

**CITY OF BAY CITY
SPECIAL PROVISION
FOR
SEWER**

BAY CITY:RLP

1 of 14

12/10/19

DESCRIPTION

This work consists of constructing sanitary and storm sewers, including; installation and repair of mainline pipe, service leads, and cleanouts for combined, storm, and dedicated sanitary sewer pipes and structures. Work includes excavation, bedding, backfill, adjusting structures, and all required system testing. Perform work in accordance with this Special Provision and the contract documents.

SUBMITTALS

The Contractor shall submit shop drawings or certificates of compliance to the Engineer prior to construction of that item, leaving time for Engineer's review and approval and fabrication of the material needed for the following items:

- A. Pipe, fittings, and joint material.
- B. Manholes and manhole adjusting rings and castings.
- C. Pipe bedding and backfill material.
- D. Specialty items and other items specified in the contract documents.

MATERIALS

PIPE

Sewer pipe shall be PVC SDR 26 meeting ASTM D3034 requirements, unless a different material is specified in the contract plans. The pipe joint shall be rubber gasket joint meeting ASTM 03212. The latest revision of ASTM, AWWA or AASHTO Specifications shall apply. Round concrete storm sewer pipe shall be reinforced concrete with premium joint meeting ASTM C-76 as specified. Concrete storm sewer pipe joint wrapping fabric shall meet ASTM D4632, D4533, D6241, D4751, D4491, and D4355.

STRUCTURES

Provide materials for sanitary sewer and combined sewer structures, and as detailed on the plans. Structures shall be supplied by Northern Concrete Pipe, Inc. (NCP) and constructed as precast reinforced concrete units in accordance with the contract. All openings shall be cored prior to delivery on site, and joints shall be sealed with Core & Seal gaskets or concrete manhole adapters (CMA), as specified in the contract documents, or as directed by Engineer. All new sanitary structures shall be constructed with flow channels and core and seal fittings. Existing structures in the system that will be utilized shall be circular core-cut, with approved gaskets used such as CMAs (concrete manhole adapters), or core and seal gaskets. Concrete storm sewer manholes shall meet ASTM C-478 standards. Chimneys shall be constructed as precast reinforced concrete units in accordance with the contract documents. All catch basins shall be 48" concrete in diameter. All basin leads must tie into mainline storm sewer manholes. If a trap is necessary, use SDR26 tee fitting with stub through the basin structure.

STRUCTURE OVER SEWER

Provide materials for sanitary sewer and combined sewer manholes, as detailed on the

plans for standard sanitary sewer manholes.

STRUCTURE FRAMES AND COVERS

Castings shall be fabricated by EJ and manufactured from iron conforming to ASTM A48, Class 35B of AASHTO M306. Manhole frames and covers will be E.J. 1040 Z Frame with solid 1040 A cover. Catch basin inlet frames and covers will be E.J. 7045 with T-1 back and M1 grate. The 7045 catch basin inlet frame must also have the fish logo and drains to river on the front of the frame. Other approved E.J. castings are: 5100 Z frame, 5100 Z frame 4", 7000 Z frame T-1 M1 grate and 5105 M3 ADA grate. The frame opening shall be a minimum of 24 inch diameter.

CEMENT MORTAR

Provide non-shrink cement mortar that conforms to Construction Type R-2 Mortar.

PIPE BEDDING AND BACKFILL

Use 6AA for bedding. Provide MDOT Class II granular material for backfill.

CLEANOUT ASSEMBLY WITH COVER

Provide PVC SDR 26 cleanout assembly with concrete slab surround, as detailed on the Plans. Provide cleanout frame and cover by EJ, Style V-8513, or Engineer approved equal.

CONSTRUCTION

Perform construction, excavation, pipe installation and backfill in accordance with this Special Provision and contract documents.

DEWATERING

Perform dewatering required to keep the excavation clear of groundwater, sewage or storm water during the progress of the work, and until the finished work is safe from injury. Where the excavation is wet sand, and suitable construction conditions cannot be obtained by other methods, the Contractor shall install and operate a pumping system connected with well points, so as to drain the same effectually. Inflated mechanical plugs may be used to control upstream flow during storm sewer installation. No masonry or pipe shall be laid in water and water shall not be allowed to rise over masonry until concrete or mortar has set at least 48 hours. All water pumped or drained from the work shall be disposed of in a manner satisfactory to the Owner without damage to adjacent property or to other work under construction. Necessary precautions shall be taken to protect all construction against flooding.

PIPE INSTALLATION

Handling Pipe & Fittings

Unload all pipes and castings and distribute in such manner and with such care as will effectually avoid damage to any pipe or fitting. Dropping pipe or fittings directly from the truck will not be permitted. Care must also be taken to prevent abrasion of the pipe.

Placement of Pipe

Check each pipe for defects prior to being lowered into the trench. The inside of the pipe and the outside of the spigot shall be cleaned of any dirt or foreign matter.

Begin construction at the outlet end and proceed upgrade with spigot ends pointing in the direction of flow. Concrete storm sewer pipe joints must be wrapped with fabric during installation in accordance with the material specifications in this special provision.

Install 6AA bedding beneath the pipe, at a minimum depth specified in the contract documents. Backfill with 6A to a minimum of 4 inches above the outside of the pipe, or as specified in the contract documents.

Pipes shall be centered in bells or grooves and pushed tight together to form a smooth and continuous invert. After laying pipe, care shall be taken so as not to disturb its line and grade. Any pipe found off grade or out of line shall be re-laid properly by the Contractor.

Potential damage can occur to exterior walls of PVC pipe, particularly under cold weather conditions, if rocks, frozen material, or large objects strike the pipe.

Avoid dumping any materials onto the pipe, other than approved bedding sand or stone on the pipe, until a minimum 12-inch cover is placed over the pipe.

Pipe walls and joints shall also be protected from abrasion and damage during handling, and shall be fully checked just prior to placing in the trench.

Care shall be taken during bedding compaction to avoid distorting the shape of the pipe or damaging its exterior wall.

Cutting of pipe where required, shall be performed using tools or equipment that will provide a neat, perpendicular cut without damage to the pipe material.

Bowing or warping of pipe can occur with temperature fluctuations. The Contractor shall store and protect the pipe to minimize bowing. Nominal 12' - 6" pipe lengths that have deviations from straight greater than one (1) inch shall not be used.

Line and Grade

Lay all pipe to the line and grade called for on the drawings. Each pipe, as laid, shall be checked by the Contractor with line and grade pole or other device to insure this result is obtained. The finished work shall be straight and shall be sighted through the pipe between structures.

Concrete Cradle for Pipe

Where called for on the drawings, or otherwise required, pipe shall be installed with a concrete cradle of MDOT Grade S3 concrete.

Each pipe shall rest on a six (6)-inch minimum thickness bed of dry mix concrete that is shaped to fit the bottom of the pipe. The dry mix concrete shall be MDOT Grade S3.

After setting the pipe, the space between the outside of the pipe and the undisturbed trench bank shall be filled to a level equal to a point 1/3 of the diameter above the pipe invert with MDOT Grade S3 concrete.

The concrete shall have a five (5) inch slump and be mechanically vibrated to insure complete filling of the annular space between the excavated face of the original ground and the outside face of the pipe.

Jointing

Where pipe is laid in wet trenches, trenches with running sand, or in trench conditions where manual means will not allow pushing the pipe home, the Contractor shall provide and use mechanical means for pulling the pipe home and holding the pipe joints tight until completion of the line.

Mechanical means shall consist of a cable placed inside the pipe with a suitable winch, jack, or come-along for pulling the pipe home and holding the pipe in position.

All joints on pipe thirty-six (36) inches and larger shall be cement mortar pointed on the inside. On bituminous mastic joints the compound shall be removed to a depth of three-quarters (3/4) of an inch from the inside of the joint before pointing.

CONNECTIONS

Wyes and Risers

Wye branches, tees, or stubs fitted with suitable stoppers shall be set for each lot shown, and at such other points as called for on the drawings.

Risers shall be six (6) inch pipe and shall be constructed where shown on the drawings. They shall connect to wye branches and shall be constructed as shown on the Owner's standard detail sheet to a depth of six (6) feet below the surface of the ground unless otherwise instructed by the Engineer.

A pipe stopper shall be placed in the top bell. Fittings and stoppers shall be equipped with the allowable type of joint used on the sewer. Backfill at all risers shall be carefully placed and tamped sufficiently to insure against damage from backfill settlement.

Service Connections

The Contractor shall construct service connections as shown on the drawings. A pipe stopper shall be placed in the end of the connection. Pipe and stopper shall be equipped with the allowable type of joint used on the sewer.

The invert of the service connections at the point of terminus shall be a minimum of ten (10) feet below grade at the property line (for basement service) except where otherwise directed by the Engineer.

The Contractor shall also furnish and place a three (3) inch minimum diameter wood or plastic marking post, three (3) feet in length, to be set directly above the end of the residential/business connection or riser. Each marker shall be set so it will be in a vertical position when backfill is completed. The top of marker shall be six (6) inches below the ground surface.

Sanitary Sewer Taps

For existing storm sewers with plugs or bulkheads, remove plugs or bulkheads without damaging the existing sewer and make watertight joint connections. Take possession and dispose of the removed material.

If tapping an existing pipe, cut a circular opening in the receiving pipe at least 6 inches larger than the outside diameter of the inlet pipe and install a Furnco Tapping Saddle or utilize a Qwik Seal. Insert the inlet pipe and cut flush with the inner wall of the receiving pipe. Repair or replace existing pipe damaged by Contractor tapping operations at no additional cost to the City.

Do not direct tap sewer inlet pipes with outside diameters greater than half the inside diameter of the trunk sewer. Construct a manhole structure for these taps. Obtain the Engineer's approval before using other methods for tapping existing sewers.

MANHOLES

Provide cast-in-place or precast concrete construction for sanitary sewer manholes. Provide structural steel plate, at least ½ inch thick, for temporary lowering of drainage structures that span 72 inch, or less. Ensure plates cover the entire drainage structure with a bearing surface of at least 12 inches. Submit to the Engineer, structural calculations prepared by a professional engineer, licensed in the state of Michigan, for plates that span greater than 72 inches.

Constructing, Adjusting, and Temporary Lowering of Drainage Structures, Precast Manhole Tees, Manhole Bases, and Manhole Risers

- A. Excavation. Excavate for constructing, adjusting, and temporarily lowering drainage structures, precast manhole tees, manhole bases and manhole risers.
- B. Concrete Construction. Construct concrete portions of drainage structures in accordance with above. Do not cast drainage structures if the concrete temperature is above 90 °F.
- C. Placing Brick and Block Masonry. Do not place masonry with mortar when the ambient air temperature is 36 °F or less unless approved by the Engineer. Remove and replace work damaged by frost. Apply a ½-inch thick plaster coat of mortar to the outer surface of structures, and to the inner surface below the outlet flow line on catch basins with traps or sumps. Place the first set of bricks or blocks on a full bed of mortar. Lay brick or block in courses with uniform mortar joints ½ inch thick, ± 1/8 inch. Stagger joints by half the length of the brick or block on adjoining courses. Place courses level unless otherwise required. Strike and point joints so the exposed surface is smooth. Rake joints and wet brick or block before placing the plaster coat. Allow the brick or block surface to dry to provide for proper bonding of the plaster coat. Wet the brick. Allow the brick surface to dry to allow the brick and mortar to bond. Do not use broken or chipped brick on the faces of the structure. Provide a course made of headers, at least every seventh course. Make closures with brick lengths no less than the width of a whole brick.
- D. Precast Reinforced Concrete Units. Use poured-in-place concrete or precast concrete footings. Construct precast reinforced concrete units in accordance with the contract. Seal the joints with mortar in accordance with above or use butyl

rubber sealant that conforms to ASTM C 990. Support precast concrete footings on a 6-inch subbase of compacted granular material Class II.

- E. Steel Reinforcement. Install steel reinforcement.
- F. Inlet and Outlet Pipes. Place and compact backfill around the manhole base or sump to provide bedding for inlet and outlet pipes. Extend inlet and outlet pipes through the outside wall surface of the manhole a sufficient length to allow for pipe connections. Carefully construct masonry around pipes and seal with mortar to prevent leakage.
- G. Backfilling. Backfill in accordance with above. The Contractor may stage backfilling to follow the construction progress of the structure.
- H. Temporary Lowering of Drainage Structures. Lower drainage structures before milling the pavement. Record the location of the structure so each cover can be reinstalled at its original location. Remove the existing frames and covers and match mark them for later identification and placement. Salvage and safely store frames and covers. Repair the existing structure to allow uniform contact of the steel plate to the top of the structure. Place and compact the HMA for patching.
- I. 9. Protection During Construction. Install appropriate inlet protection device in accordance with section 208, when working around drainage structure.

Drainage Structure Covers

Provide and install new covers, including frames and grates, on new or existing structures as required. Place castings on a full mortar bed.

Adjusting Drainage Structure Covers

Adjusting drainage structure covers applies when the new elevation of the cover requires a vertical change of no greater than 6 inches. Immediately before placing the HMA top course or overlay, make final adjustments to drainage structure covers within the HMA pavement section, if only applying one course. Use concrete adjusting rings to obtain proper structure cover grade.

Hold adjusted covers in place. Remove and replace the adjacent pavement, curb, or curb and gutter to match the existing grades or the required new elevations.

Additional Depth of Adjusting Drainage Structures

Additional depth of adjusting drainage structure covers applies when a drainage structure cover is adjusted more than 6 inches from the existing cover elevation due to a change in elevation of the roadway or when alterations to the drainage structure exceed 6 inches regardless of the change in cover elevation. Remove damaged or unsound portions of the structure, as directed by the Engineer, and adjust as required.

Drainage Structure Taps

If tapping an existing drainage structure, cut a circular opening into the receiving structure at least equal to the outside diameter of the inlet pipe plus 6 inches and insert the pipe. Pack a layer of mortar at least 3 inches thick around the inlet pipe and strike smooth with the inner wall of the receiving structure. Repair or replace existing drainage structure damaged by Contractor operations during tapping at no additional cost to the City.

Cleanout

Maintain catch basins, manholes, leaching basins, and inlets installed on the project. Ensure installed catch basins, manholes, leaching basins, and inlets are free of silt, debris, and other deleterious material at the time of final acceptance.

Cleaning Existing Drainage Structures and Leads

Before starting work, the Engineer will determine the condition and will identify the areas on the project that require cleaning of existing drainage structures and leads.

First, clean the downstream drainage structure nearest the trunk sewer and place a temporary bulkhead so the trunk sewer remains clear. Clean upstream drainage structures and leads only after cleaning and bulkheading the downstream drainage structure. Clean the drainage structures, leads, or both, of sand, silt, and debris and prevent further contamination of the leads. Dispose of the waste generated from the drainage structure or drainage structure lead cleanout operation using either Disposal Alternate A, or Disposal Alternate B. If the Contractor suspects the waste generated is contaminated but nonhazardous or is hazardous, the Contractor must notify the Engineer. Immediately notify the Engineer if testing shows the material is a hazardous waste.

Disposal Alternate A.

- A. Solid Waste Phase. Solid waste disposal rules require that the waste have no releasable liquids. Dispose of the solid waste at a Type II landfill. The landfill may require testing before accepting the waste. Provide disposal documentation from the Type II landfill to the Engineer.
- B. Liquid Waste Phase. Dispose of the liquid waste using one of the following options:

Option 1 – Evaporate the liquid waste by use of drying beds, decanting stations, or similar systems that contain the solids during evaporation.

Option 2 – Place liquid waste in a sanitary sewer system with the sanitary sewer owner's approval. Provide a copy of the owner's approval to the Engineer.

Option 3 – Pump the majority of clear liquid from the drainage structure and leads without disturbing the solids. Discharge this clear liquid to:

- 1. A sanitary sewer system with the sanitary sewer owner's approval;
- 2. The curb and gutter such that it re-enters and is completely contained within the storm sewer system and does not enter the waters of the state;
or
- 3. An area of undisturbed, well- vegetated ground at a rate that does not result in excessive ponding, runoff, or soil erosion.

Dispose of the remaining solid and liquid phase as waste using Disposal Alternate A, either Option 1 or Option 2, or Disposal Alternate B.

Disposal Alternate B.

Use a Licensed Liquid Industrial Waste Hauler to transport the waste generated and dispose of it in accordance with 1994 PA 451, Part 121, Liquid Industrial Waste. Provide the Engineer a copy of the transport manifest.

SANITARY SEWER BULKHEADS

A Wing nut style mechanical plug shall be used for pipe bulkheads. At the cities discretion, concrete bulkheads may be utilized using Grade S3 concrete, or brick, or block masonry.

SANITARY SEWER ACCEPTANCE TESTS

General

All sanitary sewers shall be subjected to infiltration, exfiltration or low pressure air tests, or a combination thereof prior to final acceptance by the Owner. All PVC plastic sewers shall be subjected to deflection testing by means of a nine-point deflection test mandrel.

All sanitary sewer acceptance tests shall be performed no sooner than thirty (30) days after the sewer installation is complete.

The Engineer shall be present for all testing operations. If testing is to be done by the Contractor, only properly trained personnel shall be allowed to perform the testing work. If testing is to be done by municipal agency work forces, then the Contractor shall be responsible for coordinating with the construction observer in order to schedule the testing.

Unless the Owner's test standards are more restrictive than the standards shown below, then the test standards shown in this specification shall apply.

In the event that the sewer pipe fails any of the required tests, the Contractor shall be responsible for repairing the pipe and repeating the test until acceptable results are achieved.

The method of testing and measurement shall be approved by the Engineer. The Contractor shall provide all necessary equipment and labor for making the tests and cost of same shall be incidental to the unit price bid for sewer.

Infiltration Test

All sanitary sewers that are over twenty-four (24) inches in diameter shall be subjected to an infiltration test. Also, all sanitary sewers that are twenty-four (24) inches in diameter and smaller and where the ground water level is more than seven (7) feet above the top of the sewer shall be subjected to an infiltration test.

The infiltration rate for all sanitary sewers shall not exceed a maximum of one hundred (100) gallons per inch diameter per mile of sewer per twenty-four (24) hours.

Low Pressure Air Test

All sanitary sewers that are twenty-four (24) inches in diameter or smaller and where the ground water level is seven (7) feet or less above the top of the sewer shall be subjected to a low pressure air test.

The procedure for air testing of sewers shall be as follows:

The sewer line shall be tested in increments between manholes. The line shall be cleaned and plugged at each manhole. Such plugs shall be designed to hold against the test pressure and shall provide an airtight seal. One of the plugs shall have an orifice through which air can be introduced into the sewer. An air supply line shall be connected to the orifice. The supply line shall be fitted with suitable control valves and a pressure gauge for continually measuring the air pressure in the sewer. The pressure gauge shall have a minimum diameter of three and one-half (3-1/2) inches and a range of 0 - 10 PSIG. The gauge shall have minimum divisions of 0-10 PSIG and accuracy of plus or minus(+/-) 0.04 PSIG.

The sewer shall be pressurized to 4 PSIG greater than the greatest back pressure caused by ground water over the top of the sewer pipe. At least two (2) minutes shall be allowed for the air pressure to stabilize between three and one half (3.5) and four (4) PSIG. If necessary, air shall be added to the sewer to maintain a pressure of 3.5 PSIG or greater.

After the stabilization period, the air supply control valve shall be closed so that no more air will enter the sewer. The sewer air pressure shall be noted and timing for the test begun.

The test shall not begin if the air pressure is less than three and one half (3.5) PSIG, or such other pressure as is necessary to compensate for ground water level.

The time required for the air pressure to decrease one (1.0) PSIG during the test shall not be less than the time shown in the following Air Test Tables. The Contractor shall use the appropriate test table based upon the sewer pipe material.

Air Test Table for PVC Pipe
Minimum Specified Time Required for a 1.0 PSIG
Pressure Drop For Size and Length of Pipe Indicated
for Q=0.0015 *

Pipe Dia., Inch	Min. Time (min:sec)	Length for Min. Time, ft.	Time for Longer Length, seconds	Specified Time for Length (L) Shown, imin:sec						
				100 feet	150 feet	200 feet	250 feet	300 feet	350 feet	400 feet
4	3:46	597	0.380 L	3:46	3:46	3:46	3:46	3:46	3:46	3:46
6	5:40	398	0.854 L	5:40	5:40	5:40	5:40	5:40	5:40	5:42
8	7:34	298	1.520 L	7:34	7:34	7:34	7:34	7:36	8:52	10:08
10	9:26	239	2.374 L	9:26	9:26	9:26	9:53	11:52	13:51	15:49
12	11:20	199	3.418 L	11:20	11:20	11:24	14:15	17:05	19:56	22:47
15	14:10	159	5.342 L	14:10	14:10	17:48	22:15	26:42	31:09	35:36
18	17:00	133	7.692 L	17:00	19:13	25:38	32:03	38:27	44:52	51:16
21	19:50	114	10.470	19:50	26:10	34:54	43:37	52:21	61:00	69:48
24	22:40	99	13.674 L	22:47	34:11	45:34	56:58	68:22	79:46	91:10

Note:

Table SA-2 is taken from ASTM F1417 "Standard Test Method for Installation and Acceptance of Plastic Gravity Sewer Lines Using Low Pressure Air Test." ASTM F1417 conforms to Uni-Bell "Recommended Practice for Low Pressure Air Testing of Installed Sewer Pipe" (UNI-8-6-98).

Exfiltration Test

Exfiltration or leakage from the sewer line can be measured by recording the water level drop over a given period of time in a standpipe placed and connected in the upstream manhole.

Exfiltration tests may be substituted for low pressure air tests where approved by the Engineer.

Exfiltration tests will not be allowed where the external water pressure exceeds four (4) feet.

For the purpose of exfiltration testing, the internal water level shall be equal to the external water level plus four (4) feet as measured from the top of the highest pipe in the system being tested.

The maximum total height of water above the invert of the pipe at the lower end shall not exceed sixteen (16) feet. A prospective test that would exceed this sixteen (16) foot limit should not be taken. The line under construction can be broken down into smaller sections such that the maximum head of sixteen (16) feet will not be exceeded.

The maximum exfiltration rate shall be the same as that permitted for the infiltration test.

The exfiltration test procedure is summarized as follows:

All service laterals, stubs and fittings into the sewer line(s) being tested should be properly capped or plugged, and carefully braced to resist the thrust actions developed by the internal water pressure. In preparing the blocking of plugs or end caps, it is extremely important to recognize that the five (5) to ten (10) feet of head in the standpipe will exert considerable thrust against the plugs or caps.

A plug is inserted and tightened in the inlet pipe of the downstream manhole to which the water supply connection is made for filling the pipe.

The upper manhole is plugged and securely tightened for connection to the standpipe. The standpipe is then placed in this manhole and connected to the tapped plug. The standpipe must be capable of handling from five (5) to ten (10) feet of water head to determine the tightness and soundness of the sewer line, as specified and directed by the Engineer.

Water is introduced into the line at the downstream (lower) manhole until the standpipe in the upstream manhole has been completely filled. By filling the line from the lowest level, the air in the line is easily pushed ahead and, finally dispelled through the standpipe at the upper end of the test section. Care should be taken to minimize entrapped air that will give distorted test results. The rate of drop in the standpipe may be quite rapid until the air has been expelled.

After filling with water, the line must be allowed to stand for at least four (4) hours before beginning the test. During this time some water absorption into the manhole structures and sewer pipe will take place. After the water absorption has stabilized, the water level in the standpipe is checked and water added if necessary.

The test is now ready to begin. The drop in the standpipe is measured and recorded over a fifteen (15) minute period. To verify the first results, a second fifteen (15) minute test is suggested.

The measured drops in the standpipe are converted to leakage in terms of gallons per inch diameter per mile per day.

Another commonly used method of conducting water exfiltration testing is to utilize the manhole in lieu of a standpipe. The test procedure is exactly as outlined for using the standpipe. However, since the manhole is larger in diameter than the standpipe, this method normally requires a minimum two (2) hour test period in order to be able to record a measurable water level drop. Manhole leakage must also be considered in the leakage rate and test results.

Caution should be taken about conducting exfiltration tests on sewer lines laid on steep grades. Consideration must be given to the downstream portion of the system to prevent excessive pressures in these lower lines. For these installations and where the upstream manholes are very deep, it is not advisable to fill the standpipe or manhole to the top when

performing the test.

Deflection Test for Plastic Pipe

The allowable maximum deflection shall be five (5) percent of internal pipe diameter.

A deflection test gauge (Go, No-Go Gauge) as manufactured by Hurco Industries, Cherne Industries, or approved equal, shall be used to verify that the maximum allowable deflection standard is met.

The test gauge must have a minimum of 9 points. Proving rings must be provided to verify the gauge diameter. The gauge must be pulled through manually. Force will not be allowed.

Pipe with deflections greater than five (5) percent will be considered unacceptable and shall be re-laid by the Contractor.

Videotaping

As a means of insuring that pipe laying was properly done and that all joints are in a "home" position, the Contractor shall provide videotaping of all of the pipe laid that is thirty- six (36) inches in diameter and smaller. This videotaping shall be done no sooner than thirty (30) days after sewer installation is complete. The Contractor shall provide twenty- four (24) hours' notice to both the Owner and Engineer prior to videotaping so that a representative may be present. A copy shall be provided to the Engineer.

A satisfactory review of the videotape by the Engineer shall be a condition for sewer acceptance by the Owner.

Typical items to be reviewed on the videotape will include pipe deflection, pipe settlement, lead connections, joints and pipe cleanliness. If the videotape review reveals unsatisfactory conditions, the Contractor shall correct the conditions at his own cost and shall re-videotape the affected pipe sections for review by the Engineer.

MEASUREMENT AND PAYMENT

Pay Item	Pay Unit
Sanitary Sewer, ____ inch, PVC SDR 26, Tr Det _____	Foot
Sanitary Sewer Lead, ____ inch, PVC SDR 26, Tr Det _____	Foot
Sanitary Sewer Bulkhead, ____ inch.....	Each
Sanitary Sewer Tap, ____ inch.....	Each
Sanitary Sewer Manhole with Cover, ____ inch dia.....	Each
Cleanout Assembly with Cover, 6 inch, PVC SDR 26.....	Each
Manhole Over Sewer.....	Lump Sum
Sanitary Sewer Manhole, Add Depth, ____ inch dia, 8 ft to 15 ft..	Foot

The Engineer will measure **Sanitary Sewer, ___ inch, PVC SDR 26, Tr Det ___** and **Sanitary Sewer Lead, ___ inch, PVC SDR 26, Tr Det ___** of the size and trench detail required, in place from center to center of manholes, or from each end of connection point. The cost of all required testing and fittings is included in the cost of the sanitary sewer pipe and will not be paid for separately.

The Engineer will measure **Sanitary Sewer Bulkhead, ___ inch**, per the each based on the size of the pipe being bulkheaded, only for sanitary sewers with a diameter greater than 12 inches. For bulkheads on pipes with a diameter of 12 inches or smaller, the cost will be included in the pay item for abandoning or removing the sewer pipe.

The Engineer will measure **Sanitary Sewer Tap, ___ inch** based on the inlet pipe size required, by each tap into the system. If tapping an existing sewer line using a structure, the Engineer will pay for one sanitary sewer tap in addition to the structure.

The Engineer will measure **Sanitary Sewer Manhole with Cover, ___ inch dia**, with the exception of drop inlets, from the top of the masonry to the top of the concrete footing. The per-each unit price for **Sanitary Sewer Manhole with Cover, ___ inch dia**, includes the cost of concrete footing and no greater than 8 feet of the structure depth. The unit price also includes the cost of temporary or final grade adjustments of the structure and providing the specified frame and cover.

The Engineer will measure **Cleanout Assembly with Cover, 6 inch, PVC SDR 26** per each and includes all required pipe and fittings from the sewer lead to the ground surface and the cleanout assembly cover, per detail on the plans. This work also includes the 24 inch by 24 inch concrete slab surround.

The Lump Sum unit price for **Manhole over Sewer** includes all work required to design and construct the manhole structure over and around the existing combined sewer pipe, including but not limited to: field investigation of existing combined sewer pipe, design of the manhole structure and appurtenances, submitting shop drawings to the Engineer for review and approval, fabricating and constructing the doghouse style manhole structure over and around the existing combined sewer pipe, constructing a concrete base for the manhole structure, furnishing and installing the manhole access riser structure with frame and cover, removal of portions of the existing combined sewer pipe within the new manhole structure, connections into the manhole structure for storm and sanitary outlet pipes with associated flow channels, temporary or final grade adjustments of the manhole riser structure, and all associated earthwork and backfill.

The unit price for **Sanitary Sewer Manhole, Add Depth, ___ dia, 8 ft to 15 ft**, includes the cost of sanitary manhole structure portions greater than 8 feet deep, but no greater than 15 feet deep.

Structure Cover Adjustments and **Service Lead Repairs** will be measured and paid for separately (see applicable Special Provision).

The removal of combined sewer manholes will be paid as **Dr Structure, Rem**, where shown on the drawings and in accordance with Section 203 of the MDOT 2012 Standard

Specifications for Construction. The removal of combined sewer pipe will be paid as **Sewer, Rem, Less than 24 inch** and **Sewer, Rem, 24 inch to 48 inch**, based on size of the pipe being removed, where shown on the drawings and in accordance with Section 203 of the MDOT 2012 Standard Specifications for Construction.