SECTION 02730

SANITARY SEWER SYSTEM

PART 1 GENERAL

1.1 REFERENCES

A. ANSI/ASTM D2321 - Recommended Practice for Underground Installation of Flexible Thermoplastic Sewer Pipe.

B. ANSI/ASTM D3034 - Type PSM Poly (Vinyl Chloride) (PVC) Sewer Pipe and Fittings.

1.2 SUBMITTALS

A. Submit shop drawings under provisions of Section 01300 for system, showing pipe sizes, locations, elevations and slopes for horizontal runs. Include details of underground structures, fittings, connections, and mechanical equipment.

B. For staking sewer lines submit two copies of each "cut sheet" showing depths of cut from top of offset stake. If a laser beam is used, cut sheet shall also show cut for each 50'-0" station in order to compute depth of cut.

1.3 PROJECT RECORD DOCUMENTS

A. Submit documents under provisions of Section 01720.

B. Record location of pipe runs, connections, cleanouts, and invert elevations.

C. Identify and describe unexpected variations to subsoil conditions or discovery of uncharted utilities.

1.4 QUALITY ASSURANCE

A. Installer: A firm specializing and experienced in sanitary sewer system work for not less than 2 years.

B. Pipe: Pipe shipped to project site shall bear mark of the manufacturer with manufacturer’s date of production and pertinent product testing specifications.

PART 2 PRODUCTS

2.1 DUCTILE IRON GRAVITY PIPE

A. Ductile Iron Pipe: Class 52, AWWA C150 and AWWA C151; Service type, minimum inside nominal diameter of 8 inches for public mains and 6 inches for service lines.

1. Ductile Iron Pipe Joint Device: ANSI A21.11, rubber gasket joint devices.

B. Ductile Iron pipe shall be lined with an amine cured novalac epoxy containing at least 20% by volume of ceramic quartz pigment. Any request for substitution must be accompanied by a successful history of lining pipe and fittings for sewer service, a test report verifying the following properties, and a certification of the test results.

1. A permeability rating of 0.00 when test according to Method A of ASTM E96, Procedure A with a test duration of 30 days.
2. The following test must be run on coupons from factory lined ductile iron pipe:
   a. ASTM B117 Salt Spray (scribed panel) – Results to equal 0.0 undercutting after two year.
   b. ASTM G95 Cathodic Disbondment 1.5 volts @ 77^0F. Results to equal no more than 0.5mm undercutting after 30 days.
   c. Immersion Testing rated using ASTM D714.
      i. 20% Sulfuric Acid – No effect after 2 years.
      ii. 25% Sodium Hydroxide – No effect after 2 years.
      iii. 160^0F Distilled Water – No effect after 2 years.
      iv. 120^0F Tap Water (scribed panel) – 0.0 undercutting after 2 years with no effect.
3. An abrasion resistance of no more than 4 mils loss after one million cycles – European Standard EN 598: 1994 Section 7.8 Abrasion resistance.
4. The lining shall be applied by a competent firm with a successful history of applying linings to the interior of ductile iron pipe and fittings.
5. Prior to abrasive blasting, the entire area to receive the protective compound shall be inspected for oil, grease, etc. Any areas where oil, grease of any substance which can be removed by solvent is present shall be solvent cleaned using the guidelines outlined in DIPRA-1 Solvent Cleaning. After the surface has been made free of grease, oil or other substances, all areas to receive the protective compounds shall be abrasive blasted using compressed air nozzles with sand or grit abrasive media. The entire surface to be lined

shall be struck with the blast media so that all rust, loose oxides, etc., are removed from the surface. Only slight stains and tightly adhering annealing oxide may be left on the surface. Any area where rust reappears before lining must be reblasted.

6. After surface preparation and within 8 hours of surface preparation, the interior of the pipe shall receive 40 mils nominal dry film thickness of Protecto 401. No lining shall take place when the ambient or substrate temperature is below 40 degrees Fahrenheit. The surface also must be dry and dust free.
7. Due to the tolerances involved, the gasket area and spigot end up to 6 inches back from the end of the spigot must be coated with 6 mils nominal, 10 mils maximum Protecto Joint Compound. The joint compound shall be applied by brush to ensure coverage. Care should be taken that the joint compound is smooth without excess buildup in the gasket seat or on the spigot ends. Coating of the gasket seat and spigot shall be done after the application of the lining.
8. The number of coats of lining material applied shall be as recommended by the lining manufacturer. However, in no case shall this material be applied above the dry thickness per coat recommended by the lining manufacturer in printed literature. The maximum or minimum time between coats shall be that time recommended by the lining material manufacturer. No material shall be used for lining which is not indefinitely recoatable with itself without roughening of the surface.
9. Protecto Joint Compound shall be used for touch-up or repair in accordance with manufacturer's recommendations.
10. Inspection
    a. All ductile iron pipe and fittings shall be checked for the thickness using a magnetic film thickness gauge. The thickness testing shall be done using the method outlined in SSPC-PA-2, Film Thickness Rating.
    b. The interior lining of all pipe barrels and fittings shall be tested for pinholes with a non-destructive 2500 volt test. Any defect found shall be repaired prior to shipment.
    c. Each pipe joint and fitting shall be marked with the date of application on that date and records maintained by the applicator.
11. The pipe or fitting manufacturer must supply a certificate attesting to the fact that the applicator met the requirements of this specification, and that the material used was as specified.

12 Protecto 401 lined pipe and fittings must be handled only from the outside of the pipe and fittings. No forks, chains, straps, hooks, etc. Shall be placed inside the pipe or fittings for lifting, positioning of laying.

D. For ductile iron pipe, pipe manufacturer is to furnish Engineer a certificate of inspection, sworn to by the factory inspector in the presence of a notary public, stating that pieces of pipe in the shipment were made and tested in accordance with ANSI A21.51 and that they were subjected to and withstood a hydrostatic pressure of 500 psi. Each statement is to give the number of pieces of pipe in shipment, length of each piece of pipe, and identification number of each piece of pipe making up the shipment. In addition, the weight of each individual piece of pipe making up the shipment is to be listed opposite the identification number of each pipe length and attached to the certificate of inspection.

2.2 POLYVINYL CHLORIDE (PVC) GRAVITY PIPE

A. Plastic Pipe: ANSI/ASTM D3034, Type PSM, Poly (Vinyl Chloride) (PVC) material; SDR 26; minimum inside nominal diameter of 8 inches for public sewer lines and 6 inches for service lines.

1. Pipe Gaskets: Rubber ASTM D1869.
2. Minimum Pipe Stiffness (F/AY) at 5% Deflection: 26 for sizes when tested in accordance with ASTM D 2412.
3. Minimum thickness shall be as follows:

Nominal Size	Minimum Wall Thickness
6	0.255"
8	0.332"
10	0.413"
12	0.490"

2.3 FITTINGS FOR GRAVITY PIPE

A. Fittings for service line material shall be of the same material as the corresponding main line material. Ductile iron fittings shall be lined per Paragraph 2.1.B of this Section.

2.4 PRESSURE PIPE

A. Force main pipe less than 4-inch diameter: Plastic Pipe for small diameter sewage force mains, typically associated with the WSD's grinder sewer system: ANSI/ASTM D2241, Poly Vinyl Chloride (PVC) material; SDR 21;

B. Force main pipe from 4 inch up to 12-inch diameter: Material shall be DR 25, C900 PVC, green in color.

C. Force main pipe greater than 12-inch diameter: Material shall be as directed by the WSD.

2.5 PIPE ACCESSORIES

A. Pipe Connectors: Flexible pipe-to-manhole EPDM gaskets as specified in Section 02607.

B. For detection purposes, a 10 gauge solid strand copper, green clad tracing wire (shielded) shall be installed with the plastic force main pipe. Connections between wires shall be soldered or connected with wire nut fasteners and wrapped and sealed to be watertight. For access purposes, tracing wire shall be terminated at all valve boxes, combination air valve assemblies, etc.

C. Magnetic detectable conductor, metallic tape clear plastic covering, imprinted with "CAUTION BURIED SEWER LINE" in large letters shall be installed 18 inches above all sewer pipe (gravity and pressure).

D. House Line Connection Couplings: Standard manufacturer's product.
   1. FERNCO Series 5000 RC
   2. Substitutions: Under provisions of Section 01600.

E. Fittings: ASTM F477; SDR 26; same material as pipe molded or formed to suit pipe size and end design, in required tee, bends, elbows, cleanouts, reducers, traps and other configurations required.
   1. Manufacturer: HARCO
   2. Substitutions: Under provisions of Section 01600.

2.6 BEDDING MATERIALS

A. Aggregate Fill: As specified in Section 02225.

B. Earth Fill: As specified in Section 02225.

C. Concrete: As specified in Section 03001.

D. Lean Concrete: As specified in Section 02225.

PART 3 EXECUTION

3.1 EXAMINATION

A. Verify that trench cut is ready to receive work and excavations, dimensions, and elevations are as indicated on layout

3.2 PREPARATION

A. Hand trim excavations to required elevations. Correct over excavation with bedding material or lean concrete as directed by WSD. Minimum 6-inch clearance required between edge of trench and outside diameter of pipe bell.

B. Remove large stones or other hard matter which could damage pipe or impede consistent backfilling or compaction.

3.3 BEDDING AND BACKFILL

A. Excavate pipe trench in accordance with Section 02225 for Work of this Section. Hand trim excavation for accurate placement of pipe to elevations indicated.

B. Provide non-metallic sewer pipe (except house connection lines) with 2'-6" minimum cover in fields, yards, lawns, and other landscaped areas and 4'-0" minimum cover in streets, roads, shoulders and driveways.

1. Where the above minimum cover is not possible either encase pipe in concrete in accordance with Standard Drawings or at the direction of the WSD. Ductile iron pipe shall be used in this application.
   a. For concrete encasement, place pipe on 6-inch concrete blocks positioned behind each pipe bell. Join pipe. Bring pipe to established grade by driving wooden wedges between pipe and concrete block.
   b. Firmly affix pipe in place for true alignment. Backfill pipe trench with concrete to spring line of pipe. Suspend backfilling until concrete has attained its "initial set".
   c. Backfill remainder of pipe trench with concrete to a point above pipe as shown on Standard Drawings, or as directed by the project Engineer and WSD. After 24 hours, complete backfill as specified herein.
   d. Place mastic expansion joints across encasement, 25'-0" o.c.

C. Unless specifically directed otherwise by the project Engineer or where required to uncover or determine the presence of underground obstructions, do not open more than 300'-0" of trench ahead of pipe laying. Do not leave more than 200'-0" of open ditch behind pipe laying.

D. Unless specifically authorized otherwise by the project Engineer, do not excavate trenches wider than 18 inches plus nominal diameter of pipe at level of crown of pipe.

E. Open trench a minimum of 6" below bottom of pipe at proper line and grade.

F. Place aggregate fill material at trench bottom, level materials in continuous layer not exceeding 6 inches compacted depth, compact to 95 percent Standard Proctor. Provide aggregate fill 4 inches deep at house connections.

G. Maintain optimum moisture content of bedding material to attain required compaction density.

H. Plug open ends of pipe lines at end of each day's work.

I. Install aggregate fill at sides and over top of PVC pipe to minimum compacted thickness of 12 inches; compacted to 95 percent.

J. When a sewer line is located in a roadway or shoulder, backfill entire trench with aggregate fill.

3.4 INSTALLATION - PIPE

A. Install pipe, fittings, and accessories in accordance with ASTM D2321 and manufacturer's instructions. Seal joints watertight. Make house connections with same pipe material as collector sewer lines.

B. Wipe bell and spigot of each pipe clean before joint is made.

C. Coat surfaces of bell and gasket with a lubricating material in accordance with pipe manufacturer's instructions.

D. Align pipe as near as is practical to final grade and alignment with spigot entering bell of last section laid. Apply force to force spigot and gasket home in bell.

E. Begin laying of gravity sewer pipes in finished trenches, at lowest point so that spigot ends point in direction of flow.

F. Lay pipe to slope gradients indicated; with maximum variation from true slope of +/-0.05%, 1/16 inch in 10 feet.

1. Slope sewer lines to maintain a minimum velocity of 2 feet per second when flowing full. The minimum slopes allowable are as follows:

a.

Line Size	Minimum Slope
8 inch	0.40%
10 inch	0.28%
12 inch	0.22%

For additional pipe sizes and their associated minimum slopes use TDEC design criteria.

2. Lay service lines to a minimum grade of 1'-0" per 100'-0" (1/8" per foot).
3. Lay house connection lines as follows:
   a. 6 inch lines at 1'-0" per 100'-0" minimum.

G. Seal open ends with a stopper or bulkhead. Mark property line end of house connection on ground by a stake as shown on Standard Drawings.

H. In general, tapping house connections into manholes will not be permitted unless otherwise approved by the WSD. Where it is necessary to do so, the invert of house connection shall not be higher than a point 3 inches below top of bench in manhole. Provide a trough in bench to prevent accumulation of solids on bench. If necessary, provide a standard interior drop connection for a house service that is tapped into a manhole.

I. Refer to Section 02225 for trenching requirements. Do not displace or damage pipe when compacting.

J. Refer to Section 02607 for manhole requirements.

K. Only one house shall be connected to one service line.

L. Install trace wire and locate tape in accordance with Paragraphs 2.5.B and 2.5.C of this Section.

M. Provide concrete foundations under PVC tees and wyes to prevent settlement.

3.5 HOUSE LINE CONNECTIONS - NEW MAIN INSTALLATIONS

A. 6-inch service line material shall match main line material. Make connection of a 4-inch house service line to the 6-inch service line using an appropriate transition coupling compatible with the specific pipe material(s). Install a cleanout assembly per the Standard Drawings.

B. Make connections of cast iron pipe and clay pipe with a special adapter.

C. If the house connection is being tied directly to sewer line, install sewer and service lines in accordance with this Section.

D. Make connection between house service line and sewer line, if no service line is available, by cutting in a factory tee and reconnecting pipes with PVC knock-on couplings.

3.6 CUSTOMER LINE CONNECTIONS - EXISTING MAIN INSTALLATIONS

A. If no service line is available from the sewer main, make connection to main using a tapping saddle with tee, cut-in tee with knock on coupling, or Inserta-Tee. Hammer taps are not allowed.

B. If service line is available from the sewer main, make connection to service line using a PVC compression coupling. No flexible couplings shall be allowed.

C. Allow inspection by WSD Inspector before backfilling.

3.7 ABANDONMENT OF NEW AND EXISTING SERVICES

A. For new service taps that have not been connected to a house or building, remove the rubber fernco cap and replace with PVC glue on cap at the stub-out location.

B. For existing sewer services previously connected to a house or building, the service line shall be cut and capped with PVC glue on cap, generally, at the R.O.W. or edge of easement.

3.8 FIELD QUALITY CONTROL

A. Field inspection and testing of materials will be performed under provisions of Section 01410.

B. Request inspection of pipe and ditch prior to and immediately after placing bedding.

C. Upon completion of the Work, inspect sanitary sewer lines for leaks, defects, or cases of excess deflection. Repair any deficiencies to the satisfaction of the WSD.

D. Perform testing of completed pipe lines in accordance with these specifications.

E. Make tests after completed backfilling.

3.9 VISUAL TESTS

A. Before backfilling lines, they should be inspected by the WSD. If acceptable, proceed with backfilling. Remove and correct joints, pipes, or other materials or workmanship found to be defective, without any extra compensation.

B. During and upon completion of construction, the WSD will make observations of the Work. Immediately repair leaks and defects found by such observation.

C. In addition to general cleanup and leakage, use the following standards to determine failure or defects of the Work:

1. Build sewers true to line and planned grade. Confirm In and Out inverts at all manholes to be consistent with approved plans. Note any deviations and notify the WSD. Replace or re-lay pipe that does not comply with the approved plans unless otherwise permitted by the WSD.

2. If PVC pipe is used, after complete backfilling, pull or float a ball thru a portion of pipe to test it for deflection. Ball shall be accurately sized to be 95% of pipe diameter of actual pipe used. Contractor will be directed by the project Engineer in his presence and witnessed by the WSD to perform this test on total pipe length of the project. One hundred percent of the tested Section shall pass this test. Mandrel testing shall not begin until thirty days after backfilling.

3.10 TESTING OF GRAVITY SEWERS

A. TELEVISION INSPECTION

1. Upon completion of the construction or earlier if the WSD deems advisable, the Contractor shall provide for a visual inspection of the sewer by use of remote television camera. Immediately repair all leaks and defects found by such inspection.
2. Prior to televising, Contractor shall thoroughly clean the pipelines of debris, grease, roots, sediment or other obstructions that could retard the movement of the television camera.
3. Immediately after cleaning, 100% of the line segments shall be visually inspected by means of closed-circuit television to verify cleaning results, the condition of the line and to locate existing service connections. The Contractor shall furnish the mobile television inspection studio, all television equipment and other necessary types of equipment, and all materials, electricity, labor, technicians, etc., as may be needed to perform the closed circuit television inspection of the new sewers for the purpose of documenting deficiencies and lateral locations prior to acceptance and placement in service of the sewer. A recorded verbal narrative describing pipe conditions and lateral locations shall be placed on the video recording and coincide with the written comments on the videotape. No work is authorized under this Section unless the

WSD's representative is present or has been notified 24 hours prior.

4. Sewer shall be built so as to remain true to line and grade. The inclining grade of the bottom of the sewer after completion shall be such that, after flooding, the flood water drains off so that no remaining puddle of water is deeper than ½ inch on 36 inches internal diameter or small and ¾ inch on pipe larger than 36 inch internal diameter. Any section of pipe that does not comply with the specifications at any time previous to final acceptance of the work shall be replaced or re-laid at the Contractor's expense.
5. The contractor shall be held strictly responsible that all parts of the work bear the load of the backfill. If cracks 0.01 inch develop in the pipe within one (1) year from the date of final acceptance of the work, the Contractor shall be required to replace, at this expense all such cracked pipe. To this end, the Contractor is advised to purchase pipe under a guarantee from the manufacturer guaranteeing proper service of sewer pipe under local conditions established by the drawings, specification and local conditions at the site of the work.
6. Camera Requirements - The camera used for this inspection shall be color. The camera head shall be capable of at least 340 degrees axial rotation and 270 degrees lateral swing. The camera shall operate under a minimum scene illumination of 3 lux with a horizontal resolution of no less than 460 lines. Sufficient lighting shall be provided on the camera so that videotapes will show images that are clear and well illuminated.
7. The internal inspection shall be performed in one section of sewer at a time between adjacent manholes. The inspection shall be performed by pulling the television camera on a skid or by transporting the camera with a mechanical transport device through the section of the sewer along the axis of the pipe. The camera shall travel in the direction of the flow or from the upstream manhole to the downstream manhole unless an obstruction in the pipe requires videotaping upstream. The camera shall not pass through the sewer at a rate greater than ¾ ft/sec. The camera shall stop at each lateral and defect and rotate so that the lateral or defect is seen from a perpendicular field of view. Each lateral and defect shall be extensively filmed.
8. The sewer main shall be clean prior to televising. If the main is new or recently rehabilitated, cleaning may not be necessary. The camera operator shall take necessary precautions to prevent "hanging" the camera in the sewer main. If the camera should get stuck in the main, the contractor will be responsible for removing the camera at his expense and making any above and below ground repairs. The Contractor shall exhaust all other means to retrieve the camera before excavating. A representative of the WSD must

be notified before excavation takes place. The distance measured to defects and lateral shall be referenced to the center of the beginning manhole. Measurements to defects and laterals shall be accurate to within +/-1 foot.

B. Documentation

1. The Contractor shall keep a daily log or record covering the television inspection work and the information acquired there from. This daily log or record shall contain at least the following data:
   a. Date and Time of Inspection
   b. Contract Name and Number
   c. Name of Contractor
   d. Name of Internal Video Inspection Company (if different from Contractor)
   e. Name of Street
   f. Identification Number of Upstream and Downstream Manholes based on Authority numbering system.
   g. Description of the Location
   h. Direction of the Video
   i. Size, Length, Depth, and Type of Pipe
   j. Size, Depth, and Material of Manholes
   k. Distance, Position on Periphery of Pipe in Clock Orientation, Type, and Description of all Laterals and Defects
   l. Computer generated diagram of pipe and manholes which graphically provides information in “k” and “l” above.
   m. An Index of Video System Codes and Abbreviations
2. Two copies of log or record with the diagrams and index, typed and bound, shall be delivered to the WSD.
3. The purpose of the video recordings shall be to supply a continuous visual and audio record of the inspection using a DVD system. The Contractor shall fill each DVD as much as practical to minimize the number of DVD’s. All sections of runs shall be recorded on one DVD. In no event, shall a segment be divided between two DVD’s. Pipe runs shall be grouped in areas and submitted in sequential order relating to the area designation.
4. Video recordings shall be enclosed in vinyl plastic containers, which shall clearly indicate the date the video was taken, the street and the designated section(s) of sewer line(s) contained on the video, the name of the project, the name of the Contractor and the index number of the video. The index number shall indicate the sequential number of the DVD out of the total number of DVD’s for the project, i.e. 2 of 5.

5. Warranty: The Contractor warrants the accuracy and completeness of the DVD for a period of two years. If the Authority determines that the video does not meet the requirements as identified herein, the Contractor shall re-video the line segments for which the reporting was faulty. There shall be no discrepancies between the video and the written report.
6. A copy of any software required to view the DVD shall be provided to the WSD at no additional charge.

3.11 GRAVITY SEWER PRESSURE TESTING

A. Measurement of sewers subjected to air tests will be horizontal length of test section between manholes as determined by manhole stations, without allowances for service lines connected thereto.

B. Test sewer line in increments between manholes. Seal line at each end. Seal at one end shall have an orifice through which to pass air into pipe. Connect air supply to orifice at one end of line. Air supply line shall contain an on-off valve and a pressure having a range of from 0 to 5 psi. The gauge shall have minimum divisions of 0.10 psi and shall have an accuracy of plus or minus 0.04 psi.

C. Pressurize pipe line under test to 4 PSIG. Allow line to stabilize between 4 PSIG and 3.5 PSIG for a period of no less than 5 minutes. If necessary, add air to line to maintain pressure above 3.5 PSIG. After stabilization period, close valve. When line pressure drops to 3.5 PSIG, commence timing with a stop watch. Allow stop watch to run until such time as line pressure drops to 2.5 PSIG, then stop watch.

D. Compare time lapse with allowable time lapse in Schedule at end of this Section. If time lapse is greater than that specified, section undergoing test shall have passed and test may be discontinued at that time. If time is less than that specified, then line has not passed test and Contractor will be required to prepare line for retest.

E. Where ground water table is known to be above sewer, raise pressures by an amount equal to ground water pressure (0.433 psi per foot of water). Air pressure test may be made with pipe in a dry or normal condition, but in event section fails to pass test, Contractor will be permitted to repeat test after having soaked pipe to produce moisture saturation.

F. Avoid over pressuring sewer and avoid blowing out test plugs. Do not enter an adjacent manhole while a section of sewer is under test. Plug and strap down service lines to prevent blowouts.

G. Low Pressure Air Test Time Interval Schedule in seconds:

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

H. Contact the WSD for air test times on pipe diameters not shown above.

3.12 FORCE MAIN PRESSURE TESTING

A. All force mains shall be tested to a test pressure of 120 psi for a duration of two (2) hours. Backfilling shall occur on the force main to the extent that it will remain in place without movement. No leakage will be permitted on force main testing and success of testing will be on a “Pass or Fail” score. All force main testing shall be performed with potable water or with groundwater. No testing shall occur with live sewage. Maximum length of a force main segment to be tested shall be 2000 LF. For force mains longer than 2000 LF, testing shall occur between valve segments or in a manner approved by the WSD.

3.13 REPAIRS AND CLEANUP

A. Regardless of the outcome of any tests, repair any noticeable leak.

B. After completing each section of the sewer line, remove all debris, construction materials, and equipment from the site of the work, grade and smooth over the surface on both sides of the line, and leave the entire area in a clean, neat, and serviceable condition.

END OF SECTION 02730 - SANITARY SEWER SYSTEM