## SANITARY SEWERS

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- B. CENTRIFUGALLY CAST FIBERGLASS REINFORCED POLYMER MORTAR PIPE (CCFRPM) - 18" to 104" Gravity Pipe
- C. SOLID WALL POLYVINYL CHLORIDE (PVC) - 8" to 60" Gravity Pipe
- D. REINFORCED CONCRETE PIPE (RCP) - 48" to 144" Gravity Pipe
- E. POLYPROPYLENE (PP) - 12" to 42" Gravity Pipe
- F. POLYVINYL CHLORIDE (PVC) - 4" to 60" Pressure Pipe
- G. OTHER SEWER PIPE
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CHAPTER 22
SANITARY SEWERS

22.00 GENERAL

The Work covered in this chapter shall include the installation of sanitary sewers and their appurtenances.

A. REFERENCED STANDARDS

2. ASTM C76 – Standard Specification for Reinforced Concrete Culvert, Storm Drain, and Sewer Pipe
3. ASTM C361 – Standard Specification for Reinforced Concrete Low-Head Pressure Pipe
11. ASTM C900 – Standard Test Method for Pullout Strength of Hardened Concrete
14. ASTM C969 – Standard Practice for Infiltration and Exfiltration Acceptance Testing of Installed Precast Concrete Pipe Sewer Lines
16. ASTM C1103 – Standard Practice for Joint Acceptance Testing of Installed Precast Concrete Pipe Sewer Lines
22.00 GENERAL (Continued)

A. REFERENCED STANDARDS (Continued)


18. ASTM C1244 – Standard Test Method for Concrete Sewer Manholes by the Negative Air Pressure (Vacuum) Test Prior to Backfill


23. ASTM D3034 – Standard Specification for Type PSM Poly (Vinyl Chloride) (PVC) Sewer Pipe and Fittings


27. ASTM D3575 – Standard Test methods for Flexible Cellular Materials Made From Olefin Polymers


29. ASTM D3753 – Glass-Fiber Reinforced Polyester Manholes and Wetwells


32. ASTM F1417 – Standard Practice for Installation Acceptance of Plastic Non-pressure Sewer Lines Using Low-Pressure Air

33. ASTM F2764 – Standard Specification for 6 to 60 in. [150 to 1500 mm] Polypropylene (PP) Corrugated Double and Triple Wall Pipe and Fittings for Non-Pressure Sanitary Sewer Applications
22.00 GENERAL (Continued)

A. REFERENCED STANDARDS (Continued)

34. ASTM F477 – Standard Specification for Elastomeric Seals (Gaskets) for Joining Plastic Pipe


38. AWWA C900 – Polyvinyl Chloride (PVC) Pressure Pipe and Fabricated Fittings, 4 In. Through 60 In. (100 mm Through 1,500 mm)

22.01 MATERIALS

The materials listed in this article are approved for use in the City of Lincoln pursuant to the Standard Specifications described herein. Developers, consultants, and Contractors may request consideration of alternate materials to the Director of the Transportation and Utilities Department. Only one type of pipe shall be used between manholes on each project unless specifically called for on the plans or authorized by the City’s Project Manager.

A. VITRIFIED CLAY PIPE (VCP) - 8" to 48" Gravity Pipe


2. Compression Joints:  ASTM C425, polyester or polyurethane material factory applied to both the bell and spigot or plain end of every pipe.

B. CENTRIFUGALLY CAST FIBERGLASS REINFORCED POLYMER MORTAR PIPE (CCFRPM) - 18" to 104" Gravity Pipe


2. Pipe Joints:  ASTM D4161, field connected with fiberglass sleeve couplings that utilize elastomeric sealing gaskets as the sole means to maintain joint water tightness.

3. Elastomeric Gaskets:  ASTM F477, supplied by qualified gasket manufacturers and be suitable for the service intended.

C. SOLID WALL POLYVINYL CHLORIDE (PVC) - 8" to 60" Gravity Pipe

1. Pipe and Fittings 15 IN and smaller: ASTM D3034, DR 35 minimum.

2. Pipe and Fittings 18 IN through 60 IN:  ASTM F679.


4. Laying Lengths:  All pipe shall be furnished in standard laying lengths.
D. REINFORCED CONCRETE PIPE (RCP) - 48" to 144" Gravity Pipe

1. Certification:
   Manufactured by a plant certified under the American Concrete Pipe Association’s (ACPA) “Quality Cast” Plant Certification Program. All RCP delivered to the jobsite shall be stamped with the “Q-Cast” certification stamp.

2. Pipe:
   a. ASTM Designation C76 or C-655 as specified on the plans or Special Provisions, except as herein provided.
   b. Circular in cross-section.
   c. The coarse aggregate used in the manufacture of the RCP shall conform to the requirements of Article 11.01.
   d. All RCP shall have an antimicrobial admixture: 1 gallon per cubic yard of concrete of ConShield® by Conshield Technologies Inc. Additive shall be included in the concrete mix design as part of the total water content. The additive shall be added to the concrete mix water to ensure even distribution throughout the concrete mixture.

3. Pipe Joints: ASTM C361 and ASTM C1619. Elastomeric seal shall be Class B.
   a. Joints shall be water tight with no visible water leaking or weeping from the joint.

4. Laying Lengths: All pipe shall be furnished in standard laying lengths.

5. Lifting holes will not be allowed.

E. POLYPROPYLENE (PP) - 12" to 42" Gravity Pipe

1. Pipe and Fittings 12 IN through 30 IN: dual wall, ASTM F2764, ASTM D2412 minimum PS of 46 pounds/inch/inch.

2. Pipe and Fittings 30 IN through 42 IN: triple wall, ASTM F2764, ASTM D2412 minimum PS of 46 pounds/inch/inch.


4. Laying Lengths: All pipe shall be furnished in standard laying lengths of 13 feet and 20 feet.

F. POLYVINYL CHLORIDE (PVC) - 4" to 60" Pressure Pipe

1. Pipe and Fittings: AWWA C900, ASTM D1784. Pressure class of pipe shall be as indicated in the Contract Documents.


3. Laying Lengths: All pipe shall be furnished in standard laying lengths of 14 feet.
22.01 MATERIALS (Continued)

G. OTHER SEWER PIPE

1. Other sewer pipe material may be authorized only by special permission from Lincoln Wastewater.

H. PRECAST CONCRETE MANHOLE

1. As per the Lincoln Standard Plans.


3. Base:
   a. Integral base with riser wall and base slab cast monolithically as a single unit with benching.
   b. Base consisting of a riser section with a secondary poured integral base slab with benching.

4. Minimum inside dimension of 48 IN.


6. Joint sealants:
   a. Rubber O-ring or profile gasket complying with ASTM C443.
   b. Exterior cold-applied mastic compound recommended by the manufacturer and complying with ASTM C990 or Butyl Sealant Wrap complying with ASTM C877.

7. Manholes on sanitary sewer trunk lines (15 inch or larger pipe) shall have an antimicrobial admixture.
   a. Antimicrobial Admixture: 1 gallon per cubic yard of concrete of ConmicShield® by Conshield Technologies Inc. Additive shall be included in the concrete mix design as part of the total water content. The additive shall be added to the concrete mix water to ensure even distribution throughout the concrete mixture.

I. FIBERGLASS MANHOLE

1. As per the Lincoln Standard Plans.

2. Fiberglass: ASTM D3753. Use resin only from a single manufacturer.

3. Minimum inside dimension of 48 IN.


5. Manhole top: Shall have a fiberglass neck that extends inside grade rings to extend 1 IN past the flat surface of the manhole cone.
22.01 MATERIALS (Continued)

J. ADJUSTING RISERS

1. Reinforced concrete: ASTM C478, risers shall be free from cracks, voids, and other defects.
   a. Use manufacturer’s recommended adhesive.
   b. Use antimicrobial admixture as outlined in 22.01 H7a. if manhole contains the admixture.

   a. Use manufacturer’s recommended adhesive.

3. Adjusting riser shall be approved by City’s Project manager prior to installation.

K. ADJUSTING RINGS

   a. Use manufacturer’s recommended adhesive.

2. Adjusting ring shall be approved by City’s Project Manager prior to installation.

L. EXTERNAL FRAME SEAL

1. Flexible external rubber sleeve: ASTM C 923.

2. Stainless steel compression bands: ASTM F593 and F594, Type 304.

3. External frame seal shall be approved by City’s Project Manager prior to installation.

M. FRAME AND COVER

1. Frame and Cover: ASTM A48/48M, Class 35B.


3. As per the Lincoln Standard Plans.

N. WATERTIGHT FRAME AND COVER

1. To be used in areas prone to flooding, areas adjacent to creeks, and other areas as specified by the City’s Project Manager.

2. Frame and Cover: Heavy Duty, R-1755-F2LM Frost/Watertight LiftMate Frame, Solid Gasketed Lid and Inner Lid, with hinge as manufactured by Neenah Foundry.

3. Furnish unit with manufacturer recommended anchoring system.
22.01 MATERIALS (Continued)

O. WASTEWATER SERVICE PIPE/PRIVATE SEWERS

1. Wastewater service pipe for new or reconstructed sanitary sewer services not owned by the City shall conform to the material requirements as provided in Title 24 of the Lincoln Municipal Code.

P. PIPE CONNECTIONS

1. Flexible watertight connector for pipes to manholes: ASTM C923.

2. Concrete collar for RCP pipe to RCP pipe connections: As per the Lincoln Standard Plans.

3. Connecting dissimilar pipe: ASTM C1173. Stainless steel clamped elastomeric couplings with stainless steel shielding band factory fabricated specifically for the use intended. The following manufacturers are acceptable:
   a. Fernco Strong Back series or equal.

22.02 EXCAVATION, FOUNDATION, BEDDING AND BACKFILL

A. GENERAL

1. Trench excavation methods, pipe foundation materials, pipe bedding materials, pipe backfill materials and methods shall conform to Chapter 20 of these Standard Specifications, except as hereinafter modified for sanitary sewer construction.
22.03 CONNECTING NEW SANITARY TO EXISTING SANITARY

A. TAP EXISTING MANHOLE AND REPLACE INVERT

1. Maintain sewer service at all times.
2. Remove existing manhole channel/invert and bench.
3. Tap shall be core drilled through existing manhole wall. Exceptions to core drilling shall require approval by the City’s Project Manager prior to construction.
4. Install flexible watertight connector into new opening.
5. Insert pipe through flexible connector. Pipe is allowed to penetrate inside wall of structure a maximum of two inches.
6. Reconstruct invert flow channel and bench in existing manhole.

B. CONVERT EXISTING MANHOLE TO DROP MANHOLE

1. Obtain approval from the City’s Project Manager.
2. Construct drop as per the Lincoln Standard Plans.
3. Maintain sewer service at all times.
4. Remove existing manhole channel/invert and bench.
5. Taps shall be core drilled through existing manhole wall. Exceptions to core drilling shall require approval by the City’s Project Manager prior to construction.
6. Install flexible watertight connector into new openings.
7. Insert pipes through flexible connector. Pipe is allowed to penetrate inside wall of structure a maximum of two inches.
8. Install other pipes and fittings for outside drop structure.
9. Place concrete encasement on crushed rock.
10. Reconstruct invert flow channel and bench in existing manhole.

C. CONNECTING DISSIMILAR PIPE

1. Contractor shall connect dissimilar pipe as per 22.01 and per City’s Project Manager approval.
2. Unless specifically designated in the contact documents, connecting dissimilar pipe shall not be paid for separately. The cost of these items shall be considered subsidiary to the other items for which direct payment is made.
22.03 CONNECTING NEW SANITARY TO EXISTING SANITARY (Continued)

D. TEMPORARY SEWER PLUGGING REQUIREMENTS
   1. Install plugs in the appropriate locations of all new sanitary sewers prior to, or during construction, and remove the plugs after construction using approved plugging methods and types to prevent any and all storm runoff, ground water and other foreign material from entering wastewater collection lines.
   2. Check each plug daily and, if required, immediately take corrective action by repairing or replacing the plugs, as applicable to the situation.
   3. Unless specifically designated in the contact documents, temporary sewer plugging shall not be paid for separately. The cost of these items shall be considered subsidiary to the other items for which direct payment is made.

E. MANHOLE REMOVAL
   1. Verify with City’s Project Manager the manhole is not in use.
   2. Excavate as necessary to accomplish the required removal.
   3. Saw cut a true line to separate the pipes from the manhole.
   4. Completely remove and dispose of existing manhole.
   5. Construct concrete sewer plugs by filling the end of the pipes with concrete as per the Lincoln Standard Plans.
   6. Backfill and compact the resulting voids in conformance with Chapter 20 of these Standard Specifications.

F. MANHOLE ABANDONMENT
   1. Verify with City’s Project Manager the manhole is not in use.
   2. Excavate as necessary to accomplish the required removal.
   3. Remove the upper portion of the structure to a minimum of three feet below the proposed finished elevation of the surrounding ground.
   4. Remove all rubble and debris from the remaining portion of the structure.
   5. Fill manhole with approved backfill material, compacted in the abandoned manhole to the densities in conformance with Chapter 20 of these Standard Specifications.
   6. Construct concrete sewer plugs by filling the end of the pipes with concrete as per the Lincoln Standard Plans.
   7. Backfill and compact the resulting voids in conformance with Chapter 20 of these Standard Specifications.
22.03 CONNECTING NEW SANITARY TO EXISTING SANITARY (Continued)

G. BASIS OF PAYMENT

1. Reconstructed manholes built in conformance with these Standard Specifications and accepted by the City’s Project Manager shall be counted and paid for at the contract unit price bid per each for TAP EXISTING MANHOLE AND REPLACE INVERT, or for CONVERT EXISTING MANHOLE TO DROP MANHOLE. Such payment shall be full compensation for all excavation, backfill, materials, equipment, tools, labor and incidentals necessary to complete the Work in accordance with the Contract Documents.

2. Plugging of existing sewer pipes shall be considered subsidiary to other items of Work for which direct payment is made. REMOVE EXISTING SANITARY SEWER MANHOLE shall be counted and paid for at the contract unit price bid per each. FILL AND ABANDON EXISTING MANHOLE shall be counted and paid for at the contract unit price bid per each. Such payments shall be full compensation for all excavation, backfill, materials, equipment, tools, labor and incidentals necessary to complete the Work in accordance with the Contract Documents.

22.04 ABANDONMENT OF SANITARY SEWER MAIN

A. GENERAL

1. Verify with City’s Project Manager the sanitary sewer main is not in use.

2. Excavate as necessary to accomplish the required abandonment.

3. Construct concrete sewer plugs by filling the end of the pipes with concrete as per the Lincoln Standard Plans.

4. All sewer pipes beneath pavement shall be filled with flowable fill as specified in Chapter 3 of these Standard Specifications unless specifically designated otherwise in the contact documents.

B. BASIS OF PAYMENT

1. ABANDONMENT OF SANITARY SEWER MAIN shall be measured and paid for at the contract unit price per cubic yard. Such payment shall be full compensation for all labor, tools, materials, and incidentals necessary to complete the work in accordance with the Contract Documents.
22.05 PIPE INSTALLATION

A. DELIVERY, STORAGE, AND HANDLING OF PRODUCTS

1. Deliver, handle and store products in accordance with the manufacturer’s instructions.
   a. Protect PVC pipe from UV degradation if stored outside for more than the manufacturer’s recommended number of days.

2. Protect pipeline sections stored at the site from damage.

3. Repair or replace any new pipe, fittings, and system appurtenances damaged before or during installation at Contractor’s expense, before proceeding further.
   a. Utilize repair methods as recommended by the manufacturer.
   b. Replace damaged materials as directed by City’s Project Manager.

B. LAYING THE PIPE

1. Excavate trench and provide pipe foundation materials, pipe bedding materials and pipe backfill materials as specified in Chapter 20 of these Standard Specifications.

2. Do not lay pipe in water or on saturated soil or bedding, or allow water to rise in trench around pipe prior to placing backfill material. Provide ground water management as specified in Chapter 20 of these Standard Specifications.

3. Install temporary watertight sewer plugs to prevent trench water, mud, dirt, or other foreign substances from entering the sanitary sewer system.


5. Begin at the lowest point in the line with the bell end pointing upstream.

6. Assemble joints.
   a. Clean joint surfaces to remove soil or foreign material prior to joining pipe.
   b. Assemble joints according to pipe manufacturer’s recommendations.

7. Provide manholes as specified in the Contract Documents. Use a saw to cut ends of pipe flush with inside wall of manholes and structures. Do not use hammer or other means to break pipe.

8. Remove material at the bottom of the trench if determined to be unsuitable by the City’s Project Manager.

9. Grade bottoms of trenches such that when bedding is placed between the trench bottom and the pipe, each section of pipe is installed to the specified depth or elevation with uniform support.

10. Determine and fix alignment and grade or elevation of each pipeline from offset stakes or calibrated laser instruments.

11. Calculate required elevation of each pipe joint and survey installed elevation at each joint prior to connecting the next joint to verify grade.
22.05 PIPE INSTALLATION (Continued)

B. LAYING THE PIPE (Continued)

12. Install pipelines on the line and grade shown on the drawings. Relay pipe to proper grade if any joint elevation deviates from the following tolerances:

a. Horizontal and vertical alignment shall not vary from design line and grade at any structure by more than 1% of the inside diameter of the pipe or ¼ inch, whichever is larger.

b. Horizontal alignment of the pipe shall not vary from design line at any point along the pipe by more than 1% of the inside diameter of the pipe.

c. Low spots holding water shall not exceed the following depths for each pipe size:

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<tr>
<th>Pipe Diameter</th>
<th>Maximum Low Spot Depth</th>
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<tr>
<td>8 IN</td>
<td>½ IN</td>
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<tr>
<td>10 IN</td>
<td>½ IN</td>
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<tr>
<td>12 IN</td>
<td>⅛ IN</td>
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<tr>
<td>15 IN</td>
<td>⅛ IN</td>
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<tr>
<td>18 IN and larger</td>
<td>5% of Pipe Diameter*</td>
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13. Do not disturb installed pipe and bedding when using movable trench boxes or supports. Block or anchor pipe as necessary to prevent joint displacement. Voids created by movement of trench boxes or supports shall be properly filled and compacted as described in Chapter 20 of these Standard Specifications.

14. Backfill trench with approved material as described in Chapter 20 of these Standard Specifications, provided all inspection and testing requirements are met.

15. Install wastewater service wyes at each location specified in the Contract Documents and detailed in the Lincoln Standard Plans.

16. Flexible piping construction shall be installed in conformance with ASTM D2321 and manufacturer recommended installation guidelines.
C. CURVILINEAR ALIGNMENT

1. Bending of the pipe barrel to achieve curvilinear alignment shall not be permitted.

2. Follow the allowable joint deflection:

   a. PVC: 1° of deflection at the joint. Standard 14 feet laying length has a minimum radius of 785 feet.

   b. PP: 3° of deflection at the joint. Standard 13 feet laying length has a minimum radius of 248 feet and standard 20 feet laying length has a minimum radius of 382 feet.

   c. RCP: As per manufacturer’s recommendations.

   d. VCP: As per manufacturer’s recommendations.

   e. Additional joint deflection using factory-made 3° couplings is allowed. The quantity and location shall be included in the Contract Documents and will not be determined in the field.

D. BASIS OF PAYMENT

1. All pipe of the various types shall be measured and paid for at the contract unit price bid for each size per linear foot for SANITARY SEWER PIPE, __". All pipe shall be measured, center to center, through manholes. Said payment shall be full compensation for all excavations, backfill, testing, materials, equipment, tools, labor and incidentals necessary to install the pipe in accordance with the Contract Documents. Special measurement and payment for all fittings and pipe materials necessary to achieve desired radius, including beveled or radius pipe, will not be considered. The extra costs, if any, shall be merged with and considered subsidiary to the cost of the various sizes of pipe called for in the Contract Documents.

2. SANITARY SEWER PLUG, __" shall be measured and paid for at the contract unit price bid per each for each type and size of sanitary sewer plug. This price shall be full compensation for all excavations, backfill, testing, labor, materials, tools, equipment and incidentals necessary to complete each type and size of sanitary sewer plug in accordance with the Contract Documents.

3. 3 DEGREE COUPLING, __" shall be measured and paid for at the contract unit price bid per each for each type and size of 3-degree coupling. This price shall be full compensation for all excavations, backfill, testing, labor, materials, tools, equipment and incidentals necessary to complete each type and size of 3 degree coupling in accordance with the Contract Documents.
22.06  HIGHWAY, STREET, RAILROAD AND UTILITY CROSSINGS

A. GENERAL

1. Highway, street, railroad and utility crossings shall be constructed in accordance with the approved permit.

2. The City will obtain the necessary permits.

3. Encasements shall conform to Chapter 20 of these Standard Specifications.

4. In laying pressure type sewer pipe over/under a water main, the center of a standard length of pipe shall be centered with the centerline water main. See Chapter 23 of these Standard Specifications.

22.07  SANITARY MANHOLE CONSTRUCTION

A. DELIVERY, STORAGE, AND HANDLING OF PRODUCTS

1. Deliver, handle and store products in accordance with the manufacturer’s instructions.

2. Store all products on level ground and not in mud or water.

3. Keep products free from dirt and other foreign matter.

4. Use approved lifting devices that will safely lift the weight of the manhole unit with applicable OSHA requirements safety factor.

B. GENERAL REQUIREMENTS FOR INSTALLATION

1. Excavate and provide foundation materials, bedding materials, and backfill materials as specified in Chapter 20 of these Standard Specifications.


3. Install rubber plug or an approved non-shrink grout in lift holes.

4. Prepare subgrade to accurate elevation required to place manhole bedding material.

C. MANHOLE BASE, RISERS, AND CONE

1. Set the manhole base on a graded bedding making sure the flexible watertight connectors or pipe openings match design elevations. If necessary, pour anti-flotation concrete base.

2. Level the top of the manhole base in both directions.

3. Install each additional manhole component, ensuring each is plumb as installed before installing the next component.

4. Install manhole eccentric cone.
D. PIPE CONNECTIONS

1. Place flexible watertight connectors according to manufacturers’ recommendation.

2. Install and bed pipes and connect to manhole. Install pipe flush with inside wall of structure. Place bedding and pipe embedment material as specified in Chapter 20 of these Standard Specifications.

E. MANHOLE JOINTS

1. Ensure joints are free of debris.

2. Install rubber O-ring or profile gasket.

3. Apply cold-applied mastic compound or butyl sealant wrap to exterior of all sanitary sewer manhole joints.

F. MANHOLE FLOW CHANNEL AND BENCH

1. Flow channel construction shall conform to the Lincoln Standard Plans.

2. Construct minimum manhole flow channel of one-half the pipe inner diameter to produce a smooth half-pipe shape between pipe inverts.

3. Slope the manhole bench no less than ½ IN per foot perpendicular to flow line.

G. MANHOLE ADJUSTING RISERS AND RINGS

1. On new and existing manholes, construct:
   a. Maximum 21 inch adjusting riser.
   b. Adjusting rings for the top 4 inches.

2. On manholes in paved areas, match the slope of the finished surface with sloped adjusting rings.

3. Bed each concrete adjusting riser with manufacturer’s approved product.

4. Bed each polypropylene riser or ring with manufacturer’s approved product and according to manufacturer’s recommended installation procedure.

H. FRAME AND COVER

1. Install the frame and cover to place the cover at the elevation specified in the Contract Documents.
22.07 SANITARY MANHOLE CONSTRUCTION (Continued)

I. MANHOLE EXTERNAL FRAME SEAL

1. Install in accordance with the manufacturer’s instructions.

2. All sealing surfaces shall be smooth, clean and free of any form offsets.

3. Extend seal a minimum of 3 inches below the lowest adjustment riser.

4. Extend seal above the flange of the manhole frame.

J. COLD WEATHER CONSTRUCTION

1. Take all reasonable precautions to protect all parts of the Work from damage due to freezing or as a result of winter weather conditions.

K. BASIS OF PAYMENT

1. Standard manholes and standard drop manholes shall be measured and paid for at the contract unit price bid per each for STANDARD MANHOLE, TYPE ___ and STANDARD DROP MANHOLE, TYPE ___. This price shall be full compensation for the manhole base, risers, and cone; pipe connections; manhole joints; manhole flow channel and bench; manhole adjusting risers and rings; frame and cover; external frame seal; drop pipes; fittings and all labor, tools, equipment and incidentals necessary to install these items. Standard manholes and standard drop manholes shall also be measured from the lowest flow line to the top of cover and paid for at the contract unit price bid per vertical foot for STANDARD MANHOLE, TYPE __ V.F. and STANDARD DROP MANHOLE, TYPE __ V.F. This payment shall be full compensation for all manhole base, risers, and cone; pipe connections; manhole joints; manhole flow channel and bench; manhole adjusting risers and rings; frame and cover; external frame seal; drop pipes; fittings and all labor, materials, tools, equipment and incidentals necessary to complete each type of manhole in accordance with the Contract Documents.

22.08 WASTEWATER SERVICES/PRIVATE SEWERS

A. NEW CONSTRUCTION

1. Construction of new wastewater services not owned by the City shall conform to the construction requirements as provided in Title 24 of the Lincoln Municipal Code and the Lincoln Standard Plates.

B. RECONSTRUCTION

1. Reconstruction of wastewater services not owned by the City shall conform to the construction requirements as provided in Title 24 of the Lincoln Municipal Code and the Lincoln Standard Plates.
22.08 WASTEWATER SERVICES/PRIVATE SEwers (Continued)

C. BASIS OF PAYMENT

1. WYE, __" x __", shall be measured and paid for at the contract unit price bid per each for each size. This price shall be full compensation for all excavations, backfill, testing, labor, materials, tools, equipment and incidentals necessary to complete the Work in accordance with the Contract Documents.

2. Measurement and payment will be made at the contract unit price bid per each for CONSTRUCT or RECONSTRUCT SEWER SERVICE. Such payment shall be full compensation for all labor, tapping permits, plumbing permit, fittings, and materials, except as otherwise provided, excavation for taps and abandonments, backfill for taps and abandonments, sod, equipment, tools and incidentals necessary to complete the reconstruction in a workmanlike manner in accordance with the Contract Documents. Tapping saddles, taps, and plugs for abandonment will be supplied at no additional cost to the Contractor.

3. Measurement and payment will be made at the contract unit price bid per linear foot for SEWER SERVICE PIPE, __". Such payment shall be full compensation for furnishing and installing all pipe materials, all labor, excavation, backfill, equipment, tools, collars or connecting devices, and incidentals necessary to place the pipe in service in accordance with the Contract Documents.

22.09 TESTING

A. GENERAL

1. Line acceptance testing is required for each section of sanitary sewer constructed between manholes or junction structures.

2. Manhole performance testing is required.

3. The tests specified herein shall not be initiated until the related backfill is compacted in place; the line, manholes, and structures have been cleaned of all interfering debris; and suitable access for necessary testing equipment is provided.

4. The Contractor shall furnish all labor, tools, and equipment to perform all the tests specified hereinafter and only in the presence of the City’s Project Manager or observer, except where such tests are specifically designated as being the responsibility of the City.

5. The methods and the equipment used for the tests shall be in conformance with the ASTM standards.

6. The costs associated with the testing are to be considered subsidiary to the costs of the sewer lines and manholes.

7. Except for pipe replacement projects where existing services must be reconnected as the new replacement pipe is being laid, or as otherwise directed by the City’s Project Manager, live wastewater flow shall not be permitted in the sanitary sewer line until all of the following tests are completed and found acceptable.
B. LINE ACCEPTANCE TESTING

1. Alignment Test:
   a. For straight section of sewer, an alignment test using either a lamp or a laser beam shall be performed. The light or laser beam shall be visible through the sewer between adjacent manholes.
   b. Repair or replace defective pipe or joints, or remove and relay pipe not meeting alignment tolerances.

2. Leakage Testing:
   a. Joint Testing for RCP in accordance with ASTM C1103 and C969.
   b. Low Pressure Air Testing for VCP in accordance with ASTM C828.
   c. Low Pressure Air Testing for CCFRPM, PVC and PP shall meet the minimum time allowance per ASTM F1417.

3. Television Inspection
   a. Contractor shall prepare the project site for safe entry and access.
   b. Internal television inspection of new sanitary sewers will be performed by the City at no cost to the Contractor.
   c. Television inspection will be scheduled no earlier than 30 days after the installation of the pipe and shall be done at the same time and in conjunction with final deflection testing and after all line leakage and manhole testing has been completed and found acceptable.
   d. Televised lines shall be termed ‘acceptable’ if no defects are found, such as open joints, breaks, cracks, excessive pipe deformation, intrusions, ground water infiltration, depositions and debris left in the line, sag in the line, or excessive vertical or horizontal misalignment.
   e. Follow-up TV inspection activities that may be required as a result of repairs to defective new sanitary sewers will be billed as an additional cost at the prevailing TV inspection rate.
   f. The prevailing TV inspection cost can be obtained from the Lincoln Transportation and Utilities Department Business Office.

4. Deflection Testing
   a. Perform deflection testing on all flexible pipe installed on the project.
      (i) On any pipe size 8" to 15" the City will perform the deflection test, at no cost to the Contractor.
      (ii) On any pipe size greater than 15", it will be the responsibility of the Contractor to perform the deflection test with City staff in observance.
C. LINE ACCEPTANCE TESTING

4. Deflection Testing (Continued)

b. Final deflection testing shall be performed after the backfill has been in place at least 30 days.

c. Pull deflection mandrel sized at 95% of the inside diameter of the pipe through the test segment using a pulling force equivalent to hand power.

d. Ensure pipe deflection does not exceed 5% of average inside diameter as established by ASTM standards.

e. The line shall be termed "acceptable" if, during final deflection testing, the mandrel passes completely through the line without restriction.

f. In no case shall excessive force be applied in pulling the mandrel that may damage the pipe or that may erroneously indicate that deflection was within acceptable limits by temporarily expanding the pipe.

g. Remove and replace pipe exceeding deflection limits at no additional cost to the City. No additional time waiting period shall apply for retesting following repair of the line and proper compaction of the backfill, unless otherwise directed by the City’s Project Manager.

h. Retest the line until found acceptable.

D. MANHOLE PERFORMANCE TESTING

1. General

a. All manholes shall be constructed to be free from infiltration. The manhole shall also remain free from visible infiltration during the two-year period of guarantee.

b. If any infiltration is observed during that period, the Contractor shall be required to make any necessary repairs.

2. Vacuum Testing

a. Vacuum test manholes in accordance with ASTM C1244.
22.10 SUBSTANTIAL COMPLETION

Sanitary sewer work shall be considered substantially complete when all pipe is laid and backfilled; all manholes are complete and backfilled; all testing for all pipe and manholes is complete and accepted.

22.11 FINAL ACCEPTANCE

The project shall be considered eligible for final acceptance by the City when all required Work is complete and accepted by the City’s Project Manager, including internal television inspection, mandrel testing of all plastic pipe, all items on plan completed, and correction of all deficiencies found as a result of testing and/or final inspection by the City’s Project Manager. Eligibility for final acceptance shall not be delayed for more than 60 calendar days past the date of substantial completion on account of the City's failure to complete internal television inspection and mandrel testing of plastic pipe because of equipment problems, scheduling conflicts, or other unforeseen circumstances attributable to the City's own responsibilities and actions.

22.12 GUARANTEE

At any time during the two-year guarantee period, and within the time period allowed, the Contractor shall correct any defect in material or workmanship which has been brought to his attention. Such items shall include but not be limited to trench settlement including subsequent pavement damage, pipe leaks, and failures.

22.13 ENVIRONMENTAL PROTECTION

Refer to Chapter 32 of these Standard Specifications for environmental protection during construction.