, FLYGT, OR MCRSD APPROVED EQUAL. MANUFACTURER SHALL WARRANT THE PUMPS FOR ONE YEAR AFTER INSTALLATION.
- ALL MATING SURFACES INTENDED TO BE WATERTIGHT SHALL BE MACHINED AND FITTED WITH NITRILE RUBBER O-RINGS WITH SEALING COMPLETE WHEN METAL TO METAL CONTACT IS MADE, RESULTING IN CONTROLLED COMPRESSION OF O-RINGS WITHOUT SPECIFIC TORQUE LIMIT. FASTENERS SHALL BE 316 S.S.
- MECHANICAL SHAFT SEAL SYSTEM RUNNING IN AN OIL RESERVOIR SHALL HAVE SEPARATE, CONSTANTLY LUBRICATED LAPPED SEAL FACES. THE LOWER SEAL UNIT BETWEEN MEDIA AND OIL RESERVOIR SHALL CONSIST OF ONE STATIONARY SEAT AND ONE ROTATING RING HELD IN PLACE BY ITS OWN SPRING. THE ROTATING SEAT RING AND THE STATIONARY SEAT RING SHALL BE MADE OF TUNGSTEN-CARBIDE. THE LOWER SEAL SHALL BE REMOVABLE WITHOUT DISASSEMBLING THE SEAL CHAMBER. THE UPPER SEAL BETWEEN SEAL CHAMBER AND MOTOR SHALL BE OF THE SAME DESIGN WITH ITS OWN SPRING. SEALS SHALL BE MAINTENANCE FREE, BUT SHALL BE EASILY INSPECTABLE.
- LOWER SEAL FAILURE ALARM SHALL BE ENGAGED BY SEAL FAILURE SENSOR PROVIDED IN THE SEAL CHAMBER WHICH SENSES WATER INTRUSION THROUGH LOWER SEAL.
- OVER TEMPERATURE ALARM, AND PUMP SHUT DOWN, SHALL BE ENGAGED BY HEAT SENSOR ATTACHED TO THE MOTOR WINDINGS. MOTOR WINDING AND STATOR LEAD INSULATION SHALL BE CLASS F WITH MAXIMUM TEMPERATURE CAPABILITY OF 155° C OR BETTER. HOUSING SHALL BE FILLED WITH HIGH DIELECTIC OIL. AIR FILLED HOUSING MAY BE ACCEPTABLE WHEN APPROVED BY MCRSD. PUMP AND MOTOR SHALL BE DESIGNED TO OPERATE PARTIALLY OF FULLY SUBMERGED IN PUMPED MEDIA WITHOUT THE USE OF COOLING JACKETS.
- RAIL SYSTEM SHALL ENABLE THE EASY REMOVAL OF THE PUMP WITHOUT THE NEED FOR A PERSON TO ENTER THE WET WELL. A NON-CORROSIVE FRP I-BEAM SHALL BE PROVIDED FOR EACH PUMP. THE GUIDE RAIL SHALL BE SUPPORTED AT THE BOTTOM BY THE DISCHARGE ELBOW, ALIGNED PERFECTLY PLUMB AND SECURELY AFFIXED TO ACCESS FRAME. ONE INTERMEDIATE GUIDE RAIL SUPPORT IS REQUIRED FOR EACH 8' OF GUIDE RAIL LENGTH. SCHEDULE 40 S.S GUIDE RAILS MAY BE ACCEPTABLE IF PUMP IS APPROVED BY MCRSD.
- CHECK VALVE SHALL BE BRONZE SEATED AND SHALL BE PROVIDED WITH BOLTED COVERS FOR EASY ACCESS TO THE DISCS. VALVE SHALL BE OUTSIDE ADJUSTABLE WEIGHT AND LEVER AS MUELLER A-2600-6-01, KENNEDY/CLOW 1106LW, OR AS APPROVED BY MCRSD. THE VALVE SHALL BE FURNISHED WITH FUSION BONDED EPOXY COATING INSIDE AND OUT IN ACCORDANCE WITH AWWA C-550.
- PROVIDE SUFFICIENT LIFT CHAIN, FLOAT MOUNTING CABLE, AND PUMP POWER AND SENSOR CABLE TO ENABLE NON-SPLICED FIELD ADJUSTMENT. LIFT CHAIN SHALL HAVE A MINIMUM WORK LOAD LIMIT OF 1100 POUNDS. FLOAT MOUNTING CABLE SHALL BE HELD IN PLACE BY WEIGHT, FLOATS SHALL BE FASTENED TO CABLE WITH S.S. CLAMPS NEAR EACH FLOAT LOCATION. PUMP POWER AND SENSOR CABLE SHALL BE SUITABLE FOR SUBMERSIBLE PUMP APPLICATIONS AND THIS SHALL BE SO INDICATED BY A CODE/LEGEND PERMANENTLY EMBOSSED ON THE CABLE.
- PLUG VALVE SHALL BE AN ECCENTRIC BUNA-N RUBBER FACED PLUG WITH HAND LEVER OPERATION IN-LINE AND GEAR OPERATION ON BYPASS. VALVE SHALL BE VALMATIC F-5800-R, KENNEDY/CLOW F-5412, OR AS APPROVED BY MCRSD. THE VALVE SHALL BE FURNISHED WITH FUSION BONDED EPOXY COATING INSIDE AND OUT IN ACCORDANCE WITH AWWA C-550.
- PRESSURE GAUGE SHALL BE TRERICE MODEL 450 LFB OR MCRSD APPROVED EQUAL. DRILL AND TAP RUN OF PIPE TO INSTALL PRESSURE GAUGE.
- PIPING AND FITTINGS IN WET WELL AND VALVE PIT SHALL BE FACTORY PRIMED TNEC SERIES PURPLE PRIME TO A DRY FILM THICKNESS OF 5.0 TO 11.0 MILS AND SHALL BE FIELD PAINTED WITH TNEC SERIES 69-COLOR TO A DRY FILM THICKNESS OF 5.0 TO 6.0 MILS. FITTINGS SHALL BE MANUFACTURED BY CLOW, TYLER, MUELLER, OR AS APPROVED BY MCRSD.
- DAMP PROOF EXTERIOR VERTICAL SURFACES WHICH ARE BACKFILLED AGAINST WITH BITUMINOUS COATING, MASTERSEAL 614.
- HORIZONTAL PROJECTIONS FROM PRECAST INTEGRAL BASE AND RISER MAY BE REQUIRED TO ENABLE THE WEIGHT OF THE VERTICAL SOIL RING ABOVE THE PROJECTION TO RESIST BUOYANCY FORCES. SEE DESIGN ENGINEER'S CERTIFICATION SHEET.
- CAMLOCK COUPLING AND ECCENTRIC PLUG VALVE ON BYPASS LINE SHALL BE 4 INCH DIAMETER WITH TRANSITION TO FORCE MAIN SIZE OCCURRING WITH CONCENTRIC REDUCER PLACED ON TOP OF BASE ELBOW. FIX OPERATING NUT FOR ECCENTRIC PLUG IN VERTICAL POSITION TO ENABLE WRENCH OPERATION FROM SURFACE. LAYOUT OF ALL VALVE VAULT FITTINGS AND EQUIPMENT TO BE BASED UPON BYPASS LINE BEING CLOSE TO HATCH OPENING, AS SHOWN.
- ALUMINUM HATCHES SHALL BE CHANNEL FRAME TYPE FLYGT SAFE-HATCH. LEAF SHALL BE 1/2 INCH ALUMINUM DIAMOND PLATE LIVE LOAD RATED TO 300 PSF. CHANNEL FRAME SHALL BE 1/2 INCH EXTRUDED ALUMINUM WITH A MILL FINISH AND BITUMINOUS COATING ON EXTERIOR SURFACES. HATCH SHALL BE PROVIDED WITH TYPE 316 S.S. HARDWARE THROUGHOUT, AUTOMATIC HOLD-OPEN ARM WITH RELEASE HANDLE, SLAM LOCK WITH REMOVABLE HANDLE, 1-1/2 INCH DRAIN COUPLING, PADLOCK HASP, AND USF FABRICATION FALL-THROUGH PROTECTION HATCH SAFETY NET.
- SEWER CONNECTION TO WET WELL SHALL BE KOR-N-SEAL, A-LOK, PRESS-SEAL, OR MCRSD APPROVED EQUAL.
- FORCEMAIN PENETRATIONS OF WET WELL AND VALVE PIT SHALL BE MADE WATERTIGHT THROUGH THE USE OF PORTLAND CEMENT GROUT.
- AUTOMATIC PUMP CONTROL PANEL SHALL INCLUDE ALL NECESSARY ITEMS AND APPURTENANCES WHICH MIGHT NORMALLY BE CONSIDERED A PART OF A COMPLETE SYSTEM, INCLUDING BUT NOT LIMITED TO: CONDENSATE HEATER; PUSH TO TEST BUTTON (EXTERNAL); PUSH TO SILENCE BUTTON (EXTERNAL); ALTERNATOR SELECTOR SWITCH FOR MANUAL DESIGNATION OF LEAD PUMP; TIME DELAY RELAY FOR LAG PUMP START; AND PUMP RUN TIME HOUR METERS. SYSTEM SHALL BE SUPPLIED BY ONE MANUFACTURE AND SHALL BE FACTORY ASSEMBLED, WIRED, TESTED, AND SHALL BE PER COMPLETE ELECTRICAL DRAWINGS AND INSTRUCTIONS. MAJOR COMPONENTS AND SUB-ASSEMBLIES SHALL BE IDENTIFIED BY THEIR FUNCTION WITH LAMINATED, ENGRAVED, BAKELITE NAMEPLATES. SYSTEM SHALL BE BUILT IN A MINIMUM 60"x36"x12" NEMA 4X S.S. ENCLOSURE SUITED FOR SPECIFIC HORSEPOWER AND VOLTAGE OF THE PUMPS. THE OUTER DOOR OF THE PANEL SHALL BE A HINGED DEAD FRONT WITH PROVISIONS FOR PADLOCKING. INSIDE SHALL BE SEPARATE HINGED PANEL TO PROTECT ALL ELECTRICAL COMPONENTS, H-O-A SWITCHES, RUN LIGHTS, CIRCUIT BREAKERS, ETC. MOUNTED SUCH THAT ONLY THE FACES PROTRUDE THROUGH SAID PANEL WITH NO WIRING FIXED TO SAID PANEL. THE MANUFACTURER SHALL WARRANT THE CONTROL CENTER FOR ONE YEAR AFTER INSTALLATION COVERING 100% PARTS AND LABOR.
- PROVIDE THE SERVICES OF A FACTORY TRAINED, QUALIFIED REPRESENTATIVE TO INSPECT, ADJUST, PLACE THE SYSTEM IN TROUBLE FREE OPERATION, AND INSTRUCT OPERATING PERSONNEL IN THE PROPER OPERATION AND CARE OF THE SYSTEM.
- ALL MAJOR COMPONENTS OF CONTROL CENTER SHALL BE AMERICAN-MADE AND AVAILABLE FROM LOCAL SOURCES. PUMP MANUFACTURER SHALL ACCEPT THE CONTROL CENTER IN WRITING TO ENSURE UNIT RESPONSIBILITY AND WARRANTY.
- PROVIDE A MANUAL TRANSFER TYPE DISCONNECT SWITCH HOUSED IN A SEPARATE NEMA 4X S.S. ENCLOSURE WITH EXTERNAL OPERATION HANDLE CAPABLE OF BEING LOCKED IN THE "ON" NORMAL POSITION OR THE "OFF" SECONDARY POSITION WITH A MIDDLE "OFF" POSITION.
- A LIGHTNING ARRESTOR SHALL BE PROVIDED AT THE PHASE RELAY BLOCK AND CONNECTED TO EACH LINE OF THE INCOMING SIDE OF THE POWER INPUT TERMINALS. A SINGLE MAIN FUSIBLE/BREAKER DISCONNECT SWITCH OF ADEQUATE SIZE TO PROVIDE POWER FOR CONTROL, OPERATION, AND APPURTENANT COMPONENTS SHALL BE PROVIDED. PROVIDE A CIRCUIT BREAKER AND MAGNETIC STARTER WITH EACH LEG MANUAL RESET OVERLOAD PROTECTED FOR EACH PUMP. STARTERS SHALL HAVE AUXILIARY CONTACTS ON 3ø APPLICATIONS TO OPERATE BOTH PUMPS SIMULTANEOUSLY. PROVIDE A PHASE MONITOR WITH PHASE FAIL RELAY. PROVIDE A CIRCUIT BREAKER AND TRANSFORMER TO POWER THE CONTROL PANEL WITH 1ø, 115 VOLT SERVICE FOR ALL CONTROL FUNCTIONS INCLUDING OMNISITE DATA ACQUISITION SYSTEM, RADIO AND FLOW METER. PROVIDE A GREEN "RUN" LIGHT, AND H-O-A SWITCH TO ENABLE FIELD CONNECTIONS.
- MATERIALS AND INSTALLATION OF THE REQUIRED EQUIPMENT GROUNDING SHALL BE IN ACCORDANCE WITH NEC SECTION 250-83(c). ALL WIRING SHALL HAVE NOT LESS THAN 600 VOLT INSULATION. WIRING AND BUSS SHALL BE IN ACCORDANCE WITH NEC, STATE, LOCAL, AND NEMA STANDARDS. ALL WIRING SHALL BE COLOR CODED. MINIMUM 4 INCH DIAMETER, SCHEDULE 40 CONDUIT SHALL BE PROVIDED FROM WET WELL TO CONTROL PANEL ENABLING PUMP POWER AND SENSOR CABLES, AND FLOAT SWITCH CABLES TO BE EASILY PULLED. SEAL CONDUIT AT CONTROL PANEL TO PREVENT SEWER GASES FROM ENTERING. ALL CONDUITS, FITTINGS, OR CONNECTIONS SHALL ENTER FROM THE BOTTOM OF ENCLOSURES.
- SUMP LEVEL RISE TO LEAD PUMP RUN FLOAT CAUSES LEAD PUMP TO OPERATE. LEAD PUMP OPERATING AND SUMP LEVEL FALLING TO PUMPS OFF FLOAT CAUSES LEAD PUMP TO SHUT OFF. LEAD PUMP OPERATING AND SUMP LEVEL RISING TO LAG PUMP RUN FLOAT CAUSES LAG PUMP TO OPERATE. LAG PUMP OPERATING AND SUMP LEVEL FALLING TO PUMPS OFF FLOAT CAUSES BOTH PUMPS TO SHUT OFF. SUMP LEVEL RISE TO HIGH LEVEL ALARM CAUSES HIGH LEVEL ALARM TO OPERATE. AN ALTERNATING RELAY SHALL BE PROVIDED TO CAUSE PUMPS TO ALTERNATE WHENEVER PUMPS OFF FLOAT IS DE-ENERGIZED. IF ONE PUMP FAILS FOR ANY REASON, THE REMAINING PUMP SHALL OPERATE UPON SUMP LEVEL RISE TO LAG PUMP RUN FLOAT. AN HOUR METER SHALL BE PROVIDED FOR EACH PUMP TO RECORD THE ELAPSED OPERATING TIME OF EACH PUMP.
- FOUR MANUALS SHALL BE PRESENTED TO THE OWNER WHICH SHALL INCLUDE THE FOLLOWING MINIMUM INFORMATION: 1) OPERATION INSTRUCTIONS; 2) MAINTENANCE INSTRUCTIONS; 3) RECOMMENDED SPARE PARTS LIST; 4) LUBRICATION SCHEDULE; 5) STRUCTURAL DIAGRAMS; 6) AS-BUILT WIRING DIAGRAMS; AND 7) BILL OF MATERIALS.
- GENERATOR RECEPTACLES TO BE CROUSE-HINDS ARKITE AR1042 100 AMP RECEPTACLE OR CROUSE-HINDS ARKITE AR2041 200 AMP RECEPTACLE WITH FACTORY SEALED SWITCH FOR RECEIPT OF A PORTABLE GENERATOR SET.
- PROVIDE OMNISITE XR 50 DATA ACQUISITION SYSTEM FOR DUPLEX PUMP STATIONS AND OMNISITE CRYSTAL BALL DATA ACQUISITION SYSTEM FOR TRIPLEX PUMP STATIONS THAT INCORPORATES; 1 SPARE INPUT/OUTPUT, 1 INPUT FOR FLOWMETER, 5 OUTPUTS TO CONTROL BEING LEAD REMOTE ON, LEAD REMOTE OFF, LAG REMOTE ON, LAG REMOTE OFF, REMOTE ALARM ACKNOWLEDGE, 10 INPUTS FROM CONTROL BEING HATCH(ES) OPEN ALARM, PANEL(S) OPEN ALARM, PUMP "A" ON, PUMP "B" ON, PUMP "A" FAIL, PUMP "B" FAIL, PHASE FAIL ALARM, POWER FAIL ALARM, HIGH WATER ALARM, AND PUMP(S) SEAL FAILURE. REMOTE LEAD PUMP OVERRIDE AND REMOTE LAG PUMP OVERRIDE.
- ECCENTRIC REDUCER TO BE INSTALLED AS REQUIRED FOR FORCEMAIN SIZE. CONSULT MCRSD IF FORCEMAIN PIPING IS GREATER THAN 6 INCH DIAMETER.
- 1/4 INCH STAINLESS STEEL DEFLECTOR PLATE REQUIRED ON ALL INFLUENT PIPES. AS SUPPLIED BY MOORESVILLE WELDING OR MCRSD APPROVED EQUAL.
- AIR/VACUUM RELEASE VALVE SHALL BE AN APCO VALVE AND PRIMER CORPORATION MODEL 400 AIR RELEASE VALVE FOR WASTEWATER AND SHALL BE SIZED BY THE DESIGN ENGINEER ACCORDING TO THE VOLUME OF MAIN AND MAXIMUM FORCE MAIN OPERATING PRESSURE. THE PIPE NIPPLES AND GATE VALVE FOR THE AIR/VACUUM RELEASE VALVE SHALL BE STAINLESS STEEL.

DUCTILE IRON PIPE SIZE	DEPTH OF COVER (INVERT TO FINAL GRADE)	THICKNESS CLASS
6" - 8"	UP TO 20 FEET	CLASS 50
	OVER 20 FEET CONTACT ENGINEER	
10" - 12"	UP TO 20 FEET	CLASS 51
	OVER 20 FEET CONTACT ENGINEER	
14" - 16"	UP TO 20 FEET	CLASS 52
	OVER 20 FEET CONTACT ENGINEER	
18" - 20"	UP TO 20 FEET	CLASS 53
	OVER 20 FEET CONTACT ENGINEER	
24"	UP TO 20 FEET	CLASS 55
	OVER 20 FEET CONTACT ENGINEER	
GREATER THAN 24" DIAMETER	GREATER THAN 20 FEET DEEP	CONTACT ENGINEER (EITHER CASE)

NOTE: NO PRESSURE RATED PIPE WILL BE PERMITTED.



\* DESIGN ENGINEER SHALL DETERMINE SPECIFIC DIMENSIONS AND BE RESPONSIBLE FOR SHOP DRAWING REVIEWS.

**DIMENSION CHART**

(A)	WET WELL DIAMETER
(B)	STATION PIPING SIZE
(C)	FORCE MAIN SIZE
(D)	INFLUENT SANITARY SEWER DIAMETER(S)
(E)	VALVE VAULT DIMENSIONS
(F)	CENTER OF WET WELL TO CENTER OF VALVE VAULT
(G)	PUMP DISCHARGE SIZE
(R)	WIDTH OF ANTI-FLOATATION COLLAR
(S)	DEPTH OF ANTI-FLOATATION COLLAR
(T)	DIVERTER PLATE SEPARATION(S)

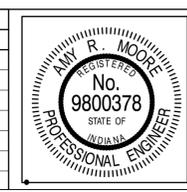
**ELEVATION CHART**

(H)	INFLUENT SANITARY SEWER INVERT(S)
(I)	INITIAL
(J)	FUTURE
(K)	INITIAL
(L)	FUTURE
(M)	INITIAL
(N)	FUTURE
(O)	BOTTOM ELEVATION - WET WELL
(P)	FORCE MAIN CENTERLINE ELEVATION
(Q)	BOTTOM ELEVATION - VALVE VAULT
(V)	FINISHED GRADE
(W)	TOP OF WET WELL AND VALVE VAULT

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 DIMSCALE: 1/8" = 1'-0"  
 PLOTTED BY: JMW  
 DATE: Aug 16, 2019 - 4:05pm

**REVISIONS**

NO.	DATE	DESCRIPTION	BY



RECOMMENDED FOR APPROVAL: *Amy R. Moore*, DESIGN ENGINEER, 08/21/2019, DATE

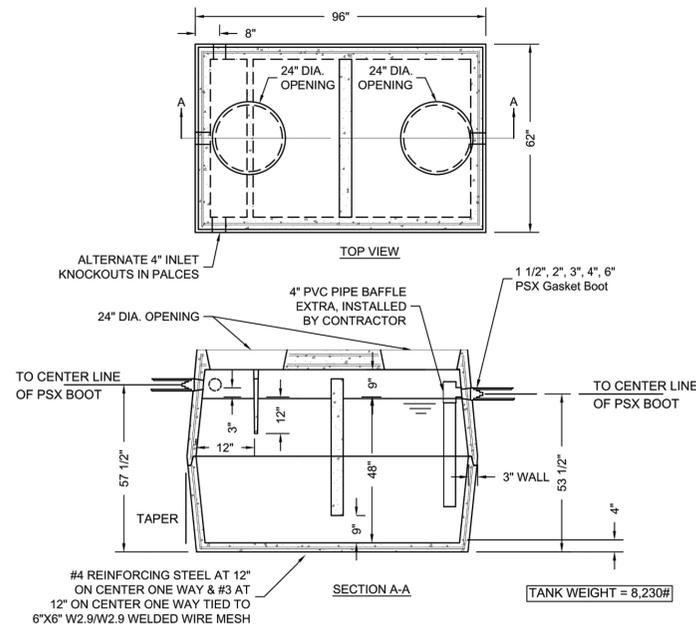
DESIGNED: LMY, DRAWN: KDK  
 CHECKED: ARM, CHECKED: ARM

MONTGOMERY COUNTY SEWER DISTRICT

**LIFT STATION STANDARD DETAILS**

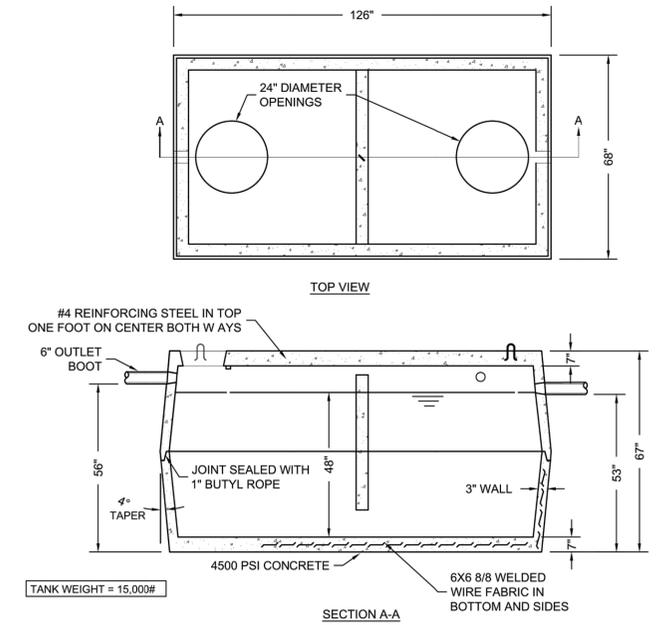
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 VERTICAL SCALE: AS NOTED

SHEETS: 07 of 12  
 PROJECT: 13-3041



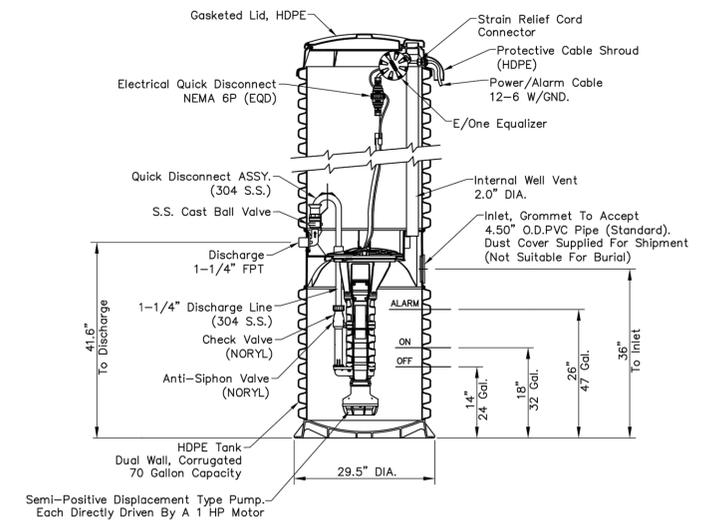
- NOTES:**
- OPTIONAL TANK RISERS SHOULD BE ORDERED TO GRADE.
  - MINIMUM 4500 PSI AT 28 DAYS CONCRETE.
  - REINFORCING BARS SHALL CONFORM TO ASTM A-615 GRADE 60 STEEL.
  - ALL REINFORCING BARS SHALL BE CUT AND FORMED TO THE DIMENSIONAL TOLERANCES SPECIFIED IN ACI-315 OR ACI-318 EXCEPT WHERE NOTED ON DRAWINGS.
  - ALL BARS SHALL BE BENT COLD. BARS WITH KINKS AND BENDS NOT INDICATED SHALL NOT BE USED. HEATING AND REBENDING OF BARS IS NOT PERMITTED.
  - REINFORCING STEEL SHALL BE #4 REBAR AT 12" O.C. BOTH WAYS TIED TO 6X6 10/10 WELDED WIRE MESH. TOP OF GREASE TRAP TO HAVE DOUBLE LAYER OF STEEL.
  - EARTH COVER: 2'-0" MINIMUM UP TO 5'-0" MAXIMUM. SIZE PAD ACCORDING TO AMOUNT OF EARTH COVER.
  - ALL TANK JOINTS SHALL BE SEALED WATERTIGHT WITH BUTYL RUBBER EXTRUDABLE PREFORMED GASKET MATERIAL, HAMILTON KENT-SEAL, OR EQUAL.
  - ALL OUTSIDE RISER RINGS SURFACES SHALL BE WATERPROOFED 3/8" WITH TROWLEABLE GRADE BUTYL RUBBER BACK PLASTER
  - PIPE SEALS SHALL BE TUF-TITE, POLYLOK, OR EQUAL.
  - MCRSD MAY ACCEPT ALTERNATIVE INTERCEPTOR DESIGNS ON A CASE-BY-CASE BASIS.

**1000 GALLON HEAVY DUTY GREASE INTERCEPTOR**



- NOTES:**
- RISER RINGS SHOULD BE ORDERED TO GRADE.
  - MINIMUM 4500 PSI AT 28 DAYS CONCRETE.
  - REINFORCING BARS SHALL CONFORM TO ASTM A-615 GRADE 60 STEEL.
  - ALL REINFORCING BARS SHALL BE CUT AND FORMED TO THE DIMENSIONAL TOLERANCES SPECIFIED IN ACI-315 OR ACI-318 EXCEPT WHERE NOTED ON DRAWINGS.
  - ALL BARS SHALL BE BENT COLD. BARS WITH KINKS AND BENDS NOT INDICATED SHALL NOT BE USED. HEATING AND REBENDING OF BARS IS NOT PERMITTED.
  - REINFORCING STEEL SHALL BE #4 REBAR AT 12" O.C. ONE WAY OR 6X6 10/10 WELDED WIRE MESH.
  - EARTH COVER: 6" MINIMUM UP TO 3'-0" MAXIMUM. SIZE PAD ACCORDING TO AMOUNT OF EARTH COVER.
  - ALL TANK JOINTS SHALL BE SEALED WATERTIGHT WITH BUTYL RUBBER EXTRUDABLE PREFORMED GASKET MATERIAL, HAMILTON KENT-SEAL, OR EQUAL.
  - ALL OUTSIDE RISER RINGS SURFACES SHALL BE WATERPROOFED 3/8" WITH TROWLEABLE GRADE BUTYL RUBBER BACK PLASTER
  - PIPE SEALS SHALL BE TUF-TITE, POLYLOK, OR EQUAL.
  - MCRSD MAY ACCEPT ALTERNATIVE INTERCEPTOR DESIGNS ON A CASE-BY-CASE BASIS.

**1500 GALLON PRECAST GREASE INTERCEPTOR**



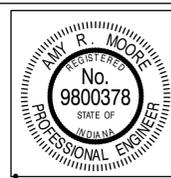
- NOTE:**
- Concrete Ballast May Be Required See Installation Instruction For Details.
  - Dimensions Are For Reference Only.

**GRINDER PUMP STATION DETAIL**

Scale: None

DIRECTORY: F:\2013\13-3041 Mont Co RSD On-call\Sanitary Standard Details\CAD  
 FILE: 13-3041 MCRSD Details.dwg  
 DIMSCALE: 1/8" = 1'-0"  
 PLOTTED BY: JMowery  
 DATE: Aug 16, 2019 - 4:05pm

REVISIONS			
NO.	DATE	DESCRIPTION	BY



RECOMMENDED FOR APPROVAL	<i>Amy R. Moore</i>	DESIGN ENGINEER	08/21/2019	DATE
DESIGNED:	LMY	DRAWN:	KDK	
CHECKED:	ARM	CHECKED:	ARM	

MONTGOMERY COUNTY SEWER DISTRICT	
SANITARY SEWER DETAILS	
MISCELLANEOUS	

HORIZONTAL SCALE	AS NOTED
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**PART 1 - GENERAL**

**1.1 SCOPE OF WORK**

THE WORK UNDER THIS SECTION INCLUDES PIPE MATERIALS, MANHOLES, AND APPURTENANCES, INCLUDING EXCAVATING AND BACKFILLING, NORMALLY ENCOUNTERED WITH SANITARY SEWER EXTENSIONS AND SANITARY BUILDING PIPING (LATERAL) FROM THREE (3) FEET OUTSIDE BUILDING CONNECTION WITH MUNICIPAL SEWERS OR OTHER DISCHARGE SYSTEM OR METHOD. THE ENDS OF SEWERS SHALL BE TIGHTLY PLUGGED OR CAPPED AT THE TERMINAL POINTS, ADJACENT TO BUILDINGS, PENDING THE CONNECTING OF ALL SUCH LINES TO THE BUILDING DRAIN AS SPECIFIED IN THE PLUMBING SPECIFICATIONS AND ARCHITECTURAL DRAWINGS. ONE SET OF APPROVED PLANS SHALL BE ON THE JOB SITE AT ALL TIMES.

**1.2 DEFINITIONS**

**BEDDING:** FILL PLACED UNDER, BESIDE, AND DIRECTLY OVER PIPE, PRIOR TO SUBSEQUENT BACKFILL OPERATIONS

**CONTRACTOR:** COMPANY OR INDIVIDUAL AUTHORIZED BY MONTGOMERY COUNTY REGIONAL SEWER DISTRICT (MCRSD) TO PERFORM WORK AS CALLED FOR BY ISSUANCE OF A SEWER CONSTRUCTION PERMIT.

**DEPTH OF PIPE:** VERTICAL DISTANCE FROM PIPE INVERT TO EXISTING GROUND AS SHOWN ON THE CONSTRUCTION PLANS.

**DEVELOPER:** ANY PUBLIC AGENCY, PRIVATE COMPANY, OR INDIVIDUAL WHO PROPOSES THE DEVELOPMENT OF PROPERTY WHICH REQUIRES CONSTRUCTION OF SANITARY SEWERS OR LATERALS.

**EMBEDMENT:** EARTH OR OTHER SPECIAL MATERIAL USED TO REPLACE MATERIAL REMOVED FROM TRENCHES DURING CONSTRUCTION FROM THE SEWER SUBGRADE.

**FORCE MAIN:** A PIPE CONSTRUCTED OR USED TO CARRY SEWAGE UNDER PRESSURE.

**MAIN SEWER:** ANY EXISTING OR PROPOSED SEWER DEDICATED TO PUBLIC USE WITHIN THE PUBLIC RIGHT-OF-WAY OR EASEMENT.

**MANHOLE:** A VERTICAL ENCLOSED STRUCTURE PROVIDING ACCESS TO A PIPELINE OR OTHER STRUCTURE.

**LATERAL:** ANY EXISTING OR PROPOSED PIPE WHICH CONNECTS FROM THE BUILDING PLUMBING TO THE MAIN SEWER.

**PROFESSIONAL ENGINEER:** REGISTERED ENGINEER IN THE STATE OF INDIANA.

**1.3 ABBREVIATIONS**

AMERICAN NATIONAL STANDARDS INSTITUTE

ASTM: AMERICAN SOCIETY FOR TESTING AND MATERIALS

AWWA: AMERICAN WATER WORKS ASSOCIATION

CCTV: CLOSED CIRCUIT TELEVISION

DI: DUCTILE IRON PIPE

HDPE: HIGH DENSITY POLYETHYLENE

IAC: INDIANA ADMINISTRATIVE CODE

IC: INDIANA CODE

IDEM: INDIANA DEPARTMENT OF ENVIRONMENTAL MANAGEMENT

INDOT: INDIANA DEPARTMENT OF TRANSPORTATION

MCRSD: MONTGOMERY COUNTY REGIONAL SEWER DISTRICT

NSF: NATIONAL SANITATION TEST LABORATORY FOUNDATION

OSHA: OCCUPATIONAL SAFETY AND HEALTH ACT, AS ADMINISTERED BY IOSHA

PVC: POLYVINYL CHLORIDE PLASTIC

RCP: REINFORCED CONCRETE PIPE

SDR: STANDARD DIMENSION RATIO

**1.4 DELIVERY, STORAGE AND HANDLING**

A. STORE PLASTIC PIPING PROTECTED FROM DIRECT SUNLIGHT AND SUPORT TO PREVENT SAGGING AND BENDING. PROTECT STORED PIPING FROM MOISTURE AND DIRT BY ELEVATING ABOVE GRADE. PROTECT FLANGES, FITTINGS, AND SPECIALTIES FROM MOISTURE AND DIRT.

B. HANDLE MANHOLES AND STRUCTURES ACCORDING TO MANUFACTURER'S WRITTEN RIGGING INSTRUCTIONS.

**1.5 REFERENCE STANDARDS**

THE PUBLICATIONS LISTED BELOW FORM A PART OF THIS SPECIFICATION TO THE EXTENT REFERENCED. THE PUBLICATIONS ARE REFERENCED IN THE TEXT BY THE BASIC DESIGNATION ONLY. MOST RECENT STANDARDS APPLY.

**A. ASTM INTERNATIONAL:**

1. ASTM C-443 - STANDARD SPECIFICATION FOR JOINTS FOR CONCRETE PIPE AND MANHOLES, USING RUBBER GASKETS.
2. ASTM C-478 - STANDARD SPECIFICATION FOR CIRCULAR PRECAST REINFORCED CONCRETE MANHOLE SECTIONS.
3. ASTM C-923 - STANDARD SPECIFICATION FOR RESILIENT CONNECTORS BETWEEN REINFORCED CONCRETE MANHOLE STRUCTURES, PIPES, AND LATERALS.
4. ASTM D-1784 - STANDARD SPECIFICATION FOR RIGID POLYVINYL CHLORIDE (PVC) COMPOUNDS AND CHLORINATED POLYVINYL CHLORIDE (CPVC) COMPOUNDS.
5. ASTM D-1785 - STANDARD SPECIFICATION FOR POLYVINYL CHLORIDE (PVC) PLASTIC PIPE, SCHEDULES 40, 80, AND 120.
6. ASTM D-2241 - STANDARD SPECIFICATION FOR POLYVINYL CHLORIDE (PVC) PRESSURE-RATED PIPE (SDR SERIES)
7. ASTM D-2321 - STANDARD PRACTICE FOR UNDERGROUND INSTALLATION OF THERMOPLASTIC PIPE FOR SEWERS AND OTHER GRAVITY-FLOW APPLICATIONS.
8. ASTM D-2412 - STANDARD TEST METHOD FOR DETERMINATION OF EXTERNAL LOADING CHARACTERISTICS OF PLASTIC PIPE BY PARALLEL-PLATE LOADING.
9. ASTM D-2729 - STANDARD SPECIFICATION FOR POLYVINYL CHLORIDE (PVC) SEWER PIPE AND FITTINGS.
10. ASTM D-2837 - STANDARD TEST METHOD FOR OBTAINING HYDROSTATIC DESIGN BASIS FOR THERMOPLASTIC PIPE MATERIALS OR PRESSURE DESIGN BASIS FOR THERMOPLASTIC PIPE PRODUCTS.
11. ASTM D-3034 - STANDARD SPECIFICATION FOR TYPE PSM POLYVINYL CHLORIDE (PVC) SEWER PIPE AND FITTINGS.
12. ASTM D-3139 - STANDARD SPECIFICATION FOR JOINTS FOR PLASTIC PRESSURE PIPES USING FLEXIBLE ELASTOMERIC SEALS
13. ASTM D-3212 - STANDARD SPECIFICATION FOR JOINTS FOR DRAIN AND SEWER PLASTIC PIPES USING FLEXIBLE ELASTOMERIC SEALS.
14. ASTM D-3350 - STANDARD SPECIFICATION FOR POLYETHYLENE PLASTICS PIPE AND FITTINGS MATERIALS.
15. ASTM D-6938 - STANDARD TEST METHOD FOR IN-PLACE DENSITY AND WATER CONTENT OF SOIL AND SOIL-AGGREGATE BY NUCLEAR METHODS (SHALLOW DEPTH).
16. ASTM F-412 - STANDARD TERMINOLOGY RELATING TO PLASTIC PIPING SYSTEMS.

17. ASTM F-477 - STANDARD SPECIFICATION FOR ELASTOMERIC SEALS (GASKETS) FOR JOINING PLASTIC PIPE.
  18. ASTM F-679 - STANDARD SPECIFICATION FOR POLYVINYL CHLORIDE (PVC) LARGE-DIAMETER PLASTIC GRAVITY SEWER PIPE AND FITTINGS.
- B. AWWA:**
1. AWWA C104 - CEMENT-MORTAR LINING FOR DUCTILE-IRON PIPE AND FITTINGS
  2. AWWA C110 - DUCTILE-IRON AND GRAY-IRON FITTINGS
  3. AWWA C111 - RUBBER-GASKET JOINTS FOR DUCTILE-IRON PRESSURE PIPE AND FITTINGS
  4. AWWA C115 - FLANGED DUCTILE-IRON PIPE WITH DUCTILE-IRON OR GRAY-IRON THREADED FLANGES
  5. AWWA C150 - THICKNESS DESIGN OF DUCTILE-IRON PIPE
  6. AWWA C151 - DUCTILE-IRON PIPE, CENTRIFUGALLY CAST
  7. AWWA C153 - DUCTILE-IRON COMPACT FITTINGS
  8. AWWA C900 - POLYVINYL CHLORIDE (PVC) PRESSURE PIPE AND FABRICATED FITTINGS, 4 IN. THROUGH 60 IN.

**1.6 COORDINATION**

A. COORDINATE CONNECTION TO SANITARY SEWER MAIN WITH MCRSD. A MCRSD REPRESENTATIVE MUST BE NOTIFIED A MINIMUM OF 48 HOURS PRIOR TO CONSTRUCTION STARTUP.

**1.7 CLOSEOUT SUBMITTALS**

- A. PROJECT RECORD DOCUMENTS: SUBMITTALS OF PROJECT RECORD DOCUMENTS SHALL CONFORM TO THE MCRSD DIGITAL SUBMISSION STANDARDS, LATEST VERSION.
- B. COMPLETE TRANSFER OF ASSETS DOCUMENTATION (FOR SEWER MAIN EXTENSIONS ONLY)
- C. PROVIDE MCRSD WITH COPY OF ANY EASEMENTS, PLATTED AND RECORDED.
- D. DELIVER TO MCRSD THE CCTV RECORDINGS OF THE COMPLETED SEWER (FOR SEWER MAIN EXTENSIONS ONLY).
- E. PROVIDE MCRSD WITH THE SEER MANHOLE AND PIPE TEST RESULTS.
- F. COMPLETE FINAL INSPECTION WITH MCRSD REPRESENTATIVE.

**PART 2 - PRODUCTS**

**2.1 EXCAVATION**

**A. DESCRIPTION**

1. THE CONTRACTOR SHALL CONSTRUCT ALL EARTH EXCAVATIONS TO THE WIDTHS AND DEPTHS DETAILED IN THE DRAWINGS, EXCAVATION SHALL INCLUDE ALL KINDS OF MATERIALS, WET AND/OR DRY, EXCAVATED, OR WHICH ARE TO BE EXCAVATED, INCLUDING ROCK, SHALE, HARDPAN, MUCK, ETC.
2. EXCAVATION INCLUDES ALL EXCAVATION, SURFACE REMOVAL, CLEARING, DISPOSAL OF SURPLUS MATERIAL, DEWATERING, BORING AND JACKING AND ALL OTHER WORK INCIDENTAL TO THE CONSTRUCTION OF THE TRENCHES OR TRENCHLESS MEANS FOR PIPE INSTALLATION. EXCAVATION ALSO INCLUDES THE SAME ACTIVITIES RELATED TO THE INSTALLATION OF MANHOLES OR OTHER REQUIRED STRUCTURES.
3. THE DEVELOPER AND HIS OR HER CONTRACTOR SHALL BE RESPONSIBLE FOR ASSURING THE PROTECTION OF ALL EXISTING IMPROVEMENTS, BOTH PUBLIC AND PRIVATE. THE MCRSD SHALL BE HELD HARMLESS FROM ANY AND ALL DAMAGES TO SAID EXISTING IMPROVEMENTS DURING THE CONSTRUCTION OF THE IMPROVEMENTS.
4. COMPLIANCE WITH THESE SPECIFICATIONS DOES NOT ELIMINATE THE NEED TO COMPLY WITH OTHER APPLICABLE CITY, COUNTY, STATE AND FEDERAL ORDINANCES, REGULATIONS, AND CONSTRUCTION REQUIREMENTS. THIS INCLUDES, BUT IS NOT LIMITED TO CODES AND STANDARDS ISSUED BY IDEM, INDOT, OR OTHER GOVERNMENTAL AGENCIES.
5. THE PROVISIONS OF THIS DOCUMENT SHALL BE DEEMED AS ADDITIONAL REQUIREMENTS TO MINIMUM STANDARDS REQUIRED BY OTHER APPLICABLE ORDINANCES AND STANDARDS. IN THE CASE OF CONFLICTING REQUIREMENTS, THE MOST RESTRICTIVE SHALL APPLY.

**2.2 EMBEDMENT AND BACKFILL**

**A. DESCRIPTION**

1. ALL TRENCHES OR EXCAVATIONS SHALL BE BACKFILLED TO THE ORIGINAL SURFACE OF THE GROUND OR SUCH OTHER GRADES AS SHOWN ON THE DRAWINGS. IN GENERAL, BACKFILLING OPERATIONS SHALL BE CARRIED ALONG AS SPEEDILY AS POSSIBLE AND AS SOON AS THE PIPE HAS BEEN LAID AND BEDDING HAS BEEN PLACED.

**B. DEFINITIONS AND GENERAL CONSIDERATIONS**

1. PIPE BEDDING SHALL BE CONSIDERED THE AREA USED FOR SUPPORT DIRECTLY UNDER THE PIPE FOR THE FULL WIDTH OF THE TRENCH. THE HAUNCH IS THE AREA FROM THE TOP OF THE BEDDING TO THE SPRINGLINE (HORIZONTAL CENTERLINE OF THE PIPE) FOR THE FULL WIDTH OF THE TRENCH. INITIAL BACKFILL IS THE AREA FROM THE SPRINGLINE TO TWELVE (12) INCHES ABOVE THE CROWN (TOP) OF THE PIPE. PIPE EMBEDMENT IS THE TOTAL AREA THAT INCLUDES THE BEDDING, HAUNCH AND INITIAL BACKFILL. THE FINAL BACKFILL IS ALL OF THE AREA ABOVE THE TOP OF THE INITIAL BACKFILL ELEVATION.
2. SPECIAL FOUNDATION MATERIAL MAY BE REQUIRED UNDER THE PIPE BEDDING FOR AREAS OF UNSTABLE SOIL MATERIAL IN CIRCUMSTANCES WHERE UNSTABLE SOIL MATERIAL IS ENCOUNTERED, THE AREA SHALL BE EXCAVATED AND REPLACED WITH SUITABLE CRUSHED STONE TO FORM A SOUND FOUNDATION. THE PIPE BEDDING CAN THEN BE PLACED UPON THE FOUNDATION MATERIAL.
3. THE CONTRACTOR SHALL NOT PLACE PIPE EMBEDMENT MATERIALS BY METHODS THAT WILL DAMAGE OR DISTURB THE PIPE OR OTHER UTILITIES. CARE SHALL BE TAKEN THAT COMPACTION EQUIPMENT DOES NOT COME INTO CONTACT WITH THE PIPE. PRIOR TO PERFORMING COMPACTION OPERATION OVER THE PIPE, THE CONTRACTOR MUST ENSURE THAT SUFFICIENT BACKFILL IS INSTALLED OVER THE PIPE TO PREVENT DAMAGE OR EXCESSIVE DEFLECTION.

**C. BEDDING AND BACKFILL OF TRENCH EXCAVATIONS FOR PIPE AND CONDUITS**

1. BEDDING AND BACKFILL MATERIALS FOR PIPE INSTALLATION AND TRENCH BACKFILL SHALL CONFORM TO THE TYPES DETAILED IN PART 3 OF THIS SPECIFICATION FOR THE SPECIFIC PIPE TYPE INSTALLED.

**D. STRUCTURAL BACKFILL**

1. BACKFILL MATERIALS FOR BACKFILL OF STRUCTURES OTHER THAN PIPES AND CONDUITS SHALL BE ACCORDING TO THE STANDARD DETAILS.

**2.3 GRAVITY SANITARY SEWER PIPE**

**A. DESCRIPTION**

1. THE CONTRACTOR SHALL FURNISH AND LAY SEWER PIPE, AND ALL ACCESSORIES, TO THE LINES AND GRADES SHOWN ON THE DRAWINGS. SEWER PIPE SHALL BE CONSTRUCTED OF THE PIPE MATERIALS AS SPECIFIED HEREIN AND AS SHOWN ON THE DRAWINGS.

2. RELATED WORK DESCRIBED ELSEWHERE:
  - a. EXCAVATION
  - b. EMBEDMENT AND BACKFILL

**B. QUALITY ASSURANCE**

1. CODES AND STANDARDS
  - a. EACH LENGTH OF PIPE SHALL BE MARKED PER THE REQUIREMENTS OF THE RESPECTIVE ASTM STANDARD.

- b. ALL CODES AND STANDARDS SHALL BE SET FORTH IN THE LATES ASTM STANDARD.

2. UPON REQUEST BY THE MCRSD, THE CONTRACTOR SHALL FURNISH COPIES OF ALL MATERIAL TESTS REQUIRED BY THE APPLICABLE ASTM/AWWA/ANSI STANDARD.

3. MAXIMUM ALLOWED INFILTRATION IN NEW GRAVITY SANITARY SEWERS SHALL BE 100 GALLONS PER 24 HOUR PERIOD PER INCH-DIAMETER-MILE.

**C. POLYVINYL CHLORIDE (PVC) PIPE, SDR-35, SDR-26, OR SDR-21**

**1. MATERIAL**

- a. POLYVINYL CHLORIDE (PVC) FOR GRAVITY SANITARY SEWER PIPE SHALL BE THE INTEGRAL WALL BELL AND SPIGOT TYPE WITH ELASTOMERIC SEAL JOINTS AND SMOOTH INNER WALLS MEETING OR EXCEEDING ALL OF THE REQUIREMENTS SET FORTH IN ASTM D-3034 FOR PIPE DIAMETERS 15-INCHES OR LESS.
- b. FOR DIAMETERS 15-INCHES OR LESS, THE PIPE SHALL HAVE A MINIMUM CELL CLASSIFICATION OF 12454 OR 12364; WITH ALL PIPE HAVING A MINIMUM TENSILE STRENGTH OF 34.5 MPA AS DEFINED IN ASTM D-1784.
- c. PVC SANITARY SEWER PIPE SHALL HAVE A MINIMUM PIPE STIFFNESS OF 46 PSI FOR SDR 35 AND 115 PSI FOR SDR 26 FOR EACH DIAMETER, WHEN MEASURED AT 5% VERTICAL RING DEFLECTION AND TESTED IN ACCORDANCE WITH ASTM D-2412.
- d. LATERALS SHALL BE 6-INCH PVC SDR-35 LAID AT A MINIMUM OF 1.00% SLOPE FROM THE SEWER MAIN TO THE RIGHT-OF-WAY LINE (OR EASEMENT LINE)
  - 1) EACH PROPERTY HAVING A SEPARATE PROPERTY OWNER SHALL HAVE ITS OWN LATERAL FROM THE BUILDING TO THE MAINLINE SEWER.
- e. SDR-35 MAY BE USED FOR PIPE DEPTHS LESS THAN 15-FEET. SDR-26 SHALL BE USED FOR PIPE DEPTHS GREATER THAN 15-FEET.
- f. FOR PIPE INSTALLATIONS WHERE THE SEWER OR LATERAL IS CLOSER THAN 51 FEET TO A RESIDENTIAL WATER WELL, THE SEWER/LATERAL SHALL BE CONSTRUCTED FROM SDR-21 IN ACCORDANCE WITH ASTM D-2241 WITH A MINIMUM CELL CLASS OF 12454.

**2. JOINTS**

- a. FLEXIBLE GASKET JOINTS SHALL BE COMPRESSION TYPE SO THAT WHEN ASSEMBLED, THE GASKET INSIDE THE BELL WILL BE COMPRESSED RADIALY ON THE PIPE SPIGOT TO FORM A WATERTIGHT SEAL. THE ASSEMBLY OF JOINTS SHALL BE IN ACCORDANCE WITH THE PIPE MANUFACTURER'S RECOMMENDATIONS AND ASTM D-3212 FOR PIPE CONFORMING TO ASTM D-3034 OR JOINTS SHALL MEET THE REQUIREMENTS OF ASTM D-3139 FOR PIPE CONFORMING TO ASTM D-2241. 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 THE REQUIREMENTS OF ASTM F-477.
- b. NO SOLVENT CEMENT JOINTS SHALL BE ALLOWED.
- c. ALL FIELD-CUTTING OF PIPE SHALL BE DONE IN A NEAT MANNER AS PER MANUFACTURER'S RECOMMENDATIONS AND THE CUT END SHALL BE BEVELED USING A FILE OR WHEEL TO PRODUCE A SMOOTH BEVEL OF APPROXIMATELY 15 DEGREES AND BE A MINIMUM DEPTH OF ONE-THIRD THE PIPE WALL THICKNESS. FIELD CUT PIPE WILL ONLY BE ALLOWED TO BE INSTALLED AT MANHOLES, AT PREFABRICATED TEES AND WYES, AND AT THE CONNECTION OF NEW SANITARY SEWER TO EXISTING SANITARY SEWER.

**3. FITTINGS**

- a. ALL PIPE FITTINGS SHALL BE MANUFACTURED IN ACCORDANCE WITH THE LATEST ASTM D-3034 AND ASTM F-679 STANDARDS AND SHALL HAVE A MINIMUM PIPE STIFFNESS OF 46 PSI FOR SDR-35 AND 115 PSI FOR SDR-26 IN ALL DIRECTIONS. THE MINIMUM CELL CLASSIFICATION SHALL BE 12454 OR 12364 PER THE LATEST ASTM D-1784 STANDARD. ALL FITTINGS SHALL BE "HEAVY WALL" AND PROVIDED GASKETS MEETING OR EXCEEDING THE STANDARDS OF THE PIPE.
- b. ALL SEWER MAIN LATERAL CONNECTIONS SHALL BE PRE-FABRICATED WYE FITTINGS. ALL PIPE FITTINGS SHALL BE INFECTION MOLDED UNLESS PRIOR WRITTEN AUTHORIZATION IS GRANTED BY THE MCRSD.
- c. SADDLE CONNECTIONS SHALL NOT BE ALLOWED FOR NEW CONSTRUCTION. FOR INSTALLATION OF A NEW LATERAL ON EXISTING SEWER, CONNECTION WITH A SADDLE MAY BE COMPLETED ON PIPE 15-INCHES IN DIAMETER AND LARGER.

**4. DESIGN**

- a. THE MINIMUM WALL THICKNESS FOR PVC SEWER PIPE AND LATERAL SEWER PIPE 15-INCHES OR LESS IN DIAMETER SHALL CONFORM TO SDR-35, SDR-26, OR SDR-21 AS SPECIFIED IN ASTM D-3034 OR ASTM D-2241.

**5. MARKINGS**

- a. THE DATE OF MANUFACTURE, SHIFT CODE, CLASS OF PIPE, ASTM SPECIFICATION DESIGNATION (E.G. PVC-SDR-26), SIZE OF PIPE, NAME OR TRADEMARK OF MANUFACTURER, AND IDENTIFICATION OF PLANT/LOCATION SHALL BE LEGIBLY MARKED ON THE OUTSIDE OF EACH PIPE SECTION AND FITTING IN ACCORDANCE WITH THE ASTM D-3034.

**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.

**D. POLYVINYL CHLORIDE (PVC) PIPE, C-900/C-905**

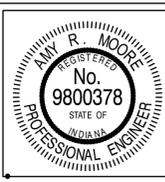
**1. PIPE**

- a. PVC GRAVITY SEWER MAIN PIPE SHALL CONFORM TO ASTM SPECIFICATION D-2241, STANDARD SPECIFICATION FOR POLYVINYL CHLORIDE (PVC) PLASTIC PIPE (SDR PR). THE MATERIAL USED SHALL CONFORM TO ASTM SPECIFICATION D-1784, STANDARD SPECIFICATION OF RIGID POLYVINYL CHLORIDE AND CHLORINATED POLYVINYL CHLORIDE COMPOUNDS, CLASS 12454. THE MINIMUM PRESSURE CLASS FOR A STREAM CROSSING SHALL BE CLASS 200.
- b. THE PIPE FITTINGS SHALL BE PRESSURE RATED IN ACCORDANCE WITH RECOMMENDATIONS OF THE PLASTIC PIPE INSTITUTE.
- c. PVC GRAVITY SEWER MAIN SHALL BE IN COMPLIANCE WITH AWWA C900 FOR 4-INCH THROUGH 12-INCH AND AWWA C905 FOR 14-INCH AND GREATER. THE MINIMUM DIMENSION RATIO SHALL BE DR18 WITH A PRESSURE RATING OF 235 PSI.
- d. ALL PLASTIC PIPE AND COUPLINGS SHALL BEAR IDENTIFICATION MARKINGS IN ACCORDANCE WITH SECTION 2.5.2 AND 2.5.3 OF AWWA C900, WHICH SHALL INCLUDE 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 PROPERT 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.

REVISIONS			
NO.	DATE	DESCRIPTION	BY



RECOMMENDED FOR APPROVAL	<i>Amy R. Moore</i>	08/21/2019
	DESIGN ENGINEER	DATE
DESIGNED: LMY	DRAWN: KDK	
CHECKED: ARM	CHECKED: ARM	

<b>MONTGOMERY COUNTY SEWER DISTRICT</b>	
<b>SPECIFICATIONS</b>	
HORIZONTAL SCALE	AS NOTED
VERTICAL SCALE	AS NOTED
SHEETS	09 of 12
PROJECT	13-3041

DIRECTORY: F:\2013\13-3041 Mont Co RSD On-call\Sanitary Standard Details\CAD\  
 FILE: 13-3041 MCRSD Details.dwg  
 DIMSCALE: 1/16"=1' L1TSKALE...0.5  
 PLOTTED BY: JMoorey  
 DATE: Aug 16, 2019 - 4:05pm

DIRECTORY: F:\2013\13-3041 Mont Co RSD On-call\Sanitary Standard Details\CAD\  
 FILE: 13-3041 MCRSD Details.dwg  
 DIMSCALE: 1/8" = 1" LSCALE: 1/8" = 1"  
 PLOTTED BY: JMooney  
 DATE: Aug 16, 2019 - 4:05pm

- C. POLYVINYL CHLORIDE PIPE (PVC)
- 1 PIPE
    - a. PVC FORCE MAIN SHALL CONFORM TO ASTM D-2241, AWWA C900 OR AWWA C905.
    - b. PVC FORCE MAIN PIPE MATERIAL SHALL CONFORM TO ASTM SPECIFICATION D-1784, STANDARD SPECIFICATION OF RIGID POLYVINYL CHLORIDE AND CHLORINATED POLYVINYL CHLORIDE COMPOUNDS, CELL CLASS 12454 (PVC 1120).
    - c. FOR ASTM D-2241, THE MATERIAL SHALL CONFORM TO ASTM D-1784, CELL CLASS 12454. THE MINIMUM PRESSURE CLASS/SDR RATING SHALL BE CLASS 200 / SDR 21.
    - d. 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 21.
    - e. 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.
    - f. PVC FORCE MAIN SHALL BE IN COMPLIANCE WITH AWWA C900 FOR 4-INCH THROUGH 12-INCH AND AWWA C905 FOR 14-INCHES 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 C900, 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 SPEICAL 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 GASSETS 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 D-1784. FITTINGS SHALL BE DESIGNED TO WITHSTAND A MINIMUM OF 755 PSI QUICK BURST PRESSURE AT 73 DEGREES F IN ACCORDANCE WITH ASTM D-1599.
    - 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 THE SURFACE NO LESS THAN EVERY 500 LF.
    - 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/C905 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.
- D. HIGH DENSITY POLYETHYLENE PIPE (HDPE)
- 1 PIPE
    - a. HDPE FORCE MAIN SHALL BE EXTRA HIGH MOLECULAR WEIGHT, HIGH DENSITY ETHYLENE/HEXANE COPOLYMER PE 3408 POLYETHYLENE RESIN MEETING THE REQUIREMENTS OF ASTM D-3550 WITH A CELL CLASSIFICATION OF PE345434C FOR MATERIALS IN ACCORDANCE WITH ASTM F-714, DR11 OR PE334434C FOR MATERIALS

- IN ACCORDANCE WITH AWWA C906, DR14. PIPE SHALL BE SIZED IN ACCORDANCE WITH DIPS. ALL MATERIAL SHALL HAVE A HYDROSTATIC DESIGN BASIS OF 1600 PSI. THE PIPE SHALL CONTAIN NO RECYCLED COMPOUND EXCEPT THAT GENERATED IN THE MANUFACTURER'S OWN PLANT FROM RESIN OF THE SAME SPECIFICATION FROM THE SAME RAW MATERIAL. ALL MATERIAL SHALL BE LISTED BY THE PLASTIC PIPE INDUSTRY IN THE NAME OF THE PIPE MANUFACTURER AND SHALL BE BASED UPON ASTM D-2837 AND PPI TR-3 TESTING AND VALIDATION FOR SAMPLES OF THE PIPE MANUFACTURER'S PRODUCTION PIPE.
- b. IN ADDITION TO THE HOLDING, STORAGE, AND COLOR REQUIREMENTS IN THESE SPECIFICATIONS, WHEN MOVING FUSED SECTIONS OF PIPE, CHAINS OR CABLE TYPE CHOKERS SHALL BE AVOIDED; NYLON SLINGS PREFERRED. CARE MUST BE EXERCISED TO AVOID CUTTING OR GOUGING THE PIPE.
  - c. PIPE POSSESSING THE FOLLOWING DEFECTS MAY BE REJECTED FOR INSTALLATION: VARIATION FROM STRAIGHT CENTERLINE, ELLIPTICAL SHAPE, ILLEGIBLE MARKINGS AS REQUIRED HEREIN, DEEP OR EXCESSIVE GOUGES OR SCRATCHES OF THE PIPE WALL, FRACTURES, PUNCTURES, OR CRACKS PASSING THROUGH THE PIPE WALL, DAMAGED ENDS WHERE SUCH DAMAGE WOULD PREVENT MAKING A SATISFACTORY JOINT.
- 2 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.
- 3 FITTINGS
- a. FITTINGS SHALL BE EITHER HDPE OR DUCTILE IRON. HDPE FITTINGS SHALL BE MANUFACTURED IN ACCORDANCE WITH ASTM D-3261 BY INJECTION MOLDING, A COMBINATION OF EXTRUSION AND MACHINING, OR FABRICATED FROM HDPE PIPE CONFORMING TO THIS SPECIFICATION. FITTINGS SHALL BE FULLY PRESSURE RATED AND PROVIDE A WORKING PRESSURE EQUAL TO THE ADJACENT PIPE WITH SAFETY FACTOR OF 2.0. DUCTILE IRON FITTINGS SHALL BE RESTRAINED JOINT DUCTILE IRON FITTINGS CONFORMING TO ANSI A21.10/AWWA C110 AND ANSI A21.11/AWWA C111 WITH MJ ADAPTERS.
- 4 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 RATION, PRESSURE RATING, TRADE NAME, MATERIAL CLASSIFICATION, CERTIFICATION BASIS, AND DATE.
- 5 LOCATING TRACING WIRE
- a. HALL 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.
- 6 CERTIFICATION
- a. THE CONTRACTOR SHALL FURNISH, UPON REQUEST, CERTIFIED REPORTS STATING THAT INSPECTIONS AND SPECIFIED TESTS HAVE BEEN MADE AND THAT THE RESULTS THEREOF COMPLY WITH THE APPLICABLE STANDARDS.
- E. AIR RELEASE VALVES
- 1 AIR RELEASE VALVES SHALL BE COMBINATION AIR RELEASE VALVES 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 INLET SHALL BE BAFFLED TO PROTECT THE FLOAT FROM DIRECT FORCES OF RUSHING AIR AND WATER TO PREVENT PREMATURE VALVE SHUT-OFF.
  - 2 MATERIALS SHALL CONFORM TO THE FOLLOWING:
    - a. BODY AND COVER: DUCTILE IRON (ASTM A-536 GR 65-45-12)
    - b. FLOAT: STAINLESS STEEL (ASTM A-240)
    - c. NEEDLE & SEAT: BUNA-N
    - d. PLUG: STAINLESS STEEL (ASTM A-276)
    - e. LEVERAGE FRAME: DELRIN/CAST IRON (ASTM D-4184/ASTM A-126 GR. B)
  - 3 VALVES SHALL BE COMBINATION AIR RELEASE AND VACUUM VALVE WITH A SINGLE BODY. THE VALVES SHALL BE RATED FOR 150 PSI WORKING PRESSURE, AND CONFORM TO AWWA C512. VALVE SHALL BE PROVIDED WITH THREADED CONNECTIONS, AND BE MOUNTED ON A FULL OPENING STAINLESS STEEL BALL VALVE TO ISOLATE THE AIR RELEASE VALVE FROM THE SYSTEM.
- F. PRESSURE TYPE PIPE COUPLINGS
- 1 TUBULAR-SLEEVE COUPLINGS:
    - a. COUPLINGS SHALL MEET AWWA C219, WITH CENTER SLEEVE, GASKETS, END RINGS, AND BOLT FASTENERS.
  - 2 MELTAL, BOLTED, SLEEVE-TYPE, REDUCING OR TRANSITION COUPLINGS FOR JOINING UNDERGROUND PRESSURE PIPING
    - a. COUPLINGS SHALL MEET A 200-PSI MINIMUM PRESSURE RATING AND ENDS OF SAME SIZES OF THE MAIN LINE PIPING.

- 3 CENTER-SLEEVE MATERIAL
    - a. SLEEVE SHALL BE STAINLESS STEEL
  - 4 GASKET MATERIAL
    - a. GASKETS SHALL BE NATURAL OR SYNTETIC RUBBER RESISTANT TO SEWAGE
  - 5 METAL COMPONENT FINISH:
    - a. FINISH SHALL BE A CORROSION-RESISTANT METERIAL OR COATING
- 2.5 CASING AND JACKING PIPE
- E. DESCRIPTION
- 1 ALL CASING AND JACKING PIPE AND HORIZONTAL BORES SHALL BE APPROVED BY MCRSD.
- F. STEEL CASING PIPE
- 1 STEEL CASING PIPE SHALL BE CONSTRUCTED IN ACCORDANCE WITH ASTM A-53 WITH 35,000 PSI MINIMUM YIELD STRENGTH, AND HAVE THE FOLLOWING MINIMUM WALL THICKNESSES:
    - a. 24-INCH STEEL CASING SHALL HAVE 0.250" MINIMUM WALL THICKNESS
    - b. 30-INCH STEEL CASING SHALL HAVE 0.375" MINIMUM WALL THICKNESS
    - c. 36-INCH STEEL CASING SHALL HAVE 0.375" MINIMUM WALL THICKNESS
    - d. 42-INCH STEEL CASING SHALL HAVE 0.375" MINIMUM WALL THICKNESS
  - 2 ALL ENCASMENT PIPE JOINTS SHALL BE WELDED.
  - 3 THE CASING PIPE DIAMETER EQUALS THE CARRIER PIPE'S LARGES OUTSIDE DIAMETER PLUS 4-INCHES MINIMUM.
  - 4 CARRIER PIPE: PER SECTION 2.3 OR 2.4 OF THESE SPECIFICATIONS.
- C. CASING SPACERS
- 1 MANUFACTURED CASING SPACERS OR WOOD BLOCKING SPACERS ARE REQUIRED ON THE BOTTOM AND TOP TO PREVENT PIPE FROM "FLOATING" DURING GROUT FILLING PROCEDURE.
  - 2 CASING SPACERS SHOULD BE AT 6-FOOT MAXIMUM, CENTER-TO-CENTER, PER DETAIL.
- 2.6 MANHOLES
- A. DESCRIPTION
- 1 STANDARD MANHOLES SHALL BE CONSTRUCTED COMPLETE, READY FOR USE. INCLUDING EXCAVATION, BACKFILL, CONCRETE WORK, CAST IRON FRAMES AND COVERS, AND PERTINENT WORK AS SHOWN ON THE DRAWINGS. ALL MANHOLES SHALL BE MADE WATERTIGHT, AND THE CONTRACTOR SHALL FURNISH ALL MATERIALS AND PERFORM ALL WORK NECESSARY FOR WATERTIGHT CONSTRUCTION.
  - 2 ALL PROPOSED CASTINGS SET IN PAVED AREAS SHALL BE FLUSH WITH THE FINAL PAVEMENT ELEVATIONS. ALL PROPOSED CASTINGS TO BE SET IN NON-PAVED AREAS SHALL STAND APPROXIMATELY THREE (3) INCHES ABOVE FLUSH WITH THE FINAL GROUND.
- B. REINFORCED CONCRETE MANHOLES AND ACCESSORIES
- 1 MANHOLES SHALL BE CONSTRUCTED IN ACCORDANCE WITH THE ASTM C-478 STANDARD SPECIFICATIONS FOR PRECAST REINFORCED CONCRETE MANHOLE SECTIONS. MANHOLES SHALL BE A MINIMUM DIAMETER OF 48 INCHES WITH A MINIMUM ACCESS DIAMETER OF 24 INCHES. THE MINIMUM WALL THICKNESS SHALL BE FOUR (4) INCHES FOR MANHOLES FOUR (4) FEET IN DIAMETER.
  - 2 THE PRECAST TOPS SHALL BE OF THE ECCENTRIC CONE TYPE. PRECAST FLAT COVERS SHALL BE NOT LESS THAN EIGHT (8) INCHES THICK AND REINFORCED WITH TWO LAYERS OF STEEL WITH A MINIMUM AREA OF 0.12 SQUARE INCHES PER LINEAR FOOT IN BOTH DIRECTIONS IN EACH LAYER. PRECAST FLAT BOTTOMS OF MANHOLES SHALL ALSO BE REINFORCED THE SAME AS SPECIFIED HEREIN FOR PRECAST FLAT TOP. HOISTING LUGS OR HOOKS SHALL BE CAST IN PLACE FOR HANDLING AND SETTING OF THE RINGS. NO THROUGH HOLES SHALL BE PERMITTED. OPENINGS OF PROPER SIZES AND SUITABLE DESIGN SHALL BE CAST IN PLACE FOR RECEIVING THE SEWER AND/OR DROP PIPES AND CONNECTIONS. ADJUSTING RISER FINGS SHALL BE PROVIDED, WITH NO MORE THAN 12-INCHES OF RISER RINGS ALLOWED.
  - 3 ALL MANHOLE JOINTS SHALL BE TONGUE AND GROOVE AND THEY SHALL BE SEALED WITH TWO ROWS OF 1/2" BUTYL MASTIC JOINT SEALANT MEETING ASTM C-990. CRACKED OR DAMAGED BARREL JOINTS SHALL NOT BE ALLOWED. ALL JOINTS SHALL ALSO HAVE AN EXTERIOR JOINT WRAP SIMILAR TO THE INFI-SHIELD GATOR WRAP AS MANUFACTURED BY SEALING SYSTEMS, INC. OR APPROVED EQUAL. THE JOINT WRAP SHALL BE A MINIMUM OF TWELVE-INCHES (12") IN WIDTH.
  - 4 MANHOLE STEPS SHALL BE INSTALLED IN ALL SANITARY SEWER MANHOLES. MANHOLE STEPS SHALL BE POLYPROPYLENE. MANHOLE STEPS SHALL BE INSTALLED IN A VERTICAL ROW ON 16-INCH CENTERS.
  - 5 MANHOLE BASES SHALL BE MONOLITHIC WITH FIRST RISER SECTION AND OF CAST-IN-PLACE OR PRECAST CONCRETE. WHERE SEWER LINES PASS THROUGH OR ENTER MANHOLES, THE INVERT CHANNELS SHALL BE SMOOTH AND SEMI-CIRCULAR IN CROSS SECTION WITH THE WALL EXTENDING TO FULL DEPTH ELEVATION OF THE PIPE. THE INVERT CHANNELS SHALL BE FORMED DIRECTLY IN THE CONCRETE OF THE MANHOLE BASE. CHANGES OF DIRECTION OF FLOW WITHIN THE MANHOLES SHALL BE MADE WITH A SMOOTH CURVE WITH AS LONG A RADIUS AS POSSIBLE. THE WALLS OF THE CHANNELS MAY BE FLARED OUT TO ALLOW TESTING EQUIPMENT TO BE INSERTED AND REMOVED. THE FLOOR OF THE MANHOLE OUTSIDE CHANNELS SHALL BE SMOOTH AND SLOPE TOWARD THE CHANNEL NOT LESS THAN ONE (1) INCH PER FOOT.
  - 6 FOR CAST-IN-PLACE BASES, NO MORTAR OR CONCRETE SHALL BE PLACED IN WATER, AND NO WATER SHALL BE ALLOWED TO FLOW OVER OR AGAINST THE CONCRETE BEFORE IT HAS HAD ADEQUATE TIME TO SET IN ORDER TO PREVENT DAMAGE TO THE STRUCTURE.
  - 7 THE STANDARD MANHOLE IS FORTY-EIGHT-INCHES (48") IN DIAMETER. LARGER DIAMETER MANHOLES MAY BE REQUIRED IN INSTANCES WITH LARGE PIPE DIAMETERS OR WITH CERTAIN INTERNAL DROPS, IF APPROVED. MANHOLE BARREL SECTIONS SHALL BE IN ONE, TWO, THREE, OR FOUR FOOT VERTICAL SECTIONS. THE CONE SECTION SHALL BE OF THE ECCENTRIC CONE TYPE, TWO OR THREE FEET IN LENGTH.
  - 8 ADJUSTING RINGS: WHERE ONE (1) SOLID RISER OR BARREL SECTION CANNOT BE USED, FINAL ADJUSTMENTS IN ELEVATION OF THE FRAME AND COVER SHALL ONLY BE ACCOMPLISHED BY THE USE OF PRECAST CONCRETE ADJUSTING RINGS CONFORMING TO ASTM C-478. RINGS SHALL BE OF A NOMINAL THICKNESS OF FOUR (4"), SIX (6") INCHES OR TWELVE (12). NOT MORE THAN TWO (2) RINGS AND NOT MORE THAN TWELVE (12") INCHES

TOTAL OF ADJUSTING RINGS SHALL BE ALLOWED FOR ADJUSTMENT OF THE MANHOLE FRAME AND COVER TO REQUIRED ELEVATION. GRADE RING JOINTS SHALL HAVE TWO ROWS OF 1/2" BUTYL RUBBER FLEXIBLE SEALANT CONFORMING TO ASTM C-990.

9 ALL PRECAST CONCRETE FOR NEW MANHOLES THAT WILL BE RECEIVING A FORCE MAIN OR ARE WITHIN FIVE HUNDRED (500') FEET UPSTREAM OR DOWNSTREAM OF THE RECEIVING MANHOLE SHALL HAVE THE INTERIOR OF THE MANHOLE LINED WITH SPECTRASHIELD, CEMENTITIOUS LINERS WITH CALCIUM ALUMINATE MORTARS SUCH AS STRONGSEAL, SAUERISEN, MADEWELL, CONCO SPRAYROQ OR APPROVED EQUAL. APPLY COATING PER MANUFACTURER'S RECOMMENDATION.

10 MINIMUM MANHOLE DIAMETERS

- a. THE FOLLOWING ARE MINIMUM MANHOLE DIAMETERS FOR SANITARY SEWERS ENTERING / EXITING A MANHOLE AT THE FOLLOWING RANGE OF ANGLES:

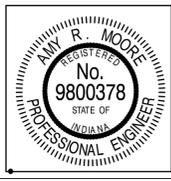
PIPE SIZE	PIPES ENTERING / EXITING AT 0 – 45 DEGREE BEND	PIPES ENTERING / EXISTING AT 45 – 90 DEGREE BEND
8" – 21"	48"	48"
24"	48"	60"
27" – 30"	60"	60"
33" – 36"	60" *	72"
* NOTE 72" IF THE "A"-LOCK CONNECTOR IS USED		

c. MANHOLE DIAMETER AND LAYOUT SHALL BE ADEQUATE TO PROVIDE MINIMUM SIX (6") INCHES OF WALL BETWEEN OPENING.

C. MANHOLE BASE CHANNELS

- 1 FOR ALL MANHOLES WITH EQUAL DIAMETER INFLUENT AND EFFLUENT PIPES, A MINIMUM OF 0.10 FOOT DROP BETWEEN THE INVERTS AND EFFLUENT PIPES SHALL BE MAINTAINED. FOR CHANGES IN DIRECTION 45 TO 90 DEGREES, A MINIMUM OF 0.20 FOOT DROP SHALL BE MAINTAINED.

REVISIONS			
NO.	DATE	DESCRIPTION	BY



RECOMMENDED FOR APPROVAL	<i>Amy R. Moore</i>	08/21/2019
DESIGNED: LMY	DRAWN: KDK	DATE
CHECKED: ARM	CHECKED: ARM	

MONTGOMERY COUNTY SEWER DISTRICT	
SPECIFICATIONS	
HORIZONTAL SCALE	AS NOTED
VERTICAL SCALE	AS NOTED
SHEETS	10 of 12
PROJECT	13-3041

DIRECTORY: F:\2013\13-3041 Mont Co RSD On-call\Sanitary Standard Details(CAD)  
 FILE: 13-3041 MCRSD Details.dwg  
 DIMSCALE: 1/8" = 1'-0"  
 PLOTTED BY: JIMOWERY  
 DATE: AUG 16, 2019 - 4:05PM

**D. SEWER PIPE TO MANHOLE CONNECTIONS**

- TO CONNECT A SANITARY SEER TO A MANHOLE, A RESILIENT PIPE TO MANHOLE CONNECTOR SHALL BE USED MEETING THE REQUIREMENTS OF ASTM C-923. EITHER A FLEXIBLE BOOT KOR-N-SEAL 1 OR 2, CAST-IN-PLACE DURA-SEAL GASKET OR "A-LOK" GASKET OR AN APPROVED EQUAL SHALL BE USED. CONNECTIONS TO AN EXISTING MANHOLE SHALL BE A FLEXIBLE BOOT SEAL.
- IF THE FLEXIBLE BOOT CONNECTION IS USED, IT SHALL BE PLACED IN THE REINFORCED CONCRETE MANHOLE BASE AND SECURED TO THE PIPE BY A STAINLESS STEEL CLAMP. FLEXIBLE CONNECTORS SHALL CONFORM TO ASTM C-923.
- ALL CONNECTIONS SHALL PROVIDE FOR A WATERTIGHT SEAL BETWEEN THE PIPE AND MANHOLE. THE CONNECTOR SHALL BE THE SOLE ELEMENT RELIED UPON TO ASSURE A FLEXIBLE WATERTIGHT SEAL OF THE PIPE TO THE MANHOLE.
- THE INVERT OF THE CONNECTION SHALL BE GROUTED WITH NON-SHRINK GROUT. THE REMAINDER OF THE RESILIENT CONNECTION SHALL BE FREE OF GROUT TO PROMOTE FLEXIBILITY OF THE CONNECTION.
- THE RUBBER FOR THE CONNECTOR SHALL CONFORM TO ASTM C-923 AND SHALL BE RESISTANT TO OZONE, WEATHER ELEMENTS, CHEMICALS, INCLUDING ACIDS AND ALKALIS, ANIMAL AND VEGETABLE FATS, OILS AND PETROLEUM PRODUCTS.
- THE STAINLESS STEEL ELEMENTS OF THE CONNECTOR SHALL BE TOTALLY NON-MAGNETIC SERIES 305 STAINLESS STEEL. THE STAINLESS STEEL CLAMP SHALL BE CAPABLE OF SUSTAINING APPLIED TORQUE IN EXCESS OF EIGHT (80) INCH-POUNDS.
- NEW CONNECTIONS MADE TO ANY EXISTING STRUCTURE SHALL BE DRILLED IN THE DIRECTION OF FLOW. THE INTERNAL BASE MATERIAL SHALL BE REMOVED AND RE-POURED WITH THE CHANNELS MEETING THE REQUIREMENTS OF THE MANHOLE BASE SECTION. IF THE STRUCTURAL INTEGRITY OF THE CONCRETE BASE SECTION IS COMPROMISED DURING THE REMOVAL OF THE INTERIOR BASE, THE ENTIRE BASE SECTION SHALL BE REPLACED. THE CONNECTOR BOOT SHALL BE APPROPRIATELY SIZED TO FIT THE OPENING AND SHALL BE KOR-N-SEAL® BY NPC, INC., DUR-A-SEAL, OR A-LOK PRODUCTS, INC., OR APPROVED EQUAL.

**E. DROP MANHOLES.**

- WHERE A SANITARY SEWER OR SANITARY LATERAL ENTERS A MANHOLE TWENTY-FOUR (24") INCHES OR MORE ABOVE THE INVERT OF THE OUTGOING SEWER, THE INCOMING SEWER SHALL BE CONNECTED TO THE MANHOLE BY MEANS OF A DROP CONNECTION.
- OUTSIDE DROP CONNECTIONS MAY BE EITHER PRECAST OR FIELD FABRICATED. DROP CONNECTIONS ON THE INSIDE OF MANHOLES SHALL BE SECURED TO THE INTERIOR WALL OF THE MANHOLE AND PROVIDE ACCESS FOR CLEANING, AND DROP PIPE CONNECTIONS ON THE OUTSIDE OF MANHOLES SHALL BE ENCASED IN CONCRETE.

**F. SAMPLE MANHOLE REQUIREMENTS**

- ALL WAREHOUSE AND INDUSTRIAL SITES SHALL INSTALL A SAMPLING MANHOLE PRIOR TO CONNECTION TO MCRSD SEWER.
- THE SAMPLING MANHOLE SHALL BE STANDARD 48-INCH PRECAST CONCRETE MANHOLE.
- THE SAMPLING MANHOLE SHALL HAVE A THREE (3') FOOT STRAIGHT LATERAL RUN ON BOTH SIDES OF THE MANHOLE.

**G. CASTINGS**

- STANDARD MANHOLES SHALL HAVE A SELF-SEALING, HEAVY-DUTY FRAME AND COVER, NEENAH R-1772, EAST JORDAN IRON WORKS 102221, OR APPROVED EQUAL. MATERIAL SHALL BE IN COMPLIANCE WITH ASTM A-48, CL 35. EACH LID SHALL HAVE "SANITARY SEWER" MOLDED INTO THE EXTERIOR SURFACE IN LETTERS TWO (2") INCHES IN HEIGHT RECESSED, AND FLUSH WITH SURFACE.
- WHERE WATERTIGHT CASTINGS ARE REQUIRED, THE MANHOLES SHALL HAVE A BOLT DOWN NEENAH R-1772 OR 102221 CASTING BY EAST JORDAN IRON WORKS, OR APPROVED EQUAL. THE FRAME SHALL BE ANCHORED THROUGH THE RISER RINGS (IF PROVIDED) TO THE CONE SECTION WITH FOUR (4) GALVANIZED RODS.
- NO OPEN PICK HOLES SHALL BE ALLOWED.

**H. FRAME, CHIMNEY AND JOINT SEAL**

- ALL MANHOLES SHALL HAVE AN EXTERNAL CHIMNEY SEAL AND JOINT SEALS.
- THE SECTION OF THE MANHOLE FROM THE ECCENTRIC CONE TO THE CASTING FRAME SHALL BE WRAPPED ON THE EXTERIOR WITH JOINT WRAP MEETING THE REQUIREMENTS OF THE WRAPIDSEAL AS MANUFACTURED BY CANUSA OR EXTERNAL CHIMNEY SEAL AS MANUFACTURED BY CRETEX, OR APPROVED EQUAL.
- ALL MANHOLE JOINTS SHALL BE WRAPPED ON THE EXTERIOR AS SHOWN IN THE DETAILS. THE JOINT WRAP SHALL BE A MINIMUM OF TWELVE-INCHES (12") IN WIDTH.
- NO GROUTING OF THE INTERIOR OR EXTERIOR OF THE JOINT WILL BE REQUIRED.

**2.7 APPURTENANCES**

**B. OIL AND GREASE INTERCEPTOR AND GREASE REMOVAL PIT**

- PIT SHALL BE CONSTRUCTED OF REINFORCED PRECAST CONCRETE OR CAST-IN-PLACE CONCRETE OF THE SHAPE AND CONFIGURATION INDICATED ON THE PLANS. PRECAST VAULTS SHALL BE CONSTRUCTED IN ACCORDANCE WITH ASTM C-857 AND BE RATED FOR AASHTO HS20-44 LOADING. THE CONCRETE SHALL HAVE A MINIMUM COMPRESSIVE STRENGTH OF 4500 PSI AT 28 DAYS, AND REINFORCEMENT SHALL COMPLY WITH ASTM A-615, GRADE 60. ACCESS TO THE PIT SHALL BE THROUGH 24" DIAMETER MANHOLE FRAME AND COVER OR THROUGH HINGED ALUMINUM ACCESS MANWAYS.
- THE PIT SHALL HOLD A VOLUME OF NO LESS THAN 1000 GALLONS.

**PART 3 - EXECUTION**

**3.1 PREPARATION**

- REMOVE LARGE STONES OR OTHER HARD MATERIALS THAT COULD DAMAGE PIPE OR IMPEDE CONSISTENT BACKFILLING OR COMPACTION.
- PROTECT AND SUPPORT EXISTING SEWER LINES, UTILITIES AND APPURTENANCES.

**3.2 EXCAVATION**

- PRIOR TO EXCAVATION, AREAS WITHIN THE PROJECT LIMITS SHALL BE FIRST CLEARED OF OBSTRUCTIONS, DEBRIS, AND EXISTING FACILITIES WITH THE EXCEPTION OF FACILITIES THAT MUST TEMPORARILY OR PERMANENTLY REMAIN. THE CONTRACTOR SHALL REMOVE AND KEEP SEPARATE THE TOPSOIL, AND SHALL CAREFULLY REPLACE IT AFTER THE BACKFILLING IS COMPLETE.
  - PROTECTION OF EXISTING IMPROVEMENTS REQUIRED TO REMAIN IN PLACE
    - BEFORE ANY EXCAVATION IS STARTED, ADEQUATE PROTECTION SHALL BE PROVIDED FOR ALL LAWNS, TREES, SHRUBS, LANDSCAPE WORK, FENCES, SIDEWALKS, HYDRANTS, UTILITY POLES, STREET, ALLEY AND DRIVEWAY PAVING, CURBS, STORM SEWERS, DITCHES, HEADWALLS, CATCH 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.
    - 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.
- PAVEMENT REMOVAL
  - 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**

- ALL MAINTENANCE OF TRAFFIC SHALL BE IN ACCORDANCE WITH THE REQUIREMENTS OF THE

REGULATORY AGENCY OR AUTHORITY IN CHARGE OF MAINTAINING THE SUBJECT ROADWAY.

- 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.
- 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 PROVISIONS MADE.
- 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 PURPOSE.

**E. UTILITY PROTECTION**

- PRIOR TO PROCEEDING WITH EXCAVATION, THE CONTRACTOR SHALL CONTACT INDIANA UNDERGROUND PLANT PROTECTION SERVICES (INDIANA811) TO ALLOW THEM TO LOCATE THEIR UNDERGROUND SERVICES WITHIN THE PROJECT AREA. UPON LOCATION OF UTILITIES, THE CONTRACTOR SHALL USE CARE IN EXCAVATING NEAR EXISTING UTILITIES IN ORDER TO PROTECT FROM DAMAGE.

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

- 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 MCRSD PRIOR TO CONTINUING CONSTRUCTION.

**G. CONSTRUCTION IN EASEMENTS**

- 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 MCRSD TO GRANT OR ACQUIRE ADDITIONAL EASEMENT.

**H. MAINTENANCE OF EXISTING DRAINAGE FLOW**

- 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, SEWERS, AND DRAINS.
- NO STORM WATER SHALL BE PERMITTED IN THE SANITARY SEWER.

**I. TRENCH DIMENSIONS**

- 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.
- SIDEWALKS 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, SIDEWALKS MAY BE BATTERED TO SUCH SLOPES AS DIRECTED ON THE PLANS TO MAINTAIN A SAFE WORKING ENVIRONMENT.
- 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**

- EARTH MATERIALS SHALL BE EXCAVATED SO THAT THE OPEN CUTS CONFORM TO THE LINES, GRADES AND DIMENSIONS SHOWN ON THE DRAWINGS.
- 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 INDIANA DEPARTMENT OF TRANSPORTATION (INDOT) STANDARD SPECIFICATIONS, 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 MCRSD FOR APPROVAL. THE MCRSD SHALL APPROVE ALTERNATE BASE STABILIZATION METHODS PRIOR TO COMMENCING LAYING OF PIPE IN THE TRENCH.
- 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.

**K. BORING AND JACKING**

- 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 PIPE.

**L. REMOVAL OF WATER**

- 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 ALL EXCAVATIONS DRY UNTIL THE STRUCTURES TO BE BUILT THEREIN ARE COMPLETED OR CONNECTIONS TO EXISTING STRUCTURES ARE COMPLETED.
- 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**

- FOR THE PURPOSE OF THIS SPECIFICATION, PIPE SHALL INCLUDE THOSE MADE OF PVC, HDPE, DUCTILE IRON, AND OTHER MATERIALS APPROVED BY MCRSD.
- 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") INCHES 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.
- 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.
- ALL MATERIALS SHALL BE PLACED IN THE TRENCH IN NO MORE THAN SIX (6") INCH LAYERS. EACH LAYER SHALL BE LEVELLED 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.

- FINAL BACKFILL IS CONSIDERED TO BE ALL MATERIAL ABOVE AN ELEVATION THAT IS TWELVE (12") INCHES ABOVE THE TOPE 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.
- 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.
- 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 MOUNDDED 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.

**B. STRUCTURES EMBEDMENT AND COMPACTION**

- FOR PURPOSES OF THIS SPECIFICATION, STRUCTURES SHALL INCLUDE BY 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.
- STRUCTURE BACKFILLING AND COMPACTION SHALL COMPLY WITH THE REQUIREMENTS AS SPECIFIED FOR THE ADJACENT SANITARY SEWER.
- 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.
- 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.
- 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.
- 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**

- 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**

- 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.
- IN EXISTING RESIDENTIAL AREAS WHERE STONE AGGREGATE HAS BEEN TEMPORARILY USED TO RESTORE THE ROADWAY SURFACE, DUST PREVENTION MAY BE REQUIRED TO REDUCT THE EFFET OF DUST UPON LOCAL RESIDENTS.
- 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**

- 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.
- ALL PIPE SHALL BE HANDELED, STORED AND INSTALLED ACCORDING TO THE MANUFACTURER'S RECOMMENDATIONS.
- 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.
- SANITARY SEWERS SHALL BE CONSTRUCTED WITH A TEN (10') FOOT MINIMUM SEPARATION FROM AN EXISTING OR PROPOSED WATER MAIN, MEASURED HORIZONTALLY FROM THE OUTSIDE EDGE OF THE SANITARY SEWER TO THE OUTSIDE EDGE OF THE WATER MAIN. 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, MUST ALSO BE MAINTAINED. WHEN A SANITARY SEWER MAIN CROSSES A WATER MAIN, 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. NO SANITARY MANHOLE SHALL BE LOCATED WITHIN EIGHT (8') FEET OF A WATER MAIN, MEASURED FROM THE OUTSIDE EDGE OF THE SANITARY SEWER MANHOLE TO THE CLOSEST OUTSIDE EDGE OF THE WATER MAIN.
- WHERE REQUIRED HORIZONTAL AND/OR VERTICAL SEPARATION FROM WATER LINES CAN'T BE MET, THE SEWER MATERIAL SHALL BE CONSTRUCTED OF ASTM D-2241 PVC SDR 21 OR AWWA C9000/C905 PVC 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 TO GRADE**

- 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.
- THE MCRSD WILL NOT ACCEPT GRAVITY SEWER DESIGNED OR INSTALLED BELOW MINIMUM SLOPE AS SPECIFIED IN 327 IAC ARTICLE 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:
  - THE UPSTREAM MANHOLE HAS NO INFLUENT FLOWS FROM SEWERS, AND
  - A SEWER IS NOT PLANNED TO BE EXTENDED FROM THE UPSTREAM MANHOLE IN THE FUTURE.
- THE CONTRACTOR SHALL VERIFY THE INITIAL STARTING ELEVATION FROM AT LEAST TWO (2) ESTABLISHED BENCHMARKS.

**C. TRENCHING**

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

**D. PIPE LAYING**

- 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 THE INSTALLATION OF PIPE.
- EXAMINATION OF MATERIAL
  - PIPE, FITTINGS AND VALVES AND OTHER APPURTENANCES SHALL BE EXAMINED CAREFULLY FOR DAMAGE AND OTHER DEFECTS IMMEDIATELY BEFORE INSTALLATION.
- PIPE ENDS
  - 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.
- PIPE CLEANLINESS
  - FOREIGN MATERIAL SHALL BE PREVENTED FROM ENTERING THE PIPE WHILE IT IS BEING PLACED IN THE TRENCH.
- PIPE PLACEMENT
  - 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.
- PIPE PLUGS
  - AT TIMES WHEN PIPE-LAYING IS NOT IN PROGRESS, THE OPEN ENDS OF THE 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 FLOATATION, SHOULD THE TRENCH FILL WITH WATER.
  - 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**

- JOINTS SHALL BE ASSEMBLED IN ACCORDANCE WITH THE MANUFACTURER'S INSTRUCTIONS.
- ASSEMBLY
  - 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.
- PIPE CUTTING
  - CUTTING PIPE FOR INSERTION OF VALVES, FITTINGS, OR CLOSURE PIECES SHALL BE DONE IN CONFORMANCE WITH 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.
  - 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**

- 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.

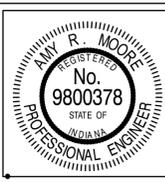
**B. ALIGNMENT AND GRADE**

- 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.
- CLEARANCE
  - 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.
- DEPTH
  - THE MINIMUM COVER FOR SANITARY FORCE MAIN SHALL BE FOUR (4') FEET. THE MAXIMUM ALLOWABLE DEPTH SHALL BE PER MANUFACTURER'S RECOMMENDATION AND SHALL BE BASED UPON THE BEDDING AND BACKFILL USED FOR THE INSTALLATION.
- SLOPE
  - FORCE MAINS MUST BE DESIGNED AT A CONSTANT POSITIVE SLOPE FROM LOW POINTS AND CLEAN-OUTS TO AIR/VACUUM RELIEF VALVES.

**C. TRENCHING**

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

REVISIONS			
NO.	DATE	DESCRIPTION	BY



RECOMMENDED FOR APPROVAL	<i>Amy R. Moore</i>	08/21/2019
DESIGNED:	LMY	DRAWN:
CHECKED:	ARM	CHECKED:
		DATE

<b>MONTGOMERY COUNTY SEWER DISTRICT</b>	
<b>SPECIFICATIONS</b>	
HORIZONTAL SCALE	
AS NOTED	
VERTICAL SCALE	
AS NOTED	
SHEETS	
11 of 12	
PROJECT	
13-3041	

DIRECTORY: F:\2013\13-3041 Mont Co RSD On-call\Sanitary Standard Details\CAD\  
 FILE: 13-3041 MCRSD Details.dwg  
 DIMSCALE: 1/8" = 1' LAYOUT SCALE: 1/8" = 1'  
 PLOTTED BY: JMowery  
 DATE: Aug 16, 2019 - 4:05pm

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 PRESSURE 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, BILSTERS, AND EXCESS COATING SHALL BE REMOVED FROM THE SOCKET AND PLAIN ENDS OF EACH PIPE, AND THE OUTSIDE OF THE PLAIN END AND 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 FLOATATION, 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 WITH 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.

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 MEASURE 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 100 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 COLLING 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, AS SHOWN ON THE PLANS. VALVES ARE CONSIDERED DEAD ENDS AND SHALL BE RESTRAINED AS SUCH.
- 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 RESTRAIN 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: THE RODS, CLAMPS, OR OTHER

COMPONENTS OF DISSIMILAR METAL SHALL BE PROTECTED AGAINST CORROSION BY HAND APPLICATION OF A SUITABLE COATING OR BY ENCASMENT 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 A-536-80, GRADE 60-42-10. SET SCREWS SHALL BE HARDENED DUCTILE IRON. 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 THE GROUND SURFACE AND ABOVE THE ONE HUNDRED (100) YEAR FLOOD ELEVATION.
- 3 MANUALLY OPERATED AIR RELIEF VALVES SHALL BE USED IN AREAS WITHIN THE ONE HUNDRED (100) YEAR FLOOD PLAIN AND WHERE FLOODING MAY OCCUR.

3.6 HORIZONTAL BORING INSTALLATION

A. PIT OR APPROACH TRENCHES

- 1 EXCAVATE APPROACH TRENCHES OR PITS AS SITE CONDITIONS REQUIRE.
- 2 ENSURE CASING ENTRANCE FACES AS NEAR PERPENDICULAR TO ALIGNMENT AS CONDITIONS PERMIT.
- 3 ESTABLISH VERTICAL ENTRANCE FACE AT LEAST 1 FOOT ABOVE TOP OF CASING.
- 4 INSTALL DEWATERING MEASURES AND EXCAVATION SUPPORTS.

B. CASING PIPE

- 1 BORING
  - a. PUSH PIPE INTO GROUND WITH BORING AUGER, ROTATING WITHIN PIPE TO REMOVE SOIL.
  - b. DO NOT ADVANCE CUTTING HEAD AHEAD OF CASING PIPE, EXCEPT FOR DISTANCE NECESSARY TO PERMIT CUTTING TEETH TO CUT CLEARANCE FOR PIPE.
  - c. ARRANGE MACHINE BORE AND CUTTING HEAD TO BE REMOVABLE FROM WITHIN PIPE.
  - d. ARRANGE FACE OF CUTTING HEAD TO PROVIDE BARRIER TO FREE FLOW OF SOFT MATERIAL.
  - e. IF UNSTABLE SOIL IS ENCOUNTERED DURING BORING, RETRACT CUTTING HEAD INTO CASING TO PERMIT BALANCE BETWEEN PUSHING PRESSURE AND RATIO OF PIPE ADVANCEMENT TO QUANTITY OF SOIL.
  - f. GROUT TO FILL VOIDS IF VOIDS DEVELOP GREATER THAN OUTSIDE DIAMETER OF PIPE BY APPROXIMATELY 1 INC.
  - g. IF BORING IS OBSTRUCTED, RELOCATE, JACK OR TUNNEL AS DIRECTED BY MCRSD REPRESENTATIVE.
- 2 JACKING
  - a. CONSTRUCT ADEQUATE THRUST WALL NORMAL TO PROPOSED LINE OF THRUST.
  - b. IMPART THRUST LOAD TO PIPE, THROUGH SUITABLE THRUST RING SUFFICIENTLY RIGID TO ENSURE UNIFORM DISTRIBUTION OF THRUST LOAD ON FULL PIPE CIRCUMFERENCE.

3 CARRIER PIPE

- a. CLEAN AND INSPECT PIPE.
- b. PLACE CARRIER PIPE PER DETAIL. EXERCISE CARE TO PREVENT DAMAGE TO PIPE JOINTS WHEN CARRIER PIPE IS PLACED IN CASING.
- c. SUPPORT PIPELINE WITHIN CASING SO NO EXTERNAL LOADS ARE TRANSMITTED TO CARRIER PIPE.
- d. ATTACH SUPPORTS TO BARREL OF CARRIER PIPE. DO NOT REST CARRIER PIPE ON BELLS.
- e. THE ANNULAR SPACE BETWEEN THE CASING PIPE AND THE CARRIER PIPE SHALL BE GROUT FILLED.

3.7 MANHOLES

A. INSTALLATION

- 1 ALL MANHOLES SHALL BE INSTALLED SO THAT THE TOP OF THE MANHOLE CASTING AND FRAME:
  - a. IN AREAS NOT SUBJECT TO TRAFFIC, THE LID SHALL BE SET AT THREE (3") INCHES ABOVE THE SURROUNDING SURFACE AFTER EARTH SETTLEMENT.
  - b. IN AREAS SUBJECT TO TRAFFIC, THE LID SHALL BE FLUSH WITH THE FINAL GROUND ELEVATION.
  - c. IN AREAS WITHIN FLOODPLAIN, THE LID SHALL BE TWO (2) FEET ABOVE THE 100-YEAR FLOOD ELEVATION.
- 2 ALL STRUCTURES SHALL BE BEDDED ON A MINIMUM OF SIX (6") INCHES OF COMPACTED AGGREGATE MEETING THE GRADATION OF #8 CRUSHED STONE PER INDIANA DEPARTMENT OF TRANSPORTATION (INDOT) STANDARD SPECIFICATIONS. NO STRUCTURE SHALL BE SET ON SOFT OR YIELDING SOILS. IF YIELDING SOILS ARE ENCOUNTERED, THE AREA SHALL BE EXCAVATED AND FILLED WITH COMPACTED CRUSHED STONE.
- 3 ALL LIFT HOLES IN PRECAST SECTIONS SHALL BE WETTED AND COMPLETELY FILLED WITH NON-SHRINK GROUT, SMOOTHED AND COATED WITH BITUMINOUS WATERPROOFING MATERIAL TO ENSURE WATER TIGHTNESS.
- 4 INSTALL EXTERIOR CHIMNEY AND JOINT WRAPS PER MANUFACTURER'S INSTRUCTIONS.

B. REGRADING

- 1 RAISE OR LOWER EXISTING MANHOLES AND STRUCTURES FRAMES AND COVERS, CLEANOUT FRAMES AND COVERS AND VALVE BOXES IN REGRADED AREAS TO FINISH GRADE. CAREFULLY REMOVE, CLEAN AND SALVAGE CAST IRON FRAMES AND COVERS. ADJUST THE ELEVATION OF THE TOP OF THE MANHOLE OR STRUCTURE AS DETAILED ON THE DRAWINGS. ADJUST THE ELEVATION OF THE CLEANOUT PIPE RISER, AND REINSTALL THE CAP OR PLUG, RESET CAST IRON FRAM AND COVER, GROUTING BELOW AND AROUND THE FRAME. INSTALL CHIMNEY SEAL AROUND RESET FRAM AND COVER AS SPECIFIED FOR NEW CONSTRUCTION.
- 2 DURING PERIODS WHEN WORK IS PROGRESSING ON ADJUSTING MANHOLES OR STRUCTURES COVER ELEVATIONS, THE CONTRACTOR SHALL INSTALL A TEMPORARY COVER ABOVE THE BENCH OF THE STRUCTURE OR MANHOLE. THE TEMPORARY COVER SHALL BE INSTALLED ABOVE THE HIGH FLOW ELEVATION WITHIN THE STRUCTURE, AND SHALL PREVENT DEBRIS FROM ENTERING THE WASTEWATER STREAM.

3.8 APPURTENANCES

A. OIL AND GREASE INTERCEPTOR AND GREASE REMOVAL PIT INSTALLATION

- 1 PIPE AND FITTINGS SHALL BE PVC. PIPING SHALL BE USED INSIDE OF TRAP, BETWEEN TRAP AND BUILDINGS, AND BETWEEN TRAP AND MANHOLE.
- 2 MANWAYS AND ACCESS MANHOLES SHALL BE SET TO FINISH GRADE PROVIDING ADEQUATE ACCESS TO THE UNIT. SLOPE PAVEMENT AROUND THE ACCESS-WAY TO PREVENT STORMWATER FROM ENTERING THE UNIT.

B. CLEANOUT INSTALLATION

- 1 INSTALL CLEANOUTS AND RISER EXTENSIONS FROM SEWER PIPES TO CLEANOUTS AT GRADE. CLEANOUTS SHALL MATCH DETAIL. INSTALL PIPING SO CLEANOUTS OPEN IN DIRECTION OF FLOW IN SEWER PIPE.
- 2 SET CLEANOUT FRAMES AND COVERS IN EARTH IN CAST-IN-PLACE-CONCRETE, 18" BY 12" AND ONE (1") INCH ABOVE SURROUNDING GRADE.

- 3 SET CLEANOUT FRAMES AND COVERS IN CONCRETE PAVEMENT AND ROADS WITH TOPS FLUSH WITH PAVEMENT SURFACE.
  - 4 THE TOP OF THE CLEANOUT ASSEMBLY SHALL BE TWO (2") INCHES BELOW THE BOTTOM OF THE COVER TO PREVENT LOADS BEING TRANSFERRED FROM THE FRAME AND COVER TO THE PIPING.
- C. BUILDING SERVICE LINES
- 1 INSTALL SANITARY SEWER SERVICE LINES TO POINT OF CONNECTION WITHIN THREE (3') FEET OUTSIDE OF BUILDING(S) WHERE SERVICE IS REQUIRED AND MAKE CONNECTIONS.
- D. SAMPLING MANHOLE
- 1 INSTALL SAMPLING MANHOLE PRIOR TO CONNECTION TO MCRSD SEWER IN A LOCATION ACCESSIBLE TO MCRSD REPRESENTATIVES.
  - 2 THE SAMPLING MANHOLE SHALL HAVE A THREE (3') FOOT STRAIGHT LATERAL RUN ON BOTH SIDES OF THE MANHOLE.

PART 4 - TESTING

4.1 FIELD QUALITY CONTROL

- A. ALL SYSTEMS SHALL BE INSPECTED AND TESTED. A MCRSD REPRESENTATIVE MUST BE PRESENT FOR ALL TESTING. MCRSD SHALL BE CONTACTED 48 HOURS PRIOR TO ANY TESTING. PRIOR TO FINAL ACCEPTANCE, PROVIDE A VIDEO RECORD OF ALL PIPING FOR SANITARY SEWER MAIN EXTENSIONS TO SHOW THE LINES ARE FREE FROM OBSTRUCTIONS, PROPERLY SLOPED AND JOINED.

B. GRAVITY SANITARY SEWERS

- 1 ONCE CONSTRUCTED, ALL SANITARY SEWERS AND MANHOLES SHALL BE WATERTIGHT AND FREE FROM LEAKAGE. THE CONTRACTOR SHALL BE REQUIRED TO REPAIR ALL VISIBLE LEAKS. THE RATE OF INFILTRATION INTO THE SANITARY SEWER SYSTEM BETWEEN ANY TWO ADJACENT MANHOLES SHALL NOT BE IN EXCESS OF 100 GALLONS PER INCH OF PIPE DIAMETER PER MILE PER DAY.
- 2 ALL GRAVITY SANITARY SEWERS CONSTRUCTED OF FLEXIBLE PIPE SHALL BE DEFLECTION TESTED NO SOONER THAN THIRTY (30) DAYS AFTER INSTALLATION AND COMPLETE BACKFILL. THE DIAMETER OF THE RIGID BALL OR MANDREL USED FOR A DEFLECTION TEST SHALL BE NO LESS THAN NINETY-FIVE PERCENT (95%) OF THE BASE, INSIDE DIAMETER OF THE PIPE TO BE TESTED, DEPENDENT ON WHAT IS SPECIFIED IN THE CORRESPONDING ASTM STANDARD. THE TEST SHALL NOT BE PERFORMED WITH THE AID OF A MECHANICAL PULLING DEVICE.
- 3 ALL SEWERS TWENTY-FOUR (24") INCHES AND LESS SHALL BE TESTED BY MEANS OF A LOW-PRESSURE AIR TEST TO DETECT DAMAGED PIPING AND/OR IMPROPER JOINTING. TESTING SHALL BE DONE PER ASTM F-1417 FOR FLEXIBLE AND SEMI-RIGID PIPE.
- 4 ALL SEWERS GREATER THAN TWENTY-FOUR (24") INCHES SHALL BE JOINT TESTED USING AIR OR WATER UNDER LOW PRESSURE. ALL JOINTS SHALL BE TESTED. TESTING PROCEDURES SHALL BE PER ASTM C-1103.
- 5 THE CONTRACTOR SHALL SUPPLY ALL EQUIPMENT NECESSARY TO PERFORM THE TEST REQUIRED.,
- 6 ALL TESTS SHALL BE CONDUCTED UNDER THE OBSERVATION OF A REPRESENTATIVE OF THE MCRSD. IT SHALL BE THE CONTRACTOR'S RESPONSIBILITY TO SCHEDULE TESTING.
- 7 ANY LEAKAGE FOUND DURING THE INFILTRATION TEST SHALL BE CORRECTED PRIOR TO ACCEPTANCE. GROUTING OF THE JOINT OR CRACK TO REPAIR THE LEAKAGE SHALL NOT BE PERMITTED FOR FLEXIBLE PIPE. IF THE DEFECTIVE PORTION OF THE SANITARY SEWER CANNOT BE LOCATED, THE CONTRACTOR SHALL REMOVE AND RECONSTRUCT AS MUCH OF THE WORK AS NECESSARY TO OBTAIN A SYSTEM THAT PASSES INFILTRATION REQUIREMENTS.
- 8 ALL SEWER MAIN EXTENSIONS SHALL BE TELEVISED PRIOR TO ACCEPTANCE OF SEWER BY THE DISTRICT.

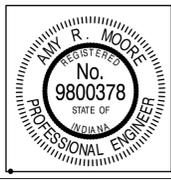
C. PRESSURE PIPE

- 1 AFTER THE PIPE HAS BEEN LAID AND BACKFILLED, ALL NEWLY LAID PRESSURE PIPE OR ANY VALVED SECTIONS OF IT SHALL, UNLESS OTHERWISE EXPRESSLY SPECIFIED, BE SUBJECTED TO A HYDROSTATIC PRESSURE TEST. THE DURATION OF EACH PRESSURE TEST SHALL BE FOR A PERIOD OF NOT LESS THAN TWO (2) HOURS AND NOT MORE THAN SIX (6) HOURS. THE BASIC PROVISIONS OF AWWA C600 (DI PIPE), C605 (PVC PIPE), SHALL BE FOLLOWED FOR ALL PRESSURE TESTING.
- 2 THE TEST PRESSURE SHALL NOT EXCEED PIPE AND/OR THRUST RESTRAINT DESIGN PRESSURES. THE TEST PRESSURE SHALL NOT VARY BY MORE THAN PLUS OR MINUS 5 PSI FOR THE DURATION OF THE TEST.
- 3 ALL NEWLY LAID PIPE OR ANY VALVED SECTION THEREOF SHALL BE SUBJECTED TO A HYDROSTATIC PRESSURE OF AT LEAST 1.5 TIMES THE MAXIMUM WORKING PRESSURE AT THE LOWEST ELEVATION IN THE LINE OR 1.25 TIMES THE MAXIMUM WORKING PRESSURE AT THE HIGHEST ELEVATION IN THE LINE. IN NOT CASE SHALL THE TEST PRESSURE BE LESS THAN FIFTY (50) PSI.
- 4 PRESSURIZATION
  - a. EACH VALVED SECTION OF PIPE SHALL BE SLOWLY FILLED WITH WATER AND THE SPECIFIED TEST PRESSURE, BASED UPON THE ELEVATION OF THE LOWEST POINT OF THE LINE OR SECTION UNDER TEST AND CORRECTED TO THE ELEVATION OF THE TEST GAUGE SHALL BE APPLIED BY MEANS OF A PUMP CONNECTED TO THE PIPE. THE PUMP, PIPE, PIPE CONNECTION AND ALL NECESSARY APPARATUS, INCLUDING GAUGES AND METERS SHALL BE FURNISHED BY THE CONTRACTOR. BEFORE APPLYING THE SPECIFIED TEST PRESSURE, AIR SHALL BE EXPELLED COMPLETELY FROM THE TEST SECTION. IF PERMANENT AIR-RELEASE VALVES ARE NOT LOCATED AT ALL HIGH POINTS, THE CONTRACTOR SHALL INSTALL CORPORATION COCKS AT ALL POINTS SO THAT THE AIR CAN BE EXPELLED AS THE SECTION IS FILLED WITH WATER. AFTER ALL THE AIR HAS BEEN EXPELLED, THE CORPORATION COCKS SHALL BE CLOSED AND THE TEST PRESSURE APPLIED. AT THE CONCLUSION OF THE PRESSURE TEST THE CORPORATION COCKS SHALL BE REMOVED AND PLUGGED.
  - b. ANY EXPOSED PIPE, FITTINGS, VALVES, AND JOINTS SHALL BE EXAMINED CAREFULLY DURING THE TEST. ANY DAMAGED OR DEFECTIVE PIPE, FITTINGS, VALVES, OR JOINTS THAT ARE DISCOVERED FOLLOWING THE PRESSURE TEST SHALL BE REPAIRED OR REPLACED WITH SOUND MATERIAL AND THE TEST SHALL BE REPEATED UNTIL IT PASSES.
  - c. PRESSURE TEST SHALL BE MAINTAINED FOR A MINIMUM OF TWO (2) HOURS.
- 5 LEAKAGE TEST
  - a. AFTER THE COMPLETION OF THE PRESSURE TEST, A LEAKAGE TEST SHALL BE CONDUCTED TO DETERMINE THE QUANTITY OF WATER LOST BY LEADAGE UNDER THE SPECIFIED TEST PRESSURE. LEAKAGE SHALL BE DEFINED AS THE QUANTITY OF WATER THAT MUST BE SUPPLIED INTO THE NEWLY LAID PIPE OR ANY VALVED SECTION THEREOF TO MAINTAIN PRESSURE WITHIN 5 PSI OF THE SPECIFIED TEST PRESSURE. AFTER THE PIPE HAS BEEN FILLED WITH WATER AND THE AIR HAS BEEN EXPELLED.
  - b. LEAKAGE SHALL NOT BE MEASURED BY A DROP IN PRESSURE IN A TEST SECTION OVER A PERIOD OF TIME.
- 6 TEST ALL TRACER WIRES TO CONFIRM CONTINUITY.

D. MANHOLES

- 1 ALL MANHOLE VACUUM TESTS SHALL BE CONDUCTED IN THE PRESENCE OF A REPRESENTATIVE OF THE MCRSD AND IN ACCORDANCE WITH ASTM C-1244, STANDARD TEST METHOD FOR CONCRETE SEWER MANHOLES BY NEGATIVE AIR PRESSURE (VACUUM) TEST.
- 2 100% OF ALL MANHOLES SHALL BE TESTED.
- 3 THE VACUUM TEST EQUIPMENT SHALL CONSIST OF INFLATABLE PLUGS FOR ALL INCOMING AND OUTGOING SEWER LINES, AN INFLATABLE TEST COLLAR TO SEAL THE MANHOLE AT THE MANHOLE FRAME, AND A VACUUM PUMP. A VACUUM LIQUID FILLED GAUGE SHALL BE LOCATED IN-LINE BETWEEN THE TEST COLLAR AND THE PUMP TO ACCURATELY INDICATE THE VACUUM IN INCHES OF MERCURY WITHIN THE MANHOLE. THE VACUUM GAUGE SHALL HAVE A MINIMUM OF 3.5 INCH DIAMETER FACE AND A RANGE TO NO MORE THAN THIRTY (30) INCHES OF MERCURY, WITH SCALE MARKINGS OF NO GREATER THAN ONE-HALF (1/2) INCH OF MERCURY VACUUM AND AN ACCURACY TO WITHIN ± TWO PERCENT (2%) OF TRUE VACUUM.

REVISIONS			
NO.	DATE	DESCRIPTION	BY



RECOMMENDED FOR APPROVAL	<i>Amy R. Moore</i>	08/21/2019
DESIGNED: LMY	DRAWN: KDK	DATE
CHECKED: ARM	CHECKED: ARM	

HORIZONTAL SCALE	
AS NOTED	
VERTICAL SCALE	
AS NOTED	
SHEETS	
12	of 12
PROJECT	
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MONTGOMERY COUNTY SEWER DISTRICT

SPECIFICATIONS