

**HOLLAND BOARD OF PUBLIC WORKS (HBPW)**  
**SPECIFICATION**  
**FOR**  
**SANITARY SEWER COLLECTION SYSTEMS – 33 30 00**

HBPW:MJG

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6-25-2021

**PART 1 - DESCRIPTION**

**1.1 SUMMARY**

- A. Section includes furnishing and installing pipe, appurtenances and accessories for gravity sanitary sewer collection systems including bypass pumping, pressure testing, CCTV inspection, the removal / abandonment of pipe, manholes and appurtenances. All work shall conform to the MDOT 2020 Standard Specifications for Construction as modified by the HBPW. Non-itemized work will not be paid for separately.

**1.2 MISCELLANEOUS**

- A. Record and provide actual locations of mains, wye connections from downstream structure, structure locations, structure rim and invert elevations (to USGS datum) and cut depth of lateral riser. Identify, describe, record and provide unexpected subsoil conditions and uncharted utilities.
- B. Indicate special construction methods required.

**PART 2 - MATERIALS**

**2.1 PIPE**

- A. Sanitary Sewer Main shall conform to ASTM F679 PS-115 or ANSI/ASTM D3034 SDR 26 Poly/Vinyl Chloride (PVC) material; bell and spigot style joints with elastomeric seal in accordance with ASTM D3212.
- B. Sanitary Sewer Laterals shall conform to ASTM D3034 SDR 26 and shall be push-on type with premium rubber gasket.

**2.2 ACCESSORIES**

- A. In-line fittings shall be same material as pipe. Saddle fittings will not be permitted for new pipeline construction.
- B. Connections to existing sewers shall be made using solid couplings. Fernco Strong Back RC Series Repair Couplings may be used at the discretion of the HBPW.
- C. Taps into existing sewers shall be Romac Style CB Saddle or HBPW approved equal.

**2.3 STRUCTURES AND CASTINGS**

- A. Structures
  - 1. Pre-cast, leak-tight units in accordance with ASTM C478 revised to include 5" wall thickness, depth as indicated,
  - 2. All precast structures shall have Xypex Bio-San C500 added to the concrete of the individual structures

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3. Cylindrical, 48" minimum clear inside diameter concentric shaft with integrally cast base,
4. Eccentric cone with minimum 32" height, concentric corbel is optional,
5. External bituminous coating,
6. Lipped male/female joints with synthetic gaskets according to ASTM C923,
7. Sleeved to receive pipe sections as required,
8. Constructed without steps,
9. Pipe Entrance Joints shall be flexible core and seal boot, Press-Seal Gasket Corporation PSX or HBPW approved equal.

### B. Covers and Frames

1. Conform to ASTM A48 Class 35B gray iron construction tar emulsion coated,
2. Provide for a minimum clear opening of 24",
3. Watertight gasketed seal, 4. Covers:
  - a. EJ 1040 AGS or HBPW approved equal,
  - b. "SANITARY SEWER" cast into the top surface in 2" raised letters,
  - c. Heavy-duty traffic rated with epic pick slot,
  - d. OFF-ROAD EJ 1040APTGS or HBPW approved equal per MDEQ requirements. Pressure-tight, 4 hex-head ½" stainless steel watertight bolts & washers.
5. Frames
  - a. EJ 1045Z or HBPW approved equal. Low profile frames (EJ 1046Z) may only be used at the discretion of the HBPW.

### C. Adjustment Rings

1. Height shall equal the distance between the bottom of the frame and the top of the cone section of the structure,
2. Inside diameter shall not be less than 24",
3. Outside diameter shall not be less than the outside diameter of the base flange of the structure frame,
4. Contain no less than ½" and no more than 3" of rubber composite adjustment riser (EJ Infra-Riser or HBPW and City of Holland approved equal) installed per manufacturer's recommendations, installed immediately below frame,
5. Additional rings shall be pre-cast concrete with 2 strands of radial steel,
6. Wherever possible, pre-cast concrete material shall be separated from iron material and other pre-cast concrete material by rubber composite adjustment risers.

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7. Maximum adjustment height of all rings to be 18", measured from bottom of frame to top of precast cone.
8. Maximum of 3 precast adjustment rings allowed.
9. Adjustment rings and frame ring to be backfilled with concrete, min 3,500 psi, from precast top to bottom of HMA base course.
10. Sealant between adjacent adjusting rings and casting shall be AV-202 available at Grand Valley Concrete.

### 2.4 SUBMITTALS

- A. Provide product data on all materials, appurtenances and accessories.
- B. Provide written verifiable proof that all sewer pipe used has been manufactured by an entity with at least 5 years of experience in producing the product.
- C. Submit 2 copies of product ASTM certification.

### 2.5 MISCELLANEOUS

- A. Abandon mains and structures using "Flowable Fill" (lean concrete).
- B. Mortars shall comply with MDOT Specifications. Also, no mortar mixed for more than 30 minutes shall be used. When outside temperature is equal to or less than 32 degrees F, no mortar shall be mixed without first heating the sand and water.

## PART 3 - CONSTRUCTION

### 3.1 GENERAL

- A. Bypass Pumping
  1. Bypass pumping shall not be paid for separately. Where existing sewage flows cannot be maintained through the existing piping system, the Contractor shall bypass all sewage around the section or sections of sewer to be reconstructed,
  2. Bypass pumping shall be accomplished by temporarily plugging an existing upstream structure and pumping the sewage into a downstream structure or separate system beyond the limits of the construction activity. The pump and bypass line shall be of adequate size to accommodate the flow, even in wet weather conditions,
  3. The Contractor shall either:
    - a. Temporarily reconnect the sewer at the end of each work day **(PREFERRED)**, or
    - b. Provide a redundant pumping system including, but not limited to, a second pump capable of handling the flow at the upstream structure. The

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Contractor shall continuously monitor the level of sewage in the upstream structure and replace or reinforce the pump if it is not meeting demand.

### 3.2 PIPE

- A. All removal work shall be scheduled to maintain service,
- B. Install pipe, fittings, and accessories in accordance with MDOT specifications and manufacturer's instructions. Seal joints watertight,
- C. Minimum pipe sections shall be no less than 8',
- D. No deflection may be achieved at the joints. Pipe may be deflected by longitudinal bending only in accordance with *Table 1*,
- E. Lay pipe to indicated gradients with maximum variation of 1/64" in 10',
- F. Excavation around existing structures shall extend around entire perimeter to minimize excavation differential to 6',
- G. Pipe shall be installed at slopes in accordance with the most recent edition of the Recommended Standards for Wastewater Facilities (Ten States Standards), H. Building Connections
  - 1. Building lead risers shall be installed at a nominal depth of 10' unless otherwise authorized by the HBPW. All risers installed without building leads shall include a HBPW approved plug,
  - 2. Building leads shall terminate (with approved plug) at the property line or easement line, unless otherwise noted, at a nominal depth of 10',
  - 3. Risers and/or building leads shall be marked with 2"x2"x12' hardwood markers, placed vertically at the end of the pipe, painted a fluorescent color and 2'x3/8" diameter rebar placed 1' below grade,
  - 4. Without exception, wye must be aligned with the flow in the sewer main.
  - 5. All homes with municipal wastewater service must be reconnected to the wastewater main regardless of indication on plans.
  - 6. Laterals connecting to mains 18 inches in diameter and larger shall have a backflow prevention device installed at the ROW line.
- I. Protect pipe and aggregate cover from damage or displacement until backfilling operation is in progress. If any portion of the new pipe is damaged, the pipe shall be replaced back to the nearest upstream structure unless otherwise directed by the engineer.

### 3.3 STRUCTURES

- A. Existing steps shall be cut flush to the inside structure wall and patched with mortar, or coat the exposed steel with mastic.
- B. Lift holes shall be filled with mortar,
- C. Seal joints with external frame & joint seal,

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- D. Place ready mix concrete collar (3,500 psi min) a minimum of 6" thick around entire circumference of structure. Collar shall extend from the bottom of the base course of HMA to a minimum of 6" below the bottom of the last adjustment ring,
- E. Bench and Channel
  - 1. Structures with elevated inverts shall have bench ramped approximately 6" in height to prevent splashing erosion,
  - 2. Channels shall be constructed to create the least amount of turbulence. Any portion of the existing structure that will interfere with such construction shall be removed,
  - 3. Concrete channels formed inside precast flexible joint structures shall be placed so as not to interfere with the flexibility of the joint. The channel shall be constructed the same size as the inside diameter of the existing pipe,
  - 4. At no time is any of the material used for constructing the bench and channel to enter the pipe. If construction material should enter the sewer, it is to be removed immediately and not allowed to continue down the sewer,
  - 5. Pipe shall not extend into a structure beyond the inside face of the structure wall as measured at the springline of the pipe. Field cutting of pipe to be used at structures shall be performed in a neat and workmanlike manner. Exposed ends of reinforcing steel shall be cut flush with the pipe end.
- F. Structure frame adjustment
  - 1. Total height of adjustment rings may not exceed 18",
  - 2. Two beads of AV-202 sealant shall be placed between the precast structure and adjusting rings, between all individual adjusting rings, and between the final adjusting ring and the iron frame.
  - 3. All surface structures outside paved areas shall be set to the plan elevation of 0.20' above the adjacent ground.

### 3.4 SANITARY MANHOLE ABANDONMENT

- A. Manhole Abandonment (Live or CIPP Lined)
  - 1. Contractor shall sawcut, and excavate an area no greater than 7'x7' and make ready the manhole for abandonment by removing any standing water present in manhole by whatever means necessary, place filter fabric over the pipe in the bottom of the manhole, pour 3500 psi concrete collar to a depth of 6-inches above the top of the pipe, and backfill with Class II sand compacted to 95% of maximum density.

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2. When abandoning live manholes Contractor shall place PVC SDR 26 pipe matching the diameter of the mainline sewer pipe over the entire length of the flow channel.
3. Existing sanitary manholes to be abandoned in accordance with MDOT 2020 Standard Specifications for Construction, Section 203.03A
4. Contractor shall remove existing lids and castings and deliver them to the HBPW Service Center for disposal.
5. Contractor shall remove and dispose of all concrete from the manhole abandoning process.

### 3.5 SANITARY SEWER MAIN TESTING AND CCTV INSPECTION

#### A. Air Testing Method Procedures

1. The section of sewer to be tested shall have been trench backfilled and cleared. Pneumatic plugs (having a sealing length equal to or greater than the diameter of the pipe to be tested) placed in both ends of the pipe to be tested shall be inflated to 25 psi. The sealed sewer pipe shall then be pressurized to
  - a.  $4.5 \text{ psi} + \text{the average height, in feet, of the water table over the sewer pipe} \times 0.433$  and allowed to stabilize for at least 2 minutes.
2. After the stabilization period, the line shall be pressurized to
  - a.  $3.5 \text{ psi} + \text{the average height, in feet, of the water table over the sewer pipe} \times 0.433$  and the time, in minutes, for pressure to drop 0.5 psi is measured.
3. Air testing techniques shall be in accordance with the latest ASTM standard practice for testing sewer lines by low-pressure air test method for the appropriate pipe material,
4. Air leakage test results shall not be less than the time per inch of pipe diameter per length of sewer pipe as specified in Table 2 of UNI-B-6-98.

#### B. Deflection Testing for Flexible Thermoplastic Pipes:

1. The pipeline shall be tested for excess deflecting by pulling a “go/no go” mandrel through the pipe from structure to structure. The mandrel shall be sized in accordance with article 4, below, and as specified in the Special Provisions. A

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- “deflectometer” may also be used to check the record deflection. Test shall not occur sooner than 30 days after installation,
2. Wherever possible and practical, the testing shall initiate at the downstream lines and proceed toward the upstream lines,
  3. Where deflection is found to be in excess of Allowable Testing Limits, the Contractor shall excavate to the point of excess deflection and carefully compact around the point where excess deflection was found. The line shall then be retested for deflection. However, should after the initial testing the deflected pipe fail to return to the original inside diameter size, the line shall be replaced back to the upstream structure,
  4. Deflection Limits for Thermoplastic Pipes (*See also Table 1*):

- a. Deflection of Polyvinyl Chloride (PVC) pipe shall not exceed five percent (5%) of the “Base ID” (Internal Diameter) of the pipe. “Base ID” shall be calculated in accordance with the following:

$$\text{Average ID} = \text{Average OD} - 2(1.06)t$$
$$\text{Tolerance Package} = (A^2 + B^2 + B^2 + C^2)^{1/2}$$

Where:

A=OD Tolerance (ASTM D3034)

B=Excess Wall Thickness Tolerance = 0.06t

C=Out-of-Roundness Tolerance = 0.015(Average OD)

T=Minimum Wall Thickness (ASTM D3034)

5. The mandrel shall be hand pulled by the Contractor through the sewer lines and witnessed by HBPW Personnel. Schedule testing with HBPW personnel a minimum of 72 hours in advance,
  6. Any sections of the sewer not passing the mandrel test shall be uncovered and the pipe replaced as necessary. The Contractor shall, at no charge, replace and compact the backfill material to the satisfaction of the HBPW,
  7. The repaired section shall be retested with the go/no-go mandrel until it meets HBPW standards and specifications.
- C. Post-Construction Closed-Circuit Television (CCTV) Inspection:
1. The Contractor shall be responsible for coordinating and conducting all CCTV inspections of the public sanitary sewer lines installed during the project,
  2. The Contractor shall make ready the sewer for CCTV by jetting the pipe and vacuuming all sand and debris. Inspection may not occur during curb, ADA ramp or HMA placement,

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3. The Contractor shall provide documentation showing the software to be used for the inspection is both National Association of Sewer Services Companies (NASSCO) and PACP certified and that the operator(s) certification conducting the inspection is current and up-to-date,
4. CCTV shall be completed and the system approved by the HBPW, Utility Owner or Representative before any permanent structures or HMA is placed within 15' of the installed sewers,
5. CCTV shall only be performed in the presence of the Contractor, the HBPW, Utility Owner or Representative. One copy of the CCTV reports and video will be turned over to each of the above parties.
6. The Contractor shall bear the cost of post construction CCTV. HBPW reserves the right to recover all costs associated with additional CCTV if inadequate post construction CCTV is provided.
7. The CCTV reports and video will be used by the HBPW, Utility Owner or Representative to evaluate the pipe for conformance with these specifications. Any non-conformance noted by the HBPW, Utility Owner or Representative shall be corrected and new reports and video generated, all at the Contractor's expense.
8. The digital video files shall be recorded in MPEG file format by a certified PACP operator and in Granite XP or the CCTV contractor shall provide the method by which to upload the PACP inspection into HBPW Granite XP program. All CCTV inspections shall include the standard PACP mandatory fields. In addition the following fields shall also be included in the inspection report:
  - a. Field 13 – Upstream Rim to Invert
  - b. Field 17 – Downstream Rim to Invert
  - c. Field 28 – Pipe Joint Lengths
  - d. Field 38 – Location Code
  - e. Field 39 – Additional Info (Condition Rating and Inspector)
  - f. Field 41 – Project (Number)
  - g. HBPW reserves the right to recover all costs associated with additional CCTV if inadequate CCTV is provided.



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**TABLE 1: PERMISSIBLE DEFLECTIONS IN PUSH-ON JOINT PVC PIPE**

Size (in)	Approximate Radius of Curve Produced by Bending of Pipe (ft.)	Approximate Deflection Produced by Longitudinal Bending of Pipe (in)	
		14'	20'
	All Lengths		
8	200	5	12
10	250	4	9
12	300	3	8

**END OF SECTION**