XXII. CITY OF MILPITAS STANDARD SPECIFICATIONS

A. STANDARD SPECIFICATIONS FOR SANITARY SEWERS

SECTION S

S1 GENERAL

S1.01 SCOPE OF WORK: The work shall include the furnishing of all materials, labor, tools, implements, and equipment necessary to construct and test the sewers with all appurtenances, complete and ready to operate, including final cleanup job of site; all construction to be in accordance with the details show in the plans, the standard drawings of the City of Milpitas, and with the provisions of these specifications.

S1.02 Definitions:

S1.02.01 "State Specifications" refers to the Standard Specifications of the State of California, Department of Transportation, latest edition.

S1.02.02 "ASTM" refers to ASTM International, the successor organization of the American Society for Testing and Materials.

S1.02.03 "City Engineer" shall mean the Engineer of the City of Milpitas, acting personally or through his or her designated representatives acting within the scope of the particular duties entrusted to them.

S1.02.04 "Owner" shall mean the party entering into the contract for whom the performance of the work covered by this contract is being done when the City is not a contracting agency.

S1.02.05 "Owner's Engineer" shall mean the Engineer engaged by the Owner, acting within the scope of the particular duties assigned by the Owner.

S1.02.06 "Inspector" shall mean the Engineering or technical inspector or inspectors duly authorized and appointed by the City Engineer, limited to the particular duties entrusted to them.

S1.02.07 "Contractor" shall mean the party entering into contract for the performance of the work covered by this contract and his authorized agents or legal representatives.

S1.02.08 Phrase "or approved equal" shall mean only that which has been approved as equal in writing by the City Engineer in response to a written request to consider an alternate as being equal. Such a request shall be made by the Contractor when the City is the contracting agency, or by the Owner when the City is not the contracting agency.

S1.02.09 "A.B.S. Pipe" shall mean acrylonitrile-butadiene-styrene sewer pipe.

S1.02.09 "PVC Pipe" shall mean polyvinyl chloride sewer pipe.

S1.03 Safety Provisions: The Contractor shall conform to the rules and regulations pertaining to safety established by the California Division of Industrial Safety.

S1.04 Special Conditions: Special Engineering consideration shall be given to a special specification written for any pipe construction with a ditch depth of less than 5 feet or greater than 15 feet. Where sewers cross or approach any other underground utility or structure within one foot, special encasement of the sewer line is required, and details of such crossing or approach must be approved by the City Engineer.

S1.05 Inspection: As the work progresses, each phase of the work must be inspected and approved before the next phase of construction is started. This condition is not meant to restrict the Contractor from carrying on simultaneous operations of several phases of construction in different areas of location within the project. The Contractor will notify the City Engineer at least 24 hours in advance when inspection will be needed, and shall keep the City Engineer informed of the schedule of work.

S1.06 Construction Staking: The Contractor will notify the City Engineer (or the Owner's Engineer, when the City is not the contracting agency) at least 48 hours in advance of needing construction stakes.

S1.07 Material Guaranty: Before any contract is awarded, the bidder may be required to furnish a complete statement of the origin, composition, and manufacture of any or all materials to be used in the project, subject to the tests provided for in these specifications to determine their quality and fitness of the work.

S1.08 Interpretation: The general plans, standard drawings, details and specifications are intended to depict, without requiring interpretation, the work and working conditions of the contract. Should interpretation be required, such interpretation shall be made by the City Engineer as provided for in the General Conditions.

S1.09 Authority of City Engineer: The City Engineer shall decide all questions which may arise as to the quality and acceptability of materials furnished and work performed and as to the manner of performance and rate of progress of work; all questions which may arise as to interpretation of the plans and specifications; all questions as to the acceptable fulfillment of the contract on the part of the Contractor; and, when the City is the contracting agency, all questions as to the compensation. His decision shall be final and he shall have authority to enforce and make effective such decisions and orders which the Contractor fails to carry out promptly.

S1.10 Superintendence: The Contractor shall keep on this work, during its progress, a competent superintendent and any necessary assistants, all satisfactory to the City Engineer. The Superintendent shall not be changed except with the City Engineer's consent, unless the Superintendent proves to be unsatisfactory to the Contractor and ceases to be in his employ. The Superintendent shall represent the Contractor in his absence and all directions given to him shall be binding as if given to the Contractor. The Contractor shall furnish the City Engineer the names and phone numbers of two

responsible men, one of whom may be reached at all times that the work is not in progress, to be called in case of any emergency on the work.

S1.11 Connection System: Only service connections conforming to established standards of the City may be connected to sewers.

S1.12 Changes in Work: If, in the opinion of the City engineer, the strict application of these specifications is impractical and will not provide the results desired, then the City Engineer may prescribe such alternate methods deemed necessary.

S1.13 Abandoned Pipes, Wells, Etc.: When, in the course of the work, a Contractor encounters or discovers in the work area any abandoned pipes, conduits, sumps, septic tanks, wells, or any condition that could cause failure to any part of the work, or constitute a threat to the public health or safety, that condition shall be rendered harmless by the Contractor to the satisfaction of the City Engineer.

S1.14 A.B.S. Pipe Allowed: A.B.S. Composite Sewer Pipe shall only be allowed for residential sewage flows. All pipes transporting commercial sewage, full strength industrial sewage or commercial/industrial sewage from other connected sewer lines shall not be A.B.S. Composite Sewer Pipe.

S2 MATERIALS

The Contractor shall furnish all materials required to complete the work. The materials furnished and used shall be new except as may be specifically provided elsewhere in these specifications, on the plans or in the special provisions. The materials shall be manufactured, handled, and used in a workmanlike manner to ensure complete work in accordance with the plans and specifications. Damaged or defective material shall be removed from the work or job site whenever discovered.

S2.01 Portland Cement Concrete: Portland Cement Concrete shall conform to all applicable provisions of State Specifications, Section 90.

S2.01.01 Class A Concrete (6-sack) shall be used for all construction except pipe encasement.

S2.01.02 Class B Concrete (5-sack) shall be used for pipe encasement or for protective cover slab over encasement as required by Standard Drawing 220.

S2.01.03 Class C Concrete (4-sack) shall be used for protective cover slab over encasement as required by Standard Drawing 222, where pipe trench does not involve street breakout.

S2.02 Polyvinyl Chloride (PVC) Pipe and ABS Composite and ABS Solid Wall Pipe.

S2.02.01 Extent: The specifications shall govern the furnishing of all PVC pipe, ABS composite pipe, and ABS solid wall pipe to be installed by the Contractor in the locations shown on the plans and in the manner hereinafter stipulated.

S2.02.02 Pipe Quality and Manufacture: PVC sewer pipe and fittings shall be manufactured in accordance with one of the following Standard Specifications:

a. ASTM D3034, "Standard Specification for Type PSM Poly (Vinyl Chloride) (PVC) Sewer Pipe and Fittings"

b. ASTM F679, "Standard Specification for Poly (Vinyl Chloride) (PVC) Large- Diameter Plastic Gravity Sewer Pipe and Fittings"

c. ASTM F794, "Standard Specification for Poly (Vinyl Chloride) (PVC) Profile Gravity Sewer Pipe and Fittings Based on Controlled Inside Diameter"

d. ASTM F949, "Standard Specification for Poly (Vinyl Chloride) (PVC) Corrugated Sewer Pipe With a Smooth Interior and Fittings"

e. ASTM F1336, "Standard Specification for Poly(Vinyl Chloride) (PVC) Gasketed Sewer Fittings"

f. ASTM F1760, "Standard Specification for Coextruded Poly(Vinyl Chloride) (PVC) Non-Pressure Plastic Pipe Having Reprocessed-Recycled Content"

g. ASTM F1803, "Standard Specification for Poly (Vinyl Chloride) (PVC) Closed Profile Gravity Sewer Pipe and Fittings Based on Controlled Inside Diameter"

ABS composite sewer pipe and fittings shall conform to ASTM D2680. ABS solid wall pipe shall conform to ASTM D2751. Standard Diameter Ratio (SDR) of any ABS solid wall pipe shall not exceed 23.5.

PVC pipe and fittings, ABS composite pipe and fittings, and ABS solid wall pipe and fitting shall be of the bell and spigot type. The ends of the pipe shall be formed so that when the pipes are laid together and joined, the pipe will form a continuous line with a smooth interior surface. All fittings shall be compatible with the pipe to which they are attached.

Caps shall be furnished with branch pipes that are to be left unconnected. Caps shall consist of the same materials as the pipe. Caps of the type recommended by the pipe's manufacturer shall be used.

All pipe furnished under these specifications shall be first quality. Each length of pipe shall be sound and durable, free from objectionable defects. All pipe shall be free from cracks, warps, and blisters. The pipe shall be smooth and the ends of each length shall be square with longitudinal axis. The City Engineer reserves the right to test sections of pipe at the site of manufacture and the supplier will furnish all materials and equipment, necessary to conduct such tests.

S2.03 Joints: All PVC pipe joints shall be gasketed, bell-and-spigot, push-on type conforming to ASTM D3212, "Standard Specification for Joints for Drain and Sewer Plastic Pipes Using Flexible Elastomeric Seals." Since each pipe manufacturer has a different design for push-on joints, gaskets shall be part of a complete pipe section and purchased as

such. Gaskets may be factory installed or field installed as recommended by the pipe manufacturer. Lubricant shall be as recommended by the pipe manufacturer.

S2.04 Castings: All castings for manhole rings, covers and other purposed castings shall conform accurately to the form and dimensions shown on the detailed drawings. They must be of workmanlike finish, free from blow and sand holes or defects of any kind, and shall possess a tensile strength of not less than sixteen thousand (16,000) pounds per square inch.

Before leaving the foundry, they shall be thoroughly cleaned and coated with asphalt applied in such a manner as to provide a firm, durable and tenacious coating.

The bottom rim of the cover and the seat of the frame shall be so matched that the cover shall set evenly and firmly in the frame, without movement or noise when driven over with a rubber-tired vehicle.

S2.05 Precast Manholes: Manhole sections, tapered sections and adjustment rings shall conform to the applicable requirements of State Specifications, Section 70, and Standard Drawing 230, 1 of 4.

S2.06 ABS Composite and Solid Wall Pipe Joints: Except where otherwise specified or directed, the Contractor shall provide solvent welded joints on all ABS sewer lines under this contract. Solvent cement compound must conform to ASTM D2680.

S3 CONSTRUCTION PROCEDURE

S3.01 Excavation: Trenches shall be excavated, either by hand or by machine, beginning at the outlet and proceeding upgrade. All trenches shall be excavated vertically and shall be of open construction. Tunneling will not be permitted except where permission is given by the City engineer and the dimensions and method of construction and backfilling have been definitely approved by him.

All trenches shall be of sufficient width to provide free working space on each side of the pipe, but in no case shall it be wider than 3/2 diameter + 12” except that 4 or 6-inch pipe may be laid in a 2-foot trench. Where bracing or shoring is necessary, an additional width as directed by the City engineer will be allowed. In all cases, there shall be sufficient space between the pipe and the sides of the trench to thoroughly backfill and compact around the pipe.

The Contractor shall undercut the trench to a depth of at least 2” below the final position of the bell of the pipe. The trench shall then be thoroughly cleaned of all loose material, after which the trench shall be backfilled to a depth of 2” above the invert of the pipe. Backfill material shall be sand or granular material of the quality specified as suitable for encasement material for water mains and sewers in City of Milpitas Standard Drawing No. 222. The pipe bed shall then be formed by hand to final grade and the bell holes excavated. In excavating bell holes, care shall be taken not to mix earth with casement material.

No pipe shall be laid until the City Engineer or his Inspector inspects and approves the condition of the bottom of the trench.

S3.02 Bracing and Shoring: The Contractor shall at all times furnish, install and maintain sufficient bracing and shoring in trenches in conformity with requirements of the California Division of Industrial Safety to ensure the safety of workmen and to protect and facilitate the work. Where practical, all such bracing and shoring shall be removed from the trench as the backfilling proceeds.

S33.03 Removal of Water and/or Unstable Material from Trenches: The Contractor shall furnish and install all sheet piling required and shall furnish, install and operate such pumps or other device as may be necessary for removing water from trenches during construction of the sewer lines. Ground water shall be removed by laying drain rock or gravel on the bottom of the trench or by other means which will prevent ground water from softening the bottom of the trench. If unstable material is encountered at excavation grade, such unstable material shall be removed to the depth directed by the City Engineer. The cost of dewatering and/or stabilizing the trench bottom shall be considered to be included in the bid price for the work, unless specifically provided for otherwise.

S3.04 Laying of Sewer Pipe: Pipe and fittings should be installed in accordance with ASTM D2321, "Standard Practice for Underground Installation of Thermoplastic Pipe for Sewers and Other Gravity-Flow Applications."

In view of the fact that in the operation of the City's system of sewers and appurtenances, it will be necessary to treat the sewage, it is particularly important that sewer lines constructed under this contract be substantially watertight.

The Contractor shall take note of this fact and shall exercise every precaution to secure watertightness throughout the component parts of the system, particularly as regarding the joining of all pipe lengths, the use of sound pipe only, the capping of all unconnecting ends, and the sealing of all pipes to structure joints. The Contractor shall follow the detailed specifications and shall conform with the intent, thereof, to secure the highest quality of workmanship in the laying of all sewer lines under the contract. All jointing of pipe shall be subject to rigorous inspection by the City Engineer or his Inspector.

S3.04.01 Bedding the Pipe: The concave bed shall be cut in the granular material by hand in a careful manner. The line and grade shall be strictly adhered to, without wedging or blocking. Should the Contractor, through his negligence or other fault, excavate below or beyond the designated lines or grades, he shall replace such excavation with approved bedding materials at his own expense.

S3.04.02 Bell Holes: As laying of pipe with bell and gasket joints proceeds, bell holes shall be excavated at each joint to facilitate the jointing operations and shall be only of sufficient size for that purpose. In order that the bell holes may be properly located, not more than six (6) bell holes shall be excavated ahead of actual pipe laying on account of the variations in joint construction operations.

S3.04.03 Solvent Cemented Joint Installation: Prior to application of solvent cement, the pipe ends must be free of dirt or other foreign matter. Solvent cement shall be applied to the inside of the socket and to the outside of the spigot end. Enough solvent cement shall be applied that when the spigot is fully inserted into the socket, a bead of excess cement will form around the entire circumference of the outside juncture of said spigot and socket. The Contractor shall apply a coating of cement to all pipe ends of ABS composite pipe whether within a coupling or not. The spigot shall then be inserted into the socket.

S3.04.04 Laterals: The term "Lateral" as used in these specifications, on the Plans, or other drawings, is used to designate the branch sewers laid from the main sewer to points on the property lines from which sewer services can be obtained by proper extensions.

All provisions for sanitary sewers of these specifications are applicable to this item and shall be adhered to as if specifically enumerated herein.

Laterals shall be laid either from the upper end of a wye branch or "T" saddle connected to the main sewer to the property, and shall have a minimum slope of 1/4" per foot. Wye branch connections must be used on main sewers 12" in size or less. "T" saddles may be used to connect laterals to trunk sewers larger than 12" in size. Where "T" saddle fittings are used, the hole in the trunk sewer shall be made of the proper size to receive the saddle. Where laterals are tapped onto existing VCP mains, machine taps shall be made.

ABS saddles shall be installed as recommended by the manufacturer. No concrete support shall be used for ABS saddles.

The lateral pipe shall be laid to a grade of on-fourth inch (1/4") vertical rise to one foot (1') run of pipe, but this grade may be increased in order that the depth at the property line shall be approximately five feet (5'), unless otherwise directed by the City Engineer. Laterals shall be installed in compliance with Standard Drawing No. 620. ABS pipe of same dimensions may be used instead of the vitrified clay pipe called out in these drawings in residential sewer lines only.

The letter "S" shall be stamped or chiseled on the face of the curb opposite the end of the lateral at the property line. If no sidewalk or curb exists, a 2" x 3" by 3" redwood marker, with a stamped "S" on the side of the stake, shall be placed at the end of the lateral. Where only the wye is placed, as in an easement, it will be marked the same as a lateral.

S3.04.05 Wyes: Each wye branch shall be of the same material as that of the main sewer in which it is placed. Exact location of all wye branches shall be determined in the field by the property owner or his representative with the cooperation of the Contractor. Particular car shall be used in placing encasement around wyes to assure that the wye is fully supported.

S3.04.06 Caps or Stoppers: Stoppers, referred to in these plans and specifications as "stoppers" or "caps" shall be placed and secured in all openings into the upstream end of sewers including wyes and laterals. Temporary "stoppers" shall be used at the end of each day's work or whenever the work has been interrupted. When mechanical compression joints are used, stoppers of the same joint material may be used. "Stoppers" shall be of material similar to the pipe itself. They shall be of a type supplied or recommended by the pipe manufacturer.

S3.05 Manholes: Pre-case concrete manholes shall be built at the places shown upon the plans and shall be of form and dimensions shown upon the detailed drawings. The base or foundation shall consist of concrete. Material for the concrete shall conform to the specifications herein before given. Pipe to manhole joints and manholes shall be sealed as needed to meet leakage tests. . Joints on pre-cast manholes shall be bituminous type such as "Ram Neck" or approved equal. PVC or ABS pipe entering or leaving a manhole shall have a rubber "O" ring water stop. These water stops shall be of the type recommended by the pipe manufacturer.

The bases shall be carefully formed so as to make invert channels for the sewers. The depth and the top width of the invert channel shall be equal to, and not greater than, the internal diameter of the pipe.

Bases for pre-cast manholes shall be formed, using circular metal form to provide a key or socket of proper cross section, into which the pre-cast manhole section can be placed.

All mortar used in construction of manholes shall consist of one (1) PART Portland Cement and two (2) parts sand. Hydropel or equal shall be used as an admixture in the amount of one and one-half (1-1/2) gallons per sack of cement. Pipe to manhole joints and manholes shall be sealed as needed to meet leakage test.

S3.06 Backfilling: After the pipe is satisfactorily laid in place, the pipe encasement shall be placed and compacted by hand. Pipe shall be covered to a height of 6" above the top of the pipe by encasement material. Encasement material shall be of the quality specified as encasement material for sewer and water mains in Standard Drawing No. 222.

Above the encasement, backfill shall conform the provisions of standard Drawing Nos. 220 and 222. Material placed within one foot of subgrade shall be compacted to 90% relative density by rolling or other "dry" methods. Above subgrade the standard roadway construction method shall govern.

S3.07 Removal and Replacing Culverts, Poles, Etc.: Wherever existing culverts, power, telephone or guy poles or other such existing facilities interfere with the construction of the sewer lines or appurtenances, the Contractor shall be responsible for their removal and also for their relocation. The cost of removing and relocating all such existing facilities shall be included in the bid price for sewer and no additional allowance shall be made therefore.

S3.08 Restoring Pavements, Curbs, Gutters, Sidewalks, Etc.: Whenever such existing improvements as pavements, curbs, gutters, sidewalks, driveways, utilities, etc., have

been cut or damaged in order to construct sewer lines, the backfill shall be thoroughly compacted and all improvements restored to the condition in which they were before the excavation was made. The cost of restoring all original improvements shall be included in the unit bid price for sewer and no additional allowance shall be made therefore. All street breakout shall be in accordance with Standard Drawing No. 220.

S3.09 Disposal of Excess Material: Excess materials which have been excavated from trenches, and which cannot be utilized for backfill shall be removed by the Contractor and shall be deposited as directed by the City engineer where work is in public land, or by Owner's Engineer where work is newly developed land where the City is not the contracting agent.

S3.10 Flushing of sanitary sewer Lines: The sanitary sewer line will be flushed with water to the satisfaction of the City engineer or his representatives. The Contractor will provide rubber plugs for the main line to be used to build a hydraulic pressure prior to flushing. During the flushing, a rubber sphere with a diameter equal to the pipe diameter will be passed through the main. Failure to pass will necessitate removal of the cause of the stoppage. The Contractor will provide the necessary rubber spheres. Flushing of sewers is to be done after manholes are raised.

S3.11 Testing of Sanitary Sewer Lines: All newly constructed sewer mains and laterals adjacent thereto shall be tested for leakage as described in the Engineering Guidelines for sewers.. The Contractor shall furnish all materials, equipment, tools and labor necessary to make leakage tests and to perform any work incidental thereto.

Leakage test shall be performed on the entire sanitary sewer installed, with the length of each test section limited to the pipe segment between adjacent manholes.

The Contractor shall follow the detailed specifications and shall conform with the intent thereof to secure the highest quality of workmanship in the laying of all sewer lines under the contract. All jointing of pipe shall be subject to rigorous inspection by the City Engineer or his representative.

When a sewer is constructed as part of the improvements of a street or road testing of the lines shall be done at such time that the subbase has been compacted and accepted by the City Engineer.

The Low Pressure Air Test shall be the accepted method used to determine watertight integrity of all sanitary sewers. The Hydrostatic Leakage Test method will only be used when specifically authorized by the City Engineer.

In addition to the Low Pressure Air Test, ABS sewer lines shall also be tested for deflection by passing a rigid mandrel through them.

The Low Pressure Air Test shall be done in the presence of the City's Inspector and in accordance with the following procedure:

(1) Plug and securely brace the ends of each reach of pipeline to be tested.

(2) Pressurize scaled line until internal air pressure reaches 4.0 pounds per square inch gauge. When prevailing water is above the sewer line being tested, increase all pressures used in this test by 0.43 psi for each foot the water is above the flow line of the pipe.

(3) Allow at least two minutes for the air pressure to stabilize, adding additional air as required to maintain 4.0 psig.

(4) The Inspector shall observe the pressure gauge attached to the pipeline and when the pressure decreases to 3.5 psig, a timing period shall be started. The timing period shall be stopped when the pressure has decreased to 2.5 psig or until the portion of line being tested is found to be "Acceptable."

(5) The portion of line being tested shall be termed "Acceptable" if the time required in minutes for the pressure to decrease from 3.5 psig to 2.5 psig is not less than the time shown for the given pipe diameters in the following table:

Pipe Diam. In Inches	Minutes
4	2.0
6	3.0
8	4.0
10	5.0
12	6.0
15	7.5
18	8.5
21	10.0
24	11.5
27	13.0
30	14.5
33	16.0
36	17.5
39	19.0
42	21.5

(6) If adjoining laterals are tested concurrently with the sanitary sewer main, one-half of the above listed respective time for the largest lateral tested shall be added to the respective required time listed for the sanitary sewer main.

(7) If the line fails to meet the above requirements, the source of the leak shall be located and corrected to the satisfaction of the Inspector. After the leak or leaks are corrected and the trench is rebackfilled and compacted, the section of the line shall then be retested to compliance.

Because of the inherent danger involved in air testing, extreme care shall be exercised in placing and bracing the pipe plugs, and no one shall be allowed in the manhole during testing. Caution shall also be taken to avoid over-pressurizing and damaging an otherwise acceptable line.

When Hydrostatic Leakage Test, in lieu of the air test, is authorized by the City Engineer, it shall be done in the presence of the City's Inspector and in accordance with the following procedure:

Each section of the sewer main to be tested shall be sealed by inserting stoppers in the lower end of the sewer segment, the inlet pipe of the upper manhole and any side sewers. The pipe and upstream manhole shall be filled with water to a point not less that four (4) feet above the invert of the pipe or prevailing ground water elevation, whichever is higher. The line shall e tested for at least two (2) hours, maintaining the head specified above by measured additions of water. The sum of the additions of water added shall be the amount of leakage for the test period.

When the amount of leakage, in a section, exceeds the allowable, the Contractor shall locate the source of the leak or leaks and correct such leaks to the satisfaction of the inspector. After the leak or leaks are corrected and the trench backfilled and compacted, the section of the line shall ten be retested to compliance.

The maximum leakage allowed shall be 200 gallons per inch of pipe diameter per mile per 24 hours (0.0263 gallons per minute per inch of pipe diameter per 1000 feet of pipe).

PVC and ABS pipe shall be tested for deflection in the presence of the City's Inspector and in accordance with the following:

1) Immediately after flushing, a solid mandrel undersized 5% shall be pulled through all lines, excluding laterals.

2) Any section of pipe through which the mandrel cannot be pulled will be considered defective and shall be placed by the Contractor at his expense. The replaced section of line shall be rebackfilled and compacted, this work meeting City specifications. The section shall then be retested to compliance.

S3.12 Maintenance Bond: The Contractor shall maintain the complete installation for a period of one year after acceptance of the installation by the City and shall furnish bond to guarantee such maintenance. Any discrepancies or failures in the work that appear during this period shall be remedied before the bond is released.