



**SEWER FORCE MAIN REPLACEMENT PROJECT
FOR
COUNTY SERVICE AREA (CSA) 70 – S3 – LYTLE CREEK**

WARNING:

ALL INDIVIDUALS INTERESTED IN BIDDING ON THIS PROJECT MUST OBTAIN THE FINAL PLANS AND SPECIFICATIONS FROM THE DEPARTMENT MANAGING THE PROJECT OR AS OTHERWISE STATED IN THE ADVERTISEMENT FOR BIDS FOR THE PROJECT. DO NOT USE THE PLANS AND SPECIFICATIONS POSTED ON THE CLERK OF THE BOARD'S WEBSITE FOR BIDDING THE PROJECT.

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If pipe is strung along trench prior to installation, string only pipe to be used within a 24-hour period; all pipe is to be laid on a flat surface. The interior as well as all sealing surfaces of pipe, fittings, and other accessories shall be kept free from dirt and foreign matter. Gaskets shall be protected from excessive exposure to heat, direct sunlight, ozone, oil and grease. Solvent cement when used shall be stored in tightly sealed containers away from excessive heat.

1.4 JOB CONDITIONS

The Contractor shall familiarize himself and comply with all applicable state, county and municipal rules and regulations pertaining to sanitation, fire protection and safety, and all provisions of the Contract Documents.

1.5 GUARANTEE

All work, materials, and equipment shall be guaranteed for the periods of time set forth elsewhere in the Contract Documents for general guaranty or warranty.

PART 2 - PRODUCTS & MATERIALS

2.1 MATERIALS FURNISHED BY CONTRACTOR

- A. Polyvinyl Chloride (PVC) Plastic Pipe. PVC solid wall pipe shall meet the requirements of ASTM designation D-2467-15.
- B. Pipe Jointing for the various types of plastic shall be as follows:
 - 1. PVC Pipe Gasketed Joint Assembly. The assembly of the gasketed joint should be performed as recommended by the pipe manufacturer. The elastomeric gaskets may be supplied separately in cartons or prepositioned in the bell joint or coupling at the factory. When gaskets are color coded, be sure to consult the pipe manufacturer or his literature for the significance. In all cases, clean the gaskets, the bell or coupling interior, especially the groove area (except when gasket is permanently installed) and the spigot area with a rag, brush or paper towel to remove any dirt or foreign material before the assembling. Inspect the gasket, pipe spigot bevel, gasket groove, and sealing surfaces for damage or deformation. When gaskets are separate, use only gaskets which are designed for and supplied with the pipe. Insert them as recommended by the manufacturer.

Lubricant should be applied as specified by the pipe manufacturer. Bacterial growth, damage to the gaskets or the pipe, may be promoted by use of nonapproved lubricants. Use only lubricant supplied by the pipe manufacturer. After lubrication, the pipe is ready to be joined. Good alignment of the pipe is essential for ease of assembly. Align the spigot to the bell and insert the spigot into the bell until it contacts the gasket uniformly. Do not swing or "stab" the joint; that is, do not suspend the pipe and swing into the bell. When field-cut is necessary, a square cut is required. Use a factory-finished beveled end as guide

for proper bevel angle and depth of bevel plus distance to the insertion reference mark.

2. PVC Solvent-Cemented Joint Assembly. Solvent-cemented joints should be made in accordance with manufacturer's recommendations or in accordance with ASTM D-2855, Standard Recommended Practice for Making Solvent-Cemented Joints with Poly (Vinyl Chloride) (PVC) Pipe and Fittings.
- C. Portland Cement Concrete. All concrete shall meet the requirements of the Detailed Provisions of the District standard specifications, except that only Type I or Type II Portland Cement shall be used.
- D. Portland Cement Mortar. All cement mortar used for construction purposes shall consist of one (1) part Portland Cement (Type V or Type II) to two (2) parts of silica sand by volume and moistened with sufficient water to permit placing, buttering, caulking or coating without crumbling, unless otherwise approved by the Engineer.
- E. Manholes. All manhole concrete frames and steps shall meet the requirements of the Detailed Provisions of the District standard specifications, and of the District standard drawings. One-piece cone and shaft will not be accepted.

Manhole stub-outs shall be included in manhole installations, and shall be of clay pipe of the size designated on the drawings. All stub-outs shall be plugged for future connection, with neoprene stoppers or approved equal.

Manhole frames and covers will be furnished by the Contractor upon prior approval by the District of shop drawings. Such prior approval by the District shall in no way nullify the District's right to accept or reject any individual unit as furnished or as installed.

- F. Manhole Connections. Connections of plastic sewer pipe to a manhole shall be watertight. Concrete manhole connections shall be "O" ring type produced from elastomeric compound or prefabricated manhole waterstop, grouted or locked into the manhole wall, the type to be approved by the Engineer. Additional requirements may be imposed by District for manhole connections in projects constructed in areas of high or potentially high ground water.

PART 3 - EXECUTION

3.1 INSTALLATION OF PIPE

Installation of pipe shall start at the low end of each section and proceed upgrade. All bell and spigot pipe shall be laid with the bell end upgrade. Assembly of all types of pipe shall be done in strict conformance with the requirements of the pipe manufacturer. Curved sewers shall not be constructed of plastic pipe.

Pipe shall be accurately laid to alignment and grade shown on the drawings or established by the Engineer. Where grade stakes are provided with which to establish the proper pipeline grade, pipe shall be laid to grade within a tolerance of 0.02', or 0.05' cumulative deviation from elevations set at 100' stations.

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Sags, or standing water in pipe, shall meet the following criteria:

Complies with Specification	Does not Comply with Specifications Resulting in No Payment	Does not Comply with Specifications and Reconstruction is Required
1/2" or less sag	greater than 1/2" sag	greater than 1" sag

If standing water depth in the sag exceeds the value listed under "No Payment", then to compensate for anticipated higher than average pipeline operation and maintenance cost, no payment will be made for construction. The nonpayment amount will include all construction costs including such items as excavation, pipe installation, backfilling, resurfacing, etc., for the length of standing water that exceeds the value for "No Payment".

Due to unacceptably high operation and maintenance costs and poor system reliability, pipelines with sag depths exceeding those listed for "Reconstruction is Required" will be rejected. Reconstruction of the entire length of standing water plus 20 feet on each side of the standing water will be required.

Damaged pipe must be removed and not reused.

- A. **Bedding.** All pipe shall be laid in a bed prepared by hand work, dug true to line and grade, to form a true and firm bearing for the pipe throughout its entire length. Adjustment of pipes to lines and grade shall be made by scraping away or filling in and tamping material under the body of the pipe throughout its entire length, and not by blocking or wedging. Where a hand-shaped trench bottom conforming to barrel of pipe is not available or practical, Class "C" bedding shall be utilized below the pipe to a depth of one-eighth (1/8) the outside diameter of the pipe, but not less than 4".

The flexibility of plastic pipe may cause a possible problem in maintaining line and grade. Therefore, special care must be taken in the preparation of the subgrade and in the placement of bedding to ensure that the pipe is laid true to line and grade as required in this specification.

Plastic pipe shall be bedded as shown in the following table:

Type of Pipe	Depth of Cover	Bedding Required
Traffic	Less than 4'	Concrete blanket per E-19
Solid Wall (ABS & PVC) 4" to 15" size	4' to 17'	Crushed rock bedding to spring line of pipe
	17' to 30'	Concrete cradle per Standard Drawing E-18
	Greater than	Special Design

Type of Pipe	Depth of Cover	Bedding Required
ABS & PVC Composite 8" to 15" size or	Less than 4'	Concrete blanket per E-19
ABS Solid Wall SDR 23.5, 4"	4' to 9'	Normal bedding per Standard Drawing E-18
to 6" diameter	9' to 20'	Crushed rock bedding to spring line
	20' to 30'	Encasement per Standard Drawing E-18
	Greater than 30'	Special Design

- B. Bell Holes shall be provided at the ends of each pipe length, of sufficient size to permit making up the particular type of joint being used.
- C. Alignment. Pipes shall be laid in accurate conformity with the prescribed lines and grades, which alignment shall be obtained by plumbing and measuring from a tightly stretched wire or line running parallel with the flow line grade and supported over the centerline of the sewer by batterboards or bars accurately placed and firmly fastened in place across the trench; or by some other comparable method acceptable to the Engineer.

Alternate use of commercial LASER grade setting systems in lieu of string lines specified herein is acceptable when the following requirements and conditions are met:

1. The Contractor shall have the responsibility of providing an instrument operator who is qualified and trained in the operation of the LASER and said operator must adhere to the provisions of the State of California Construction Safety Orders issued by the Division of Industrial Safety. Attention is particularly directed to Section 1516, and 1800 through 1901, of said Orders for applicable requirements.
2. All LASER control points shall be established bench marks or construction off-set stakes identified on cut sheets and set in the field for the work. LASER set up points shall be on these control points or on points set directly from them by instrument.
3. Pipe alignment shall not deviate from that shown on the plans by more than 3/4 pipe diameter, nor shall it change in alignment more than 2 inches in 20 feet.

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4. After each length of pipe has been laid to line and grade, it shall be jointed to the preceding section as hereinafter specified, and after said jointing procedure has commenced, there shall be no movement of the pipe whatsoever in subsequent operations.

- D. Pipe Cleaning. Before each new length of pipe is placed, the interior of the preceding pipe shall be carefully cleaned of all dirt and debris. At all times when the work of installing pipe is not in progress, all openings into the pipe and the ends of the pipe in the trench shall be tightly closed to prevent entrance of animals and foreign materials.

The Contractor shall take all necessary precautions to prevent the pipe from floating due to water entering the trench from any source, shall assume full responsibility for any damage due to this cause and shall at his own expense remove and replace the pipe to its specified condition and grade if it is displaced due to floating.

- E. Laterals and Clean-outs shall be constructed at the points indicated on the plans, and in accordance with the standard drawings. Connections of house laterals to sewer mains shall be made with factory-mounted wye or tee connections as shown on standard drawings, except that only one type shall be used universally throughout the project.

Wye or tee branches shall be laid with the axis of the "Y" or "T" entering the main sewer at an angle above the horizontal axis of said main, unless specifically called out otherwise on the plans or in the Special Conditions, but, unless specifically called out otherwise, this angle shall not exceed 45°.

Whenever any service connection is to be temporarily blanked off, it shall be plugged with a cover or plug recommended by the manufacturer of the pipe.

3.2 MANHOLES

Manholes shall be constructed in the locations and to the dimensions as shown on the drawings. Cast-in-place concrete shall conform to the requirements set forth in Section "Portland Cement Concrete" in these specifications. Pre-cast units shall be assembled accurately with full-bed mortar joints.

Unless otherwise shown on the drawings, the sewer pipe shall be laid continuously through the location of the manhole. After the manhole has been constructed, the open channel shall be formed by cutting the pipe and removing the top half. If the open channel cannot be formed in this manner, it shall be formed of concrete with the depth equal to the diameter of the sewer pipe. The floor of the manhole shall slope at least 2" from the sides of the manhole to the open channel.

When completed, the top of the manhole cover shall be accurately brought to the elevation called for on the drawings, or if no elevation is indicated, it shall be brought flush with the surface of the surrounding ground or pavement. The manholes shall be constructed so that there is not more than 19" of throat section between the top of the cone and the top of the frame.

When located in roadway subgrades, manholes shall be constructed up to the proper elevation preparatory to street paving, and temporarily covered with planks or steel plates. After paving operations have been completed the temporary covers shall be removed and the frames and covers installed flush with pavement grade.

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3.3 CLEANING SEWER LINES

All sanitary sewer mains and laterals shall be flushed with water and "balled" or cleaned by acceptable method prior to testing to ensure that all dirt, debris, and obstructions are removed. This work must be performed in the presence of and to the satisfaction of the Engineer, and the Contractor shall notify the Engineer at least one (1) working day in advance of starting the cleaning work.

The Contractor shall, following backfill compaction and line cleaning provide:

- A. 3/8" minimum pull ropes from manhole to manhole.
- B. Equipment and traffic control to assist in the T.V. inspection performed by District's sub-contractor.

3.4 MANDREL TEST OF ABS & PVC PIPE

Following the placement and densification of backfill and prior to the placing of permanent pavement, all main line pipe shall be cleaned and then mandrel tested to measure for obstructions (deflections, joint offsets and lateral pipe intrusions). A rigid mandrel, approved by the Engineer, with a circular cross section having a diameter of at least 95% of the specified average inside diameter, shall be pulled through the pipe by hand.

Ninety-five percent (95%) of the specified average inside diameter for flexible plastic pipe taken from the appropriate ASTM requirements are as follows:

PVC Solid Wall (ASTM D-2467-15) Sch. 80	
Pipe Nominal Dia.	
4"	3.60"
6"	5.42"
8"	7.19"

3.5 LEAKAGE TESTS

All sanitary sewers shall be tested for tightness after they and all appurtenances have been completed, backfilled (except for test tees) and compacted, and are ready for service. Tests shall be made on each section, including manholes, from one manhole or test tee to the next, unless grades are flat enough to permit testing two or more sections at one time.

The method of required test (water test or air test) shall be determined by the Inspector.

- A. Preparation for Tests. Each section of sewer, including house laterals, between successive manholes shall be tested by closing the lower end of the section to be tested, the inlet sewer of the upper manhole, and the ends of house laterals with stoppers, and filling the pipe and manhole with water to a level of 4' above the invert of the open sewer in the upper terminal. After the section has been filled, it shall be allowed to stand for a sufficient length of time to allow the manhole to absorb what water it will, prior to making the leakage test described in the following paragraphs (Water Test and Air Test). This period of time for absorption of water shall not be less than 30 minutes nor greater than 24 hours.
- B. Test Procedure and Allowable Leakage.
1. Water Test. The leakage test shall consist of measuring the quantity of water required to maintain the water level at the elevation prescribed in the above paragraph for a period of one (1) hour. The water used in the test shall be measured through a meter or by other means satisfactory to the Engineer. The allowable leakage shall be computed from the following formula:

$$E = 0.0012 LD / H$$

Where E = allowable leakage in gallons

L = length of the sewer and house connections tested in feet

D = inside diameter of the pipe in inches

H = difference in the elevation (in feet) between water surface in the upper manhole and the invert of the pipe at the lower manhole.

If the leakage during the test period exceeds the allowable leakage, the sewer line shall be overhauled and, if necessary, relaid until the joints hold satisfactorily under the test.

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2. Air Test. Installed pipeline shall be field tested in accordance with the air test required for vitrified clay pipe specified in the National Clay Pipe Institute 1967 Supplement to Engineering Manual, and its supplementary tables contained in the NCPI publication entitled "Low Pressure Air Test for Sanitary Sewers (Procedures and Tables)."

Isolation of defects by air test shall be the Contractor's responsibility to perform; however, if performed by the District or its agent, they shall be performed at the Contractor's expense.

- C. Alternate Infiltration Test. If excessive groundwater is encountered in the construction of a section of the sewer, the test for leakage previously described shall not be used. The end of the sewer at the upper structure shall be closed sufficiently to prevent the entrance of water and pumping of groundwater shall be discontinued for at least three (3) days, after which the section shall be tested for infiltration. The allowable infiltration for any portion of the sewer system should not exceed 100 gallons per inch of internal pipe diameter per mile per day (4.6 l/mm/km/day), including manholes. Infiltration in excess of this amount shall be reduced to a quantity within the specified amount before the sewer will be accepted. In any case, the Contractor shall stop any individual leaks that may be observed.

Unless otherwise specified, infiltration will be measured through a meter or by other means satisfactory to the Engineer.

- A. Manhole Leakage. Should an initial test show excessive leakage in a section of line, it is permissible to draw off the water of a water test and test the manhole that contained water. This test shall be made by plugging all openings in the manhole, filling same with water to the same elevation as used for the initial test, and checking the loss in a one hour period. The leakage so determined may be deducted from the total leakage in the section of pipe initially tested.

If, in the opinion of the Engineer, the manhole leakage thus determined is excessive, the Contractor shall waterproof the interior of the manhole by applying a coating of grout or an approved waterproofing material. Excessive leakage is defined to be 50 gallons per hour when filled to the top of the barrel sections (not including cone or grade rings). Shallow rectangular manholes shall be filled to the top of the manhole sections (not including grade rings), with 50 gallons per hour leakage allowed.

3.6 SEWER PIPE REPAIRS

Sewer pipe leakage in excess of the allowable maximum shall be corrected by repairs acceptable to the Engineer, and retesting as required.

The section of damaged pipe will be cut out and the ends of the remaining pipe and replacement pipe will be prepared per Article 2.01 C.1. The closure will be made with a "closure coupling" as supplied by the manufacturer of type pipe used.

END OF SECTION 02762

SPECIFICATIONS - DETAILED PROVISIONS
Section 15340 - Manholes and Fittings

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"NOT FOR BID"

SECTION 15340 MANHOLES AND FITTINGS

PART 1 - GENERAL

1.1 REQUIREMENT

Under this specification, the Contractor shall be required to furnish, deliver and unload within the time specified in the Contract Documents, the manholes and fittings as specified on the Bidding Sheets, shown on the Contract Drawings, and described in these specifications, except as otherwise approved in writing by the Engineer.

1.2 GUARANTEE

The Contractor shall guarantee all materials and workmanship of items furnished under these specifications to be free from defects for a period of one (1) year after final completion and acceptance of the entire contract work. The Contractor shall, at his own expense, repair or replace all defective materials or workmanship supplied by him found to be deficient with respect to any provisions of this specification.

PART 2 - PRODUCTS

2.1 MANHOLES

All manhole rings, tops, and cones, as constructed in place shall be designed for A.A.S.H.O. H-20 highway loading, and shall conform to District standard drawings and the requirements of ASTM C-478 and the following requirements.

2.2 RINGS

All manhole rings shall be centrifugally spun or compactly vibrated in forms.

2.3 TOPS

All manhole tops and cones shall be compactly vibrated in forms.

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2.4 MANHOLE COVERS

All manhole covers and frames shall conform to District standard drawings and the requirements for Class 30 gray iron castings in ASTM Designation A-48, or Class 60 Ductile Iron castings in ASTM A-536. The castings shall be thoroughly cleaned and coated with commercial quality asphaltum paint. Frames and covers shall be matchmarked in pairs before delivery to the work site and must be machined matched between cover and frame to avoid rocking.

2.5 MANHOLE STEPS

Manhole steps shall conform to District Standard Drawings and shall be constructed of 1/2" plain steel bar encapsulated with copolymer polypropylene plastic as approved by an Engineer.

END OF SECTION 15340

"NOT FOR BID"