

SECTION 1

STANDARD SPECIFICATIONS



DEPARTMENT OF PUBLIC WORKS

CITY OF MANTECA
STANDARD SPECIFICATIONS INDEX

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CONSTRUCTION SPECIFICATIONS FOR PUBLIC IMPROVEMENTS

Public Improvements within the City of Manteca shall be done in accordance with the Standard Specifications of the State of California, Department of Transportation, Division of Highways, current edition, which specifications are hereinafter referred to as the Standard Specifications, and in accordance with the following modifications and revisions, and the City of Manteca Standard Plans.

In the event of discrepancy between the contract documents, the order of precedence from highest to lowest shall be as follows:

- Special Provisions
- Project Plans
- City of Manteca's Standard Plans
- City of Manteca's Standard Specifications
- Standard Specifications, State Department of Transportation

Specifications pertaining to the administration of the City contracts will be contained in Special Provisions for the contract.

References to contract administration, measurement and payment shall apply only to contracts awarded by the City.

1-1.01 DEFINITIONS AND TERMS

Whenever in the State Standard Specifications, or in any documents or instruments where these specifications govern, the terms State of California, Department of Transportation, Director, Engineer, or Laboratory are used, the following terms shall be substituted, and any reference to any of the above terms shall be understood and interpreted to mean and refer to such substituted terms as follows:

STATE OF CALIFORNIA: The City of Manteca.

DEPARTMENT OF TRANSPORTATION: The Public Works Department of the City of Manteca.

DIRECTOR: The Director of Public Works of the City of Manteca.

ENGINEER: The City Engineer of the City of Manteca, acting either directly or through properly authorized agents, such agents acting within the scope of the particular duties entrusted to them.

LABORATORY: Any laboratory as may be authorized by the City to test materials and work involved in the Contract.

Whenever in these special provisions attention is directed to specific portions of the Standard Specifications, such direction is not exclusive and shall not be interpreted as excluding other applicable provisions of said Specifications.

DUST CONTROL

SECTION 10

Attention is directed to Section 10 "Dust Control" of the Standard Specifications and these special provisions.

The Contractor is required to obtain a water permit from the Department of Public Works prior to any construction. The permit is issued for a yearly fee.

The Contractor shall use City approved hydrant wrenches only.

Dust control shall be maintained at the expense of the developer during all phases of construction, on non-working days, and as directed by the Engineer.

In lieu of the last paragraph of Section 10-1.04 of the Standard Specifications, the Contractor shall control the dust resulting from construction of this project regardless of whether it is the result of his operations, public traffic, or natural causes.

10-1.04 PAYMENT

Full compensation for such dust control shall be considered as included in the prices paid for the various contract items of work and no separate payment will be made therefor.

EXISTING FACILITIES

SECTION 15

Attention is directed to Section 15, "Existing Highway Facilities" of the Standard Specifications and these special provisions.

15-1.02 PRESERVATION OF PROPERTY

Existing facilities which are to remain in place shall be protected in accordance with the provisions in Sections 7-1.11, "Preservation of Property", and 7-1.12, "Responsibility for Damage", and Section 8-1.10, "Utility and Non-Highway Facilities".

The Contractor will be held responsible for the maintenance, protection and damage to existing facilities, structures, or obstructions shown on the plans.

If such objects are damaged by reason of the Contractor's operations, they shall be replaced or restored at the Contractor's expense.

The fact that any underground facility is not shown on the plans shall not relieve the Contractor of his responsibility under Section 8-1.10, "Utility and Non-Highway Facilities".

The Contractor shall verify locations of all existing underground utilities and shall contact the respective utility companies forty-eight (48) hours prior to commencement of work.

The Contractor is responsible for coordination of the removal or relocation of all existing utilities with the respective utility companies.

Payment for protection of existing facilities shall be considered as included in the price paid for the various items of work and no additional compensation will be allowed therefor.

CLEARING AND GRUBBING

SECTION 16

Attention is directed to Section 16 "Clearing and Grubbing" of the Standard Specifications and these special provisions.

16-1.02 PRESERVATION OF PROPERTY

All existing street designation, traffic control signs and posts within the limits of work shall be carefully removed and cleaned of excess earth and delivered to the City Corporation Yard on Wetmore Street except those required for traffic control as determined by the Engineer. Existing signs required for traffic control shall be temporarily set as directed by the Engineer.

All signs to be removed and delivered to the City Corporation Yard shall be marked to indicate the exact location from which they were removed.

Resetting of street designation and traffic control signs, removed for the purpose of clearing and grubbing, shall be the responsibility of the Contractor. The relocation of a permanent sign shall be directed by the Engineer.

Existing improvements, facilities and trees that are not to be removed, shall be protected from damage or injury resulting from the Contractor ' s operations.

16-1.03 CONSTRUCTION

The area to be cleared and grubbed shall be the area shown on the plans, unless otherwise specified in the special provisions.

All stumps, large roots and other objectionable material shall be removed to a depth of three feet (3') below finished grade in the area between curbs, and to a depth of twelve inches (12") below finished grade in the area between curb and property line. The resulting holes shall be back filled with suitable material placed and compacted in accordance with the applicable provisions of Section 19-6.02.

Combustible debris shall be disposed of away from the site of work. Burning within the limits of the project will not be allowed.

The Contractor shall notify the Engineer of any survey monuments encountered, and shall not disturb such monuments until they have been properly cross referenced by a licensed Land Surveyor .

16-1.04 REMOVAL AND DISPOSAL OF MATERIALS

The Contractor shall make arrangements and pay all costs to dispose of materials removed from the work site, unless otherwise indicated in the plans or special provisions.

16-1.06 PAYMENT

Clearing and grubbing will be paid for at the contract lump sum price, which price shall include full compensation for furnishing all labor, materials, tools and equipment, and doing all the work involved in clearing and grubbing as specified herein, and no additional allowance will be made therefor.

EARTHWORK

SECTION 19

Attention is directed to Section 19 "Earthwork" of the Standard Specifications and these special provisions.

19-1.01 DESCRIPTION

This work shall consist of performing all necessary grading operations.

19-1.03 GRADE TOLERANCE

Immediately prior to placing subsequent layers of material thereon, the grading plane shall conform to one of the following:

- A. When aggregate base is to be placed on the grading plane, the grading plane shall not vary above or more than 0.1 foot below the grade established by the Engineer.
- B. When asphalt concrete is to be placed on the grading plane, the grading plane shall not vary above or more than 0.05 foot below the grade established by the Engineer.

19-2.02 UNSUITABLE MATERIAL (The following shall apply in lieu of Section 19-2.02)

Material below the natural ground surface in embankment areas, and basement material below the grading plane in excavation areas, that is determined by the Engineer to be unsuitable for the planned use, shall be excavated and disposed of or stabilized as directed or approved by the Engineer.

The removal and disposal of such unsuitable material will be paid for as roadway excavation for the quantities involved.

When unsuitable material is removed and disposed of the resulting hole shall be filled with material suitable for the planned use. Such suitable material shall be placed and compacted in layers as hereinafter specified for constructing embankments.

19-2.08 MEASUREMENT

Earthwork operations measured and paid for as roadway excavation for the quantities of material involved shall include excavating unsuitable materials when directed by the Engineer, and no additional compensation will be allowed therefor.

19-2.09 PAYMENT

Payment for roadway excavation shall be in accordance with Section 19-2.09 except that overhaul shall not apply and that excess material from excavation which

is not used for embankment construction shall become the property of the Contractor and shall be disposed of by him at his expense, unless directed otherwise by the Engineer.

19-3.06 STRUCTURE BACKFILL

Specifications for pipe bedding, trench backfill, and resurfacing shall be as shown on Drawings U-4, U-5, U-6 and U-7 of the City of Manteca Standard Plans.

19-5.03 RELATIVE COMPACTION

(95 percent - Test Method No. California 216 and 231)
(The following shall apply in lieu of Section 19-5.03)

Relative compaction of not less than 95 percent shall be obtained for a minimum depth of 0.5 feet below the grading plane for the full width of the planned structural section including curb, gutter and sidewalk, whether in excavation or embankment. Any area of the subgrade may be required to have a minimum 95 percent relative compaction, as required by the Engineer.

New Subdivisions - The City shall be responsible for cost of initial test and moisture density curve. If the first test fails, the Contractor shall be responsible for cost of all subsequent curves and tests.

Existing Streets and General Construction - Contractor shall be responsible for cost of all required compaction testing.

AGGREGATE BASES

SECTION 26

Attention is directed to Section 26 "Aggregate Bases" of the Standard Specifications and these special provisions.

26-1.01 DESCRIPTION

Aggregate base shall be Class 2, and the combined aggregate shall conform to the 3/4" maximum gradings specified in Section 26-1.02B, "Class 2 Aggregate Base".

Aggregate base shall not be placed until the subgrade has been approved by the Engineer.

26-1.035 ADDING WATER

The Contractor shall maintain a moisture content sufficient to obtain the required compaction.

ASPHALT CONCRETE

SECTION 39

Attention is directed to Section 39, "Asphalt Concrete" of the Standard Specifications and these special provisions.

Asphalt concrete shall be produced at an established commercial mixing plant. The aggregate and asphalt binder shall be heated and mixed thoroughly.

When the asphalt concrete is to be produced in a batch plant, the asphalt concrete shall be proportioned and mixed by the automatic method.

Asphalt concrete shall be Type "B", 1/2" maximum, medium grading.

39-2.01 ASPHALTS

Asphalt binder to be mixed with aggregate for asphalt concrete surface and leveling courses shall be AR-4000 grade paving asphalt. The amount of asphalt to be mixed with the aggregate shall be as determined by the Engineer.

The grade of asphalt binder shall be Grade AR-4000 and shall conform to the provisions of Section 92, "Asphalts", of the Standard Specifications.

The amount of asphalt binder (AR-4000) to be mixed with the aggregate shall be between 5 percent and 7 percent by weight of the dry aggregate. The exact amount of paving asphalt to be mixed with the aggregate will be determined by a mix design to be submitted by the contractor 15 days prior to paving and shall be approved by the Engineer.

39-2.02 AGGREGATE

The aggregate grading of the various types of asphalt concrete shall conform to the following:

Surface Course . . . Type B---1/2" Maximum, Medium
Leveling Course. . . Type B---3/4" Maximum, Medium

Except for aggregate for open graded asphalt concrete, in addition to the aggregate requirements listed in Section 39, "Asphalt Concrete", of the Standard Specifications, the combined aggregates shall conform to the following quality requirement when mixed with paving asphalt Grade AR-4000 in the amount of asphalt determined to be optimum by California Test 367:

Test	California Test	Requirement
Surface Abrasion	360, Method A	Loss not to exceed 15 grams

39-4.01 GRADE TOLERANCES

A soil sterilizer shall be applied when asphalt concrete is placed directly on a native material subgrade. Soil sterilizer shall consist of Pramitol, Spike or Casoron and shall be applied in accordance with the manufacturer's recommendations.

Asphalt concrete shall not be placed until the subgrade has been approved by the Engineer.

If the finished surface of the asphalt concrete does not meet the specified surface tolerances, it shall be brought within tolerance by either (1) abrasive grinding, (with fog seal coat on the areas which have been ground), (2) removal and replacement, or (3) placing an overlay of asphalt concrete. The method will be selected by the Engineer. The corrective work shall be at the Contractor's expense.

If abrasive grinding is used to bring the finished surface to specified surface tolerances, additional grinding shall be performed as necessary to extend the area ground in each lateral direction so that the lateral limits of grinding are at a constant offset from, and parallel to the nearest lane line or pavement edge, and in each longitudinal direction so that the grinding begins and ends at lines normal to the pavement centerline, within any ground area. All ground areas shall be neat rectangular areas of uniform surface appearance. Abrasive grinding shall conform to the requirements in the first paragraph and the last 4 paragraphs in Section 42-2.02, "Construction", of the Standard Specifications.

39-4.02 PRIME COAT

Prime coat shall consist of MC-70 grade liquid asphalt as directed by the Engineer and shall be furnished and applied in accordance with the provisions in Section 93, "Liquid Asphalts". Application shall be made when the surface is dry or slightly damp.

Prime coat shall be spread at the approximate total rate of 0.25 gallons per square yard of surface covered, or as directed by the Engineer.

39-5.01 SPREADING EQUIPMENT

Asphalt concrete shall not be spread with blading equipment.

In addition to the requirements in Section 39-5.01, "Spreading Equipment", of the Standard Specifications, asphalt paving equipment shall be equipped with automatic screed controls and a sensing device or devices.

When placing asphalt concrete, automatic controls shall control the longitudinal grade and transverse slope of the screed. Grade and slope references shall be furnished, installed and maintained by the Contractor. Should the Contractor elect to use a ski device, the minimum length of the ski device shall be 30 feet. The ski device shall be a

rigid one-piece unit and the entire length shall be utilized in activating the sensor.

When placing the initial mat of asphalt concrete on existing pavement, the end of the screed nearest the centerline shall be controlled by a sensor activated by a ski device not less than 30 feet long. The end of the screed farthest from the centerline shall be controlled manually.

When paving contiguously with previously placed mats, the end of the screed adjacent to the previously placed mat shall be controlled by a sensor that responds to the grade of the previously placed mat and will reproduce the grade in the new mat within a 0.01 foot tolerance. The end of the screed farthest from the previously placed mat shall be controlled in the same manner as when placing the initial mat.

Should the methods and equipment furnished by the Contractor fail to produce a layer of asphalt concrete conforming to the requirements, including straight edge tolerance, of Section 39-6.03, "Compacting", of the Standard Specifications, the paving equipment shall be discontinued and the Contractor shall modify his equipment or furnish substitute equipment.

Should the automatic screed controls fail to operate properly during any day's work, the Contractor may use manual control of the spreading equipment for the remainder of that day, however, the equipment shall be corrected or replaced with alternative automatically controlled equipment conforming to the requirements in this section before starting another day's work.

The Contractor shall schedule his paving operations such that each layer of asphalt concrete is placed on all contiguous lanes of traveled way each work shift. At the end of each work shift, the distance between the ends of the layers of asphalt concrete of adjacent lanes shall not be greater than 10 feet nor less than 5 feet. Additional asphalt concrete shall be placed along the transverse edge at the end of each lane and along the exposed longitudinal edges between adjacent lanes, hand raked, and compacted to form temporary conforms. Kraft paper, or other approved bond breaker, may be placed under the conform tapers to facilitate the removal of the taper when paving operations resume. After removal of the temporary conforms, all edges shall be left vertical for continuation of the pavement mat. Under no circumstances shall conforms be left along any edge to be overlaid.

39-5.02 COMPACTING EQUIPMENT

Rolling equipment shall conform to the requirements of Section 39-6.03 of the State Standards. Vibratory rollers may be used as approved by the Engineer.

Compaction shall be performed with a steel-tired tandem roller weighing not less than 8 tons and shall consist of not less than 3 complete coverages of the roller over each layer, with proper overlap to prevent displacement. The first coverage shall be completed before the temperature of the mixture drops below 250°F., unless a lower temperature is directed by the Engineer.

All asphalt concrete shall be spread and compacted in one layer.

The dumping of material in a windrow, in accordance with Section 39-5.01, shall be limited to 500 feet in advance of the paving machine, unless otherwise permitted by the Engineer.

Temperature requirements shall conform to the requirements of Section 39-6.01 of the State Standards.

39-8.01 MEASUREMENT

Asphalt concrete will be measured by weight. The quantity to be paid for shall be supported by the State Certificates of Weight and Measures furnished by the Contractor.

39-8.02 PAYMENT

The contract price paid per ton for asphalt concrete shall include full compensation for furnishing all labor, materials, tools and equipment, and doing all work involved in furnishing and placing asphalt concrete as specified, including furnishing and applying asphaltic prime coat, paint binder and trimming or cutting joints.

Full compensation for furnishing weightmaster's certificates shall be considered as included in the contract price paid per ton for asphalt concrete and no additional allowance will be made therefor.

39-8.03 TESTING

Contractor shall be responsible for cost of all required materials tests.

CAST-IN-PLACE CONCRETE PIPE

SECTION 63

63-1.01 DESCRIPTION

Cast-in-place concrete pipe will not be permitted unless approved by the Engineer.

ASBESTOS-CEMENT PIPE

SECTION 64

Attention is directed to Section 64, "Asbestos-Cement Pipe" of the Standard Specifications and these special provisions.

64-1.01 DESCRIPTION

These specifications apply to asbestos-cement pipe to be used for non-pressure sanitary sewers and storm drain systems.

64-1.03 MATERIALS

Asbestos-cement pipe used for sanitary sewers shall be manufactured in accordance to the requirements of ASTM designation C-644 for pipe sizes of 4" and 6", and ASTM designation C-428 for pipe sizes 8" and larger. All pipe shall be Type II.

For storm drains, asbestos-cement pipe shall conform to the provisions of ASTM C-663.

Asbestos-cement pipe shall be either Class III, Class IV or Class V, as shown on the plans or otherwise specified in the special provisions or designated in the contract item.

Shallow depths, loads, or other conditions that require the use of pipe stronger than Class III will need a pipe design submittal to be approved by the Engineer.

Plastic lined asbestos-cement pipe, if specified for use, shall conform to the requirements of ASTM designation C-541.

Joints for asbestos-cement pipe used for sewer conduit shall be rubber ring gasket joints conforming to ASTM designation D-1869.

64-1.04 EARTHWORK

Excavation and backfill shall be as shown on Standard U-4, U-5, and U-6, "Trench Backfill for New Subdivision Streets, Existing Streets, and Outside Street Areas (P.U.E.)" of the City of Manteca Standard Plans.

64-1.05 STRUCTURES

Storm drain manholes shall be standard four-foot diameter precast manholes as detailed in the Standard Plans. Storm drain manhole barrels and taper sections shall be precast concrete sections using Type II Portland Cement complying with ASTM C-478.

Catch basins and curb inlets shall be constructed as shown in the Standard Plans.

Connections to existing storm drain structures shall be made with care to avoid unnecessary damage to any existing curb and gutter or sidewalk. Any damaged section of curb and gutter or sidewalk shall be removed and replaced in accordance with City Standards and as approved by the Engineer. Pipe connections to the existing structures shall be sealed with cement mortar.

64-1.06 LAYING CULVERT PIPE

No pipe shall be laid which is cracked or damaged and which, in the opinion of the Engineer, is unsuitable for use.

64-1.08 PAYMENT

Payment shall include full compensation for furnishing all labor, materials, tools, equipment, and incidentals, and for doing all the work involved in installing different sizes and classes of pipe, including excavation, backfill, disposal of excess material, connecting new pipe to existing facilities, complete in place, and replacement of any damaged curb and gutter or sidewalk, as shown on the plans, as specified in these specifications and the special provisions, and as directed by the Engineer.

The contract unit price paid for storm drain structures, including manholes, catch basins, curb inlets, and inlet and outlet structures, shall include full compensation for furnishing all labor, materials, tools, equipment, and incidentals, and for doing all the work involved in furnishing and installing the structures, complete as shown on the plans, including excavation, backfill, and disposal of excess material.

REINFORCED CONCRETE PIPE

SECTION 65

Attention is directed to Section 65, "Reinforced Concrete Pipe" of the Standard Specifications and these special provisions.

65-1.01 DESCRIPTION

These specifications apply to Reinforced Concrete Pipe (RCP) intended to be used for non-pressure storm drain system.

In lieu of the AASHTO designation, reinforced concrete pipe shall be either Class III, Class IV, or Class V, as shown on the plans and shall conform to the provisions of the ASTM C-76, non-reinforced concrete pipe for all sizes 24 inches in diameter and smaller shall conform to the applicable ASTM designation C-14.

Shallow depths, loads, or other conditions that would require concrete pipe stronger than Class III would require pipe design submittal and approval prior to bidding.

65-1.04 EARTHWORK

Excavation and backfill shall be as shown on Standard U-4, U-5, U-6, and U-7 of the City of Manteca Standard Plans.

65-1.05 STRUCTURES

Storm drain manholes shall be standard four-foot diameter precast manholes as detailed in the Standard Plans. Storm drain manhole barrels and taper sections shall be precast concrete sections using Type II Portland Cement complying with ASTM C-478.

Catch basins and curb inlets shall be constructed as shown in the Standard Plans.

Connections to existing storm drain structures shall be made to avoid unnecessary damage to any existing curb and gutter or sidewalk. Any damaged section of curb and gutter or sidewalk shall be removed and replaced in accordance with City Standards and as approved by the Engineer. Pipe connections to the existing structures shall be sealed with cement mortar.

65-1.06 JOINTS

Each joint shall be sealed to prevent leakage and infiltration.

Only rubber gasketed joints will be accepted and shall conform to the requirements of ASTM designation C-443.

Rubber gaskets shall be lubricated with the lubricant recommended and supplied by the manufacturer of the pipe.

65-1.07 LAYING PIPE

No pipe shall be laid which is cracked or damaged and which, in the opinion of the Engineer, is unsuitable for use.

Curved alignment shall be accomplished by one of the two methods described below.

1. Maximum permissible joint deflection for gasketed joints shall be as recommended by the pipe manufacturer. The Contractor shall submit a copy of the pipe manufacturer's recommendations. Pipe sections of less than standard length to reduce angular deflection of joints will be allowed only with the Engineer's approval.
2. Beveled Pipe - Sections of pipe with one or both ends beveled may be used for curved alignment. Beveled pipe shall have a maximum deflection of five (5) degrees from a plane perpendicular to the pipe axis unless otherwise shown on the plan or approved by the Engineer.

65-1.10 PAYMENT

Payment shall include full compensation for furnishing all labor, materials, tools, equipment, and incidentals, and for doing all the work involved in installing different sizes and classes of pipe, including excavation, backfill, disposal of excess material, manholes, catch basins, curb inlets, and other structures connecting new pipe to existing facilities complete in place, and replacement of any damaged curb and gutter or sidewalk, as shown on the plans, as specified in these specifications and special provisions, as directed by the Engineer.

SANITARY SEWER

SECTION 71

Attention is directed to Section 71, "Sewers", of the Standard Specifications and these special provisions.

71-1.02 MATERIALS

Sewer pipe shall be vitrified clay pipe, ductile iron cement lined, acrylonitrile-butadiene-styrene pipe, or polyvinyl chloride gravity pipe.

71-1.02C CLAY SEWER PIPE

Vitrified clay pipe and fittings shall be unglazed bell and spigot pipe conforming to extra strength V.C.P. ASTM designation C-700 and C-301. Joints shall be flexible compression joints conforming to ASTM designation C-425 for Type I or II joints. All material shall meet ASTM Specification D-3034.

71-1.02D ACRYLONITRILE-BUTADIENE-STYRENE PIPE

(ABS) S.D.R. 23.5 solid wall pipe is an acceptable sewer pipe for laterals and mains in sizes four inches (4") and six inches (6") in diameter. Pipe fittings shall conform to ASTM D-2751.

(ABS) Composite pipe is an acceptable sewer pipe in sizes eight inches (8") in diameter and up to and including fifteen inches (15") in diameter. Pipe fittings shall conform to ASTM D-2680.

The above pipe and fittings shall conform to their respective ASTM designations with the following exceptions and additions:

1. All (ABS) pipe and fittings shall be connected by solvent weldings with cement conforming to paragraph 5.4 of ASTM Designation 2680.
 - a. ABS pipe shall be joined by applying a coating of cement to the inside of the bell and to the outside of the spigot end of the pipe and then by quickly bringing the two pipes together.
 - b. Cement shall be applied to exposed cross-sections of composite pipe when making tees, tie in's, etc.
2. Fittings not described by this standard shall be shop fabricated or molded from materials conforming to ASTM D-2680.
3. All ABS pipe entering a concrete structure shall have a standard manhole gasket as supplied by the manufacture firmly clamped around the pipe exterior near the structure wall center.

Reducing wyes for service laterals shall be either saddle type wyes or in-line bell and spigot type wye fittings. All reducing wyes shall be premoulded and factory fabricated.

In addition to the solvent welding of the saddle to the main pipeline, the saddle type wye shall be attached to the main pipeline with a stainless steel clamp.

When the temperature is below 40 degrees F., a primer shall be applied to the pipe surface to be cemented and joined.

All pipes shall have a home mark to indicate full penetration of the spigot when the joint is made.

After pipe installation and placement and compaction of backfill, but prior to placement of pavement all pipe shall be cleaned and then mandrelled to measure for obstructions. Obstructions shall include, but not be limited to deflections, joint offsets, lateral pipe intrusions and cement. The maximum pipe deflection (change of inside diameter) will be equal to or less than four percent (4%). A rigid mandrel, provide by the Contractors, with an effective circular cross section having a diameter of at least 96% of the specified average inside diameter shall be pulled through the pipe by hand. The minimum length of the circular portion of the mandrel shall be equal to the nominal diameter of the pipe. All obstructions encountered by the mandrel shall be corrected by the Contractor.

If a section of pipe fails to meet the mandrel test and is reinstalled and fails the second time, said section (s) of pipe shall be replaced with an approved rigid pipe material. Mandrel diameters: 4"=3.70", 6"=5.52", 8"=7.44", 10"=9.36", 12"=11.28", 15"=14.16".

71-1.02P DUCTILE IRON PIPE

Ductile iron pipe shall be cement lined, new pipe conforming to ANSI A21.51 as sponsored by the American Water Works Association for thickness Class 50 Ductile Iron Pipe. The pipe shall be furnished with either bell and spigot ends, "Tyton Joints", or mechanical joints except where specified on the plans.

All ductile iron pipe buried underground shall be encased in polyethylene film in tube form. Polyethylene material and installation procedure for the encasement shall conform to ANSI A21.5. Installation Method "A" as described in aforementioned specification shall apply.

Couplings for connection to the sewer main shall be of type approved by the Engineer.

All fittings shall conform to ANSI C-110.

71-1.02Q POLYVINYL CHLORIDE GRAVITY PIPE

A. General

Polyvinyl chloride pipe and fittings shall conform to ASTM D-3034, C-3212, F-477, and installation of pipe shall conform to ASTM D-2321. Pipe shall be in accordance with SDR-35 requirements.

B. Pipe, Joints, and Fittings

Pipe, joints, and fittings shall be molded from clean, virgin P.V.C. plastic material from the same manufacturer. All joints shall be integral wall, bell and spigot configuration, factory formed. All joints shall be made with elastomeric seals or rings. Assembly of all joints shall conform to ASTM D-3212. Solvent weld joints are not allowed. Wyes and/or tees for house service connections shall be complete rather than the saddle type.

C. Straightness

For all P.V.C. pipe the maximum allowable ordinate as measured from the concave side of the pipe shall not exceed one-sixteenth inch (1/16th) per foot of length, but in no event shall the deviation from straight be more than one-half inch (1/2") for any joint of pipe.

D. Handling and Storage

Care shall be taken during transporting of the pipe to insure that the binding and tie down methods do not cut the pipe or create point loading. Pipe shall be stored on a flat surface as to support the barrel evenly.

E. Embedment Materials

Embedment materials (Class I, II, and III) shall conform to ASTM D-2321 as follows:

Class I

Angular 6 to 40-mm (1/4 to 1-1/2 inch), graded stone, including a number of fill materials that have regional significance such as coral, slag, cinders, crushed stone, and crushed shells.

Class II

Course sands and gravels with maximum particle size of 40-mm (1-1/2"), including variously graded sands and gravels containing small percentages of fines, generally granular and non-cohesive, either wet or dry. Soil types GW, GP, SW, and SP are included in this class.

Class III

Fine sand and clay gravels, including fine sands, sand-clay mixtures, and gravel-clay mixtures. Soil types GM, GC, SM, and SC are included in this class.

Native soils having the above characteristics will be acceptable. No native material may be used in embedment zones until approved by the Engineer. Upon the discretion of the Engineer, tests and certification of materials by an independent soils laboratory may be required for approval. All costs associated with the material classification tests shall be borne by the Contractor.

F. Trench Construction

The width of the trench at any point below the top of the pipe should not be greater than necessary to provide adequate room for joining the pipe and compacting the haunching and initial backfill. In narrow trenches compaction of bedding, haunching, and initial backfill shall extend to the trench wall.

Excavation of trench shall be in such a manner to provide a uniform undisturbed trench bottom immediately following excavation.

Where an unstable or running soil condition is encountered in the trench wall, it shall be stabilized prior to laying the pipe. Stabilization shall consist of tight sheeting and stay bracing as directed by the Engineer.

G. Bedding

Prior to pipe installation, the bedding material shall be to a grade along the entire length of the pipe installed. Adequate and uniform support shall be provided under the pipe to avoid differential settlement of the pipe.

Where an unstable trench bottom condition is encountered, it must be stabilized before laying pipe. Unstable material shall be removed and replaced with a bedding of stable material with Class I and Class II soil qualities compacted to a minimum of 90% density. Depth of the bedding will be determined by the Engineer.

H. Haunching and Initial Backfill

Class I and Class II:

In any area where an unstable trench bottom condition has been encountered and a Class I or Class II bedding used, the same Class I or Class II material shall be used for the haunching and initial backfill zones.

The initial stage (haunching) shall consist of hand tamping material at the sides and under the pipe at six inch (6") maximum lifts to the springline in order to provide adequate support. The Contractor shall call for inspection of the haunching operation prior to placing initial backfill. Failure to call for haunching inspection shall be just cause for rejection of all pipe work.

Initial backfill shall be placed to a point at least twelve inches (12") above the top of pipe. Compaction for the initial backfill shall consist of hand tamping and/or mechanical tamping at one-foot (1'-0") maximum lifts. Extreme caution shall be taken during mechanical tamping to avoid deflection of the pipe. The type and size of mechanical equipment to be used in the initial backfill operation shall be approved by the Engineer.

Both zones of haunching and initial backfill shall be compacted by hand or mechanical tamping to a 90% minimum relative compaction.

Class III:

Using Class III material to perform haunching and initial backfilling shall be in the same manner as outlined for Class I, II material, above, using hand or mechanical tamping.

Neither jetting or flooding will be allowed in haunching or initial backfill zones. The remainder of the backfill operation shall be in accordance with the City of Manteca Standard Plans.

Upon the discretion of the Engineer, tests certifying the specified minimum soil densities may be required. All costs associated with the compaction tests shall be borne by the Contractor.

Testing of Sewer:

Testing of all portions of sewer mains and laterals will be required. Testing shall be in accordance with Section 71-1.08 of these specifications.

Upon completion of backfilling, compaction, and testing, the Contractor, at the Engineer's discretion, shall pull an approved deflection gauge as approved by the Engineer through the installed lined to demonstrate that the maximum deflection does not exceed 7.5 percent. If excessive pipe deflection obstructs passage of the mandrel, the Contractor shall excavate and make suitable repairs to the Engineer's satisfaction.

Allowable deflections are as follows:

DEFLECTION TABLE

PIPE SIZE ID	BASE ID	MINIMUM ALLOWABLE
6"	5.79"	5.36"
8"	7.76"	7.18"
10"	9.71"	8.98"
12"	11.56"	10.69"
15"	14.14"	13.08"

At the Contractor's expense, all locations with deflection greater than allowable shall be excavated, repaired or replaced, backfilled and retested.

71-1.03 EXCAVATION AND BACKFILL

Excavation and backfill shall be as shown on Standard U-4, U-5, U-6, and U-7 of the City of Manteca Standard Plans.

At no time shall there be more than 300 feet of trench open per trenching machine, including the section opened ahead for pipe laying and the section behind which is not completely backfilled, unless otherwise specified by the Engineer.

The bottom of the trench shall be graded and prepared to provide a firm and uniform bearing throughout the entire length of the pipe barrel.

Suitable excavation shall be made to receive the bell of the pipe and the joint shall not bear upon the bottom of the trench. All adjustment to line and grade shall be made by scraping away or filling in with sand, gravel, or granular material under the body of the pipe, and not by wedging or blocking.

All stumps and large roots encountered during trenching operations shall be removed to the satisfaction of the Engineer.

The trench shall be opened sufficiently ahead of the pipe laying operations to reveal obstructions. Trench crossings shall be provided as necessary to accommodate public travel and to provide convenient access to adjacent properties. Flow shall be maintained in any sanitary sewer, storm drains, water lines, or watercourses encountered in trenching.

No tunneling or jacking will be permitted without written permission from the Engineer.

The excavation shall be supported so that it will be safe and the ground alongside the excavation will not slide or settle and all existing improvements,

either on public or private property, will be fully protected from damage.

All supports shall be removed after construction is completed, unless otherwise directed by the Engineer, and shall be withdrawn in a manner that will prevent the caving of the sides of the excavation. All openings caused by the removal of supports shall be filled with suitable material properly compacted.

Bedding shall be defined as that material supporting, surrounding and extending to one foot above the top of the pipe. Where it becomes necessary to remove boulders or other interfering objects at subgrade for bedding, any void below such subgrade shall be filled with bedding material. Where concrete is specified to cover the pipe, the top of the concrete shall be considered as the top of the bedding.

If soft, spongy, unstable, or other similar material is encountered upon which the bedding material or pipe is to be placed, this unsuitable material shall be removed to the depth specified by the Engineer and replaced with bedding material suitably densified.

Densification of bedding for pipe shall be accomplished after the sheeting or shoring has been removed from the bedding zone. Alternate methods of pipe laying which are recommended by the pipe manufacturer may be used if approved by the Engineer. Bedding zone for PVC and ABS pipe shall be mechanically compacted before remainder of trench is compacted.

In cases where native material is suitable for use as bedding, the trench may be excavated to a point above the invert grade and the trench bottom hand-shaped so that the bottom segment of the pipe is firmly supported on undisturbed material.

Where an unstable or running soil condition is encountered in the trench wall, it shall be stabilized prior to laying the pipe. Stabilization shall consist of tight sheeting and stay bracing as directed by the Engineer.

Prior to pipe installation, the bedding material shall be to a grade along the entire length of the pipe installed. Adequate and uniform support shall be provided under the pipe to avoid differential settlement of the pipe.

Any area at the bottom of the trench where an unstable trench bottom is encountered, or determined to be unsuitable by the Engineer, shall be removed and replaced with six inches (6") of Class I, II, or III materials at 90% minimum relative compaction.

In any area where an unstable trench bottom condition has been encountered and a Class I, II, or III bedding material used, the same Class I, II, or III material shall be used for the haunching and initial backfill zones.

The initial stage of haunching shall consist of hand tamping material at the sides and under the pipe at six inch (6") maximum lifts to the springline in order to provide adequate support. The Contractor shall call for inspection of the haunching operation prior to placing initial backfill. Failure to call for haunching inspection shall be just cause for rejection of all pipe work.

Initial backfill shall be placed to a point at least twelve inches (12") above the top of pipe. Compaction for the initial backfill shall consist of hand tamping and/or mechanical tamping at 1' 0" maximum lifts. Extreme caution shall be taken during mechanical tamping to avoid deflection to the pipe. The type and size of mechanical equipment to be used in the initial backfill operation shall be approved by the Engineer.

Upon inspection and approval by the Engineer, native material may be used within the embedment zone.

Both zones of haunching and initial backfill shall be compacted by hand or mechanical tamping to a 90% minimum relative compaction.

Neither jetting or flooding will be allowed in haunching or initial backfill zones. The remainder of the backfill operation shall be in accordance with the City of Manteca Standard Plans.

Upon the discretion of the Engineer, tests certifying the specified minimum soil densities may be required. All costs associated with the compaction tests shall be borne by the Contractor.

Where ground water is present, the bottom of the trench shall be kept entirely free of water during pipe laying operations and pumping shall continue until backfilling has progressed to a sufficient height to prevent flotation of the pipe. Water shall be disposed of in such a manner as to cause no property damages or be a hazard to public health. Full compensation for handling any ground water intrusion shall be considered as included in the prices paid for the various Contract items of work and no additional allowance will be made therefore.

All trenches shall be backfilled and patched at the end of each working day. Any temporary trench patching shall be subject to the approval of the City Engineer.

Sanitary sewer pipe shall be paid for at the Contract unit price per linear foot which shall include full compensation for furnishing all labor, materials, tools, equipment, incidentals and for doing all the work involved in installing the storm drain line including; excavation, backfill, resurfacing, disposal of excess material, fittings, complete in place as shown on the plans, as specified in these Special Provisions, and as required by the Engineer.

71-1.04 EXISTING MANHOLES

Existing manholes and cleanouts located within the street right-of-way shall be adjusted to conform to finished pavement grades in accordance with the City of Manteca's Standard Plans.

Prior to the removal of an existing manhole frame, a platform shall be constructed in the manhole above the top of the sewer to prevent any dirt or debris from falling into the sewer. The platform shall remain in place until all work on the manhole has been completed and the asphalt concrete has been placed around the manhole. Prior to the removal of the platform from the manhole, all dirt and debris shall be removed.

Lowering of the manhole ring and cover shall be accomplished by the removal of existing concrete grade rings below the manhole ring or by removing the upper section of manhole barrel and substituting a shorter section of barrel.

At the Contractor's option, in lieu of removing and replacing barrel sections as indicated above, the top of the existing upper barrel section may be trimmed and the taper section replaced on such trimmed surface, however, such trimming shall not crack or otherwise damage the remaining portion of the barrel section.

In the event the portion of barrel section to remain is cracked or damaged or otherwise made unsuitable for use by such trimming, the entire section shall be removed and replaced with a new section of barrel. Trimming of taper sections will not be permitted.

All sections of the manhole shall be set in cement mortar and all joints smoothly plastered inside and out.

All manhole frames and cleanouts shall be adjusted to grade after placement of the surface course of asphalt concrete.

Existing grade adjustments rings in the adjustment of manhole frames shall become the property of the Contractor and, if undamaged and thoroughly cleaned of mortar, may be reused in the work. If not so used, they shall be disposed of away from the site of the work at the expense of the Contractor.

71-1.05 PIPE LAYING

Installation shall be in accordance with the manufacturer's specifications, ASTM designation D-2321 and the City of Manteca's Standard Plans, and these special provisions.

The width of the trench at any point below the top of the pipe should not be greater than necessary to provide adequate room for joining the pipe and compacting the haunching and initial backfill. In narrow trenches, compaction of bedding, haunching, and initial backfill shall extend to the trench wall.

Pipe shall be protected during handling against impact shocks and free fall. Pipe will be carefully inspected in the field before and after laying.

Pipe shall be laid true to line and grade. Any pipe which is not in true alignment or shows any undue settlement after laying shall be taken up and re-laid at the Contractor's expense.

Pipe sections shall be laid and joined in such a manner that the offset of the inside of the pipe at any joint will be held to a minimum at the invert. The maximum offset at the invert of pipe shall be one percent of the inside diameter of the pipe or 3/8 inch (9.5 mm), whichever is smaller.

All pipe shall be laid with bell end up grade, unless otherwise permitted by the Engineer.

Polyvinyl chloride (PVC) pipe shall be deflected in accordance with the manufacturer's recommendations and minor curvatures shall be achieved by deflecting the pipe lengths themselves, leaving the alignment of the joints as straight as possible.

No reinforced concrete pipe (RCP) shall be laid which is cracked or damaged and which, in the opinion of the Engineer, is unsuitable for use.

At the sewer line crossing, the storm drain line shall be constructed such that the pipe joints of the storm drain line will be located equal distance on either side of the sewer line.

Proper implements, tools, and facilities satisfactory to the Engineer shall be provided and used by the Contractor for safe, convenient, and workmanlike prosecution of the work. Under no circumstances shall the pipe or accessories be dropped or dumped into the trench. Before lowering and while suspended, the pipe shall be inspected for defects. Any defective, damaged, or unsound pipe shall be rejected and sound material furnished.

When connections are to be made to any existing pipe, conduit, or other appurtenances, the actual elevation or position of which cannot be determined without excavation, the Contractor shall excavate for, and expose, the existing improvement before laying any pipe or conduit. The Engineer shall be given the opportunity to inspect the existing pipe or conduit before connection is made. When the new facilities interfere with the existing flow of sewage, the Contractor shall provide satisfactory bypass facilities at his expense.

Whenever the work ceases for any reason, the end of the pipe shall be securely closed with a tight fitting plug or cover.

Whenever existing pipes are to be cut or abandoned, the open ends of said pipes shall be securely closed by a tight fitting plug or wall of concrete not less than 0.5 foot thick, or by a tight brick wall 0.67 foot thick with cement mortar joints.

All lateral sewers shall have a minimum cover of 30" from the top of the pipe to finished grade at center line. Sewers with less than minimum cover shall be ductile iron pipe.

Sewers within 100 feet of domestic wells shall be ductile iron pipe.

71-1.07 SEWER STRUCTURES

Sewer manholes shall be standard four feet (4') diameter precast manholes as detailed in the Standard Plans.

Manhole barrels and taper sections shall be precast concrete sections complying with ASTM C-478.

The inside bottoms of new manholes and existing manholes, where new connections are made, shall be shaped to provide channels conforming to the size and shape of the lower portion of the inlets and outlets of the manholes. The channels shall vary uniformly in size and shape from inlet to outlet.

In no case shall the bell of a pipe be built into the wall of a manhole or structure.

All joints in manholes shall be grouted with mortar.

Class "B" concrete shall be used for manhole concrete collars and concrete bases.

Grease traps and interceptors shall be constructed by the developer on private property on the sewer service lateral for any facility whose operation will result in oil, grease, sand, or other solids being discharged into the City's sanitary sewer system.

The traps or interceptor shall conform to Section 708 and 711 of the Uniform Plumbing Code, and shall be constructed where it can be easily inspected for proper operation by the Engineer.

71-1.08 TESTING OF SEWERS

Air testing of all portions of the sewer will be required.

The Contractor shall furnish all materials, equipment and labor for making an air test.

The test shall be performed after the line has been laid and all backfill placed and compacted as specified elsewhere in these specifications. The Contractor, at his option, may test the line at any time during construction. However, the final test for acceptance shall be made only after all backfill is in place.

The following procedure shall be used for air testing:

1. Clean pipe to be tested by propelling a snug fitting inflated rubber ball through the pipe with water.

2. Plug all pipe outlets with suitable test plugs. Brace each plug securely.
3. Add air slowly to the portion of the pipe installation under test until the internal pressure is raised to 4.0 p.s.i.g.
4. After an internal pressure of 4.0 p.s.i.g. is obtained, allow at least two minutes for air temperature to stabilize, and the internal pressure to drop to 3.5 p.s.i.g.
5. After obtaining 3.5 p.s.i.g., disconnect the air supply.
6. The internal air pressure will be required to be maintained above 2.5 p.s.i.g. during the minimum allowable time in seconds based on the diameters and lengths of the pipe under test.

The air test may be dangerous if a line is improperly prepared. It is important that the various plugs be installed and braced in such a way as to prevent blow outs. No one shall be allowed in the manholes during testing.

All sewer lines shall be inspected for proper installation by the Engineer prior to backfilling of trenches.

The Contractor shall furnish properly sized mandrels for size and type of pipe installed. Certification of proper mandrel size may be required.

The Contractor shall furnish all equipment needed to complete this test. The cost for the deflection test shall be included in the unit price bid for the sanitary sewer pipe. The deflection test shall be conducted after the placement and densification of backfill.

Prior to performing tests, the pipe shall be thoroughly cleaned. Cleaning shall be performed by the Contractor by means of an inflatable rubber ball. The ball shall be of a size that will inflate to fit snugly into the pipe to be tested. The ball shall be controlled with a tag line. The ball shall be placed in the last lamphole or manhole on the pipe to be cleaned, and water shall be introduced behind it. The ball shall pass through the pipe with only the pressure of the water impelling it.

Upon completion of all testing and after streets are paved, the Contractor shall clean the sewer such that all foreign matter and debris shall be removed and disposed of in a manner acceptable to the Engineer.

71-1.09 MEASUREMENT

Quantities of concrete manholes and cleanouts will be determined as units from actual count, and shall be complete with

manhole frames and covers, and cleanout frames and covers, and as otherwise detailed in the Standard Plans.

No separate measurement or payment will be made for excavation and backfill, supporting existing facilities, or for concrete, or trench resurfacing involved in the construction of sewers.

71-1.10 PAYMENT

Sewer pipe will be paid for at the contract price per lineal foot, which price shall include full compensation for furnishing all labor, materials, tools and equipment, and doing all the work involved in furnishing and installing the sewer pipe complete in place including excavation, bedding, backfill, trench surfacing, testing, connecting and plugging sewer lines, and abandoning existing manholes, where shown on the plans, compacting, any relocation of existing facilities, and any other item necessary to place the sewer line and not specifically enumerated in the plans or these specifications and no additional allowance will be made therefore.

Manholes and cleanouts will be paid for at the contract price each, which price shall include full compensation for furnishing all labor, materials, tools, and equipment and doing all the work involved in constructing manholes and cleanouts complete in place including excavation, backfill, and concrete collar, and furnishing and installing cast iron frame and cover, and no additional allowance will be made therefore.

Sewer service laterals will be paid for at the contract price each, which price shall include full compensation for furnishing all labor, materials, tools and equipment, and doing all work involved in constructing sewer laterals including excavations, backfill, resurfacing, and disposal of excess material, complete in place, as shown on the plans, as specified in these special provisions, and as required by the Engineer.

71-2.01 LARGE DIAMETER POLYVINYL CHLORIDE PIPE

The requirements of this section apply to polyvinyl chloride (PVC) large diameter (18" to 27") gravity sewer pipe, fittings, materials, dimensions, testing of materials, installation and inspection of pipe suitable for non-pressure drainage of sewage.

All large diameter polyvinyl chloride pipe used in the City of Manteca shall be approved by the Public Works Department and shall conform with the requirements of ASTM designation F-679. The manufacturer's specifications and installation guidelines shall be included with the submittal of the subdivision improvement plans.

71-2.02 MATERIALS

The pipe shall be made of polyvinyl chloride plastic having a cell classification of 12364C or 12454C as defined in ASTM specification D-1784.

Rubber gaskets shall be in compliance with ASTM specification F-477.

The lubricant used for assembly shall have no detrimental effect on the gasket or pipe.

71-2.03 JOINTS

All joints shall be a gasketed integral bell and spigot configuration. All joints shall be made with elastomeric seals in conformance with ASTM specification F-477. Solvent weld joints are not allowed. The gasket inside the bell shall be a factory installed solid cross-section rubber ring. The assembly of joints shall be in accordance with the pipe manufacturer's recommendations and shall be approved by the Engineer.

71-2.04 FITTINGS

All fittings shall be made from polyvinyl chloride material with a wall thickness the same as the minimum wall thickness of an equivalent size pipe as specified in ASTM F-679.

The assembly of all fittings and manhole connections shall be in accordance with the manufacturer's specifications and shall be approved by the Engineer.

71-2.05 FABRICATION REQUIREMENTS

The pipe shall be made from an extrusion process that does not leave seams along the length of the pipe. Spiral or wrapped pipe with welded seams will not be allowed.

The average outside diameter and wall thickness of the pipe shall meet the requirements given in ASTM F-679.

71-2.06 TESTING & INSPECTION

Leakage tests shall be made on all lengths of sanitary sewer installations including service laterals. Testing shall be in accordance with Section 71-1.08 of the City's Standard Specifications.

Following the placement and compaction of backfill and prior to placement of permanent pavement, the Contractor shall perform a deflection test on the pipe. A rigid mandrel undersized 5% shall be hand pulled through all lines. Any line through which the mandrel cannot be pulled will have failed. If the pipe fails the deflection test, the Contractor shall uncover the pipe and make adjustments in the bedding and/or backfill conditions that will be necessary to achieve a passing test. The trench shall be backfilled and street subgrade shall be recompact and the pipe retested. Any corrective measures found necessary to meet the deflection requirements, including recompact and regrading of the street subgrade, shall be at the Contractor's expense.

The City reserves the right to televise any and all sewer lines for conformance to these specifications.

The City may also televise sewer lines prior to the expiration of the one (1) year warranty. If a defective condition is found, it shall be presumed to be caused by defective workmanship or materials. The Contractor shall be notified and shall correct the work in a manner approved by the Engineer. The cost of televising any sewer lines shall be that of the Contractor. If any defective pipe or condition is discovered by televising, it shall be corrected at no cost to the City. Any corrective work proposed shall be approved by the Engineer.

71-2.07 SPECIAL INSPECTOR

A special inspector is required to be present during the installation of all pipe 18 inches or larger.

The resume of the special inspector shall be submitted to the Public Works Department for approval. A "Daily Report" shall be completed at the end of each work day, signed and submitted to the Public Works Department. The cost of providing the special inspector shall be that of the Contractor.

Installation of sewer lines larger than 24 inches shall be reviewed by the State of California, Department of Health.

71-2.08 INSTALLATION

Installation shall be in accordance with the manufacturer's specifications, ASTM designation D-2321 and the requirements of Section 71-1.02Q of the City's Standard Specifications.

Suitable excavation shall be made to receive the bell of the pipe.

Where ground water is present, the bottom of the trench shall be kept entirely free of water during pipe laying operations and as long thereafter as directed by the Engineer.

71-2.09 CERTIFICATE OF COMPLIANCE

The manufacturer shall furnish a certificate of compliance stating that all of the required tests have been made and the results thereof comply with the requirements of these Specifications.

71-2.10 PIPE MARKING

Each standard and random length of pipe shall be marked in conformance with the information required in ASTM F-679.

CONCRETE CURBS AND SIDEWALKS

SECTION 73

Attention is directed to Section 73, "Concrete Curbs and Sidewalks", of the Standard Specifications and these special provisions.

73-1.01 DESCRIPTION

This work shall consist of constructing curbs, sidewalks, gutter depressions, island paving, and driveways of the form and dimensions shown on the plans, and as specified in these specifications and the Special Provisions. The concrete shall be class "B" concrete, attaining a minimum compressive strength of 2500 psi at 28 days, and shall contain not less than five (5) sacks of cement per cubic yard. Maximum slump of the concrete shall be four (4) inches, as determined in accordance with ASTM C-143. Contractor shall be responsible for cost of all required concrete tests.

73-1.02 SUBGRADE PREPARATION

The subgrade shall be constructed true to grade and cross section, as shown in the plans or directed by the Engineer. It shall be watered and thoroughly compacted pursuant to State Specifications except 95% to 0.5 feet below finished subgrade and 90% to 2.5 feet below finished subgrade. Unsuitable material shall be removed and replaced, to provide a stable grade with optimum moisture content for a minimum depth of 0.5 feet.

The completed subgrade shall be tested for grade and cross sections by means of a template supported on the side forms, and shall not project into the planned concrete cross section at any point. The subgrade and forms shall be wet immediately in advance of placing concrete.

73-1.05 CURB CONSTRUCTION

Attention is directed to the City of Manteca Standard Plans for the construction of weakened planes, expansion joints and score marks.

The finished surface of the top of curb shall not vary more than 0.01 feet above or below the staked grade.

73-1.06 SIDEWALK, GUTTER DEPRESSION, ISLAND PAVING AND DRIVEWAY CONSTRUCTION

Attention is directed to the City of Manteca Standard Plans for construction of weakened planes, expansion joints and score marks.

A pedestrian ramp shall be constructed in all curb returns in accordance with the City of Manteca Standard Plans or as required by the Engineer, unless otherwise shown on the plans.

Monolithic curb, gutter and sidewalk or median curb and gutter may be placed with extrusion machinery.

Expansion joint material shall be installed to the full depth of the concrete at locations shown on the plans and as designated by the Engineer.

Score marks and weakened plane joints shall be located as shown on the plans and as directed by the Engineer.

Reinforcement shall conform to the provision in Section 52, "Reinforcement".

All reinforcement shall be cleaned of dirt, rust, grease, loose scale and any other substance that may prevent concrete bonding. All reinforcement shall be securely positioned and supported so as to maintain the proper position during placement of concrete.

Concrete cure shall be accomplished by either the water, pigmented curing compound or waterproof membrane method and shall conform to the provisions in Section 90-7 "Curing Concrete" of the Standard Specifications. White pigmented curing compound shall not be used on exposed surfaces.

After steel troweling, the concrete surfaces shall be given a fine hair broom finish. Brooming on sidewalk shall be transverse to the length of curb.

Curb and gutter shall be water tested in the presence of and prior to acceptance by the Engineer.

Concrete delivery tickets with weighmaster's certificates or certificates of compliance may be required by the Engineer.

Traffic, parking and street name signs on City streets which require relocation because of the work will be relocated by the City but two working days advance notice is required. Utility poles which require relocation because of the work shall be relocated by the utility company owning the poles. The Developer or City Contractor shall be responsible for protecting the work against damage and insuring the safety of the public.

73-1.08 MEASUREMENT

Curb and gutter will be measured by the linear foot, measured in place along the face of the curb.

Quantities of concrete in sidewalks and driveway areas will be measured by the square foot, computed on the basis of measurement of areas of completed work in place and the thickness shown on the plans.

73-1.09 PAYMENT

Curb and gutter will be paid for at the contract price per linear foot, which price shall include full compensation for construction of pedestrian ramps for the handicapped.

Quantities of concrete in sidewalks and driveway areas will be paid for at the contract price per square foot.

MONUMENTS

SECTION 81

This work shall consist of furnishing and installing City monuments at the locations shown on the plans and in accordance with Standard ST-15 "Monument Box Detail" and Standard ST-16 "Standard Monument Box Frame and Cover Assembly", of the City of Manteca Standard Plans.

The exact location of the monuments will be established by the City Engineer for City Contracts and by the subdivider's Engineer for subdivisions, and upon completion, the monuments will be checked by the City Engineer or the subdivider's Engineer.

City monuments will be paid for at the contract unit price each, which price shall include full compensation for furnishing all labor, materials, tools and equipment and doing all the work in constructing monuments complete in place.

LOT CORNERS

Prior to acceptance of improvements, all lot corners shall be marked with not less than a five-eighths inch (5/8") iron pin, twenty-four inches (24") long, and the extension of lot lines shall be marked by reference crosses cut into the sidewalk.

TRAFFIC STRIPES AND PAVEMENT MARKINGS

SECTION 84

Attention is directed to Section 84, "Traffic Stripes and Pavement Markings", of the Standard Specifications and the special provisions.

84-1.01 DESCRIPTION

This work shall consist of applying painted and/or thermoplastic traffic stripes and pavement markings at the locations and in accordance with the details shown on the plans or designated by the Engineer, and as specified in these specifications and the special provisions.

The kind of material, paint or thermoplastic, to be applied will be designated in the contract item, specified in the special provisions, or shown on the plans.

84-1.02 CONTROL OF ALIGNMENT AND LAYOUT

All work necessary to establish satisfactory alignment for stripes and all layout work required for pavement markings shall be performed by the Contractor.

84-1.04 PROTECTION FROM DAMAGE

Newly placed traffic stripes and pavement markings shall be protected from damage by public traffic or other causes until paint is thoroughly dry or the thermoplastic material has sufficiently hardened.

84-1.05 APPLICATION

The thermoplastic material shall conform to either State Specification 8010-71K-19. Glass beads to be applied to the surface of the molten thermoplastic material shall conform to AASHTO requirement M247 Type I.

Existing surfacing which is to receive the thermoplastic material shall be mechanically wire brushed to remove all dirt and contaminants.

Thermoplastic material shall be applied only to dry pavement surfaces and only when the pavement surface temperature is above 50°F.

A primer, of the type recommended by the manufacturer of the thermoplastic material, shall be applied to all asphaltic surfaces over 6 months old and to all portland cement concrete surfaces. The primer shall be applied immediately in advance of, but concurrent with, the application of thermoplastic material. The primer shall be applied at the application rate recommended by the manufacturer and shall not be thinned.

Glass beads shall be applied immediately to the surface of the molten thermoplastic material at a rate of not less than 8 pounds per 100 square feet.

The kind of paint to be used (solvent borne or water borne) shall be determined by the Contractor based on the time of year the paint is applied.

Solvent borne white and yellow paint shall be either the Fast Dry or Rapid Dry type at the option of the Contractor.

Thinning of paint will not be allowed.

84-1.06 MEASUREMENT

Thermoplastic and painting traffic stripes will be measured by the linear foot along the line of the traffic stripes, without deductions for gaps in broken traffic stripes. A double traffic stripe, consisting of two 4-inch wide yellow stripes, will be measured as 2 traffic stripes.

Thermoplastic pavement markings will be measured by the square foot for the actual area covered.

84-1.07 PAYMENT

The contract prices paid per linear foot for painted and/or thermoplastic pavement markings and traffic stripes, of the widths and patterns shown on the plans, shall include full compensation for furnishing all labor, materials, tools, equipment, and incidentals, and for doing all work involved in applying thermoplastic traffic stripes and pavement markings, complete in place, including establishing alignment for stripes, and layout work, as shown on the plans, as specified in these specifications and the special provisions, and as directed by the Engineer.

PAVEMENT MARKERS

SECTION 85

Attention is directed to Section 85, "Pavement Markers", of the Standard Specifications and the special provisions.

85-1.01 DESCRIPTION

This work shall consist of furnishing and placing pavement markers at the locations shown on the plans or where directed by the Engineer.

Pavement markers shall be of the type and color shown on the plans or specified in these specifications and the special provisions.

85-1.06 PLACEMENT

Except as provided herein, markers shall be cemented to the pavement with Rapid Set Type adhesive conforming to the provisions of Section 95-2.04 of the Standard Specifications.

The epoxy adhesive shall be applied evenly on the cleaned pavement surface or on the bottom of the pavement marker in an amount sufficient to completely cover the area in contact with the pavement, with no voids, and with a slight excess of epoxy seepage from under the pavement marker after it has been pressed into place.

Excess epoxy around the pavement markers and on the pavement shall be removed immediately with a solvent conforming to Federal Specification TT-T-291 or kerosene may be used. No other solvent shall be used.

Rapid Set Type Epoxy shall not be mixed by hand, and reference is made to Section 85-1.06 of the Standard Specifications for application time limits.

Regardless of the type of adhesive used, markers shall not be placed under the following conditions:

1. When either the pavement or the air temperature is 32°F. or less.
2. If the relative humidity of the air is greater than 80 percent.
3. If the pavement is not surface dry.
4. On new asphalt concrete surfacing or seal coat until the surfacing or seal coat has been opened to public traffic for a period of not less than 14 days.

The portion of the highway surface to which the marker is to be bonded by the adhesive shall be free of dirt, curing compound, grease, oil, moisture, loose or unsound layers, paint and any other material which would adversely affect the bond of the adhesive.

All work necessary to establish satisfactory alignment for placing pavement markers shall be performed by the Contractor.

85-1.08 MEASUREMENT

The quantity of reflective and non-reflective pavement markers will be measured as units determined from actual count in place.

85-1.09 PAYMENT

The Contract unit prices paid for pavement markers shall include full compensation for furnishing all labor, materials, tools, equipment, and incidentals, and for doing all work involved in furnishing and placing pavement markers, complete in place, including adhesives, and establishing alignment for pavement markers, as shown on the plans, as specified in these specifications and the special provisions, and as directed by the Engineer.

SIGNALS AND LIGHTING

SECTION 86

Attention is directed to Section 86, "Signals and Lighting" of the Standard Specifications and these special provisions.

86-1.01 DESCRIPTION

The work to be covered shall include furnishing all labor, material, equipment, and services to construct, install, and place in operation the Electrical System for the Street Lighting. The work shall include, but shall not be limited to, the following:

- a) Provide and install electroliers, complete with brackets, lamps, wiring, conduit, and bases.
- b) Provide and install all conduit junction boxes, and branch circuit wiring for street lighting circuits.
- c) Permits, fees, and service charge for initial installation only.
- d) Any other items which may be reasonably inferred to be a part of the electrical work in accordance with the intent of this criteria.

The Contractor shall notify the Engineer prior to any installation in order that the exact locations of the electroliers may be verified and marked in the field. Locations shown on the plans are approximate only. The City assumes no liability for damage to underground facilities by determining the electrolier locations. The Contractor is responsible for avoiding damage to utilities and other property and shall coordinate his operations with the utilities and the owners of other facilities that may be damaged by installation of the street lighting system.

The Contractor shall call for inspection of electrolier installation (1) when the conduit has been installed, but before it is covered; (2) when foundations have been dug and all bolts, steel conduit and ground are in place, but before concrete is placed.

86-1.03 EQUIPMENT LIST AND DRAWINGS

Shop drawings for street light poles and mast arms shall be submitted to the City Engineer for approval prior to placing orders for poles and mast arms.

86-2.01 EXCAVATION AND BACKFILL

Contractor shall do all excavating and backfilling required for electrical work. Trenches shall be straight and true to line and grade; bottom shall be smooth and undisturbed. Trench backfill shall conform to City Standards U-4, U-5, U-6, and U-7. All backfilling to be brought flush with finished grade. Excess material shall be removed from site. Trenches shall be backfilled immediately after approval.

86-2.03 FOUNDATIONS

The electrolier base shall be provided in accordance with City Standards.

Dimensions of the concrete electrolier base shall be as indicated for the proper type of electrolier and location. Anchor bolts shall be a minimum of 36 inches long with a 4 inch right angle bend for bond and shall be of diameter as specified by the manufacturer for the electrolier to be used. Concrete to be Class "B". All exposed portions of the anchor bolts, nuts and washers shall be hotdip galvanized.

An alternate to the above shall be embedded foundations as shown on Standard ST-29.

86-2.04 STANDARD STEEL PEDESTALS AND POSTS

Street light poles shall be galvanized steel, or aluminum round tapered shafts complete with base flange, hand hole with cover, base plate cover, and shaft cap with set screws. The access hole shall be located on the side of the pole 180° from the mast arm.

Contractor shall be responsible for painting on identification number, to be determined by PG&E, on each pole. Numbers shall be black and in block style, 1-1/2" high.

86-2.05 CONDUIT

Conduit shall be Type 40 1-1/2" P.V.C. conduit, except as noted, and shall meet the following requirements:

- a) Conduit shall be suitable for-direct burial.
- b) Conduit shall be laid straight and true with all couplings set square.
- c) Minimum radius of bends shall be 18". All bends and/or offsets shall be accomplished with factory sections. No field bends shall be used on the plastic conduit installation.
- d) Cast-in-place Foundation - All extensions above finished grade shall be rigid metallic conduit. All plastic conduit stubs into the concrete base of luminaire shall be completed by a 90° rigid metallic conduit ell. Conduits terminating in street lighting standard shall terminate as close to the handhold of the pole as possible with the end of the conduit below, but within 1 inch of the lower edge of the door. The prolongation of the conduit shall pass through the door opening. Conduit terminating in poles shall extend vertically approximately 1 inch above the foundation cap and shall be centered within the circle.
- e) Embedded Pole – All extensions above finished grade shall be rigid metallic conduit. All plastic conduit stubs into the 2" x 6" oval slot shall be completed by a 90° ell extending a minimum of 6" above the bottom of the ground line sleeve.

- f) Bushings shall be buried to the following depths:
 - 1. Within sidewalk or parkway areas: 2'-0" min.
 - 2. Within roadway areas: 3'-0" min.

86-2.06 PULL BOXES

Pull boxes shall be Brooks Products, Inc. No. 3 1/2 Christy, Inc. N9 (or equal) or larger where required, with hold down lugs. Covers shall be inscribed "Street Lighting".

Where boxes are subject to traffic loads, they shall be set on a concrete footing and the cover shall be cast iron or steel of sufficient strength to withstand the traffic load and shall be fastened to the box to prevent rattling and movement.

Pull boxes shall be installed at the location shown on the plans or, in long runs, they shall be spaced at not over 250 feet. It shall be the option of the Contractor, at its expense and subject to the approval of the Engineer, to install additional pull boxes that it may desire to facilitate the work.

86-2.08 CONDUCTORS

Street lighting conductors for the multiple circuits shall be to the conductor size indicated on the plans and shall be 7-strand soft copper with polyvinylchloride insulation and rated for 600 volt operation.

All conductors shall conform to the latest requirements of the National Electric Code and be labeled by Underwriters' Laboratories, Inc. Conductors shall be soft drawn copper thoroughly tinned. Wire size, insulation type, and manufacturer's name shall be permanently marked on the conductor jacket at regular intervals along with an approval tag indicating wire size and type of insulation.

Wire shall be installed in continuous lengths from luminaire to handhole in pole and from handhole to pull box without intermediate splices.

Each luminaire shall be protected by (2) 10 amp fuses mounted in watertight in line fuse holder. The fuses shall be located in the handhole of pole as shown on the plans. Fuse kits shall be carefully assembled so that they are watertight.

86-2.09 CABLE PULLING AND SPLICING

Any lubricant, if used, shall be inert. Wiring shall be neatly arranged. Two feet of slack shall be provided at all ends.

No mechanical means shall be used to pull in wires smaller than #1 AWG, and only approved type lubricants shall be used. Before any wire is pulled in, all conduits or ducts shall be swabbed clear of water, debris, etc., and dried out by an approved means if necessary.

Wire shall not be pulled into any portion of the raceway system until all construction work which might cause damage to the conductors has been completed. Mechanical means shall not be used to pull wire unless approved by the Engineer.

Splices in wires shall be spliced by approved solderless connectors of proper size. All splices shall be provided with the insulation equal to or greater than the insulation of the wire.

86-2.10 BONDING AND GROUNDING

Bonding and grounding shall conform to the details shown on the Manteca Standard Plans.

86-2.11 SERVICE CONNECTION

The Contractor shall furnish and install all material and equipment necessary to complete the electrical connection between the terminating point of the serving utility and the electrical system, as shown on the plans. The Contractor shall arrange with the serving utility to complete service connections.

Street light services shall be connected to Pacific Gas and Electric Company's wires at the locations shown on the plans.

The Contractor shall be responsible for coordinating the service installation with the power company and to furnish and install all necessary hardware, conduit and wire to complete the connections.

The Contractor shall also pay all connection and service costs levied by the utility company.

86-6.07 PHOTOELECTRIC CONTROLS

Each street light shall be controlled by a Type III photoelectric cell mounted on the top of the luminaire.

WATER MAIN CONSTRUCTION

SECTION 99

99-1.01 DESCRIPTION

All water mains and related appurtenances shall be constructed in accordance with the City of Manteca Standard Plans and Standard Construction Specifications for Public Improvements.

99-1.02 PIPE

The pipe except where specified on the plans can be either Ductile Cast Iron, Polyvinyl Chloride or Asbestos Cement, all in accordance with the following:

- A. Ductile Iron Pipe shall be cement lined, new pipe conforming to ANSI A 21-51 as specified by the American Water Works Association for thickness Class 50 Ductile Iron Pipe.
- B. Polyvinyl Chloride pressure pipe shall be Class 150 DR-18, unless otherwise indicated on the plans and shall conform to AWWA C-900 except as may be herein modified and shall be PW Pipe or J-M Mfg., Inc. or approved equal. All Polyvinyl Chloride (PVC) pipe shall be twenty (20) foot laying lengths. PVC C-900 Pipe shall have cast iron outside diameters (C.I.O.D.).
- C. Asbestos-Cement Pipe and couplings shall be new pipe and shall conform to the most recent American Water Works Association Standard Specifications for Class 150 Asbestos-Cement Pipe, with all subsequent amendments, if any.

Each and every length of pipe and coupling shall be marked with the manufacturer's name, lot number, and the date the pipe was tested in the State of California.

The pipe shall be tested in accordance with the most recent American Water Works Standard Specifications and amendments thereto for the pipe furnished.

Accompanying or preceding each load of pipe, a Certificate of Compliance shall be furnished to the City certifying that the pipe delivered has been tested and meets the requirements of the most recent American Water Works Association Standard Specifications. The Certificate shall identify the pipe by manufacturer's name, lot number, and date tested in California. A materials testing laboratory certified by the State of California shall either furnish the required Certificate of Compliance or furnish a letter specifying that the manufacturer furnishing the pipe has performed the required tests in accordance with these specifications.

99-1.03 JOINTS

Ductile Iron Pipe shall be furnished with either bell and spigot ends, "Tyton Joints", or mechanical joints except where specified on the plans.

Joining of PVC pipe shall be with elastomeric-gasket bell ends or couplings.

The bell ends of PVC pipe shall be an integral thickened bell end (IB) or an integral sleeve-reinforced bell end. The bell joints shall have a minimum wall thickness of the bell or sleeve-reinforced bell equal, at all points, to the DR requirements for the pipe. The minimum wall thickness in the ring groove and bell-entry sections shall equal or exceed the minimum wall thickness of the pipe barrel.

One PVC coupling, manufactured of the same material and by the same manufacturer as the pipe, shall be furnished with each length of pipe together with two (2) rubber rings. The coupling shall be designed so as to insure a water-tight joint with the pipe. The coupling body and socket shall have a wall thickness equal to the pipe barrel thickness with which the coupling is to be used.

All rubber rings for PVC pipe shall be furnished by the pipe manufacturer. These rubber rings (Elastomeric Gaskets) shall be manufactured to conform with the requirements of ASTM F-477.

The coupling for Asbestos-Cement Pipe shall be of the rubber sealing Ring-tite or Fluid-tite type as manufactured by either Johns-Manville or Certainteed, or approved equal.

99-1.04 DUCTILE IRON FITTINGS

Ductile Iron fittings shall be Class 125 conforming to AWWA C-151 of latest revisions.

99-1.05 CAST IRON FITTINGS

Cast Iron fittings shall be Class 125 conforming to AWWA Standard C-110 of latest revision and shall be bituminous coated inside and outside and with the proper type of ends to match the type of pipe used.

99-1.06 FITTINGS FOR POLYVINYL CHLORIDE PIPE (PVC)

All fittings for use with Polyvinyl Chloride pipe shall be cast iron or ductile iron.

Cast iron fittings shall be classified as "Short body cast iron fittings" of material specified in ANSI A 21.10 (AWWA C-110) with metal thickness Class D. Ductile iron fittings shall be classified as "Compact ductile iron fittings" of material specified in ANSI A 21.53 (AWWA C-153). All fittings shall be cement mortar lined in accordance with ANSI A 21.4 (AWWA C-104).

All tees and crosses used with Polyvinyl Chloride pipe (PVC) shall have all flanged ends except fire hydrant, blowoff, and pumping tees which shall have flange by mechanical joint ends; reducers shall have flange by mechanical joint ends; elbows may be either mechanical joint or flanged ends.

"A/C TO C.I.O.D. PVC ADAPTER RINGS MAY NOT BE USED".

99-1.07 RESILIENT SEAT GATE VALVES

Resilient seat gate valves shall be Mueller, Waterous, Clow or approved equal and shall conform to AWWA Standard C-509 of latest revision and shall have non-rising stem opening counter-clockwise with o-ring stem seal and suitable ends for connections to type of pipe or fitting used.

All valves for use with Polyvinyl Chloride pipe (PVC) shall meet current City Standards.

VALVE ENDS: Valves for use on Polyvinyl Chloride pipe (PVC) may have mechanical joint or flange by mechanical joint ends.

"HUB ENDS MAY NOT BE USED"

99-1.08 RUBBER SEATED BUTTERFLY VALVES

Butterfly valves shall conform to AWWA Standard C-504 of latest revision and shall be of the rubber seat type. Valve discs shall rotate 90 degrees (90°) from the full open position to the tight shut position. The valve seat shall provide a tight shutoff at a pressure differential of 150 psi upstream and 0 psi downstream in either direction. The valve operator shall be the traveling nut type. Valve shall open with a 2-inch counter-clockwise rotation of the operating nut.

99-1.09 VALVE BOXES

Each gate valve shall be covered by a precast 8" valve box set flush with street surface with a cast iron ring and cover marked "WATER". The valve boxes and lids shall be "Christy No. G5" and "Christy No. C275" or approved equal.

99-1.10 APPURTENANCES

All appurtenances used in conjunction with Polyvinyl Chloride Pipe (PVC) shall meet the City Standard Specifications.

SADDLES (SERVICE CLAMPS): Bronze saddles shall be used for all 1", 1 -1/2", and 2" taps made on PVC pipe. A circumferential bail-type strap shaped to fit the actual O.D. of the PVC pipe shall be used. Bronze saddles are to be Jones, Ford, Mueller, or approved equal.

"MULTIPLE O. D. RANGE SADDLES WILL NOT BE USED".

TAPPING: Polyvinyl Chloride DRY water mains shall be tapped with either an Apac, Mueller, Ford, or approved equal, "HAND OR POWER OPERATED TAPPING MACHINE".

Polyvinyl Chloride LIVE water mains shall be tapped with either an Apac, Mueller, Ford, or approved equal, "HAND OPERATED TAPPING MACHINE", unless specifically otherwise approved by the City Engineer.

USE OF A HAND HELD POWER OPERATED DRILL ON PVC WATER MAINS WILL BE CAUSE FOR REJECTION OF PIPE.

Cutting tools shall be specifically designed for use with a tapping machine and shall be classified as a core cutting tool of the shell design which retains the chip while penetrating the wall of the water main. THE CUTTING TOOL SHALL BE CARBIDE-TIPPED.

Tapping sleeves and valves shall be used for service connections larger than 2 inches and shall be approved by the City Engineer.

Direct tapping of PVC water mains will not be allowed.

99-1.11 LAYING AND HANDLING PIPE MATERIAL

Proper implements, tools, and facilities satisfactory to the Engineer shall be provided and used by the Contractor for safe, convenient, and workmanlike prosecution of the work. All pipe fittings and valves shall be carefully lowered into the trench in such a manner as to prevent damage to pipe coatings. Under no circumstances shall pipe or accessories be dropped or dumped into the trench. Before lowering and while suspended, the pipe shall be inspected for defects and the case iron pipe rung with a light hammer to detect cracks. Any defective, damaged, or unsound pipe shall be rejected and sound material furnished. Cutting of pipe for inserting valves, fittings, or closure pieces shall be done in a neat and workmanlike manner without damage to the pipe.

All pipe shall be laid and maintained to the required lines and grades, with fittings and valves at required locations and with joint centered and spigot home, and with all valve stems plumb. The pipe shall be brought into true alignment and shall be secured there with bedding material carefully tamped under and on each side of it.

Whenever it is necessary to deflect the pipe from a straight line, either in vertical or horizontal plane, to avoid obstructions or when long radius curves are permitted, the amount of deflection shall not exceed the maximum recommended by the pipe manufacturer or that required for satisfactory jointing.

Each length of pipe shall have a swab drawn through it and shall be freed of any visible evidence of contamination, dirt, and foreign material before it is lowered into its position in the trench, and it shall be kept clean by approved means during and after laying.

At times when pipe laying is not in progress, the open ends of any pipe which have been laid shall be closed by approved means to prevent the entrance of small animals or foreign material. Trench water shall not be permitted to enter the pipe.

Installation of PVC pipe shall be according to current City Standards, but in the event a question arises, installation shall be in accordance with UNI-BELL PVC PIPE ASSOCIATION HANDBOOK OF PVC PIPE, latest edition.

Asbestos cement pipe shall be installed in conformance with AWWA C-603. Individual pieces of pipe, valves and fittings shall be joined by placing the rubber rings on the machined ends of the pipe and pulling the couplings, valves, or fittings in accordance with the manufacturer's recommendations. The rings shall be checked to be sure they are in the proper position after the coupling is in place. Care shall be taken to insure proper seating of the rings, and adapters shall be utilized for connections as required by the manufacturer.

99-1.12 THRUST BLOCKING

All tees, bends, and plugs shall be provided with thrust blocking and/or harness as shown on the plans or in accordance with Standard W-4 and W-5 of the City of Manteca Standard Plans. Full compensation for conforming to the requirements of this article shall be considered as included in the price paid for the various contract items of work and no additional allowance will be made therefore.

99-1.13 CONNECTIONS TO EXISTING WATER MAINS

Under no circumstances shall anyone other than a representative of the City of Manteca Public Works Department open or close any valve operation in the existing City water system. Requests for valve operation shall be made to the Engineer at least 48 hours in advance, and the Contractor shall make satisfactory preparation for the planned work to minimize the interruption. The procedure shall be reviewed and approved by the City prior to the start of construction.

99-1.14 HYDROSTATIC TEST

Testing of PVC pipe to insure compliance with these specifications shall be made in accordance with AWWA C-900.

The test shall be performed after the line has been laid and all backfill placed and compacted as specified elsewhere in these specifications. The Contractor, at his option, may test the line at any time during construction. However, the final test for acceptance shall be made only after all backfill is in place. Each valved section of pipe, or combined sections, as approved by the Engineer, shall be subjected to a hydrostatic pressure of not less than 50 psi above working pressure, and not less than 150 psi at any point on the main.

The duration of each pressure test shall be two (2) hours. Each valved section of pipe shall be slowly filled with water and the specified test pressure shall be applied by means of a pump connected to the pipe in a satisfactory manner. The pump, pipe connection, gauge and measuring devices and all necessary apparatus shall be furnished by the Contractor. Before applying the test pressure, all air shall be expelled from the pipe. To accomplish this, taps shall be made, if necessary, at the points of the highest elevation.

Pipe installations will be accepted when leakage is less than 40 gallons per 24 hours, per mile of pipe, per inch nominal diameter of pipe. Should testing of combined sections of pipe disclose leakage per mile of pipe greater than that specified, or if individual sections show leakage greater than the specified limit, the Contractor shall, at his own expense, locate the cause and repair the defect.

Leakage is defined as the quantity of water to be supplied into the newly laid pipe, or any valved section, necessary to maintain the specified leakage test pressure after the pipe has been filled with water and the air expelled. The Engineer shall designate the time at which the tests shall be made.

The Contractor shall repair any obvious leaks even though the hydrostatic test results are within the above prescribed limits.

99-1.15 DISINFECTING WATER MAINS

All new water lines shall be completely isolated from any existing main until it has been tested and disinfected to the satisfaction of the Engineer. New mains may be filled from existing mains only by temporary tap in conformance with City Standard W-3. When the new main is properly disinfected and the isolation dam is removed, extreme care shall be exercised to prevent the entry of contamination.

The interior of all pipe and fittings shall be kept as free as possible from dirt and foreign material. During pipe laying operations if bacterial contamination of interior pipe surfaces is obvious or suspected by the Engineer he may order said surfaces to be swabbed with an approved bacterial solution. Disinfection shall consist of applying chlorine by any of the standard methods described in AWWA Standard C651 before being placed in service.

Following testing and chlorination, the main shall be flushed and the water shall be tested for bacteriological quality in accordance with the California Administrative Code Title 22. Water samples shall be collected in accordance with AWWA Standard C651 by an independent testing laboratory approved by the City Engineer.

If the initial disinfection fails to produce satisfactory bacteriological samples, the main shall be reflashed and resampled daily from the same sampling point (s) until two consecutive samples are negative for coliform organisms.

The initial test (s) shall be paid for by the City of Manteca. All testing necessitated by the failure of the initial test (s) shall be paid for by the Contractor.

99-1.16 MEASUREMENT

Water mains shall be measured in linear feet for the various sizes of pipe as shown on the plans and shall include all work as specified herein.

Pipe bends, wyes, tees and other branches will be measured by the linear foot for the sizes of pipes involved.

Butterfly valves and gate valves shall be measured per each for the various sizes of valves shown on the plans and shall include all work as specified herein except those included as fire hydrant assemblies.

Fire hydrant assemblies shall be measured per each and shall include all work as specified herein.

99-1.17 PAYMENT

Water mains shall be paid for at contract unit price per linear foot which shall include full compensation for furnishing all labor, materials, tools, equipment, incidentals, and for doing all the work involved in installing the various sizes of water main including excavation, backfill, resurfacing, disposal of excess material, fittings, caps, blind flanges and thrust blocking complete in place as shown on the plans, as specified in these special provisions, and as required by the Engineer.

Butterfly valves and gate valves shall be paid for at the contract unit price each which shall include full compensation for furnishing all labor, materials, tools, equipment, incidentals, and for doing all the work involved in installing the various sizes of valves including valve box, excavation, backfill, and disposal of excess materials, complete in place as shown on the plans, as specified in these special provisions, and as required by the Engineer.

Fire hydrant assemblies shall be paid for at the contract unit price each which shall include full compensation for furnishing all labor, materials, tools, equipment, incidentals, and for doing all the work involved in installing the fire hydrant assemblies including excavation, backfill, resurfacing, disposal of excess material, valve box, pipe run, riser, and thrust blocking complete in place as shown on the plans, as specified in these special provisions, and as required by the Engineer.

**LARGE DIAMETER
POLYVINYL CHLORIDE (PVC) WATER PIPE
(AWWA C-905)**

SECTION 99-2.00

99-2.01 GENERAL

This section applies to the materials, fabrication, and testing of large diameter (16" through 36") Polyvinyl Chloride (PVC) pressure water pipe used in the City of Manteca. All PVC pressure pipe shall be PWPipe, J-M Pipe, or approved equal and shall conform to the requirements of the City of Manteca Standard Plans and Standard Specifications and AWWA C-905 Standard Specifications.

99-2.02 FABRICATION

All PVC pressure pipe shall be made from class 12454-A or 12454-B compounds as defined in ASTM D-1784. Determination of the appropriate dimension ratio (DR) designation used for the PVC pipe shall be made by the Engineer.

The PVC pipe shall have cast iron outside diameters and come in 20 foot laying lengths.

99-2.03 JOINTS

Joining of PVC pipe shall be with elastomeric-gasket bell ends or couplings.

The bell ends of PVC pipe shall be an integral thickened bell end (IB) or an integral sleeve-reinforced bell end. The bell joints shall have a minimum wall thickness equal to the DR requirements for the pipe. The minimum wall thickness in the ring groove and bell-entry sections shall equal or exceed the minimum wall thickness of the pipe barrel.

One PVC coupling, manufactured from the same material and by the same manufacturer as the pipe, shall be furnished with each length of pipe together with two (2) rubber rings. The coupling shall be designed so as to insure a water-tight joint with the pipe. The coupling body and socket shall have a wall thickness equal to the pipe barrel thickness with which the coupling is to be used.

All rubber rings for PVC pipe shall be furnished by the pipe manufacturer. The rubber rings (Elastomeric Gaskets) shall be manufactured to conform with the requirements of ASTM F-477.

99-2.04 FITTINGS

All fittings for use with PVC pressure pipe shall be made of cast iron or ductile iron.

Cast iron fittings shall be classified as "Short body cast iron fittings" of material specified in ANSI A 21.10 (AWWA C-110) with metal thickness Class D. Ductile iron fittings shall be classified as "Compact ductile iron fittings" of material specified in ANSI A 21.53 (AWWA C-153). All fittings shall be cement mortar lined in accordance with ANSI A 21.4 (AWWA C-104).

All tees and crosses used with PVC pressure pipe shall have flanged ends except fire hydrant, blowoff, and pumping tees which shall have mechanical joint ends. Reducers shall have mechanical joint ends and elbows may be either mechanical joint or flanged ends. A/C to C.I. O. D. PVC adapter rings may not be used.

99-2.05 INSPECTION AND TESTING

The City, at its discretion, may inspect the manufacture's fabrication facility and testing procedures. All cost incurred by the City in obtaining test results of the PVC pipe shall be borne by the contractor furnishing the pipe. The pipe shall be tested in accordance with the most recent American Water Works Standard Specifications and amendments thereto.

99-2.06 CERTIFICATE OF COMPLIANCE

Accompanying or preceding each load of pipe, a Certificate of Compliance shall be furnished to the City certifying that the pipe delivered has been tested and meets the requirements of the most recent American Water Works Association Standard Specifications. The Certificate shall identify the pipe by manufacturer's name, lot number, and date tested in California. A materials testing laboratory certified by the State of California shall either furnish the required Certificate of Compliance or furnish a letter specifying that the manufacturer furnishing the pipe has performed the required tests in accordance with these specifications.

99-2.07 VALVES

All valves for use with PVC pressure pipe shall meet current City of Manteca Standards. Valves for use on PVC pressure pipe may have mechanical joint or flange by mechanical joint ends, but hub ends may not be used.

99-2.08 APPURTENANCES

All appurtenances used in conjunction with PVC pressure pipe shall meet current City of Manteca Specifications.

99-2.09 TAPPING

DRY PVC water mains shall be tapped with either an Apac, Mueller, Ford (or approved equal), hand or power operated tapping machine.

LIVE PVC water mains shall be tapped with either an Apac, Mueller, Ford (or approved equal), hand operated tapping machine, unless otherwise specifically approved by the City Engineer.

Direct tapping of PVC water mains will not be allowed. The use of hand held power operated drills on PVC water mains will not be allowed, and is due cause for rejecting the pipe.

Cutting tools shall be specifically designed for use with a tapping machine and shall be classified as a core cutting tool of the shell design which retains the chip while penetrating the wall of the water main. The cutting tool shall be Carbide-Tipped.

Tapping sleeves and valves shall be used for service connections larger than 2 inches and shall be approved by the City Engineer.

99-2.10 LAYING AND HANDLING OF PIPE

All water mains and related appurtenances shall be constructed in accordance with the City of Manteca Standard Plans and Standard Construction Specifications for Public Improvements.

Proper implements, tools, and facilities satisfactory to the Engineer shall be provided and used by the Contractor for safe, convenient, and workmanlike prosecution of the work. All pipe fittings and valves shall be carefully lowered into the trench in such a manner as to prevent damage to pipe coatings. Under no circumstances shall pipe or accessories be dropped or dumped into the trench. Before lowering and while suspended, the pipe shall be inspected for defects and cracks. Any defective, damaged, or unsound pipe shall be rejected and sound material furnished. Cutting of pipe for inserting valves, fittings, or closure pieces shall be done in a neat and workmanlike manner without damage to the pipe.

Whenever it is necessary to deflect the pipe from a straight line, either in vertical or horizontal plane, to avoid obstructions or when long radius curves are permitted, the amount of deflection shall not exceed the maximum recommended by the pipe manufacturer or that required for satisfactory jointing.

Installation of PVC pipe shall be according to current City Standards, but in the event a question arises, installation shall be in accordance with the latest edition of the UNI-BELL handbook of PVC pipe.

99-2.11 THRUST BLOCKING

All tees, bends, and plugs shall be provided with thrust blocking and/or harness as shown on the plans or in accordance with Standard W-4 and W-5 of the City of Manteca Standard Plans.

99-2.12 HYDROSTATIC TEST

Testing of PVC pipe to insure compliance with these specifications shall be made in accordance with AWWA C-900.